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From January 1, 1915 to June 30, 1915

Railway Age Gazette

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SIXTIETH YEAR

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FIRST HALF

INDEX

Fifty-eighth Quarto Volume—January 1, 1915, to June 30, 1915.

[Space forbids making the index of the *Railway Age Gazette* so detailed as to show every reference in the entire half year to every detail of every subject. General headings, therefore, are used which are intended to be inclusive, and if the reader fails to find a particular subject under the specific heading with which he connects it in his mind, if he will look under the general subject of which this is a branch he should find the article he is looking for. For instance, one of the articles published during this half year was entitled "A Billion Dollar Confiscation." This article dealt with the general subject of the Interstate Commerce Commission's accounting rules and in particular with their rules for charging for depreciation on equipment. The article is indexed, therefore, under Accounting—Depreciation, I. C. C. Rules for. There is also, it might incidentally be mentioned, a cross reference Depreciation—see Accounting.]

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*Illustrated.

Car Construction in 1914

Probably the most interesting feature of the figures for car construction in 1914 is the increase in the number of all-steel box cars built, the greater part of which is due to the adoption of the all-steel type of construction on the Pennsylvania Railroad. It will be noticed also that there is a considerable increase over 1913 in the number of steel underframe box cars built, while the number of steel frame box cars falls off materially. At first glance it might seem that the steel frame construction is losing in popularity, but there may be other explanations for these figures. In a year of depression like the one just past many of the railroads order little or no equipment, so that the cars built are for a comparatively few roads and it is difficult to point to any definite tendency which is indicated by the construction figures. There is also an increase in the number of steel underframe passenger cars built, but most of these were built for a comparatively few roads, some of which favor this type of construction. The all-steel car preponderates, although there is a falling off in the total number of cars built. Of the wooden passenger equipment cars, the greater proportion were milk, refrigerator, and cars for other special service.

Increased Capacity in Existing Locomotives

The ever pressing need of greater trainloads has increased locomotive dimensions and capacities so rapidly that the large locomotives of a few years ago, which the more modern equipment replaces, have developed a serious problem for the motive power and operating departments to solve. There are numbers of these locomotives which possess more capacity than is needed for way-freight or branch line service, yet in many cases it has been necessary to place them in such service, as well as in switching. Many of these engines are capable of developing a maximum tractive effort which will start very heavy trains, but are deficient in boiler capacity and are therefore incapable of economically hauling such trains for any distance. If there were some way of increasing the steam making capacity of such locomotives they could take their place in heavy main line service; in fact, such an increase in boiler capacity could very easily obviate the necessity of a road's making considerable expenditures for new locomotives of greater capacity. The difficulties attending the use of superheated steam with slide valves and the expense necessary in applying piston valve cylinders have prevented the use of superheaters in many such instances. Of the past year's locomotive development, therefore, perhaps the one of most direct interest to railways is that which has shown the possibilities of increased capacity obtainable from existing locomotives. It is now possible to apply piston valves without going to the extent of entirely new cylinder and saddle castings, and the use of the superheater and the brick arch, even on narrow firebox locomotives, has given remarkable results in increased hauling capacity. It is therefore probable that the immediate future will see the modernizing of the large locomotives of a few years ago, in considerable numbers.

The Electrification of Steam Roads in 1914

The past year has witnessed marked progress both in the adoption of electric operation on existing steam roads and in the design of transmission and motor equipment. The important improvements in the equipment are discussed on another page by N. W. Storer. There was completed the first year of electric operation of the Butte, Anaconda & Pacific where heavy tonnage ore trains have been handled regularly on steep grades with marked reductions in operating costs. The New York, New Haven & Hartford also finished the electrification of its four-track main line into New Haven. The Chicago, Milwaukee & St. Paul is proceeding with the electrification of the first engine district of 114 miles from Harlowton, Mont., to Deer Lodge, crossing the Rocky mountains, which is the first step in the electrification of 440 miles of main line extending west to Avery, Idaho. The trolley poles have been erected for a considerable distance and a contract was given recently for 12 electric locomotives and substation equipment. It is expected that the first district will be completed for operation late next fall. The Norfolk & Western is engaged in the electrification of 30 miles of its line between Bluefield, W. Va., and Vivian. The power house and overhead construction are completed, and the first locomotive tests are now being conducted. Another large project now under construction involves the electrification of 80 miles of suburban tracks on the Paoli subdivision of the Pennsylvania in the suburbs of Philadelphia. This project is also approaching completion, and if successful will undoubtedly lead

to the electrification of other suburban lines of the same road in this vicinity. The Canadian Northern is completing the electrification of its new entrance into Montreal through Mt. Royal tunnel. Another interesting project on which electrical studies have not yet been completed is that of the operation of the five-mile tunnel of the Canadian Pacific at Rogers Pass, B. C. Upon its completion late in 1916 it will be operated electrically.

Thus, it is evident that the electrification of steam roads is making steady progress. At present over 2,250 miles of such tracks have been converted for electric operation and over 280 electric locomotives are employed regularly in addition to motor cars, etc.

SOME REASONS FOR OPTIMISM

EVERYBODY directly or indirectly connected with the railway industry should enter the year 1915 with a feeling of optimism. The year which closed yesterday was certainly a most unsatisfactory one in the railway business and the railway supply business. The situation in these industries was bad enough before the war began. The decline in total railway operating revenues per mile in the fiscal year ended on June 30, 1914, was less than 3½ per cent; in other words, the total loss of traffic was comparatively small. But the total operating revenues did not reflect the true condition of the railway business. There were very heavy increases in operating expenses due to advances in wages. There were very heavy increases in taxes. Such increases in expenses and taxes had been going on for years. There had been no advances in rates to offset them. The consequence was that affairs in the railway business got sadly out of joint, and demoralization ensued. This demoralization in the railway business produced a terrible effect on the railway supply business, and a less serious, but nevertheless serious, effect on other classes of business concerns.

While the total operating revenues per mile in the fiscal year 1914 declined less than 3½ per cent, the net operating income per mile declined almost 16 per cent; and this in spite of the fact that the most strenuous efforts were made by the railway managers to curtail expenses. They were unable to pay the increased taxes and to meet the advances in wages, while at the same time employing the same number of men and making the same expenditures for equipment and supplies as before. To offset the increases in wages and taxes they laid off as many employees as they could and cut their purchases as much as they could. What was the result? In 1914 the total wages paid were greater than in any preceding year, but these total wages were paid to a very much smaller number of men than were employed in the preceding year. We have secured from the railways entering Chicago, and published on another page, statistics showing the reduction which they made in the numbers of their employees in the year ending August 1, 1914. This date was chosen for comparative purposes because it was the one on which the great war in Europe began, and therefore, up to that time the condition of the railway business in this country had not been affected by the war. As our statistics show, the railways entering Chicago had before the war began reduced the number of their employees by 91,000. The situation on the roads entering Chicago unquestionably was typical of the situation on all the railways of the country, and if this was the case, then on August 1, 1914, the railways of the United States had on their payrolls almost 200,000 less men than they had a year before.

The effect of the curtailment of railway purchases was even more serious in proportion. We have also collected, and publish elsewhere, statistics showing the number of men normally employed and the number employed on August 1, 1914, by a large number of representative railway supply concerns throughout the United States. These figures show that before the war in Europe began these concerns were employing 40 per cent less men than they do normally. Doubtless their condition was typical of that of railway supply concerns in general.

Needless to say, the effect of the situation in the railway and railway supply businesses was felt throughout every other line of business in America. The hundreds of thousands of men who were out of employment in these industries had their power to buy from the retail merchant greatly curtailed. This affected the ability of the retail merchant to buy from the wholesale merchant. This affected the ability of the wholesale merchant to buy from the manufacturer. There resulted a general dislocation of industry, and unemployment all along the line, from the railway at one end to the purchasers of all kinds of raw materials at the other. The conditions have grown much worse since the war began. The number of men in the railway and railway supply businesses out of employment is much greater now than it was on August 1. But this aggravation of the situation is attributable to the war.

What were the causes of the conditions prevailing in the railway and railway supply businesses before the war began? They were partly due to the decline in traffic; but this decline was relatively small. They were due chiefly to the fact that, not only in the fiscal year 1914, but for some years before, there had been heavy increases in wages, taxes and the rate of interest which the railways had not been permitted to offset by increases in their rates. That was the main and fundamental thing that was wrong with the railway business. That was the main cause of the reduction in net operating income. That has been the main cause of unemployment in the railway business. That has been the main cause of the reduction in railway purchases and of unemployment in the railway supply business. And that probably has been the main cause of the industrial depression which so long has been felt in every line of business.

Now, what has happened to justify us in saying that everybody directly or indirectly connected with the railway industry should enter the year 1915 with a feeling of optimism?

For years the spokesmen of the railways and students of their business had been endeavoring to show the public, the press and the Interstate Commerce Commission that it was only a matter of time until disaster would overtake the railways and the other industries of the country if railway expenses and taxes continued to increase and the roads were not allowed to deal with these tendencies by advancing their rates. It long seemed impossible to make the public, the press and the commission recognize the facts and act accordingly. This was the cause, and a justifiable cause, of the pessimism regarding the future of the railways which prevailed widely. During the last year that ground for pessimism has been removed. The public and press were brought to a full realization of the facts. The Interstate Commerce Commission showed by its decision on July 29 that it had become aware of the situation, and it showed this more fully still in its recent decision in the reopened 5 per cent rate case. The commission did not give the railways all that they asked for, or thought they were entitled to receive, but it did assent unreservedly to the proposition that the net earnings of the eastern railways had become too low. It accepted the view of the railway managers as to the reasons for this, and it has given the railways some of the advances in rates they asked for and some they did not ask for. It is to be regretted, no doubt, that the commission did not go farther. But the problem with which the commission is dealing is a big problem. Being a big one, it cannot be solved in a day. The important thing was to get the commission to realize and concede that the railways must have advances in their rates and to grant some of the needed advances. The commission has now granted some advances in the eastern rates, and there is strong reason for believing that it will grant further increases both on the eastern and western roads if the cases are properly presented to it and to the public. We add, "and to the public," because the developments have shown that the railways must try their cases before the bar of public opinion as well as before the commission and the courts. And one of the encouraging features of the situation is that those who led the railways in their contest for rate advances in the east demonstrated that

they had learned how to try their case before the court of public opinion.

In another column of this issue Chairman Kruttschnitt of the Southern Pacific discusses the subject, "Whither Are the Railways Drifting?" Mr. Kruttschnitt shows clearly the serious conditions with which the railways are confronted. But he also expresses confidence that the outcome will be the success and continuance of private ownership and management subject to public regulation. Doubtless there will be no great and immediate change in business conditions. Doubtless improvements will come slowly. But, on the other hand, doubtless the decisions of the commission in the 5 per cent case marked the beginning of a change in our policy of regulation. That such a change cannot fail in a comparatively short time to prove beneficial to the railways and all related industries and ultimately to all the industries of the country, can not be intelligently questioned. The campaign for fair regulation and for the benefits it will confer has not been finished. But after many battles have been lost a great battle at last has been won. If the entire campaign for fair regulation is to be ultimately successful it must be pushed on both vigorously and courageously, but that it will be the *Railway Age Gazette* has no doubt.

It is only a matter of time until traffic in general will begin to increase. The trouble in the past has been that whether traffic increased or not, expenses and taxes increased more in proportion, and, therefore, net earnings tended to decline. Under a policy of fair regulation, which will give the railways the advances in rates that they need, increases in traffic will be accompanied by proportionate increases in net earnings. And reasonable increases in net earnings will restore prosperity to the railway and railway supply businesses, give back their jobs to the hundreds of thousands of men in these industries who are now out of employment and exert a salutary influence on the industry of the United States in general.

RAILWAY CONSTRUCTION IN 1914

THE mileage of new lines built is generally considered one index of the conditions existing in the railway industry. The marked decrease in the mileage built in 1914, as indicated in the statistics published in another column, would therefore lead one to believe that 1914 was an unusually bad year for the railways. The new mileage constructed was only half as much as in the previous year, and was the least for any year since 1895. While a reduction was expected by everyone, its extent will surprise even many closely in touch with conditions. For the first time more mileage was built in Canada in 1914 than in the United States, although Canada was only 60 miles behind the United States in 1913. This is the first time, in fact, that any country in the world has exceeded the United States in this regard.

Another significant feature of last year's record is the completion of many large projects which have been under way for two or more years, such as the Magnolia cut-off of the Baltimore & Ohio, the new lines of the Louisville & Nashville in Tennessee, Alabama and Kentucky, the new lines of the Northern Pacific from Tacoma, Wash., to Tenino, and the extensive double track work of the Chicago, Milwaukee & St. Paul in Iowa. These projects were all undertaken before the depression of the last year was felt so keenly, and it was advisable to carry them through to secure a return on the large sums already spent. Bearing this in mind, one can see that, even the low figures for 1914 do not indicate fully the depression which has existed in railway construction.

This condition is not surprising in view of the increasing difficulties under which the railways have been laboring. The continuance of unfavorable agitation and legislation, the attitude of the employees as evidenced in the demands for full crew laws, and the decreasing business in the face of increasing costs of materials and labor, have all served to make the railways hesitate before authorizing large investments for extensions to reach new territories or for costly improvements in existing facilities. A study of the detailed statistics shows that no long extensions were built last year and that a large proportion of the new mileage was composed of short lines to reach traffic which already existed.

While the decrease in the mileage of new multiple main tracks built reflects the same general unsatisfactory conditions, it also indicates that the present railway facilities are not being taxed to their capacity. Following the traffic congestion of 1906 and 1907, and of 1910, the roads spent large sums in the construction of new terminals and additional main tracks to enable them to handle the increasing traffic quickly and economically. As a result they have a plant capable of handling more business than is actually being offered to it now, and the demand for more multiple main tracks is not so urgent.

The distribution of new mileage between the different states last year is interesting and shows a tendency evidenced in recent years. If the country is divided into four groups, the territory west of and including Colorado leads with over 645 miles of new line. Next to this the largest mileage was built in that portion of the country south of the Ohio and east of the Mississippi rivers, where 485 miles of new road was built last year. Less than 125 miles was built east of Chicago and north of the Ohio river. The relatively active construction in the far west and in the southeast is in accord with the comparatively rapid development of these areas. This undoubtedly accounts for Florida leading the country in new mileage, as large areas have been made available for cultivation by the reclamation of swamp lands in recent years.

Less than 280 miles of new line was completed in the states lying between Chicago and the Rocky mountains, and over 100 miles of this was in North and South Dakota. In Texas, which for a number of years led in the amount of new line constructed, only 51 miles was built, as compared with 356 miles in the previous year, while in Oklahoma only 4 miles was built. The figures for some of the other states in this area—Kansas, 11 miles; Missouri, 4 miles; Nebraska, 1 mile; Iowa, 26 miles—are equally instructive, when it is remembered that these states have led in the passage of drastic regulatory measures. While the development of these states, and especially of Texas and Oklahoma, is retarded by the lack of railway facilities, it is only reasonable to expect that this condition will exist so long as the law makers and commissioners maintain their present attitude.

While the mileage of new lines completed in Canada in 1914 shows a decrease of over 1,000 miles as compared with 1913, it is larger than for any year previous to 1912. The decrease last year is an indication that the unusually rapid development of western Canada, in which the railways have led in the opening up of new territories, is returning to a normal basis. The pushing of the coast extensions of the Grand Trunk Pacific and the Canadian Northern also aided considerably in increasing the figures for 1913.

It is very difficult at this time to predict what the new year will produce. At present there is probably less construction work under way than at any time within the present generation. But the general cessation of construction activities in the past three or four years, during which time the population and the industries of the country have been steadily growing, the recent favorable action of the Interstate Commerce Commission in the rate advance case, indicating a greater realization of the needs of the roads on the part of this and other commissions, and the changing public sentiment, as indicated in the nullification of the Missouri full crew law by referendum vote, indicate that the coming year may be one of considerably increased activity along construction lines. More work than ever before remains to be done which the railways desire to undertake whenever they are in a position to obtain the necessary funds are available at reasonable rates.

LOCOMOTIVE DEVELOPMENT IN 1914

THE number of locomotives built in the calendar year 1914 was 1,265, which is the lowest of any year since 1897, when the number built was 1,251, and constitutes a marked falling off from 1913, when there were 5,332 built. The falling off in building was of course due to the general business depression, but the poor business conditions have by no means eliminated developments tending toward the improvement of the locomotive.

A year ago we referred to what is without doubt the highest development of the Atlantic type locomotive, embodied in the latest engine of that type built by the Pennsylvania Railroad. These locomotives were largely the result of long continued experiments along the lines of refinement in design and increase in boiler capacity. A number of them have been built and are in daily service hauling very heavy trains on extremely fast schedules. The same policy which resulted in the production of this Atlantic type locomotive has, during the past year, produced on the Pennsylvania a Mikado and a Pacific type locomotive which are especially noteworthy. Interchangeability of parts has been carried out in these two locomotives to a considerable extent, the boilers of the two engines being identical. On the testing plant at Altoona the Pacific type locomotive recently developed approximately 3,200 horsepower, a truly remarkable figure, and in this connection it is interesting to note that this horsepower was obtained when the locomotive was equipped with a type of exhaust tip having four internal projections, and that the horsepower obtainable with the ordinary form of exhaust tip was considerably less.

Heat treated steel takes a prominent place in the design of the Pennsylvania locomotives, and of locomotive design in general it may be said that alloy steels continue in favor for such parts as axles, crank pins, main and side rods, frames and springs.

The large locomotive is again to the fore in 1914. The Pacific type locomotives built by the American Locomotive Company for the Chesapeake & Ohio lead in point of total weight for this type, this being 312,600 lb., while the maximum tractive effort of 46,600 lb. developed by these engines is also the greatest for this type. The heaviest locomotive of the Mikado type of which we have record is also a Chesapeake & Ohio engine and weighs 322,500 lb. The Baldwin Locomotive Works built during the year for the Baltimore & Ohio a 2-10-2 type locomotive which has a total weight of 406,000 lb., and is the heaviest locomotive ever built on a single set of drivers. The world's record for large locomotives was again broken by the construction for the Erie Railroad by the Baldwin Locomotive Works of a 2-8-8-8-2 type, Triplex compound articulated locomotive using the weight of the tender for adhesion and having a total weight of 853,000 lb. This locomotive has a theoretical maximum tractive effort of 160,000 lb. and has hauled a train of 251 loaded cars weighing 17,912 tons. A few locomotives of the Mountain, or 4-8-2 type, were built during the year, but they are intended for service under special conditions and there does not seem to be any general tendency to go beyond the Pacific type for hauling heavy passenger trains.

The mechanical stoker has taken a prominent place in increasing locomotive capacity, and there are a number of locomotives now in service which would not have been built had it not been possible to fire them by mechanical means. On large hand-fired locomotives the use of coal pushers in the tender, for moving the coal forward within the reach of the fireman, has greatly increased.

During the year experiments have been completed resulting in the successful use of powdered coal in locomotive fireboxes, and while the results of these experiments are not yet available it is probable that when published they will prove of very considerable interest and value.

The large locomotive is likely to continue in favor in new construction, although it may be doubted that the two-cylinder type can be carried much beyond present dimensions because of limitations in clearance. The possibilities in the use of three cylinders were brought out recently in a discussion before the American Society of Mechanical Engineers by J. B. Ennis, chief mechanical engineer of the American Locomotive Company, and it would not be surprising to see steps taken in the near future toward developing large locomotives with this cylinder arrangement. With few exceptions the compound locomotive has gained nothing in favor during the past year, although the Mallet type continues in use for the particular classes of work for which it is suited, and it is of special interest to note that a large locomotive of this type which was built by the American Locomotive Company in 1912 for the Virginian Railway has developed in service a horsepower somewhat over 3,000. This power is noteworthy when it is considered that it was necessarily developed at low speed.

For the future it may be said that further economies will probably develop from superheating, and while the use of feed water heaters in America has thus far been only of an experimental nature, the results obtained are promising and would seem to indicate its development before long toward an extensive use. Considered from all standpoints the locomotive development of the immediate future will probably continue along the lines of increased capacity through the means of refinement in design and the application of economy producing features and those which tend directly to increase boiler capacity.

RECEIVERSHIPS AND FORECLOSURE SALES

IN 1896 there was a greater mileage of railroad in the United States in the hands of receivers than in any other year since that time. In that year according to the Interstate Commerce Commission's figures, 30,475 miles of road were being operated under receiverships. At the end of December, 1914, according to the compilation which has been made by the *Railway Age Gazette*, 21,048 miles of road, with a total funded debt of $830,728,790 and a total capital stock of $434,599,738, was in the hands of receivers. During the calendar year 1914, 22 roads, with a total mileage of 4,222, with a funded debt of $137,250,296, and with a capital stock of $62,321,150 were put

Receiverships Established in 1914

Name of Company.	Mileage.	Funded Debt Outstanding.	Stock Outstanding.
Arkansas Southeastern	30	$500,000	$500,000
Blakely Southern	22	77,156	.....
Cape Girardeau & Northern	104	1,500,000	110,000
Chic., Peoria & St. Louis	245	2,000,000	4,000,000
Cincinnati, Hamilton & Dayton *b*	1,015	62,135,640	8,248,575
Columbus & Southern	23	500,000	2,000,000
Florida, Alabama & Gulf	25	.....	.....
Gould Southwestern	25	.....	51,000
International & Great Northern *c*	1,106	24,594,500	4,822,000
Kane & Elk	15	9,000	75,000
Kans. City & Memphis	58	796,000	852,000
Liberty-White	50*f*	250,000	1,300,000
Marietta, Columbus & Cleveland	49	250,000	250,000
Muscatine North & South	54	890,000	1,000,000
Ohio River & Columbus	24	85,000	501,000
Opelousas, Gulf & No.-East	57	1,143,000	1,421,475
San Antonio, Fredericksburg & Northern	25	.....	.....
San Antonio, Uvalde & Gulf	316	3,663,000	230,000
Texas Mexican *d*	161	1,380,000	2,500,000
Toledo, St. Louis & Western	450	28,037,000	19,947,600
Trinity & Brazos Valley *e*	303	8,760,000	304,000
Wabash, Chester & Western	65	690,000	1,250,000
Total	4,222	137,250,296	62,321,150

a The company had only a few miles of track laid, but some terminals at Martin Point, Alaska.

b Under an agreement made in 1909 the Baltimore & Ohio guaranteed principal and interest of $12,500,000 first and refunding mortgage 4 per cent bonds of the Cincinnati, Hamilton & Dayton, and of these bonds there were $7,500,000 outstanding in the hands of the public at the time of the receivership in July. In addition, the Baltimore & Ohio had advanced $3,900,000 for construction purposes, taking as collateral $4,861,000 of these bonds, and in addition the Baltimore & Ohio had advanced $1,800,000 for equipment, $1,200,000 for reconstruction of property destroyed by the flood, and $3,200,000 for general treasury purposes.

c Arrangements had been made with the Jay Gould estate by which the $11,000,000 3-year 5 per cent notes, which fell due August 1, were to have been extended for two and a half years at 6 per cent, but the war and subsequent disturbance of the financial markets generally led to an appointment of a receiver.

d The receivership, it was said, was brought about through the refusal of the National Railways of Mexico to reopen the bridge across the Rio Grande at Laredo, Tex. All of the securities, both bonds and stocks, are owned by the National Railways of Mexico.

e Half of the stock of this company is owned by the Colorado & Southern and the other half by the Chicago, Rock Island & Pacific or subsidiaries.

(*f*) The road had, it is understood, abandoned its schedules and was delivering mail by automobile. The receivership proceedings were at the request of the stockholders.

into the hands of receivers. As will be seen from the comparison of the roads placed in the hands of receivers during each one of the years of which a record has been kept by the *Railway Age Gazette*, there have been only one year in which a greater mileage of road went into bankruptcy, and no year since 1896 in which there was as great a mileage in the hands of receivers. Whereas, however, 1896 was not the culmination of a period of depression, but was the beginning of better times, and by 1898 the mileage in the hands of receivers was reduced to 12,744, 1914 shows no tendency toward improvement, but a continuance of the downward tendency. There were only eight roads which were taken out of the hands of receivers in 1914, and none of these were important.

Of the roads that went into the hands of receivers in 1914 the two most important were the Cincinnati, Hamilton & Dayton, operating 1,015 miles of road, and the International & Great Northern, operating 1,106 miles of road. The immediate cause of the Cincinnati, Hamilton & Dayton receivership was the road's inability to recover from the effects of the flood of the year before and the Baltimore & Ohio's unwillingness to jeopardize its own position by making further advances to its controlled road at a time when its own credit was put to so severe a strain by business depression and the war. The immediate cause of the International & Great Northern receivership was the European war and the inability of the company to refund $11,000,000 notes which fell due August 1.

The Cincinnati, Hamilton & Dayton was taken out of the

FORECLOSURES IN 1914.

Name of Company.	Mileage.	Funded Debt Outstanding.	Stock Outstanding.
Chicago, Anamosa & Northern	36	.....	$112,000
Florida Central	47	$500,000	50,000
Greenville & Knoxville	23	460,000	260,000
Kansas City, Mexico & Orient	973	29,348,000	26,000,000
Lancaster, Oxford & Southern	28	250,000	200,000
Laramie, Hahn's Peak & Pac.a	111	4,636,000	10,000,000
New Mexico Central	116	2,500,000	2,500,000
Oklahoma Central	136	3,180,000	3,193,500
Total	1,470	40,874,000	42,315,500

a Sold in two sections, but to the same parties, the Wyoming section being sold for $500,000 and the Colorado section for $100,000.

RAILROADS NOW IN THE HANDS OF RECEIVERS.

	Miles	Outstanding stock	Total funded debt
Apalachicola Northern	102	$3,000,000	$2,000,000
Arkansas, Louisiana & Gulf	61	1,231,100	1,230,000
Arkansas Southeastern	30	500,000	500,000
Atlanta, Birmingham & Atlantic	645	35,000,000	18,533,000
Beaumont, Sour Lake & Western	118	85,000	2,007,251
Birmingham, Columbus & St. Andrews	38	4,500,000	250,000
Boyne City, Gaylord & Alpena	90	501,200	175,000
Buffalo & Susquehanna	91	10,000.000	7,059,000
Cape Girardeau Northern	104	110,000	1,500,000
Chicago & Eastern Illinois	1,282	25,817,800	63,155,000
Chicago, Anamosa & Northern	36	112,000	.....
Chicago, Peoria & St. Louis	245	4,000,000	2,000,000
Cincinnati, Bluffton & Chicago	52	1,125,000	1,500,000
Cincinnati, Hamilton & Dayton	1,015	8,248,575	62,135,640
Colorado Midland	338	10,000,000	9,532,000
Columbus & Southern	23	2,000,000	500,000
Dansville & Mt. Morris	15	50,000	150,000
Denver, Laramie & No. W	56	29.072,800	1,500,000
Fitzgerald, Ocilla & Broxton	23	300,000	150,000
Florida, Alabama & Gulf	25	.....	.....
Florida Central	47	50,000	500,000
Ft. Worth & Rio Grande	235	(See St. L. & S. F.)	
Gould Southwestern	25	51,000	.....
Greenville & Knoxville	23	260,000	460,000
International Great Northern	1,106	4,822,000	24,594,500
Iowa & Omaha Short Line	14	.....	175,000
Kane & Elk	15	75,000	9,000
Kansas City & Memphis	58	852,000	796,000
Kansas Southern & Gulf	10	1,000,000	.....
Liberty White	50	300,000	250,000
Louisiana & Northwestern	121	2,300,000	2,180,000
McCrory & Beedeville Southern	12	.....	.....
Macon & Birmingham	97	500,000	500,000
Marietta, Columbus & Cleveland	49	250,000	250,000
Missouri & North Arkansas	365	8,340,000	8,340,000
Missouri, Oklahoma & Gulf	329	8,261,000	8,261,000
Muscatine North & South	54	1,000,000	890,000
New Berlin & Winfield	8	30,000	33,800
New Orleans, Mobile & Chicago	402	8,075,300	12,699,500
New Orleans, Texas & Mexico	287	(See St. L. & S. F.)	
Ocala Northern	54	.....	.....
Ohio & Kentucky	40	300,000	425,000
Ohio River & Columbus	24	501,000	85,000
Opelousas, Gulf & Northeast	57	1,421,475	1,143,000
Orange & Northwestern	62	(See St. L. & S. F.)	
Pere Marquette	2,322	26,186,590	63,672,000
Pittsburg, Shawmut & Northern	291	15,000,000	14,655,600
Rome & Northern	20	1,000,000	.....
St. Louis & San Francisco	4,747	41,985,762	295,499,358
St. Louis, Brownsville & Mexico	528	(See St. L. & S. F.)	
St. Louis, San Francisco & Texas	242	.....	.....
Salt Lake & Mercur	14	300,000	250,000
San Antonio, Fredericksburg & Northern	..	.....	.....
San Antonio, Uvalde & Gulf	316	230,000	3,663,000
Sharpsville	21	350,000	.....
Tennessee Ry.	54	1,000,000	1,129,000
Tennessee Central	293	7,941,450	12,379,900
Texas Mexican	161	2,500,000	1,380.000
Toledo, St. Louis & Western	450	19,947,600	28,027,000
Trinity & Brazos	303	304,000	8,760,000
Valdosta, Moultrie & Western	42	100,000	300,000
Virginia & Kentucky	5	119,100	35,500
Wabash	2,514	92,801,986	115,156,496
Wabash, Chester & Western	65	1,250,000	690,000
Wabash Pittsburgh Terminal	63	10,000,000	30,236,000
West Side Belt R. R	22	1,080,000	383,000
Wheeling & Lake Erie	459	36,980,000	15,000,000
Williamsville, Greenville & St. Louis	38	$25,000	$25,000
Wisconsin & Michigan	123	956,000	3,518,245
Total	21,048	$434,599,738	$830,728,790

SUMMARY OF RECEIVERSHIPS FOR 39 YEARS.

Year.	No. of roads.	Miles.	Bonds. and stocks.
1876	42	6,662	$467,000,000
1877	38	3,637	220,294,000
1878	27	2,320	92,385,000
1879	12	1,102	39,367,000
1880	13	885	140,265,000
1881	5	110	3,742,000
1882	12	912	39,074,000
1883	11	1,990	108,470,000
1884	37	11,038	714,755,000
1885	44	8,836	385,460,000
1886	13	1,799	70,346,000
1887	9	1,046	90,318,000
1888	22	3,270	186,814,000
1889	22	3,803	99,664,000
1890	26	2,963	105,007,000
1891	26	2,159	84,479,000
1892	36	10,508	357,692,000
1893	74	29,340	1,781,046,000
1894	38	7,025	395,791,000
1895	31	4,089	369,075,000
1896	34	5,441	275,597,000
1897	18	1,537	92,909,000
1898	18	2,069	138,701,000
1899	10	1,019	52,285,000
1900	16	1,165	78,234,000
1901	4	73	1,627,000
1902	5	278	5,835,000
1903	9	229	18,823,000
1904	8	744	36,069,000
1905	10	3,593	176,321,000
1906	6	204	55,042,000
1907	7	317	13,585,000
1908	24	8,009	596,359,000
1909	5	859	78,095,000
1910	7	735	51,427,500
1911	5	2,606	210,606,882
1912	13	3,784	182,112,497
1913	17	9,020	477,780,820
1914	22	4,222	199,571,446

SUMMARY OF FORECLOSURE SALES IN 39 YEARS

Year.	No. of roads.	Miles.	Bonds. and stocks.
1876	30	3,840	$217,848,000
1877	54	3,875	198,984,000
1878	48	3,906	311,631,000
1879	65	4,909	243,288,000
1880	31	3,775	263,832,000
1881	29	2,617	137,323,000
1882	16	867	65,426,000
1883	18	1,354	47,100,000
1884	15	710	23,504,000
1885	22	3,156	278,394,000
1886	45	7,687	374,109,000
1887	31	5,478	328,181,000
1888	19	1,596	64,555,000
1889	25	2,930	137,815,000
1890	29	3,825	182,495,000
1891	21	3,223	169,069,000
1892	28	1,922	95,898,000
1893	25	1,613	79,924,000
1894	42	5,643	318,999,000
1895	52	12,831	761,791,000
1896	58	13,730	1,150,327,000
1897	42	6,675	517,680,000
1898	47	6,054	252,910,000
1899	32	4,294	267,534,000
1900	24	3,477	190,374,000
1901	17	1,139	85,808,000
1902	20	693	39,788,000
1903	13	555	15,885,000
1904	13	524	28,266,000
1905	6	679	20,307,000
1906	8	262	10,400,000
1907	6	114	13,777,000
1908	3	138	2,547,000
1909	12	2,629	250,033,000
1910	17	1,100	93,660,109
1911	13	1,386	40,741,453
1912	12	661	25,910,990
1913	6	1,159	86,163,850
1914	9	1,470	83,189,500

receiver's hands in 1909 when a plan of readjustment was put through by which the Baltimore & Ohio took the control of the company and charge of its operation and in return guaranteed some of its securities. The Cincinnati, Hamilton & Dayton before that receivership was overcapitalized and the readjustment was by no means drastic. With the Baltimore & Ohio's credit behind it and with favorable conditions, or even average conditions, it would have probably gotten along all right. The floods of 1913, however, were fatal.

The International & Great Northern is a Gould property, but with better credit than some of the other Gould roads. Arrangements had been made for the refunding of $11,000,000 5 per cent notes for two years and a half. The details, however, of the arrangement had not been carried through when the European war was declared, and the consequence was that the general upset of financial markets made the fulfillment of this plan impossible. A receivership, therefore, followed.

The foreclosure suit and sale in respect to the Chicago, Rock Island & Pacific Railway Company stock which was deposited under the Chicago, Rock Island & Pacific Railroad Company 4 per cent bonds is not, of course, included in our table showing either receiverships or foreclosures, since this table applies only to railroad companies which are operating companies.

The most discouraging feature about the fact that nearly 10 per cent of the total mileage in the United States is in the hands of receivers, is the indifferent attitude with which the public can regard this fact. The receiver must operate the property. The public loses nothing directly. There is no present prospect of any such period of prosperity as followed in the years after 1896. Roads like the Pere Marquette get deeper and deeper into the mire. It is only indirectly that the public is affected and that after some length of time. Then the impairment of railroad credit becomes apparent, and then it is that the public sees how widespread is the harm which railroad bankruptcy on a large scale may entail.

RATE SUSPENSIONS BY THE INTERSTATE COMMERCE COMMISSION

THE *Railway Age Gazette*, in its issue of December 11, published an editorial headed "Absentee Landlordism and the Commission" dealing with the suspensions by the Interstate Commerce Commission of tariffs containing increased freight rates, and criticizing the commission for entrusting too many imporant matters to subordinates.

We have received a letter from an officer of the commission quoting the following extracts from the editorial, and then stating that there is "absolutely not one word of truth in any statement quoted:"

". . . the suspension of unimportant . . . rate advances . . . have been left to be settled wholly by young employees of the Commission. . . . No commissioner personally even knows of the matter, but a law clerk receives a letter from some shipper, whose responsibility he knows nothing of, protesting against the advance. To be on the safe side he suspends the advanced rate . . . and at the expiration of a year or a year and a half it is found that the advanced rate is entirely reasonable. . . . The railroad never had a chance to justify the rate before it was suspended, never even had a hearing. Some commissioner may theoretically have passed on the case, but if he did it was in a purely cursory way. . . . The Interstate Commerce Commission . . . has to leave innumerable important decisions to $1,500-a-year clerks. . . . It is, therefore, a palpable injustice for the commission to permit its clerks automatically to suspend any advanced rates if there seems to be the remotest possibility of a protest from shippers. . . ."

In response to a request for a full statement of the procedure followed in suspending rates the officer of the commission who criticized the foregoing charges, replied, in part, as follows:

"I would advise that during the 11 months which ended on October 31, 1914, 149,031 separate publications, each containing many and various rates, classifications, fares, or charges were filed in this office.

"The number of proceedings instituted on our Investigation and Suspension Docket during this period was 188, and 147 such cases were disposed of. In 27 instances the tariffs under suspension were voluntarily withdrawn by the carriers; in 6 instances the protests were withdrawn and the proceedings subsequently dismissed; in 44 instances the proposed changes were allowed as filed; in 25 instances they were allowed in part; in 42 instances they were disallowed, and in 3 instances proposed reduced rates were afterwards justified by the carriers and the commission's order of suspension was vacated. In one instance the increased rates under suspension were after hearing required to be canceled, but, upon rehearing, were permitted to become effective.

"During this same period the commission declined to suspend tariffs in 205 instances.

"Immediately upon receipt of a complaint, in any form whatsoever, in respect to an increased rate which is contained in a tariff filed with the commission but which has not yet become effective, it goes to our Suspension Board, composed of Messrs. J. M. Jones, chief of our Division of Tariffs; Hugo Oberg, a rate expert; S. H. Smith, also a rate expert, attorney, and chief of our Division of Inquiry; J. H. Fishback, chief of our Division of Correspondence and assistant to the secretary, and the secretary. The complaint and all possible questions arising in consequence of the complaint in connection with the rates complained of are considered carefully by this board, and it prepares a statement of all pertinent facts in respect thereto, which together with the entire file in each case is laid before the commission, and is considered by the commission, and when I say by the commission, I mean by each member of the commission, and each member of the commission votes as to whether or not any rate shall or shall not be suspended. No rate in any tariff has ever been suspended by the commission without a quorum vote by the commissioners.

"Furthermore, when a protest against a proposed increased rate is received by us we transmit to the carrier, filing the tariff containing said proposed increased rate, information respecting the protest, and give the carrier an opportunity to submit such explanation as it may desire to make, as to the reasons for the increased charges or changes in regulations. In instances, after we have transmitted these statements to the protestants, their protests have voluntarily been withdrawn. Whenever the carrier or the complainant requests a hearing prior to the effective date of the proposed change in rate, it is always granted and the representatives of the carriers and of complainants, or either, are given an opportunity to be heard, and any carrier is at liberty at any time to ask the commission for an opportunity to explain orally the reasons why changes, either in rates or regulations, have been proposed."

The *Railway Age Gazette* has at various times criticised the giving of the power to the commission to suspend advances in rates, and it believes that there are some features of the law which should be corrected, but we have never intended to criticize the commission unfairly and we are convinced that the editorial in question did contain erroneous statements and was unjust to the commission. Moreover, as a large number of railroad men and others have an erroneous impression regarding the routine work of the commission in handling suspensions of rates, we are glad to publish the foregoing statement regarding the procedure followed. In this connection it may be worth while to give the salaries paid the members of the suspension board. They were stated to be as follows in the commission's annual report for 1913: Mr. McGinty, $5,000; Mr. Jones, $5,000; Mr. Smith, $3,900; Mr. Fishback, $2,400; Mr. Oberg, $1,740.

While, as the foregoing clearly shows, the statements in the editorial in question did injustice to the commission, it does not by any means follow that criticisms of the exercise of the suspension authority are not justifiable. Regardless of the principles on which the commission has been acting, or the procedure by which it has carried them out, the great objection remains that in the exercise of its discretion it has been suspending a large number of rates after comparatively little complaint, and, in cases where it has found later that the advances are reasonable, it has been depriving the railroads for too long a time of revenue which they have needed and to which they have been entitled.

Chairman Harlan, of the commission, in his dissenting opinion in the rehearing of the 5 per cent case, pointed out that the carriers contended that their necessities were so urgent that they could not await an increase of revenues from the other sources suggested by the commission, and added: "Relief, however, could be had immediately if the commission would refrain from a too free use of its power to suspend increases in rates pending investigation. *This power is exercised, in my judgment, with unnecessary frequency*, in view of the opportunity that shippers have of testing the reasonableness of increased rates upon formal complaint filed with the commission; and, in my judgment, the Congress never intended so free a use of it when the power to suspend was granted to us."

This statement from the chairman of the commission supports the position we have taken that the power of suspension is being abused.

The Railway Situation from Different Viewpoints

Julius Kruttschnitt, Charles A. Prouty, Daniel Willard,
William J. Jackson, P. W. Coyle, J. Herndon Smith,
A. B. Leach, Norman W. Storer and J. S. Marvin

WHITHER ARE THE RAILWAYS DRIFTING?

By J. Kruttschnitt
Chairman, Executive Committee, Southern Pacific Company

To answer your questions, whither the railways of the United States are drifting, and where they are finally likely to land, we must consider: (1) The present condition of the railroads; (2) what has cast them adrift, and (3) the forces that will determine whether they are to remain in the hands of their owners, or to be irretrievably wrecked and pass to the government.

(1) It cannot be denied that our railroads are in a state of severe stress. Gross revenues have been falling for many months, expenses and taxes have been rising rapidly and uninterruptedly, and under these influences net earnings are vanishing at an alarming rate. The shrinkage of the margin between revenues and expenses has affected railroad credit, and owners of money are unwilling, except on terms commensurate with the risk, to invest it in enterprises whose capital is grudgingly allowed by regulating bodies to earn less than is earned by capital invested in farms, manufactories, banks, and other enterprises. It is not as generally known as it should be, that the railroads are now earning a smaller surplus than they did eight or ten years ago, although in that period one and a half to two billions of dollars have been spent in extensions, equipment, terminals, additional main tracks, and miscellaneous additions and betterments. As the railroads cannot afford to pay higher rates for capital than they can make it earn, they have necessarily had to stop purchasing locomotives and cars, discontinue extensions and improvements, and reduce expenditures for maintenance and operation, to a point where most efficient public service is impaired.

(2) Many causes have contributed to bring the railroads to their present condition. The principal one is the fall in surplus, caused by smaller revenues and greater expenses—the former brought about by regulating bodies, the latter by unreasonable demands of labor and expensive, embarrassing, and obstructive laws, supplemented by orders of forty-nine commissions, whose dicta have the force of law and from which there is no appeal to the courts. As examples, we may cite:

Full crew laws.

Laws limiting the size of freight trains.

Expenses of federal and state valuation.

Expenses of changing methods of accounting, and of keeping two or more sets of accounts.

Next is the increase in taxes. Through methods which have increased railroad taxes much more rapidly than taxes on other property, the general public is discriminating unjustly against that part of the public which has devoted its property to public use. Commissions seem to forget that they are the representatives of *all* of the people, and not of those people only who use the railroads, and that their duty is to deal as justly with the owners as with the users of railroads. Rates are reduced and reparation is granted to railroad users easily and quickly, in marked contrast to the deliberation with which requests for increases in rates are treated, and which, if granted, are never coupled with reparation, no matter how long and unreasonable the delay of investigation may have been. In the five years during which their application for an increase in rates has been under consideration by the Interstate Commerce Commission, the railroads affected have no doubt spent enough money in conducting their case and in supplying unusual and useless information and statistics, to absorb a large fraction of one year's expected gain from the increase.

(3) To public opinion, the supreme force that dominates and controls all classes and political parties in our country, we must look for a solution of the problem of the future of our railroads. It decreed years ago that unjust discrimination by its railroad servants and unfair practices with respect to railroad *users*, should cease; and these evils no longer exist. The same supreme power will, when convinced that the time for action has arrived, decree that unjust discrimination by its legislative and administrative servants, and unfair practices with respect to railroad *owners*, shall cease. Legislatures and commissions will be made to realize that power is delegated to them for the benefit of *all* classes of citizens—owners as well as users of railroads, unorganized as well as organized labor—and evidence is afforded by the utterances of the press and of those occupying high public office, that the spirit of fairness and justice in the American people has been quickened, and public opinion is even now compelling the attention of politicians. The public's attitude toward recent unreasonable demands of organized railroad labor, foreshadows the modification of existing laws governing mediation and arbitration of industrial disputes so as to afford public opinion opportunity to influence the settlement of demands of railroad servants before permitting them to deprive the country of transportation by rail.

The majority of the American people do not desire government ownership of railroads, and will finally substitute constructive for destructive regulation, and will insist that the powers of all public servants be co-ordinated so that all will work for the common good. Unfair discrimination against the railroads will cease, and even-handed justice will be accorded to both railroad owners and users. When the general public understands how it has been misrepresented by unjust and unwise public servants, and how perilously near to ruin they have brought all business interests in our country, in starving and threatening the life of the railroads, they will not long delay the exercise of the necessary corrective power. Indeed, it must be apparent to the most superficial observer even, that public opinion has already been aroused, and its effect has been seen in the recent solution of a long-pending and exceedingly vexatious problem.

WHY THE VALUATION SHOULD NOT BE DISCONTINUED

By Charles A. Prouty
Director of Valuation, Interstate Commerce Commission

You ask me to write you briefly why the valuation of railways now in process by the United States government should not be discontinued.

The Supreme Court of the United States has decided, and it is today universally accepted as a legal principle, that a railroad is entitled under the constitution of the United States to a fair return upon the *fair value* of the property which it is devoting to the public service.

The power of the court—certainly the power of the federal court—can only extend to fixing the limit below which the legislative branch of the government may not go, and in my own opinion a commission may and should establish a rate substantially higher than this court limit. A commission may also consider in the fixing of individual rates circumstances and conditions which could not properly influence the court in passing upon the question of confiscation. But, nevertheless, while the function of the commission differs from that of the court, when the question before legislature or commission is upon the

general level of railroad rates, the fundamental fact still is the *value* of the property devoted to the public service.

It appears, therefore, that whether court or commission is dealing with a general schedule of rates, the all-important inquiry is, What is the *value* of this property? Now, how can court or commission discharge its full duty; how can justice be done between the public which pays and the railroad which exacts, until this question has been answered? Should not the government of the United States, if it is to undertake the regulation of railroad charges, ascertain in the speediest and the most complete manner possible the value of the property which is being devoted to that service?

It may be said with truth that the value of a railroad for rate-making purposes has never yet been clearly defined, but it is also true that courts, commissions and economists are all one in the opinion that for the determination of this question certain facts must be marshalled, of which the principal are, cost of reproduction new, cost of reproduction less depreciation, original investment in the property, and the history of that investment. These facts must be had before value can be determined, and these facts are now being collected by the government.

It is true, as I have myself pointed out, that the value of a railroad cannot be made the basis of its rates in the same way that the value of a gas plant or a water plant or a system of street railways can be, for the railroads of this country stand in competition with one another and their rates cannot be independently established. But while this infirmity goes to the making of a particular rate, it does not apply to railway rates as a whole. In the past the question presented to the federal commission has usually been one of individual rates. Is this rate too high as compared with some other rate or as compared with rates in general? Today our railroads are claiming that railroad property as a whole is receiving too little for the service rendered and that railroad rates as a whole must be advanced.

I have been quoted as saying that the Eastern Rate Advance Case should not be decided until the railroads of this country had been valued. That would have been an absurdity, for the commission must have dealt with that question when it arose upon the best evidence available, but I did say, and I repeat, that questions of that character can never be satisfactorily and finally decided until the railroads of this country have been valued by the government. This application for an advance will by no means be the last, and the commission must find some solid ground on which to stand. The people of this country desire to treat its railroads justly, and they must do so if an efficient service is to be rendered, but they also desire to know, and they are entitled to know, what the actual value of these properties is.

It is suggested that some particular railroad, or the railroads of some particular section, should be valued in order that it may appear whether such a valuation is of service in rate-making. This assumes that it is still an open question whether the value of railroad property is of significance in the making of railroad rates; but the Supreme Court has decided that the value of the property devoted to the public use should be the controlling factor, and has applied that decision in several cases itself.

Our railroads have earnestly urged in recent discussions that their credit was in serious danger. When a private industrial plant desires to establish its credit it employs some competent means of appraising the value of its property and exhibiting that value to the investing public. The investor desires to know the inherent value of the thing in which he invests. What could more strengthen the credit of the railroads of this land than a certificate from the government of the value of their property, especially when the government is legally and in good conscience bound to allow sufficient earnings to justify that valuation?

There is also a business reason why the present valuation should be prosecuted to a speedy completion.

No precedent existed for the doing of this work upon the scale required by the Valuation Act, and the development of the present organization has been necessarily experimental and therefore slow and expensive. That organization has been substantially completed and should be entirely perfected by July 1 next. Beginning January 1, 1915, the present force of the commission should proceed at the rate of from 20,000 to 25,000 miles per annum. The same overhead organization could take care of 50,000 miles per annum. Good business economy would require that the work be developed up to that stage within the next six months and kept there until completed. To adopt any other course, if this work is to be done at all, would involve great pecuniary loss.

EFFECT OF THE RATE ADVANCE DECISION

By Daniel Willard

President of the Baltimore & Ohio

What the decision might be said to indicate or promise for the future is, in my opinion, even more valuable than what it actually gives in the way of immediate increase in rates.

The present report of the commission should be read in conjunction with that given under date of July 29, in order to realize the scope of the decision and its ultimate effects. In that it has extended the territory and the classes of traffic to which the 5 per cent increase may be generally applied, the commission has afforded a further measure of immediate relief; but what I consider of even more importance is its recognition of the needs of the railroads for increased revenues and the reiteration of its former statement as to its duty and purpose to aid, so far as it legally may, in the solution of the problem as to what course the carriers may pursue to meet the situation.

Personally I was disappointed because the commission had not granted the full 5 per cent advance which was asked for, and that coal, coke and ore, which constitute nearly two-thirds of the entire tonnage handled by the Baltimore & Ohio Railroad, were among the articles to which the 5 per cent increase does not apply.

While I feel disappointed and earnestly believe that it would have been better for all concerned if the full increase as requested had been granted, nevertheless I have found much in the decision that is encouraging. The commission in its report finds that "from whatever comparative standpoint used, the net operating revenues of the last fiscal year must be regarded as unduly low; that the operating costs and operating revenues fail to show the tendency to such concomitant variation as should prevail in the transportation industry; and that while the gross revenue declined only 3.4 per cent, the net revenue shrank approximately 17.7 per cent as against the previous fiscal year"; the commission concluding that "the indication is that some important items of cost have become relatively inelastic, and that a fall in gross revenues leaves an increasingly narrow margin of net revenue." This is exactly the contention of the railroads. It is what they foresaw in 1910, and it is what they have been urging that the results of the operation of the years since then have demonstrated.

It is a fact, as the commission says, that a condition has come about whereunder it is absolutely impossible for the railroads to hold their expenses in proper relation to their gross earnings, and this is due to many different influences which have been quietly at work for a number of years. Among such influences may be mentioned, full crew laws, hours of labor laws, higher wages, certain standard minima of service prescribed in some states by public commissions and insisted upon none the less strenuously in other places by the force of public opinion, increased taxes, etc., etc. These influences or conditions, whether in themselves good or bad, have all contributed to bring about the state of affairs so clearly recognized by the commission, and in my opinion fully justify the railroads in their efforts to obtain higher rates.

The commission also says, "We can not view with favor any attempt to obtain an increase in net revenue through unduly restricted expenditures upon maintenance," and it is most en-

couraging that the commission should have spoken as it did concerning that particular matter. It was urged during the hearing in the 5 per cent case by some of those claiming to speak with authority for the public that the railroads were spending too much upon maintenance, and it was also urged that if the railroads would spend less for maintenance, they would be able with existing rates to pay a fair return upon the capital invested. It is clear, however, that the commission was not misled by such arguments.

It is also encouraging to have the clear statement of the commission that "if we are to set rates that will afford reasonable remuneration to these carriers, we must give consideration to the increased hire of capital as well as to other increased costs." This increased cost of capital was one of the contentions urged most strongly by the carriers in support of their request for advanced rates.

The commission in its report of July 29 suggested ten sources of additional revenue for all carriers throughout official classification territory, and now stated in that connection: "It is expected that the constructive work suggested in the original report for the purpose of conserving and augmenting the net revenues of the carriers generally will be carried forward without interruption"—and it is perhaps in that particular paragraph that I find most encouragement in the last decision.

The carriers, while admitting that increased revenue might be gained from the ten suggested sources pointed out by the commission, were convinced that much time would be required in the working out of the various problems presented, and urged that an immediate increase was necessary and should be granted to meet the pressing needs of the present, feeling certain that it would develop as the case proceeded, that the increased revenues from all the sources suggested, including the 5 per cent advance, if granted, would not be too great for the proper needs of the situation, and, speaking in that connection, Chairman Harlan of the commission, uses these words:

> My own view of the record has been and is that the carriers in that territory, considered collectively, are in need of more additional net income than the amount, $50,000,000, which they estimated the proposed 5 per cent increase in rates would yield.

I appreciate the very difficult problem that was presented to the commission in connection with this case, and I am not ignorant of the arguments that have been urged by some against any action by the commission intended to be helpful to the railroads. I realize also the limitations established by law within which the commission must act. It should be encouraging, therefore, to all real friends of the railroads, and by that I mean all who are interested in the proper industrial development of this country, that the commission has been willing to treat the question before it in a broad way, and while not granting all the immediate relief specifically asked for, by the railways, and in the manner requested, it has recognized, unanimously, the necessities of the carriers and had again reiterated its former statement that:

> It is our duty and our purpose to aid, so far as we legally may, in the solution of the problem as to the course that the carriers may pursue to meet the situation.

I am confident that the result of this inquiry will be to bring about a much better understanding of the railroad problem by all concerned or interested in that question. Further, I feel confident that better working relations will be established between the railway managers, the regulatory bodies and the shippers, and I am hopeful that because of such better understanding and relations the railroads, the shippers and the regulating agencies, both state and federal, will be able in the future to work out to a satisfactory conclusion the many serious problems that are certain to occur under our system of private ownership with government control.

I think that upon the whole the ultimate result of Mr. Brandeis' connection with the case will be beneficial to the railways. The commission had unanimously held that the evidence in the record was sufficient to convince it of the necessity for increased net revenues, a view in which Mr. Brandeis evidently concurred. Indeed in his argument in the first case, as well as in his brief, he clearly recognized and frankly admitted the needs of the carriers for increased net revenues. He opposed, however, the proposition to obtain the increased net revenues by a uniform advance of freight rates and suggested other methods and sources through which the proper measures of relief might be obtained. It must be admitted by all that rates clearly unremunerative ought to be advanced, and that services performed without charge should either be discontinued or be properly paid for. Concerning these and many other things I think the majority of railroad managers would be in full accord with Mr. Brandeis. Incidentally, the very searching investigation conducted by the commission into the general subject of railroad practices, did more to disabuse the public mind concerning such matters than anything else that could possibly have happened. Undoubtedly, abuses have existed in connection with railroad management as has been the case in all other lines of human endeavor, but the commission's report would indicate that the most searching investigation failed to develop that any serious abuses exist at the present time which could have any material influence upon the condition of the carriers involved in this hearing, and the result of the inquiry should not only be gratifying to holders of railroad securities, but it is also a tribute to the efficiency and character of present railway management.

I have no definite information, but judging from estimates that have been prepared at various times, and assuming the full co-operation of all state bodies is had in applying the increase to intrastate traffic as well as interstate, I believe that the Baltimore & Ohio will realize as much as $2,000,000 per annum, or approximately one-half of what a 5 per cent increase on freight rates on all traffic would have amounted to on the basis of the freight earnings in the fiscal year 1913.

REGULATION OF RAILWAY OPERATION

By W. J. Jackson

Chairman of the Special Committee on Relations of Railway Operation to Legislation

In response to your request I am glad to make a brief statement of my personal views as Chairman of the Special Committee on Relations of Railway Operation to Legislation. These have been gradually formed through three years of study of the problems confronting us, and are necessarily subject to such modification as future developments may require.

The minutiæ of railway operation are so numerous, and are so interrelated that it is unreasonable to expect that a correct understanding of the questions involved in legislation on the subject can be reached by those responsible therefor, without the assistance only to be obtained from those who have the necessary knowledge.

With some exceptions almost all bills relating to railway operation are drawn by those who have no practical acquaintance with the subject. Bills which are intended to remedy conditions of one kind, do not actually reach those conditions, but affect another set which it was not intended to cover. Or, if they do reach the intended conditions, they also have a bearing on other matters equally outside the purposes of their authors. Bills which apparently involve little or nothing, may commit the roads to expenditures of such amounts as to be wholly prohibitory and beyond the bounds of reason.

In all propositions involving legislation on operating matters, five questions, therefore, inevitably present themselves.

1. What is the precise purpose?
2. Will the suggested form of legislation accomplish that purpose?
3. What is the real necessity for it?
4. What will it cost?
5. Is the object worth the cost?

The primary function of this committee, then, is to provide legislators with correct replies to these questions, and this is

best accomplished by producing before them men who have accurate knowledge of the particular subjects involved.

In most instances it has been found that when these correct answers have been furnished, the vast majority of the proposed bills are dropped by their advocates.

The measures which are not eliminated by this procedure fall into three classes.

1. Those designed to promote practices which are desirable from every point of view.
2. Those designed to promote uniformity.
3. Those promoted by special interests.

In regard to the first class, we have conceived it to be the function of this committee to assist in the formulation of such legislation, with a view to having it practical, enforceable and beneficial, and after its enactment, to contribute to its successful administration by promoting a uniform understanding on the part of all concerned, and by securing the general co-operation of the roads in its intelligent enforcement.

As to the second class, uniformity inevitably means change. Unless the object sought is of such importance as to justify the danger which often is caused by changes in operating methods, the committee has not deemed it necessary to go so far in its co-operation. Should a real necessity exist, however, the same course would be pursued as in the case of the first class.

The third class, of course, presents the most serious problem. The special interests pushing different items of legislation range from an obscure patentee on the one hand to a combination of labor organizations on the other, with all possible combinations of interests between the two named.

This committee has, however, never felt justified in departing from the fundamental principle adopted at the inception of its work, and has in all cases simply endeavored to see that the exact facts surrounding each bill were placed in the possession of those who must be responsible for the legislation.

That this course has been the correct one has been proven by the results.

FROM A WESTERN INVESTMENT BANKER'S POINT OF VIEW

By J. Herndon Smith

Smith, Moore & Company, St. Louis, Mo.

For some time it has been apparent that investors prefer many other kinds of investments to railroad securities. In fact, for the past two years it has been almost impossible to sell railroad securities of any kind in this western country. Even receiver certificates—issued at the expense of all other securities—at a very high rate of interest, have failed to "tempt" capital.

Being in the investment banking business I have naturally tried to find out *why* these conditions exist.

From canvass of many of our large investors, the reason appears to be due to loss of confidence—resulting mostly from the inability of railroads to show a satisfactory statement of earnings, on account of increase in cost of operation and decrease in rates, and the inability of railroads to obtain permission from the Interstate Commerce Commission to advance rates sufficiently to show the margin of safety that formerly existed. Another reason which has been apparent, is the exposures of financing of certain large systems, which has proved disastrous to these companies.

Consequently there is a very decided preference on the part of investors for municipals, public utility and industrial bonds as against railroad securities. As an example of this: One of my customers who handles trust estates, mostly for widows and orphans, which aggregate over $200,000,000, of which $60,000,000 is in railroad bonds, has not bought a railroad security during the past two years; and they tell me they will not put a cent into railroad securities until the railroads are allowed to increase their rates not only to a substantial amount over fixed charges, but enough to enable them to pay off each year some part of their indebtedness, either by sinking fund or serial bond.

To my mind, one of the worst features of railroad financing in the past has been that there has been no provision made in advance for paying off indebtedness at or before maturity. I believe that if railroad bonds are issued on a serial plan, or with a large sinking fund, which would practically retire the issue at maturity, it will go a long way towards helping to restore confidence on the part of investors.

The Interstate Commerce Commission has granted the application of the eastern railroads to increase their rates in part, but I think it will be some time before this will very materially help the earnings of the eastern roads.

The roads west of the Mississippi have not received any increase as yet, and they are also hampered by the attitude of the state commissions in different western states. Railroad credit has been so much impaired in the past few years that it is going to take much larger earnings to restore the confidence on the part of investors than it would have if the increase in rates had been granted some time ago.

FROM A NEW YORK INVESTMENT BANKER'S POINT OF VIEW

By A. B. Leach

President Investment Bankers' Association

In the confusion of tongues, all noisy with the railroad rate problem, the piling up of statistics and figures by the technical journals dealing with this most important subject, it has often seemed to me that perhaps our people were losing sight of what, to my mind, is one of the cardinal points in this controversy.

The railroad problem, with which this country is grappling, is not a new one. It has been before the public constantly. This should not surprise us. The developments of the railroads are so essentially linked up with the development of the country at large that it is small wonder that upon the railroads should be focused at all times a great deal of attention.

We all remember very well the first stage of railroad building in this country. If we follow this history it can easily be seen how the present situation constitutes a distinct and logical phase in the development. Great was the need in the middle of the nineteenth century for railroad communication; insistent was the demand for transcontinental lines, feeder lines and well constructed terminals, in order that this country could be given the development to which it was so fully entitled. It was realized that a railroad once constructed, as by magic touch, turned enormous areas of little use theretofore to the community at large, suddenly into busy agencies for local upbuilding and business development of the country in general. It can therefore easily be understood, how from all sides aid not only was promised but also literally given to the pioneer railway builders of this country, in the way of land grants and substantial subsidies, in some cases, lower rates for taxation, high returns in freight and passenger charges, liberal rights of way, while cities and villages competed with each other for the location of the lines. It was realized that funds invested in railways would not only be of great benefit to the communities served and to the new states which they were upbuilding, but that it would also benefit the country as a whole. It was expected that these inducements would be of great ultimate profit to those who were courageous enough to invest their money in what was at that time considered an extra hazardous investment.

History tells us that a very large percentage of all these enterprises became bankrupt, not because the enterprise or the motives in building the property were not intrinsically sound, but merely because the business did not develop fast enough to carry the interest and other fixed charges necessary for the completion of the property. As one authority puts it: "So rudimentary was the industry of the country and so small its rates of increase that the best located lines, instead of creating as they do now, an annual traffic much ex-

ceeding their cost, were a heavy charge upon the bondholders and stockholders."

The first stage of railway building in this country was one of misfortune, one that in a great many cases brought very heavy losses to the investment world. Nevertheless, the fact stands out clearly, that these railways, no matter what their financial vicissitudes might have been, were the greatest upbuilders of the country. They were monuments of enterprise, bearing testimony to American courage, pluck and perseverance, that made possible the growth and development of the very states and cities which now are among the loudest in their outcry against the railroads.

A second stage in railway history was then ushered in. Upon the debris of the old properties new companies were built up. The construction that took place in the first period had given a tremendous impetus to the productivity of the country and led to greater diversification of production. Consequently, there was a large demand for more railroad communication. While in 1840, the ratio of mileage of railroads to population was one mile of road to every 7,415 inhabitants, and in 1850, it was one mile to every 2,398; in 1860, this ratio had declined to one mile for every 1,027 inhabitants; in 1870, to one mile for every 729, and in 1880, to one mile for only every 538 inhabitants. Between 1855 and 1865, the mileage of railroads in this country was doubled, notwithstanding a panic (the one of 1857) and that our Civil War intervened. This increase in railroad mileage continued unabated. Existing railroads grew prosperous.

What happened before in history then happened again. Managers in charge of these prosperous properties—we say advisedly, managers, because not in all cases were they real owners, the ownership being vested in stock and bondholders scattered all over the globe—became arrogant. They imagined themselves to be the owners of the road instead of the servants of the stock and bondholders and of the public. Their attitude toward the public became unreasonable; their financing became extravagant, not to use a stronger term; in a word, the railway managers felt that they were above the public. "The public be damned," was the motto.

As action inevitably produces reaction, the answer to this arrogance and unreasonable attitude of the railway managers was increased legislation. First, by the several states, then, by the Federal government. We got a large number of state railway commissions, and alongside of them the Interstate Commerce Commission was called into existence. The powers of the latter were continually increased, and at the present time in the hands of this commission rests such a stupendous authority in matters relating to the prosperity or adversity of millions of people as no official body of men has ever possessed.

With the event of this increase and regulation, the pendulum swung too much into the other direction and little regard was meanwhile given to the complete change in attitude on the part of the railway managers. A new school of railway managers who were not first and foremost financiers, or possibly Wall Street speculators, took a hold of the properties. Many of these operators had started railway operation at the very lowest round of the ladder, and their present position is a fine tribute to the highest ideals of American democracy. This school of railway managers substituted for the above-quoted motto another one, more in harmony with a broad vision. "The public be pleased" was their motto, and in that spirit of public policy, railway operation is at present conducted in this country.

However, the public mind, with preconceived notions, in many cases handed down from past generations, has been framed in such a manner that I feel that the railways today are not receiving that just and reasonable treatment which I believe we, as Americans, are always ready to accord to every one.

Three things stand out in the present situation.

First—We have reached a period of *overregulation*, as a result of which investment of new money in railway properties today is at its minimum. Unless a sudden and radical change is brought about, this overregulation will lead the railways into bankruptcy. History points out that all conditions are more or less transient and that nothing has really come to stay. Personally, I believe that the American people are too sensible not to be willing that the railways shall be run in such a way and shall charge such a price for the service that real money invested in railway property will become profitable and pay a satisfactory and constant rate of return. Those who are intently watching the trend of public sentiment have seen that this desire of the American people for fair play is again manifesting itself in many ways, and consequently a change in overregulation of our railroads and at least in the obstructions put in their way for earning a reasonable return on the investment, may be expected.

Second—Commerce, without transportation, is impossible. No community has ever prospered without adequate transportation enabling it to bring its products with great despatch to the distant places where they were needed, and at the same time giving it the facilities for having brought to its door, without delay, all it needs. Therefore, every community served by a railroad is directly interested in the welfare of that railroad. It is imperative for the growth of any community that the company serving it with transportation should be solvent; that its business should be profitable and that it will be in a position to give to that community the very best service in every respect. In order to do this, the railway company should have excellent facilities in rolling stock, roadbed, stations and other physical characteristics, and none of these can be had if the railroad in question is constantly harassed by federal and local authorities hampering it in its endeavor to earn a reasonable return on its investment, in order to establish thereby the credit so essentially necessary for keeping its physical as well as its financial position in first-class condition. I don't think I am over optimistic when I state that our communities are becoming more and more conscious of this necessity and this has much good in store for the future.

Third—The American people have never been nor ever will be a nation desirous of cheapness only, in any product. They want the best that there is. Even under present conditions, American railway service is still, in many respects, unmatched and the best of any in the world. Private initiative has established in this country a record of attainment that can stand comparison with any of the government owned railway systems of Europe. It certainly would be one of the greatest misfortunes that could happen to this country, both for the sake of the railways and the people, if government ownership would be inaugurated, and I am sure, if I judge recent development aright, that whatever inclinations there might have been of going into the direction of government ownership, a second and saner thought on the subject is now manifesting itself.

For the reasons outlined above, I believe that a change is due, that better, fairer and more reasonable treatment of the railways is to be had.

I have the highest respect for the Interstate Commerce Commission, not only as a most desirable regulative body, far to be preferred above the conflicting authorities of state commissions and state legislators, but also in regard to its personnel. I believe most confidently in the good faith and the integrity of these gentlemen. But does it not appear that they have been burdened with an impossible task, and that too great an authority has been placed on their shoulders?

All things point to the fact that a cure of the railway rate situation lies in the stopping of further legislation. Let the railroads run their own properties. Let not the authority to run the business be snatched away from the railroad's operators and be exercised by those who have no responsibility, whatsoever, to the owners of the properties. Let us not be misunderstood. We do not want to go back to the chaotic conditions of the seventies and thereabouts. We wish to see established, how-

ever, a condition of affairs whereby the railroads run their own properties, of course, under legislative authority, assuring equal treatment to every shipper, big and little, but the railroads in turn insisting:

First—That in the way of charges, a fair value shall be paid for every dollar of obligation issued;

Second—That the railways shall be relieved, as far as passenger traffic is concerned, of local legislative restrictions.

The railways are the largest business interests in this country, they control more trade in the way of purchasing power, and are more nearly alive to the success of their business, than any other enterprise.

If our railways are not properly managed, prosperity in this country is impossible. If they are to be constantly restricted by unreasonable legislation, if they continue to remain a most popular thankful and remunerative object for baiting on the part of politicians, big and small, then so long will general prosperity not come to this country. Luckily, we enter the new year with hopeful signs, indicating that an ever increasing number of our citizens is getting nearer to a full and unbiased realization of the real facts, and to a better understanding of the true merits of the cause of the railroads.

PROGRESS IN RAILWAY ELECTRIFICATION IN 1914

By N. W. Storer
General Engineer, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

All those who are interested in the electrification of steam railways have every reason to feel encouraged at the progress that was made during the past year. While no great electrification projects have been completed, the developments have been continuous and of far-reaching importance.

MERCURY ARC RECTIFIER

Probably the most important advance that has been made during the year is that in the development of the mercury arc rectifier in its adaptation to heavy railway service. This, of course, is not a new development, nor was it applied commercially during the year except in a very limited way, but the progress has been great and the results that have been achieved in its operation—both on the locomotive supplied with power from a single phase line and in substation use—have been such as to give the greatest encouragement to the belief that in a very short time the rectifier will be a thoroughly commercial article. The rectifier can be used with either the d. c. or the single-phase a. c. system. In the d. c. system its place will be in the substation in place of the synchronous converters and motor generator sets which are now used to transform from alternating to direct current. Here its high efficiency under all conditions of load and its adaptation to any commercial frequency make it certain that if it proves to be a satisfactory piece of apparatus, it will be used very largely for substation work where direct current is applied to the trolley.

On the other hand, its successful performance on the Pennsylvania combination car which was fitted up as a 1,000-h.p. locomotive, and which has been in operation on the New Haven system for the past nine months, shows that it is equally applicable to such service. With this apparatus any direct current locomotive can be adapted for operation from a single phase trolley by the addition of a transformer, rectifier, and a few additional pieces of control; thus, all of the advantages of transmission at high voltage alternating current will be enjoyed and all of the advantages of the direct current motor will be secured, together with the flexibility in speed control which results from changing the voltage applied to the motor. The Pennsylvania car referred to is one of the standard suburban steel combination cars and is equipped with four 250-h.p. d. c. motors. It has the transformer, rectifier and control equipment located in the baggage compartment and is really a locomotive of 1,000-h.p. capacity. A single rectifier furnishes all of the current required by these four motors. The efficiency of the rectifier will vary from 95 to 98 per cent, depending on the voltage which it supplies. For voltages of 1,200 or over, the efficiency will be above 97 per cent at all loads.

THE D. C. SYSTEM

New records have been made during the past year in direct current railway electrification. The Butte, Anaconda & Pacific, which is operating at 2,400 volts d. c., reports most satisfactory results. Direct current at 2,400 volts is also being applied to the third rail on another line, and the Chicago, Milwaukee & St. Paul has given a contract for the equipment of a subdivision of its line with 3,000 volts d. c., but of even greater importance are the tests which have been made at East Pittsburgh with still higher voltages. The great drawback to the use of high voltage direct current has been the difficulty of building high voltage motors for car equipments. This difficulty seems to have been largely overcome since an equipment consisting of two 100-h.p. motors has been operated successfully on a car at East Pittsburgh from an overhead trolley with voltages from 5,000 to 7,000 d. c. The tests were remarkably successful, both as regards motors and control, and the further development of this apparatus will be watched with interest. The apparatus has thus far been tested only in an experimental way; it is, however, shortly to be placed in actual service on a branch line of a large system where it can be given a thorough test. If it is found that direct current at a voltage of 5,000 can be utilized commercially for railway purposes without increasing the cost of equipment or of maintenance to an undue amount, there is no question but that such an equipment, together with the mercury arc rectifier for substation use, will have a large field.

THE SINGLE PHASE SYSTEM

The single phase system has made notable progress during the past year. The New York, Westchester & Boston Railway, handling a heavy suburban service out of New York, the Spokane & Inland Empire, and the Chicago, Lake Shore & South Bend, are all operating with the series compensated motor. At this time, however, there are three alternatives that may be presented to the railroad adopting single phase current for its trolley:

First, it may use the commutator type motor. Many improvements have been made in this form of motor which will tend to increase its reliability and decrease the cost of maintenance. This is the motor which the Pennsylvania has adopted for its suburban electrification at Philadelphia.

Second, it may select the split phase locomotive. This is the type that has been adopted by the Norfolk & Western for the electrification of its Elkhorn grade. This system employs a phase converter which is a rotating piece of apparatus located in the cab of the locomotive, which serves the triple purpose of supplying polyphase current for the induction motors which are used to drive the locomotive, and also drives the ventilating fan and the air compressor. It is generally recognized that the induction motor has many admirable characteristics, chief among which are light weight and rigid design, high efficiency, and ability to automatically regenerate power on descending grades. This type of motor makes it possible to secure an output from a locomotive with a given number of drive wheels, which would be practically out of the question with the commutator type of single-phase motor on account of its larger dimensions. The use of this type of motor in heavy freight service on mountain grades is especially desirable on account of the automatic regenerative characteristics which enable a train to be operated down grade at a constant speed without the use of brakes.

The third alternative is the rectifier locomotive which, as previously explained, uses d. c. motors with rectifiers and single phase transformers.

These three alternatives make the single phase system attractive for heavy electrification for long lines where the high voltage of transmission is of paramount importance. The

high voltage direct current system has also shown its ability to handle practically any traffic. With satisfactory operation promised for the various systems, the selection will depend upon the local conditions surrounding each proposition.

HOW RAILWAY EARNINGS SHOULD BE INCREASED; A SHIPPER'S VIEW

By P. W. Coyle

Traffic Commissioner, Business Men's League of St. Louis

That commercial conditions are out of joint there seems to be no question. The real cause of this condition is difficult to determine and the remedy that should be applied to give relief to the carriers, which will enable them to obtain desirable net results, is indeed a perplexing problem.

It would seem, however, that in order to give fair consideration to the subject we should take a retrospective view and examine some of the fundamental features involved. Primarily, of course, the legitimate purpose of the railroads is to furnish adequate transportation to the shipping and traveling public on as economic and equitable a basis as possible. When the means to this end are misused, or perverted, commerce must suffer to the degree that it is thus intimately associated.

In the construction and management of railroads, as in that of other business enterprises, the desire for personal gain and the consequent sharp competition have dominated the management of these properties until, in many cases, the interests of the public have been overlooked or made secondary to these dominating influences.

Up to a few years ago these carriers gave scant recognition to their obligations as public utilities. It is also unfortunate, but, nevertheless, true, that the desire for personal gain so dominated the management of many railroads in the early days that there is left, as a result, a trail of perversion of railroad property to individual use, running through the financial history of certain railroads almost, if not quite, transcontinental in extent. This perversion of railroad property is the foundation of large fortunes invested in other properties, in some instances so closely allied to the railroads as to sap the vitals of the latter, and it is significant that most of the railroads expressing the greatest degree of suffering, in consequence of their impoverished condition, are those through whose financial history runs this trail of perversion.

Of course, we cannot go back and repair all of this damage. It should be kept in mind, however, sufficiently to enable us to view the entire situation calmly and deliberately, because it cannot be said of the railroads of this country as a whole, that they are in the impoverished condition of the roads indicated.

I am, therefore, greatly in doubt as to whether a general advance in the rates is the sole contribution which should be made to bring about satisfactory net results.

Obviously, the dominating influence in railroad management today seeks to serve the public along legitimate lines and conserve the interests of the users and the owners of the properties, subject to reasonable governmental regulation.

In any event, we must recognize the fact that all railroads are intimately woven into the commercial fabric of the country, and we should not, therefore, jeopardize the entire business structure by singling out these roads whose systems have been impaired until they are, figuratively speaking, the weak threads, and require all to atone for their transgressions; nor should we allow their dire necessities to unduly influence our actions in attempting to prescribe a general remedy.

The question comes to my mind frequently: Is the public demanding too much of the carriers in the way of service, both freight and passenger? or rather, have not the carriers given to the public from time to time more service than was really demanded, simply to attract traffic or divert it to individual lines without particular regard to commercial conditions, or the necessity of the public? It, therefore, appeals to me that there is much room for economy in this respect, especially in passenger service, without injury to communities or individual interests.

Since rates are practically fixed by commission, apparently an unnecessary amount of money is expended by the carriers in soliciting business, both freight and passenger, which expense in the last analysis, of course, is borne by the shipper and the passenger. However, I can readily see where the capital invested in railroads must be consistently protected in this respect, so long as there is any element of competition between the carriers. Hence, great economy regarding this feature or others which might be suggested, could not reasonably be expected unless the railroads were permitted to, in some manner, pool their interests, subject, of course, to national supervision.

It would seem, too, that better results might be obtained both for the public and the carriers, if the latter were given a little more latitude in the management of their properties and the conduct of their business in general, subject only to national regulation.

From my viewpoint the greatest need of regulation, at the moment, is that which will enable or compel the carriers to so adjust their rates and regulate their service as to eliminate discriminations between communities, which in certain cases might be done by advancing rates or curtailing service without material injury to the public.

To this end I believe it would be mutually beneficial to the carriers and the public if the right to suspend rates were so modified as to give greater initiative to the career, and the jurisdiction of the Interstate Commerce Commission be so extended, or the co-ordination of that body and the state commissions made so complete, as to make it impossible for the action of the latter to in any wise nullify or affect the action of the former.

SHIPPER ADVOCATES CAR POOLING

By J. S. Marvin

General Traffic Manager, National Automobile Chamber of Commerce

A number of suggestions have been made for increasing the net revenue of the carriers, and many of them have opened discussion which is interesting and which will probably prove valuable, but I will devote the time and space allotted to me for a shipper's point of view to one subject on which all interests are fairly in accord and which it seems to me should have particular prominence at this time. Extensive results appear possible through a change in the American Railway Association's rules governing the interchange of its members' cars, or at least through the removing of a large proportion of such cars from the application of these rules.

The principle underlying car service rules from the beginning has been that each road is entitled to have its cars returned to the home rails when made empty on another road. While this appears as a natural statement of property rights, it is of very doubtful application under our present extensive railroad systems or in considering the best interests of the carriers, individually or collectively, and of the shipping public, which is entitled to have the several roads so organize themselves and their methods in certain respects as to constitute in effect one great system for the handling of the country's commerce. To illustrate: A freight car owned by the A. B. C. railroad is loaded today at a point on that road to a destination west of its own rails on the D. E. F. railroad. It is placed at destination on consignee's sidetrack, perhaps some distance from the breaking-up yard. The consignee unloads this car in the morning and the same day desires to load a carload of freight to a point still farther west, but the car service rules do not permit him to use this identical car, which must be returned, loaded or empty, to the home road. The railroad on which he is located is therefore required to take this car from his siding back to the yards and switch another car from the yards, or possibly from some other point on its line, into the factory for the outgoing load, notwithstanding

the fact that both cars are practically identical in size and carrying capacity. The cost of tracing and car accounting, telegraph service in the handling of equipment, empty car hauling, switching expenses, congestion of the yards and shippers' sidings, involved in the carrying out of these rules, is incalculable and must be tremendous when it is considered that these rules govern the handling of the more than two million freight cars now in service on our railroads. While the D. E. F. railroad is performing this service for one of its shippers, the A. B. C. railroad is doing the same where a D. E. F. car is on a factory siding empty and could be loaded east except for the rule. Similar conditions prevail in public freight yards.

The fact is that these rules, if enforced absolutely during periods of heavy traffic and car shortage, would cause interruption and delays in the handling of freight that would result in enormous losses to shippers. At such times the circumstances compel the railroads to ignore the rule to a very large extent, and we have the spectacle of railroads being forced to abandon an operating rule that they may handle commerce when it is at its height. In other words, instead of facilitating traffic the rule is impracticable and works contrary to the best interests of the carriers and the shippers as a whole when business is heavy, while on the other hand, when business is light and the carriers would like to reduce their operating expenses the rule is more closely complied with, particularly on account of the per diem system of charges under which each road tries to keep foreign equipment off of its rails as much as possible. Therefore, in periods of slack business we have the railroads undertaking a sort of solitaire on a great scale with freight cars as the cards, and thousands and thousands of these empty cars are hauled to get them onto the home rails, and we all know that there is no greater item of dead loss to the railroads than the hauling of empty cars.

Is this avoidable? Probably not entirely, but to a very great extent, yes, and in saying this I am not expressing an individual opinion that is contrary to the views held by operating officials. It is not a new suggestion. For years railroad operating officials of high standing have expressed themselves openly, and committees of railroad experts in this branch of the service have done the same, to the effect that the present rules should be changed, and succeeded in great part at least by a pooling arrangement that would obviate the stated difficulties and expense. Shipping interests are in favor of it. The National Industrial Traffic League has been urging the railroads for more than a year to take a definite step towards the change, realizing the greatly simplified service that would result where, instead of one car on a shipper's siding as used in the illustration quoted, they are more likely there in multiples of ten. This means that shippers must state in advance to the carrier serving them what shipments they have to move, the destinations and the routes, and the carrier then undertakes to furnish them cars that will answer the purpose according to the present rules which restrict cars to certain directions and routes, notwithstanding the fact that the shipper probably has on his siding all or most of the cars necessary, but of other ownership. And it is a daily occurrence for a shipper to be denied immediate service when empty cars are available, because the carrier will not permit him to load those particular cars in the direction the shipments must go, and he must wait until they can get other cars, although of identical size and carrying capacity. Should the suggested spotting charges be permitted a further injustice would be done the shipper in not permitting him to load the car already spotted. Such delays frequently mean a direct financial loss to the shipper through his inability to get bills of lading for goods ready to ship. It is also apparent that this condition enters very largely into the periodical so-called car shortages.

It is not contended that all cars could be pooled at once. Some roads have better cars than others; they are of greater carrying capacity; and there are a great many cars especially adapted to the particular traffic originating on the roads which built them; the financial obligations assumed by carriers in some cases for equipment must be properly protected. But these are details which could be worked out in view of the tremendous benefits to accrue, and considering the long time which this plan has been discussed and the endorsement it has had from experts it would seem that in this branch of railroad operation the shipping public is entitled to have the railroads make a definite start towards its accomplishment. It is true that a standard for box cars is now under consideration, whereby, hereafter, such cars would be built more nearly alike in dimensions, capacity and mechanical details. But the results of this proposal are at best a long way in the future and I see no reason why it should precede a start on the pooling proposition. There are thousands of cars now in service that are practically alike and a freer use of this large group would relieve the situation and make the application of the home and home rule more possible of enforcement on cars which really require it. And it must be borne in mind that owning roads today, even if they consider their cars better than others, have them returned in great part only when other roads have no use for them. The per diem charge for the use of box cars is the same regardless of their construction and capacity, and whatever plan adopted could properly recognize the roads which have furnished their full quota of equipment and reversely those that fail to do so.

At the recent meeting of the National Association of Railway Commissioners the Committee on Railway Service and Railway Accommodations stated in its report, "we are still impressed that too much time is lost in handling foreign equipment by empty movements or holding cars in order to load in the direction of home." The Interstate Commerce Commission has stated that the present rental and rules are sometimes not equal to the necessities of the situation and do not fully comply with the duties imposed by the act to regulate commerce, which requires reasonable regulation with respect to the interchange of cars so that through routes may be kept open. The commission characterized the stealing of equipment by one road from another as "loose and archaic methods of a disorganized industrial system" and "not the expression of civilization which leads to order, system and certainty" (22 I. C. C., 39). The American Railway Association has a commission of its own members to supervise the observance of car service rules, and this commission has stated that the sudden enforcement of drastic measures tending to return box cars to owners without regard to the traffic offered would result in a decrease in the loaded mileage of box cars that would result in new and greater shortages at all points in the country; it stated that while special equipment and open cars could probably be effectively regulated by the present rule, box cars cannot, because the practice of the home route for such cars is an economic waste. Therefore we have commissions, the shipping public and railroad officials in favor of a change. There has been any amount of discussion and recommendation on the subject, but "what's everybody's business is nobody's business." Such matters are usually of broad import and cover the entire field of certain industry. They become association business. By all means let the American Railway Association right now give one of its experts the particular and only task of formulating an up-to-date plan for free interchange of the thousands of box cars which are practically alike. The carriers' demands for increased rates have led to counter demands that all possible economies be effected. With cars now in plentiful supply and largely on home rails, and with traffic light, the situation is well in hand for the move. The time is opportune.

New Railway in Corea.—The Seoul-Gensan Railway was formally opened on September 6. Its construction was begun during the late war, but suspended until October, 1910, since which time the work has been carried on with vigor. The railway crosses the peninsula from east to west and is 141 miles in length.

Cars and Locomotives Ordered and Built in 1914

Equipment Market Was Poor, Particularly During Latter Half of Year. Grounds for Optimism Now, However

In 1914 railways and other purchasers of cars and locomotives in the United States, Canada and Mexico placed orders for 80,264 freight cars, 2,002 passenger cars and 1,265 locomotives. In the same period there were built in the plants of the various car and locomotive companies and the several railroad shops 104,541 freight cars, 3,691 passenger cars and 2,235 locomotives. These totals as a whole rank with the lowest yet experienced since the compilations of these figures were begun. It will surprise many to learn, however, that even with the war in Europe, the general business depression in America and the financial difficulties of the railways, the returns for the past year are much better than those for 1908 and that, in particular, the orders for freight cars were from 25 to 33 per cent and the orders for passenger cars approximately 50 per cent greater than in 1908.

The tables in the following pages contain detailed statements of the new freight cars, passenger cars and locomotives ordered by the railroads, private car lines and industrial companies of the United States, Canada and Mexico. Although the compilation of figures from such numerous sources is subject to some slight omissions however great the care taken, the results are sufficiently accurate to meet the general purpose for which these statistics are prepared, namely, to show the character and extent of the purchases of rolling stock in 1914 as compared with previous years.

The data given herewith are compiled from official sources. The *Railway Age Gazette*, in answer to its inquiries this year, received communications either stating that no cars or locomotives were ordered in 1914 or containing the details of orders, if such were placed, from all but three of those railroads in the United States, Canada or Mexico owning over 500 freight cars. It also received similar information from the greater part of the remaining smaller roads and from a majority of the private car lines. In those cases in which no replies were received the data were taken from the weekly records of the paper or from the reports of the builders.

These weekly records show that the orders for cars and locomotives held up exceedingly well during the first six months of the year, but that during the latter six months the number of orders placed was almost nil. It would be hard to find a clearer indication of the effect on the railways or on the railway supply companies of the war and the adverse rate decision, since superseded.

The total of freight cars ordered in 1914, 80,264, compares with a total for 1913 of 146,732. Of the 1914 total over 90 per cent were specified as having all-steel or steel underframes, and approximately 60 per cent as having friction draft gear. Another indication, also, of the tendencies in freight car construction is the total of 2,693 all-steel box cars. A surprising feature of slightly different nature is the fact that the orders for hopper cars in 1914 were less than 25 per cent of the number ordered in 1913.

The total of passenger cars ordered in 1914 was 2,002, as compared with 3,179 in 1913. All but 234 of the 1914 total were specified as being of all-steel construction or as having steel underframes. Of the locomotives ordered in 1914, 1,265, as compared with 3,467 in 1913, 970 or 78 per cent were specified as

Freight and Passenger Cars Built Each Year Since 1899.

Year.	Freight.	Passenger.	Total.
1899	119,886	1,305	121,191
1900	115,631	1,636	117,267
1901	136,950	2,055	139,005
1902	162,599	1,948	164,547
1903	153,195	2,007	155,202
1904	60,806	2,144	62,950
1905*	165,155	2,551	168,006
1906*	240,503	3,167	243,670
1907*	284,188	5,457	289,645
1908*	76,555	1,716	78,271
1909*	93,570	2,849	96,419
1910*	180,945	4,412	185,357
1911*	72,161	4,246	76,407
1912†	152,429	3,060	155,489
1913†	207,684	3,296	210,980
1914†	104,541	3,691	108,232

*Includes Canadian output.
†Includes Canadian output and equipment built in railroad shops.

Cars and Locomotives Ordered During Past 13 Years.

Year.	Locomotives.	Cars—Passenger.	Cars—Freight.	Year.	Locomotives.	Cars—Passenger.	Cars—Freight.
1901	4,340	2,879	193,439	1908	1,182	1,319	62,669
1902	4,665	3,459	195,248	1909	3,350	4,514	189,360
1903	3,283	2,310	108,936	1910	3,787	3,881	141,204
1904	2,538	2,213	136,561	1911	2,850	2,623	133,117
1905	6,265	3,289	341,315	1912	4,515	3,642	234,758
1906	5,642	3,402	310,315	1913	3,467	3,179	146,732
1907	3,482	1,791	151,711	1914	1,265	2,002	80,264

Locomotives Built for Every Year Since 1893.

Year.	No. Built.	Year.	No. Built.	Year.	No. Built.
1893	2,011	1901	3,384	1908*	2,342
1894	695	1902	4,070	1909*	2,887
1895	1,101	1903	5,152	1910*	4,755
1896	1,175	1904	3,441	1911*	3,530
1897	1,251	1905*	5,491	1912†	4,915
1898	1,875	1906*	6,952	1913†	5,332
1899	2,475	1907*	7,362	1914†	2,235
1900	3,153				

*Includes Canadian output.
†Includes Canadian output and equipment built in railroad shops.

Classification of Locomotives Ordered During the Past Four Years

	1914	1913	1912	1911
Mikado	333	796	1,309	590
Switching	201	638	821	443
Consolidation	166	823	858	577
Pacific	174	566	594	486
Santa Fe	63	...	...	...
Mallet	59	72	168	112
Ten-wheel	48	255	364	238
Atlantic	34	46	5	9
Mogul	24	42	61	127
American	19	8	8	27
Mountain	12	24	...	2
Electric	59	94	75	133
Other	73	103	252	106

Classification of Freight Cars Ordered During 1914

	All-steel a	Steel frame and steel underframe bc	Steel underframe b	Composite underframe d	Wood f	Not specified	Total	Draft Gear: Spring m	Friction n	Not specified
Box	2,693	8,698	25,005	1,902	1,714	200	41,212	13,905	25,884	1,423
Refrigerator	...	...	560	837	1,122	325	2,844	2,409	...	435
Hopper, including Ore	7,632	...	25	...	3	...	7,660	1,390	6,153	117
Gondola	15,570	110	866	30	15	950	17,541	3,792	12,699	1,050
Coal (not otherwise specified)	15	...	150	475	...	...	640	490	150	...
Stock	...	900	607	550	11	...	1,668	1,565	2	101
Flat	2,324	...	...	...	800	64	3,188	1,477	1,227	484
Tank	3,353	...	2	...	100	150	3,605	101	2,344	1,160
Caboose	4	10	115	200	21	55	405	237	85	83
Miscellaneous or not specified	38	252	666	...	266	278	1,501	365	253	883
Total	31,629	9,570	28,996	3,995	4,052	2,022	80,264	25,731	48,797	5,736

having superheaters and 767 or 60 per cent as being provided with brick arches. Another interesting feature is the prominence of the Mikado and Santa Fe types.

The returns relating to cars and locomotives built in 1914 have come from builders in both the United States and Canada and, as was the case in 1913 and 1912, the output of the several railroad shops is also included. Of the total of 104,541 freight cars built, 44,098 were of all-steel construction; 51,515 had steel underframes and only 8,928 were of wood. Of the 3,691 passenger cars built, 3,441 were of all-steel construction, 94 had steel underframes and only 156 were of wood.

Returns from the locomotive builders show that 2,235 locomotives were built, a considerable drop from the 3,467 of 1912. Of the total 1,962 were for domestic use and the remainder, 273, for export.

It does not take an optimist to see that 1915 will be a far more prosperous year for the railway equipment market than the year just past. That, to be sure, is not saying a great deal. It is almost universally agreed, nevertheless, that the tide has turned. The railroads have been awarded at least a considerable part of the 5 per cent increase for which they asked, and that combined with the opening of the stock exchanges should soon put them in a position to purchase the cars and locomotives for which many of them are in urgent need. The railway equipment builders are also beginning to receive new business from abroad, and several large orders have already been placed.

CLASSIFICATION OF PASSENGER CARS ORDERED DURING 1914

	All-steel a	Steel underframe b	Wood f	Not specified	Total	Method of Lighting: Electric x	Gas y	Electric and gas xy	Oil w	Electric and oil xw	Gas and oil yw	None	Not specified
Coaches and Smoking, including Comb. Coach and Smoking	795	148	20	12	975	900	31	10	12	10	...	...	12
Parlor and Chair	96	11	...	...	107	62	4	41	...	...	...	...	...
Dining	49	14	...	1	64	60	...	3	...	...	...	...	1
Comb. Passenger and Baggage	101	5	1	...	107	104	...	...	...	2	...	...	1
Comb. Passenger and Mail	3	...	1	...	4	3	1	...	...	...	...	...	...
Baggage	147	50	14	6	217	144	56	...	5	...	5	...	7
Comb. Baggage and Mail	89	15	10	4	118	60	32	...	10	2	10	...	4
Mail	49	14	2	...	65	34	21	...	...	...	10	...	...
Gas-electric and Gasolene	31	...	...	...	31	17	...	...	...	...	...	...	14
Miscellaneous	49	102	163	...	314	123	...	14	1	1	...	150	25
Total	1,409	359	211	23	2,002	1,507	145	68	28	15	25	150	64

FREIGHT CARS ORDERED IN 1914

Purchaser	No.	Kind		Builder
Alabama & Vicksburg	bn 7	Gondola	80,000	Amer. Car & Fdy.
	bn 34	Box	60,000	Amer. Car & Fdy.
Alabama Great Southern	am 25	Gondola	100,000	Pressed Steel
	am 36	Flat	100,000	Amer. Car & Fdy.
	bm 23	Box	60,000	Lenoir
Alberta & Gt. Waterways	fm 50	Box	60,000	National Steel
Aliqui-a & Southern	an 3	Hopper	200,000	Summers Steel
American Roling Mill Co.	an 6	Gondola	100,000	Pressed Steel
	an 1	Flat	150,000	Pressed Steel
Anderson, A. L., Bros.	an 2	Flat	100,000	Cambria Steel
Atchison, Top. & S. Fe	an 200	Tank	80,000	Pressed Steel
Atlanta & West Point	b 1	Scale test		Amer. Car & Fdy.
Atlantic Coast Line	fm 20	Caboose		Company shops
	an 350	Flat	60,000	Company shops
	an 100	Log	80,000	Cambria Steel
Bangor & Aroostook	an 89	Flat	80,000	Standard Steel
	bn 134	Box	60,000	Standard Steel
	bn 2	Stock	60,000	Standard Steel
	bn 5	Caboose		Amer. Car & Fdy.
Bessemer & Lake Erie	an 1,000	Gondola	100,000	Pressed Steel
	an 250	Hopper	100,000	Pressed Steel
	an 250	Hopper	100,000	Ralston Steel
	an 1,000	Hopper	100,000	Standard Steel
Bethlehem Steel Co.	an 1	St'l rf. gon.	100,000	Pressed Steel
Bingham & Garfield	an 2	Flat	100,000	Pressed Steel
	bcn 4	Box	100,000	Pressed Steel
Borough Ash Removal Co.	fm 15	Gondola	80,000	Mount Vernon
Boston & Albany	bm 905	Box	80,000	Amer. Car & Fdy.
	an 500	Gondola	100,000	Standard Steel
Boutwell, Milne & Varnum Co.	am 1	Grout	80,000	Laconia
Boyd & Harvey	fm 2	Flat	20,000	Laconia
	fm 2	Flat	8,000	Laconia
Buffalo Creek & Gauley	an 200	Hopper	100,000	Pressed Steel
Buff., Roch. & Pittsburgh	bn 500	Box	100,000	Standard Steel
	bn 500	Box	80,000	Standard Steel
Butler County	bm 5	Box	80,000	Amer. Car & Fdy.
	am 20	Flat	80,000	Amer. Car & Fdy.
	a 10	Flat	80,000	Amer. Car & Fdy.
Butte, Anaconda & Pac.	an 150	Ore	100,000	Western Steel
California Despatch	b 25	Box	80,000	Amer. Car & Fdy.
California Western R. R. & Navigation Co.	fm 1	Refrig.	60,000	Company shops
Cambria & Indiana	am 500	Hopper	100,000	Cambria Steel
Cambria Steel Co.	an 45	Coke	100,000	Cambria Steel
	bn 50	Gondola	100,000	Cambria Steel
Camden Coke Co.	an 1,000	Hopper	100,000	Pressed Steel
Canadian Explosives, Ltd.	am 2	Dump		Can. Car & Fdy.
Canadian Pacific	dm 87	Refrig.	60,000	Company shops
	bcm 450	Box	80,000	Company shops
	am 40	Ore	100,000	Can. Car & Fdy.
	am 150	Flat	80,000	Company shops
	dm 50	Stock	60,000	Company shops
	am 20	Ore	100,000	National Steel Car
Central of Georgia	bn 500	Box	80,000	Standard Steel
Central of New Jersey	a 1	Freight		Company shops
	b 11	Freight		Company shops
	d 1	Freight		Company shops
Central Vermont	f 28	Freight		Company shops
Charlotte Harbor & Nor.	an 30	Phosphate	80,000	Pressed Steel
Chesapeake & Ohio	an 1,000	Hopper	115,000	Standard Steel
	an 1,000	Gondola	115,000	Pressed Steel
Chicago & Alton	b 6	Freight		Company shops
	f 26	Freight		Company shops
	f 10	Refrig.	60,000	Amer. Car & Fdy.
	dm 475	Coal	80,000	Haskell & Barker
Chicago & Ill. Midland	an 250	Gondola	100,000	Haskell & Barker
	an 250	Gondola	100,000	Amer. Car & Fdy.
Chicago & North Western	bcn 3,000	Box	80,000	Amer. Car & Fdy.
	bcn 2,000	Box	80,000	Pullman
	bcn 250	Ballast	100,000	Rodger Ballast
	an 10	Tank	80,000	Amer. Car & Fdy.
Chicago, Burl. & Quincy	dm 500	Box	80,000	Haskell & Barker
	dm 1,000	Box	80,000	Haskell & Barker
	bcm 1	Box	80,000	Company shops
	am 1,250	Gondola	100,000	Haskell & Barker
	dm 750	Refrig.	80,000	Haskell & Barker
	dm 300	Stock	60,000	Company shops
	dm 200	Dbl. dk. stk.	60,000	Company shops
	bm 25	Way		Company shops
Chicago Great Western	an 200	Gondola	100,000	Amer. Car & Fdy.
	bcn 500	Box	80,000	Amer. Car & Fdy.
Chicago, Ind. & Louisville	bcn 254	Box	80,000	Haskell & Barker
Chicago Mill & Lbr. Co.	a 80	Flat	80,000	Amer. Car & Fdy.
	a 70	Flat	80,000	Amer. Car & Fdy.
Cin., N. O. & Tex. Pac.	am 66	Gondola	100,000	Pressed Steel
	bm 19	Box	60,000	Lenoir
Cleve., Cin., Chi. & St. L.	bn 18	Caboose		Company shops
	bn 2,000	Box	80,000	M. D. T. Co.
	bn 1,000	Box	80,000	Amer. Car & Fdy.
	bn 1,500	Box	80,000	Amer. Car & Fdy.
	an 2,500	Gondola	100,000	Standard Steel
Cleveland-Cliffs Iron Co.	1			Western Steel
Cumberland Valley	bn 60	Gondola	100,000	Penn. R. R. shops
Delaware & Hudson	b 20	Freight		Company shops
Delaware, Lack. & W.	an 350	Hopper	100,000	Cambria Steel
	an 500	Hopper	100,000	Amer. Car & Fdy.
	bn 400	Box	60,000	Amer. Car & Fdy.
	bn 250	Box	60,000	Western Steel
	bn 100	Automobile.	60,000	Western Steel
	bn 100	Automobile.	60,000	Western Steel
	bn 500	Gondola	80,000	Pressed Steel
	bcn 10	Caboose	60,000	Company shops
Dept. of Rys. & Canals	fm 6	Flat	30,000	National Steel
Duluth & Northern Minn.	2	Caboose		Peteler Car
	f 10	Flat	60,000	Company shops
	f 1	Stock	60,000	Company shops
Duluth, Missabe & Nor.	an 1,000	Ore	100,000	Western Steel
Dungannon Lbr. Co.	f 5	Logging	20,000	Amer. Car & Fdy.
Durham & Southern	f 2	Freight		Company shops
East Broad Top	am 40	Hopper	60,000	Company shops
	fm 1	Hopper	60,000	Company shops
	fn 2	Hopper	50,000	Company shops
East Tenn. & West. N. C.				
Edmonton, Dunvegan & B. C. Ry.	fm 50	Box	60,000	National
El Paso & Southwestern	an 50	Ore	100,000	Pressed Steel
Erie	an 10	Hopper	140,000	Standard Steel
	bn 200	Gondola	110,000	Standard Steel
	an 200	Hopper	100,000	Pressed Steel
	an 200	Hopper	100,000	Amer. Car & Fdy.
	an 200	Hopper	100,000	Standard Steel
	b 35	Freight		Company shops
	f 51	Freight		Company shops
Federal Furnace Co.	an 1	Ore	100,000	Pressed Steel
Florida East Coast	bn 500	Vent. box	60,000	Mount Vernon
Fonda, Johnstown & Gloversville	b 1	Caboose		Amer. Car & Fdy.
Forbes, W. S., & Co.	am 1	Tank	80,000	Pressed Steel
Frost-Johnson Lbr. Co.	f 11	Logging	50,000	Amer. Car & Fdy.
Ft. Dodge, Des M. & So.	fm 1,300	Box	60,000	Haskell & Barker
	fm 3	Way	60,000	Haskell & Barker

Purchaser	No.	Kind		Builder
Ft. Worth & Denver City	f 5	Freight ...	.....	Company shops
Georgia	f 4	Freight ...	.....	Company shops
Georgia So. & Florida...	bm 1	Vent. box.	60,000	Lenoir
Gillespie, L. C., & Sons.	a 3	Flat	80,000	Amer. Car & Fdy.
	a 10	Flat	60,000	Amer. Car & Fdy.
Grand Trunk	bcm 500	Stock	30,000	National Steel
Great Northern	fm 1,000	Refrig. ...	60,000	Haskell & Barker
Greenbriar, Cbeathem & Elk	f 25	Flat	80,000	Amer. Car & Fdy.
	f 25	Flat	80,000	Amer. Car & Fdy.
Hart Otis Car Company.	fm 70	Ballast	100,000	Can. Car & Fdy.
	am 12	Gen'l Serv.	100,000	Can. Car & Fdy.
Heinz, H. J., Co.	bn 2	Tank	100,000	German-American
Hocking Valley	an 1,000	Gondola ..	115,000	Amer. Car & Fdy.
	bcm 8	Gondola ..	100,000	Ralston Steel
	b 4	Caboose ...	.....	Company shops
Hudson Bay Cons. Co.	fm 50	Flat	60,000	Can. Car & Fdy.
Illinois Central	am 1,000	Gondola ..	100,000	Amer. Car & Fdy.
	bm 500	Refrig. ...	80,000	Amer. Car & Fdy.
	bcn 1,000	Box	80,000	Standard Steel
	bcn 1,000	Box	80,000	Haskell & Barker
	hcn 1,500	Box	80,000	Amer. Car & Fdy.
	bcn 1,500	Box	80,000	Western Steel
Illinois Southern	fm 300	Box	60,000	Haskell & Barker
Illinois Traction System..	dm 30	Gondola ..	100,000	Haskell & Barker
Imperial Oil Co., Ltd....	an 100	Tank	.....	Can. Car & Fdy.
	an 10	Tank	.....	Can. Car & Fdy.
	fn 100	Tank	8,000 g.	National Steel
	an 210	Tank	.....	Company shops
Independent Packing Co.	f 100	Refrig. ...	60,000	Amer. Car & Fdy.
Index-Galena Lbr. Co....	a 1	Logging ...	60,000	Bettendorf
Indian Refining Co.....	an 3	Tank	80,000	Chicago Steel Car
Interborough Rapid Tran.	am 10	Dump	.....	Magor
Intercolonial	bcm 200	Box	80,000	Nova Scotia
	bcm 180	Box	80,000	Can. Car & Fdy.
	bcm 180	Box	80,000	Eastern Car
	am 4	Pit	150,000	Eastern Car
	an 250	Gondola ..	100,000	Eastern Car
	am 200	Flat	80,000	Nova Scotia
Interstate	an 1	Test weight	.....	Pressed Steel
Jane Oil & Gas Company	100	Tank	.....	Penn. Tank Car Co.
	50	Tank	.....	Amer. Car & Fdy.
Kanawha & Michigan...	an 1,160	Gondola ..	100,000	Ralston Steel
	b 121	Freight ...	.....	Company shops
Kansas City Southern...	b 100	Ballast	100,000	Amer. Car & Fdy.
Keith Car Co.	an 219	Tank	100,000	Amer. Car & Fdy.
Kentwood & Eastern....	fm 30	Log	30,000	Selby Loco. & Mach.
Kingan Refrigerator Line	fn 5	Furniture..	60,000	Company shops
Lackawanna & Wyo. Val.	an 15	Hopper ...	100,000	Pressed Steel
Lake Champlain & Moriah	am 20	Gondola ..	120,000	Pressed Steel
L. Erie, Frank. & Clarion	bn 100	Coal	100,000	Standard Steel
Lake Shore & Mich. So.	b 8	Caboose ...	.....	Company shops
	b 10	Box	.....	Company shops
Lehigh & Hudson River.	an 20	Ore	100,000	Pressed Steel
Lehigh & New England.	b 1	Box	60,000	Amer. Car & Fdy.
	b 9	Caboose ...	.....	Amer. Car & Fdy.
Live Oak, Perry & Gulf.	b 8	Freight ...	.....	Company shops
	f 10	Freight ...	.....	Company shops
Live Poultry Trans. Co..	275	Poultry ...	.....	Haskell & Barker
Louer, W. B., Co.	am 2	Flat	.....	Western Steel
Louisiana Ry. & Nav. Co.	an 50	Flat	60,000	Amer. Car & Fdy.
	2	Work	80,000	Kilbourne & Jacobs
Louisville & Nashville...	b 500	Box	80,000	Company shops
	b 100	Stock	80,000	Company shops
	b 200	Vent. Box.	80,000	Company shops
	a 100	Flat	80,000	Company shops
	50	Caboose ...	.....	Company shops
	450	Gondola ..	100,000	Company shops
	200	Box	80,000	Company shops
	75	Refrig. ...	80,000	Company shops
	500	Gondola ..	100,000	Company shops
Lyon Cypress Lbr. Co...	a 1	Logging ...	60,000	Amer. Car & Fdy.
McCloud River	bcn 15	Box	80,000	Pullman
	fn 10	Flat	80,000	Company shops
Magnolia Cotton Oil Co.	a 10	Tank	80,000	Amer. Car & Fdy.
Manufacturers' Ry. Co. of St. Louis.	bn 50	Coal	100,000	Amer. Car & Fdy.
Marathon Lbr. Co.	f 60	Logging ...	60,000	Amer. Car & Fdy.
Michigan Central	b 144	Box	.....	Company shops
Milliken Refining Co.	an 50	Tank	100,000	Amer. Car & Fdy.
Mine LaMotte Lead & Smelting	an 9	Hopper ...	80,000	Ralston Steel
Mineral Point & Nor....	bm 6	Caboose ...	.....	Mount Vernon
Mineral Point Zinc Co..	an 25	Tank	100,000	German-American
Minn., Dakota & Western	fm 100	Flat	80,000	Haskell & Barker
Mississippi Eastern	a 1	Flat	80,000	Amer. Car & Fdy.
Missouri & No. Arkansas	bm 6	Caboose ...	.....	Mount Vernon
Missouri, Kansas & Texas of Texas	bn 200	Ballast	100,000	Amer. Car & Fdy.
Mobile & Ohio.	bm 1,008	Vent. Box.	60,000	Amer. Car & Fdy.
Montreal Harbor Com..	am 15	Coal	100,000	Can. Car & Fdy.
Morris & Co.	250	Refrig. ...	.....	Haskell & Barker
Mussens, Ltd.	am 2	Flat	80,000	Can. Car & Fdy.
New Eng. Coal & Coke Co.	an 200	Hopper ...	100,000	Pressed Steel
New Iberia & Northern.	1	Caboose ...	.....	Company shops
New Orleans & N'eastern	an 50	Gondola ..	100,000	Amer. Car & Fdy.
	bn 47	Gondola ..	80,000	Amer. Car & Fdy.
	bn 243	Box	60,000	Amer. Car & Fdy.
New York & Northeastern Cement & Lime Co...	a 6	Cement ...	.....	Amer. Car & Fdy.
N. Y. Cen. & Hud. River	bn 500	Box	80,000	Haskell & Barker
	bn 500	Box	80,000	Barney & Smith
	bg 33	Box	80,000	Company shops
	b 2	Caboose ...	.....	Company shops
	b 1	Poling	.....	Company shops
N. Y., Ont. & Western..	fm 3	Box	60,000	Company shops
N. Y., Phila. & Norfolk.	hm 2	Caboose ...	.....	Penn R. R. shops
Norfolk & Western.....	bn 38	Caboose ...	.....	Company shops
Northern Central	an 321	Box	100,000	Altoona shops
Nor. Ohio Trac. & Light.	am 4	Gondola ..	100,000	Ralston Steel
Northern Pacific	fm 300	Flat	70,000	Company shops
	amn 250	Ore	100,000	Western Steel
Northwestern Iron Co....	am 1	Flat	100,000	Western Steel
Northwestern Pacific ...	b 3	Caboose ...	.....	Standard Steel
Ocean Shore	b 4	Ballast	100,000	Rodger Ballast
Ohio Valley Elec.	f 2	Flat	50,000	Amer. Car & Fdy.
Pacific Great Eastern ...	bm 3	Refrig.	80,000	National Steel
	am 10	Gondola ..	100,000	National Steel
	bm 5	Stock	60,000	National Steel
	am 3	Caboose ...	.....	National Steel
	am 40	Flat	80,000	Can. Car & Fdy.
Pennsylvania	an 41	Box	100,000	Altoona shops
	an 1,000	Box	100,000	Altoona shops
	an 1	Caboose ...	.....	Altoona shops
	an 243	Box	100,000	Altoona shops
	an 321	Box	100,000	Altoona shops
Pensacola, Ala. & Tenn.	f 11	Freight ...	.....	Company shops
Phila., Balt. & Wash....	an 156	Box	100,000	Altoona shops
Pittsburgh & Lake Erie...	a 2	Well	.....	Company shops
Pittsburg & Shawmut...	am 750	Hopper ...	100,000	Amer. Car & Fdy.
	bm 25	Box	80,000	Amer. Car & Fdy.
	a 1	Flat	100,000	Amer. Car & Fdy.
Poitevent & Favre Lbr. Co	f 1	Caboose ...	.....	Amer. Car & Fdy.
Pressed Steel Car Co...	an 1	Ore	100,000	Pressed Steel
Quebec Harbor Comm...	am 2	Flat	80,000	Can. Car & Fdy.
Ray & Gila Valley	an 10	Gondola ..	160,000	Standard Steel
Raymond Log Loader Co.	fm 1	Flat	60,000	Mil. Ref. Trans.
Red River Lbr. Co.	60	Logging ...	.....	Seattle Car & Fdy.
Reid, Murdoch & Co....	am 2	Flat	80,000	Western Steel
Republic Iron & Steel Co.	an 16	Coke	100,000	Pressed Steel
Richm'd, Fred. & Potomac	b 15	Ballast	100,000	Rodger Ballast
Ringling Brothers	fm 11	Flat	80,000	Barney & Smith
	fm 10	Stock	80,000	Barney & Smith
Rutland	an 100	Hopper ...	100,000	Standard Steel
St. L., Browns. & Mexico	bm 200	Box	60,000	Amer. Car & Fdy.
	bn 600	Box	60,000	Amer. Car & Fdy.
	an 20	Tank	100,000	Amer. Car & Fdy.
	bn 10	Caboose ...	.....	Mount Vernon
St. Louis Refrig. Car Co.	b 114	Freight ...	.....	Company shops
St. Louis Southwestern..	bgn 1,260	Box	80,000	Amer. Car & Fdy.
	an 400	Flat	80,000	Amer. Car & Fdy.
	bn 100	Gondola ..	100,000	Amer. Car & Fdy.
	bg 240	Box	80,000	Amer. Car & Fdy.
	bg 120	Box	60,000	Amer. Car & Fdy.
	a 1	Flat	80,000	Amer. Car & Fdy.
	4	Flat	.....	Amer. Car & Fdy.
South Cons. Co.	bcn 462	Vent. Box.	60,000	Pressed Steel
Solvay Process Co.	an 50	Gondola ..	150,000	Amer. Car & Fdy.
	an 5	Gondola ..	100,000	Bettendorf
South Brooklyn	fm 26	Dump	.....	West'n Wb. Scraper
	a 2	Flat	50,000	Transit Dev. Co.
Southern	bm 1,450	Vent. Box.	60,000	Amer. Car & Fdy.
	bm 750	Vent. Box.	60,000	Mount Vernon
	bm 1,050	Vent. Box.	60,000	Lenoir
	bm 150	Box	60,000	Lenoir
	bm 100	Stock	60,000	Lenoir
	bm 25	Poultry ...	60,000	Lenoir
	dm 200	Caboose ...	.....	Lenoir
	bcn 2	Dynamometer	....	Lenoir
	am 500	Flat	100,000	Amer. Car & Fdy.
Southern Creosoting Co.	am 6	Flat	100,000	Pressed Steel
Standard Oil Co. of Ind.	a 11	Coke	60,000	Amer. Car & Fdy.
E. H. Stanton Co.	bm 4	Beer	60,000	Mil. Ref. Trans.
	fm 11	Beer	60,000	Mil. Ref. Trans.
	bm 50	Refrig. ...	60,000	Mil. Ref. Trans.
	bm 3	Beef	60,000	Mil. Ref. Trans.
Sumpter Valley	f 6	Freight ...	.....	Company shops
Sydney & Louisburg.....	bm 25	Hopper ...	30,000	Can. Car & Fdy.
Tacoma Eastern	fn 150	Flat	80,000	Company shops
Tennesee & No. Carolina	2	Caboose ...	.....	Company shops
Tennessee Copper Co....	am 10	Ore	100,000	Pressed Steel
Texas Company	an 17	Tank	60,000	Amer. Car & Fdy.
	an 350	Tank	80,000	Amer. Car & Fdy.
Texas, Okla. & Eastern..	f 23	Freight ...	.....	Company shops
Tidewater & Western....	f 1	Freight ...	.....	Company shops
Toledo & Ohio Central..	an 1,250	Gondola ..	100,000	Haskell & Barker
	an 1,250	Gondola ..	100,000	Ralston Steel
	an 1	Gondola ..	100,000	Ralston Steel
	bcm 2	Gondola ..	100,000	Ralston Steel
Toledo, Bowling Gr. & So.	dm 2	Box	60,000	Barney & Smith
Toledo, Peoria & Western	dm 400	Box	80,000	Haskell & Barker
Toledo, St. L. & Western	bcn 1,000	Box	80,000	Haskell & Barker
Toronto, Ham. & Buffalo	bn 3	Caboose ...	.....	National Steel
Tremont & Gulf.	an 65	Flat	80,000	Bettendorf
Union Pacific.	bgm 2,000	Box	100,000	Amer. Car & Fdy.
	bgm 2,000	Box	100,000	Western Steel
	am 600	Automobile	100,000	Western Steel
	bm 400	Stock	80,000	Western Steel
	am 1	Box	100,000	Bettendorf
	am 1	Automobile.	100,000	Bettendorf
Union Tank Line.	an 1,000	Tank	80,000	Amer. Car & Fdy.
	am 100	Tank	60,000	Amer. Car & Fdy.
	a 500	Tank	.....	Standard Steel
	a 500	Tank	6,500 g.	Standard Steel
U. S. Government.	am 4	Hopper ...	100,000	Mount Vernon
Universal Car & Mfg. Co.	am 3	Dump	40,000	Laconia
Utah Copper Co.	an 2	Flat	100,000	Pressed Steel
	bcn 4	Box	100,000	Pressed Steel
Utah Railway	am 500	Gondola ..	100,000	Pressed Steel
Verde Tunnel & Smelter.	an 5	Flat	100,000	Pressed Steel
Vicks., Shreve. & Pacific.	bn 2	Gondola ..	80,000	Amer. Car & Fdy.
	bn 23	Box	60,000	Amer. Car & Fdy.
Virginia & Carolina.	an 1	Flat	100,000	Pressed Steel
Virginia & S'western Ry.	am 850	Gondola ..	100,000	Pressed Steel
Virginian	an 1,000	Gondola ..	110,000	Standard Steel
West Jersey & Seashore.	an 9	Box	100,000	Altoona shops
Westmoreland Coal Co..	an 100	Hopper ...	100,000	Cambria Steel
	a 100	Gondola ..	.....	Cambria Steel
	a 100	Hopper ...	.....	Cambria Steel
Wood Products Co.	an 28	Tank	60,000	German-American
Yosemite Valley	fm 6	Box	60,000	Seattle Car & Fdy.
	am 10	Log	60,000	Seattle Car & Fdy.

a Indicates all-steel cars.
b Indicates steel underframe cars.
c Indicates steel frame cars.
d Indicates composite underframe cars.
f Indicates all-wood cars.
g Indicates steel end cars.
m Indicates spring draft gear.
n Indicates friction draft gear.

PASSENGER CARS ORDERED IN 1914

Purchaser	No.	Kind	Builder
Amer. Baptist Pub. Soc..	aw 1	Chapel	Barney & Smith
Arkansas Northwestern..	a 1	Gasoline Mech. Drive	McKeen
Arms Pal. Horse Car Co.	b 27	Horse	Barney & Smith
Atlanta & West Point...	4	Coaches	Amer. Car & Fdy.
Atlantic Coast Line.....	ax 2	Dining	Pullman
	ax 6	Coaches	Amer. Car & Fdy.
	ax 4	Baggage & mail	Amer. Car & Fdy.
	ax 4	Baggage & mail	Amer. Car & Fdy.
Bangor & Aroostook.....	bw 1	Baggage	Amer. Car & Fdy.
Bevier & Southern.....	fw 3	Coaches	Amer. Car & Fdy.
Bos., Rev. Beach & Lynn	fw 4	Coaches	Laconia
Bryan & Central Texas..	ax 2	Gas-electric	Hall-Scott
Butler County	a 1	Gasoline Mech. Drive	McKeen
Cambria & Indiana.....	bx 5	Storage battery	J. G. Brill Co.
Canadian Northern	bx 5	Postal	Preston Car
	fx 40	Colonist	Can. Car & Fdy.
	fx 15	Colonist	Crossen Car
	bx 7	Colonist	Crossen Car
	bx 11	Sleeping	Can. Car & Fdy.
	bx 2	Compt. sleeping	Can. Car & Fdy.
	bx 7	Obs. compt. sleeping.	Can. Car & Fdy.
	bx 7	Dining	Can. Car & Fdy.
	bx 7	Tourist	Can. Car & Fdy.
	fx 10	1st Class Coaches	Can. Car & Fdy.
	bx 7	1st Class Coaches	Can. Car & Fdy.
	bx 5	1st Class Coaches	National Steel
	bx 5	2nd Class Coaches	Can. Car & Fdy.
	fx 8	Baggage	Preston Car
	fx 3	Baggage	Crossen Car
	bx 15	Baggage	National Steel
Canadian Pacific	ay 12	Postal	Company shops
	ax 7	Dining	Company shops
Catholic Church Ex. Soc. of U. S. A.....	axw 1	Chapel	Barney & Smith
Central N. Y. Southern.	a 2	Gasoline Mech. Drive	McKeen
Central of New Jersey..	ax 30	Coaches	Har. & Hollingsworth
Central Vermont	f 2	Passenger	Company shops
Chicago & Eastern Ill...	ax 2	Postal	Pullman
Chicago Great Western..	a 1	Gasoline Mech. Drive	McKeen
Chicago, Mil. & St. Paul.	axy 4	Parlor	Barney & Smith
	axy 2	Compt. obs. parlor..	Barney & Smith
	axy 2	Cafe-observation	Barney & Smith
	axy 11	Sleeping	Barney & Smith
	axy 3	Obs.-sleeping	Barney & Smith
	axy 1	Dining	Barney & Smith
	axw 2	Pass. & baggage	Barney & Smith
	axw 2	Mail & baggage	Barney & Smith
	axw 10	Coaches	Standard Steel
Chic., St. P., M. & O...	ay 2	Coaches	Pullman
Cin., N. O. & Tex. Pac..	ax 2	Chair	Pressed Steel
	ax 1	Chair & baggage	Pressed Steel
Coal & Coke.....	fw 1	Baggage & mail	Pullman
	fw 3	Coaches	Pullman
Del., Lackawanna & West.	ax 12	Coaches	Pullman
	ax 96	Sub Coaches	Pullman
	ax 14	Pass. & baggage	Pullman
Denver & Rio Grande...	by 10	Baggage & mail	Amer. Car & Fdy.
Duluth & Iron Range...	ay 3	Mail, bagg. & express	Barney & Smith
East Tenn. & West. N. C.	fw 9	Baggage & Mail	Company shops
Electric Short Line.....	ax 3	Gas-electric	General Electric
El Paso & So. Western..	f 1	Passenger	Company shops
Erie	b 2	Passenger	Company shops
	bx 4	Parlor	Osgood-Bradley
	ax 7	Coaches	Pressed Steel
	ax 1	Pass. & baggage	Pressed Steel
Florida East Coast.....	ax 2	Dining	Pullman
Grand Trunk	ax 5	Postal	Pressed Steel
	hx 15	Suburban	Can. Car & Fdy.
	bx 40	1st Class Coaches	Can. Car & Fdy.
	bx 10	1st Class Coaches	Amer. Car & Fdy.
	bx 5	1st Class & bagg.	Amer. Car & Fdy.
	bx 17	1st Class Coaches	Osgood Bradley
	by 10	Baggage	Osgood Bradley
	by 5	Express	Osgood Bradley
	by 10	Baggage	National Steel
	bx 6	Dining	Pullman
	bx 5	Parlor	Pullman
	bx 1	Parlor-buffet	Pullman
	bx 1	Dining	Can. Car & Fdy.
	bx 1	Parlor-buffet	Can. Car & Fdy.
Great Northern	bx 30	Coaches	Barney & Smith
	f 75	Expr. refrig.	Barney & Smith
Green Bay & Western...	bw 1	Coach	Central Loco. & Car
Illinois Central	ax 4	Gas-electric	General Electric
	ax 1	Private	Amer. Car & Fdy.
Intercolonial	f 19	Exp.-refrig.	Comny shops
	bx 6	1st Class Coaches	Can. Car & Fdy.
	ax 8	Sleeping	National Steel
	ax 4	Sleeping	Preston Car
	by 2	Postal	Company shops
	by 4	Baggage	Company shops
Kanawha & Michigan....	ay 2	Baggage & mail	Amer. Car & Fdy.
	ax 5	Coaches	Amer. Car & Fdy.
Kewaunee, G. B. & W..	bw 1	Coach	Central Loco. & Car
Lake Erie & Western...	ax 3	Baggage & mail	Standard Steel
Lake Shore & Mich. So..	bx 1	Baggage	N.Y.C. & H.R. shops
Louisiana & Arkansas....	ay 1	Baggage & mail	Barney & Smith
Louisville & Nashville...	8	Coaches	Amer. Car & Fdy.
	6	Baggage	Amer. Car & Fdy.
	4	Baggage & mail	Amer. Car & Fdy.
	1	Dining	Amer. Car & Fdy.
Midland Valley	f 1	Pass. & baggage	Company shops
	f 1	Baggage	Company shops
Minneapolis & St. Louis..	ay 2	Postal	Pullman
Minnesota Northwest....	ax 1	Gas-electric	General Electric
Minn., St. P. & S. S. M.	a 1	Gasoline mech. drive.	McKeen
Minn., St. P. Roch. & Dubuque	a 2	Gas-electric	General Electric
Missouri & No. Arkansas	fy 1	Pass. & mail	Amer. Car & Fdy.
	ax 1	Gas-electric	General Electric
Missouri Pacific	ay 3	Postal	Amer. Car & Fdy.
	ay 4	Paper	Amer. Car & Fdy.
	ay 16	Baggage	Amer. Car & Fdy.
	ax 2	Baggage	Amer. Car & Fdy.
Missouri Pac. (Continued)	ay 11	Baggage & mail	Amer. Car & Fdy.
	ax 1	Pass. & baggage	Amer. Car & Fdy.
	ax 9	Compt. coaches	Amer. Car & Fdy.
	ax 23	Chair cars	Amer. Car & Fdy.
	ax 2	Cafe-parlor	Amer. Car & Fdy.
	ax 2	Parlor	Amer. Car & Fdy.
Mobile & Ohio.....	ax 4	Baggage & mail	Amer. Car & Fdy.
	ax 4	Baggage & express	Amer. Car & Fdy.
	ax 8	Coaches	Pressed Steel
Motley County	a 1	Gasoline mech. drive.	McKeen
Mt. Royal Tunnel & Ter.	ax 8	Suburban	Pressed Steel
Nash., Chat. & St. Louis.	ay 1	Baggage	Amer. Car & Fdy.
	ax 4	Postal	Amer. Car & Fdy.
	ax 6	Coaches	Amer. Car & Fdy.
	ax 3	Part. coaches	Amer. Car & Fdy.
	ax 2	Dining cars	Amer. Car & Fdy.
N. Y. Cen. & Hud. River	ax 3	Baggage	Company shops
	ax 4	Dining	Company shops
	f 1	Milk	M. D. T. Co.
New York Municipal....	ax 200	Subway	Amer. Car & Fdy.
N. Y., New Haven & H.	ax 30	Coaches	Osgood Bradley
	ax 50	Baggage	Osgood Bradley
	ax 10	Pass. & baggage	Osgood Bradley
	ax 10	Bagg. & mail	Osgood Bradley
	ax 6	Club	Standard Steel
N. Y., Phila. & Norfolk.	ax 2	Coaches	Standard Steel
Northern Central	ax 3	Pass. & baggage	Altoona shops
Northern Pacific	b 40	Exp. refrig.	Western Steel
	ax 21	Sleeping	Pullman
	ax 33	Coaches	Pullman
	ax 14	Smoking	Pullman
	ax 22	Mail & express	Pullman
	ax 17	Baggage	Pullman
	ax 6	Dining	Pullman
Northwestern Elevated...	ax 128	Elevated	Cincinnati Car
Northwestern Pacific....	ay 26	Coaches	Pullman
	ay 4	Chair	Pullman
	ay 6	Baggage	Pullman
	ayw 3	Baggage & mail	Pullman
	ayw 3	Mail & express	Pullman
Oregon Short Line.....	ax 1	Dining	Pullman
Ore.-Wash. R. R. & Nav.	axy 1	Observation	Pullman
	axy 2	Dining	Pullman
	axy 10	Coaches	Pullman
	axy 2	Parlor	Pullman
	ayw 5	Baggage	Pullman
	ayw 4	Bagg. & mail	Pullman
Pacific Electric	ax 22	Motor coaches	Pressed Steel
	ax 2	Motor pass. & exp.	Pressed Steel
Pacific Great Eastern....	ax 1	Gas-electric	Hall-Scott
	ax 3	Trailers	Can. Car & Fdy.
	by 3	Passenger	E. H. Wilson & Co.
Pennsylvania	ax 26	Pass. & bagg.	Altoona shops
Phila., Balt. & Wash....	ax 12	Pass. & bagg.	Altoona shops
Portland, Eugene & East.	ax 3	Elec. mail, bagg., exp.	J. G. Brill Co.
Quebec Central	fx 2	Postal	Company shops
Rutland	ax 9	Coaches	Amer. Car & Fdy.
	ax 2	Smoking	Amer. Car & Fdy.
	ax 3	Baggage	Standard Steel
	ax 3	Mail & smoking	Standard Steel
	ax 1	Postal	Pressed Steel
	f 8	Milk	M. D. T. Co.
St. Joseph Valley.....	ax 1	Gas. electric	Hall-Scott
St. Louis, B. & Mexico..	bx 6	Coaches	Amer. Car & Fdy.
	hw 4	Baggage & express	Amer. Car & Fdy.
	by 5	Baggage & mail	Amer. Car & Fdy.
San Diego & Arizona....	ax 1	Coach	Pullman
	ax 1	Pass. & baggage	Pullman
Seaboard Air Line.....	ax 15	Coaches	Pressed Steel
	ax 9	Pass. & baggage	Pressed Steel
	ax 9	Express	Pressed Steel
	ax 7	Postal	Pressed Steel
	ax 5	Baggage & mail	Pressed Steel
Southern	ax 36	Coaches	Pressed Steel
	ax 1	Chair & baggage	Pressed Steel
	ax 6	Baggage & mail	Amer. Car & Fdy.
	ax 2	Chair	Pressed Steel
	ax 5	Baggage & express	Amer. Car & Fdy.
	ax 5	Pass. & baggage	Pressed Steel
	ax 4	Dining	Barney & Smith
Southern Pacific	ax 50	Coaches	Pullman
	ax 1	Postal	Pullman
	a 3	Gasoline mech. drive.	McKeen
Spokane, Port. & Seattle.	ax 12	Coaches	Barney & Smith
	ax 3	Parlor	Barney & Smith
	ax 3	Mail & express	Barney & Smith
	ax 2	Baggage	Barney & Smith
	ax 1	Gas-electric	General Electric
Tenn., Kentucky & Nor..	a 1	Gasoline mech. drive.	McKeen
Texas & Pacific.....	ay 2	Postal	Amer. Car & Fdy.
Trona	ax 1	Gas-electric	Hall-Scott
Union Pacific	ax 18	Dining	Pullman
	ax 7	Observation	Pullman
	ayx 30	Chair	Pullman
	ayw 10	Postal	Pullman
	ax 2	Baggage & buffet	Pullman
	ax 15	Baggage	Pullman
	a 1	Gasoline mech. drive.	McKeen
U. S. Government.....	bx 2	Coaches	Wason
U. S. Gov't (Yuma Val.)	a 1	Gasoline mech. drive.	McKeen
Wabash	bx 7	Postal	Amer. Car & Fdy.
Wash., Balt. & Annapolis Elec.	ax 3	Pass. & baggage	Cincinnati Car
Waterloo, Cedar Falls & Northern	ax 4	Pass. & baggage	McGuire Cummings
	ax 3	Parlor	McGuire Cummings
West Jersey & Seashore.	ax 4	Pass. & baggage	Altoona shops
Willamette-Pacific	a 1	Gasoline mech. drive.	McKeen

a Indicates all-steel cars.
b Indicates steel underframe cars.
c Indicates steel frame cars.
d Indicates composite underframe cars.
f Indicates all-wood cars.
x Indicates electric lighting.
y Indicates gas lighting.
z Indicates acetylene lighting.
w Indicates oil lighting.

LOCOMOTIVES ORDERED IN 1914

Purchaser.	No.	Cylinders.	Total Weight.	Type.	Builder.
Alabama Central	†1	16x24	114,500	2-6-2	Baldwin
Alabama, Florida & So...	1	16x24	104,000	4-6-0	Baldwin
Alabama Great Southern.	*†1	27x30	277,000	2-8-2	American
Alexandria & Western...	†1	16x24	92,800	2-6-0	Baldwin
Arkansas Lbr. Co.	1	17x24	123,000	4-6-0	Baldwin
Asbestos & Asbestic Co..	1	13x16	60,000	0-6-0	Canadian
Atch., Top. & Santa Fe.	*1	26x26	293,000	4-6-2	Baldwin
Atlanta, Birm. & Atlantic	*†5	24x30	249,900	2-8-2	Baldwin
Atlantic Coast Line.	*†25	22x28	226,500	4-6-2	Baldwin
Baldry, Yerburgh & Hutchinson	1	15x22	91,000	0-6-0	Canadian
	2	15x22	87,000	0-6-0	Canadian
Baltimore & Ohio	*†1	30x32	407,000	2-10-2	Baldwin
	*†30	30x32	410,200	2-10-2	Baldwin
Bangor & Aroostook	*†5	23x30	183,000	2-8-0	American
Barrow & Hawkins			52,000	Geared	Heisler
Bingham & Garfield	*1	21x30	197,000	2-8-0	American
Bond Foley Lbr. Co.	1		104,000	Geared	Heisler
Bos., Rev. Beach & Lynn	†3	14x18	80,000	2-4-4	American
Brenner, Ferd, Lbr. Co.	1	12x16	50,000	0-6-4	Davenport
Brooklyn Cooperage Co.	1	15x20	72,000	2-6-0	Davenport
Brownell Imp. Co.	†1	20x24	148,800	0-6-0	Baldwin
Brydon, L. B., & Co.	1	5x10	12,100	0-4-0	Baldwin
Buckland, John M.	†1	20x26	149,700	0-6-0	Baldwin
Buckwalter, J. R., Lbr. Co.	†1	16x24	102,250	2-6-2	Baldwin
Buffalo Creek	*†3	22x26	206,500	0-8-0	American
Buffalo, Roch. & Pitts.	*†10	26½x30	278,000	2-8-2	American
	*†2	24½x26	261,000	4-6-2	American
	*†25	23½&37x32	429,000	2-6-6-2	American
Burton, E. P., Lbr. Co.	1	13x22	76,800	2-6-2	Baldwin
Burton-Swartz Cyp. Co.	1	16x24	109,000	2-6-2	Baldwin
Butte, Anaconda & Pac.	4		160,000	Electric	General Elec.
	3		80,000	Electric	General Elec.
Cairo, Truman & So.	1		84,000	Geared	Heisler
Calcasieu Long Leaf Lbr. Co.	1	16x24	110,000	2-6-2	Baldwin
California Western	1	12x12	120,000	Shay	Lima
Cambria & Indiana	1		.....	2-8-2	Baldwin
Canadian Northern	5	19x26	124,000	0-6-0	Canadian
	4		160,000	Electric	General Elec.
	2		160,000	Electric	Can. Gen'l Elec.
Canadian Pacific	*8	22½x28	225,000	4-6-2	Angus shops
	*5	22½x28	225,000	4-6-2	Angus shops
	*†2	23½x32	286,000	4-8-2	Angus shops
	*3	23½x30	241,000	0-10-0	Angus shops
	*5	19x24	138,000	4-6-0	Angus shops
	*8	19x24	138,000	4-6-0	Angus shops
Canton	1	19x24	118,000	0-6-0	Baldwin
Cape Girardeau Northern	2	18x24	113,200	4-4-0	Baldwin
	1	18x24	115,900	2-6-0	Baldwin
Carnegie Steel Co.	1	22x26	154,900	0-6-0	Baldwin
Carolina, Atl. & Western	3		.....	4-6-0	Baldwin
	1		.....	0-6-0	Baldwin
Car., Clinchfield & O.	*†2	25x30	280,300	4-6-2	Baldwin
Carolina Spruce Co.	1		.....	Shay	Lima
Carpenter-O'Brien Co.	3	16x24	113,550	2-6-2	Baldwin
Carr Bros.	1	9x14	36,000	0-6-4	Davenport
Central Vermont	*†3	20x28	188,000	4-6-0	American
Charleston & West. Car.	†1	19x24	122,300	0-6-0	Baldwin
Chesapeake & Ohio	*†6	28x29	325,500	2-8-2	American
	*†6	27x28	312,600	4-6-2	American
	*†14	22&35x32	428,000	2-6-6-2	American
Chetic'y Gyp. & Plas. Co.	1	13x18	60,000	0-4-0	Canadian
Chicago & Illinois Mid.	2	21x28	219,000	2-8-2	American
Chicago & North Western	*†10	22x26	231,000	4-6-2	American
	*†5	25x28	263,000	4-6-2	American
	*†25	27x32	303,000	2-8-2	American
Chic., Burlington & Q	*†10	30x32	377,100	2-10-2	Baldwin
	*†1	30x32	377,100	2-10-2	Baldwin
	*†15	30x32	377,100	2-10-2	Baldwin
Chic., Indianapolis & L.	*†5	28x30	341,000	2-10-2	American
Chicago Junction	*2	20x26	148,000	0-6-0	American
Chic., Mil. & St. Paul	*†25	26x30	275,000	2-8-2	American
	1		100,000	Electric	General Elec.
	12		520,000	Electric	General Elec.
Clev., Cin., Chic. & St. L.	*†10	21x28	170,000	0-6-0	American
Coal & Coke	2	22x28	183,000	2-8-0	Baldwin
Confederation Cons. Co.	2	13x18	60,000	0-4-0	Canadian
Connecticut Co.	2		50,000	Electric	Westinghouse
Conway Lbr. Co.	1	12x16	55,000	2-6-2	Baldwin
Cook Const. Co.	3	17x24	94,000	0-6-0	Davenport
Cranford Co.	1		.....	0-4-0	American
Cushing Traction Co.	1		100,000	Electric	Westinghouse
Death Valley	1	18x20	112,700	2-8-0	Baldwin
Delaware & Hudson	*†10	24x28	293,500	4-6-2	American
	*15	25x30	358,000	2-8-0	American
Del., Lackawanna & West.	*†4	25x28	290,000	4-6-2	American
	*†13	25x28	291,000	4-6-2	Lima
Delta Land & Timber Co.	*†1	25x28	295,000	4-6-2	Lima
	†1	18x24	143,400	2-8-2	Baldwin
	†1	17x24	124,500	2-8-2	Baldwin
Dempsey Lbr. Co.	1		124,000	Geared	Heisler
De Queen & Eastern	1	16x24	111,000	2-6-2	American
Detroit Terminal	*3	21x28	172,000	0-6-0	American
Detroit United	1		100,000	Electric	Westinghouse
Dewar, J. A., Co.	1	10x14	31,000	0-4-0	Canadian
Dill-Cramer-Truitt Corp.	†1	12x16	55,000	2-6-2	Baldwin
Dolese & Shepard	1	18x24	104,000	0-4-0	American
Duluth & Northeastern	2		.....	2-8-0	Lima
	2		.....	Shay	Lima
East Broad Top	1	19x24	147,000	2-8-2	Baldwin
Edmonton, Dunvegan & B. C.	1	19x26	130,000	2-6-0	Canadian
Erie	*†4	25x28	284,000	4-6-2	Baldwin
	*†1	31x32	416,000	2-10-2	Baldwin
Fort Smith & Western	†1	18x24	113,000	4-4-0	Baldwin
Fort Worth Belt	1	19x26	135,000	0-6-0	American
Forburgh Lbr. Co.	†1	14x22	87,350	2-6-2	Baldwin
Frost-Johnson Lbr. Co.	†1	18x24	107,000	2-6-2	Baldwin
Gainesville & Northwest'n	†1	16x24	106,750	4-6-0	Baldwin
Georgia	*†3	27x30	284,000	2-8-2	Lima
Georgia Coast & Piedmont	2	17x26	115,400	4-6-0	Baldwin
Georgia Southern & Flo.	*6	21x28	192,250	4-6-0	Baldwin
Gould Southwestern	*†1	13x18	55,650	2-6-0	Baldwin
Grand Trunk	*†6	21x26	247,000	4-6-4	Montreal
Great Lakes Stone & Lime Co.	5	12x18	56,200	0-4-0	Baldwin
Green Bay & Western	*1	19x26	139,000	2-6-0	American
Green River Lbr. Co.	1		46,000	Geared	Heisler
Guthrie, A., & Co.	3	20x26	135,200	0-6-0	Baldwin
	3	20x26	135,200	0-6-0	Baldwin
Harbor Comm. of Quebec	1	19x26	122,000	0-6-0	American
Hoboken Manufacturers'	1	21x26	157,000	0-6-0	Baldwin
Holly Ridge Lbr. Co.	1		64,000	Geared	Heisler
Holly Shelter Land Co.	1	12x16	53,400	2-6-0	Baldwin
Hudson Bay Cons. Co.	6	19x26	130,000	2-6-0	Canadian
Illinois Central	*†50	27x30	283,850	2-8-2	Baldwin
	*†22	21x26	169,000	0-6-0	American
	*†25		.....	0-6-0	American
Inland Steel Co.	1	20x24	130,000	0-6-0	American
Intercolonial	*6	24x32	232,000	2-8-0	Canadian
	*†5	21x26	154,400	0-6-0	Canadian
	*5	23½x28	248,400	4-6-2	Montreal
	*5	23½x28	247,400	4-6-2	Montreal
	*6	22x28	200,900	2-8-0	Can. Allis-Chal.
	*†4	21x26	150,000	0-6-0	Can. Allis-Chal.
Inter Mountain	4		.....		Lima
Island Central	1	10x16	56,000	0-4-4	Davenport
Issaquenna Lbr. Co.	1		52,000	Geared	Heisler
Jamestown Westfield & Northwestern	1		90,000	Electric	Westinghouse
Johnson, H. C., Co.	1		46,000	Geared	Heisler
Kettle River Co.	†1	17x24	91,000	0-6-0	Baldwin
Kewaunee, Green Bay & Western	*†1	19x26	128,000	2-6-0	American
Kneeland-West Lbr. Co.	†1	16x24	105,280	2-6-2	Baldwin
Laclede Gas Light Co.	1	13x18	57,350	0-4-0	Baldwin
Lake Erie, Frank. & Clar.	1	22x28	179,800	2-8-0	Baldwin
	1	18½x26	145,000	4-6-0	American
Laurel River Lbr. Co.	†1	18x24	94,000	2-6-0	Baldwin
Lehigh Coke Co.	1	20x26	148,000	0-6-0	Baldwin
Lehigh Valley Coal Co.	1	10x16	39,150	0-4-0	Baldwin
	1	10x16	37,500	0-6-0	Davenport
Lewisburg & Ronceverte	1		52,000	Electric	Westinghouse
Ligonier Valley	†1	18x24	121,900	4-4-0	Baldwin
London & Port Stanley	3		120,000	Electric	General Elec.
Louisiana Saw Mill Co.	1	16x24	85,300	2-6-0	Baldwin
Louisville & Jeffersonville Bridge	*†1	21x28	163,000	0-6-0	American
Louisville & Nasbville	*†24		.....	2-8-2	Company shops
	*†12		.....	4-6-2	Company shops
M'Cloud River	*1	20x28	178,700	2-8-2	Baldwin
McLean Hardwood Lbr. Co.	1		84,000	Geared	Heisler
McLean Lbr. Co.	1		84,000	Geared	Heisler
McNair, R., Shingle Co.	1	13½x18	70,200	0-6-0	Canadian
Macomb, Industry & Littleton	1	16x24	88,000	2-6-0	Davenport
Maine Central	*†7	26½x30	275,000	2-8-2	American
Manilla & Southwestern.	1	11x16	46,000	0-4-4	Davenport
Maryland & Pennsylvania	*†2	22x28	193,850	2-8-0	Baldwin
Marsch, John	2	10x16	37,500	0-4-0	Davenport
Mason County Logg. Co.	1	20½x28	175,000	2-8-2	Baldwin
Michigan Alkali Co.	†1	19x24	120,000	0-6-0	Baldwin
Midland Pennsylvania	†1	18x24	113,000	4-4-0	Baldwin
Minneapolis & St. Louis	*†15	24x30	258,000	2-8-2	American
Minn. St. P., Roch. & Dubuque	3		.....	Gas-elec.	General Elec.
	3	19x24	115,000	.....	Porter
Missouri & North Ark.	*3	23x28	194,000	2-8-2	Baldwin
	*1	20x26	168,000	4-6-0	Baldwin
Missouri Iron Co.	1	10x16	37,500	0-4-0	Davenport
Mo., Kan. Tex. of Tex.	*†30	26½x30	289,000	2-8-2	American
Mobile & Ohio	*8	24x30	220,600	2-8-2	American
Motley County	a 1	Gasoline	Mech.	Drive	McKeen
Mount Carbon Co., Ltd.	†1	19x26	137,000	2-6-0	Baldwin
Nash. Chat. & St. Louis	*†10		.....	2-8-2	Baldwin
	*†6		.....	4-6-2	Baldwin
Nevada Northern	*1	21x30	195,000	2-8-0	American
Newark, City of, N. J.	1	13x18	62,550	0-4-0	Baldwin
Newburgh & South Shore	1	20x26	126,000	0-6-0	Baldwin
New Ladysmith Lbr. Co.	1	12x26	57,000	2-4-2	Canadian
New Orleans & No. East.	*†5	22x28	206,800	4-6-2	Baldwin
	*†3	22x28	209,400	2-8-2	Baldwin
New Park & Fawn Grove	1	16x24	93,000	2-6-0	Baldwin
N. Y., New Haven & H.	1		260,000	Electric	General Elec.
Norfolk & Western	*†340	22&35x32	405,000	2-6-6-2	Baldwin
	12		540,000	Electric	West.-Bald.
Northwestern Iron Co.	†1	18x24	100,000	0-6-0	Baldwin
Northwestern Pacific	4	20x28	181,500	4-6-0	American
	2	21x28	198,000	4-6-0	American
	3	19x24	124,000	0-6-0	American
	4	19x26	159,000	4-4-0	American
	2	20x28	180,000	4-6-0	American
Oak Ridge Coal Co.	1	16x24	98,000	2-4-0	Davenport
Ocean Shore	2	20x26	141,000	2-6-0	Baldwin
Oregon Short Line	*†5	25x28	278,000	4-6-2	Lima
	*†5	19x26	154,682	0-6-0	Lima
Oregon-Washington	*4	19x26	154,682	0-6-0	Lima
Ozan Lbr. Co.	1	18x24	138,500	2-8-2	Baldwin
Pacific Great Eastern	*4	22x28	190,500	2-8-0	Canadian
	1	16x24	94,000	0-6-0	Davenport
Panama Pacific Exp.	1		160,000	Electric	General Elec.
	1		120,000	Electric	General Elec.
Pennsylvania	*†6	23½x26	240,000	4-4-2	Juniata shops
	*†28	23½x26	240,000	4-4-2	Juniata shops
	*†84	27x30	319,300	2-8-2	Juniata shops
Pere Marquette	*†5	25x28	256,500	4-6-2	Baldwin
Philadelphia & Reading	*10	21x24	173,490	4-4-0	Baldwin
	5		.....	.....	Company shops
Philadelphia Slag Co.	1		.....	0-6-0	Baldwin

*Indicates superheater. †Indicates brick arch. ‡Indicates compound.

Purchaser.	No.	Cylinders.	Total Weight.	Type.	Builder.
Phoenix Sand & Grav. Co.	1	10x16	37,000	0-4-0	American
Pittsburgh & Shawmut..	6	22x28	229,000	2-8-2	Baldwin
Portland Southeastern....	1	11x16	40,000	2-6-0	Davenport
Pub. Belt of New Orleans	*2	19x24	129,470	0-6-0	Baldwin
Purington Pav. Brick Co.	2	10x14	31,000	0-4-0	Davenport
Purity Cannel Coal Co...	1	8x12	21,550	0-4-0	Baldwin
Randolph MacDonald Co.	1		.....	0-4-0	American
Reed Cons. Co.....	1		.....	Shay	Lima
Richmond, Fredericksburg & Potomac.....	*†2	24x28	229,000	0-8-0	American
Roper, John L., Lbr. Co.	†1	13x22	78,000	2-6-2	Baldwin
	†1	13x22	78,350	2-6-2	Baldwin
Rowland Lbr. Co.....	†1	13x22	79,600	2-6-2	Baldwin
Russe & Burgess.....	1		46,000	Geared	Heisler
Rutland	*1	20x26	145,000	0-6-0	American
Ryan, Car Co....	1	14x20	80,000	0-4-0	Davenport
St. L., Brownsville & Mex.	*20	21x28	172,000	2-8-0	Baldwin
St. Paul Bridge & Term.	1	20x26	154,000	2-6-0	American
San Diego & Arizona....	1	22x30	216,500	2-8-0	American
	1	22x30	216,500	2-8-0	American
San Joaquin & Eastern..	1	18x24	110,950	4-6-0	Baldwin
San Pedro, Los Angeles & Salt Lake.....	*1	26x28	285,100	2-8-2	Baldwin
Scott, Fred K.....	1		46,000	Geared	Heisler
Scott Lbr. Co.....	1	12x18	55,400	2-4-2	Baldwin
Seaboard Air Line.....	*†10	27x28	319,000	4-8-2	American
	*†19	27x30	282,000	2-8-2	American
Seeds, Enos L.....	1	8x12	19,250	0-4-0	Baldwin
Serge Islct.....	1	7x12	18,500	0-4-0	Davenport
Shafer Bros. Log. Co...	1		126,000	Geared	Heisler
Shawmut Mining Co....	1	10x16	37,500	0-4-0	Baldwin
Solvay Process Co.....	*†2	20x26	157,000	0-6-0	American
South Dakota Central...	2	20x24	138,000	2-8-0	American
Southern	1	19x26	144,200	4-6-0	Baldwin
	*25	27x30	272,940	2-8-2	Baldwin
	*20	27x30	277,000	2-8-2	American
	*5	24x28	232,000	4-6-2	Baldwin
	*10	24x28	235,000	4-6-2	American
	*2	24x28	208,700	0-8-0	Baldwin
	13	20x26	145,000	0-6-0	Lima
Southern Aluminium Co.	1	17x24	150,750	2-6-2	Baldwin
Southern Pacific.....	*20	26x28	305,000	2-8-2	Lima
	*10	19x26	155,000	0-8-0	Lima
	*1	26x28	280,960	2-8-2	Baldwin
Standard Oil Co.....	1	19x24	108,000	0-6-0	Baldwin
Stimson, J. V., Hdw. Lbr. Co.....	1		52,000	Geared	Heisler
Sydney & Louisburg....	1	21x26	178,500	2-8-0	Montreal
Tampa & Gulf Coast....	3	19x26	144,000	4-6-0	Baldwin
Tennessee & North Caro.	1		.....	.....	Company shops
Tennessee Central.....	2	20x26	166,000	2-8-0	American
Texas Long Leaf Lbr. Co.	†1	15x20	89,200	2-6-2	Baldwin
Tex., Okla. & Eastern..	1	18x24	131,000	4-6-0	American
Transit Dev. Co.....	2		110,000	Electric	General Elec.
Trona	1	22x30	202,600	2-8-0	Baldwin
Tuscarora Valley	1		.....	4-6-0	Baldwin
Union Carbide Co. of Can.	1	15x24	90,000	0-4-0	Canadian
Union Freight.....	1	12x15	109,000	0-4-0	American
Union Pacific	*†15	26x28	286,117	2-8-2	Lima
	*†20	25x28	278,000	4-6-2	Lima
	*5	19x26	154,682	0-6-0	Lima
Valley & Siletz.....	1	17x24	119,000	2-6-2	Baldwin
Verde Tun. & Smelter..	*†2	21x26	160,000	0-6-0	American
Virginia & So. Western.	*2	27x30	277,000	2-8-2	American
	*1	21x28	192,250	4-6-0	Baldwin
Wakefield Iron Co.....	†1	17x24	100,550	0-6-0	Baldwin
Waterloo, Cedar Falls & Northern	5		120,000	Electric	Westinghouse
Western Ohio.....	1		70,000	Electric	General Elec.
Willamette Valley So....	1		100,000	Electric	General Elec.
Winnipeg, City of.....	1	19x26	132,000	2-6-0	Canadian

*Indicates superheater. †Indicates brick arch. ‡Indicates compound.

THE SEASON'S TRAFFIC THROUGH "SOO" CANALS

Colonel Mason M. Patrick, U. S. A., reports the amount of commerce through the canals at Sault Ste. Marie for the season of 1914 (242 days) as follows:

Articles		Eastbound U. S. Canal	Can. Canal	Total
Copper	tons	88,877	2,887	91,764
Grain	bu.	36,044,479	32,293,593	68,338,072
Building stone	tons	.....	.....	.....
Flour	bbls.	7,511,031	2,203,392	9,714,423
Iron ore	tons	10,516,927	20,893,142	31,410,069
Pig iron	tons	14,179	4,200	18,379
Lumber ....M. ft. B. M.		431,019	21,129	452,148
Wheat	bu.	52,190,614	98,093,481	150,284,095
General mdse.	tons	173,483	72,701	246,184
Passengers	No.	15,613	13,177	28,790
		Westbound		
Coal, hard	tons	1,906,418	334,087	2,240,505
Coal, soft	tons	10,240,259	2,006,457	12,246,716
Flour	bbls.	512	150	662
Grain	bu.	.....	.....	.....
Mfd. iron	tons	162,518	58,786	221,304
Iron ore	tons	.....	3,696	3,696
Salt	bbls.	676,892	100,316	777,208
General mdse.	tons	693,647	377,473	1,071,120
Passengers	No.	14,179	16,832	31,011
		Summary		
Vessel passages	No.	12,639	6,078	18,717
Reg. tonnage	net	24,690,381	17,295,958	41,986,339
Freight—				
Eastbound	tons	14,667,041	24,803,622	39,470,663
Westbound	tons	13,104,426	2,794,845	15,899,271
Total freight	tons	27,771,467	27,598,467	55,369,934

In all items except copper and salt the movement was considerably lighter than in 1913. The decrease in soft coal was 23 per cent, in wheat 27 per cent, in other grain 39 per cent, and in passengers 23 per cent.

DIVIDEND CHANGES

The accompanying table shows the changes in amount of dividends declared in the calendar year 1914 as compared with the calendar year 1913. In some cases dividends are declared in one year, payable in the next. Wherever this has occurred the table is based on the time when the dividend was declared, not when it was paid.

All the important changes were, as will be seen, reductions. The Atlantic Coast Line and Louisville & Nashville reductions reflect conservatism rather than absolute necessity, as does also the reduction and payment in scrip by the Southern Railway. The Michigan Central reduction indicates conditions with that company, and the Seaboard Air Line and Central of Georgia reflect temporary disappointment in plans which had been working out successfully, due to conditions in the South since the war. The Buffalo, Rochester & Pittsburgh reflects conservatism and the large falling off in business between the Lakes and Pittsburgh.

Dividend Changes

	Declared in 1914.	Declared in 1913.	Present annual rate.	Annual rate in 1913.
Atlanta & Charlotte Air Line.....	9	7	9	7
Atlantic Coast Line.....	6	7	5	7
Bangor & Aroostook.....	3½	3	4	*a*
Buffalo, Roch. & Ptgh.....	5	6	4	6
Central of Georgia, preferred.....	3	6	*b*	6
Chic., Indianapolis & Louis.....	None	3¼	Nothing	3¼
Chic., Rock Island & Pac. Ry.....	None	5	Nothing	5
Cincinnati Northern	None	1½	Nothing	1½
Colorado & Southern, preferred.....	None	4	Nothing	4
Delaware River R. R. & Bridge.....	4	6	2	6
Detroit & Toledo Shore Line.....	*c*	8	8	8
Fonda, Johnstown & Gloversville.....	None	2	Nothing	2
Hocking Valley	7	12	7	7
Louisville & Nashville.....	6	7	5	7
Michigan Central	4	6	2	6
Missouri, Kans. & Tex., preferred...	None	4	Nothing	4
Nevada County Narrow Gage.....	16	5	*d*	*d*
New Orleans & Northeastern.....	1	5	1	5
New York, Ontario & Western, common..	None	2	Nothing	2
Norfolk Southern	2	8	Nothing	8
Northern Central	*e*	8	8	8
Paterson & Ramapo.....	6	4	8	4
Pennsylvania Company	4	7	—	7
Pittsburgh & Lake Erie.....	10	15*f*	10	10
Pittsburgh, Cin., Chic. & St. L., pref..	4¼	5	4	5
Pittsburgh, Cin., Chic. & St. L., com..	3½	5	3	5
St. Louis Southwestern, preferred....	1½	4¾	Nothing	4
Seaboard Air Line.....	3	1	Nothing	4
Southern Railway	4½*g*	5	4	5
Union Pacific	*h*	8	8	10
Vandalia	None	4	Nothing	4
Vicksburg, Shreveport & Pac., com....	None	2	Nothing	2

a The annual rate to January, 1913, was 4 per cent, and in July, 1913, a semi-annual dividend of 1 per cent was declared, apparently reducing the annual rate to 2 per cent, which was, however, increased in 1914, as shown in the table.

b The stock is a 6 per cent cumulative stock.

c An extra dividend consisting of $315,000 first mortgage bonds was paid during the fiscal year ended June 30, 1914, to the parent company, the Toledo, St. Louis & Western.

d There is no regular annual rate for this stock.

e Besides the regular dividend of 8 per cent in 1914 an extra dividend of 10 per cent in cash and 40 per cent in stock was paid under the lease agreement of August, 1914, and also 28 per cent extra in cash, which represented the annual 8 per cent dividends on the stock dividend declared in January, 1911, and held up by the courts until August, 1914.

f The regular annual rate on the stock is 10 per cent, but in each year since 1909 up to and including 1913, extra dividends of varying amounts have been declared, the extra dividend in 1913 being 5 per cent.

g The reduced dividend of 2 per cent declared in October, 1914, was paid in interest bearing scrip.

h In January, 1914, an extra dividend, consisting of Baltimore & Ohio preferred to the amount of 12 per cent on the par value of Union Pacific and Baltimore & Ohio common to the amount of 22½ per cent on the par value of Union Pacific and $3 per share of Union Pacific, was declared and paid in July. The regular annual dividend, therefore, was reduced by 2 per cent, since the return on the extra dividend would amount to just about 2 per cent.

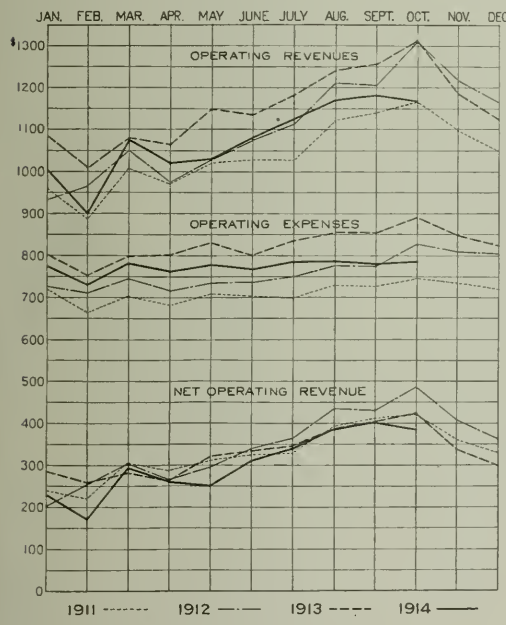
English Railwaymen's Union Invests in Municipal Stock.—The National Union of Railwaymen of England has recently effected an investment of $150,000 in stock of the Derby Corporation, Derby being headquarters of the Midland Railway.

The Trend of Railway Earnings in the Year 1914

Steadily Declining Gross Revenues Are Not Offset by Lower Operating Expenses Despite Economies

By Frank Haigh Dixon
Professor of Economics, Dartmouth College; Chief Statistician, Bureau of Railway Economics

So widespread has been the public interest in the application of the eastern railways for a 5 per cent increase in their freight rates and so much more detailed and exact than usual is the public information as to the financial condition of the railways in general, that a review of the trend of earnings during the year need be little more than a comment on the more significant statistics. Month by month for nearly two years, with only an occasional variation to relieve the monotony, the story has been the same—a slow but continuous fall in gross earnings, a failure to offset this decline altogether by the cutting of expenses in spite of determined attempts that have involved abandonment of many plans for maintenance work, and a resultant heavy decline in net earnings. With the constantly increasing burden of labor costs, the proportion of the expenses



Comparative Chart of Earnings and Expenses

that are fixed beyond the control of the carriers is becoming steadily larger. The result is that in periods of declining traffic the power of the roads to preserve their net by reducing expenses is being lessened. Only by such radical action as the laying off of employees and the reduction of train service can the situation be met in any degree.

Table I, based on the compilations of the Interstate Commerce Commission, presents the revenues and expenses for the fiscal years 1911 to 1914 of all railways having annual operating revenues of $1,000,000 or over, and includes about 90 per cent of the mileage of the country. Were the statistics for the other 10 per cent of the mileage available, the per mile figures would be somewhat less, but the relation of the different years would be only slightly affected. This table shows a figure for operating revenues per mile for 1914 in excess of that for 1911 and 1912, but less than 1913 by 3.4 per cent. Operating expenses could not be reduced in the same proportion, but were held almost stationary, showing an increase in 1914 over 1913 of 0.5 per cent. The result was that net operating revenue declined 12 per cent in 1914 as compared with 1913. In fact the net per mile is the lowest figure since 1908, the year following the panic. As the commission states in its decision on the rehearing of the 5 per cent case, "from whatever comparative standpoint viewed, the net operating revenues of the last fiscal year must be regarded as unduly low."

Depression in business never seems to reach the tax gatherers. The item of taxes shows handsome increases each year, the 1914 per mile figure being 9.6 per cent larger than that of 1913, 14.3 per cent larger than 1912, and 24.9 per cent larger than 1911. As a consequence per mile figures of operating income are even more discouraging than those of net earnings.

For the purpose of bringing the discussion down to include the latest available information, Table II has been prepared showing gross revenues, expenses and net per mile by calendar months for the years 1911 to 1914. It should be explained that the figures for the months of July to December for the years 1913 and 1914 are not exactly comparable with the rest of the figures, because of a change in accounting methods prescribed by the commission, effective July 1 of this year. However, this change does not disturb any of the conclusions to be drawn from the exhibit. It will be observed that operating revenues per mile in 1913 were larger than for either of the two previous years for every month except November and December. October would also have shown a decline except for a change in accounting methods. The year 1914 shows a decline from 1913 for every month thus far reported, the heaviest fall being 11 per cent in the months of February and October. In other words, a decline in earnings beginning in the fall of 1913 has continued since uninterruptedly. Operating expenses throughout the months of 1913 are larger than for the two previous years, although the increase was arrested in December and on the old accounting basis, would have been about at a standstill. The splendid efforts of the roads to meet the situation are shown in the 1914 figures, where the decline in operating expenses per mile shows an almost uninterrupted progress until it reaches the percentage of 11.8 for the last month reported. The outcome as shown in the net revenue columns is not so gratifying as these percentages of decline in operating expenses would lead one to expect. Declines in net operating revenue per mile are shown for every month of 1914 except March, and they run as high as 34 per cent in February and 22 per cent in May. To understand these great variations from month to month, one must take the three factors together of gross revenue, expenses, and net. For example, in March the gross earnings were nearly as large as in the previous year; the policy of economy had been inaugurated and expenses per mile were cut down 2.1 per cent. As a consequence net showed an increase of over 4 per cent. On the other hand, in October, the last month reported, gross fell off 11 per cent. Yet in spite of the fact that the slash in expenses was the greatest of any month of the year, it was impossible to neutralize the heavy decline in business, and net shows a 9.4 per cent decrease per mile as compared with 1913.

The statistics of this table are presented graphically. The heavy black line illustrates the 1914 situation. The striking features on this diagram are the relatively low position of the 1914 curve of operating revenues, the increasing gap between the 1913 and 1914 curves of operating expenses and the per-

sistent depression of the 1914 curve of net revenue below those of the three other years.

Table III presents for the year 1914 in comparison with 1913 the monthly revenues and expenses per mile from January to October, arranged by districts. This makes possible a localization of the favorable and unfavorable factors of the situation, which is obscured in a table presenting the facts for the country as a whole. But a glance at the table shows that roughly speaking, the conditions have been general and that no section thoroughly were the roads able to put their policies of economy into operation that five months showed increases in net revenue, and these included the last three months. The increase for September was nearly 7 per cent. In the west, the month of March alone showed an increase in net revenue, and October's decline amounted to 9.6 per cent. The south showed increases in three months, that for April being as large as 13.6 per cent, yet this favorable exhibit was more than offset by a decline in October of 31.6 per cent.

TABLE I—REVENUES AND EXPENSES IN THE AGGREGATE AND PER MILE OF LINE OF STEAM ROADS HAVING ANNUAL OPERATING REVENUES OF $1,000,000 OR OVER; FISCAL YEARS ENDED JUNE 30, 1914, 1913, 1912 AND 1911

	1914		1913		1912		1911		Increase or decrease per mile of line 1914 over 1913		1912		1911	
	Amount	Per mile of line	Amount	Per mile of line	Amount	Per mile of line	Amount	Per mile of line	Amt.	Per cent	Amt.	Per cent	Amt.	Per cent
Miles of line operated (average)	225,478	...	223,547	...	219,666	...	216,330	...	...	...	...	...	...	...
Total operating revenues	$2,991,391,325	$13,267	$3,069,326,784	$13,730	$2,768,963,853	$12,605	$2,708,791,199	$12,580	*$463	*3.4	$662	5.3	$687	5.5
Total operating expenses	2,155,134,734	9,558	2,126,813,364	9,514	1,914,960,351	8,717	1,857,102,048	8,625	44	0.5	841	9.6	933	10.8
Net operating revenue	836,256,591	3,709	942,513,420	4,216	854,003,502	3,888	851,689,151	3,955	*507	*12.0	*179	*4.6	*246	*6.2
Net revenue — outside operations	def. 1,941,606	def. 9	1,363,638	6	475,164	2	1,250,094	6	*15	...	*13	...	*15	...
Taxes	136,612,209	606	123,655,189	553	116,419,026	530	104,446,682	485	53	9.6	76	14.3	121	24.9
Operating income	697,702,776	3,094	820,221,869	3,669	738,059,640	3,360	748,492,563	3,476	*575	*15.7	*266	*7.9	*382	*11.0

* Decrease. def. Deficit.

seems to have escaped the business depression or to have failed to meet it in part by a curtailment of expenses. In the comparison of the monthly figures, the last month reported, October, showed that the unfavorable business situation had by that time affected railways generally, for there was a decline of 10 per cent in the east, 17 per cent in the south, and 9 per cent in the west. In the east and west, declines in operating expenses per mile appeared in every month, increasing in amount, and reaching in October, 14 per cent in the east and 9

What will be the effect of the commission's grant of the increase in rates to the eastern carriers, it is too early to state with any exactness. If it has its much predicted psychological effect and starts a revival in business, the roads should at least for a time gather the increase into their net revenue purse. How long such a happy state of things can continue will depend upon the amount of deferred maintenance which must be resumed, and upon the attitude of labor. If the brotherhoods feel that a large part of the increase belongs to them, they will

TABLE II—MONTHLY REVENUES AND EXPENSES PER MILE OF LINE: 1911, 1912, 1913 AND 1914

	Operating Revenues per Mile					Operating Expenses per Mile					Net Operating Revenue per Mile				
				1914					1914					1914	
Month	1911	1912	1913	Amount	Per cent Increase or decrease from 1913	1911	1912	1913	Amount	Per cent increase or decrease from 1913	1911	1912	1913	Amount	Per cent increase or decrease from 1913
January	$959	$932	$1,087	$1,005	*1.5	$720	$728	$803	$776	*3.4	$239	$203	$284	$229	*19.4
February	886	964	1,011	900	*11.0	664	210	752	729	*3.1	221	254	259	171	*34.0
March	1,010	1,051	1,081	1,076	*0.5	703	746	799	782	*2.1	307	305	282	294	4.3
April	970	974	1,065	1,021	*4.1	681	717	802	763	*4.9	288	257	262	258	*1.5
May	1,020	1,030	1,150	1,030	*10.4	709	735	830	779	*6.1	311	295	320	250	*21.9
June	1,028	1,075	1,135	1,079	*4.9	704	737	801	768	*4.1	324	339	334	311	*6.9
July	1,027	1,113	†1,183	†1,124	*4.9	699	750	†836	†785	*6.1	328	363	†347	†340	*2.0
August	1,122	1,211	†1,241	†1,171	*5.6	728	776	†853	†786	*7.9	394	435	†387	†385	*0.5
September	1,139	1,206	†1,257	†1,182	*6.0	727	775	†853	†780	*8.6	412	430	†403	†401	*0.5
October	1,166	1,311	†1,314	†1,169	*11.0	745	827	†891	†786	*11.8	421	484	†423	†383	*9.4
November	1,097	1,218	†1,186	...	....	734	809	†848	...	....	362	409	†338	...	....
December	1,050	1,165	†1,122	...	....	720	803	†824	...	....	329	362	†298	...	....

* Decrease. † Includes "outside operations" (Revenues and Expenses each average from $20 to $25 per mile).

per cent in the west. In the south there were increases in operating costs in five of the ten months reported, but the last month of October disclosed a vigorous handling of the situation. The percentage decline jumped from 4.7 per cent in September to 10.7 per cent in October. With these variations in gross revenue and the introduction of temporary and radical economies by railway executives, startling variations in net revenue are hardly to be wondered at. The east in 1914 as compared with 1913 showed declines in net per mile as heavy as 39 per cent in January and 56 per cent in February. Yet so

make the usual moves to put themselves in possession. But in the present temper of the commission, the shippers, and the people generally, they might well sit down and reason together before taking so hazardous a step. After all, the largest single advantage to the roads that will be realized from the commission's decision will be the restoration of confidence to the investing class—an assurance that regulation does not mean oppression, and that administration of public service industries involves reasonable rates from the standpoint of the carrier quite as truly as from that of the shipper.

TABLE III—MONTHLY REVENUES AND EXPENSES PER MILE OF LINE, JANUARY TO OCTOBER, 1914, BY DISTRICTS

	Eastern District						Southern District						Western District					
	Operating Revenues		Operating Expenses		Net Oper. Revenues		Operating Revenues		Operating Expenses		Net Oper. Revenues		Operating Revenues		Operating Expenses		Net Oper. Revenues	
Month of 1914	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913	Amt. per mile	Per ct. inc. or dec. from 1913
January	$1,661	*11.2	$1,380	*2.3	$280	*38.6	$927	*0.4	$687	2.0	$239	*6.9	$724	*6.0	$523	*6.3	$201	*5.2
February	1,474	*14.2	1,299	*1.9	174	*55.6	842	*5.4	635	*0.6	207	*17.8	651	*9.4	494	*5.3	158	*20.3
March	1,811	0.2	1,402	*0.6	409	2.7	973	1.9	685	1.7	288	2.6	767	*1.8	526	*5.1	242	6.3
April	1,751	*5.1	1,325	*6.8	427	0.9	893	4.6	669	1.9	223	13.6	723	*5.9	531	*5.0	191	*8.3
May	1,773	*12.3	1,370	*7.3	403	*26.1	881	*4.4	669	*2.7	212	*9.2	733	*10.2	541	*5.6	192	*21.0
June	1,860	*6.9	1,355	*5.1	505	*11.6	860	*0.2	646	1.3	214	*4.5	788	*3.9	536	*4.3	253	*2.9
July	1,939	*7.1	1,373	*8.7	566	*2.8	884	1.0	665	0.8	219	1.4	828	*3.9	553	*4.9	275	*1.6
August	2,044	*6.5	1,376	*10.1	667	2.0	887	*2.2	658	*2.2	229	*2.1	863	*5.2	556	*6.7	306	*2.2
September	2,024	*5.5	1,374	*10.4	649	6.9	859	*8.9	642	*4.7	217	*19.0	900	*5.1	553	*7.1	347	*1.4
October	1,963	*10.1	1,384	*13.9	578	0.2	861	*17.3	635	*10.7	226	*31.6	905	*0.3	561	*9.1	345	*9.6

* Decrease.

New Railway Construction Statistics for 1914

Less Track Was Laid in the United States Than for Any Year Since 1895. Canada Also Shows Decrease

During 1914, a total of 1,531.80 miles of new first track was completed in the United States. In the same period 565.58 miles of second track and 29.84 miles of other multiple main track was built and placed in service. In Canada, 1,978.07 miles of first and 152.50 miles of second track was built during the past year. No new mileage was reported from Mexico. These figures are based upon returns made directly to us by the different roads, supplemented by our own construction records, and are as complete as it is possible to compile at this time.

The mileage of new lines built in the United States was practically the same for the three preceding years. This year it fell to one-half the figure for these years, as shown by the accompanying tables and diagram. In 1913, 3,071 miles of new construction was reported, while in 1914 the amount of new line built was 1,532 miles—the lowest figure since 1895. The mileage of new line completed this year was only 25 per cent of that for 1902, the high record year.

The figures of new construction by years, beginning with 1893, are as follows:

1893	3,024	1904	3,832
1894	1,760	1905	4,388
1895	1,428	1906	5,623
1896	1,692	1907	5,212
1897	2,109	1908	3,214
1898	3,265	1909	3,748
1899	4,569	1910	4,122
1900	4,894	1911	3,066
1901	5,368	1912	2,997
1902	6,026	1913	3,071
1903	5,652	1914	1,532

New mileage was reported built in 1914 by 166 companies, including subsidiary companies of larger roads separately. No new or second-track mileage was added in Alaska, Arizona, Colorado, District of Columbia, New Hampshire or Vermont. For some years the state in which the largest new mileage has been built has been in the West. This year a Southern state, Florida, takes the lead, with 220 miles of new lines. Other states with over 100 miles of new lines are California, Idaho and Washington.

The longest continuous line reported completed last year was the extension of the Burlington from Casper, Wyo., to Orin Junction, 61 miles, and the next longest line was that of the Charleston, Atlantic & Western from Andrews, S. C., to Charleston, 57 miles. The Atlantic Coast Line also completed an extension from Dunnellon, Fla., to Wilcox, 50 miles. The greatest total mileage completed by any one road, including its subsidiaries, was built by the Chicago, Milwaukee & St. Paul, with a total of 122 miles. The Southern Pacific System was second, with 92 miles. Sixty-five per cent of the mileage of new lines was built in ten states.

Our reports show that 566 miles of second track was built in 1914 as compared with 1,264 miles in 1913, and 1,073 miles in 1912. This work was distributed through 30 states and territories, although 64 per cent was built in five states. The Chicago, Milwaukee & St. Paul led, with 110 miles of second track between Green Island, Iowa, and Manila. The Atlantic Coast Line completed 62 miles of second track between Selma, N. C., and Parkton, while the Northern Pacific completed 55 miles in Washington, and the Norfolk & Western completed 54 miles in Virginia.

The 30 miles of other multiple main tracks was divided between third track, 10 miles; fourth track, 19 miles; fifth, sixth, seventh and eighth tracks, each 0.1 mile. This was all composed of small projects, the largest of which were 5.35 miles of fourth track on the Delaware, Lackawanna & Western, in Pennsylvania, and 4.53 miles of fourth track on the Philadelphia & Reading, in New Jersey.

The above figures do not include the relocation and rebuilding

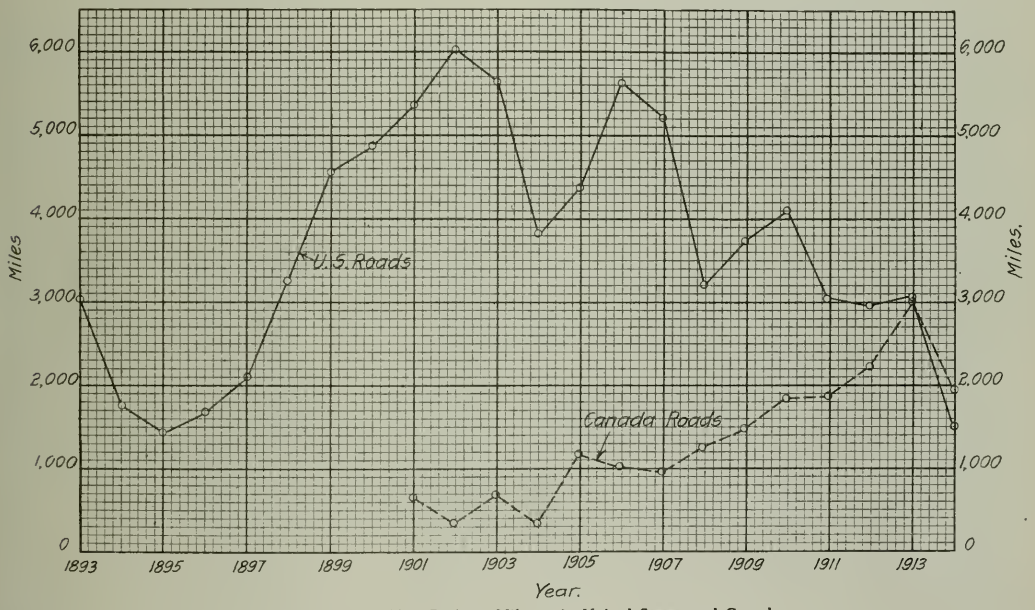


Diagram Showing New Railway Mileage in United States and Canada

of existing lines where the mileage is not increased. Thus, some of the most important projects now under way involving very heavy work, do not appear in the statistics.

At the close of the year, 1,015 miles of new first track was under construction and uncompleted in the United States, in addition to 1,229 miles of new lines surveyed and 2,031 miles projected. On the same date 71 miles of second track was under construction and 194 miles projected. On January 1, 1914, 1,522 miles of new line was under construction, 1,511 miles of additional line had been located and 1,296 miles was projected, while 408 miles of second track was under construction and 249 miles located or projected.

While the mileage of new lines built in Canada did not show as great a decrease as in the United States, the reduction there is also marked. There was 1,978 miles of first track and 152 miles of second track completed in 1914 as compared with 3,013 miles of new first track and 353 miles of second track in 1913. The Canadian Pacific built 620 miles of new line; and the Canadian Northern and its subsidiaries built 515 miles, while the Grand Trunk Pacific built 249 miles. Nearly all of this mileage is in western Canada. The construction of second track was confined entirely to the Canadian Pacific. At the present time, 465 miles of new first track is under construction in Canada, with 2,127 miles additional surveyed and 80 miles projected.

New Track Built in 1914.

United States—	No. Cos. building	First track	Second track	Third track	Fourth or more track	Total miles
Alabama	4	1.00	33.81	.....	.....	34.81
Arkansas	5	27.10	.50	.....	.....	27.60
California	9	103.91	18.94	.....	.....	122.85
Connecticut	1	.....	2.10	.....	.....	2.10
Delaware	2	1.15	.....	.....	1.00	2.15
Florida	7	220.46	.....	.....	.....	220.46
Georgia	5	14.66	7.84	.....	.....	22.50
Idaho	3	117.22	12.89	.....	.....	130.11
Illinois	6	3.17	9.24	1.61	2.29	16.31
Indiana	4	12.80	13.15	.....	2.26	28.21
Iowa	4	26.16	110.00	.....	.....	136.16
Kansas	2	11.00	.49	.....	.....	11.49
Kentucky	4	31.57	16.68	.....	.....	48.25
Louisiana	3	7.79	.....	.....	.....	7.79
Maine	2	.21	.61	.....	.....	.82
Maryland	2	.....	12.14	.....	.....	12.14
Massachusetts	2	.....	.13	1.50	1.35	2.98
Michigan	4	18.81	.....	.....	.....	18.81
Minnesota	2	8.42	.....	.....	.....	8.42
Mississippi	2	19.15	.....	.....	.....	19.15
Missouri	4	4.32	4.89	1.70	2.10	13.01
Montana	2	48.13	2.00	.....	.....	50.13
Nebraska	1	.88	.....	.....	.....	.88
Nevada	3	10.01	.70	.....	.....	10.71
New Jersey	2	.80	.....	1.16	4.53	6.49
New Mexico	2	29.47	.....	.....	.....	29.47
New York	6	10.45	9.90	.68	.....	21.03
North Carolina	5	34.00	71.61	.....	.....	105.61
North Dakota	4	63.24	4.33	.....	.....	67.57
Ohio	8	17.05	28.30	.....	.....	45.35
Oklahoma	1	4.00	5.00	.....	.....	9.00
Oregon	7	90.42	2.30	.....	.....	92.72
Pennsylvania	12	62.74	.97	.47	5.35	69.53
Rhode Island	1	.....	.....	.66	.66	1.32
South Carolina	2	66.60	.....	.....	.....	66.60
South Dakota	1	41.30	.....	.....	.....	41.30
Tennessee	4	11.21	45.56	.....	.....	56.77
Texas	6	50.86	.80	.....	.....	51.66
Utah	1	41.95	.....	.....	.....	41.95
Virginia	7	66.05	74.00	.....	.....	140.05
Washington	6	142.73	61.30	2.31	.....	206.34
West Virginia	4	19.80	5.99	.....	.21	26.00
Wisconsin	3	29.78	9.41	.....	.....	39.19
Wyoming	1	61.43	.....	.....	.....	61.43
Total	166	1,531.80	565.58	10.09	19.75	2,127.22
Canada	21	1,978.07	152.50	.....	.....	2,130.57
Mexico	..	.....	.....	.....	.....	.....

New Track Built in 1913.

United States—	No. Cos. building	First track	Second track	Third track	Fourth or more track	Total miles
Alabama	9	57.60	102.28	.....	.....	159.88
Arizona	4	19.71	92.91	.....	.....	112.62
Arkansas	8	139.29	6.00	.....	.....	145.29
California	11	164.41	65.15	.....	.....	229.56
Colorado	2	53.10	.....	.....	.....	53.10
Connecticut	1	.....	9.16	.....	.....	9.16
Florida	8	104.86	.....	.....	.....	104.86
Georgia	11	81.98	11.37	.....	.....	93.35
Idaho	3	76.67	23.90	.....	.....	100.57
Illinois	7	113.96	34.79	19.79	1.02	169.56
Indiana	4	6.74	104.12	.....	2.43	113.29
Iowa	4	28.66	150.00	.....	.....	178.66
Kansas	2	36.21	.....	.....	.....	36.21
Kentucky	7	48.34	43.12	.....	.....	91.46
Louisiana	4	44.43	.....	.....	.....	44.43
Maine	1	7.20	.....	.....	.....	7.20
Maryland	1	.23	1.54	.....	.....	1.77
Massachusetts	2	9.82	.75	1.70	.....	12.27
Michigan	7	103.93	.....	.....	.....	103.93
Minnesota	5	20.53	70.54	.....	.....	91.07
Mississippi	4	47.00	7.58	.....	.....	54.58
Missouri	4	30.25	3.63	.....	.....	33.88
Montana	6	375.11	1.75	.....	.....	376.86
Nebraska	3	26.47	41.80	.....	.....	68.27
Nevada	2	59.56	38.78	.....	.....	98.34
New Hampshire	1	7.47	.....	.....	.....	7.47
New Jersey	5	1.47	2.55	12.59	11.00	27.61
New Mexico	1	13.00	.....	.....	.....	13.00
New York	9	2.26	36.86	24.13	9.83	73.08
North Carolina	6	103.57	.....	.....	.....	103.57
North Dakota	6	152.08	.....	.....	.....	152.08
Ohio	6	28.00	78.48	13.79	14.78	135.05
Oklahoma	2	34.00	.....	.....	.....	34.00
Oregon	8	122.89	1.14	.....	.....	124.03
Pennsylvania	14	50.76	42.36	11.73	4.20	109.05
Rhode Island	1	.....	2.48	.....	.....	2.48
South Carolina	5	32.70	5.00	.....	.....	37.70
South Dakota	2	38.00	101.00	.....	.....	139.00
Tennessee	5	111.29	13.81	.....	.....	125.10
Texas	14	356.40	10.63	.....	.....	367.03
Utah	4	17.09	.....	.....	.....	17.09
Vermont	2	2.96	.....	.....	.....	2.96
Virginia	5	23.54	65.55	.....	.....	89.09
Washington	7	209.06	1.60	.....	.....	210.66
West Virginia	8	43.61	.33	4.64	.....	48.58
Wisconsin	4	9.38	78.39	.....	.....	87.77
Wyoming	3	55.53	14.53	.....	.....	70.06
Total	238	3,071.12	1,263.88	88.37	43.26	4,466.63
Canada	23	3,012.96	353.33	.....	.....	3,366.29
Mexico	2	38.20	.....	.....	.....	38.20

Canada

1901	658	1908	1,249
1902	342	1909	1,488
1903	687	1910	1,844
1904	316	1911	1,898
1905	1,181	1912	2,232
1906	1,007	1913	3,013
1907	976	1914	1,978

As would be expected, the disturbances in Mexico have caused an entire cessation of railway construction in that country, and no new mileage was reported.

The comparative amounts of various classes of new tracks built in each state during 1914 are shown in the two accompanying tables and in detail in data following.

UNITED STATES.

Alabama

First Track

	Miles.	Miles.
Atlanta, Birmingham & Atlantic—Helena to Falliston	1.00	1.00

Second Track

Louisville & Nashville—Decatur to Boyles	28.30	
Nashville, Chattanooga & St. Louis—Between Mile 123 and 129	2.91	
Southern Railway—Birmingham to North Birmingham	2.60	33.81
Total of all track		34.81

Arkansas

First Track

Butler County—To Piggott	2.24	
Cairo, Truman & Southern—Judd Hill beyond Weona	10.00	
Fourche River Valley & Indian Territory—Bellevue to Thornhury	4.86	
Helena, Parkin & Northern—To Woodville	6.00	
Little Rock, Maumelle & Western—Not specified	4.00	27.10

Second Track

Fourche River Valley & Indian Territory—Not specified	0.50	0.50
Total of all track		27.60

California

First Track

Central Pacific (So. Pac.)—Ten miles west of Susanville to Westwood, 21.00 miles; Oakland to Oakland Pier, 2.00 miles; at Fruitvale, 0.30 miles; total	23.30	
Colusa & Hamilton—Near Razor to North of Glenn	8.30	
Minkler Southern (A. T. & S. F. C. L.)—Between Minkler and Exeter	8.88	
Mount Tamalpais & Muir Woods—At Muir Woods	0.72	
Northwestern Pacific—Between Willets and Shively	32.80	
San Diego & Arizona—Coyote Wells to Westwood	8.80	
Southern Pacific—Oakland to Oakland Pier, 1.90 miles; Viola Junction to Viola, 8.50 miles; total	10.40	
Trona Railway—Between Trona and Searles	10.71	103.91

Second Track

Atchison, Topeka & Santa Fe Coast Line—Between Fresno and Calwa	3.25	

CALIFORNIA (*Continued*)

	Miles.	Miles.
Central Pacific (So. Pac.)—Colfax to east of Magra, 8.50 miles; Oakland to Oakland Pier, 2.00 miles; at Fruitvale, 0.30 miles; total	10.80	
Northwestern Pacific—Baltimore Park to San Rafael, 1.35 miles; San Anselmo to San Rafael, 1.54 miles; total	2.89	
Southern Pacific—Oakland to Oakland Pier	2.00	18.94
Total of all track		122.85

CONNECTICUT

Second Track

New York, New Haven & Hartford—New Milford south	2.10	2.10
Total of all track		2.10

DELAWARE

First Track

Maryland, Delaware & Virginia—Cut off to Lewes	1.15	1.15

Fourth Track

Philadelphia, Baltimore & Washington—At Wilmington, 0.37 miles; at Newark, 0.63 miles; total	1.00	1.00
Total of all track		2.15

FLORIDA

First Track

Atlantic Coast Line—Mildale to Eastport, 4.30 miles; Dunnellon to Wilcox, 50.10 miles; total	54.40	
East & West Coast—Between Bradentown and Arcadia	45.00	
Florida East Coast—Lokosee to Okeechobee	38.90	
St. Andrews Bay Railway & Terminal Co.—From A. & St. A. B. Ry., towards St. Andrews	1.00	
Seaboard Air Line—Spur near Early Bird, 4.87 miles; spur near Beaward, 1.96 miles; Bartow to Pembroke, 8.74 miles; Pembroke to Juneau Phosphate Plants, 3.59 miles; total	19.16	
South Florida & Gulf—Between Kenansville and Kissimmee river	6.00	
Tampa & Gulf Coast—Between Gulf Coast Junction and St. Petersburg	56.00	220.46
Total of all track		220.46

GEORGIA.

First Track

Greene County—Good Hope to Monroe	7.00	
Shearwood Railway—Harville to Nevill	1.66	
Waycross & Western—Sirmans to Milltown	6.00	14.66

Second Track

Central of Georgia—Macon to Terra Cotta	3.34	
Southern Railway—Between Armour and Crosskeys	4.50	7.84
Total of all track		22.50

IDAHO

First Track

Intermountain—Not specified	26.00	
Nezperce & Idaho—Lewiston to Tammany	10.00	
Oregon Short Line—Donnelly to Lakeport, 11.73 miles; Menan to St. Anthony, 27.23 miles; St. Anthony to Lincoln, 42.26 miles; total	81.22	117.22

Second Track

Oregon Short Line—Dingle to Pescadero	12.89	12.89
Total of all track		130.11

ILLINOIS

First Track

Chicago & Alton—Eldred to Macoupin creek	1.40	
Fredonia & Reed (Ill. Cent.)—Fredonia to Reeds	1.77	3.17

Second Track

Chicago & Alton—Atlanta to Lawndale	3.85	
Chicago & North Western—At West Chicago	1.36	
Chicago, Peoria & St. Louis—C. B. & Q. Junction to Jacksonville	0.55	
Louisville & Nashville—On St. Louis division	3.48	9.24

Third Track

Pennsylvania Lines West—In Chicago	1.61	1.61

Fourth Track

Pennsylvania Lines West—In Chicago	2.29	2.29
Total of all track		16.31

INDIANA

First Track

Chicago, Terre Haute & Southeastern—Libertyville to Jackson Hill Mine	3.00	
St. Joseph Valley—Angola to North Metz	9.80	12.80

Second Track

Chicagn & Erie (Erie)—Ohio State line to North Judson	13.15	13.15

Fourth Track

Pennsylvania Lines West—In Fort Wayne	2.26	2.26
Total of all track		28.21

IOWA

First Track

Cedar Rapids & Iowa City—Mt. Vernon to Lisbon	2.00	
Chicago & North Western—Miami south	0.63	
Waterloo, Cedar Falls & Northern—Waterloo to Cedar Rapids	23.53	26.16

Second Track

Chicago, Milwaukee & St. Paul—Between Green Island and Manilla	110.00	110.00
Total of all track		136.16

KANSAS

First Track

Anthony & Northern—Iuka to Byers	11.00	11.00

Second Track

Missouri Pacific—At Kansas City	0.49	0.49
Total of all track		11.49

KENTUCKY

First Track

Carolina, Clinchfield & Ohio—Pool Points to Kentucky-Virginia state line	0.50	
Lexington & Eastern (L. & N.)—Maloney to Tallega	5.07	
Louisville & Nashville—Winchester to Irvine	26.00	31.57

Second Track

Cincinnati, New Orleans & Texas Pacific—Crittenden to a point south of Williamstown	11.36	
Louisville & Nashville—Paris to Winchester	5.32	16.68
Total of all track		48.25

LOUISIANA

First Track

Mansfield Railway & Transportation Co.—Not specified	1.00	
Oberlin, Hampton & Eastern—Hampton south	4.00	
Ouachita & Northwestern—Not specified	2.79	7.79
Total of all track		7.79

MAINE

First Track

Bangor & Aroostook—Main line to St. John River bridge	0.21	0.21

Second Track

Maine Central—Augusta to East Augusta	0.61	0.61
Total of all track		0.82

MARYLAND

Second Track

Cumberland Valley (Penn. R. R.)—Mason-Dixon to S. O. Tower east of Hagerstown	3.46	
New York, Philadelphia & Norfolk—King's creek to Pocomoke	8.68	12.14
Total of all track		12.14

MASSACHUSETTS

Second Track

Boston & Albany—Chelsea to Cary Cut on Grand Junction branch	0.13	0.13

Third Track

Boston & Maine—At Lynn	1.50	1.50

Fourth Track

Boston & Maine—At Lynn	1.35	1.35
Total of all track		2.98

MICHIGAN

First Track

Boyne City, Gaylord & Alpena—Not specified	9.00	
Copper Range—From main line to Dollar Bay	0.90	
Detroit, Bay City & Western—Snover to Sandusky	8.00	
Munsing, Marquette & Southeastern—Extension of North East branch	0.91	18.81
Total of all track		18.81

MINNESOTA

First Track

Duluth, Missabe & Northern—Sharon to Shiras Mine, 0.93 miles; Helmer to Deacon Mine, 1.34 miles; Silver Yard to Prindle Mine, 1.91 miles; total	4.18	
Northern Pacific—Loerch to Wilcox Mine, 1.64 miles; Ironton to Duluth-Brainerd Mine, 2.60 miles; total	4.24	8.42
Total of all track		8.42

MISSISSIPPI

First Track

Cybur, Gulf & Northwestern—Cyhur to Picayune	10.00	
Yazoo & Mississippi Valley (Ill. Cent.)—Brazil to Swan Lake	9.15	19.15
Total of all track		19.15

Missouri

First Track

	Miles.	Miles.
Butler County—Linstead to Poplar Bluff	0.82	
Kansas City Terminal—In Kansas City	2.50	
Rolla, Ozark & Southern—Between Rolla and Anutt	1.00	4.32

Second Track

Kansas City Terminal—In Kansas City	4.60	
Missouri Pacific—At Kansas City	0.29	4.89

Third Track

Kansas City Terminal—In Kansas City	1.70	1.70

Fourth Track

Kansas City Terminal—In Kansas City	1.70	1.70

Fifth or More Tracks

Kansas City Terminal—In Kansas City, 0.10 miles each of fifth, sixth, seventh and eighth tracks; total	0.40	0.40
Total of all track		13.01

Montana

First Track

Chicago, Milwaukee & St. Paul—Roy Junction to Winifred, 23.00 miles; between Lewistown and Great Falls, 1.65 miles; between Lewistown and Grass Range, 1.50 miles; total	26.15	
Montana Eastern (Gt. Nor.)—Newton to Lamhert	21.98	48.13

Second Track

Chicago, Milwaukee & St. Paul—At Lewistown terminals	2.00	2.00
Total of all track		50.13

Nebraska

First Track

Hastings & North Western (U. P.)—In Hastings yard	0.88	0.88
Total of all track		0.88

Nevada

First Track

Nevada Short Line—Between Oreans or Nenzel and Rochester	9.00	
Tonopah & Tidewater—Gold Center to Beatty Junction	1.01	10.01

Second Track

Central Pacific (So. Pac.)—Sparks Yard	0.70	0.70
Total of all track		10.71

New Jersey

First Track

Central of New Jersey—At Manville	0.80	0.80

Third Track

Philadelphia & Reading—Between Hopewell and Belle Mead	1.16	1.16

Fourth Track

Philadelphia & Reading—Between Hopewell and Belle Mead	4.53	4.53
Total of all track		6.49

New Mexico

First Track

Denver & Rio Grande—Caliente to La Madera	16.44	
El Paso & Southwestern—Burro Mountain Junction to Tyrone	13.03	29.47
Total of all track		29.47

New York

First Track

Degnon Terminal—In borough of Queens, New York City	0.25	
Lehigh Valley—Seneca Junction to Lehigh Valley Junction, 5.71 miles; connection at Cayuga Junction, 0.48 miles; total	6.19	
New York Central & Hudson River—Extension of Rome branch at Rome	4.01	10.45

Second Track

Central New England—Highland to Loyd	2.30	
Long Island—Syosset to Cold Spring, 1.73 miles; in Flushing, 1.65 miles; total	3.38	
New York Central & Hudson River—Extension of Rome branch at Rome	4.22	9.90

Third Track

New York, New Haven & Hartford—Woodlawn Junction east	0.68	0.68
Total of all track		21.03

North Carolina

First Track

Atlantic & Carolina—Between Warsaw and Kenansville	10.00	
Virginia-Carolina—From North Carolina-Virginia state line to Jefferson	21.00	
Watauga & Yadkin River—From one mile west of Elkville to Dennys	3.00	34.00

Second Track

Atlantic Coast Line—Selma to Parkton	62.00	
Seaboard Air Line—Hamlet to Coguac	9.61	71.61
Total of all track		105.61

North Dakota

First Track

	Miles.	Miles.
Minneapolis, St. Paul & Sault Ste. Marie—Makoti to Van Hook	23.92	
Montana Eastern (Gt. Nor.)—Between Fairview, Mont., and Watford, N. D.	7.58	
Northern Pacific—Golden Valley to Kildeer	31.74	63.24

Second Track

Great Northern—Surrey to Minot	4.33	4.33
Total of all track		67.57

Ohio

First Track

Hocking Valley—At Pomeroy	1.60	
Lake Erie & Eastern (L. S. & M. S. and P. & L. E.)—Through Youngstown, 6.25 miles; connection with P. & L. E. at Youngstown, 0.64 miles; total	6.89	
Pennsylvania Lines West—Strasburg branch	7.92	
Pittsburgh & Lake Erie—Connection with L. E. & E. at Youngstown	0.64	17.05

Second Track

Baltimore & Ohio—Between Sherwood and Defiance	4.85	
Chicago & Erie (Erie)—Between Marion and Indiana state line	7.37	
Lake Erie & Eastern (L. S. & M. S. and P. & L. E.)—At Youngstown	0.64	
Pittsburgh & Lake Erie—At Youngstown	0.64	
Pittsburgh, Cincinnati, Chicago & St. Louis—Through Piqua, 2.26 miles; Alton to Glade Run, 7.59 miles; total	9.85	
Toledo Terminal Railroad Company—Not specified	4.95	28.30
Total of all track		45.35

Oklahoma

First Track

Oklahoma, New Mexico & Pacific—Between Ardmore and Ringling	4.00	4.00

Second Track

Oklahoma, New Mexico & Pacific—Not specified	5.00	5.00
Total of all track		9.00

Oregon

First Track

Columbia & Nehalem—Columbia towards Nehalem river	8.00	
Oregon & California (So. Pac.)—Extension Portland-Airlie branch, 0.30 miles; Newberg loop, 1.10 miles; Hillsboro loop, 1.70 miles; Forest Grove loop, 3.10 miles; at Whiteson, 0.10 miles; total	6.30	
Oregon-Washington Railroad & Navigation Co.—Vale to Riverton, 17.48 miles; between Coyote Junction and Stanfield, 2.34 miles; total	19.82	
Portland, Eugene & Eastern (So. Pac.)—End of Willamette Falls division to Willamette river, half mile south of Oswego	1.10	
C. A. Smith Timber Company's Line—South of Myrtle Point	4.00	
Willamette-Pacific (So. Pac.)—Northeast of Vaughn to near Acme, 47.00 miles; North Bend to Marshfield, 4.20 miles; total	51.20	90.42

Second Track

Oregon & California (So. Pac.)—Extension Portland-Airlie branch, 0.50 miles; Portland-Corvallis branch at Portland, 0.60 miles; total	1.10	
Sumpter Valley—Between Baker and Prairie	1.20	2.30
Total of all track		92.72

Pennsylvania

First Track

Baltimore & Ohio—Between Callery and Foxburg	0.30	
Bessemer & Lake Erie—Curtisville to Mine	3.43	
Buffalo, Rochester & Pittsburgh—Craigsville to end of line	2.61	
Gleasonton & Paddy's Run—Gleasonton to mines	8.50	
Lake Erie, Franklin & Clarion—Elss to Harvey mine	1.50	
Lehigh & New England—Crane Junction to Catasauqua,5.43 miles; Gap Junction to Palmerton, East, 1.23 miles; at Benders Junction connecting track, 0.29 miles; total	6.95	
Monongahela Railroad—Martin to Vanzandt	9.10	
Pennsylvania Railroad—Millbell to Cowansburg, 14.05 miles; extension of branch lines, 2.63 miles; total	16.68	
Philadelphia & Reading—In Philadelphia	0.52	
Pittsburgh & Shawmut (P. S. & N.)—Kittanning to Nicholson mines	7.00	
Pittsburgh, Cincinnati, Chicago & St. Louis—Langeloth to Verner mine	6.15	62.74

Second Track

Baltimore & Ohio—On Pittsburgh & Connellsville	0.97	0.97

Third Track

Philadelphia & Reading—At Philadelphia	0.47	0.47

Fourth Track

Delaware, Lackawanna & Western—West of Henryville to Analomink	5.35	5.35
Total of all track		69.53

Rhode Island

Third Track

New York, New Haven & Hartford—Pawtucket to Central Falls	0.66	0.66

RHODE ISLAND (*Continued*).

	Miles.	Miles.
Fourth Track		
New York, New Haven & Hartford—Pawtucket to Central Falls	0.66	0.66
Total of all track		1.32

SOUTH CAROLINA

First Track		
Charleston, Atlantic & Western—Andrews to Charleston	57.00	
Northwestern Railroad of South Carolina—Manville Junction to Rose Hill	9.60	66.60
Total of all track		66.60

SOUTH DAKOTA

First Track		
Fairmount & Veblen—Veblen to Grenville	41.30	41.30
Total of all track		41.30

TENNESSEE

First Track		
Louisville & Nashville—Maplewood to Brentwood Junction	9.71	
Tennessee Railway—Branch line extension	1.50	11.21
Second Track		
Illinois Central—Gibbs to Trimble, 18.46 miles; Dyersburg to Fowlkes, 4.14 miles; South Fork to Curve, 10.34 miles; total	32.94	
Louisville & Nashville—Maplewood to Overtons	4.65	
Nashville, Chattanooga & St. Louis—Chattanooga division, mile 2.22 to mile 4.93, 2.71 miles; between miles 123 and 129, 3.20 miles; mile 135.4 to mile 136.36, 0.96 miles; mile 147.4 to mile 148.5, 1.10 miles; total	7.97	45.56
Total of all track		56.77

TEXAS

First Track		
Galveston, Harrisburg & San Antonio (S.C. L.)—Bay Shore Junction to Seabrook	11.23	
Houston & Texas Central (S.C. L.)—Between Eureka and Stella Junction	1.23	
San Antonio, Uvalde & Gulf—Odem to Corpus Christi	17.30	
Texas & New Orleans (S.C. L.)—Turpentine to Angelina river	4.10	
Texas Southeastern—Between Neff and Bluff City	17.00	50.86
Second Track		
San Antonio, Fredericksburg & Northern—At Fredericksburg	0.80	0.80
Total of all track		51.66

UTAH

First Track		
Utah Railway—Utah Junction to Black Hawk, 21.10 miles; Provo to Thistle, 20.85 miles; total	41.95	41.95
Total of all track		41.95

VIRGINIA

First Track		
Carolina, Clinchfield & Ohio—Virginia-Kentucky state line to Bear Hollow	29.00	
Mill creek—Hotchkiss to The Wilderness	15.00	
New River, Holston & Western—Rocky Gap to Suitars	13.80	
Norfolk & Western—Connections at Norfolk, 0.20 miles; connection at Riverton, 0.05 miles; total	0.25	
Virginia-Carolina—Creek Junction to Virginia-North Carolina state line	8.00	66.05
Second Track		
Atlantic Coast Line—Between Stony Creek and Virginia state line	18.50	
Norfolk & Western—Not specified	54.31	
Southern Railway—Between Monroe and Amherst	1.19	74.00
Total of all track		140.05

WASHINGTON

First Track		
Goodyear Lumber Company's Line—West of Callum	2.50	
Great Northern—Between Wenatchee and Oroville	23.00	
Northern Pacific—Between Tacoma and Tenino, 31.74 miles; Edgecomb to Kruse spur, 3.79 miles; total	35.53	
Oregon-Washington Railroad & Navigation Company—Between Ayer Junction and Spokane	3.30	
Puget Sound & Willapa Harbor (C. M. & St. P.)—Maytown to Doty	38.00	
Seattle, Port Angeles & Lake Crescent (C. M. & St. P.)—Port Angeles west, 24.60 miles; Port Angeles to Dungeness river, 15.80 miles; total	40.40	142.73
Second Track		
Great Northern—Metum to Interbay	4.76	
Northern Pacific—Tacoma to Tenino, 42.72 miles—Easton to Lester, 11.97 miles; total	54.69	
Oregon-Washington Railroad & Navigation Company—In Spokane	1.85	61.30
Third Track		
Northern Pacific—Seattle to Inter Bay	2.31	2.31
Total of all track		206.34

WEST VIRGINIA

First Track		
Baltimore & Ohio—Magnolia cut-off, Orleans Road to Little Cacapon	12.00	

WEST VIRGINIA (*Continued*).

	Miles.	Miles.
Norfolk & Western—Extension King Mountain branch, 0.33 miles; Briar Mountain branch connection, 0.11 miles; Mate Creek branch, 6.05 miles; total	6.49	
Tug River & Kentucky (L. & N.)—Not specified	0.17	
Virginian Railway—Allen Creek branch	1.14	19.80
Second Track		
Norfolk & Western—Not specified	0.99	
Virginian Railway—Mullens to Taft	5.00	5.99
Fourth Track		
Baltimore & Ohio—Between Weaverton and Grafton	0.21	0.21
Total of all track		26.00

WISCONSIN

First Track		
Chicago, Milwaukee & St. Paul—Merrill northwest	17.00	
Chicago, St. Paul, Minneapolis & Omaha—Kaiser to Park Falls	5.99	
Fairchild & North-Eastern—Between Foster and Cleghorn	6.79	29.78
Second Track		
Chicago, Burlington & Quincy—Charme to Lynxville, 8.13 miles; between Purdy and Alma, 1.28 miles; total	9.41	9.41
Total of all track		39.19

WYOMING

First Track		
Chicago, Burlington & Quincy—Casper to Orin Junction	61.43	61.43
Total of all track		61.43

CANADA

First Track		
Alberta & Great Waterways—Edmonton, Alta., to Lac La Biche	137.00	
Canadian Northern—In Alberta, Brazeau branch, Saunders to Nordegg, 17.44 miles; In Manitoba, Grosse Isle branch, Chatfield to Hodgson, 27.18 miles; total	44.62	
Canadian Nortbern Alberta (Can. Nor.)—Near Mount Geekie	2.48	
Canadian Northern Ontario (Can. Nor.)—In Ontario, between Ottawa and North Bay, 130.00 miles; In Quebec, between Grenville and Montreal, 39.00 miles; total	169.00	
Canadian Northern Pacific (Can. Nor.)—In Britisb Columbia	248.00	
Canadian Pacific—In Manitoba, Gimli to Riverton, 26.00 miles; In Saskatchewan, Weyburn west mile 231 to mile 317, 86.00 miles; Expanse southwest mile 35 to mile 50, 15.00 miles; Assiniboia north to mile 7, 7.00 miles; In Alberta, between Swift Current and Bassano mile 94.5 to mile 230, 135.50 miles; Monitor-Kerrobert line, 72.00 miles; Alberta Central branch, 64.50 miles; Coronation northwest, 25.00 miles; Suffield southwest mile 57 to mile 84, 27.00 miles; Gleichen-Shepard line, 13.00 miles; In British Columbia, Kootenay Central, Edgewater to Skookumchuk, 67.00 miles; total	538.00	
Edmonton, Dunvegan & British Columbia—Sawridge, Alta., to Smoky River	124.00	
Esquimalt & Nanaimo (Can. Pac.)—Vancouver Island, B. C., Qualicum to Courtenay	36.00	
Essex Terminal—In Ontario, In town of Sandwich	1.10	
Glengarry & Stormont (Can. Pac.)—Between St. Polycarpe Junction, Ont., and Cornwall	27.00	
Grand Trunk Pacific—In British Columbia—between Hutton and Rose Lake, 217.30 miles; In Saskatchewan, Talmage to Weyburn, 14.50 miles; Central Butte to Riverhurst, 17.60 miles; total	249.40	
Greater Winnipeg Water District—Between St. Boniface, Man., and Indian Bay, Shoal Lake, Ont.	96.25	
Hudson Bay—Between The Pas, Man., and Port Nelson	120.00	
Intercolonial—In New Brunswick, Nelson to Nelson Junction, 2.69 miles; In Nova Scotia, North Sydney to Leitches Creek, 4.30 miles; total	6.99	
Lake Erie & Northern (Can. Pac.)—Between Galt, Ont., and Port Dover	19.00	
Quebec Central—In Quebec—to a point 10 miles east of St. Sabine	5.00	
Reid Newfoundland Co.—In Newfoundland not specified	33.00	
St. John & Quebec—In New Brunswick not specified	30.00	
Toronto, Hamilton & Buffalo—Smithville, Ont., to Dunville	14.90	
Vancouver, Victoria & Eastern (Gt. Nor.)—Coalmont, B. C., to Brooks	25.58	
Winnipeg & Northern (Can. Nor.)—Between Winnipeg, Man., and Grand Marais	50.75	1,978.07
Second Track		
Canadian Pacific—In Ontario, between Azilda and Cartier, 17.00 miles; Nemegos-Chapleau, 7.20 miles; Healy-Bolkow, 6.00 miles; White River-King, 9.30 miles; Salim-Pays Plat, 9.50 miles; Manitoba division, Kemnay to Broadview, 10.00 miles; Saskatchewan division, Broad view to Swift Current, 41.00 miles; British Columbia division, Revelstoke to Tranquille, 52.50 miles; total	152.50	152.50
Total of all track		2,130.57

SOUTH MANCHURIA RAILWAY TO BUILD LOCOMOTIVES FOR KOREA.—The shops of the South Manchuria Railway at Shahokou are now building locomotives for the companies' lines and have recently completed one of consolidation type. It is said that these shops will construct locomotives for the Korean railways, which are also of standard gage.

Mileage of American Railroads Block Signaled

A Total of Eighty-eight Thousand Miles. Nearly Thirty Thousand Miles Equipped with Automatic Signals

The mileage of railroad in the United States operated under the block system on January 1, 1915, as shown in the large table printed herewith, is 88,128 miles. The increase over the total given in our table of one year ago is 943 miles; but this comparison is somewhat inaccurate for reasons given with last year's statement. The more significant total is that of automatic block signal mileage; 29,689 miles of road, as compared with 26,123 reported a year ago and 26,569 reported a year ago by the government. This increase of something over 3,000 miles of automatic signaling compares with 3,827 miles increase in 1913. The year 1914 makes a better showing than was to have been expected. The 1913 increase was very large, compared with years before that. Now, as in former years, the smaller increase in the grand total is explained by the fact that a large mileage of automatic signals was installed to take the place of the manual or telegraph block system. The detailed comparison of the totals of the *Railway Age Gazette* tables for three years is as follows:

	Automatic		Manual		Total	
	Jan. 1.	Increase over prev. year.	Jan. 1.	Increase over prev. year.	Jan. 1.	Increase over prev. year.
1915.....	29,869	3,566	58,443	decrease	88,128	943
1914.....	26,123	3,827	61,062	5,127	87,185	8,954
1913.....	22,296	1,961	55,935	decrease	78,231	1,821

These figures are to be understood with the usual conditions, with which the reader is assumed to be familiar. Some of the roads with light traffic, reporting the manual block system in use, employ it usually only for passenger trains. A number of roads, notably the Pennsylvania, exclude from their statement of total mileage operated, all lines on which there is regularly in service only one locomotive. Our statements, like those issued by the government, deal only with passenger lines; yet a number of roads have installed automatic block signals on lines used exclusively for freight; and in some of the statements these freight lines have been included.

Four roads appear in the list this year for the first time: the Canadian Pacific, the Rock Island Southern, the South Dakota Central and the Western Maryland. The signals reported by the last-named road are automatic.

Below will be found the usual statements of proposed new work, including proposed interlocking signals. As in former years, many prominent roads reply that their plans for 1915 are not yet ready to be given out. The more important items of proposed new mileage are those under the heads of the Boston &

LINES IN CANADA WORKED BY BLOCK SYSTEM.

	Automatic miles of road	Manual miles of road	Total miles of road
Canadian Pacific (East of Fort William)....	226	4,428[1]	4,654
Canadian Pacific (Western Lines).....	...	....	....
Canadian Government (Intercolonial).....	43	....	43
Dominion Atlantic	...	273	273
Grand Trunk	2	3,619[3]	3,621
Michigan Central	245[2]	....	245
Toronto, Hamilton & Buffalo.....	62	....	62
Total	578	8,247	8,898

[1]Includes 366 miles double track; also includes 73 miles single track, worked by electric train staff.
[2]All double track.
[3]Includes 653 miles double track.

Maine, the Chicago, Milwaukee & St. Paul, the Delaware & Hudson, the El Paso & South Western, the Erie, the Great Northern, the Illinois Central, the Louisville & Nashville, the Alabama Great Southern and the Texas & Pacific. In two cases, and perhaps in others, automatic block signal items here noted refer to installations which are to take the place of the manual block system.

The Panama Railroad is now operated by the block system; automatic, 40 miles single track, 7 miles double track; manual, single track, 7 miles.

Canada.—The block system is now operated in Canada on 8,825 miles of road, of which 578 miles is automatic, as reported by the six companies given in the table in the previous column.

PROPOSED NEW WORK

The Atchison, Topeka & Santa Fe plans this year to install a mechanical interlocking plant of 20 levers, at Erie, Kan.; and the Gulf, Colorado & Santa Fe will install a similar plant at Longview, Tex.

The Baltimore & Ohio Chicago terminal is planning to extend its automatic block signaling 2.33 miles during the coming year.

The Boston & Maine expects to install automatic block signals this year on its line between White River Junction, Vt., and Wells River, 40 miles.

The Carolina, Clinchfield & Ohio expects to open during the coming year an extension to Elkhorn City, Ky., and on this line there will be automatic signals over a length of two miles, through Sandy Ridge tunnel, single track.

The Central New England plans this year to install automatic signals on two miles of new second main track.

The Chicago & North Western expects to install three electric interlocking plants at drawbridges during the coming year; two at Milwaukee, with 33 and 45 levers respectively, and one at Deering, Ill.

The Chicago, Milwaukee & St. Paul proposes this year to install automatic block signals on 101 miles of its line, double track, now operated by the manual block system.

The Chicago, Rock Island & Pacific plans to install this coming year an electric interlocking plant at Walnut street, Peoria, Ill., 28 levers.

The Cumberland Valley has under construction at Chambersburg, Pa., an electric interlocking plant of 24 levers.

The Delaware & Hudson expects to extend its automatic block signals about 23 miles during the coming year.

The Delaware, Lackawanna & Western plans to install an electro-pneumatic interlocking plant of 31 levers at the drawbridge over Buffalo river.

The Detroit, Toledo & Ironton expects to install interlocking plants during the coming year at three points, two of which are joint as between this road and the Detroit United Railways.

El Paso & Southwestern.—This company plans to install automatic block signals on 29 miles of road during the coming year.

The Erie plans during the coming year to install automatic block signals, in place of the manual block system, on 43 miles of road, double track, as follows: Solon, Ohio, to Cleveland, 16 miles, and Kent, Ohio, to Leavittsburg, 27 miles.

The Grand Trunk plans to install automatic block signals during the coming year on its line between Forty-seventh street, Chicago, and Thornton Junction, Ill., about 17 miles.

The Great Northern plans during the coming year to install automatic block signals on 200 miles of its line. The signaling plans for 1915 include also two mechanical interlockings at Duluth, 16 levers each; one of 22 levers at Aberdeen, S. D., and one of nine levers at Calumet, Minn.

The Illinois Central statement shown in the table includes 7 miles, automatic, single track, only recently completed, between Mercer, Ky., and Graham; and the Yazoo & Mississippi Valley includes 20 miles just finished on the line between Baton Rouge, La., and Kenner. These two installations are parts of a considerable program of new construction, the balance of which, about 195 miles, will be completed during 1915. This new work, yet

LENGTH OF RAILWAYS IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM, JANUARY 1, 1915.

Name of Railway	Miles of Road — Automatic: Single track	Automatic: Two or more tracks	Automatic: Total	Non-automatic: Single track	Non-automatic: Two or more tracks	Non-automatic: Total	Total both kinds	Total passenger lines operated	Percentage operated under block system
Albany Southern	...	...	...	27	16	43	43	43	100
Ann Arbor	...	...	...	1	...	1	1	...	...
Arizona & New Mexico†	1	...	1	...	...	...	1	...	...
Atchison, Topeka & Santa Fe (incl. Coast lines and Gulf, C. & S. F.).	122	441	563	1,021	510	1,531	2,094	9,905	21
Atlanta & West Point	...	6	6	...	...	...	6	86	13
Atlantic Coast Line	11	249	260	250	13	263	523	3,745	13
Baltimore & Ohio System:									
Baltimore & Ohio	39	351	390	1,925	789	2,714	3,104	3,104	100
Baltimore & Ohio Chicago Terminal	1	20	21	...	...	...	21	43	48
Baltimore & Ohio Southwestern	35	25	60	866	37	903	963	963	100
Cincinnati, Hamilton & Dayton	118	27	145	738	25	763	908	908	100
Baltimore, Chesapeake & Atlantic	...	...	...	87	...	87	87	87	100
Bangor & Aroostook	6	...	6	...	...	...	6	621	1
Bessemer & Lake Erie	...	...	...	65	129	194	194	186	100
Boston & Maine	499	627	1,126	...	...	...	1,126	2,220	50
Boston Elevated (elevated lines)	...	17	17	...	...	...	17	...	...
Boston, Revere Beach & Lynn	...	14	14	...	...	...	14	14	100
Buffalo, Rochester & Pittsburgh	140	83	223	175	41	216	439	408	100
Butte, Anaconda & Pacific	8	...	8	...	...	...	8	58	14
Canadian Pacific	...	...	...	199	...	199	199	...	...
Carolina & North Western	...	...	...	3	...	3	3	133	...
Carolina, Clinchfield & Ohio	10	...	10	...	...	...	10	256	...
Central New England	2	38	40	224	...	224	264	264	100
Central of Georgia	...	...	...	66	7	73	73	1,910	4
Central of New Jersey	41	201	242	...	...	...	242	466	52
Central Vermont	...	...	...	396	6	402	402	402	100
Chesapeake Beach	...	...	...	2	...	2	2	...	...
Chesapeake & Ohio†	...	455	455	1,532	21	1,553	2,008	2,008	100
Chicago & Alton	411	188	599	106	37	143	742	1,025	72
Chicago & Eastern Illinois	58	154	212	189	32	221	433	1,013	43
Chicago & North Western	208	927	1,135	2,565	25	2,590	3,725	7,332	51
Chicago & Western Indiana	...	21	21	...	7	7	28	28	100
Chicago, Burlington & Quincy	159	81	240	7,954	780	8,734	8,974	8,974	100
Chicago Great Western	257	86	343	48	...	48	391	1,471	25
Chicago, Indianapolis & Louisville	294	...	294	...	...	...	294	578	51
Chicago Junction	...	...	...	1	...	1	12	12	...
Chicago, Milwaukee & St. Paul	366	839	1,205	2,936	245	3,181	4,386	8,705	53
Chicago, Ottawa & Peoria	16	...	16	...	...	...	16	108	15
Chicago, Peoria & St. Louis	1	...	1	246	...	246	247	247	100
Chicago, Rock Island & Pacific	691	283	974	1,087	...	1,087	2,061	8,141	25
Chicago, St. Paul, Minneapolis & Omaha	22	173	195	464	1	465	660	1,672	...
Chicago, Terre Haute & Southeastern	1	...	1	...	...	...	1	...	...
Colorado Midland	...	...	...	2	...	2	2	...	...
Columbia & Puget Sound	10	9	19	...	...	...	19	51	37
Copper Range	...	...	...	80	...	80	80	78	100
Cornwall & Lehanon	...	...	...	9	13	22	22	22	100
Cumberland & Pennsylvania	...	...	...	4	3	7	7	31	...
Cumberland Valley	4	56	60	106	...	106	166	164	100
Delaware & Hudson	164	247	411	...	35	35	446	802	55
Delaware, Lackawanna & Western	285	533	818	...	...	...	818	964	84
Denver & Salt Lake†	...	...	...	35	...	35	35	214	...
Duluth & Iron Range	...	17	17	...	...	...	17	200	7
Durham & Southern	...	...	...	57	...	57	57	59	96
Elgin, Joliet & Eastern	7	3	10	9	...	9	19	...	...
El Paso & Southwestern	159	...	159	...	...	...	159	1,027	...
Empire United (electric)	40	6	46	...	...	...	46	...	...
Erie[1] (including controlled lines)	28	894	922	655	230	885	1,807	2,218	77
Florence & Cripple Creek	...	...	...	5	...	5	5	96	...
Fort Dodge, Des Moines & Southern	18	...	18	102	...	102	120	126	95
Grand Trunk	...	81	81	842	242	1,084	1,165	1,165	100
Great Northern	189	346	535	320	...	320	855	6,905	12
Hocking Valley	2	...	2	239	...	239	241	338	71
Hudson & Manhattan†	...	9	9	...	...	...	9	9	100
Illinois Central	187	433	620	5	...	5	625	4,572	13
Yazoo & Mississippi Valley	31	...	31	...	...	...	31	1,370	2
Illinois Traction	120	2	122	...	...	...	122	443	27
Interhorough Rapid Transit Co. (New York)	...	7[2]	7	...	...	...	7	63	...
Kanawha & Michigan	2	...	2	2	...	2	4	164	...
Kentucky & Indiana Terminal†	...	...	...	3	8	11	11	11	100
Kentwood & Eastern†	...	...	...	3	...	3	3	30	...
Lackawanna & Wyoming Valley	...	...	...	1	2	3	3	23	...
Lehigh & Hudson River	72	...	72	...	...	...	72	75	100
Lehigh & New England	3	...	3	...	...	...	3	73	...
Lehigh Valley	71	515	586	594	52	646	1,232[2]	1,218	100
Ligonier Valley	...	...	...	14	...	14	14	14	100
Long Island	...	114	114	29	10	39	153	361	42
Louisville & Nashville	215	55	270	112	46	158	428	4,714	9
Maine Central	437	63	500	...	...	...	500	1,103	45
Portland Terminal	5	12	17	...	...	...	17	18	...
Maryland, Delaware & Virginia	...	...	...	78	...	78	78	78	100
Minneapolis & St. Louis	...	...	...	11	...	11	11	1,538	...
Minneapolis, St. Paul & Sault Ste. Marie	...	...	...	1,422	12	1,434	1,434	3,489	40
Missouri, Kansas & Texas	102	10	112	10	...	10	122	3,175	3
Missouri Pacific	59	38	97	3,541	10	3,551	3,648	3,889	93
St. Louis, Iron Mountain & Southern	114	13	127	2,640	169	2,809	2,936	3,254	90
Mobile & Ohio	5	...	5	38	...	38	43	949	4
Monongahela†	...	2	2	...	...	...	2	59	...
Munising, Marquette & Southeastern	...	...	...	4	...	4	4	119	...
Nashville, Chattanooga & St. Louis	...	...	...	111	...	111	111	1,230	9
Newburgh & South Shore	...	...	...	1	5	6	6	...	...
New York & Long Branch	...	38	38	...	...	...	38	38	100
New York Central Lines:									
Boston & Albany	3	209	212	...	1	1	213	378	56
Chicago, Indiana & Southern	5	...	5	239	59	298	303	303	100
Cleveland, Cincinnati, Chicago & St. Louis (incl. Peoria & E.)	24	98	122	561	283	844	966	1,865	51
Lake Erie & Western (incl. Northern Ohio)	48	9	57	815	...	815	872	872	100
Lake Shore & Michigan Southern	28	577	605	1,007	44	1,051	1,656	1,662	...
Dunkirk, Allegheny Valley & Pittsburgh	...	...	...	90	...	90	90	90	100
Lake Erie & Pittsburgh†	...	...	...	28	...	28	28	...	...
Michigan Central	...	517	517	740	49	789	1,306	1,749	74
New York Central & Hudson River	2	729	731	1,665	570	2,235	2,966	2,983	...
Pittsburgh & Lake Erie	...	159	159	3	...	3	162	166	...
Toledo & Ohio Central	3	4	7	127	...	127	134	400	33
Zanesville & Western	1	...	1	...	...	...	1	85	...
New York, Chicago & St. Louis	146	12	158	...	...	...	158	523	30
New York, New Haven & Hartford	2	342	344	222	241	463	807	1,803	44
New York, Ontario & Western	48	150	198	...	...	...	198	493	40

LENGTH OF RAILWAYS IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM, JANUARY 1, 1915

Name of Railway	Miles of Road — Automatic — Single track	Automatic — Two or more tracks	Automatic — Total	Non-automatic — Single track	Non-automatic — Two or more tracks	Non-automatic — Total	Total both kinds	Total passenger lines operated	Percentage operated under block system
New York, Philadelphia & Norfolk	9	...	9	49	54	103	112	112	100
Cape Charles†	...	...	...	9	...	9	9	9	100
Norfolk & Western	99	487	586	1,001	25	1,026	1,612	1,879	89
Northern Pacific	684	504	1,188	308	18	326	1,514	5,567	27
Northwestern Pacific	11	16	27	...	...	...	27	517	...
Oregon Electric	1	7	8	...	...	...	8	154	...
Pennsylvania:									
Grand Rapids & Indiana	...	...	...	225	2	227	227	546	41
Pennsylvania (east of Pittsburgh and Erie)	...	730	730	2,947	948	3,895	4,625[4]	4,625[5]	100
Pennsylvania Co.	...	528	528	836	206	1,042	1,570	1,651	95
Pittsburgh, Cincinnati, Chicago & St. Louis	...	30	30	741	621	1,362	1,392	1,415	98
Vandalia	6	...	6	303	61	364	370	782	...
Peoria & Pekin Union	...	...	...	...	6	6	6	16	...
Pere Marquette	109	7	116	...	...	...	116	1,629	...
Philadelphia & Reading (and subsidiaries)	40	518	558	293	63	356	914	1,354	67
Quincy, Omaha & Kansas City and Iowa & St. Louis†	...	...	...	307	...	307	307	307	100
Queen & Crescent Route:									
Alabama & Vicksburg	78	...	78	...	...	...	78	142	54
Alabama Great Southern	269	...	269	...	...	...	269	290	92
Cincinnati, New Orleans & Texas Pacific	215	117	332	4	...	4	336	336	100
New Orleans & Northeastern	97	16	113	...	...	...	113	196	57
Richmond, Fredericksburg & Potomac	...	19	19	10	59	69	88	80	100
Rock Island Southern	...	...	...	80	...	80	80	80	100
St. Louis & San Francisco	697	34	731	...	...	...	731	5,259	...
St. Louis Merchants' Bridge Terminal	...	6	6	...	1	1	7	10	...
St. Louis Southwestern (less than 1 mile)	...	...	...	...	...	...	...	...	...
San Francisco-Oakland Terminal	...	4	4	...	...	...	4	...	...
San Pedro, Los Angeles & Salt Lake	4	...	4	...	...	...	4	...	...
Seaboard Air Line	...	...	...	317	...	317	317	3,060	10
South Dakota Central	...	...	...	103	...	103	103	103	100
Southern†	6	145	151	1,938	289	2,227	2,378	6,604	...
Virginia & Southwestern	...	...	...	2	...	2	2	...	...
Southern Illinois & Missouri Bridge	...	5	5	...	...	...	5	5	100
Southern Pacific, Atlantic system:									
Galveston, Harrisburg & San Antonio	280	...	280	...	...	...	280	1,321	21
Houston & Texas Central	3	...	3	...	...	...	3	...	...
Houston, East & West Texas	3	...	3	...	...	...	3	...	...
Iberia & Vermillion	16	...	16	...	...	...	16	16	100
Louisiana Western	104	...	104	...	...	...	104	208	50
Morgan's Louisiana & Texas	95	...	95	...	...	...	95	364	...
Texas & New Orleans	110	...	110	...	...	...	110	448	24
Southern Pacific, Pacific system[3]	2,397	389	2,786	51	...	51	2,833	6,965	40
Spokane & Inland Empire (less than 1 mile)	...	...	...	...	...	...	...	...	...
Spokane, Portland & Seattle	...	7	7	...	...	...	7	540	...
Staten Island	...	24	24	...	...	...	24	24	100
Terminal R. R. Assn. of St. Louis	...	6	6	...	1	1	7	13	...
Texas & Pacific	1	...	1	...	...	...	1	...	...
Tidewater Power Co.†	...	...	...	6	...	6	6	11	...
Toledo, Peoria & Western (less than 1 mile)	...	...	...	...	...	...	...	...	...
Toledo, St. Louis & Western	...	...	...	188	...	188	188	450	41
Ulster & Delaware	24	...	24	...	...	...	24	130	19
Union (Pittsburgh)	...	1	1	1	...	1	2	...	...
Union Pacific	653.	820	1,473	11	...	11	1,484	3,588	41
Oregon-Washington R. R. & Navigation Co.	605	27	632	1	...	1	633	1,995	31
Oregon Short Line	530	93	623	...	...	...	623	1,981	...
Virginia & Kentucky (less than 1 mile)	...	...	...	...	...	...	...	...	...
Virginian	...	...	...	13	...	13	13	481	...
Wabash†	10	100	110	1,539	221	1,760	1,870	2,041	...
Wabash Pittsburg Terminal	...	4	4	...	...	...	4	60	...
Washington, Baltimore & Annapolis	...	14	14	...	...	...	14	...	...
Washington Southern	..	6	6	...	26	26	32	32	100
Washington Terminal	...	2	2	...	...	...	2	2	100
Washington Water Power Co.	22	...	22	...	...	...	22	22	100
Western Maryland	63	...	63	...	...	...	63	663	9
Western Pacific	11	...	11	...	...	...	11	935	...
Total	13,408	16,281	29,689	51.137	7,406	58,443	88,128	...	...

† No report received; figures repeated from last year. [1] Erie: 84 miles of freight lines block signaled. [2] Includes only the four-track line. [3] Includes some lines operated for freight only. [4] Includes passenger lines only. [5] Excluding lines on which only one engine is in service. [6] The discrepancy in totals is due to a duplication of mileage in which both automatic and manual systems are used.

to be finished, includes 62 miles additional between Baton Rouge and Kenner, and 14 short sections on the Illinois Central, the more important of which are the following: Gibbs, Tenn., to Trimble, 18 miles, double track; Dyersburg, Tenn., to Curve, 15 miles, double track; and the following, all single track: Leitchfield, Ky., to Horse Branch, 24 miles; Mona Siding, Iowa, to Benson, 10 miles; Tip Top, Ky., to Graham, 10 miles; Coleman, Ill., to Plato Center, 9 miles, and Cecilia, Ky., to East View, 8 miles.

The Interborough Rapid Transit Company, New York City, plans during the coming year to install electro-pneumatic interlocking at Chatham Square junction, on the elevated lines, the machine to be of 23 levers. This will take the place of a mechanical interlocking.

The Louisville & Nashville during the coming year will complete work, now under way, which will equip with automatic block signals the line between Cincinnati, Ohio, and Winchester, Ky., 97 miles. About 90 miles of this division of the road—Winchester to Corbin—has been equipped with automatics during the past year.

New York Central Lines.—The Cleveland, Cincinnati, Chicago & St. Louis will install electric interlocking at Nokomis, Ill., 32 levers.

The New York, Ontario & Western contemplates the installation during the coming year of a mechanical interlocking plant at Campbell Hall, N. Y., of 56 levers.

The Norfolk & Western has prepared plans for the installation of automatic block signals on 25 miles of road, which plans will be carried out whenever there shall be sufficient improvement in business to warrant the expenditure.

The Oregon Short Line will install at Pocatello, Idaho, an electric interlocking machine, having 8 working levers and 3 spare spaces. The machine will be type "F" of the Union Switch & Signal Company.

The Pennsylvania advises that the only signaling plans which have been completed for the coming year are those in connection with the electrification of the main line from Philadelphia to Paoli, 20 miles, four-track. In connection with this work, the electro-pneumatic interlocking at Bryn Mawr will be replaced by Union electric interlocking, type F; and all of the

signals between Overbrook and Paoli will be taken out and replaced by "beam-light" signals.*

Queen & Crescent.—The Cincinnati, New Orleans & Texas Pacific is to install electric interlocking, 12 working levers, at McLean avenue, Cincinnati; and mechanical interlockings at Robbins, Tenn., 13 levers, and at Mile 225, 7 levers. The Alabama Great Southern will install at Chattanooga two electric interlockings, one of 16 working levers and one of 47; and the plans for the year include new automatic block signals on 22 miles of road.

The Southern Pacific plans to install three large power interlockings during the coming year; at Davis, Cal., and at Bloomington, Cal., the General Railway Signal Company's model 2—eighty levers at Davis and twenty-four levers at Bloomington: at Fourth street, San Francisco, the Union Switch & Signal Company's electro-pneumatic, 107 levers.

The Texas & Pacific has under construction automatic block signals on 23 miles of line, to be ready to put in service early in 1915. It is expected that 17 miles additional will be equipped with automatic block signals during the year, or 40 miles altogether.

The Toronto, Hamilton & Buffalo has contracted with the General Railway Signal Company for three interlockings on the branch line from Smithville to Dunnville, namely; at the crossing of the Michigan Central at Attercliffe, 28 levers, and at the crossing of the Grand Trunk, 16 levers; and at Dunnville, crossing of the Grand Trunk, 16 levers. All of these are mechanical interlockings.

*"Beam light" is a term used to designate a signal consisting wholly of lights, uncolored; and the indications are given by means of shape. A row of four lights, arranged horizontally, means stop; a similar group inclined 45 degrees upward means caution, and a row arranged vertically means proceed. By putting over the lights a suitable hood, the signals are made visible in daylight, and tests have shown that they can readily be seen in bright sunlight at a distance of 4,000 ft.

UNEMPLOYMENT RESULTING FROM RAILROAD DEPRESSION

For the purpose of obtaining an indication of the amount of unemployment that has resulted from the unsatisfactory conditions of the railroad business, with the consequent effect on the railroad supply business, which has been one of the chief causes of the general business depression, the *Railway Age Gazette* asked the railroads entering Chicago for a statement of the number of men in their employment on August 1 and June 30, 1914, as compared with the number employed on those dates in 1913. It also asked the members of the Railway Business Association, including the principal companies throughout the country that make and sell materials, equipment and supplies to railroads, for the number of men in their employment on August 1, 1914, as compared with the number employed under normal conditions. August 1 was selected, instead of a later date, because the European war began on that date and the figures as of that date exclude effects which are attributable to the war.

As the total operating revenues of the railroads of the United States for the fiscal year ending June 30, 1914, showed a reduction of only 3.4 per cent per mile as compared with the previous year, indicating that general business was not far below normal, while their operating income was reduced 15.7 per cent, the reductions in forces made by the railroads and the railway supply companies manifestly have resulted from conditions affecting the railroad business that did not exist in the general business situation. This is further supported by the fact that of 32 supply companies that advised us they had made no reductions in force, 22 are only partially dependent on the railroads for business.

Statements were received from 20 railroad systems entering Chicago, covering their entire mileage, and including nearly all of the larger systems entering that city, and from 152 companies that sell to railroads, although the information received was not in all cases entirely complete, and some companies gave the number employed now instead of on August 1. A compilation of the information furnished us shows the following:

20 RAILROADS

Number employed June 30, 1913	879,492
Number employed June 30, 1914	809,929
Reduction	69,563
Per cent reduction	7.9
Number employed August 1, 1913	855,761
Number employed August 1, 1914	764,827
Reduction	90,934
Per cent reduction	10.8

SUPPLY COMPANIES

78 companies employ normally	251,795
Employed August 1, 1914	153,537
Reduction	98,258
Per cent reduction	39.1
*34 companies employ normally	86,644
Employed in December, 1914	32,266
Reduction	57,378
Per cent reduction	64

24 companies reported reductions in force, in wages or in time without giving figures.
32 companies reported no reduction in force.
2 companies reported increases in force.
28 companies also working part time.

*Including 18 companies that reported both for August 1 and for December.

A detailed statement for the railroads entering Chicago is given in the accompanying table, including five companies that asked that the figures be given without reference to their names. The lines of these companies extend to almost all parts of the country, from the Atlantic to the Pacific and from Minnesota to the Gulf of Mexico, and therefore the condition as to unemployment shown by them may be considered as fairly representative. By applying the percentage of reduction shown as of August 1, 1914, by these roads to the total number of employees reported by the Interstate Commerce Commission for June 30, 1913—1,815,239—it may be conservatively estimated that over 192,000 railroad employees were laid off during the year ending August 1, 1914.

Some of the figures furnished by the railroads require some explanation. Where the figures are given for another date than August 1 it has been indicated in the table.

The Baltimore & Ohio furnished a more complete statement, giving the number of employees in the various departments and for additional dates. From the following table it will be noted that the estimated number of employees for December 31, 1914, was 20,164, or about 33⅓ per cent. less than for June 30, 1913.

NUMBER OF MEN EMPLOYED ON BALTIMORE & OHIO SYSTEM

	Departments						
Date.	General.	Traffic.	M. of W.	M. of E.	Transportation.	Engr.	Miscl.	Total.
June 30, 1913.	988	991	15,460	14,376	27,037	311	1,526	60,689
Aug. 1, 1913.	1,034	1,002	11,707	13,749	26,681	314	2,223	56,710
June 30, 1914.	1,047	992	8,529	13,629	24,729	162	1,401	50,489
Aug. 1, 1914.	1,051	953	10,478	14,876	24,357	244	2,060	54,019
Oct. 31, 1914.	1,054	932	11,037	13,389	23,177	344	2,052	54,005
Nov. 30, 1914.	1,037	945	7,300	12,149	24,000	169	1,902	47,502
Dec. 31, 1914*	1,000	925	5,000	10,000	22,000	100	1,500	40,525

*Estimated.

The Chicago & Alton says in connection with its statement that, while some of the difference between the 1913 and 1914 figures is due to the business depression, a large part of it is accounted for by the fact that in 1913 the company was performing some extraordinary improvement and construction work, the completion of which reduced the forces.

The Chicago, Indianapolis & Louisville also gave the number of employees on November 1, 1914, 3,474, which is 378 less than for August 1, 1914, and 521 less than for June 30, 1913.

The reduction of forces in the railroad supply business is naturally larger in proportion than on the railroads themselves, because the reduction of railway traffic was much smaller than the reduction in business of companies that are almost or entirely dependent upon the railroads and some of which may have no business when the railroads are not buying any more than necessary. Moreover, the figures given showing the reduction in forces by the railroad supply companies are by no means fairly representative of their conditions, because a large number

of them, in addition to laying off men, were also obliged to reduce the working time, and consequently the wages of employees who were retained. Twenty-four companies that gave us no detailed figures showing the number of their employees reported that the number had been reduced from 10 to 50 per cent or that the working time, payroll or capacity had been reduced from 20 to 50 per cent.

Moreover, of the companies that did give figures showing reductions in force, 28 also reported that the employees retained were working part time. One company normally employing 15,500 men had reduced its force on August 1 to 5,700 and in December to 2,800. Another company normally employing 17,841 men had reduced its force to 7,098 on August 1 and on September 12 to 3,329, the weekly payroll having been reduced from $275,000 to $25,000. A car building company normally employing from 1,300 to 1,400 men had reduced the number to 936 on August 1 and in September closed its plant entirely. Two large car companies had each reduced their forces by nine thousand on August 1, 1914.

Number Men Employed on Railroads Entering Chicago

Road	Aug. 1, 1914	Aug. 1, 1913	Reduction	June 30, 1914	June 30, 1913	Reduction.
A. T. & S. F. System	68,240	70,892	2,652	63,684	67,406	3,722
B. & O.	54,019	56,710	2,691	50,489	60,689	10,200
C. & A.	8,552	10,293	1,741	8,116	10,774	2,558
C. & E. I.	...	...	...	7,409	8,208	799
C. & N. W.	46,778	51,847	5,069	45,950	46,484	534
C. G. W.	8,408	8,529	121	8,288	8,301	13
C. I. & L.	3,852	3,877	25	3,588	3,995	407
Chicago Junction	1,286	1,387	101	1,250	1,258	8
C. M. & St. P. (Aug. 31)	57,603	76,674	19,071	61,938	61,898	*40
C. R. I. & P.	41,810	41,089	*721	37,140	36,745	*395
Grand Trunk	38,105	42,581	4,476	37,338	40,787	3,429
N. Y. C. Lines (July)	142,101	170,399	28,298	142,457	167,412	24,955
N. Y. C. & St. L. (July 31)	5,720	7,047	1,327	5,509	7,075	1,566
Pennsylvania Sys. (July 31)	213,203	232,626	19,423	212,202	231,696	19,494
Wabash (Aug. 16)	15,285	16,891	1,606	14,714	16,840	2,126
Five roads that asked that their names be withheld	59,865	64,919	5,054	109,857	110,024	167
Total	764,827	855.761	90,934	809,929	879,492	69,563

*Increase.

THE RAILWAYS AND THE COMMISSION

[From the North American Review]

Here is the key-note of the whole situation. An increase in rates by governmental authority which would help to offset the tremendous loss of $120,000,000 of net operating railway revenues in the year ending June 30, 1914, would do more than any other conceivable thing to make possible the general trading which is essential to renewal of confidence and business activities in the United States. It is not, moreover, a mere matter of stocks and bonds; a far more vital thing even than that is credit. Railway companies cannot obtain money for extensions, betterments, or even maintenance when hovering in the shadow of bankruptcy. And this means that manufacturing concerns, iron makers, steel makers, tie makers, and all of the innumerable others who ordinarily supply the railway companies with all sorts of material are estopped completely from performing their normal functions.

Why? Because higher rates are not really needed? No. That fact has been established beyond question. Because the public objects? No. The public long ago was convinced that the higher costs of living and wages reach to the railway companies no less than to all others. Because the Interstate Commerce Commission cannot or will not perceive the "extraordinary emergency" mentioned by the President as making for a "very real need?" Possibly, to a degree; but clearly the chief obstacle in the way of first steps toward prosperity, in the way of open markets, in the way of the United States government, the Democratic party, and the Democratic President, is Louis Brandeis, counsel and guide of the Interstate Commerce Commission, who solemnly insists that the right to "regulate" rates comprises only the right to "reduce" them. The natural assumption is that if that had been the intent of Congress, Congress would have said so, but Mr. Brandeis holds or at least asserts the contrary view—and the amenably automatic commission obediently acquiesces.

What to do in such a circumstance? Technically the President is helpless, and Congress, too. Government by commission invariably involves abandonment of authority by the chosen representatives of the people. The President does right, therefore, even while making his own opinion known, in keeping within the strict letter of the law and refraining from interference. But even a commission which plumes itself upon being on a plane with the Supreme Court is no greater than the source of its creation; and we say plainly to the patient President that, if this particular body should persist in its present inexcusably dilatory, incomprehensibly stupid, and arrogantly obdurate course, he can do no more popular thing than to ask a willing Congress to legislate it out of existence.

PROGRESS ON THE ALASKA RAILWAY SURVEYS

Since the creation of the Alaskan Engineering Commission about May 1, 1914, considerable progress has been made in the selection of a route to the interior of Alaska. Owing to the shortness of the season in that country, the commission decided immediately on its organization to place as many men in the field as could be employed to advantage. Fourteen locating parties were sent out, twelve of which were given the customary quota of engineers for the running of preliminary lines while one was organized to make special topographical surveys and another to conduct an extensive reconnaissance. Owing to the difficulties of transportation a large pack train was provided for each party, and in some cases boats were furnished for use on the various rivers.

The commission had at its command all the information gathered by previous commissions or furnished by various railroad parties who had considered building into this territory. In some cases this information was in the form of preliminary surveys and estimates, but it usually was in the form of a report on a reconnaissance. As it was not feasible to make careful surveys of all the possible routes from the sea coast to the interior in one season, the attention of the commission was directed especially to the making of a careful preliminary survey of the route from Portage Bay to Fairbanks via Broad Pass with a branch to the Matinuska coal fields, Broad Pass being in the main Alaska range about 256 miles from Portage Bay. A survey was also made from Chitina on the Copper River & Northwestern to the Matinuska coal fields. Two bases of supplies were used, one at Ship Creek, the head of deep water navigation on Cook's Inlet and the other at Fairbanks, the principal interior town. From these points supplies were sent to the different camps by pack trains or boats.

The distance thus outlined covers about 750 miles. It was divided between the several preliminary parties, each taking what it could cover with a good preliminary line during the short season. The first party began work about June 15, and the last early in July. Their season's work was completed at various dates between September 15 and November 5. In this manner a very good preliminary line was run and careful topography was taken for a considerable distance on each side. Maps were made on a working scale and a location projected for the purpose of getting an estimate of the cost.

In addition to the surveys between Portage Bay and Fairbanks, and to the Matinuska coal fields, a careful survey was also made of the existing line of the Alaska Northern extending north from Seward for 72 miles. Data were also gathered for a line from mile 39 of the Copper River & Northwestern to the Bering river coal fields via Lake Charlotte, while a reconnaissance was made for several hundred miles through the Susitna and Kuskokwim valleys. The members of the commission also made various careful examinations of several other proposed railroad termini, including Valdez, Cordova, Katalla and Controller Bay, and gathered a great deal of information regarding other feasible routes from the seaboard into the interior.

The field parties have now been disbanded and a small force of office men are employed in condensing the data for a report

WHY A RAILROAD SHOULD PAY A DIVIDEND*

BY IVY L. LEE
Executive Assistant, Pennsylvania Railroad Company

At the recent hearing before the Interstate Commerce Commission in the rate advance case, when Daniel Willard, president of the Baltimore & Ohio, was on the stand, Mr. Brandeis said:

"You have defended here today a reduction of practically everything that has to do with this railroad. You are putting off expenditures and necessarily, in the course of that, discharging employees. And the only thing that is maintained at its standard is the dividend."

To suggest the cutting or passing of dividends as a preliminary step in railroad economy is to strike at the very roots of our present business processes. The pride of the Pennsylvania Railroad is that since the company began to operate trains nearly seventy years ago it has always paid a cash dividend. The shareholders of this company have paid into it a total of about $540,000,000; and the outstanding capital stock is $499,265,700. This means that there is no "water."

On its stock the company has since the beginning paid an average dividend of 6.1 per cent. The policy has been to pay a reasonable dividend and to make that dividend secure. What was left over after interest and dividends went back to the public in improved service, in facilities which did not add to earnings.

All the money received by the railroad company goes back to the public. Out of some $381,000,000 received last year by the Pennsylvania System from all sources, all but $10,417,531 was paid out for wages, materials, taxes, bond interest and dividends. In other words, less than three cents out of each dollar received was at the year's end available for extraordinary expenses, and to protect the company's credit against the future.

During the past 17 years the Pennsylvania Railroad System has paid out in wages $1,932,626,384. It has paid to its stockholders in dividends less than one-fourth as much—$434,613,302—and it has paid a dividend to the public in the form of non-income adding improvements which cost $366,372,902.

The policy of the Pennsylvania Railroad from the beginning has been to maintain such a standard of credit and financial stability that in times of stress investors could look to Pennsylvania stock as a sure fortress.

The purpose of a railroad is to give good service at fair rates and to earn a dividend on its capital. The owners of a railroad are primarily concerned with the earnings as a whole. The details of charges and service they are anxious to have adjusted to promote the convenience and the prosperity of the community.

If it were not for the capital invested there would be no Pennsylvania Railroad. Society considers it important to pay interest on savings bank deposits; but a larger part of such deposits earn their interest through investments in railroad securities. Why then propose to penalize the man who invests direct instead of through the medium of the savings bank or the insurance company?

Society commends the man who saves money, buys a house and thus avoids paying rent. But what about the man who saves money and buys railroad stock, depending upon his dividends with which to pay his house rent?

The dividend—the payment for all capital—is a sort of back-salary to those who have denied themselves the immediate benefit of earnings in order to assure themselves future benefits. They invest their savings. The fact that there are some large fortunes which do not imply such self-denial does not invalidate the great fact that the vast amount of money invested in railroad property in this country is from the savings of the people.

The insurance companies alone have over $1,500,000,000 invested in railroad securities, and the savings banks upward of $800,000,000. There are 30,000,000 insurance policy holders and 10,000,000 savings banks depositors in this country. Here then are 40,000,000 separate accounts which have indirectly invested about $2,500,000,000 in railroad bonds.

This takes no account of upward of $4,000,000,000 in American railroad securities held in Europe; it takes no account of that vast number of our own people who have directly invested their money in railroad securities. Restrict them to a small return on their money when times are prosperous; deny them a fair return when times are bad, and the railroads of this country will palsy and shrivel.

To insure a fair dividend to the railroad investor is the concern and the obligations of the public, which wants good service; it is the profound duty of the employee.

The Pennsylvania Railroad System paid to its 250,000 employees last year $189,000,000 in wages. This was at a rate of wages 35 per cent higher than in 1900. In other words, had the 1900 rate of wages been paid in 1913 the total payments would have been only $125,000,000. Total wage payments in 1900 were about $71,000,000, so that the increased rate of payment for 1913 was actually more than the total wage payment of 1900.

The Pennsylvania Railroad paid to its 90,000 shareholders last year about $29,000,000 in dividends, and the annual rate of dividend was precisely what it was in 1900.

Wages to employees were 35 per cent higher, but holders of Pennsylvania Railroad stock enjoyed no higher wages for the use of their money than they did 14 years ago. Many stockholders bought their shares at a substantial premium above par, and many paid into the company $120 for $100 par value of stock. And for holders of Pennsylvania stock the price of living has gone up exactly as for the men in the shops or on the road.

The wage-earner has a very great incentive to protect the Pennsylvania dividend. The Pennsylvania Railroad has always paid the highest rates of wages in the territory through which it moves, and employees of other railroads have sought to get their wages adapted to the Pennsylvania standard.

The safety of the Pennsylvania's dividend must be secured if the company is to enjoy the confidence and support of those to whom the public must look to obtain money to supply future needs. Ninety thousand people, among whom there are nearly 45,000 women, have had such faith in the fact that the management and the employees would protect the integrity of that dividend that they have invested in our stock. More persons have intrusted their money to the officers and employees of this company, to enable the Pennsylvania Railroad to pay the wages it does and give the service it does, than to any other railroad in the world.

This company is not owned by a few capitalists. Some 20,000 persons own less than 10 shares each of our stock. All the directors and all the employees together own less than 5 per cent of the total capital. In the very highest sense of the word, our officers and employees are trustees. If, then, we are to keep faith with these people, located as they are in all parts of the world, must we not feel that every employee of this company when he enters its service undertakes an implied contract that in so far as in his power lies he will neglect no opportunity to see to it that dividend is earned and paid?

*From an address at meeting of the Media Division, Veterans' Association of Pennsylvania Railroad Employees at West Chester, Pa., November 19, 1914.

RAILWAY CROSSINGS IN ZURICH TO BE ELIMINATED.—The managing directors of the Swiss Federal railways and the Municipal Council of Zurich have finally entered into an agreement for the reconstruction by the former of the Zurich Sea Left Bank Railway, within the city limits of Zurich.

General News Department

The Commercial Club of Puyallup, Wash., has adopted resolutions urging the repeal of the full crew law passed by the state legislature in 1911.

The large roundhouse of the Duluth, Winnipeg & Pacific at Duluth, Minn., was destroyed by fire December 25. Several locomotives were damaged.

R. H. Aishton, vice-president of the Chicago & North Western has been named by President Wilson as a member of the Industrial Relations Commission. The appointment is to fill the vacancy caused by the resignation, some time ago, of F. A. Delano, who became a member of the Federal Reserve Board.

The annual meeting of the Western Society of Engineers, Chicago, will be held on January 13 and 14, 1915. The annual banquet will be given at the Auditorium hotel on Wednesday evening, January 13. The following day will be devoted to an inspection of important engineering work in the vicinity of Chicago by special train. That evening a smoker will be held at the society's rooms with moving pictures of the San Diego and San Francisco expositions.

In response to a request from a committee of the city council for a conference regarding the beginning of work on the new Union station in Chicago, the officers of the company have announced that a meeting of the directors will be held in Chicago on January 12, to consider the entire construction program. The council committee desires to persuade the railroads to begin work at once on the terminal improvements in Chicago in order to give employment to a large number of men.

F. A. Spink, traffic manager of the Chicago & Western Indiana and the Belt Railway of Chicago, has been elected chairman, and Frank T. Eyman, assistant freight traffic manager of the Chicago & North Western, vice chairman, of the Railroad Subdivision of the Chicago Association of Commerce for the ensuing year. The other members of the committee are James Webster, assistant freight traffic manager of the New York Central Lines West of Buffalo; A. C. Ridgway, second vice-president of the Chicago, Rock Island & Pacific, and J. C. Clair, industrial commissioner of the Illinois Central.

Ralph Peters, president of the Long Island Railroad, continuing a custom of several years' standing, held informal receptions to employees of the road at three of the principal terminals on Wednesday and Thursday, the two days preceding Christmas. He shook hands with ten or fifteen hundred men, calling a large portion of them by name. Outsiders who were present remarked that there was "none of the artificial and forced atmosphere often observed on such occasions." Those who attended received the special attention of Don Hudnell, who has been messenger and clerk for four successive presidents of the road, and from him each man received a cigar, while each woman employee received a box of candy.

On Wednesday, December 23, an inspection of the railroad Y. M. C. A. buildings in the vicinity of Chicago was made by the Railroad Department Committee, including H. G. Hetzler, president of the Chicago & Western Indiana, general chairman; A. M. Schoyer, vice-president, Pennsylvania lines; Robert Quayle, general superintendent, motive power and car department, Chicago & North Western; W. J. Jackson, receiver and general manager, Chicago & Eastern Illinois, and other officers of the roads interested. The party traveled by special train, visiting the building at the Chicago & Eastern Illinois yard at Dolton, the Chicago & North Western building at Fortieth avenue, Chicago, the Dearborn station department of the Chicago & Western Indiana, the Grand Trunk department at Fifty-first street, the Fifty-ninth street department of the Pennsylvania and the Glenn Yards department of the Chicago & Alton.

Colonel Jose Rodriguez, general manager of the National Railways of Mexico, says that a large order for fuel oil has been given to the Waters-Pierce Oil Company. This oil is being obtained from the United States, and many carloads have already entered the country through El Paso en route to distributing points in Mexico. The cutting off of the supply of crude oil from the Tampico fields made it necessary to buy in the United States. Announcement is also made by Colonel Rodriguez that arrangements have been made with American concerns to supply large quantities of timber, iron, steel and other materials for the construction of cars in the shops at Aguas Calientes. These shops were recently reopened and are now running to their full capacity, giving employment to about 4,500 men. Employment is now being given to several thusand men in the building of new bridges, relaying track and general rehabilitation work upon different divisions of the system.

Parcel Post News

[From the New York World]

Representative George J. Kindel, of Colorado [a former railroad man] . . . has been in New York looking into the operation here of the parcel post. He declares that he has "new proof of the petty larceny of the system."

"New York people," he said, "are paying $1,000,000 a year more for service by parcel post than they would for the same service by express. For distances of from 50 to 150 miles the parcel post beats express, and for uninsured 5-pound packages up to 600 miles. But beyond that it's very different.

"Between New York and Boston the parcel post rate on 20 pounds is 44 cents. Post Office officials say they pay the railroads 33 cents for this haul, but the express company will pick up the package, insure it for $50 and deliver it at the other end, all for 36 cents. . . . Parcel post rates meet express rates on 5-pound packages in the 300-mile zone; they practically meet them on 10-pound packages in the 150-mile zone, and they do meet them on 20-pound and 50-pound packages in the zone. When you get to the 1,000-mile zone—New York to Chicago for instance—the insured rates by express and parcel post are, respectively, as follows: 5 pounds, 31 and 42 cents; 10 pounds, 42 and 72 cents; 20 pounds, 64 cents and $1.32.

"Now here comes the thing that angers me. The new express and parcel post rates, which went into effect February 1 last, were fixed by the Interstate Commerce Commission, which said to the express companies: 'You must put in these rates,' and to the Post Office Department, 'you may put in these rates.' We are paying $2,000,000 for the Interstate Commerce Commission, and that is the kind of service we are getting. . . ."

While in New York Mr. Kindel got the figures of the parcel post traffic here for the two weeks ending October 15. To all zones, 8,994,175 packages weighing 9,491,747 pounds were carried in that time, the postage paid being $521,361.54. By zones this business was distributed as follows:

First (50 miles), 811,180 packages, postage, $38,410.57; second (150 miles), 1,125,529 packages, $48,609.21; third (300 miles), 1,262,918 packages, $54,846.03; fourth (600 miles), 1,173,216 packages, $62,675.28; fifth (1,000 miles), 1,411,718 packages, $74,035.48; sixth (1,400 miles), 1,243,944 packages, $69,275.07; seventh (1,800 miles), 770,929 packages, $72,919.77; eighth (over 1,800 miles), 773,129 packages, $83,375.72.

"You will notice from these figures," Mr. Kindel said, "that the average weight of the packages was less than one ounce over one pound. The people are chiefly sending by the 'new' parcel post the things they sent by the 'old.' The great glory of the parcel post, you know, was to be its effect on the cost of living. You are not going to reduce the cost of living by packages that weigh a pound each.

"In the local, first and second zones the number of packages weighing above twenty-one pounds sent from New York in two weeks was 4,940; their weight was 141,482 pounds, and the postage paid on them was $1,378.99. The bulk was just one-sixtieth of the total.

"A mail order house will ship 100 pounds by express to Des Moines, for example, break the package up there into five twenty-

pound parcels and reship by post. They will save $5 per 100 pounds on the all-parcel-post rate by doing it.

"Let me give you one other illustration of our system. Lord & Taylor have houses in both this country and Germany. The rate on their 11-pound parcels from Germany to Cuba is 50 cents; to Mexico, 55 cents. . . . From Germany they can post 11 pounds to San Francisco for 81 cents; from New York the rate is $1.32.

"What I want to do about all this is to have the weight limit increased, first of all, to 100 pounds. Then I want the rates revised."

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Demurrage Commissioner, Boston, Mass. Annual convention, April, 1915, Richmond, Va.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D., L. & W., Hoboken, N. J. Next meeting, October, 1915.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 21-24, 1915, Richmond, Va.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, May 20-21, 1915, San Francisco, Cal.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 20 W. 39th St., New York. Annual convention, October, 1915, San Francisco, Cal.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. C. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, Chicago.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, Atlantic City, N. J.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN RAILWAY SAFETY ASSOCIATION.—L. F. Shedd, C. R. I. & P., Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July, 1915.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Atlanta, Ga.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, third week in May, 1915, Galveston, Tex.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

FREIGHT CLAIM ASSOCIATION. Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, Rue de Louvain, Brussels, Belgium. Next convention, June 23 to July 6, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 W. Broadway, Winona, Minn. Next convention, July 14-17, 1915, Sherman House, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I & P., Eldon, Mo.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 26 to 28, 1915, Chicago, Ill.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-17, 1915, Detroit, Mich.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October, 1915.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., La Salle St. Sta., Chicago. Annual meeting, September, 1915.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next regular meeting, January 21, 1915, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, September, 1915, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

In Cleveland it is reported that the Pennsylvania and the New York Central have announced that free delivery of passenger tickets to residences and offices will be much curtailed. The delivery service in Cleveland has cost each of these roads, it is said, about $100 a month.

A press despatch from San Francisco says that the three lines of steamships running between that port and the Atlantic coast through the Panama canal have agreed on an increase in the rates of transportation on iron and steel goods and certain other commodities.

The American steamship "Pathfinder" left Galveston December 25 for Bremen, with a cargo of cotton, 6,650 bales, the first cotton to go to Germany since the beginning of the war. The freight rate on this cotton, $3 per 100 lb. is said to be the highest ever paid at the port of Galveston. A year ago the current rate was about 35 cents per 100 lb.

The Pennsylvania Railroad reports that the parcel post packages sent out in the mail cars of that road from New York and from Philadelphia in the seven days ending with December 24, numbered about nine millions. The Christmas rush was about 50 per cent heavier than a year ago. Three times the regular force of men to handle the mails had to be kept on duty at stations.

On Wednesday, December 30, the Delaware, Lacakawanna & Western took out of Hoboken a special train of 12 cars destined for Los Angeles over the Atchison, Topeka & Santa Fe, carrying seven companies of motion picture actors, going out to begin their winter season. The train consisted of five sleeping cars, a dining car, a buffet car, a parlor car and four baggage cars.

Nine representatives of the passenger department of railroads operating in Indiana called on Governor Ralston and members of the Indiana Public Service Commission on December 21, to discuss the proposal to repeal the two-cent fare law and establish a rate of 2½ cents a mile in its place. The railroad men pointed out that the Interstate Commerce Commission had recognized the need for a higher rate of passenger fares and had allowed advances in the interstate rates, but that similar changes could not be made in the intrastate fares without a change in the state law. Neither the governor nor the members of the commission would commit themselves as to their attitude. The railroad men said they were preparing to make a direct and public appeal to the assembly of Indiana for the repeal of the present two-cent fare law and the enactment of a new law authorizing a fare of 2½ cents a mile. The rate charged prior to the enactment of the present law was 3 cents a mile. Representatives of the railroads in Ohio also held a conference with the state public utilities commission on December 22, and asked the commission to recommend the repeal of the two-cent fare law and the substitution of a law providing for a 2½-cent rate.

Increased Use of the Multiplication Table

Scales of rates to be used in making the general increase of 5 per cent in freight rates recently ordered, have been submitted to the commission by C. C. McCain, chairman of the Trunk Line Association committee. The first class rate between New York and Chicago will be 78.8 cents per 100 lb., and the other five classes will be graded proportionately. To points intermediate between New York and Chicago, taking 71 per cent and higher of the New York-Chicago class rates, the new tariffs will become effective on January 15, and to points taking a lower percentage of the rates they will become effective February 1.

From New York to points taking 60 per cent of the Chicago rate, the charges on the various classes will be as follows: First class, 47.3 cents; second, 41 cents; third, 31.5 cents; fourth, 22.1 cents; fifth, 18.9 cents, and sixth, 15.8 cents.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has suspended from January 1 to May 1, 1915, certain tariffs of the Baltimore & Ohio, the Central of New Jersey, the Delaware, Lackawanna & Western, the Erie, the Lehigh Valley, the New York Central & Hudson River, the New York, Ontario & Western, the Pennsylvania and the West Shore, containing increased charges for the handling of freight by lighter and float from and to points in New York harbor, both within and outside free lighterage limits.

Rates on Grapes to Points in Montana and Wyoming

Lindsay & Company et al. v. Northern Pacific et al. Opinion by Commissioner Clements:

The commission finds that the rates on grapes from producing points in New York, Pennsylvania, Michigan, Iowa, Missouri and Kansas to points in Montana and Wyoming are not unreasonable. Complaint dismissed. (32 I. C. C., 287.)

Gravel and Sand Switching Charges at Chicago

Opinion by Commissioner Clements:

The commission finds that a proposed cancellation of absorption of switching charges on sand and gravel from Janesville, Beloit and other Wisconsin points to Chicago and from these points and also from Carpentersville, Algonquin and Elgin to certain points in Indiana within the Chicago switching district is justified. (32 I. C. C., 291.)

Joint Rates Between Rail and Water Lines

Eastern Shore Development Steamship Company v. Baltimore & Ohio et al. Opinion by Commissioner Meyer:

The commission finds that the refusal of the Baltimore & Ohio to establish through routes and joint rates in conjunction with the complainant, a water line, between landings on Chesapeake Bay and its tributary waters on the one hand and points on the Baltimore & Ohio and its connections on the other is unreasonable and discriminatory. (32 I. C. C., 238.)

Rates on Potatoes and Onions From St. Matthews, Ky.

St. Matthews Produce Exchange v. Louisville & Nashville et al. Opinion by Commissioner McChord:

The commission finds that the rates on potatoes and onions from St Matthews, Ky., and other stations to Cincinnati, Ohio, and via that point to central freight association territory are not unreasonable or discriminatory as compared with the rates from Louisville. Certain local rates from St. Matthews and other stations, however, when used in connection with interstate shipments of potatoes and onions via Louisville, Ky., are found unreasonable. (32 I. C. C., 233.)

Rates on Cement From Ada, Okla.

Oklahoma Portland Cement Company v. Arkansas, Louisiana & Gulf et al. Opinion by Commissioner McChord:

In a complaint dealing with cement rates from Ada, Okla., to all points in Louisiana west of the Mississippi, southern Arkansas and certain destinations in eastern Texas, the commission finds that Ada should be put on a 3-cent differential under the Kansas gas belt rates to the Arkansas destination points and a 2-cent differential under the Kansas gas belt rates to the Louisiana and Texas points. The St. Louis, Iron Mountain & Southern is required to establish through routes from Ada to the destination points to which it operates through routes from the Kansas gas belt. (32 I. C. C., 221.)

STATE COMMISSIONS

The Alabama Railroad Commission has approved a proposed increase in freight rates on the railroads of that state, averaging 10 per cent.

The New Hampshire Public Service Commission has approved tariffs filed by the Boston & Maine, advancing passenger fares in that state on January 1 to the basis of 2½ cents a mile. Similar tariffs filed by the B. & M. in Massachusetts have been suspended by the Public Service Commission of that state until February 1.

John P Dohoney, investigator of accidents for the Pennsylvania Public Service Commission, in his annual report, which covers eleven months ending June 30, 1914, says that on the railroads of the state 15 passengers, 328 employees, 555 trespassers and 93 other persons were killed during the year and a total of 9,199 persons were injured. The street railways reported 170 persons killed and 2,991 injured, 19 of the killed being passengers. Of persons who were killed while under the influence of intoxicating liquor the railroads report 24, and the street railways 9, all of these being, apparently, trespassers. The public grade crossings in the state of Pennsylvania number about 10,000, and in the six months ending June 30, 15 people were killed and 34 injured at crossings which are classed as protected; that is to say, they were equipped with gates, or bells, or both, or were attended by watchmen.

PERSONNEL OF COMMISSIONS

Henry Clay Hall of Colorado has been nominated by the President to succeed himself as a member of the Interstate Commerce Commission.

The governor of Pennsylvania has appointed Walter H. Gaither, of Pittsburgh, a member of the Public Service Commission of the state, filling a vacancy. Mr. Gaither was for a number of years a newspaper reporter in Pittsburgh. The governor has designated ex-Governor Samuel W. Pennypacker as chairman of the commission.

Richard Sachse has been appointed chief engineer of the California Railroad Commission. Mr. Sachse has been acting chief engineer of the commission since December 1, 1913. He is a graduate of the Royal Technical Institute of Dresden, Germany. After completing the course in civil and structural engineering, Mr. Sachse was secretary to the chief engineer of the Joint Government Board of Germany, France and Great Britain on preliminary railroad location investigations in West Africa. In 1903 he came to the United States and did engineering work in Chicago, Milwaukee and other places. During 1906 and 1907, he was assistant engineer in the United States Reclamation Service, and thereafter he was connected successively with the land department of the Southern Pacific and the construction department of the Western Pacific. In December, 1911, he began work for the California Railroad Commission as assistant engineer and was later appointed to the position of principal assistant engineer in direct charge of valuation work.

COURT NEWS

The Chicago Association of Commerce, the Illinois Central and the Morton Salt Company have filed in the Federal Court at Chicago an appeal from a recent decision of the Interstate Commerce Commission, ordering that salt rates from the Michigan fields to points in Illinois shall not exceed, by more than 2½ cents per 100 lb., the rates from Chicago and Chicago rate points to the same destination. The ground given for the objection is that the decision deprives Chicago of the advantage which it has heretofore had by reason of cheap lake transportation.

EGYPTIAN RAILWAY AFFAIRS.—The military authorities of Egypt find the facilities afforded by the Egyption State Railways workshop at Boulac, Cairo, very useful. Among other things they have recently placed an order for the manufacture in them of 2,000 camp bedsteads for the use of troops.

Railway Officers

Executive, Financial, Legal and Accounting

W. P. Briggs has been appointed general attorney of the Pacific & Idaho Northern, with headquarters at New Meadows, Idaho.

H. D. Davis has been appointed contract attorney for the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with headquarters at St. Louis, Mo.

A. T. Hardin, vice-president of the New York Central & Hudson River at New York, has been appointed vice-president in charge of the operating department, embracing transportation, construction, roadway and equipment, with headquarters at New York, of the New York Central Railroad, which is the name of the new company which has taken over the New York Central & Hudson River and the Lake Shore & Michigan Southern. J. J. Bernet, vice-president of the Lake Shore & Michigan Southern, at Chicago, has been appointed resident vice-president of the New York Central Railroad, with headquarters at Chicago, and will act as the general representative of the company in that territory and perform such other duties as may be assigned to him.

Operating

Henry Miller has resigned as general manager of the Wabash, effective January 1, but will continue as a director and vice-president of the company.

J. W. Leonard, assistant to vice-president of the Canadian Pacific at Montreal, Que., will leave that company on January 1 to assume the general management of the Toronto Terminals Railway at Toronto, Ont.

O. H. Hobbs, superintendent of the Baltimore division of the Baltimore & Ohio at Baltimore, Md., has been transferred to Parkersburg, W. Va., as superintendent, succeeding C. E. Bryan, transferred. M. H. Cahill, superintendent of the New Castle division at New Castle, Pa., has been appointed superintendent of the Baltimore division, succeeding Mr. Hobbs. J. W. Kelly, Jr., superintendent of the Cumberland division at Cumberland, Md., succeeds Mr. Cahill, and C. L. French, assistant general superintendent at Pittsburgh, Pa., has been appointed superintendent of the Cumberland division, succeeding Mr. Kelly, and the position of assistant general superintendent at Pittsburgh has been abolished. S. A. Jordan, superintendent at Winchester, Va., has been appointed assistant superintendent of the Baltimore division, with headquarters at Brunswick, Md., and H. F. Howser, road foreman of engines at Brunswick, Md., has been appointed road foreman of engines and assistant trainmaster of the Shenandoah district, with office at Harrisonburg, Va.

Traffic

A. A. Heard, general passenger agent of the Delaware & Hudson at Albany, N. Y., has resigned, effective January 1.

Drew Head has been appointed assistant general freight agent of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex.

Myron Wood, general agent of the Pittsburgh & Lake Erie at Youngstown, Ohio, since May, 1888, retires on January 1, under the retirement rules of the company. He has been in the service of this road since February, 1879, and for many years served as chief clerk and joint freight agent of the Pittsburgh & Lake Erie and the Erie.

Fred E. Signer, whose appointment as general eastern freight agent of the Lehigh Valley, with headquarters at New York, has already been announced in these columns, was born at Buffalo, N. Y. He began railway work in 1886, as clerk with the Buffalo, New York & Philadelphia, now a part of the Pennsylvania Railroad. He was then consecutively in the service of the Chicago & Atlantic, now a part of the Erie, at Chicago, the Southern Pacific, at Los Angeles, Cal., the Chicago & Alton, at Chicago, and the Wabash at Chicago. From 1898, to May, 1900,

he was board of trade representative of the Wabash, and then for about two years was agent of the Wabash & Lackawanna Despatch. He was then general freight and passenger agent of the Cincinnati, Richmond & Muncie, now part of the Chesapeake & Ohio of Indiana, until 1903, when he became general manager of the Lehigh & Wabash Despatch. In January, 1906, he was appointed assistant general freight agent of the Wabash at St. Louis, Mo., and the following November became general freight agent of the Wisconsin Central at Milwaukee, Wis., and later at Chicago. He was general freight agent of the Minneapolis, St. Paul & Sault Ste. Marie following the absorption of the Wisconsin Central by that road, in charge of the Chicago division, remaining in that position until 1910, when he was appointed commissioner of the Association of Lake Lines, with headquarters at Buffalo, N. Y., which position he held at the time of his recent appointment as general eastern freight agent of the Lehigh Valley, as above noted.

Engineering and Rolling Stock

C. H. Seabrook, superintendent of machinery of the International & Great Northern, with headquarters at Palestine, Tex., has resigned, effective January 1.

C. E. Bryan, superintendent of the Ohio River division of the Baltimore & Ohio at Parkersburg, W. Va., has been appointed division engineer of that territory.

Harry Bortin has resigned as assistant to general secretary of the Presidents' Conference Committee on Valuation, and after January 1 will engage in private practice, specializing in valuation work. He was formerly engineer in charge of the valuation department of the Union Pacific.

E. Ben Carter, superintendent of maintenance of way of the Florida East Coast at St. Augustine, Fla., has been appointed chief engineer, with headquarters at St. Augustine, and his former position has been abolished. C. S. Coe has been appointed engineer of maintenance of way, reporting to the chief engineer.

C. E. Brinser, division engineer of the Camden Terminal division of the Pennsylvania Railroad and the West Jersey & Seashore at Camden, N. J., has been appointed division engineer of the Williamsport division of the Pennsylvania Railroad, with office at Williamsport, Pa.; J. T. Skillman, division engineer of the New York, Philadelphia & Norfolk at Cape Charles City, Va., succeeds Mr. Brinser, and M. W. Clement, supervisor of the Pittsburgh division at Conemaugh, Pa., succeeds Mr. Skillman.

H. Cramer, road foreman of engines of the Seaboard Air Line at Savannah, Ga., has been appointed supervisor of locomotive operation of lines south of Columbia, with headquarters at Jacksonville, Fla., and T. U. Brown has been appointed supervisor of locomotive operation, lines north and west of Columbia, with headquarters at Hamlet, N. C. J. R. Bissett has been appointed road foreman of engines of the South Carolina division, with headquarters at Savannah, Ga., and the River Junction line formerly under the supervision of the road foreman of engines of the Florida division is now under the supervision of the road foreman of engines of the South Carolina division. A. E. Hopkins, road foreman of engines of the North Carolina division at Hamlet, N. C., has been transferred to the Alabama division in the same capacity, with headquarters at Americus, Ga., and W. W. Payne has been appointed road foreman of engines of the North Carolina division, with headquarters at Hamlet, succeeding Mr. Hopkins.

OBITUARY

George M. Sargent, general agent of the San Pedro, Los Angeles & Salt Lake at Chicago, died suddenly at his home in that city on December 27.

Franklin Fairman, formerly auditor of the Illinois Central, died at his home in Chicago on December 26, aged 81 years. Mr. Fairman was connected with the Illinois Central from 1855 to July, 1904. He filled minor positions until 1862, when he was made assistant general freight agent. Later he was successively auditor of freight accounts, freight auditor, and auditor of freight receipts until November, 1900, when he was appointed auditor, which position he held until his retirement in July, 1904.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Illinois Central has ordered 25 switching locomotives from the American Locomotive Company.

The Tuscarora Valley has ordered 1 ten-wheel type locomotive from the Baldwin Locomotive Works.

The Cambria & Indiana has ordered 1 Mikado type locomotive from the Baldwin Locomotive Works.

The Nashville, Chattanooga & St. Louis has ordered 10 Mikado and 6 Pacific type locomotives from the Baldwin Locomotive Works.

CAR BUILDING

The Wisconsin & Michigan is in the market for 40 box cars.

The Lake Superior & Ishpeming is in the market for 400 ore cars.

The Grand Rapids & Indiana is in the market for 6 70-ft. steel passenger coaches and 1 70-ft. postal car.

The Atchison, Topeka & Santa Fe has ordered 100 10,500-gal. tank cars from the Pressed Steel Car Company in addition to the 100 recently reported.

The Union Tank Line has ordered 500 6,500-gal. capacity tank cars from the Standard Steel Car Company, in addition to the 500 cars reported last week.

The Chicago Great Western has just purchased 100 second-hand coal cars from the Pennsylvania Coal & Coke Corporation. This order is in addition to a recent order for 300 similar cars.

IRON AND STEEL

The New York Central Lines are in the market for 44,000 tons of steel rails.

Kasara Railway Tunnel Near Bombay.—A railway tunnel 1,507 ft. in length is now being constructed for the Great Indian Peninsular Railway in the Western Ghats, about 100 miles from Bombay. The contractors, Pauling & Co., of Bombay, began work on the tunnel by machine drills on December 6, 1913. To expedite the work two shafts, one of 101 ft. and the other of 89 ft. were sunk. The headings met on July 8 of this year, construction having progressed at the rate of 215 ft. per month. It is expected that the work will be completed in July, 1915. The tunnel is being worked out on the Belgian system—by opening out the top section first, inserting the arching where necessary, and taking the lower part out subsequent to formation. The tunnel will render unnecessary a reversing station now required on account of heavy grades.

The Fuel Supplies of the Railways of New South Wales.—The railways of New South Wales are at present using about 1,250,000 tons of coal per annum, and the government has more than once expressed the opinion that it would be a good thing if a state-owned mine were worked for the production of this coal. Mr. Cann, minister for mines, in a recent speech, said that the government really needed three collieries. Tests had been made on 40,000 acres of land held by the Crown, near Lithgow, and good coal had been proved. In the South Coast district the Crown had reserved all the mineral rights under the National Park area, and there was nothing to prevent them having a mine there that would put out 2,000 tons a day. The Sydney city council is also inviting applications for the sale to the council of a coal mine within 120 miles of Sydney, or for a contract extending over a long period. Among local coal-owners neither project is regarded as being very promising.—*The Engineer.*

Supply Trade News

The General Railway Signal Company on January 1 will move its New York office from 55 Liberty street to 30 Church street.

The Nachod Signal Company, Inc., has moved its offices from 50 Church street, New York, to 4777 Louisville avenue, Louisville, Ky

Fred N. Baylies, assistant sales manager of The Aluminum Company of America, with offices in Chicago, has been appointed eastern manager of The P. & M. Company, with headquarters at 30 Church street, New York City, effective January 1, 1915. Mr. Baylies has been a director of The P. & M. Company since its incorporation.

By a recent decision of the directors of the Pullman Company, the work of building one steel sleeping car a day will continue throughout the winter months. Because of the small demand for cars during the past few months a discontinuance of this policy had been considered, but the recent decision will afford work to the men during the winter.

The T. A. Willson & Co., Inc., Reading, Pa., was awarded the grand prize at the Second International Exposition of Safety and Sanitation, held at the Grand Central Palace, New York, from December 12 to 19. The award was given to the company in recognition of the merits of the Willson eye protectors, namely the Willson Safety Glass, the New Willson Goggle and the Albex Eye Protector.

TRADE PUBLICATIONS

BOILER TUBE CLEANERS.—The Wm. B. Pierce Company, Buffalo, N. Y., has issued a circular entitled "How to Clean Arch Tubes Clean," which describes the Dean boiler tube cleaner and explains how it does its work. This boiler tube cleaner has been standardized by the Illinois Central.

PORTABLE ELECTRICALLY DRIVEN TOOLS.—The Neil & Smith Electric Tool Company, Cincinnati, is now sending out catalog No. 4, describing and illustrating the company's line of Ideal Portable Electrically Driven Tools. Included are various types of grinding tools, electric drills, electric portable screw drivers, etc. The catalog describes each appliance in detail and is well illustrated.

ROLLING RAILS.—The Lackawanna Steel Company has just issued a booklet describing in detail the deseaming process for rolling rails by which the outer surface of the rail bar is milled off by a special machine, thereby removing the larger part of the seams, which are otherwise carried into the finished rail. This process was described by Robert W. Hunt in our issue of December 4. The booklet is well illustrated.

ELECTRICAL APPLIANCES.—The Western Electric Company is now distributing the first edition of its 1915 Electrical Supply Year Book in the form of a most comprehensive catalog of the goods handled by the company, bound in cloth and containing over 1,200 pages. The book contains between its covers illustrations and price lists of all sorts and kinds of electrical instruments, its many sections being devoted respectively to Interphones and Accessories, Power Apparatus, Protective Apparatus and Switchboard Accessories, Measuring and Testing Instruments, Batteries and Accessories, Electrical House Goods and Novelties, Lighting Fixtures and Accessories, Wiring Devices, Knife Switches, Fuses and Cut-outs, Wire, etc. The catalog is a radical departure from accepted practice in two ways. It is the intention of the company to issue the book annually, whereas the practice in the past has been to issue a new catalog not oftener than once in three years. In addition, and perhaps more important, the price lists have been entirely readjusted so that now one discount is made to apply to nearly the entire line of electrical appliances, in place of a different discount for almost every different class of apparatus. The book is remarkably well edited up and will undoubtedly prove valuable to the buyer of electrical supplies.

Railway Construction

ARKANSAS MINING & DEVELOPMENT COMPANY'S LINES (Electric).—We are told that this company expects to let contracts early in 1915 to build an electric line from Hoxie, Ark., west via Portia, Black Rock, Denton, Smithville, Nelsonville, Poughkeepsie, Evening Shade, Zion, Lacrosse, Melbourne and Newburg to Calico Rock, 72 miles. A branch is also projected from Nelsonville southwest via Shelbyville and Cave City to Batesville. The plans call for building a total of about 130 miles. J. W. Myers, Nashville, Ark., may be addressed. (September 18, p. 549.)

BIG HORN CANYON IRRIGATION & POWER COMPANY (Electric).—We are told that location surveys have been finished for the line to be built from a point near Custer, Mont., to Big Horn canyon, 68 miles. John J. Harris, president, Hardin. (February 27, p. 451.)

CANADIAN NORTHERN ONTARIO.—An officer writes that the company has projected a line from Toronto, Ont., to Thorold and Niagara Falls, Ont., 79.63 miles.

CANADIAN NORTHERN QUEBEC.—An officer writes that surveys are being made to build an extension from Huberdeau, Que., to St. Remi, eight miles.

COLUMBIA & NEHLEM.—An officer writes that this company during 1914 finished work on a section of eight miles from Columbia, Ore., towards the Nehlem river. In addition 18 miles are now under construction to Nehlem, on which grading work will be completed ready for track laying in about 30 days.

MINNESOTA, DAKOTA & WESTERN.—An officer of this company, which operates a line from International Falls, Minn., to Nakoda, also to Pelland, Laurel and Loman, writes that the company has given a contract to the Minnesota & Ontario Power Company to build an extension from Littlefork, south to Craig, 45 miles.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—An officer writes regarding the report that a line is to be built from Guntersville, Ala., via Warrenton to Bean Rock, that the company has made some surveys near Guntersville, but it is not probable that the work will be carried out in the near future, as the improvement has not yet been authorized.

PACIFIC ELECTRIC.—Work on the extension from Arlington to Corona, Cal., 7.75 miles, is about 50 per cent completed. The average cut a mile on this extension will be about 3,000 cu. yd., and the average fill 3,500 cu. yd. The maximum grade is 0.95 per cent, and the maximum curvature is 3 deg. There will be no bridge work other than a few culverts which will be put in by company forces. The grading contract was awarded to Robert Sherer & Co., Los Angeles. This railroad company has also under construction extensions between Hawthorne and El Segundo, Cal., and from Santa Ana to Orange, Cal.

PENSACOLA, MOBILE & NEW ORLEANS.—An officer writes that this company is building with its own forces a 25-mile section from Pemono, Ala., to Mobile. E. M. Laughlin, Pensacola, Fla., may be addressed.

PORTLAND & OREGON CITY (Electric.)—This line is being built between Milwaukee, Ore., and Oregon City, a distance of 16 miles. Work is about 75 per cent completed and is being done by company forces.

RHODE ISLAND COMPANY (Electric).—An officer of this company, which operates electric lines in Rhode Island and Connecticut, writes that during 1914 the company built 5.28 miles of first track and .85 miles of second track at different locations in Rhode Island.

SAN PEDRO, LOS ANGELES & SALT LAKE.—Maps for a proposed line to extend through the Angeles forest reserve, California, have been filed by this company. However, construction work will not begin for a time.

SOUTHERN RAILWAY.—An officer writes regarding work on the extension of the Wauhatchie Railway that the line is being

built from Wauhatchie, Tenn., the northern terminus of the rails of the Alabama Great Southern, to a connection with the Lookout Mountain Tunnel line of the Southern Railway. A large amount of the work was done some years ago, but the line was never placed in service. The Southern Railway is now putting the tunnel line into shape and some double track is also being constructed on the Belt Railway of Chattanooga which, in connection with the Wauhatchie extension, will provide a double track line from the Chattanooga terminal station to Wauhatchie, six miles, enabling the Alabama Great Southern to enter Chattanooga over its own tracks and those of the Southern Railway instead of using the tracks of the Nashville, Chattanooga & St. Louis as at present. With the completion of the new line the Memphis division trains of the Southern will also use this new route between the Chattanooga terminal station and Wauhatchie, but will continue to use the tracks of the N. C. & St. L. between Wauhatchie and Stevenson, Ala.

Three Forks, Helena & Madison Valley.—An officer of this company, which started work in 1912 on a line from Helena, Mont., south via Radersburg, Three Forks and Ennis to Yellowstone Park, about 150 miles, writes that no work has been carried out during the past year. Grading has been finished on 20 miles, but no track has yet been laid. The company expects to resume work and complete at least 25 miles, early in 1915. E. A. Tennis, president, Three Forks, Mont.

Warren, Johnsville & Saline River.—An officer writes that work is now under way building a five-mile logging line for the Bradley Lumber Company from Johnsville, Ark., towards Peters Lake. The company is carrying out the work with its own forces.

RAILWAY STRUCTURES

Appleton, Wis.—The Chicago & North Western is preparing plans for a single track bridge across the Fox river near Appleton, Wis.

Jacksonville, Fla.—The Railroad Commissioners for the State of Florida have issued an order requiring the railroads interested in the proposed new union terminal station at Jacksonville to build on the Myrtle avenue site, instead of at Lee street on the site of the present station. The railroads have been given until May 1, 1915, to file additional completed yard plans if desired. (February 6, p. 297.)

St. Catharines, Ont.—A contract for the steel superstructure of the St. Paul street high level bridge over the old Welland canal has been given to the Canadian Bridge Company, Walkerville, at $91,000. The contract includes rails and track fittings. The bridge is to carry tracks for operating street railway cars.

Shelby, N. C.—Bids will probably be asked for about March 1, to build two bridges on the proposed line of the Shelby Northern from Shelby, N. C., north to Casar, 21 miles. S. S. Royster, president. C. R. Poole, Rockingham, N. C., is interested.

Bavarian Railway Statistics.—A recent British consular report on the trade of Bavaria for 1913 and part of this year contains some interesting information on the state railways of that part of Germany. At the beginning of this year, the total length of the state system was about 4,950 miles, of which slightly under 120 miles were built during 1913. The report mentions that only a few miles of purely local lines have been added since the beginning of the present year, and it is to be assumed that new construction is now entirely at a standstill. Complete details of receipts and expenditures are apparently only available down to 1912, when the revenue amounted to $76,029,840, and the expenditure, "including amortization and interest on invested capital," was $71,077,500. The net revenue is thus returned at $4,952,340, as compared with $5,569,560 in the previous year. In three successive years a total of $3,450,600 has been voted for electrification, of which more than half, $1,846,800 to be precise, figured in the 1914-15 budget. It may be doubted whether the government will now be able to commit itself to this expenditure. During 1912, the state railway administration paid over $170,100 as compensation in respect of accidents due to the negligence of employees. As the annual average for the past five years amounts to about $243,000, there has probably been an improvement in this respect.

Railway Financial News

Chicago, Rock Island & Pacific.—It is understood that the company has made arrangements with New York bankers for the renewal of a loan of $2,500,000, which matured December 31, and which was negotiated in June. The extension runs for three months, with interest at 6 per cent.

Great Northern.—The lease of the United States Steel Corporation ore lands by the Great Northern Ore Company expired on December 31. It was decided a considerable while ago not to renew the lease.

Lake Shore & Michigan Southern.—See New York Central Railroad.

Lehigh Valley.—Vice-President Smith is quoted as saying that no immediate issue of bonds on the terminal at Buffalo is contemplated. The plan is to make a mortgage on these terminals, but no action will be taken in the immediate future.

New York Central Railroad.—Application has been made to list on the New York Stock Exchange $249,590,500 stock of the New York Central Railroad, which is the name of the new company which has taken over the New York Central & Hudson River and the Lake Shore & Michigan Southern. The first meeting of the board of directors of the new company was noted in these columns last week.

The $249,590,500 represents the amount of the new stock to be issued at once. The consolidation plans provided that $50,409,500 should be retained in the treasury, making $300,000,000 in all. The $249,590,500 stock which the New York Central Railroad seeks to list is to be devoted to an exchange of stock on the following basis: New York Central & Hudson River Railroad stock, par for par, $225,581,066; Lake Shore & Michigan Southern Railway minority stock, $4,706,900, five shares of New York Central for one of the Lake Shore, minority stockholders in the other subsidiaries, $574,934.

New York Central & Hudson River.—See New York Central Railroad.

Toledo, St. Louis & Western.—The court has authorized the receivers to pay the semi-annual interest due January 1 on $9,500,000 prior lien 3½ per cent bonds.

West Jersey & Seashore.—A meeting of the stockholders has been called to authorize an increase in the capital stock of the company by $3,000,000 and the issue of $13,000,000 general and refunding mortgage bonds. The Pennsylvania Railroad controls the company through stock ownership and will receive new stock to the extent of about $2,000,000 to pay off advances to the company.

Russo-Swedish Railways.—The Stockholm newspapers report that Russia has approached the Swedish government respecting its attitude on the question of connecting the railway systems of the two powers by a bridge at Karungi, a city situated on both sides of the frontier formed by the River Torne. The eastern part of Karungi belongs to Finland and the western to Sweden. A railway is now in course of construction on the Finnish side, between the cities of Torneaa and Finnish Karungi, opposite the terminus of the Swedish railway system. It is understood that the Swedish government has replied that it is necessary to place the matter before the Swedish Riksdag.

Electrification in Italy.—In order to operate the extensions of the electrically equipped sections of the Italian state railways now under construction, 34 new 3,000-volt three-phase 16⅔-cycle locomotives have been ordered by the government—18 of the 4-6-4 type, weighing 84 tons, from Brown, Boveri et Cie., and 16 of the 2-6-2 type, weighing 68 tons, from the Italian Westinghouse Company. Both are driven by side-rods from two motors, jack-shafts at the ends being employed in the former, but not in the latter. The motors develop 1,300 h.p. each at 45 miles an hour. By a combined arrangement of pole-changing and cascade connection four economical speeds are obtained, namely, 22, 30, 45 and 60 miles an hour respectively.

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Contents

*Illustrated.

The Argentine Loan

On Monday, January 4, a syndicate of American bankers offered to the American public $15,000,000 6 per cent notes of the Argentine government and the entire offering was sold within a few hours. The amount is, of course, almost insignificantly small when compared with the scale on which London bankers finance foreign needs; but as an indication of the actual steps which are being taken toward extending trade possibilities to South America, this piece of financing by American bankers for the Argentine government is a most propitious opening for 1915. The prejudices and practical difficulties in the way of selling American supplies, including, of course, railway supplies, to South American countries are as nothing compared to the fundamental difficulty which has heretofore existed, in that South American countries buy from the nation which finances their needs, and heretofore the United States has not been the banker for any foreign country of importance. As the New York Sun points out, this Argentine loan is the latest of a series which, within the last few weeks, has totaled $72,590,000 of foreign government loans offered publicly in the United States. Encouraging as this is from the manufacturers' and railway supply concerns' point of view, it emphasizes the point made by the railroads in their case before the Interstate Commerce Commission that the railroads are faced with an unprecedented competition in their bid for capital to be subscribed by the American investor. The Argentine loan was offered to yield 6 per cent on the one-year notes and 6¼ per cent on the two and three-year notes, the offering being divided into three series.

Broad Interpretation of Demurrage Rules

The Supreme Court of the United States recently rendered a decision by Chief Justice White, in a demurrage case, which is likely to have considerable importance in its effect on the interpretation of demurrage rules. The case was that of the Berwind-White Coal Mining Company against the Erie, and involved the question whether demurrage charges should be paid on carloads of coal shipped by the plaintiff coal company from West Virginia to Chicago, there to be reconsigned. It was insisted on behalf of the plaintiff that the tariff only authorized demurrage at destination and that the cars never reached their destination. They were held at Hammond, Ind., where are located the storage tracks of the railroad for cars billed to Chicago for reconsignment. This is a considerable distance from the terminals of the road nearer the center of the city, but is convenient to belt lines by which cars can be transferred to any desired new destination, and, as the court observes, the holding on such tracks of cars consigned as were those in question, was in accordance with a practice which has existed for more than 20 years. "Under these circumstances," the chief justice concludes, "the contention of the coal company is so wholly wanting in foundation as in fact to be frivolous." The decision is important not only in making it clear that the payment of demurrage charges may not be avoided on a technical claim that delivery was not actually effected at the destination named, but especially because it shows that the Supreme Court believes that the demurrage rules should be interpreted broadly and that their purpose should not be nullified by frivolous technicalities.

Train Crews and Safety

The Public Utilities Commission of Connecticut, after a thorough investigation of the operation of both freight and passenger trains in the state, with reference to the number of brakemen required, has recently issued a report finding that in general the trains "are now sufficiently manned, and operated with a degree of safety which no order for a general increase of trainmen would augment." One of the principal arguments advanced by railroad officers against the "full crew" bills has been that there is no necessity for legislatures to regulate the number of brakemen when the state railroad commissions have ample authority to do this if the safety of the public or of the employees requires action. This argument prevailed with the legislature of Connecticut at the 1913 session, when, for a bill requiring the employment of additional brakemen, there was substituted one directing the state commission to investigate the requirements and conditions of the service and make whatever orders might be deemed necessary. The report of the commission was published in part in the *Railway Age Gazette* of December 18, and some of its findings make instructive reading. "We feel," said the commission, "that to increase the prescribed minimum gen-

erally, or to increase the train crews beyond a reasonably safe requirement, would tend rather to lessen efficiency, and to decrease safety in operation because of a greater division of responsibility and the lessened individual alertness which would follow. The facts brought out in the present investigation disclosed no instances of the jeopardizing of the safety of either the public or employees which increased train crews would prevent. It is the belief of this commission that, of all the railroad accidents attended by fatalities which have been reported to and investigated by it, not one has been attributable to an insufficiency in number of the train crew involved." It is hardly to be expected that such conclusions will have weight with the class of politicians who are always eager to vote for anything a labor union asks, but they should influence legislators who have been deceived into thinking the train crew bills were safety measures.

DISCREDITABLE ACTION REGARDING RAILWAY MAIL PAY

BY passing the railway mail pay rider to the postoffice appropriation bill introduced by Chairman Moon, of the House Committee on Postoffice and Post Roads, the House of Representatives has added another very discreditable chapter to the very discreditable record which Congress and the postoffice department have been making for years in dealing with the question of compensating the railways for carrying the mails.

The question of the reasonableness of railway mail pay had been vigorously raised by the carriers before the parcel post law was pasesd, and they had presented to the department, to Congress and to the public convincing evidence that the government was not adequately remunerating them. Despite this, Congress enacted the parcel post law, thus adding largely to the mail service which the railways had to render without providing for any additional compensation for the service. After the roads had been carrying the parcel post matter some time for nothing, Congress provided for an increase in mail pay not exceeding 5 per cent. This was wholly insufficient to cover the increased expense forced on the carriers by the parcel post.

Meantime, a joint committee, created by Congress for this express purpose, was engaged in investigating the whole subject of railway mail pay. This committee prepared a report severely criticising the attitude which the postoffice department had assumed, and recommending a further increase in mail compensation of at least $3,000,000 a year, together with action to relieve the railways from the rendering of certain incidental services which are now rendered without payment and which represent an expense to them of several million dollars annually. Thus, the claim of the railways that they were being unjustly dealt with received the sanction of a body created by Congress itself to determine the facts and the equities involved.

Mr. Moon and his committee ignored the report of the Joint Congressional Committee, of which former Senator Bourne, of Oregon, the author of the parcel post law, was the chairman. They reported a rider to the postoffice appropriation bill which would increase the pay of the railways by $2,000,000 during the next year, but the later effect of which would be, according to a statement made by Mr. Moon on the floor of the House, to reduce their compensation by $8,000,000 annually. One does not have to be apt at figures to see that between the recommendation of the Bourne committee and Mr. Moon's estimate of what the enactment of his measure would save to the government, there is a difference of at least $11,000,000.

On what grounds did Mr. Moon demand the passage of his bill? Chiefly on grounds political. With engaging frankness he said, "the Democratic committee on postoffices and post roads asks for a rule to consider legislation that would save to this country millions of dollars; and *the Democrat who turns his back on that demand violates the best interests of the Democratic party.*" In other words, this bill ought to be passed, not because it was based on investigation, not because it was honest, not because it was fair or in the public interest, but because it was conceived that it would promote "the best interests of the Democratic party." And now, convinced by Mr. Moon's extraordinary argument, the House has passed his bill.

It is impossible to characterize the course of Mr. Moon, of his committee and of the House of Representatives in parliamentary language. Impervious to every argument based on considerations of fairness and honor, they have attempted to commit the government of the United States to a policy of robbery of the railways in order that for political reasons it may show a profit in the operations of the postoffice department. Such action either will or will not deprive the railways of a fair profit from the handling of all their business. If it does deprive them of a fair profit from all their business its tendency must be to starve the roads, and thereby disable them from rendering satisfactory service in the transportation of freight and passengers as well as mail. If it does not deprive the railways of a fair profit this will be due to the fact that they will be allowed to charge travelers and shippers high enough rates to reimburse them for the loss which they will suffer from their mail business. In that event, shippers and travelers will be required to pay higher rates than they otherwise would be in order that the postoffice department may show economies in operation and profits which in reality do not exist.

Is this a suitable way for the government of the United States to transact its business at a time when it is engaged in thundering and legislating against inefficiency and crookedness in other lines of business? Ought it not to teach business concerns generally how to be fair and honest and decent by example as well as by regulation? The crookedest bunch of pirates that ever gutted a corporation in Wall Street were as good citizens as members of Congress who will commit the government to a policy of robbing corporations for political purposes.

The obviously fair and square thing for Congress to do would be to delegate to the Interstate Commerce Commission the authority to fix reasonable rates for carrying the mails. Why should passenger rates, express rates and freight rates be made subject to the commission's jurisdiction while the rates for carrying the mails are subject to the arbitrary fiat of the politicians in Congress and the politicians in the postoffice department?

"POISONING THE WELLS"

THE hardest task ever undertaken in the history of mankind is for public utility corporations to please their professional critics. The managers of steam railways, electric railways, light and power companies and similar concerns receive innumerable requests from the universities for co-operation in carrying on their business courses. In many instances these requests are specifically for practical lectures on practical subjects by men who are practical because they are now engaged in the kinds of work which the students are trying to fit themselves to do. Recently, the American Electric Railway Association adopted a "code of principles," one of the proposals of which was that men of prominence in the electric railway field should avail themselves of the opportunities presented to make addresses before student bodies in order that a more thorough and better understanding between the railways and the public might be brought about.

This called forth the following comment from the New Republic, a new weekly magazine: "We are much in need of a far more thorough exposition of the practices and purposes of the public service companies—an honest partisan exposition of their side, with no pretense to a monopoly of 'correct principles.' But a deliberate policy of 'influencing public

opinion at its source' is sure to be worse than futile." Then followed the familiar "well-poisoning" figure.

The implication regarding the purposes and motives of the Electric Railway Association is plain. But who, pray, is to determine whether an exposition of the practices and purposes of the public service companies is honest or is intended to "poison the wells"? The man who makes the exposition is quite as likely as anybody else to know the honesty of his own motives; and if he happens to be a practical expert on his subject he is quite as likely to know whether his statements are correct or not as is anybody else—as is, for example, some writer who adopts the pose of omniscience, and then devotes his life to carping, superficial, negative criticism of those who are engaged in constructive work.

It is to be hoped that the doors of the lecture rooms of our universities will be opened wider and wider to those who really know, because they have learned in the hard school of experience, and that those who really know will more and more frequently enter. Lectures by such men will help to purify some wells which have already been poisoned by numerous writers and teachers who really know nothing about commerce or industry, and who have become neo-socialists and are making their students neo-socialists because they have immured themselves in their libraries and buried their noses in books, instead of getting out into the great world of human activity and learning what is really going on there.

THE SECURITY OF EQUIPMENT TRUST CERTIFICATES

THE Investment Bankers' Association committee on equipment trust certificates urges members of the association to insist, as a condition of purchase of equipment trust certificates, that certain rigid requirements be complied with by the railroad company. The report of the committee is published elsewhere in this issue. In the opinion of the committee 20 per cent of the cost of the equipment should be paid for in cash by the railroad company; the certificates should mature semi-annually or annually within a period of ten years or less; bankers buying issues of equipment trust certificates should require periodical reports from the railroad company as to the condition of the equipment securing the certificates, and great care should be taken that the title to the equipment does not pass through the railroad company's possession so that there may be no possibilities of legal difficulties because of provisions of other mortgages of the railroad in case of the necessity for foreclosure of the equipment trust certificates.

Railroad men, who are even more concerned with the maintenance of railroad credit than are the bankers, will be thoroughly in accord with the last of these suggestions. Equipment trust certificates have generally been considered particularly good investments because of the tangibility of the assets securing them and the directness of the lien on the assets created by the indenture. The value of equipment trust certificates as investments is enhanced by the fact that in case of a receivership the trustee of equipment certificates is in a strategic position in a great many cases as compared with the trustees of other mortgages because of the simplicity of enforcing his demands, whereas the trustee of a general mortgage may find it necessary to bargain and finally accept a compromise in any plan for reorganization, since the assets securing the general mortgage bonds are inseparable from assets and equities of other security holders.

The other two suggestions, however, are open to argument. It is a practical and physical impossibility for a railroad management to know at any given date just what is the condition of its freight cars. Some of these are scattered all over the country. Repairs are being made by other lines for which the railroad company responsible for the equipment may not receive bills for a considerable period. There is furthermore a question as to the advisability of bankers attempting to directly supervise details of railroad operation such as the repairs of equipment. When and how repairs should be made is an operating question controlled, of course, like many other operating questions, by the ever present financial question as to the company's immediate resources and income. As such it would be likely to suffer rather than be benefited through interference in the consideration of it by bankers. The general credit of a railroad company issuing equipment trust certificates should, and does among discriminating investors, affect the price at which equipment trust certificates of that company can be sold. One of the factors in the general credit of a company is the adequacy of maintenance.

The facts that underlie this particular recommendation of the committee have to do with the relations of the investment banker and his customer. The investment banker knows that in the great majority of cases the individual customer relies on the reputation of the banker offering him an investment fully as much as he does on his own knowledge of the security behind the investment or the credit of the company issuing the securities. While this is admittedly true, it does not and ought not to clothe the investment banker with the responsibility of detailed supervision of keeping intact the security back of bonds or equipment trust certificates. The banker's responsibility should be that of making a very thorough investigation of the credit, maintenance policy, etc., of the railroad company before recommending to his customer equipment trust certificates or any other securities of the company. This, however, is about as far as the banker's responsibility can extend.

The other suggestion that 20 per cent of the cost of equipment be paid in cash by the railroad company and that the certificates be paid off in instalments within a period of ten years, suggests some considerations as to the advantages or disadvantages to a railroad company of financing through the sale of equipment trust certificates. As a matter of fact, it is more often the roads whose mortgages are such as to make it difficult for them to pay for equipment out of the proceeds of general mortgage bond sales, or whose current funds are not sufficient to permit of the purchase of equipment outright from current funds, that resort to the issue of equipment trust certificates. But if equipment trust certificates are resorted to, a railroad company has to face a semi-annual drain on its current funds which may come at a time that is quite inconvenient, and it has eventually to pay for the equipment entirely out of surplus earnings, assuming, of course, that the company remains solvent. For instance, a road buys 110 locomotives costing $2,200,000 cash. It has to draw on its current funds for $200,000, for which in some cases it is possible to use the proceeds of general mortgage bond sales, but in others not possible, depending, of course, on the provisions of the general mortgage. It issues $2,000,000 equipment trust certificates maturing in ten annual instalments.

Assuming that the company is liberal in its expenditures for maintenance and its charges for depreciation, in the neighborhood of $330,000 will be spent in repairs each year, $66,000 will be charged each year for depreciation, and $200,000 will be paid out of current funds each year and charged to additions to property, through income and surplus, for maturing instalments of the equipment trust certificates. At the end of five years there will be but $1,000,000 of securities outstanding against equipment intrinsically worth at least $1,700,000, with a further charge to expenses of $330,000 for depreciation. If the road has shown a surplus or at least not shown a deficit for the five-year period, the $330,000 charged for depreciation is an addition to its assets through income, although, of course, it is not a specific fund or asset set aside. At the end of ten years the company will have paid for the equipment entirely out of earnings and further charged expenses with $660,000 for depreciation. All this amounts to a quite rapid addition to property investment without any addition—after the transaction has been completed—to capital securities and is all very conservative and possible for a strong road; but it is the weak roads which have in the past found their way out of difficulty in certain cases through the issue of equipment trust certificates. Viewed from this angle 20 per cent paid from current funds and a limitation to 10 years seems rather more than ample protection to safeguard equip-

ment trust certificates. The investment banker's suggestion is analogous to the Interstate Commerce Commission's requirements in regard to depreciation in that it accentuates the weakness of weak roads and the strength of strong roads.

THE PRACTICAL LIMIT OF DETAIL IN THE FEDERAL VALUATION

THE abstract of the instructions to the federal valuation parties published on another page will be of special interest to engineers, outlining as it does not only the methods for the conduct of this work, but the nature and extent of the information which the government forces are to secure.

The roadbed is to be cross sectioned with almost the same detail that it would be measured up for a contractor's estimate, and all material is to be classified. The ties and track fastenings are to be estimated from a count of the actual number in two 600-ft. sections per mile. The weight of the rail in all main and side tracks, together with the year in which they were laid, are to be ascertained, while the depth of the ballast is to be determined by digging into it at intervals not greater than 1,000 ft.

The prosecution of this work in such detail will impress many railway engineers as unnecessary. There is no question but that the valuation is being made in much greater detail than a possible purchaser of the roads would require. It would seem that the amount of earthwork, especially on lines completed within the past few years, could be determined with sufficient accuracy for all practical purposes from the records of the company, checked by accurate measurements of limited stretches at various intervals. Likewise, the records of rail in main tracks, which most roads keep for their own purposes, should, if verified by a reasonable amount of checking, be accepted as affording complete and accurate information.

In the determination of hidden quantities and unit costs for earthwork and other materials it will be necessary for the government to consult the records of the roads, and such records will undoubtedly have considerable influence in the final determination of the prices used. If reliance is placed on the records of the roads for such data it would not seem inconsistent to accept information as to other quantities which investigation shows are reasonably accurate.

The federal act providing for the valuation does not state the purpose for which it shall be made, whether for rate-making, the regulation of securities or ultimate government ownership. Therefore, it is necessary for the government forces to secure data in sufficient detail to provide the necessary information for any or all of these purposes. As in the case of any project of great magnitude and without precedent, it will be recognized as advisable for the government to collect too much rather than not enough data. Valuations made by some of the states and by the railways themselves have not withstood the test of the courts because of the inadequate data on which they have been based. Now that the government is definitely committed to this project it is highly expedient that it be carried through with the proper degree of thoroughness to withstand any attacks of this character. Also, in order satisfactorily to execute this project it is necessary to establish a spirit of mutual confidence, and of co-operation, between the forces of the carriers and those of the government. But if this spirit is established it will undoubtedly be possible to accept considerable data from the carriers which the government forces are now collecting independently in the field.

It is equally to the interest of the carriers and the government to eliminate all unnecessary duplication of work in order to reduce the expense to the practical minimum, as well as to hasten the completion of the entire valuation. The instructions under review may, therefore, be assumed to show the maximum amount of data which the government forces are to be called upon to collect, and it may reasonably be expected that as the forces, both of the government and of the railways, become better organized and more familiar with their duties, material modifications in the instructions will be made.

Letters to the Editor

ERRORS IN LOCATION AND CONSTRUCTION

St. Louis, Mo.

To the Editor of the Railway Age Gazette:

On reading your editorial on the subject of valuation in the issue of December 18, the thought occurred to me that the so-called valuation is an inventory of what exists on the road at the time it is taken, to which current prices are supposed to be applied to obtain the "value" of the property. But does this ascertain the value? Where a road has been built two or three years the "cost" (which is but the "value") might be ascertained, if it were not already known from the auditor's books. But when a road has been built 25 or more years the question of experience comes in, aside from any "adaptation or solidification of roadbed."

At the time the railroad was built errors of judgment were certainly made in the haste of location and construction, and all the years since have shown these, and they have been corrected. Grades were too low in places, bridges were too small or wrongly placed, damages had to be paid (often extending over many years) for defective drainage, personal and other injuries took place, etc. No engineer is infallible, and if the road were to be "reproduced at present prices" none of these errors would be taken into account, although they undoubtedly would occur. The percentage for contingencies would be very large, in many cases from 50 to 100 per cent.

C. D. Purdon,
Chief Engineer, St. Louis Southwestern.

THE BROOKLYN SIGNALING CONTRACT

New York City.

To the Editor of the Railway Age Gazette:

In the article in your issue of December 25, "Signals for New Brooklyn Subways," there is an error in the paragraph reading: "When the new bids were opened the Federal Company, whose bid was higher than that of the General, protested that the action of the company and of the Public Service Commission was irregular and unwarranted."

This company was never asked to submit but one bid, upon one set of specifications. Upon these specifications the Federal Signal Company was the low bidder. The Federal company was subsequently requested to meet the price which had been offered by the General company after the bids were opened, with the privilege to the New York Municipal Railway Company to substitute a speed control and cab system, provided a satisfactory scheme could be developed.

The Federal company offered to grant the privilege of this substitution, but refused to lower the price $100,000 to meet the revised bid of the General company, which had reduced its original price $515,000; this for the original specifications with the additional option to substitute a speed control system.

The only communication received by the Federal company from the New York Municipal Railway Corporation, after the bids were opened, was the following from the president of the latter corporation, as follows:

> I have yours of even date. I assume that your company would be able to develop a system which might be as efficient as that proposed by the General Railway Signal Company, but even upon this assumption we save something over $100,000 by adopting their proposal as against yours.

In view of the above it is evident that there were only one set of specifications offered for bidding, and the chief engineer admitted at a hearing which was held before the Public Service Commission that he would not know how to draw up specifications for a speed control system.

Federal Signal Company.

Organizing the Supply Department on the Seaboard Air Line

Sufficient Facilities and No Division of Authority Proved to Be the Essentials of Success of This Organization

By H. C. Pearce
General Purchasing Agent, Seaboard Air Line

The purpose of the organization of the supply department of the Seaboard Air Line is best expressed in President Harahan's circular of July 19, 1913, which reads:

The General Purchasing Agent will have charge of the purchase of all materials and supplies. He will have charge of the Stores Department, which department will have jurisdiction over all materials and supplies on the railroad not actually in the hands of the various officers for application to specific work. The Purchasing Agent and General Storekeeper will report to the General Purchasing Agent.

The problem was how to place the resources immediately under control and at the same time carry on the considerable work that was under way without delay or incurring any unusual expense. It was necessary to act quickly in order to meet the unfavorable business conditions that had already set in.

The Seaboard Air Line operates 3,100 miles in the states of Virginia, North Carolina, South Carolina, Georgia, Alabama and Florida. It has extensive terminals at Portsmouth, Va.; Hamlet, N. C.; Atlanta and Savannah, Ga.; Jacksonville and Tampa, Fla. The territory it serves and the class of traffic that it handles makes it subject to very close supervision and closer operation.

The stock on hand, as represented by the balance sheet, was small considering the mileage, being only $1,896,755, June 30, 1913, including rail, fuel, cross ties and dining car supplies. Mr. Harahan was too close an observer to be misled by the figures shown by the balance sheet. He knew that there was a large amount of material on hand that was not reflected by these figures, and that the purchases were entirely out of line. He had a thorough investigation made by an expert which proved that his conclusions were correct.

It was the same old story. In order to forestall criticism and investigation, which is always aimed at the stock as reflected by the balance sheet, and the payroll, it was necessary to resort to the common practice of charging out the material when it was received and letting the users handle it, or, in other words, handle the bills instead of the material. Naturally the material was scattered over the entire system, each individual looking out for himself as best he could. There were storekeepers at some of the more important points, but they merely looked after the delivery of the material as best they could. No attempt was made to handle other than supplies used by the mechanical department.

After making a careful inspection of the property, I was satisfied that while the usual thing to do would be to call for sufficient facilities and organization to inventory, bring in and arrange the material at central points for issue at once, such a plan would involve an investment and operating expense that would not be considered, and besides, I was not fully convinced that this expense was warranted, or that reasonably good results could not be obtained in a different way and without in any way diverting from the purpose desired.

The plan decided upon was to organize the purchasing, storing and distributing first, and follow up later with the organization of the division stores and outside depots. A review of this work may be of interest to those who have similar problems to meet:

PURCHASING

Consolidation of Purchases.—Arrangements were immediately made to have the purchasing agent buy everything except commissary supplies. This included locomotive fuel, cross ties, lumber and stationery, as well as a large quantity of materials and supplies which were formerly purchased by division officers, such as superintendents, division engineers, roadmasters, etc., under the guise of emergencies. It is absolutely necessary to consolidate the purchase of all material in one office in order to exercise the necessary control.

Consolidation of Requisitions.—Arrangements were promptly made to have all requisitions pass through one channel where they could be recorded, checked, consolidated and filled from available material, or arrangements made for purchase under proper specifications. Requisitions are given a number when received by the general storekeeper and this number serves as a requisition, inquiry, proposal, order and correspondence file number; thus making one number the means of identification for all interested parties. This, it will be appreciated, is of great importance in systematizing the ordering, tracing, inspection and accounting.

Inquiries or Bids.—Arrangements were made to send out inquiries, or what are commonly known as bids, for all materials or supplies not covered by contracts or agreements. It was arranged to first establish an inquiry list of commodities arranged alphabetically. This list is added to or deducted from as occasion demands. Inquiries are sent out to all firms on this list. The proposals received are tabulated on quotation sheets and the business awarded, everything being equal, to the lowest bidder. This sheet, including the inquiry and proposal, together with copy of the order, is attached to the requisition, to which is added any subsequent correspondence.

Price Records.—Price cards and loose leaf price books were established, thus giving a perfect description of commodities arranged in alphabetical order, showing the quantity, order number, date of order and name of seller, together with prices and delivery point. Quotations are entered on the same card, except that they are entered in red. These cards also answer the purpose of a correspondence index file.

The price cards present a picture of each transaction. They serve the further purpose of a correspondence file and a still further purpose of a record of quantities for comparative purposes.

Checking of Invoices.—A copy of the order is placed on the order file, in addition to the copy which is filed with the requisition, arranged numerically. This gives the name and address of the seller, description of material, prices, quantity, agreed delivery, quotation number, routing and destination. The invoices are checked against this record before they are sent to the general storekeeper's office, and date of shipment as shown on invoice and bill-of-lading entered thereon.

It is the duty of the purchasing agent to see that all invoices are accurately checked as regards quantity, prices, date of shipment, delivery and delivery point before the invoices leave his office.

Tracing.—A systematic system of tracing was installed. This is done from the order file referred to above. It is the duty of the clerk having charge of this work to see that deliveries are made in accordance with the deliveries specified on the face of the orders, and to guard against overshipments. Orders should show the deliveries, and material should be traced before being asked for. The delivery should be as much a part of the agreement as the price. It is the duty of the purchasing agent to see that deliveries are made in accordance with terms of purchase. He should not wait until he is asked to trace for material.

STORING

Organization of Stores.—It was decided to organize two general supply depots to care for the system at the two principal shops. Sufficient platforms, racks and bins had to be provided

to properly segregate not only the material on hand, but the material that was not needed, which we intended to bring in from off the line, and take back from the shops where it had been drawn and not used.

We decided that in order to save time and expense, we had better go ahead and do this work with store labor under our own supervision.

The stock was arranged in section order, which consists in a section being assigned to the same general class of material, which is based on combining such classes of material as would naturally be handled to the best advantage by a single man. For example, all of the air brake material, lubricators, injectors, sanders, etc., were segregated in one section, the idea being that the man who has charge of this section of material must have knowledge of this class of equipment. Another section contains bolts, nuts, lag screws, etc., which can be placed in the hands of a laborer without technical knowledge. Bar iron, flues, firebox steel, tank steel, arch brick, etc., were segregated in one section for the reason that this class of material is usually maintained adjacent to the boiler and smith shop.

The plan has as its basis the purpose of having one man who has actual knowledge of and who is responsible for the ordering, receiving and delivery of every item in his charge, actually handle it with his own hands, as well as keep his stock records. The plan is broad and flexible enough to meet any conditions.

Preparation of Stock Books and Standard Lists.—Due to the fact that the practice had been to send a large portion of the requisitions directly to the purchasing agent, it was very difficult to secure proper description of material. It was necessary that stock books be prepared immediately, giving this information, so that we could use these books as a guide in checking requisitions, both as regards quantities and description.

The stock books are fundamental, and must be so prepared and maintained as to show what is actually on hand at each point every thirty days, what is due on unfilled obligations and the average monthly consumption over a period. Each item must be fully and completely specified, and still further, identified by a number. This record is the basis of calculations in placing requisitions for future requirements, plus such additional information as may be known to the storekeeper at the time.

Inspection of Material.—Arrangements were made to have all material as far as possible pass through the general stores for the purpose of proper inspection and control. Probably nothing has been so sadly neglected as the inspection and checking of material. This is due to the mistaken idea of the economy of direct shipments to save handling.

There is only one way to have material properly inspected, compared and checked, and that is to have it pass through the general stores where we have sufficient trained men to properly do the work. Material which requires chemical analysis or technical inspection is covered by an inspection certificate which is attached to the purchase bill.

The best inspection of all is that of the section storekeeper who receives and handles the material in conjunction with the user. These men are in position to know what is best suited for the work, and it is wonderful what can be accomplished by applying this method of inspection to most materials and supplies.

DISTRIBUTION

Store Delivery.—Realizing the importance of having the material delivered directly to the users instead of over counters, as is the usual practice, a store delivery system was installed at once, which consists of an organized force sufficient to deliver the material directly to the users instead of having mechanics come to the storehouse and be waited on by attendants.

In addition to the expense and delays of having mechanics and helpers leave their machines to go to the storehouse to obtain material instead of having the material delivered directly to them, as it should be, another fundamental fact must be apparent—that in this way the section storekeeper is in position to actually know that the material is needed and that it is suitable for the work required. This enables him to utilize a great deal of material which otherwise would become obsolete. It also enables him to keep up his stock and prevent the accumulation of a surplus, either in the stores or in the shops.

During July, there were 5,575 individual deliveries made to the shops at Portsmouth, or an average of 214 for each working day. The force consists of a foreman, one man and four boys. Boxes are placed at 25 points throughout the shops and regular trips are made every 30 minutes, and as many additional trips as may be necessary—the boys picking up and bringing in the tickets on their rounds. This crew also brings back to the stores the shop-made material and repair work.

Supply Train.—Supply cars consisting of one car for miscellaneous material and track tools, and a car for oil, had been in operation on local trains, but they were not a success. The supply train was established in November, 1913. This train delivers all material used for ordinary maintenance and operation except rail, ties and lumber, and it picks up all serviceable tools and salvage that for any reason is not needed. An inspection of all supplies and tools at each tool house and supply depot on the system is made every 60 days, and only what is actually needed, after a personal inspection on the ground, is delivered.

The supply train is to the system what the store delivery is to the shops. This train should be accompanied by the road-master, division engineer, general storekeeper or inspector of stores. It offers the only thorough and practical method of distribution and control of materials and supplies for maintenance and operation, and is the only medium by which accurate information can be obtained as to what is needed before it is delivered, the service materials and tools are giving, and other information which a supply officer must have first-handed in order to intelligently provide and control issues.

Reclamation of Material and Sorting of Scrap.—Practically no attention had been given to the reclamation of material and the sorting of scrap. The practice had been to sell a great deal as miscellaneous scrap. This for the purpose of saving the cost of handling.

This work was taken over September 1, 1913. From that date all scrap received was carefully sorted into classes, in addition to the enormous quantity which was already stored in the yard. Facilities are being gradually installed and the work of reclamation is being gradually increased. In the meantime, everything which we believe can be reclaimed is being segregated and laid aside until we have the facilities to do the work properly.

There is an unlimited field for saving in the handling of salvage on a railroad. Nothing should ever be scrapped that can be made available for use at less than the purchase price.

Stationery Store.—The purchase of stationery was formerly done by the stationery storekeeper. The turning of this work over to the purchasing agent greatly reduced the prices of all forms. We recently installed a printing press which further reduced the cost of forms.

The cost of stationery does not reflect what was done for the reason that during the past year we purchased a great many mechanical appliances, such as billing machines, adding machines, comptometers, etc. The saving effected in printed forms was more than consumed by the cost of these mechanical appliances, the cost of which was charged to the same account.

Division Stores.—As soon as the two general supply depots were properly organized, we took up the work of organizing the division stores along the same general lines. This work has progressed slowly, and it will take considerable time to go over and arrange all of the material at outside points, ship in what is not needed and arrange the remainder in sectional order. Uniform stock books will be established at all division points this year.

With two general stores properly organized and the supply train system thoroughly installed, we are in position to reduce the stocks at outside points to a thirty days' basis, and maintain them with the minimum of expense. The purpose is to re-

duce the stocks of material at outside points until we will deliver each month only sufficient to take care of the requirements for the succeeding month, picking up and bringing back to the general supply depots what remains for any reason. Division engineers' and roadmasters' stores are being dismantled and the material brought into the general supply depots.

The following, so far as such things do, will reflect the work accomplished:

Unapplied material recovered and returned to the Stores	$121,507.00
Usable material recovered from scrap and returned to the Stores	6,482.00
Usable material reclaimed from scrap, issued and charged direct to the Maintenance of Equipment	24,544.00
Scrap reclaimed and credited to Maintenance of Equipment	208,428.00
Scrap reclaimed and credited to Maintenance of Way	58,117.00
Inventory overage charged direct to Store Stock and credited to Operating Expenses	55,818.00
Material investment reduced	227,983.00
Purchases reduced	178,606.00

The real work, however, consists in the organization and system which has been installed, the merit of which will be reflected in decreased purchases the ensuing year.

It will be recalled that the reorganization was not effected until July 19, 1913, and we really did not get started until September, so that these figures only cover a period of ten months.

The merit of the supply department consists in providing better service with less expense and *less net cost for materials.* Work of this kind can really only be reflected in the final operations of the property.

Attention is called to the fact that we made no expenditures for improvements and facilities other than such as we have done ourselves. We were simply obliged to do the best we could with what we had.

My experience has fully convinced me that no supply department can be effective, no matter what the experience or ability of its officers, that has not a well defined purpose and a thoroughly practical plan, fully understood and supported by the chief executive.

Our railroads must realize before the question of supply can be properly controlled, that the great need is to discourage the accumulation of large quantities of material in advance of requirements, and that the presence of material unused, is a much greater sin than its absence.

I am firmly of the opinion that a plan can be devised and carried out whereby work will not suffer for lack of material when once it is thoroughly understood in the operating departments that it is as wasteful to have material unapplied as it is to have labor unemployed.

There are certain fundamental principles involved in carrying out any plan, which must be understood and adhered to.

First.—Sufficient facilities and organization to properly purchase, care for and distribute what is actually needed, and some method of determining that material is actually required and will be used promptly. The time to reduce purchases is before they are made. No real economy can be obtained when everyone has all they need at all times. Material for specific work should not be bought until it has been decided beyond reasonable doubt that it is going to be used and within a specified time, and the purchase arranged accordingly. A large percentage of the material on our railroads is material which was ordered for some particular work and the work either curtailed or abandoned.

Maintenance officers should be held rigidly accountable for material on hand unused. Broadly speaking, there should be no stock outside of the storehouses. Altogether too much attention has been paid to complaints that work was delayed or the cost increased for want of material. Few of these complaints are justified, and are merely a fence. Very little work is ever delayed on a railroad for want of material. There is always enough to do on a railroad so that there should be no delay to work as a whole. Fear of criticism and desire for commendation has made many of our supply officers and storekeepers impotent. These officers must be supported and strengthened in their efforts to control the purchases and stocks and prevent unnecessary accumulation.

Second.—There must be no division of responsibility from the time the purchase is authorized until the material is actually delivered to the work and the salvage disposed of.

With these principles clearly defined and understood, the work is then a matter of system and applied common sense.

PROSPECTS OF STATE OWNERSHIP IN ENGLAND*

BY W. M. ACWORTH

When I was invited last spring to address you this autumn on the subject of Railway Nationalization, none of us expected that we should be confronted with a *fait accompli.* Today the railways of this country, with unimportant exceptions—Ireland has got home rule in this matter—are nationalized. And it has been done so quietly that the man in the street doesn't know that it has been done, and that the porter in Queen street is at this moment a government official. But so it is, and it shows how easily the thing can be done. It may be undone—I don't think it will be—if two of the most influential men in the cabinet get their way, and induce their colleagues to see what a good opportunity the conclusion of the war would be for bringing forward a great scheme of social policy which cuts across normal political divisions.

But in any case, what has been done once can be done again. And it may be done again in the same way—taking over the whole thing as it stands by an interim arrangement and dealing gradually with knotty problems, such as the rights of the different classes of shareholders, the reorganization of the tariffs of the unified system, the right of state servants to strike, and so on—I only mention a few.

That nationalization of our English railways is bound to come, I have long believed. That it will come pretty soon, I fully expect. Judging by the evidence before the Royal Commission now sitting, the great majority of the great manufacturers and traders of the country are opposed to it, the Leeds Chamber of Commerce among the number. But the captains of industry have few votes; the railway servants alone can vote them down; the Trade Union vote would simply swallow them. And I have no doubt which way the working classes, who expect the bottomless purse of the state to provide simultaneously higher wages, shorter hours, easier work and lower fares, would vote.

For my own part I shall greatly regret the change, which I believe to be inevitable. Not only because:

> "Men are we and must grieve when even the shade
> Of that which once was great has passed away,"

but because we shall lose, in my judgment, more than we can gain. I admit we shall gain something—a good deal perhaps. English business admittedly had grown slack—take the iron and engineering trades for instance—twenty years ago. Rule of thumb methods, antiquated machinery, neglect of cost accounting, and so forth, held undisputed sway. English business was effectually awakened by the severity of foreign competition. English railways are not exposed to foreign competition, and their methods still need modernization. The railway profession nowadays need the best brains and high scientific training. Our railways mainly recruit their headquarters staff from the rank and file. The headquarters staff of the civil service are the pick of the very best brains of the country. I cannot doubt that nationalization would *at the outset* lead to more scientific and, therefore, more economical operation.

I will concede another point and a big one. No nation has yet solved the problem of satisfactory state control of a private railway system. Our railways used to be pretty well controlled by competition. But competition is dying before

*An address delivered before Leeds Luncheon Club, Leeds, Eng., on November 16, 1914.

our eyes. There remain the Board of Trade and the Railway Commission. Nobody, I assume, supposes that they control the railways. The Royal Commission now sitting has shown no signs so far of having begun to think out a scheme of adequate control, or even of appreciating that such a thing is required. France used to have, under the name of *Comite Consultatif*, a really competent body of experts controlling its railways on the commercial side. But of recent years political pressure has greatly increased the membership of the committee till it has become an overgrown debating society, whose debates are not primarily conducted from the point of view of the public interest. As for America, high hopes were entertained not long since of the Interstate Commerce Commission. But its recent record has disappointed even its most fervent admirers. And at this moment the commission, having done its worst in impairing the credit even of the strongest companies, is occupied in eating with what grace it can a decision on the most important question ever submitted to it, which it pronounced after twelve months' inquiry as recently as last July.

Private railways must be controlled by the state. And when one admits that no state has yet discovered a satisfactory way of doing it, one may seem to have gone a long way in admitting the necessity for state ownership. And yet I still think that the balance of argument is definitely on the other side for two main reasons, financial and political. Though the doctrines of the Manchester school are out of fashion nowadays, it still remains true that the state cannot, or at least does not, conduct business as efficiently and economically as private enterprise. I have said that I believe that state management in this country at this moment would induce immediate economy. I have not said, and I do not think, that it would secure better public service. And I still believe that, if our railways remain in private hands, and have to work out their own salvation, they will be operated twenty years hence more efficiently than they ever would be by any government department. The largest part of the expenditure of a railway is the wages bill. Does anyone believe that the state gets as good value for £1 spent in wages as the private employer? Whether our English railwaymen are underpaid at present, I am not concerned to discuss. I only wish to point out that, under a state system, wages must go up sharply, and that the public will have to foot the bill.

It is in Prussia, if anywhere, that government railways are efficient. And yet I believe that any impartial expert, comparing Prussia with France, and taking into consideration the conditions, geographical, commercial, and economic, the service rendered, and the rates charged, would come to the conclusion that the French companies, hampered though they are at every turn by political interference, are managed more efficiently and economically than the Prussian state system. As for the exploits in disorganization of the French government since it took over the Western Railway, it is only kind to draw a veil over them, and say that things have been so bad that it is impossible that they should not get better. But, if the Prussian state cannot hold its own with the French companies, still less can the Australasian state railways face comparison with American companies. Comparing the efficiency of the Victorian or New South Wales railways with that, I will not say of the Pennsylvania, but of the Southern Pacific or even the bankrupt St. Louis & San Francisco, would be as absurd as comparing a blunderbuss with Lee Metford.

Even more important to traders than the quality of service given is the scale of rates charged. If our railways are nationalized they will need to earn much the same net revenue as at present; or else saddle a deficit on the taxpayer. Private companies naturally try to raise the necessary revenue with the minimum of economic friction. Their motto is "Charge what the traffic will bear." Drop the rates where the traffic cannot bear them; keep them up where the traffic can. Their goods manager is from his situation impartial between rival claims. By training he is an expert to know where the shoe most pinches. The state instinctively tends to broad general rules and a dead level of uniformity. And, in practice, at least in a parliamentary country, adjustments towards uniformity can only be downwards. And this means that certain individuals, in no way specially meritorious, will secure increased profits at the expense of the general public. Under a state system I have no doubt that rates would be reduced to a dangerous extent. It is emphatically untrue that reduction of rates always increases net revenue. If it were true, why do not the commercial companies reduce rates today? The famous apple woman who could afford to sell each apple at a loss because she sold so many lived in Ireland. And Ireland is an exceptional country.

I have left to the last what is in my mind the final and crucial point—politics. Under a state system, to quote the words of the famous Italian commission of thirty years ago, "Politics would corrupt the railways. And the railways would corrupt politics." The Italians since then have put the question to the test of experience, and have abundantly proved that the commission was right. I cannot attempt to give you the evidence. It is to be found all over the world, from Belgium and France to Argentina and Peru. Some samples culled from the records of our own Australasian colonies will be found in Sir Charles Owens' evidence before the Royal Commission. I have myself called attention to evidence from Canada and the Cape to the same effect. It is safe to say that no democratic state has ever yet succeeded in keeping railway management out of politics. In my belief no democratic state ever will. And it is because I believe that politics would corrupt the railways and railways would corrupt politics, not necessarily through money bribes but through the worse and more insidious bribery of votes, that I shall oppose government ownership of railways in England as long as the question remains an open one. But I fear I shall live long enough to say, "I told you so."

RAILWAY AFFAIRS IN OTHER COUNTRIES

The illustration shows a German troop train which was wrecked while running at high speed near Stendal, Geomany, when it ran into the rear of a freight train. The train was carrying soldiers who had recovered from their wounds to such

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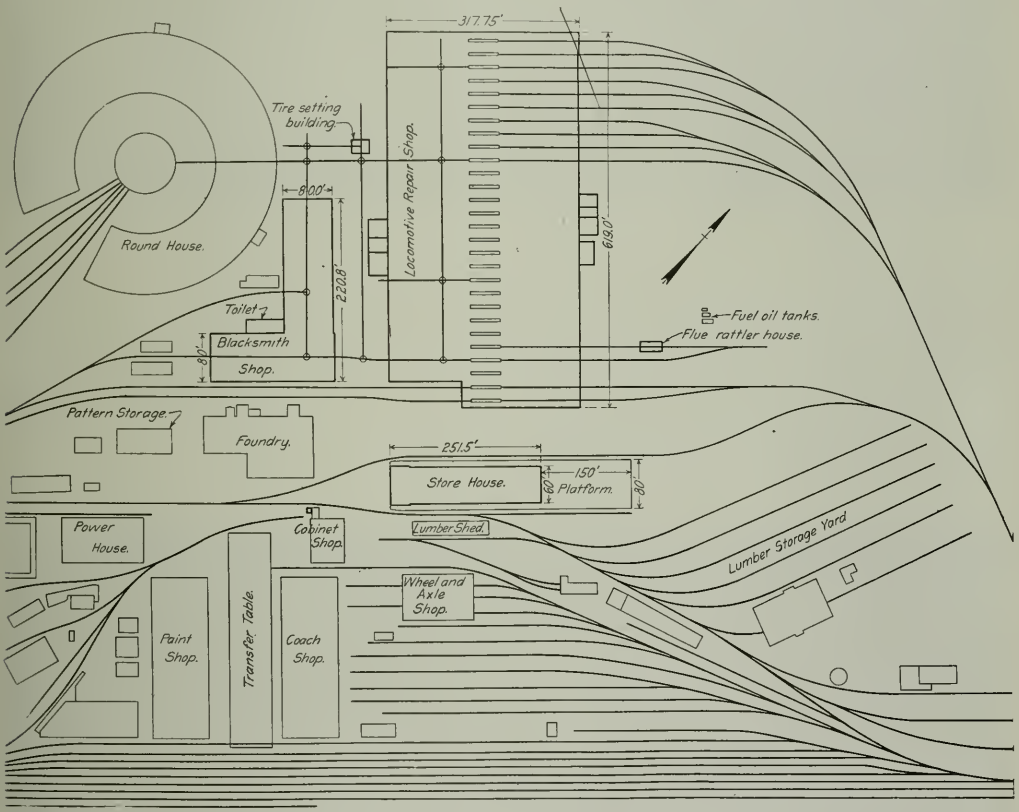
A German Troop Train Wrecked Near Stendal, Germany

an extent that they were returning to the French battlefields. The cars were telescoped and several of them totally wrecked, a large number of the returning soldiers being killed and seriously wounded.

New Chicago & Alton Shops at Bloomington, Ill.

Increased Facilities for Heavy Repairs Provided by Construction of Three Large Modern Buildings

The Chicago & Alton has maintained car and locomotive repair shops in connection with its engine terminal at Bloomington, Ill., for many years. When the necessity arose for increased capacity in these shops some time ago, the advisability of removing these facilities from Bloomington was considered, but to prevent this the city agreed to furnish the land necessary for the enlargement of the shops and yards sufficient to care for requirements for some time to come. The new buildings just completed on this land, which adjoins the old site on the north, comprise a locomotive shop, a blacksmith shop, a storehouse, a tire heating building and a flue rattler building. A number of unique features were introduced in the design of these buildings, notably the placing in one structure of the several departments of the locomotive shop and the improved layout of the blacksmith shop. The general layout provides not only for existing and probable future needs but for the utilization as far as possible of the old shops and for the development of a well defined scheme that will ultimately utilize the tract in the most economical and effective manner. The arrangement of the new buildings and their relation to the old buildings, the storage yard tracks and platforms are shown in the plan.



Layout of Chicago & Alton Shops at Bloomington, Ill., Showing New Buildings Recently Completed and Their Relation to the Yards and the Old Buildings

LOCOMOTIVE REPAIR SHOP

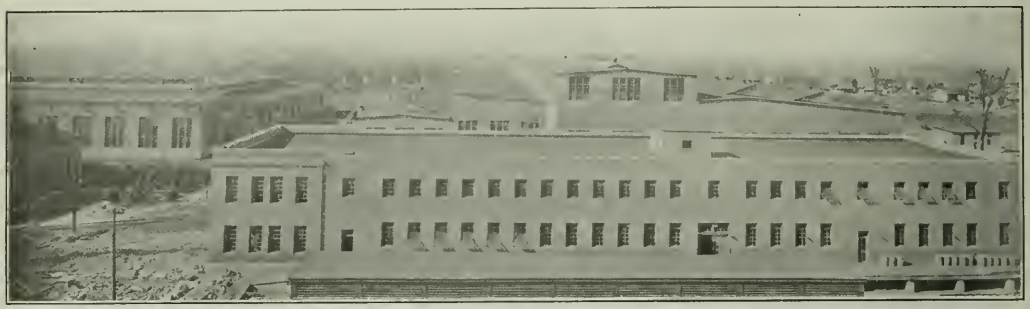
The locomotive repair shop is 619 ft. long and 317 ft. wide, covering an area of nearly 4½ acres. The building is divided into five longitudinal bays housing the erecting shop, the machine shop and the boiler and tender shop, as well as the master mechanic's and foreman's offices, tool rooms and sub-store rooms. This combination of the various departments under one roof without partitions admits of such an arrangement of tools that work and materials may pass through the shop in an orderly and progressive manner with the least possible rehandling.

This building consists of a structural steel frame on concrete foundations with side walls of concrete up to the window sills and brick above that level, with the exception of the high walls of the central erecting bay which are of tile with stucco finish. The floor consists of a 4-in. sub-base of tarred rock well rolled and covered with a 1-in. layer of sand and tar in which is embedded an underflooring of 3-in. yellow pine overlaid by a

1 1/16-in. maple floor. The roof has wood purlins with 2-in. planks covered with prepared roofing. The building is well lighted as the combined window area of the side walls and the saw tooth and monitor roof construction amounts to over 28 per cent of the floor area. The artificial lighting consists of Tungsten nitrogen-filled lamps in 400-watt units spaced to eliminate shadows and the necessity for individual lamps on the machines except for inside work.

The shop is heated by an indirect blower system located in two specially constructed rooms outside of and immediately adjacent to the main walls of the shop and situated one on either side of the building about midway of its length. These rooms are large enough to be divided, a part of the space being used for lavatory and locker rooms for the men. The blower system consists of two 240-in. steel plate exhauster type fans direct-connected to horizontal throttling engines. These fans draw air through 20,200 sq. ft. of Vento heaters and discharge it through concrete underground ducts to register boxes located along the outside walls and on interior columns. The Vento heaters are supplied by high pressure steam transmitted from the power house about 1,000 ft. away at 125-lb. pressure, which is reduced in the fan room to 1½ lb. The exhaust steam from the fan engine is also used in the heaters. A suitable system for the unwheeling of locomotives being of 150 tons capacity equipped with two trolleys of 75 tons each located on the upper runway, while the lower runway carries a 10-ton messenger crane. On every alternate column between the erecting pits jib cranes are provided for handling materials on the front ends of the locomotives.

Adjoining the erecting bay to the south is a 60-ft. bay in which are located the heavy machine tools which are served by a 10-ton traveling crane. South of this bay is another 60-ft. bay in which are placed the lighter tools. The heavy tools are all equipped with individual motor drive, while the lighter ones are arranged in groups driven by motors of 20 to 25 hp.



Looking Over the New Chicago & Alton Shop Buildings, Store House in the Foreground, Blacksmith Shop to the Left and Locomotive Shop to the Right

North of the erecting bays are two 60-ft. bays devoted to boiler and tank work. These two bays are served by traveling cranes, one of 15 tons capacity and the other in the boiler assembling bay of 40 tons capacity, each equipped with two trolleys. The hydraulic riveter is centrally located in the boiler shop with a tower constructed especially for it and is served by its own 25-ton crane.

BLACKSMITH SHOP

The blacksmith shop is of brick and steel construction on concrete foundations similar to that of the locomotive shop. It is an L-shaped building 80 ft. wide, one wing being 200 ft. long and the other 300 ft. long. All the steam hammers, ranging in capacity from 300 lb. to 6,000 lb., are assembled in the 200-ft. wing, and the forges and small power tools in the 300-ft. wing. The roof trusses on the former wing are 10 ft. higher than those on the latter in order to provide the 30-ft. headroom required

General View of the Interior of the Locomotive Shop Taken from the Light Machine Bay

of piping is provided for distributing live steam, compressed air, fuel oil and water for fire protection, drinking and hydraulic pressure throughout the shops.

The erecting bay, located in the center of the building, is 75 ft. wide, center to center of columns, and contains 28 pits. It is served by two traveling electric cranes on two levels, the crane

for the jib cranes and hammers. A space 100 ft. long has been partitioned off in the longer wing for use as a tinshop temporarily until this space is required for blacksmith work, when the tinshop will be removed to other quarters.

In the general design special care was taken to provide a layout that would afford opportunity for an orderly progression of the work through the shop, and ease and economy in transporting materials or parts to the point of final use in the locomotive shop with which it has suitable track connections.

Excellent ventilation is provided by the monitors in the roof in addition to the means for removing smoke and gases from the forges. A lavatory is located in the angle of the "L" in an addition just outside the main building, which includes both toilets and washroom facilities for the men.

STOREHOUSE

The two-story brick storehouse is located east of the locomotive shop and separated from it by a 95-ft. storage yard. This building is 60 ft. wide and 250 ft. long without a basement, the first floor being on an earth fill affording facilities for handling and storing heavy materials on a level with the car floors. A wooden platform 10 ft. wide on concrete piers extends the entire length of the building on both sides, and a large storage platform 80 ft. by 100 ft., with the floor laid on an earth fill, is provided at the north end.

Ample storage bins, arranged in transverse rows to give a maximum of light in the aisles, are provided in the house. The second floor, where the lighter materials are stored, is served by an electric freight elevator of 5,000 lb. capacity, while a chute is provided by which small packages made up on requisition can be transferred to the first floor for delivery. At one end of the building is provided office space for the general storekeeper and his clerks, adequate toilet facilities and a first-aid hospital.

To permit the erection of the new buildings and the laying of some of the tracks it was necessary to remove two rather old buildings of stone masonry. These were of considerable size, one of them being two stories high, but they were successfully moved with their contents intact.

These new shop buildings were designed and constructed by Westinghouse, Church, Kerr & Co., New York, acting in cooperation with H. T. Douglas, Jr., chief engineer, and J. E. O'Hearne, superintendent of motive power of the Chicago & Alton, the actual field construction being in charge of P. J. Watson, assistant engineer.

COMBINATION THROUGH CLASSIFICATION AND TERMINAL YARD*

By W. C. Copley

Freight Trainmaster, Pennsylvania Railroad, Altoona, Pa.

The following description covers actual practice in a supposedly well designed, operated and organized yard—a main line yard on the Pennsylvania Railroad located between Chicago and New Jersey, consisting of more than 200 miles of track and having standing room for over 10,000 cars; it handles 6,000 cars per day of through business, about equally divided as to directions, and 3,500 inter-yard movements exclusive of the through business; that is, cars to and from the shops, transfer warehouses, and industrial and public delivery sidings. This makes it a combination through classification and terminal yard. The 6,000 cars of through business means that that number of cars are despatched from the yard, or in other words the cars are counted only once on the outgoing trip. The terminal or inter-yard movement of 3,500 cars per day represents each movement of a car within the yard after it has been classified and placed in the classification yard up to the time it is returned to the hump for a re-classification for final despatching from the yard.

When a train arrives in the receiving yard, the road conductor delivers his card manifests to the assistant yardmaster in charge of the movement in the direction the train is going, who counts the manifests and marks on his train register the engine number, the arrival time in the receiving yard and the number of manifests representing cars in the train. The manifests are then turned over to the assistant yardmaster's clerk, who takes out any for cars he may have "hold" or "change" orders for. He also takes a book record of all the city delivery cars in the train. The manifests are then turned over to the reconsigning clerk, located in the same office, who represents the freight agent. This clerk picks out those for any bill-of-lading or reconsignment cars he may hold orders to rebill. About 200 cars per day of this class of freight pass through the yard, 75 per cent of which are changed or re-billed before the cars are classified, while the remaining 25 per cent go to the hold-track to await disposition. The manifests are next turned over to the conductor or car-marker, who takes them into the yard, passes along the train and compares the numbers and initials with the cars as they stand to make sure that each car is represented by a manifest.

While the manifests are being thus handled the car inspectors make a thorough inspection of the train under blue flag protection, making any slight repairs which can be made in the receiving yard, and marking for the shop any cars with defects that cannot be thus repaired. As the car marker compares the manifests with the cars in the train, he chalks the front end of each car for the track on which it is to be placed in the classification yard beyond the hump; he faces down the manifests for any cars he may mark for the shops. Upon returning to the assistant yardmaster's office he makes out a shifting slip for the use of the leverman in the tower, who operates the switches from the hump to the classification yard; he then removes from the pack the manifests for cars for the shop, sealing them in an envelope marked "Shop cars out of train of Engine ———." The manifests for the other cars are sealed in a separate envelope, which shows the engine which brought the train to the yard, the number of the track on which the train was received, and the time it was marked. He then pins his switching slip to the envelopes containing the manifests and places the entire pack in a pigeon-hole in the assistant yardmaster's office, representing the track in the receiving yard that the train is on.

The train is now prepared for classifying over the hump. The manifests are given to the man in charge of the hump engine; the engine is placed back of the train and the manifests are delivered to the conductor in charge of the hump, who in turn delivers the switching card to the leverman, and forwards the manifests for the train, still sealed in the envelope, to the assistant yardmaster at the despatching end of the yard; he sorts the pack, placing the manifests in pigeon-holes representing the tracks on which each respective classification of the various cars in the train is made. The manifests for shopped cars are turned over to the shop car clerk in the tower at the hump; it is his duty to take a book record of the face of the manifest, including the date, the number of the engine bringing the train into the yard, and the time the train was shifted, which, of course, gives the time the car was delivered to the shop.

The shop cars are delivered direct from the hump to the interchange track between the main classification yard and the shop repair tracks. A shop engine then places them on the repair tracks, which hold from 15 to 25 cars each. The shop car clerk takes the numbers of the cars standing on the repair tracks and then returns to the tower, picks out the manifests for the cars undergoing repairs, as they stand on the repair tracks, and marks on the back the number of cars on the track, as well as the track number on which the cars stand, checking cars already entered in the book as going to the shop, giving the time and date. After the cars have been repaired, the shop engine pushes them out through a depressed track beyond the hump; the hump conductor goes to the tower and gets the manifests representing that track, chalks the cars for their respective tracks and makes out a shifting slip the same as had been done

*Received in the contest on The Operation of Terminal Yards. Other papers in this series appeared in the issues of October 9, October 16 and October 30

in the receiving yard. The shop train is then re-classified over the hump the same as a through train. Not a single manifest for a shop car has been lost at this point in the ten years this system has been in force.

The manifests for the city delivery cars, including those containing material for the shops, are sent by messenger to the agent at the transfer station as soon as the train is marked, and a "put-card" is issued for each car in place of the original manifest. It indicates for whom the car is to the yard conductor, and on what particular industrial siding or shop track the car is to be placed. This gives the freight agent an opportunity to make out his freight bills and notify the consignee that his car has arrived with the approximate time it will be delivered on his siding, which is about six hours after arrival in the receiving yard.

The shifting service for the inter-yard movement is divided into districts, and each conductor in this service is regularly assigned his work for the day. Each crew is responsible for the proper and prompt performance of service assigned to it.

The yard is divided into seven districts, each under the supervision of an assistant yardmaster, who is responsible for the performance of crews while in his territory. In addition to these assistant yardmasters there are two yardmasters, one eastbound and one westbound, whose duty it is to pass from one to the other of the assistant yardmasters' districts and see that they are properly performing their duties, and to relieve any congestion that may occur at any point. Day after day these crews perform the work assigned without receiving a single order from a yardmaster or an assistant yardmaster. However, if at any time, the work assigned a crew should be lighter than usual, the conductor when he gets through his work is required to report promptly to the yardmaster, in which case he will be used in any service in any portion of the yard where he may be needed. Six day crews and four night crews are engaged in this inter-yard service, while the through business is much greater in volume; it is less difficult to handle, except that about 1,800 cars per day must be weighed. In the westbound yard, where 60 per cent of the cars handled are empty, it has been found necessary to maintain what is termed a perpetual record of empty cars as they stand on the classification tracks. This record is made by the assistant yardmaster at the hump end of the yard, who counts the number of cars for each classification track as shown on the switching card when the train is started and classified over the hump. He adds the number of cars for each track to those already standing on the track, while the clerk at the despatching end of the yard telephones the assistant yardmaster at the hump the number of cars taken off of each one of the tracks at the despatching end. The assistant yardmaster subtracts this from those already shown on the card. This gives the exact number of cars on the classification tracks at all times. This record has been running for 14 years, and provides the same check on the number of cars on each track as if they were loaded cars with manifests. In addition to the through business passing through the westbound yard about 400 empty and 100 loaded cars originate daily on the industrial and track delivery sidings, coal wharves, shops and transfers, etc., all of which are delivered to the loaded or empty receiving yard by yard engines and are classed as inter-yard movements.

The yard is equipped with advance or departure tracks in both directions. The trains are made up exclusively by yard engines in the classification yard and are hauled to the advance tracks, there being no attempt to couple the air hose or to make any minor repairs until after the trains have been delivered to the advance tracks. Protecting the train with blue flags at either end, a force of air brake inspectors then takes charge, tests the air, and makes such minor repairs as can be made on these tracks, holding the air pressure on the train until the arrival of the road crew and until the engine is attached. It is only necessary for the road crew to make a service application of the air, as the inspectors have given them information as to the number of air brake cars in service and the number of cars, if any, on which the air is cut through.

Two men, known as car tracers, cover all the hold-for-order industrial, team and M. W. tracks, and all outlying sidings twice each 24 hours, thus avoiding an unnecessary delay to cars for any reason, such as awaiting an agent's "put-card," errors on the part of the car markers or the men making out the put-card, as well as furnishing the necessary information for the demurrage charges where the car is held in excess of the specified time by the consignee or consignor. Through and local records are also maintained in the office of the assistant freight trainmaster, who is in direct charge of the yard. The through record is taken from the incoming conductor's car report, while the outgoing record is taken from the yardmaster's record of the cars despatched, thus giving the arrival and departure of all through cars. The local record represents every movement the car makes in the yard. This information is taken from a conductor's report, which gives the detailed movement of every loaded or empty car handled during the day.

It may seem that the matter of economy has not been taken into account in the organization and operation outlined, but comparisons made with other yards handling a similar class of business, have shown that the cost per car passing through the yard is a few cents less than where the organization is less extensive and the car records are not so systematically maintained. While the cost per car over the hump is low in comparison with other points, it is no doubt largely due to the fact that by systematically operating the advance tracks, the classification yard is kept free, thus enabling the hump to perform a maximum amount of business each day. Another factor in the economical operation of humps is a car checker located on each hump, whose duty it is to record the man on each draft of cars over the hump throughout the day. This checks each car dropper in the proper performance of his duty. In addition it locates responsibility for any damage to cars in the classification yard which has not been reported by the car dropper.

Another economical feature of the operation is that all switches on the humps (of which there are four, two in either direction), are equipped with electro-pneumatic direct-movement push-button machines, as well as fog horns or air whistles of different tones located in each one of the receiving yards, which enables shifting operations to be continued during foggy weather. Because of the efficient lighting of the yard at night, there is little difference in the amount of business handled and the cost of operation night and day. In the hump yard for empties, where the maximum volume of business per day is slightly in excess of 3,000 cars, a searchlight with diffusing lens is so located that the rays cover the entire classification yard of 31 tracks, without the annoyance or inconvenience of changing the position of the lamp at any time. The installation of this lamp increased the efficiency of the hump about 12 per cent, which brings it almost up to the efficiency of the same hump in daylight.

The selection of yardmasters and their assistants is carefully made from men who have been trained in yard work and who have displayed special ability, not only in yard operations, but in handling men and supervising the work. One of the most valuable features of the organization is the harmony existing throughout, there being no disposition on the part of any yardmaster or conductor to shift responsibility or unload work from one yardmaster's district to another. This may sound peculiar among railroad men, but nevertheless it is a fact. I don't mean to say that this harmony is voluntary in all cases, but it is insisted on by the officers directly responsible for the organization and operation of this particular yard.

British Rails Abroad.—The external demand for British rails has been scarcely maintained this year, the exports to November 30 having only amounted to 419,125 tons, as compared with 459,870 tons in the first eleven months of 1913, and 377,878 tons in the first eleven months of 1912.

The Bankers and Equipment Trust Certificates

The Investment Bankers Recommend More Stringent Restrictions on the Issue of Equipment Trust Certificates

The following report on railroad bonds and equipment trusts was presented by one of the committees at the annual meeting of the Investment Bankers' Association, held on November 12.

When the committee on railroad bonds and equipment trusts was first formed in 1912, the committee as then constituted took up, by correspondence with the principal trust companies in New York, Boston, Chicago, Philadelphia, etc., who had acted as trustees under indentures securing equipment trusts, what was the general practice of these trustees to provide for the maintenance by the railroads of the equipment pledged under such trusts, for the replacement of equipment worn out, lost or destroyed, and what steps these various trust companies took to keep themselves advised as to the condition of the equipment pledged under the trust. At that time it was found that there was no general course of action common to all the trust companies. In some cases the trust companies used definite forms for periodical reports on the condition of the equipment, but the amount of responsibility assumed by the trustees varied from an honest effort to protect and maintain the value of the security pledged for the equipment trust, to a position assumed by one company that it had no responsibility whatever for the security underlying these equipment obligations, and that it did not consider it part of the duty of the trustee to see that the covenants of the trust were carried out. On the whole, however, it was clear that the trust companies were using their best efforts to protect the investor in equipment trust obligations, and that the difficulties which they had to overcome were largely due to the fact that the banking houses who originally purchased the equipment trust had not been insistent that specific agreements be included in the indenture which would enable the trustees to obtain the necessary information from the railroads as to the condition of the equipment pledged; and secondly, if it was found that the railroad was not maintaining the equipment properly, the trustees had no power to force the railroad to maintain or replace the equipment by declaring a default under the indenture.

The whole question of equipment trusts and the sufficiency of equipment as security for an equipment trust is one which goes into the very heart of the theory and the practice of railroad accounting, bringing with it questions as to what is adequate maintenance and what is the true value from time to time of equipment through its depreciation year by year.

While conditions affecting the management, auditing and financing of the corporations of this country have undergone many changes during the past few years, all of which changes tend to safeguard and protect the interest of the investor in the securities of these corporations, and while there has been a growing realization of the obligation of the trustee to the public, yet the development of the indenture securing railroad bonds and equipment trusts has been along lines to make these indentures more and more flexible and more and more of a character to enable the borrowing corporation to best serve its own ends rather than to protect the interest of the investor. The whole theory of the equipment trust which was based on an original cash payment of 20 per cent with a loan maturing in not more than 10 annual instalments and with the title to the equipment remaining at all times in the hands of the trustee or banker making the loan has changed till now we have equipment trusts running 15 years or longer with 10 per cent cash paid in instead of 20 per cent, with the title of the equipment being held by a corporation or by individuals who are nothing else but the railroad itself acting under a different name; and, in one case an equipment trust has been issued by one of our most important railroads, over $1,000,000 of which are outstanding at the present time in the hands of the investor, where the title to the equipment has reverted back to the railroad against each instalment of principal paid, which vitiates the fundamental principle of equipment trusts.

PROVISIONS TO BE INCORPORATED IN THE EQUIPMENT TRUST INDENTURES

The principal matters which need to be especially considered in the drawing of equipment trust indentures, group themselves under the following heads:

I. *The Proper Vesting of Title in the Trustee to the Equipment Pledged under the Equipment Trust.*—This problem is one of the most important, and no matter how well the actual indenture may be drawn, if it does not sufficiently cover this important detail, the safety of the investor is not fully provided for. The trust has to be protected against three classes of persons: (a) Attachments and judgment creditors of the railroad company. (b) Purchasers for value and subsequent mortgagees of the railroad company. (c) Prior mortgages which contain the usual after-acquired property clause covering rolling stock.

As to the first two, the existing special rolling stock recording acts which have been passed in practically every state and in Canada, protect the trust against these classes of claimants if the trust agreement is properly recorded; but here we run into a difficulty, inasmuch as cars are moved all over the United States and Canada in the ordinary course of business, while the company which owns the cars may have lines only in one or two states. It is not the custom to record the agreement of a company whose line is solely in New York for instance, in every state, and the question arises as to whether title to these cars will be properly protected in other states in case they were sold there to a purchaser without notice, or caught through attachment.

With regard to prior mortgages containing the after acquired property clause, the important thing is to make perfectly sure that the title to the equipment vests in the trustee of the equipment trust before the railroad acquires any title whatever thereto; for it is obvious that if, for instance, a railroad company constructs or acquires cars and thereafter, by arrangement with bankers and a trust company, goes through a form of then making a conditional sale or lease to the railroad, the transaction instead of being a real conditional sale—in which case the title to the equipment comes to the railroad subject to the prior lien of the equipment trust—is rather in the nature of a chattel mortgage, and being made subsequent to the railroad's existing mortgages, gives to the trustee of the equipment trust only a junior lien and not a first lien on the cars pledged. It is therefore extremely important always to provide that no part of the equipment to be covered by the trust shall be delivered to the railway company prior to the execution and filing for record of the agreement, and in your committee's opinion also, the agreements for the construction of the cars should be made directly between the car manufacturers and the bankers or the trustee of the equipment trust.

Of recent years a great deal of laxity seems to have become prevalent with respect to these details, due largely to the fact that it is usually extremely inconvenient to the railroad company to go through the necessary steps which are involved in the process of preventing the title from vesting prior to the execution and recording of the trust. In addition various schemes have been prepared by which individuals or car companies acquired cars from time to time for the uses of a particular railroad, arranging for leases of the same to the railroad and thereafter selling equipment leased certificates to bankers. Although this practice has become quite common, these arrangements are open to question on the ground that these individuals are usually either the railroad itself in a different form, the stock of the

car company usually being owned by the railroad company, and the individuals being agents of the railroad company and not representing anybody else.

We do not refer here to the so-called form of equipment trust issued under what is commonly known among bankers as the Philadelphia plan, but to certain other forms of trusts in which individuals appear as the lessors. We have gone into this question at great length because we feel that while the investor has, up to the present time, been fortunate in the very few defaults which have occurred under equipment trusts, with the changing conditions now confronting the railroad industry, it is of the utmost importance that in the future more than usual care be taken in the drawing of these indentures and in the protection of the investor. Through long practice and a feeling of false security arising from the fact that there have been so few defaults of equipment trust in the past, both the investment banker and the investor has become careless in his investigation as to the form of the indenture, under which the equipment trusts which he purchases have been issued.

II. *Maintenance of Equipment.*—The maintenance of equipment pledged under the indentures at all times in good workable order and the replacement of worn-out, lost or destroyed equipment, appears to the committee to be a phase of this question which should receive much more careful attention than has been accorded to it in the past. While we realize that almost all equipment trusts have provision in the indenture requiring that equipment shall be maintained or replaced, it has unfortunately not been the practice of many trustees or of the banking firms handling equipment trusts to require of the railroads that these provisions in the indenture shall be lived up to, and to insist that the railroads officially perform the obligations that they originally agreed to. During the past year a number of situations have arisen where when a railroad has got into or was facing financial difficulties we have found that the equipment pledged under the equipment trusts has become so depreciated in value as to seriously impair the security of the trust certificates issued against it. When cars were lost or destroyed, new equipment has not been added. When cars have been withdrawn from service owing to their bad condition, these cars have not been repaired and their value maintained. New equipment has been bought by means of the issuance of additional new equipment trusts, while needed repairs on equipment already owned have not been made, which repairs, if they had been made, would not have made the purchase of additional equipment necessary.

The necessity of a road making as good a showing as possible of net earnings in order to preserve credit for additional borrowing has tempted roads to resort to capital expenditures rather than to maintenance charges, which being charged to operating expenses would in turn be reflected in their statement of net earnings. In order to prevent such practices, your committee deem it wise to have regular reports made to the trustee by the railroads, covering the condition of the equipment pledged, and we strongly urge that the investment banker face the responsibility accruing to him when he handles equipment trusts to see that these reports by the railroads are made to the trustees; that the trustees keep accurately informed as to the value of the equipment from time to time, and that in case the value of the equipment is not maintained by the railroads, the trustees be placed in a position to take such action that shall conserve and protect the interest of the investor.

III. *Handling of Payment of Principal and Interest.*—One of the fundamental principles of an equipment trust is that each six months or each year a certain proportion of the certificates outstanding shall be paid off and retired, so reducing the amount of indebtedness against any given amount of equipment pledged. In this manner the depreciation of the equipment is offset as far as the security of the loan is concerned by a reduction in the amount of the indebtedness against such equipment. The committee has found, in looking into a number of these indentures, that no provision has been incorporated in the indenture to prevent the extension of such maturing obligations, and we strongly recommend that a clause be included in indentures which will prevent such extension. In order to safeguard against this practice we believe that the necessary funds sufficient to pay the principal and accrued interest of notes as they may become due should be deposited with the trustee to be used for the payment of such notes, and that when such notes are paid they should be canceled and no notes in substitution of them issued. It is of the utmost importance that no purchase or sale of notes or advances upon the same shall operate to keep equipment notes alive after maturity, nor should the railway company extend or consent to the extension of the time of the payment of the principal or interest of any equipment trust.

IV. *Enforcing Clause.*—In order that the trustee may be placed in a proper position to protect the investor, it is necessary that an enforcing clause be included in the indenture, which will enable the trustee to declare a default if the provisions of the indenture are not lived up to by the railroad company.

The committee also strongly recommends that when an equipment trust is drawn, provision be made that the trustee shall be given full and complete drawings describing the equipment pledged so that in case of default the trustee may have a full record and complete information to enable it to effect sale of the equipment or to take such other steps as it may deem wise for the protection of the trust.

THE OBLIGATION OF THE INVESTMENT BANKER

The committee feels that it is necessary to enlarge on one most important phase of this question which must be self-evident to all. The value of the collateral under any loan and the maintenance of the value of such collateral can be safeguarded to a certain extent by the terms of the indenture, and by establishing through the pressure of well directed public opinion an active oversight by the trustee of the methods pursued by the railway company in living up to the terms and spirit of the indenture.

This, however, is but a means to the desired end. Eagerness to do business bred by over-keen competitive conditions has led many of us in the past into situations where securities have been bought and sold before sufficiently careful intelligent investigation was made of the terms of the indenture, and perhaps what is of even greater importance, without thoroughly considering the moral risk involved in the loan arising from the methods and character of the management of the borrower.

The responsibility of the investment banker does not cease with the sale of the equipment trust certificates to his clients. It is the part of wisdom to investigate at regular intervals whether his and his clients' interests are being properly safeguarded both by the railway company and by the trustee. "A stitch in time saves nine" says the old adage and the investment banker could many times have prevented the difficult and unpleasant situation confronting his client and himself if he had followed the useful course of doing what he could to prevent the loss by consistently and regularly keeping himself advised as to the true situation and value of the equipment pledged from the time he assumed the responsibility of the loan by placing it with his client.

The greatest evil today in connection with the problem of equipment trusts, the investment banker and the investor is this neglect of investigation and regular oversight. If our members will make themselves familiar with what provisions should be included in a properly drawn indenture securing equipment trusts, if they will refuse to handle equipments unless the indenture be properly drawn, and if they will continue to guard their clients' interests regularly and systematically after they have placed the issue by seeing to it that both the trustee and the railway company live up to the terms of the equipment trust agreement that both entered into, then, they will make it difficult for many of the evils to exist which are now confronting our profession of investment bankers.

GERMAN IRON ORE PRODUCTION.—Germany's iron ore production for 1913 is given by Stahl und Eisen as 35,941,285 metric tons, having a value of 3.71 marks (88.2 cents) per ton, as compared with 33,711,142 tons in 1912 with a value of 3.73 marks (88.7 cents) per ton.

A Study of Combustion in Locomotive Fireboxes

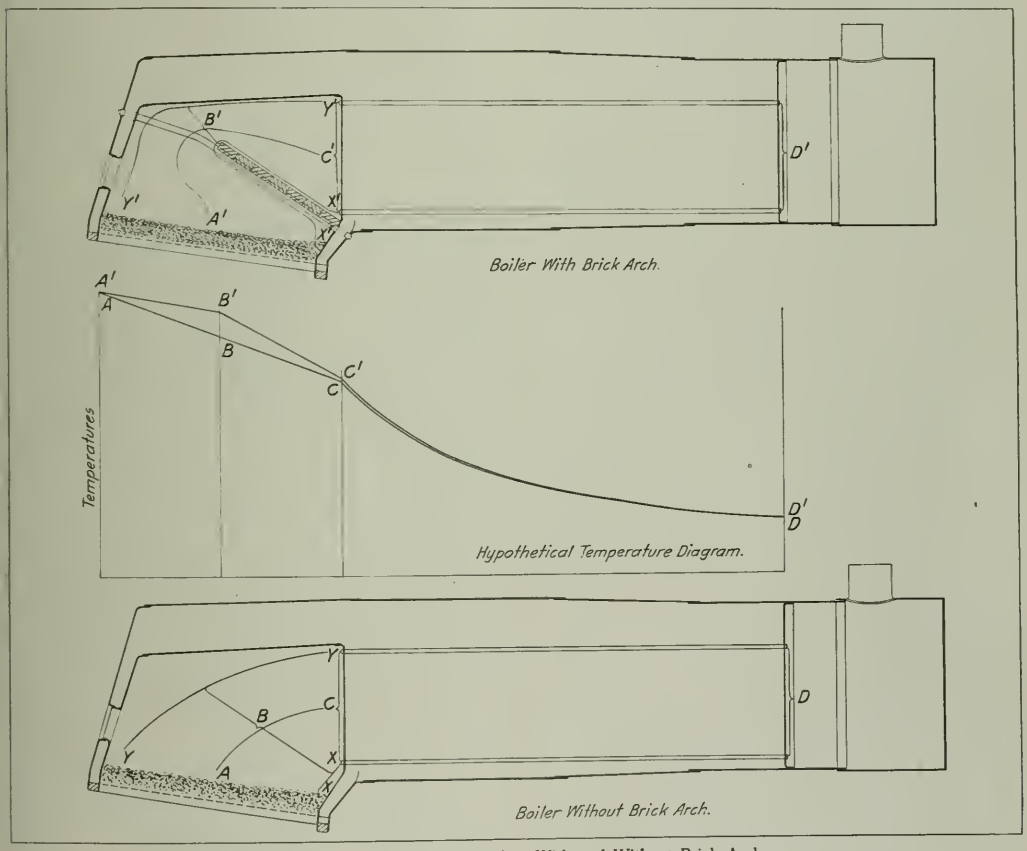
Effect of the Brick Arch and Its Supporting Tubes; Factors Which Should Be Considered in Firebox Design

At the railroad session of the annual meeting of the American Society of Mechanical Engineers, held in New York, December 2, 1914, J. P. Neff, vice-president, American Arch Company, New York, discussed the Brick Arch and Circulating Arch Tubes, and J. T. Anthony, manager of the service department of the same company, read a paper on Firebox Design. These papers are presented in abstract below:

THE BRICK ARCH AND CIRCULATING ARCH TUBES

J. P. Neff.—About ten years ago, when I began devoting my whole attention to the subject of locomotive brick arches, a somewhat careful canvass of the situation in regard to this subject on American railroads revealed that a very few roads were consistently using brick arches; a much larger number were tolerating them in a very small percentage of their engines, and a still larger number had discarded them entirely. Many of the mechanical officers of those roads tolerating arches in a few locomotives expressed themselves in terms unfavorable to the arch, but admitted that they were forced to use them on certain engines; that is, on engines handling the important trains in exacting service or on hard schedules. This was in order to have available all the boiler capacity possible.

All modern locomotives, or at least practically all those built in the last few years, have been built to haul heavy steel passenger trains on hard schedules or to meet exacting conditions in other kinds of service. As the locomotive itself has been greatly improved and refined in the last ten years, so has this special device, to the end that it has been shorn of many of its original faults, leaving its never disputed virtues standing out all the more prominently. The brick arch insures more nearly complete combustion. The combustion of high volatile coal at the rapid rates necessary to meet the demands for large hauling capacity today is fraught with considerable losses due to incompleteness. That represented by the CO content in front end gases is only a part of it. The losses from the incomplete combustion of hydro-carbons may easily be four times that represented by the CO per cent in the gas analysis. Anything that will mitigate these losses without introducing too high air excess reflects at once in higher furnace temperatures. The introduction of the combustion chamber helps by lengthening



Temperature Diagram for Firebox With and Without Brick Arch

the flame travel, a very important thing, but the introduction of the arch, especially the arch on water tubes, not only doubles the average length of the flame travel, but in addition possesses the more important virtue of being a mechanical mixer.

The eminent authority, Dr. Breckenridge, says in his treatise entitled A Study of 400 Steaming Tests: "Mere length of combustion chamber counts for little compared with some device for thoroughly mixing the gases of the flame stream; one good mixing wall or baffle is probably worth many feet of undisturbed flow." A study of the full text of the work of Dr. Breckenridge impresses one with the thought that the above-quoted statement was not made with the intention of belittling the importance of combustion chamber length or flame length, but with the idea of emphasizing the importance of mechanically mixing and jumbling the different strata or ribbons of the gas stream.

By fostering or enhancing combustion above the fuel bed in this way considerably more heat is evolved and higher firebox temperatures result. Authentic tests have shown that with certain coals this increase in firebox temperature may be 15 per cent; yet, as a rule, these higher firebox temperatures are not accompanied by higher front end temperatures. This is explained by the fact that the tube supported arch by virtue of its position performs another important function, that of forcing these higher temperature gases to sweep or brush at considerably increased velocity a considerably greater area of evaporating surface; not only the added area of the arch tube surface, but much surface of hitherto unswept firebox plate, so that the double result is accomplished, of creating more heat, and causing to be absorbed this increased amount of heat, giving a net result of increased boiler output for the same amount of coal consumed, a distinct advance or rise in the boiler efficiency. The illustration for fireboxes with and without the brick arch gives a hypothetical temperature diagram.

The circulating tubes or arch pipes play no small part in this. Not only do they present by far the most effective heat-transmitting surface, but the circulating effect in itself is very important, especially at high rates of evaporation. Just as the particles of gases must quickly touch the heat absorbing surface and give way instantly to other particles, so must the water, or steam film, on the opposite side of these surfaces give way quickly to other particles of water, if a high rate of heat transfer is to be accomplished. Expedited circulation will insure this favorable condition. A locomotive boiler can no more give high duty per pound of weight or square foot of heating surface when the gases move leisurely over its surfaces and through its tubes than can the locomotive as a whole give high horsepower in a slow turning of the wheels.

Arch tubes, as they are now, give much aid, but there is still more to be done in this direction. Arch tubes or circulating water tubes through the firebox may be used in still greater number with good results, if properly arranged and disposed, so as to aid in mechanically mixing and in circulating without too quickly lowering the temperature of the gases. We have information from three different authentic sources that the locomotive brick arch, together with its circulating water tubes, can be counted on to produce an increase in maximum boiler capacity of approximately 15 per cent. The four 3-in. arch tubes reported on from one of these sources of information were held to be responsible for one-third of this increase. It is fair to assume that further progress is possible in one or the other, or both, of these features.

FIREBOX DESIGN

J. T. Anthony.—The boiler is the power plant of the locomotive, and the firebox, in addition to its furnace function, is also responsible for a large part of the evaporation, this varying from 30 to 50 per cent of the total. The principal points to be considered from a furnace point of view are grate area, flameway or volume, firing clearance and air supply. From the boiler point of view, we must consider the extent and location of the heating surfaces.

In order to secure high efficiency, the grate area should be sufficient to keep the maximum rate of combustion below 100 lb. of coal per square foot per hour at full boiler capacity, as the losses, due to imperfect combustion, cinder discharge, front end gases, radiation and those unaccounted for, increase rapidly above this rate, with a corresponding decrease in boiler efficiency.

The Master Mechanics' Association, in 1897, recommended a ratio of heating surface to grate area of 60 for bituminous coal locomotives; but this ratio on the modern superheater locomotives ranges from 70 to 80, or even higher. This is due in part to the decrease in coal consumption brought about by the introduction of the superheater, and in part to the prevailing idea that large grates in addition to requiring more coal for firing up waste more coal when standing idle. It is possible, however, that the higher efficiency due to the large grate and low rate of combustion will more than offset the larger amount of coal used when firing up and standing idle.

The high efficiency at lower rates of combustion is due not only to a reduction in the heat losses enumerated above, but also to the relatively large proportion of the total evaporation that takes place around the firebox. Most of the heat received by the firebox heating surfaces is radiated directly from the fuel bed and luminous flames, only a small amount being due to convection or direct contact. The amount of heat received by radiation depends on the area of the radiating surfaces and the difference in temperature between the radiating and cooling surfaces.

The tubes receive their heat by convection, and the amount of heat so received, other things being equal, depends on the weight of the gases going through the tubes. This varies with the rate of combustion, and as the rate of combustion increases, the tube evaporation increases. Under the same conditions, the firebox evaporation increases to some extent, due to the slightly higher temperature and the increase in the mass of flames, but not nearly so fast as the tube evaporation.

High firebox evaporation means high boiler efficiency, for the high heat absorption by the firebox reduces the temperature of the gases entering the tubes; and for any one boiler, the temperatures of the gases entering and leaving the tubes are directly proportional when reckoned above steam temperature. Hence a lower temperature of entering gases means lower front end temperatures and an increase in efficiency.

A large percentage of the bituminous coal burns above the grate as gas. The rapidity and completeness of the combustion of these gases depends on the amount of oxygen present and the thoroughness of the mixing. In a firebox with 60 sq. ft. of grate, with a rate of combustion of 60 lb. of coal per square foot of grate per hour, an air supply of 20 lb. per pound of coal and an average firebox temperature of 2,000 deg., the volume of the gases evolved is about 1,200 cu. ft. per second. A firebox of this size would have a capacity of about 200 cu. ft., and would have to discharge and be refilled with gases about six times per second. The average time available for combustion of each particle of gas would then be about one-sixth of a second, and this is insufficient for complete and proper mixing by diffusion. With the short time allowed, it is necessary to mix the gases by mechanical means, and this is generally accomplished by an arch or baffle which forces the gases to pass through a restricted area, this area being not less than the net tube area.

It is evident that mere firebox volume is not sufficient of itself, and it is necessary to have a flameway of such cross section and length as to intimately mix the gases and provide sufficient space for burning before the gases reach the tubes. In an ordinary firebox, without baffle or combustion chamber, the average length of flameway is only 5 to 6 ft. By the introduction of baffles and combustion chambers, this length can be increased to from 10 to 15 ft., which results in not only more complete combustion but also in increased radiating surface, with a corresponding increase in firebox evaporation and a lowering in temperature of the escaping gases.

A Pacific type locomotive with 55 sq. ft. of grate area, a tube-

supported arch and an average flameway of 8 ft. had an average firebox temperature, covering a range of 25 tests, of 2,100 deg. This temperature was taken at the center of the firebox at about the end of the arch. The temperature of the gases entering the tubes showed an average of 1,725 deg., or a drop in temperature of 375 deg.

Another Pacific type locomotive with the same size grate and a tube-supported arch, but with a combustion chamber 3 ft. long, giving an average flameway of 11 ft., showed over the same range of tests an average firebox temperature of 2,185 deg. with the temperature of the gases entering the tubes of 1,485 deg., or a drop of 700 deg. between the center of the firebox and the tube sheet.

We obtain high efficiency at low rates of combustion in spite of the large air excess which generally accompanies. This is due to the fact that at low rates the firebox absorbs a larger percentage of the total heat evolved, and the amount so received for any one firebox depends primarily on the temperature of the fuel bed. It is possible that this temperature is higher with large air excess than with the lower, as the temperature is due to the rapidity of combustion which in turn depends upon the scouring and cutting action of the air blast.

The firing clearance, or the vertical distance between the fuel bed and the lower tubes, or arch, has been materially increased by the introduction of modern types of locomotives with trailing trucks, as this has permitted the firebox to be placed behind the drivers and the grates dropped lower. This one step has probably offset to some extent the high ratios between heating surface and grate area which are found in modern locomotives. The extent of the firebox heating surface is determined largely by the size and location of the grate; but there is no fixed relation between heating surface and grate area, or between firebox and boiler heating surface.

As stated above, the firebox evaporation depends primarily upon the extent and temperature of the radiating surfaces and not on the extent of the firebox heating surface. Increasing the firebox heating surface without increasing the grate area or flameway will result in very little increase in evaporation. Its only effect is to reduce the amount of heat absorbed by each unit of surface, with a slight reduction in the temperature on the fire side of the surface. An evaporation of 60 lb. of water per square foot of firebox heating surface per hour requires a difference of less than 100 deg. between the water and the fire side of the sheet, and if sufficiently high firebox temperatures or sufficiently large radiating surfaces could be obtained, it would be possible to materially increase even this high rate of evaporation without forcing the heating surface to its capacity.

In the Coatesville tests, conducted by Dr. Goss, the two fireboxes gave an evaporation as high as 58 lb. of water per square foot of heating surface per hour; but there was practically no difference in the total amount of water evaporated by each of the fireboxes when working at the same rate of combustion and with the same grate area, notwithstanding the fact that one of them had 12 per cent more heating surface than the other.

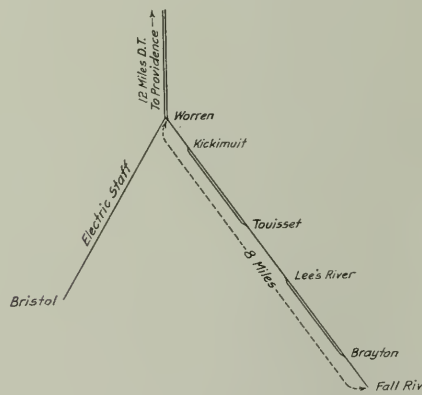
Judging from the past, we are not apt to see any radical departures from the present type of firebox in the near future, unless the nature of the fuel is materially changed, and the writer believes that any improvement in the efficiency of this part of the locomotive will be obtained by paying particular attention to and making ample provision for grate area, firing clearance, gas mixing, flameway or combustion chamber space, and air supply.

Russian (White Sea) Railway Connection.—It has been decided by the Russian government to commence the construction of a railway between Petrozavodsk and Kem. It is proposed to extend the line to the port of Alexandrovsk to connect the White Sea with the main Russian railway system. The line is to be completed in a year, and to be entrusted to the Olonetz Railway Company, which will build a railway connecting Petrosavodsk with Zvanka on the Northern Russian Railway system.

THE SIMPLE TRAIN STAFF*

The reader interested in train-operation will have noticed in our issue of December 18, 1914, an account of what may be called a simplified block system, in use on the Ligonier Valley and of the use of the electric train staff, on a busy suburban section of the Long Island, without station attendants. While both of these installations lack certain elements which are essential in a complete block system, they are decidedly interesting as examples of ready adaptation of facilities to conditions surrounded by undesired limitations. In neither of these cases can we speak of block *signals*, as in neither of them do we find fixed visual signals, using that term in its ordinary sense. Semaphores and green and red lights they can get along without, indefinitely.

But in commending simplified railroading in these two instances we have told an incomplete story. An officer of the New York, New Haven & Hartford, to whom the article was shown, reminds us that on that road they have used the staff system, pure and simple; no electric wires, no semaphores, no disks, no telegraph and no telephone. This use was temporary, on the occasion of heavy holiday traffic; but it deserves to be recorded (if for no other reason) because this simple and efficient preventive of butting collisions seems not to be properly appreciated in this country. An electric road in North Carolina and a short freight track of the Lackawanna road are the only places that we can recall where it is used regularly. It was used



for some time about 1890 on a short section of the New Haven road.

The simple train staff was used in England a half century ago. In regular use the system provides for sending two or more trains, following one another, on the authority of the one and only staff, by means of "staff tickets," kept in a cavity in the staff and given out, to preceding trains, by the engineman of the last train, who carries the staff and the unused tickets. With this arrangement the system affords, of course, no protection against rear collisions. In the use of the simple staff today there is available one important advantage which was unknown when the system was in most extensive use in England, namely, the telephone. In case a train finds that the staff is at the wrong end of the staff-section measures can be taken to get the right to the road by wire. In the old days a man was sent on horse back, or on foot; or possibly a hand car could be used.

On the New Haven a speeder was provided, so as to make the

*For the benefit of non-railroaders it may be said that the train staff system is a method of regulating the movements of trains, on a single track line, which takes its name from the fact that originally a stick of wood, 22 in. long, was the staff. An engineman, running a train over a section of road, say from A to B, derives his right to use the track over that section not by a timetable, or a signal, as in ordinary practice, but by the possession of the staff. This is given to him by the station attendant at the entrance of a section, and at the outgoing end of the section he delivers it to the attendant at that station. It may then be used for a train running in the opposite direction.

service independent of the telephone and telegraph. It was used once in the course of three heavy days, on the occasion of the failure of an engine.

The use now recalled was in connection with summer excursion traffic on the line between Providence, R. I., and Fall River. The plan of this part of the railroad is roughly indicated by the sketch. The sections on which the staff was used were those between Warren and Kickimuit; between Touisset and Lee's River, and between Brayton and Fall River. On the first of these sections the staff was colored red; on the next one yellow and on the last one blue. On the days in question the number of passenger trains during the hours between 7 a. m. and 9 p. m. was about 116; and during the busiest period as many as ten trains an hour were run. The speed limit for all trains over the switches at Kickimuit and Lee's River was 15 miles an hour; and, aside from this reduction in speed, there were practically no delays due to the use of the staff. With so many extra trains there were, of course, some cases of waiting at one end or the other of a single track section; but this was not due to the method of operation.

WESTERN ASSOCIATION OF SHORT LINE RAILROADS

Officers of a dozen short line railroads of the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming met in San Francisco in November last and organized the Western Association of Short Line Railroads. Their main purpose is to secure more equitable compensation for carrying the mails, but the association will take up other matters of common interest. A letter, signed by the president and secretary, has been sent to every member of congress setting forth the bad features of the present laws regulating mail carriage and of the proposed changes now before Congress. This letter says in part:

"House bill 17042 changes the basis of mail transportation rates from a weight to practically a space basis and invests the Postmaster General with autocratic power in regulating the compensation, character of service and form of equipment, even to compelling the use of steel cars for mail carrying, and gives him the power to impose a fine of $5,000 per day for refusal of a railroad to carry the mail at the rates of compensation and in the manner specified by him. . . . The short line railroads operating in the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming most earnestly protest against the enactment of either H. R. 17042 or S. 6405 as being grossly unfair to such railroads. Their mail revenue, which at present is entirely inadequate for the service rendered, will be arbitrarily reduced. . . .

"The rates of compensation provided for are based on averages obtained all over the country. . . . The short line railroads west of the Rocky Mountains, due to the sparsely settled condition of the country, the heavy mountain grades and long hauls between stations, are operating under conditions far more expensive than those existing in other parts of the United States. The majority of these railroads operate but one mixed train per day each way, so that it should be apparent that no such average can be fairly applied. . . . An exclusive space basis would give the employees of the postoffice department absolute control over the amount of compensation to be paid railroads, according to their opinions or inclinations, and might be used for personal advantage or political gain.

"The Bourne bill further provides that the Postmaster General shall not have authority to authorize payment for more than seven lineal feet of space, for closed pouch service, in any one train. It is immaterial how much space the postal matter delivered to the railroad for transportation will occupy, be it 10, 15 or 20 ft.; only 7 ft. will be paid for, and when the railroad operates but one train a day, it has no opportunity to equalize this burden.

"Radiating from the termini and from points on the line of most of the short line railroads of the states mentioned, numerous Star Routes carry the mail by wagon or motor to the small towns and ranches not reached by the railroad. These Star Routes are a continuation of the railroads in so far as the mail is concerned, and the retail merchants of the communities off the railroad are profiting by this fact because the parcel post rates, including wagon haul, are less in many instances than even the freight rates on the railroads; consequently the wagon haul from the railroad to destination is accomplished at no cost to the shipper. In this manner immense shipments of foodstuffs and other matter, in the aggregate running into tons and carloads in each consignment, and consisting of flour, bran, canned goods, cement, coal, pressed brick, etc., are sent by parcel post, the government paying out for the team haul alone in many instances more than the total sum received by it for the entire haul by rail and team, and the railroad receives little or nothing for a tonnage that legitimately belongs to it and for the transportation of which, as freight or express, it was formerly paid.

"Since the last quadrennial weighing of the mail in the West, the packers have reduced the standard weight of merchandise packages to about 48 pounds. Mail contractors, builders and merchants have been quick to take advantage of this, which has not benefited the consumer, and as a consequence the railroads are hauling a tonnage of postal matter for which they receive no pay whatever.

"It is a matter of common knowledge that most of the short line railroads in the western states are struggling for a mere existence and if the carrying of the United States mail is to become a heavy burden, it will mean that freight and passenger rates will have to be advanced. . . .

"The short line railroads in the states named urge that the present law regulating railroad mail pay be amended so as to provide for annual instead of quadrennial mail weighing, pay for apartments in cars used as traveling post offices, and relief from carrying the mail between railroad stations and post offices.

"In the event that Congress shall not deem it advisable to amend the present law as suggested, we then urge that the entire matter of fixing rates for carrying mail be placed in the hands of the Interstate Commerce Commission with full power to act."

The president of the association is D. M. Swobe, traffic manager of the McCloud River, and the secretary is C. M. Oddie, general counsel of the Nevada Central, and the office is in the Mills building, San Francisco, Cal.

American Companies to Supply Ties and Fuel for the Egyptian State Railways.—The Cairo correspondent of an English contemporary, states that the efforts being made by American manufacturers and producers to procure Egyptian railway and engineering orders are remarkable. Only a short while ago a British steamer sailed from California loaded with ties for Port Sudan; and this is stated to be the first business of this kind which has ever been done between the American Pacific coast and the Red Sea ports. Considerable assistance is being given to tie representatives by the fact that most of the ties hitherto used by Egyptian railways have been of Turkish oak or Karamanian wood or of Baltic creosoted pine, none of which are now obtainable. The contract for the supply of coal for use on the Egyptian state railways during the next 12 months has now been let. Of the total quantity required—190,000 tons—a London company has received an order for 120,000 tons and the balance—70,000 tons—or over one-third of the supply, has been placed with American companies as follows: 60,000 tons from the Fairmont region of West Virginia, 5,000 tons of New River coal and 5,000 tons of Greek Island coal.

What the Stoker Has Done for the Locomotive

Data as to Increase in Capacity and Effect on Coal Consumption; Stoker Should Do 100 Per Cent of Firing

In the issue of December 11, 1914, page 1079, we published part of the discussion of the report on "Steam Locomotives of Today" at the annual meeting of the American Society of Mechanical Engineers, held in New York, December 2. In taking up that part of the committee report dealing with mechanical stokers for locomotives some interesting data were presented by C. F. Street, vice-president of the Locomotive Stoker Company, New York, and E. A. Averill, engineer of operation of the Standard Stoker Company, New York.

DISCUSSION BY C. F. STREET

The most important accomplishments of the mechanical stoker as applied to locomotives, are the increasing of the earning power of existing locomotives, and the removal of all limitations, from a fuel quantity standpoint, on the size of locomotives.

The locomotive designer should always keep in mind the fact that every dollar earned in the operation of a railway must be earned by its locomotives, and, therefore, I have, in the above, given first place to the increase in the earning power of existing locomotives. I could cite many instances to prove this statement, but as an illustration, will take one:

A locomotive having about 54,000 lb. tractive effort when running with saturated steam, had a tonnage rating over a certain division of 4,750 tons. Superheaters were applied to this locomotive, and the tonnage increased to 5,000; stokers were applied, and the tonnage increased to 5 250; then 5,500; tben 5,750, and finally 6,000 tons. In the meantime, the tonnage rating of the shovel-fired, superheated steam locomotives was increased to 5,500 tons. This shows an increase of over 20 per cent in the tonnage rating of this locomotive after the stokers were applied, and the locomotive today, stoker-fired, is hauling 10 per cent more tonnage than when shovel-fired.

The increase in the tonnage rating of the shovel-fired locomotives is very interesting, and brings out strongly one of the indirect advantages of the stoker. It shows very clearly that before stokers were applied, the shovel-fired locomotives were not doing anywhere near what they should do, and as soon as the stoker came into use, it increased the earning power, not only of locomotives to which it was applied, but to all others on the division.

The stoker is making it possible to come much nearer to theoretical conditions in regular operation. We all know that there is a wide difference between the earning power of a locomotive under test conditions and under average road conditions. I have in mind one case, in which, under test conditions, it was found that a certain locomotive could haul 4,000 tons comfortably over a certain division. When this locomotive was put in regular service, however, it was found impossible to operate it with more than 3,500 tons over this same division. With the stoker, these locomotives can easily haul 4,000 tons in regular road service.

The fact that the stoker has removed limitations in the size of locomotives can be brought out by reference to several of the locomotives referred to in the committee's report.* The Mountain type locomotives referred to were fitted with stokers when they were built, have always been stoker-fired, and no attempt has ever been made to shovel-fire them. One of the locomotives referred to would never have been built had it not been known that a stoker could be secured which would fire it. There are 30 of the locomotives of one class referred to now in regular operation, and they would never have been built had it not been known that a stoker could be secured which would fire them. A number of other locomotives, notably the most powerful Pacific type as yet built, are now in regular operation, and would never have been contemplated without a stoker.

In another paragraph, the report says "It is now possible to fire six tons and more of coal per hour in a locomotive firebox." As high as eight tons has been put in a firebox with an existing machine, and without working it to its capacity. There is no reason why any desired quantity of coal cannot be fired by the use of a stoker, and this limitation is entirely removed in connection with the designing of new locomotives.

The stoker, as yet, has not progressed far enough to bring forth definite figures regarding its efficiency. Wherever it has been introduced, the question of increased tonnage has been more important than that of fuel economy, and the latter has therefore been given very little consideration. This, of course, is only a temporary condition, and as more stokers are applied, the question of fuel economy will become more and more important. We have, however, gone far enough with the stoker to definitely determine two points, which have a bearing on this feature:

First, the stoker will burn a much cheaper grade of coal than it is possible to use with hand firing.

Second, it will give a more uniform rate of fuel consumption on locomotives performing the same service.

It is well known that there is a difference of from 25 to 50 per cent in the amount of coal burned by different firemen for performing the same work. The stoker is eliminating this great variation, and making the results more uniform. The stoker is to the locomotive what the automatic feed is to a machine tool. It means increased capacity, more uniform output, and in addition the elimination of inaccuracies and wide variations in results.

There are today, very few, if any, shovel-fired locomotives in this country having a maximum tractive effort of 50,000 lb. or over, which are being worked to their full capacity. Wherever stokers have been applied, the earning power of the locomotives on which they have been placed has been increased from 10 to 20 per cent. There is no instance where stoker-fired and shovel-fired locomotives are being operated under identical conditions. The stoker-fired locomotives are, in every case, hauling increased tonnage, or using a cheaper fuel, or working at higher average speeds than the shovel-fired locomotives, and are, therefore, earning more money for the railroads on which they operate.

DISCUSSION BY E. A. AVERILL

Although the proper firing of a locomotive by hand has reached the stage of a skilled operation and some remarkable records have been made in certain instances, the progress of locomotive development has now almost entirely passed the point where skilled manual firing can properly do the work if the full capacity of the locomotive is to be used.

At a speed in miles an hour equal to about one-half (.476 to .636) the diameter of the drivers in inches, the capacity of most modern freight locomotives is fixed by the boiler capacity. In a report of a test on a large locomotive at the Altoona test plant of the Pennsylvania Railroad, it is stated that the results indicate that the capacity of the boiler was limited by the ability to burn the coal on the grates and not by any failure of the heating surface to absorb the heat supplied. While in this case the limit was marked by the impossibility of supplying sufficient air through the grates to properly burn the fuel, there are a reasonably large number of locomotives operating in this country today which are running at less than full boiler capacity because of the physical inability of the fireman to supply the amount of fuel that can be burned. These locomotives are giving to the drawbar the pull the man can supply but not what

*Railway Age Gazette, November 20, 1914, page 947.

the locomotive is capable of supplying at the desired speed.

I have selected at random ten classes of locomotives built during the past three years which are typical of the general size and capacity of all the larger freight engines built in that time. These are shown in the accompanying table. The American Locomotive Company's standard practice in connection with steam per horsepower hour and evaporation per pound of coal has been used; also the percentage of tractive effort and maximum horsepower at various piston speeds and the evaporation per square foot of heating surface for the firebox and tubes. It is assumed that each locomotive is working at the speed indicated on a .5 per cent grade, and that the cars in the train each weighs with lading 70 tons.

When delivering the power each of these locomotives is easily capable of giving, if in good condition, it will be seen that they require from 4,900 lb. to over 8,000 lb. of good quality coal an hour. Similar calculations for grades of less rise will show a higher speed and greater coal requirements per hour.

It is evident that these engines, with the possible exception of the last one, are not being supplied with this amount of coal, although they could use it if they were. They are actually getting from 4,500 to 5,000 lb. an hour and handling trains of a proportional size. The last one on the list is included to show the size that lies near the dividing line between hand and stoker-firing. These ten examples are typical of the ones referred to as giving the drawbar pull the man can supply, but not what the locomotive is capable of supplying.

A number of locomotives like these, all of the same class and operating on the same division, will have a tonnage rating in proportion to the ability of the average poorest fireman that is assigned to them rather than of the average best fireman. While there may be a few firemen on the division who are capable of developing the full boiler capacity, the group of engines as a whole may be daily working much below their actual capacity. The acceptance of the opportunity to supply the desired quantity of coal at all times to these locomotives, that is offered by the stoker, will have the same practical effect on operating expense as would a new order of more efficient, larger locomotives. A reduction in the cost of conducting transportation follows this increased locomotive capacity in a number of the principal items when presented on a ton-mile basis. The stoker itself offers an opportunity for further saving, particularly in the cost of fuel, reduced claims for damage or accident, and the recruiting of men of higher caliber for locomotive service.

An instance of the possible savings in the cost of conducting transportation through increased locomotive capacity following the application of a stoker, is found on a certain division where ten tonnage trains are sent one way over the road each day with hand-fired locomotives. Application of stokers has permitted an increase of over 11 per cent in the tonnage of a train. The return movement is largely empties. The application of stokers will give a direct saving in wages and train supplies alone of about $100 per engine a month on this division. If advantage is taken of the increased capacity of the division for tonnage without the addition of more locomotives, the saving will be considerably larger.

Naturally one of the first features to be investigated by a railroad considering the application of stokers, is the cost of maintenance. In general, the machine of any kind with the fewest parts, if they are properly designed, will cost the least for maintenance, inspection or repairs. This rule holds good for stokers. During the past year and a half there has been a distinct advance made in connection with the simplification of the stoker apparatus. The latest type of locomotive stoker consists of a comparatively few strong, heavy parts and a few wearing surfaces. This is progress in the right direction, not only for the cost of repairs when overhauling but for reliability of operation in regular service and ease of thorough inspection.

There has been much discussion of the amount of coal consumed on stoker fired locomotives. In some cases they do burn more coal per trip and the mistake of making the comparison on pounds of coal consumed per 1,000 ton-miles, has led to the deception of some investigators. Accurate tests permitting the comparison of shovel and stoker-firing to be made on the basis of pounds of coal per indicated horsepower, or pounds of equivalent evaporation per pound of coal, however, have shown widely varying results with different designs of stokers. Some carefully conducted evaporative tests with the most recent design of stoker are very encouraging in this particular. These tests were made with the locomotive in regular service. Comparing the average of five hand-fired runs and four stoker-fired runs on the basis of actual pounds of water evaporated per million B. t. u. supplied, the stoker gave an increase of nearly 7½ per cent. No data from which the horsepower or the drawbar pull could be accurately determined was taken, and hence no comparison can be made on those bases.

These tests showed an actual economy of coal and were well checked by later individual runs where the evaporation per 1,000,000 B. t. u. supplied was considerably larger than that just mentioned. In one case the increase in evaporation with the stoker was nearly 12 per cent. From these figures, as well as observations in regular daily service, it would appear that some saving in coal can be expected from this stoker. These tests were made with run-of-mine coal.

A stoker should successfully handle the coal in any condition it may be put on the tender. It should make no difference if it be all dust or clean lumps of larger size, soaking wet, slightly damp, or bone dry. It should take the coal as it finds it the same as a fireman does. The development of stokers in this direction during the past year or two has been particularly satisfactory and ordinary run-of-mine coal is now being used with complete success. The use of lower and cheaper grades of coal is quite general on the stoker locomotives of a number of roads, which report a net saving from the practice.

Calculations that have been made of the movement of the gases in a firebox equipped with a brick arch, show that velocities of over 180 miles an hour, or 265 ft. a second, will occur over the end of the arch when burning 6,000 lb. of coal an hour on 70 sq. ft. grate area. The velocity decreases as the fire bed is approached and at a point 2 ft. above the grate the gases have an average velocity of about 33 ft. a second, or 22.5 miles an hour. This clearly indicates the importance of injecting the fuel charge as low down in the firebox as possible to reduce the loss by partially burned fine coal passing through the tubes.

Type	Cylinders, In.	Steam Pres., Lb.	Diam. Driv., In.	Max. Tractive Effort, Lb.	Max. Cyl., Hp.*	Normal Hp. from Heating Surface†	Coal per Hr. at Max. Hp.‡ Lb.	Speed for Max. Hp. Mi.	On grade of .05 per cent: Speed m.p.h.	Tons in Train	Hp. Req'd	Coal per hr., Lb.	Coal per sq. ft., G. A., Lb.	Water per sq. ft., H. S., Lb.
2-8-2	25 x 32	180	63	48,600	2,027	2,210	6,587	35	25	1,930	1,945	6,320	112	9.88
2-8-2	28 x 32	170	63	57,460	2,400	2,310	7,507	35	25	2,382	2,290	7,440	106	11.5
2-8-2	27 x 30	175	63	51,700	2,296	2,269	7,374	37.5	25	2,183	2,160	7,020	100	11.05
0-8-8-0	26 & 41 x 28	200	51	105,000	.....	3,032	8,759§	32.5	15	6,050	2,860	8,240§	82.4	10.6
4-8-2	28 x 28	185	69	50,000	2,613	2,451	7,965	44	35	1,403**	2,390	7,767	124	12
2-6-6-2	21½ & 34 x 32	200	57	67,500	2,533	2,312	7,514	32	15	3,820	1,940	6,300	111	9.2
2-8-2	28 x 32	180	64	60,000	2,542	2,418	7,858.5	36	25	2,470	2,410	7,840	100	10.8
2-8-0	26 x 30	185	57	55,900	2,251	2,167	7,242	34	15	3,210	1,765	5,750	86	10.4
2-8-8-2	26 & 40 x 30	200	57	87,600	.....	2,942	9,561	34	15	5,060	2,390	7,800	92	9.2
2-8-0	25 x 30	180	57	50,328	2,027	1,848	6,006	34	15	2,920	1,510	4,900	87	11

*Horsepower = .01798 Pd² at 1,000 ft. piston speed. †Normal horsepower from heating surface = evaporation, lb. per hour ÷ 20.8 lb.
‡ 3.25 lb. coal per horsepower hour. § 7.2 lb. water per lb. of coal. ** Passenger train.

The opportunities for economy in connection with the reduction in damage claims follow the better lookout from the locomotive by the fireman because of being left free to watch signals, crossings and the operation of the machinery on the left side.

One of the essentials in this connection is noiseless operation. The stoker should not prevent free conversation across the cab nor make any noise that can be heard when the locomotive is running. The development of the past year or two has shown a wonderful improvement in this particular and stokers are now being applied which are essentially noiseless in their operation.

The stoker should be 100 per cent efficient; it should do all the firing, handle all the coal from the tender with the minimum attention and not require alteration of the distributing means after it is once properly adjusted. The fireman should be free to attend to the duties mentioned above and should be able to control the stoker operation from a position on the seat box.

It is well established in manual firing that small quantities of coal fed frequently and distributed by the "cross fire" method give the most perfect combustion. The stoker should follow this method but perform the operation more exactly than it can be done by hand. Recent development shows a full appreciation of this requirement, and at the same time provides a flexibility that allows the stoker to exactly meet the conditions of combustion at the various parts of the grate. If 70 per cent of the coal is being burned on one side of the grate, the stoker should discharge that proportion of the fresh fuel on that section. If more fuel is being burned in front than at the back, the stoker should distribute to suit. This flexibility is essential for 100 per cent stoker work.

There is another feature of improvement in the most recent of the scatter type stokers that has been particularly appreciated by designers and by enginemen. I refer to the absence of any part of the stoker on the boiler head or in the cab. There are stokers now being applied which show practically nothing in the cab and thus allow the best arrangement of the many instruments and appliances required on a modern locomotive. This, especially in connection with the reduction of noise, is one of the most important developments of the recent past, as it is in the direction of greater safety of operation and reduced strain on the mental and physical energy of the engineer. The absence of apparatus at this point also permits the proper inspection of all the staybolts and their renewal if necessary without the removal of any part of the stoker.

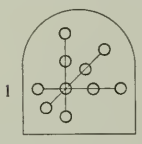
BEAM-LIGHT SIGNALS ON THE PENNSYLVANIA

The Pennsylvania Railroad, in connection with the introduction of electric traction on its main line from Philadelphia westward will introduce, in place of semaphore block signals, a novel arrangement of lights, uncolored, by which both motion and color will be done away with, the lamps being used day and night. Mr. Rudd, the signal engineer, has given us the following description of the new signals:

"We have developed what we call, for lack of a better name, the 'beam-light' signal, and are to install it between Overbrook and Paoli, about 16 miles of four-track road with five interlockings. The signals will give three-block indications, and will be located approximately 3,500 ft. apart. If the scheme proves satisfactory it will be useful especially where A. C. track circuits are installed, as with it the only moving part in the system is the control relay, which is necessary with any system. As designed each unit is generally arranged as shown in Fig. 1. Four fixed lights in a row, one light being common to all three rows. The containers for the lamps, lenses, etc., are clamped to steel tubes diverging from a center casting, a suitable background being attached to the center support but back of and separate from the tubes supporting the lamps.

"The lamps are spaced 18 inches apart, center to center, and are 12-volt, 4-candlepower, 5-watt Mazda; concentrated filament with adjustable base, burning at 11-volts in bright daylight or in fog, 6-volts at twilight and 3-volts at night. The current consumption will average up about ten watts for the four lights. Special inverted 5⅜ in. lenses and very light yellow cover glasses are placed in front of the lamps; and a reflecting mirror above the cover glass to throw some of the rays down for close range. There will be a hood over each unit. These lights are readily seen in brightest sunlight at 4,000 ft. or more. Scareheads of newspapers can be read by them at night 1,000 ft. away if the full day voltage is used; hence the necessity of dampening down at night.

"The voltage will be controlled from the nearest signal cabin by the signalman. The entire arrangement is immovable, the rows of lamps being lighted as conditions require. Two units will be used on all signals—equivalent to two semaphore arms—thus making a uniform system, the aspects corresponding to the position of the arms as in standard practice, but at interlocking signals the bottom (low-speed) arm will not be displayed in the stop position at all. When it is required two short-range lights will be shown, diagonal or vertical, in addition to the two upper arms horizontal. This is a decided advantage, as the engineman will know that unless two full size beams appear, the signal is improperly displayed. No permissive aspect



will be required, but if needed it can be shown by a row of lights diagonal (45 deg.) in *lower* right-hand quadrant.

"The staggered light effect to distinguish stop and proceed signals from stop and stay will be produced by having the bottom horizontal beam moved to the left one light, as shown in Fig. 2, the difference being required only in the stop indication.

"For dwarf signals, which cannot be hooded lest close range reading should be obscured, frosted white cover glasses and higher candlepower lamps will be used.

"This arrangement will eliminate all failures due to moving parts of signals and mechanisms (except the relays), and all chances of freezing or sticking clear. From our records it appears that this should reduce all failures, with their consequent delays, at least 10 per cent, and all dangerous failures 40 per cent. The scheme solves the colored-light problem for night indications completely, by eliminating all colors and establishing signaling by position only.

"With current supplied from a power line generation of current is cheaper, as there is no 'peak of the load' to be provided for as in motor signal work. This reduces the cost of operation. The initial cost of installation is less; the cost of maintenance, aside from necessary policing should be less and the cost of delays will undoubtedly be reduced. The risk to employees is reduced as all their work will be on the ground, except occasional inspection of wires, adjustment of lights, renewal of lamps and cleaning the lenses."

Electrification of a Portuguese Railway Line.—A decree has been signed by the president of the Portuguese Republic for the electrification and lease of the railway connecting Lisbon with Cascais. The line is about 16 miles long and is owned by the Portuguese Railway Company. It is double-tracked, of broad gage, and rock ballasted. There are practically no grades. The line serves the so-called Riviera of Portugal and should be a paying investment. In the summer season 40 trains each way are operated, and in winter 26. Expresses make the entire distance in from 35 to 40 minutes, with 3 stops; the locals, stopping 19 times, take 1 hour and 8 minutes. It is proposed to operate electric trains every half hour and to make the entire run in 25 minutes.

Instructions for the Federal Valuation Parties

An Abstract of the Regulations Governing the Field Engineers, Showing the Data They Are to Secure

The Interstate Commerce Commission, Division of Valuation, has issued a second tentative draft of instructions for the guidance of roadway and track parties in the conduct of their field work. The following is an abstract of those portions of these instructions of interest to railway men:

Each roadway party will be provided with right-of-way and track maps, station maps and profiles of the property to be inventoried. They will also be provided with such ballast, rail and fence charts, and culvert, bridge and building lists, and other records of property which the carrier may be able to supply, and which will assist in identifying the property.

Wherever it can be so arranged the carrier will place with each roadway party a representative who is familiar with the property. He will be permitted to observe in detail the methods used, and the records of fact made by the roadway party, provided a co-operative agreement with regard to said notes has been executed.

Field Corps.—A field corps shall consist of three or more roadway parties directed by a field engineer. The field party of the roadway and track departments shall generally consist of three groups: A chaining group, a cross-section group, and one computing group. The chaining group shall generally consist of a recorder in charge, a head chainman, and a rear chainman. In general it shall be the duty of this party to chain the track and locate by station and plus all structures and property, and to inventory ties, rail, track material and fastenings, culverts, small bridges, fences, signs, crossings, small buildings, pavings, etc. The cross-section group shall generally consist of an instrumentman in charge, a rodman and a tapeman. In general it shall be the duty of this group to measure the grading, ballast, tunnels and subways. There shall generally be two computers with each party.

Condition of Property.—The assistant field engineer shall make notes on the condition of all property which it is his duty to inventory. The notes shall generally be made in accordance with the following outline:

(*a*) *Age.*—Ascertain, where practicable, the year of construction, installation or purchase of the property, and whether at that date the property was new or second-hand. If used prior to its present service, give such facts as may be obtained as to length and nature of service elsewhere. State source of data.

(*b*) *Wear and Decay.*—Record such facts as to wear and decay as may be practicable from field observations.

(*c*) *Maintenance.*—Record whether maintenance is normal. If the maintenance is above or below normal, give facts on which the conclusion is based. Where extensive or unusual repairs are needed to put the property in serviceable condition, note such facts in detail.

(*d*) *Probable Service Life.*—Record any local conditions which many operate to shorten or lengthen the service life of the property as compared with average service life of similar property elsewhere. Record any evidence which may be ascertained in the field as to the inadequacy or obsolescence of the property. Where any definite field evidence can be ascertained as to the probable remaining service life of units of property, note shall be made of same.

Abandoned Property.—Abandoned property, in so far as the work of the roadway party is concerned, may be considered as fixed physical property which has been acquired or created by the carrier and used for transportation purposes, and which subsequently the carrier has permanently ceased to use or hold for any of its purposes as a carrier. The commission has directed carriers to file detail schedules and claims of property abandoned. Where such claims and schedules are furnished by the carrier, and records supplied which will enable the roadway party to identify the property in whole or in part, it shall make such a general check of the claims and identify the property to the extent practicable in the field. Where carriers file no claims on account of abandoned property, the roadway party shall not attempt to locate or ascertain the quantity of such property, unless specifically instructed to do so. All notes of abandoned property shall be kept entirely separate from those of property in use.

Base Line.—Unless otherwise instructed the base line will be as follows:

1. On single-track roads, including side tracks, midway between the rails of the main track.

2. On double-track roads, midway between the two main tracks.

3. Where the carrier has a base line already defined on the ground it may be used. Structures shall all be located by their station and plus on the base line.

The base line shall be accurately chained with a steel tape.

Cross-Section Instruments.—The instruments to be used in cross-section work will depend on the character of the grading. Where the cuts and fills are less than 8 ft. in height, hand level, rod and tape shall generally be used. For cuts and fills of greater height a hand level, Wye level or other instrument may be used.

Land for Transportation Purposes.—The external boundaries of the right of way, as shown on the right of way and track maps, shall be verified on the ground by measurements to fences, monuments or other evidences of right of way limits, and if no such evidences exist the fact shall be recorded in the notes. When the maps show the right of way to be of uniform width, it will be sufficient to measure and record the width at each tenth station. Where a change of width or other irregularity occurs, note and give station of same. For irregular parcels make sketches where necessary to show boundaries and dimensions measured.

Grading.—The grading inventory shall include all work classified under this account, and in addition thereto, separately recorded, grading work done for buildings and structures where, in the judgment of the assistant field engineer, such work can best be measured by the cross-section group. Cross-section measurements shall be made of the roadbed as it now exists in such manner as will permit an accurate ascertainment of the quantities therein. In general, cross sections shall be made at each 100-ft. station and at such intermediate points as the conditions demand for calculating the grading quantities and their classification. The station and plus of all grade points shall be noted.

Following the specific instructions of the assistant field engineer, the instrumentman will make notes as to classification of excavated materials, recording when possible the lines of demarcation between the different classes of materials in excavations in order that such lines may be platted.

Unless otherwise instructed, all material excavated shall be classified by the assistant field engineer as "solid rock," "loose rock" or "common excavation." Where the lines of demarcation in excavations are not plain, the use of the pick and shovel shall be resorted to and every effort made to secure cross-section notes which will permit the calculation of quantities of classified material. Where evidence on the ground indicates that the determination at the present time of quantities which have entered into the grading could not be done with the proper degree of precision, the carrier's cross-section notes of original construction, where these exist, shall be utilized to assist in establishing the original ground surface, and where so used the notes shall clearly indicate it.

Notes shall be made where evidence exists of the acres of clearing and grubbing required for the original construction of the roadway. Notes shall be made of the character and quantity of materials entering into retaining walls, riprap, cribbing, artificial sodding, dams, mattresses, bulkheads and similar construction used for supporting or protecting the roadbed. Sketches shall be made where necessary, giving sufficient dimensions and description to enable the computation of materials.

Tunnels and Subways.—Tunnels shall be measured between portal faces and the station and plus of each face recorded. Sketches shall be made of cross-sections, giving dimensions. Note all changes in cross-sections and the length of the varying sections. Portals shall be measured and sketched with sufficient detail to permit a calculation of quantities. The character and thickness, where practicable, of lining walls, invert, etc., shall be noted: also note character of ventilation, drainage, amount and character of back filling, and other similar information pertaining to the actual construction of tunnels as fully as can be obtained in the field. A description, supplemented with sketches in the absence of plans, shall be made of shafts, drains, ducts, etc., sufficient to permit the quantities and materials of construction to be calculated and full notes made of the special conditions affecting the cost under which the tunnel was built. If the present section is an enlargement of the original section, this fact should be stated with such notes regarding the original section as can be ascertained from records or from railroad employees and others familiar therewith. As far as practicable classify and ascertain the quantities of materials encountered in excavating the tunnels.

Bridges, Trestles and Culverts.—The roadway party shall locate by station and plus all bridges, trestles and culverts, but shall inventory in detail only those structures which are less than 12 ft. in span, unless otherwise instructed. Bridges of 12 ft. span and over shall generally be inventoried by the bridge department.

Ties.—The kind of ties, whether treated or untreated, and whether oak, pine, cedar, fir, etc., together with the dimensions, class and average number per mile, shall be noted. The ties in main lines and sidings shall be listed separately and note made of the kind and class of ties in each track. Note shall be made whether ties were obtained locally or shipped in, and from where.

In order to estimate the number of ties per mile the ties shall be counted in not less than 600-ft. sections, two sections per mile. The station and plus of sections counted and details of the tie count shall be noted. Note length of track occupied by each set of switch ties or crossing timbers. Observations for noting condition data of track ties in main line shall generally be made on these 600-ft. sections.

Switch ties shall generally be inventoried by sets. Where the carrier has standard turnouts note shall be made of the number of switch sets of each type or standard of turnout. The kind of timber, and if treated or untreated, shall be noted in each case. Where there are material variations from the standard turnouts the exact number of switch ties shall be counted. Note shall be made of all special switch and crossing timber in sufficient detail to permit of estimating cost.

Rails.—Note the weight of all rail and give the station and plus wherever the weight changes in either main or side track. The lengths of individual rails shall be measured only at sufficient intervals to determine the standard rail lengths in use. Note if rail is Bessemer, or open hearth, or special steel. Where a carrier has no standard drawings showing sections of rail make dimensioned sketches where necessary of sections of different weights of rail. Where obtainable the brand of rail shall be noted from time to time as information as to age, weight and source. Particular attention shall be paid to rails in both main and side tracks to secure information as to where the rail was obtained, and whether when laid, it was new or re-lay.

Other Track Material.—In general, rail joints, bolts, spikes, nut locks, tie-plates, etc., in main line shall be obtained and noted by determining the various track materials in the same 600-ft. sections as the ties, and from the data thus obtained estimate such material in the mile. For rail joints, show kind, weight, maker's brand and number, number and kind of bolts required, and number and kind of nut locks used, if any. If carrier has no plan showing types of rail joints in use make sketches where necessary of the different types.

For spikes, note size, average number used per tie, and total per mile. For tie-plates, note kind, dimensions and weight. It is not necessary for the field party to count the number of each kind of tie-plates in a mile, but only to obtain and note as above for a mile of main line or a siding, with the notation that they are mixed kinds. If practicable an estimate may be made of the percentage of each kind. For rail braces make notes in same maner as for tie-plates.

For other track material not specifically mentioned, use such methods to ascertain the inventory as will give substantially accurate results without a detail count of each small item. Other track material in sidetracks shall be listed separately for each track.

Switch points shall be inventoried complete by standard points of different kinds and weights unless there are missing parts which materially affect the cost of the switch. Missing parts shall be taken into consideration in noting on "condition." Frogs shall be classified by kind, i. e., rigid, spring, movable point, etc.; number and weight of rail. Also note when special alloy steel is used. For switch stands, obtain and show kind, i. e., high ladder, high, low or ground throw; kind of lamp used, if any; name of manufacturer and index number.

For materials of this account in sidetracks, but not specifically mentioned, ascertain the amount and kind in a way consistent with the importance of the items involved. Note extra spiking on curves and switches, or elsewhere. Special fixtures which can not be described by number or otherwise, so that they may be identified by catalogue or plans of carrier, shall be measured and a dimension sketch made, where necessary. Note station and plus of all main-line switch points; also give switch leads, length of crossovers, length of slip switches, etc. Length of sidetracks shall be determined from point of switch to point of switch or to end of track.

Ballast.—Notes for ascertaining ballast shall be made as follows: Excavation sufficient to determine the cross-section of ballast shall be made at intervals of not greater than 1,000 ft. where the ballast is of one kind and the section apparently uniform, and a dimensioned sketch of said section shall be recorded. Such sketches shall also be made at points where the kind of ballast changes or where there are material variations in the ballast sections. The station and plus of sections taken shall be noted.

Notes shall show the kind of ballast, and where two or more materials are encountered in a cross-section the dimension sketch shall clearly show the extent of each kind; the quality of the ballast; the location from which ballast was secured, and if off the line of the carrier, the length of haul to the nearest point on the line of the carrier under inventory; and also information as to conditions of handling and loading, where these facts can be obtained in the field.

Where ballast is of a depth in excess of the standard section of the carrier; or, in the absence of such a standard, greater than 18 in. below base of rail, a separation of the excess ballast material shall be made in the computation of quantities. Ballast quantities shall be summaried by miles, and notes shall show what deduction was made for displacement of ties. The quantities of ballast in main and side tracks shall be shown separately.

Track Laying and Surfacing.—This is a labor item and can not, therefore, be inventoried, but the assistant field engineer shall note any unusual conditions, if any, which would affect the cost of doing the work.

Right of Way Fences.—This item shall include right of way fences, cattle guards, wing fences, aprons and hedges. Other fences around station buildings, shop grounds, stockyards, etc., shall also be inventoried, but shall be classified with the par-

ticular building or structure to which they apply. Record shall be made of the length and location of each kind of fence, giving the average number, kind and spacing of posts per unit, number and kind of wires, size of plank where used, character of bracing, etc. The number and type of all gates shall be noted. Fence charts will be furnished where these exist, and their accuracy checked and reported. In the absence of these, sketches shall be made by the recorder, using conventional signs, if desired, for different kind of fencing. The length of fencing, including wing fences, must be shown in the record.

The location and kind of all cattle guards shall be noted, whether surface or pit, and if surface the kind of material and name of the guard or type of construction shall be indicated.

LOCAL FREIGHT BY PARCEL POST

The photograph illustrates in a striking manner the extent to which the railways are being called on to carry local freight on passenger trains under the guise of United States mail. The boxes shown are part of a shipment of 250 cases of condensed milk sent by wholesale grocers of El Paso, Tex., to Mogollon, N. Mex., about 80 miles inland from Silver City. These cases weighed 42 lb. each or a total of 10,500 lb. They were delivered to the Atchison, Topeka & Santa Fe at Deming, N. Mex.

One of the most flagrant abuses of the parcel post in the southwest lies in the shipping of groceries from the larger towns to outlying points. One illustration is shipments of this nature moving over the Santa Fe from Albuquerque to Los Cerrillos, the final destination being Cuba, N. Mex., and other inland points. On April 28 a ton of flour was shipped in 50-lb. sacks; on May 21, half a ton of oats, 50 lb. of potatoes and a box of canned goods were handled; on May 23, 1,100 lb. of

Handling 242 Boxes of Condensed Milk by Parcel Post

flour was taken; on May 27, 1,400 lb. of sugar and potatoes, and on May 30, 2,620 lb. of sacked wheat.

As a further illustration, there was shipped from Deming to Mogollon on March 12, 70 sacks (3,500 lb.) of beans by parcel post, at a postage rate from Deming to destination of $1.04 per 100 lb. The freight rate for this same business is 30 cents from Deming to Silver City and $1.25 from Silver City to Mogollon by team, or $1.55 per 100 lb. through.

The reason for this traffic going by parcel post is evident. The freight rate from Albuquerque to Los Cerrillos is $1 per 100 lb. while the parcel post rate is $1.08 to destination. The star route carrier having the contract for handling the mail to Cuba and two or three other inland towns receives $2,600 a year. Prior to the establishment of parcel post he made two or three trips a week with a light buggy, but since the parcel post has come into action he is now required to make extra trips with a wagon.

The movement of fruit in this territory from Farmington, N. Mex., to points west of Albuquerque has been referred to previously in these columns. However, as a further example, on October 31 Santa Fe train No. 7 received at Lamy, N. Mex., 301 boxes of apples of 50 lb. each, or a total of 15,050 lb. It was necessary to transfer this to train No. 9 at Albuquerque, causing delay at both points. On November 3 train No. 7 loaded 179 boxes of apples at the same point, and on November 5, 213 boxes. These illustrations are typical of many of the abuses of the parcel post for which the railway company not only loses the freight or express revenue, but is obliged to carry the goods on its fast passenger trains at a very material actual loss.

"N. A. S. O." FIRST AID JAR

M. W. Alexander, West Lynn (Mass.), secretary of the National Affiliated Safety Organizations, announces that the Conference Board, composed of representatives of the constituents of this organization—large associations of manufacturers—has agreed on a standard first aid jar, made of glass, which contains a considerably larger number and variety of medicines and appliances than are generally found in railroad first-aid kits. An illustrated circular has been issued describing the jar. It is 9½ in. in diameter, 6 in. high and, complete, with contents, weighs about 12 lb. Besides the usual appliances and tools it contains eight two-ounce bottles of approved remedies. The bottles are ingeniously arranged in the jar so that their labels are visible through the sides of the jar, and any one bottle can be taken out without disturbing the others. These bottles contain aro-

First Aid to the Injured

matic spirits of ammonia, aqueous boric acid, alcoholic iodine, white wine vinegar, castor oil, burn ointment and Jamaica ginger. The jar has been made strong by special annealing treatment, and its walls are plain, so that the jar may easily be kept clean.

The Conference Board has issued a circular of brief instructions to laymen for first-aid treatment of common injuries and disorders, which includes illustrated directions for resuscitating persons who have suffered electric shocks; the inside of the cover of the jar is also filled with printed instructions.

It is the intention to furnish the jars and their contents at cost price, and they can be had from the National Founders' Association, 29 South La Salle street, Chicago, and the National Association of Manufacturers, 30 Church street, New York.

General News Department

The hearing at Chicago before the board of arbitration on the demands of the enginemen on the Western railroads was resumed on January 4.

E. T. Howson, engineering editor of the *Railway Age Gazette*, will address the Detroit Engineering Society on January 8, on "Heavy Railroad Construction Work."

The Lake Erie & Eastern, a new road, eight miles long, giving the New York Central lines access to large industries in Youngstown, Ohio, has been opened for business.

The new line of the Louisville & Nashville from Winchester, Ky., to Irvine, was opened for business December 28.

On December 21 the machine shops of the Lake Erie & Western at Tipton, Ind., were destroyed by fire. Much machinery was also damaged. The estimated loss is $20,000.

An officer of the National Railways of Mexico is reported as being in Dallas, Tex., for the purpose of leasing 1,000 box cars from the Texas & Pacific. It is understood that the Mexican lines need large numbers of freight cars for use during the next three months.

The large shops of the Baltimore & Ohio at Baltimore resumed work January 4 in every department, about 2,000 employees being put at work. The shops of the Big Four at Beech Grove, Ind., which had been closed for some time, resumed work January 1, with about 2,400 men.

Within the past few years, through the co-operation of the livestock and agricultural departments of the Nashville, Chattanooga & St. Louis, more than 2,000 head of pure bred cattle have been placed in the territory served by the road, many of them in counties where before few such animals could be found.

The Pennsylvania Railroad reports no passenger killed in a train accident in 1914 on the entire system, east and west of Pittsburgh; 16,303 miles of road. The number carried was 188,411,876; passenger train miles, 67,389,381. The lines east of Pittsburgh in the past two years carried 311,675,794 passengers and not one of them was killed in an accident to a train.

The California State Railroad Commission has sent to the Senate committee on post offices, at Washington, a letter recommending a reasonable adjustment of the compensation to be paid to railroads for carrying parcel post matter. The commission acts on the request of the Western Association of Short Line Railroads, and endorses the railroads' statement that if they are forced to carry certain traffic at unremunerative rates the remaining traffic must bear an undue share of the burden.

Chairman Adamson, of the House Committee on interstate and foreign commerce, has introduced in Congress a bill designed to strengthen the commodities clause of the interstate commerce law so as to more completely divorce interstate carriers from all industrial operations. After two (or three) years he would make it unlawful for any railroad subject to the act to regulate commerce to transport any commodity in which at that time, or in the past, it had an interest, or which had been mined or produced from lands owned or controlled by it.

The Pennsylvania Railroad has issued a statement to the effect that in the year ending June 30 last, the road paid one dollar for personal injuries for every 1,579 car miles, and that the average that year for 44 railroad systems for which statistics have been compiled was 740 car miles per one dollar paid. In other words, for each 1,000 miles run by cars the Pennsylvania paid out in damages 63 cents, while the average for 44 roads was 135 cents, more than double the Pennsylvania's burden. The cost to 40 of the principal railroad systems in this country for personal injuries for the year ending June 30 was $29,996,617. There were fewer accidents in 1914 than in 1913, but the amount paid for personal injuries was greater by $3,593,179. It has been estimated that the cost per year for personal injuries on all of the railroads in the country is not less than $57,000,000.

Finley Yard, the new gravity classification yard of the Southern Railway, near Birmingham, Ala., containing thirty miles of track, with a capacity of 2,000 cars, has just been placed in service. The buildings include a 25-stall roundhouse of reinforced concrete with a 90-foot electrically-operated turntable; a concrete coaling station with an overhead storage capacity of 1,000 tons, and water, sand and cinder handling facilities. Electric lights and a complete system of fire protection have been provided. The road will concentrate at Finley work which has been done at four different points scattered over a territory of ten miles.

The Mail Pay Committee calls attention to the fact that since the outbreak of the war in Europe the government has shipped nearly 200 tons of gold, worth about $99,000,000, from Philadelphia to New York without cost for railroad transportation. The gold was sent by parcel post. It was packed in canvas sacks, each containing $5,000 and weighing a trifle under 19 lb., and 19,800 such sacks were carried. The postage required, at the ordinary parcel post rates, was $4,554, but this was merely a shifting of funds from one department of the government to another. The railroad furnished, altogether, four special cars. As an extra precaution, requested by the postal authorities, the cars were detached from the regular trains some miles from destination and hauled the remainder of the way by special locomotives. Round trip transportation was provided for more than 100 postal clerks and inspectors who accompanied the gold as guards and for each of whom the railway company was obliged to assume the same liability as for a passenger paying full fare. All of this was done without any compensation to the railroad beyond the regular monthly payment for the routine mail service. In similar manner, $5,000,000 was sent from New York to Boston and $840,000 from New York to Ottawa.

"By passing Chairman Moon's railway mail pay rider in the Post Office appropriation bill, the House of Representatives has voted authority to the post office department to confiscate the facilities of the railroads." This fact is brought to the attention of the public in a circular from Ralph Peters, chairman of the Committee on Railway Mail Pay. Unless the Senate bars its final enactment, the Moon rider will force the railroads, under penalty of $5,000 for each refusal, to carry the mails for whatever the postmaster general chooses to pay. "Even should he in all cases allow the maximum rates permitted by the Moon rider," says Mr. Peters, "railway mail pay will be heavily cut and the present underpayment and injustice to the railroads greatly increased." It will be recalled that Chairman Moon told the House, during debate, that his rider would enable the post office department to "save" $8,000,000 annually out of the already inadequate payments to the railroads for carrying the mails. "The greatest wrong would be done in the case of the parcel post, for the carrying of which the railroads are today underpaid not less than 50 per cent. Chairman Moon apparently wishes to make this underpayment 100 per cent, for he announced in the House of Representatives that his rider would provide the post office department with machinery whereby railroad transportation could be obtained for *all the parcel post* 'probably without any additional compensation.'"

Toronto Terminal Company

This is the name of an organization which has been formed by the Canadian Pacific and the Grand Trunk to build the extensive new terminal facilities in the city of Toronto which have been under consideration for two or three years past. The plans include a passenger station and large freight station. It is understood that each of the two companies will

take one-half of the stock, and be responsible for one-half the financial burden. The appointment of J. W. Leonard, of the Canadian Pacific, as the head of the terminal company was announced in our last issue.

Valuation of the Pere Marquette

The Pere Marquette Railroad has a reproduction value of $96,962,771. This is the announcement on the completion of an appraisal completed by Dean Mortimer E. Cooley, of the University of Michigan, and submitted to the receivers of the road and the State Railroad Commission. The reproduction cost, less depreciation, is given by the report as $78,545,241. Dr. Cooley, with a staff of assistants, has been at work on the appraisal during the last eight months. The cost of the road a mile is figured at $45,392, or $36,770 less depreciation. There are 2,586.73 miles of track in Michigan and 2,965.87 miles in five states and Canada.

Progress in Rogers Pass Tunnel

During the month of December the pioneer tunnel at the west end of the five-mile double track tunnel of the Canadian Pacific now being driven at Rogers Pass, B. C. (see *Railway Age Gazette*, December 11, 1914), was driven 852 ft. and the pioneer tunnel at the east end 544 ft. The center heading in the west end of the main tunnel proper was driven 686 ft. and in the east end 523 ft. Work is now being started on the enlargement of the center heading in the east end to the full section. From these figures it can be seen that the unusual records made in the early months of this construction are being continued.

Passenger Suffocated in New York Subway

As a result of a small fire in a manhole at the side of the Interborough Subway at Broadway and 53d street, Manhattan, New York City, on the morning of January 6, two train-loads of passengers were thrown into a panic and nearly two hundred persons, largely women, were partly suffocated or injured by being trampled on; and the injuries of one women were fatal. The fire was caused by a short circuit in power cables at the connection with the power house, and the chief trouble was from dense volumes of smoke from burning insulating material which gradually filled the tunnel for a considerable distance. The two trains were stalled (by the cutting off of the power because of the accident to the wires) a few hundred feet away, and their rear ends were not far from an emergency exit; but there appears to have been considerable delay in reaching and using the means of escape. Passengers who were prompt to try to escape seem to have got out safely. No trains were run for about eight hours, and the excitement in the city was the greatest in the ten years' history of the subway.

Safety on the Cumberland Valley

M. C. Kennedy, president of the Cumberland Valley Railroad, a part of the Pennsylvania System, has addressed a letter to employees congratulating them on the almost total absence of accidents of all kinds during the year 1914. He says:

"During the year just closed the Cumberland Valley Railroad transported approximately eight and a quarter million tons of freight and two million passengers without the loss of life of a passenger or one of its 2,100 employees, and without injuring a passenger.

"While there have been minor accidents to employees, not so much as a finger or a toe has been amputated, and with the exception of one fractured ankle, not a leg nor an arm broken.

"Without taking into consideration the few slight accidents on industrial sidings and in yards there has not been a wreck, in the general acceptation of that term. The wreck crew has only been called seven times during the year and the total cost of wrecking has been insignificant.

"This splendid record, of which I feel justly proud, and which I do not believe has been equaled by any railroad of its size and same density of traffic, is not attributable to any one man but to the hearty co-operation of every officer and employee in their untiring efforts to make the Cumberland Valley the best and safest railroad in the United States.

"I congratulate you and ask a continuance of that loyal support without which such a record could not have been made; and I extend to you one and all my best wishes for a happy and prosperous New Year."

The Cumberland Valley operates 164 miles of road; receipts, by last annual report to the Interstate Commerce Commission, one year, $3,521,447; train miles, 1,515,138.

Presidents' Conference Committee on Valuation

Thomas W. Hulme, general secretary of the Presidents' Conference Committee on the Federal Valuation of Railways, has just issued a statement reviewing the work of this committee for the past year. After reviewing the orders of the Interstate Commerce Commission and the various circulars which have been issued by the government, the report states that the inventory has been practically completed on four roads, the Norfolk Southern; the Atlanta, Birmingham & Atlantic; the Texas Midland, and the New Orleans, Texas & Mexico; and that it will be completed in the near future on the Kansas City Southern and the San Pedro, Los Angeles & Salt Lake. Tentative prices have been applied by the local government engineers, but these are subject to review at Washington. Both the government and the railway organizations are gathering cost data to aid in this review. It is realized that before these prices are applied and the valuation is made some fundamental questions must be decided, some general principles established, and some terms in the valuation act defined. It is probable that there will be a general hearing on these matters during the later part of the winter, and preparation is being made for their full consideration by the government and the railways.

The report also contains a list of all the communications issued by the committee for the guidance of the railways in the preparation of the information required by the government.

Dr. Hadley on the New Haven Situation

President Arthur T. Hadley, of Yale University, speaking before the Twentieth Century Club of Springfield, Mass., this week, on the railroad situation, with special reference to the New York, New Haven & Hartford, of which company he is a director, said, in part:

"The present condition of the New Haven road was brought about by a combination of some unwise finance with a great deal of unwise operation and unwise politics.

"In 1913 the road paid $9,000,000 more for wages and fuel than would have been the case at the prices which prevailed ten years earlier, and received no more for its services. . . . Methods of handling freight had become more economical as the volume of traffic increased. Methods of handling passengers became more expensive under the same conditions. The authorities of New York state compel the New Haven road to do its commutation passenger business at rates which mean a direct loss of nearly $1,000,000 a year. The United States government penalizes the road an equal amount for the carriage of the mails. These three things, taken together, would have involved a serious reduction of the dividend even if there had been no outside purchases of any kind. . . .

Loss and Damage Claims

The Central Safety and Efficiency Committee of the San Pedro, Los Angeles & Salt Lake on January 1 issued a circular urging a special campaign among the employees to reduce the amount of loss and damage claims. It is pointed out that in the last four years payments of such claims have totaled nearly $250,000 on this road, which means that out of every dollar received for the handling of freight one cent is paid back to the shipper or consignee in the form of claims for merchandise lost or damaged. The circular gives the figures for the past five years, and also the amount of claims paid on various commodities during the last six months of the fiscal year 1914. The following suggestions are given as to how the various employees may help to reduce the amount of such claims:

"The receiving clerk may help by seeing that he receives all the freight he signs for. He is the man to reject consignments improperly prepared for shipment.

"The trucker may help by careful trucking, and by being sure that the freight is loaded in the proper car.

"The stevedore or loader may help by careful stowing and bracing, and by supervising the work of the loader.

"The warehouse foreman may help by choosing suitable cars

for loading, and by seeing that cars selected are free from nails and other projections, and from oil or other refuse which may injure the lading.

"The switchman may help by avoiding unnecessary movements of the car, by careful signaling, and by making smooth couplings.

"The engineer may help by prompt and careful observance of signals, and by avoiding sudden and hard applications of the air brake.

"The conductor and brakeman may help by unloading and loading freight as though it were their own property, being cautious to see that it is put off at its correct destination, and by reporting instances of improper loading."

Automatic Train Stops

The New York State Public Service Commission, First District, has notified the Interborough Rapid Transit Company to proceed at once to equip its elevated lines with apparatus capable of preventing collisions. The resolution of the commission is as follows:

"Resolved that it is the sense of the commission that the elevated railroad lines of the Interborough Rapid Transit Company should be equipped with a signal system which will prevent collisions, and that the company be required to make an investigation and report to the commission within sixty days on such speed control, cab signaling or other improved signaling devices that will allow the minimum headway on the elevated railroads and provide the greatest factor of safety."

At present the rule for trains on the elevated lines is to run at all times with speed under control, except on certain curves, where automatic block signals are provided. Throughout the lines the stations are usually not more than one-quarter mile apart, limiting the speeds to a low rate.

The New York Central Railroad

Under the reorganization of the consolidated New York Central Railroad Company, two grand divisions will be established, the eastern under W. J. Fripp, general manager, with headquarters at Albany; and the western under D. C. Moon, general manager, with headquarters at Cleveland. Under Mr. Moon will be two general superintendents, Albert S. Ingalls in charge of lines between Buffalo and Toledo, and Frank H. Wilson, in charge of lines between Toledo and Chicago. Under Mr. Fripp will be three general superintendents, T. W. Evans in charge of lines between Buffalo and Syracuse, and between Montreal and Clearfield, Pa.; E. J. Wright, in charge of lines between Syracuse and the electric zone at New York; and Miles Bronson, in charge of the electric division.

Abraham T. Hardin will have general charge of operation, maintenance and construction as vice-president. Patrick E. Crowley will be in general charge of transportation on the consolidated lines between Chicago and New York as assistant vice-president.

The road will be divided into five operating districts: First, between New York and Syracuse; second, between Syracuse and Buffalo; third, between Buffalo and Toledo; and fourth, between Toledo and Chicago. The New York electrified zone constitutes a separate (fifth) district.

Chicago is called the western terminus of the road, but there are really three western termini, the other two being Zearing, on the former Chicago, Indiana & Southern, 96 miles west of Chicago, and Danville, on the same road, 128 miles south of Chicago. (See operating officers.)

Proposed Railway Legislation in Kansas

C. W. Kouns, general manager of the Atchison, Topeka & Santa Fe and chairman of the Kansas Committee on Relations of Railways to Legislation, has addressed two circular letters to the people of Kansas on proposed railway legislation in the state, requesting, on behalf of the 12 railway companies operating in Kansas, that a thorough investigation be made of proposed legislation having to do with railroad business. The letter states that the legislature this winter will have before it the so-called "full crew" bill which, the circular states, if enacted into the law would force the railways to spend approximately $2,000,000 every year for extra brakemen on freight trains without any compensating benefit to anybody except the men who want jobs as brakemen. There are other similar bills, one of which prohibits the running of trains of more than 50 cars, and another requires extensive changes in cabooses, cars, etc. One part of the letter is devoted to demonstrating that the full crew bill is not a safety measure, and that as far as safety is concerned a third brakeman would be of no more value on a freight train than would an extra man on a corn planter, or a load of hay, or at the pump as a means of safety.

The letter says: "As a matter of fact the Kansas railway workers who have jobs have never made application to the roads for a third brakeman for the freight train service. The full crew agitation is carried on wholly by, and in the interest of, those who want to force the railways by law to give them employment." Regarding the bill limiting the number of cars in a train to 50, the circular says: "This is a double-edged sword with a poisoned tip, not only providing for a superfluous man on every train, but in many instances for an additional or unnecessary train and engine crew, with an additional engine at heavy expense to the roads and their patrons. For example, if 51 cars of stock are offered for shipment an engine with one engineer, one fireman, one conductor and two brakemen at full pay would be required to move the fifty-first car, regardless of the capacity of the engine handling the 50-car train; or the fifty-first car would have to be declined or delayed, no matter how important the shipment."

I. C. C. Report on Derailment Near Bigelow, Minn.

The Interstate Commerce Commission has just issued a report, prepared by H. W. Belnap, chief of the division of safety, on the derailment of passenger train No. 2 of the Chicago, St. Paul, Minneapolis & Omaha near Bigelow, Minn., on February 9, 1914, which resulted in the death of one pasesnger and one express messenger, and the injury of 11 passengers and 6 employees. This train, which consisted of 1 mail car, 1 express car, 1 buffet car, 2 sleeping cars, 1 chair car and 1 smoking car, all of wooden construction except the mail and chair cars, was en route from Omaha to Minneapolis. It was derailed at a point about 2½ miles east of Bigelow while running at an estimated speed of 45 miles an hour. This portion of the line is single track and was tangent for more than a mile in each direction from the point of accident with a 1 per cent descending grade. It was laid with 80-lb. rails supported on 18 oak and cedar ties per rail in 18 in. of gravel ballast.

In the derailment the engine broke away from the cars, coming to a stop about 1,650 ft. from the point of derailment. The forward pair of engine truck wheels and the rear pair of tender truck wheels were derailed, as were all the cars in the train.

The accident was caused by a broken rail weighing 80 lb. per yard, rolled by the Carnegie Steel Company in September, 1899. It was broken into a large number of pieces, 74 of which were recovered. A detailed study of this rail showed that the failure resulted from a split head which had developed during service. The steel was a very coarse-grained Bessemer steel of about normal carbon content, without excessive segregation about the split; but the inner portions had a carbon content considerably above the maximum specified for rails of this type and weight. The metal was decidedly unhomogeneous, badly streaked and laminated, especially in the web, and contained microscopic fissures.

Because of the frequency with which split rails are encountered, James E. Howard, engineer physicist of the commission, prepared a lengthy discussion of this type of failure which is included with the report.

Grand Trunk Orders Pay Reduced

Employees of the Grand Trunk belonging to the unions, said to number 14,000, have been notified by Howard G. Kelley, first vice president, that on account of the falling off in business they will be asked to accept a reduction of wages dating from April 1 next. Employees on the Grand Trunk Pacific have received a similar notice. These notices have been sent to the men through the chief officers of the respective labor unions. The men are said to have replied that on no account will they accept a reduction. Mr. Kelley's letter reads:

"In view of the serious contraction in business and the consequent alarming decrease in earnings, the company is confronted with a situation which must be relieved as quickly as possible. The general downward tendency of rates, both passenger and freight, without any compensating reduction in cost of operation,

has narrowed the margin of receipts over expenses to such an extent that with any further continuation of the present conditions this company will be confronted with a deficit.

"It, therefore, becomes necessary, much to the regret of the management, to notify you that the company will ask for a reduction in the rates of pay, beginning with April 1, 1915. The extent of the reduction will be based upon the results of operation for the half-year ending December 31, 1914, and will be communicated to you after January 1, 1915."

The G. T. P. letter is the same, save that the cut is to take effect at once instead of three months hence. On the Grand Trunk there are approximately 1,500 enginemen, 1,500 firemen, 1,500 conductors, 3,500 brakemen and baggagemen, 1,500 telegraphers and 4,500 sectionmen, making a total of 14,000, all said to be members of the international unions. On the Grand Trunk Pacific it is understood that only the enginemen, firemen, conductors and brakemen are embraced in the proposed reduction.

Nothing is made public as to what, if any, contracts are in force between employer and employee, or, if in force, for how long a time.

Summary of Revenue and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for October, 1914, are as follows:

Railways operating 228,233 miles of line are covered by this summary, or about ninety per cent of all steam railway mileage in the United States. Their operating revenues for the month of October, 1914, amounted to $266,793,865. This amount includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail and auxiliary operations. Compared with October, 1913, these operating revenues show a decrease of $29,507,027. Total operating revenues per mile averaged $1,169 in October, 1914, and $1,314 in October, 1913, a decrease of $145, or 11 per cent.

Operating expenses, which include the cost of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to $179,431,409. This was $21,562,782 less than for October, 1913. These operating expenses per mile of line averaged $786 in October, 1914, and $891 in October, 1913, a decrease of $105 per mile, or 11.8 per cent.

Net operating revenue, that is, total operating revenues of rail and auxiliary operations less operating expenses amounted to $87,362,456, which was $7,944,245 less than for October, 1913. Net operating revenue per mile of line averaged $383 in October, 1914, and $423 in October, 1913, a decrease of $40 per mile, or 9.4 per cent.

Taxes for the month of October amounted to $11,522,028 or $50 per mile, a decrease of 1.6 per cent over October, 1913.

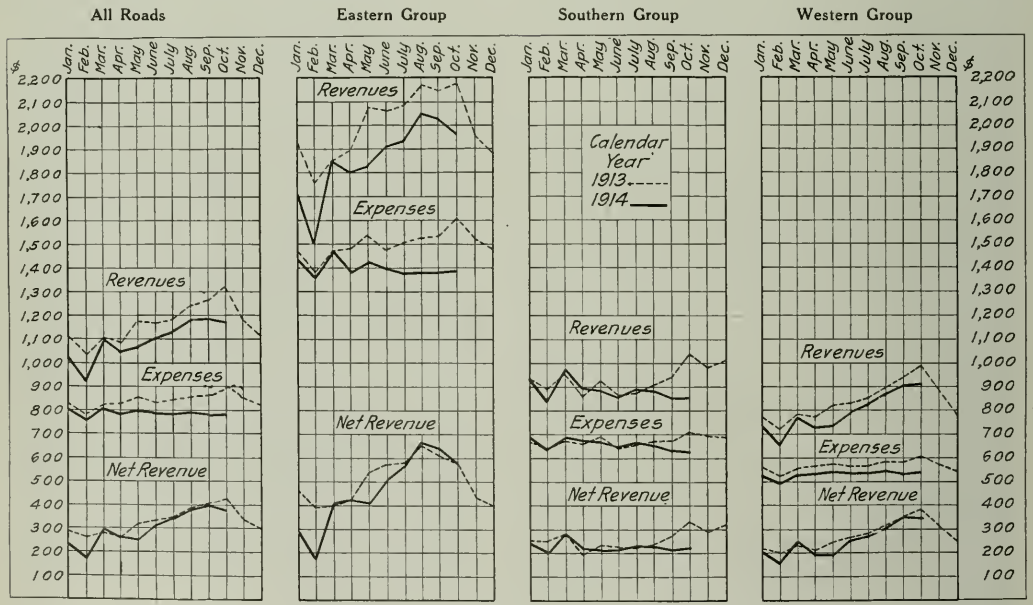
Operating income, which is net revenue from rail and auxiliary operations, less uncollectible revenues and taxes, averaged $332 per mile of line, and in October, 1913, $371, thus decreasing $39, or 10.6 per cent. Operating income for each mile of line for each day in October averaged $10.71, and in October, 1913, $11.98. Operating income is that proportion of their operating receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and for dividends.

The railways of the Eastern district show a decrease in total operating revenues per mile of line as compared with October, 1913, of 10.1 per cent, those of the Southern district a decrease of 17.3 per cent, and those of the Western district a decrease of 9.3 per cent.

Operating expenses per mile decreased 13.9 per cent in the East, decreased 10.7 per cent in the South, and decreased 9.1 per cent in the West. Net operating revenue per mile increased 0.2 per cent in the East, decreased 31.6 per cent in the South, and decreased 9.6 per cent in the West. Taxes per mile show a decrease of 3.9 per cent in the East, and increases of 0.4 per cent in the South and West. Operating income per mile increased 0.8 per cent in the East, decreased 35.6 per cent in the South, and decreased 10.9 per cent in the West.

The operating ratio for October, that is, the per cent of total operating revenues absorbed in operating expenses, was 67.3 per cent, which is comparable with 67.8 per cent in October, 1913, and 63 per cent in October, 1912. The operating ratio in the Eastern district for October was 70.5 per cent, as compared with 73.6 per cent in 1913; was 73.7 per cent in the Southern district as compared with 68.3 per cent in 1913; was 61.9 per cent in the Western district as compared with 61.8 per cent in 1913.

Comparison of returns for four months of the current fiscal year with the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 6.9 per cent, a decrease in operating expenses per mile of 8.6 per



Monthly Revenues and Expenses per Mile of Line in 1914

cent, and a decrease in net operating revenue per mile of 3.2 per cent.

This net operating revenue per mile increased 1.6 per cent in the East as compared with the corresponding period of the previous year, decreased 15 per cent in the South, and decreased 3.9 per cent in the West.

When the returns for the ten months of the calendar year 1914 are compared with the corresponding months of 1913, they show a decrease in total operating revenues per mile of 6.7 per cent, a decrease in operating expenses per mile of 6 per cent, and a decrease in net operating revenue per mile of 8.6 per cent. This net operating revenue per mile decreased 10.8 per cent in the East as compared with the corresponding period of the previous year, decreased 8.9 per cent in the South, and decreased 6.3 per cent in the West.

The diagram shows the variations in operating revenues, operating expenses, and net operating revenue per mile for the separate months of the calendar year 1913, and of the calendar year 1914 to date.

The following table shows the per cent of operating revenues consumed by such class of expenses:

PER CENT OF TOTAL OPERATING REVENUES

	October, 1914				Four months of the fiscal year 1915
	United States	Eastern district	Southern district	Western district	
Freight revenue	70.8	69.9	72.8	71.3	67.9
Passenger revenue	20.2	20.2	19.6	20.3	23.2
Mail revenue	1.9	1.5	1.7	2.2	1.8
Express revenue	2.2	2.3	2.3	2.1	2.2
All other revenues	4.9	6.1	3.6	4.1	4.9
Maintenance of way and structures	12.6	12.1	13.7	12.6	13.0
Maintenance of equipment	16.5	17.7	20.1	14.1	16.6
Traffic expenses	1.9	1.6	2.6	1.9	1.9
Transportation expenses	33.5	36.1	34.4	30.8	33.2
General expenses	2.3	2.3	2.7	2.2	2.3
All other expenses	0.5	0.7	0.2	0.3	0.5
Total operating expenses	67.3	70.5	73.7	61.9	67.5

Disastrous Collision on the Great Eastern

A press despatch from London, January 1, reports a collision on the Great Eastern, near Ilford, on the morning of that day, in which ten persons were killed and many others injured. Ilford is five miles from London and the trains appear to have been suburban passenger trains running toward the city.

American Electric Railway Association

The mid-year meeting of the American Electric Railway Association and the joint dinner with the American Electric Railway Manufacturers' Association, will be held at the New Willard Hotel in Washington on January 29. At the meeting proper at 10 a. m. addresses will be made by Dwight W. Morrow, of J. P. Morgan & Company, who will discuss electric railways from the banker's standpoint; N. C. Kingsbury, vice-president of the American Telephone & Telegraph Company, who will speak on publicity, and T. S. Williams, president of the Brooklyn Rapid Transit Company, who will consider the code of principles adopted by the association at its last convention. At 2 o'clock the delegates will be received at the White House by President Wilson. At 7 p. m. there will be the annual dinner. The speakers for this dinner have not yet been announced, but among others Arthur S. Williams will announce the winner of the Anthony N. Brady medal for the electric railway which has done the most during the year to conserve the life and health of its passengers and employees, and C. L. Henry, president of the Indianapolis & Cincinnati Traction Company, will speak from the railways' standpoint. Arrangements have been made for a special train leaving New York on the night preceding the dinner for the convenience of the New York delegates.

Nominations for A. R. E. A.

The nominating committee of the American Railway Engineering Association has recommended for election the following members: President, Robert Trimble, chief engineer, maintenance of way, Pennsylvania Lines, Northwest System; first vice-president, A. S. Baldwin, chief engineer, Illinois Central; second vice-president, J. D. Sullivan, chief engineer, Canadian Pacific Lines West; secretary, E. H. Fritch; treasurer, G. H. Bremner, assistant district engineer, Interstate Commerce Commission, Division of Valuation, Chicago.

New England Railroad Club

At the regular monthly meeting of the New England Railroad Club at the New American House, Boston, Mass., on Tuesday evening, January 12, a paper will be presented by Roy V. Wright, managing editor of the *Railway Age Gazette*, entitled "Making Friends."

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. Hereafter the full list of meetings and conventions will be published only in the first issue of the Railway Age Gazette for each month.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Mt. Royal Sts., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meetings, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next regular meeting, January 21, 1915, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF NOVEMBER, 1914.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama & Vicksburg	143	$77,715	$28,017	$117,778	$19,983	$35,158	$3,367	$46,823	$3,000	$5,484	$113,816	$3,962	$7,000	—$3,038	—$37,335
Alabama Great Southern	309	276,733	78,630	386,837	44,454	94,749	13,216	134,451	3,254	9,723	299,897	86,941	15,493	71,433	52,274
Ann Arbor	301	134,639	42,996	191,157	24,046	27,522	6,140	83,459	382	7,074	148,624	42,533	13,880	28,653	—12,853
Arizona Eastern	367	115,266	24,396	151,711	26,846	20,221	2,164	41,980	992	10,012	102,216	49,495	13,100	36,393	—53,634
Atchison, Topeka & Santa Fe	8,514	5,678,369	1,832,193	8,212,065	1,163,735	1,405,124	171,451	2,299,247	.....	154,339	5,181,306	3,030,758	367,747	2,662,036	95,450
Atlanta, Birmingham & Atlantic	646	148,648	37,038	202,890	28,438	45,006	12,927	93,286	.....	9,673	189,329	13,561	8,000	5,530	—64,020
Atlanta & West Point	93	49,266	33,563	96,813	13,066	23,020	5,157	31,372	1,589	4,522	78,726	18,088	7,125	10,963	—13,945
Atlantic & St. Lawrence	167	84,624	24,809	120,047	23,255	19,842	4,033	51,448	.....	3,391	101,969	18,078	10,800	7,278	—26,540
Atlantic Coast Line	4,697	1,770,995	578,721	2,541,495	364,248	440,770	58,885	911,619	7,561	75,967	1,857,197	684,299	138,000	546,172	—442,836
Baltimore & Ohio—System	4,516	5,209,074	1,106,478	6,879,270	738,862	1,292,029	164,829	2,888,147	49,451	171,946	5,305,213	1,574,056	265,942	1,305,798	48,678
Baltimore & Ohio Chicago Terminal	79	.....	509	119,731	14,985	18,735	762	55,614	1,250	4,384	95,729	24,002	19,021	4,981	9,178
Bangor & Aroostook	631	241,658	55,614	317,476	47,827	51,561	2,201	93,049	903	9,268	204,607	112,869	8,750	104,119	—5,191
Belt Ry. Co. of Chicago	24	.....	.....	266,488	12,765	22,017	572	96,476	.....	6,337	138,168	128,320	10,347	117,973	37,781
Bessemer & Lake Erie	204	507,394	26,364	545,552	49,407	157,170	8,702	145,181	305	10,809	366,978	178,574	20,002	158,569	—34,681
Birmingham Southern	44	33,124	712	59,753	12,540	8,965	435	22,991	.....	3,725	48,655	11,097	2,949	8,148	22,636
Boston & Maine	2,302	2,205,340	1,202,424	3,745,539	579,645	551,329	33,484	1,669,594	14,543	87,769	2,936,364	809,175	141,500	667,675	208,345
Buffalo & Susquehanna R. R. Corporation	253	112,343	6,829	122,181	21,231	33,559	961	37,247	.....	5,136	98,124	24,057	2,600	21,457	.....
Buffalo & Susquehanna Railway	91	13,224	5,735	21,360	3,242	6,227	419	12,071	7	2,327	24,294	—2,933	1,600	—4,533	19,033
Buffalo, Rochester & Pittsburgh	586	581,043	87,264	693,393	86,256	174,490	10,690	254,526	1,238	17,866	545,075	148,318	20,000	128,199	—109,929
Carolina, Clinchfield & Ohio	248	150,665	12,074	166,185	15,511	21,080	6,388	34,392	.....	8,732	85,548	80,638	14,250	66,379	—56,322
Carolina, Clinchfield & Ohio of S. C.	18	8,414	1,338	10,031	1,044	79	1,704	1,970	.....	754	5,549	4,482	750	3,724	5,765
Central of Georgia	1,924	665,575	227,159	1,002,012	122,923	191,770	34,184	354,584	1,145	33,074	734,232	267,780	41,804	225,469	—104,794
Central New England	304	258,939	36,252	310,055	121,767	30,764	1,032	119,993	.....	4,290	277,845	32,210	12,000	20,210	—111,950
Charleston & Western Carolina	341	124,367	22,816	154,182	29,728	27,567	3,053	55,605	.....	4,736	120,690	33,492	5,000	28,492	—17,345
Chesapeake & Ohio Lines	2,367	2,273,975	427,997	2,880,999	352,118	648,559	53,401	1,030,089	18,499	72,206	2,174,872	706,127	109,922	595,921	—231,783
Chicago & Alton	1,033	791,591	289,229	1,179,305	148,020	291,925	37,285	452,218	10,061	30,082	969,590	209,714	44,850	164,683	82,957
Chicago & Eastern Illinois	1,282	843,266	208,700	1,143,498	144,838	269,008	26,465	457,262	7,114	37,202	941,589	201,909	56,900	144,924	—20,898
Chicago & Erie	270	359,836	44,638	445,192	69,289	61,362	20,047	223,712	2,241	11,923	374,353	70,838	23,479	47,359	92,661
Chicago & North Western	8,108	3,957,685	1,557,777	6,202,041	797,491	1,150,678	107,432	2,449,674	48,576	145,824	4,599,534	1,602,507	375,000	1,227,289	—602,576
Chicago, Burlington & Quincy	9,377	5,629,179	1,590,627	7,903,284	711,247	1,251,748	113,174	2,572,753	62,006	178,541	4,889,469	3,013,815	307,384	2,706,431	66,447
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	59,530	13,563	80,640	14,216	15,410	1,521	45,634	.....	1,951	78,731	1,909	2,870	—973	—21,462
Chicago, Indiana & Southern	359	306,551	23,124	341,283	35,634	108,613	7,892	127,683	1,314	9,946	291,083	50,200	20,085	30,089	20,150
Chicago Junction	12	.....	.....	157,182	19,735	16,731	1,225	87,595	.....	4,387	129,673	27,509	2,223	25,286	—15,559
Chicago, Milwaukee & St. Paul	10,067	5,219,983	1,390,275	7,377,909	903,455	1,181,942	148,264	3,073,818	59,193	151,663	5,332,408	2,047,501	401,429	1,646,072	—783,766
Chicago, Peoria & St. Louis	255	101,321	21,286	130,605	23,413	24,752	6,009	57,573	.....	5,350	117,097	13,507	5,700	7,807	31,133
Chicago, Rock Island & Gulf	477	212,067	47,919	279,722	32,085	49,897	9,818	103,853	1,670	7,676	204,999	74,724	6,318	68,310	—11,073
Chicago, Rock Island & Pacific	7,852	4,010,359	1,386,496	5,804,093	904,857	904,587	152,533	2,322,803	34,961	138,761	4,453,108	1,350,986	295,296	1,055,228	—33,830
Chicago, St. Paul, Minneapolis & Omaha	1,753	957,710	392,073	1,474,487	130,432	187,251	30,439	583,945	13,704	36,046	977,963	500,524	86,853	413,137	—115,018
Chicago, Terre Haute & Southeastern	374	153,579	15,481	173,257	26,822	19,119	3,159	58,137	847	11,488	149,573	24,685	11,500	13,185	6,684
Cincinnati, Hamilton & Dayton	1,015	581,219	112,052	773,672	114,590	164,743	19,016	351,445	.....	18,096	667,890	105,783	40,042	65,558	69,263
Cincinnati, New Orleans & Texas Pacific	337	559,512	149,746	752,366	76,741	189,642	25,766	241,420	6,684	20,523	560,777	191,590	31,000	160,590	—90,589
Cincinnati Northern	246	110,530	14,680	130,198	13,731	24,792	3,032	42,446	.....	3,188	87,189	43,008	5,000	38,008	63,749
Cleveland, Cincinnati, Chic. & St. Louis	2,361	1,870,095	629,392	2,759,200	318,434	589,050	103,774	1,122,912	23,791	60,611	2,212,552	546,648	130,000	413,922	296,861
Colorado Midland	338	135,923	13,752	166,623	23,665	33,205	7,401	63,815	868	5,881	134,835	31,788	8,530	23,258	18,680
Cumberland Valley	164	170,991	54,786	240,346	72,434	37,830	3,883	83,556	797	7,463	205,964	34,382	5,910	28,472	—33,155
Delaware & Hudson Co.—R. R. Dept.	881	1,583,705	203,208	1,887,395	136,110	334,604	22,550	679,420	10,113	62,062	1,244,176	643,220	56,250	586,750	.....
Detroit & Mackinac	400	52,425	26,496	86,026	14,553	13,164	3,069	34,348	.....	2,713	67,847	18,180	10,199	7,981	—12,007
Detroit & Toledo Shore Line	79	127,122	.....	127,440	12,214	9,643	2,909	35,412	.....	3,191	63,370	64,071	6,300	57,771	—10,761
Detroit, Grand Haven & Milwaukee	191	154,000	47,000	240,405	34,625	34,609	6,512	118,639	721	5,057	200,164	40,241	3,360	36,811	—7,827
Duluth & Iron Range	292	58,437	19,814	85,782	65,729	64,764	804	54,630	2,218	7,997	196,142	—110,360	4,194	—114,555	172,054
Duluth, Missabe & Northern	364	72,073	28,042	106,053	39,360	50,661	2,039	60,706	2,258	19,493	174,506	—68,453	5,443	—73,896	—218,320
Duluth, South Shore & Atlantic	628	104,985	70,923	197,043	32,334	34,033	8,264	85,575	3,796	8,212	172,214	24,829	19,000	5,814	21,144
El Paso & Southwestern Co.	1,037	434,003	93,134	571,744	69,420	80,751	16,755	148,448	5,842	23,440	341,225	230,519	23,211	207,302	27,311
Elgin, Joliet & Eastern	778	457,322	4	510,172	56,405	124,272	5,353	182,038	.....	18,157	386,202	123,950	32,833	91,117	—202,705
Erie	1,988	3,167,887	700,270	4,270,025	442,657	948,453	96,396	1,674,468	27,831	96,073	3,260,362	1,009,662	171,370	836,836	—200,987
Florence & Cripple Creek	87	80,749	11,106	93,772	5,489	7,748	2,228	27,665	.....	4,152	47,282	46,490	5,658	40,832	316
Florida East Coast	696	202,904	120,051	370,416	54,428	59,453	6,836	117,537	2,817	15,839	255,554	114,862	18,000	96,862	14,349
Fort Worth & Denver City	454	395,306	139,836	559,220	44,343	67,428	6,715	217,101	3,822	14,316	353,724	205,496	9,679	195,817	82,748
Georgia	307	177,629	54,476	248,953	32,541	49,645	11,517	99,882	361	7,857	201,804	47,149	5,706	41,438	—31,170
Grand Rapids & Indiana	576	255,337	127,455	417,636	40,948	88,372	10,671	188,223	12	14,258	342,484	75,152	24,270	50,882	—20
Grand Trunk Western	347	387,000	140,000	576,257	146,925	101,581	18,079	265,745	3,332	13,484	549,145	27,112	35,920	—8,848	—31,426
Gulf & Ship Island	308	96,134	20,718	124,509	17,702	30,642	2,595	34,606	195	6,460	92,199	32,311	7,114	25,197	—16,676
Gulf, Colorado & Santa Fe	1,937	1,195,369	249,929	1,513,605	184,264	200,578	26,238	503,232	.....	35,922	950,234	563,371	45,231	517,858	122,320
Hocking Valley	351	420,622	67,301	527,154	61,873	105,115	8,569	185,515	.....	13,717	374,790	152,364	38,800	113,564	—30,885
Illinois Central	4,769	3,648,523	1,032,218	5,077,115	713,219	1,128,801	107,973	1,906,276	31,169	138,982	3,993,120	1,083,995	269,000	812,334	—204,771
Indiana Harbor Belt	105	.....	.....	279,369	39,089	27,878	2,748	129,366	.....	7,482	206,563	72,806	7,785	64,910	10,004
International & Great Northern	1,160	677,965	144,818	879,379	100,915	123,949	22,816	323,766	2,680	29,536	603,663	275,716	35,000	240,710	—73,246
Kanawha & Michigan	177	170,719	28,987	207,109	32,804	42,512	2,751	69,675	.....	6,729	154,472	52,637	11,375	41,262	—18,238
Kansas City Southern	827	675,768	123,770	879,047	84,171	98,350	28,436	300,840	.....	47,967	554,276	324,771	47,089	277,482	—83,089
Lake Erie & Western	906	343,526	54,886	422,557	75,181	87,587	10,420	189,080	.....	12,085	374,351	48,206	24,513	23,692	—44,109

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF NOVEMBER, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.				
Lake Shore & Michigan Southern	1,852	$2,477,858	$897,160	$3,892,159	$361,714	$830,816	$106,725	$1,440,670	$45,501	$162,694	$2,948,119	$944,039	$210,000	$733,614	$290,910
Lehigh & Hudson River	97	133,096	8,941	143,398	19,210	19,411	1,162	55,766	.....	3,711	99,260	44,137	4,150	39,987	16,143
Lehigh & New England	294	200,164	1,070	208,825	30,395	29,744	1,914	48,521	.....	5,782	116,356	92,469	5,670	86,800	15,356
Lehigh Valley	1,444	3,026,962	307,036	3,527,395	395,924	676,359	68,207	1,345,254	11,060	66,317	2,563,121	964,274	140,000	820,420	—154,155
Long Island	398	324,304	508,755	965,233	107,757	106,442	11,192	344,134	8,623	27,156	705,304	259,928	65,237	194,674	117,276
Louisiana & Arkansas	279	105,379	17,900	126,834	23,860	20,447	2,817	38,582	.....	3,989	89,647	37,187	6,250	30,937	—14,575
Louisiana Ry. & Navigation	351	133,871	19,358	163,457	30,482	19,225	5,794	70,106	.....	5,525	131,133	32,325	7,500	24,825	—24,611
Louisiana Western	208	120,192	53,633	186,650	18,028	37,882	7,175	58,832	2,798	6,513	131,217	55,433	12,539	42,892	2,042
Louisville & Nashville	5,034	2,925,162	823,914	4,050,145	639,406	870,315	111,448	1,474,710	13,389	105,664	3,205,780	844,365	184,275	659,642	—560,045
Louisville, Henderson & St. Louis	200	68,709	30,678	106,903	23,047	15,845	5,021	38,651	.....	2,858	85,422	21,481	3,800	17,655	—9,829
Maine Central	1,219	627,046	243,842	934,006	136,787	155,429	10,361	349,616	3,032	25,498	680,722	253,284	49,788	203,491	8,219
Michigan Central	1,800	1,569,695	634,073	2,526,096	290,212	443,321	70,939	1,169,626	56,256	54,770	2,085,124	440,972	134,000	305,936	—35,351
Midland Valley	380	88,219	36,101	32,294	22,931	17,283	2,179	40,470	.....	5,278	88,140	44,154	6,582	37,525	2,743
Minneapolis, St. Paul & Sault Ste. Marie	4,102	1,793,097	479,333	2,441,074	232,675	333,412	42,809	787,779	13,453	47,708	1,447,073	994,001	84,208	909,794	—136,627
Missouri, Kansas & Texas System	3,865	2,134,480	706,397	3,033,044	378,738	393,460	58,086	1,008,432	23,028	79,583	1,940,072	1,092,973	102,635	989,852	192,020
Missouri, Oklahoma & Gulf	334	80,825	18,400	104,049	23,545	12,430	3,470	39,914	110	4,950	84,419	19,630	6,462	13,153	—18,322
Missouri Pacific	3,920	1,866,209	375,882	2,433,220	324,678	460,796	67,505	953,554	4,610	61,660	1,872,802	560,418	98,590	460,790	152,474
Mobile & Ohio	1,122	667,433	91,938	810,352	76,188	84,279	41,262	326,424	1,914	29,686	559,754	250,598	27,595	222,743	—10,402
Monongahela	75	71,179	1,996	74,749	15,338	7,292	585	26,251	.....	1,993	51,358	23,390	1,140	22,250	—47,932
Morgan's La. & Tex. R. R. & S. S. Co.	405	339,618	81,627	457,276	41,317	54,272	11,537	170,565	2,411	11,620	291,576	165,700	17,310	148,334	—5,777
Nashville, Chattanooga & St. Louis	1,231	628,581	189,365	895,099	124,030	171,096	45,969	375,014	6,039	29,430	751,568	143,532	27,213	116,292	—130,851
Nevada Northern	165	55,190	7,234	65,371	13,153	11,842	420	19,777	56	3,827	49,076	16,295	4,064	12,232	—52,811
New Orleans & North Eastern	204	199,427	38,431	263,317	32,484	61,326	9,413	93,588	6,183	12,562	215,555	47,762	13,000	34,762	—27,764
New Orleans Great Northern	283	85,349	21,426	117,660	16,109	16,881	2,617	38,017	155	6,996	80,775	36,886	1,667	35,217	—25,096
New Orleans, Mobile & Chicago	403	105,998	20,994	136,191	29,155	16,179	3,755	53,239	—4	6,408	108,733	27,458	6,180	21,228	56,013
New Orleans, Texas & Mexico	286	115,780	18,889	140,469	29,502	13,973	3,003	49,547	.....	9,535	105,561	34,908	1,621	33,287	—9,884
New York, Chicago & St. Louis	568	796,296	99,350	932,518	102,598	135,431	37,885	418,295	4,443	19,606	718,259	214,259	42,000	172,257	—42,736
New York, New Haven & Hartford	2,003	2,390,991	2,160,667	5,125,780	638,475	877,892	37,320	2,032,142	45,813	128,242	3,758,920	1,366,859	209,000	1,157,714	—24,049
New York, Ontario & Western	568	519,419	76,992	694,958	94,779	137,180	8,730	288,313	.....	14,528	543,531	151,427	20,000	131,427	39,325
New York, Philadelphia & Norfolk	112	222,513	36,075	281,269	25,610	59,797	3,688	137,958	4,469	9,074	240,595	40,674	12,000	28,662	—14,695
New York, Susquehanna & Western	140	158,957	41,263	226,635	27,797	29,527	2,278	109,144	.....	5,082	173,820	52,815	13,125	39,689	—19,843
Norfolk & Western	2,044	2,575,424	363,141	3,074,133	354,395	602,449	53,862	1,006,541	9,485	72,648	2,054,128	1,020,005	155,000	865,005	—217,364
Norfolk Southern	900	202,832	75,678	300,209	38,402	51,621	6,842	116,000	361	19,874	233,101	67,108	9,525	57,580	—33,947
Northern Pacific	6,458	4,190,535	1,007,040	5,648,727	522,177	523,483	84,047	1,651,259	27,127	97,591	2,884,150	2,800,577	404,196	2,396,357	—248,359
Oregon Short Line	2,162	1,272,056	345,133	1,766,777	250,901	230,422	27,514	426,662	24,353	60,828	1,012,346	754,431	101,514	652,867	—164,654
Oregon-Washington R. R. & Nav. Co.	2,023	837,118	327,426	1,279,481	178,744	162,624	41,484	429,389	11,732	57,121	875,627	403,854	89,296	314,504	51,496
Panhandle & Santa Fe	668	292,686	50,059	357,173	72,068	62,875	3,946	114,359	.....	8,092	261,341	95,832	8,598	87,234	50,486
Pennsylvania *Company*	1,757	2,837,069	734,029	4,057,245	752,756	839,138	86,445	1,586,886	37,325	108,217	3,410,768	646,477	261,356	385,074	—320,371
Pennsylvania *Railroad*	4,519	10,261,335	3,107,073	14,825,283	1,947,618	3,020,514	202,398	5,796,895	217,223	403,115	11,587,763	3,237,520	731,333	2,505,042	—237,589
Pere Marquette	2,319	1,089,460	286,269	1,484,421	128,375	300,788	30,642	594,069	3,608	35,708	1,093,116	391,306	52,891	338,414	282,049
Philadelphia, Baltimore & Washington	717	733,055	727,129	1,641,491	246,139	303,254	26,472	703,770	10	42,534	1,322,181	319,310	57,663	261,601	6,737
Pittsburgh & Lake Erie	224	832,767	126,561	1,004,112	169,711	276,702	15,040	319,147	2,955	27,512	811,067	193,045	52,250	140,795	—353,433
Pittsburgh, Cincinnati, Chic. & St. Louis	1,472	1,883,088	585,005	2,874,234	411,710	651,574	72,432	1,171,536	24,488	75,604	2,407,344	466,891	171,704	294,993	—71,789
Richmond, Fredericksburg & Potomac	88	115,455	74,027	218,747	21,746	30,400	2,933	86,869	4,978	7,123	154,047	64,700	6,476	58,131	—16,958
Rutland	468	174,384	79,657	289,725	34,677	44,994	7,101	113,257	1,187	5,402	206,619	83,105	17,088	66,018	—28,661
St. Louis & San Francisco	4,746	2,409,845	810,855	3,448,432	501,151	558,471	61,975	1,163,362	.....	84,729	2,369,687	1,078,745	83,706	993,751	—40,527
St. Louis, Brownsville & Mexico	548	101,084	52,620	170,211	32,988	21,433	5,190	61,561	10,521	—319	131,384	38,827	6,750	32,077	—660
St. Louis, Iron Mountain & Southern	3,365	1,930,527	432,074	2,555,914	373,710	428,149	56,944	834,925	7,286	59,019	1,760,033	795,881	113,032	681,519	—406,557
St. Louis Merchants' Bridge Terminal	9	.....	135	146,470	21,37	7,898	802	76,377	.....	7,632	114,680	31,789	8,330	23,454	2,944
St. Louis, San Francisco & Texas	235	85,011	26,064	116,723	17,053	17,255	1,840	42,533	.....	4,241	82,922	33,802	1,439	32,356	—6,285
San Antonio & Aransas Pass	724	226,893	77,409	326,110	73,376	65,912	6,826	165,514	.....	11,502	323,130	2,980	12,002	—9,083	—152,764
San Pedro, Los Angeles & Salt Lake	1,132	476,659	164,567	704,706	74,100	118,261	31,081	243,811	11,575	16,873	495,701	209,005	41,989	167,002	—55,866
Seaboard	3,101	1,211,477	327,707	1,713,798	224,554	250,085	71,686	628,446	7,201	55,712	1,237,685	476,112	91,000	384,793	—210,848
Southern	7,036	3,371,440	1,216,577	5,046,463	683,026	770,071	186,207	1,844,977	27,231	161,799	3,652,946	1,393,517	218,110	1,173,164	—623,968
Tennessee Central	294	73,715	27,972	109,595	31,168	15,365	5,461	46,304	.....	6,687	104,984	4,610	4,480	86	—16,653
Terminal R. R. Ass'n of St. Louis	35	.....	168	223,727	22,691	12,710	950	77,636	.....	6,224	120,211	103,516	31,517	71,998	20,954
Texas & Pacific	1,887	1,320,772	350,844	1,784,923	165,291	250,265	36,997	717,829	12,271	39,335	1,220,539	564,384	68,700	495,548	—88,950
Toledo & Ohio Central	446	381,862	48,078	454,678	67,805	86,584	6,912	175,084	1,719	9,843	347,947	106,730	28,299	80,342	53,077
Toledo, Peoria & Western	248	53,494	35,228	94,178	15,472	31,607	2,567	44,775	.....	3,652	98,073	- 3,894	6,100	—9,994	—4,138
Union Pacific	3,615	3,276,820	788,714	4,545,925	507,982	608,712	90,375	1,149,137	74,321	121,088	2,550,386	1,995,538	185,119	1,809,955	—98,786
Union R. R. of Baltimore	9	103,255	23,580	128,767	14,822	.....	.....	4,540	.....	2,697	22,059	106,707	6,230	100,477	—21,347
Union R. R. of Pennsylvania	31	.....	.....	213,054	31,251	95,969	100	113,115	.....	2,581	243,016	—29,962	829	—30,791	—83,972
Vandalia	910	598,877	186,847	893,736	130,778	175,375	27,809	369,707	9,547	21,288	734,503	159,233	29,826	129,407	—69,583
Vicksburg, Shreveport & Pacific	171	61,713	37,300	113,086	22,622	24,053	3,386	46,364	2,297	5,032	103,754	9,332	6,000	3,332	—33,316
Virginian	503	376,477	29,184	436,479	58,541	83,525	4,762	108,021	10,139	10,798	275,146	161,332	22,500	138,609	—128,222
Washington Southern	36	32,212	36,156	93,682	10,837	14,214	1,193	40,109	2,123	2,940	71,418	22,264	3,236	19,028	—6,616
West Jersey & Seashore	356	143,635	207,031	393,697	91,789	70,895	10,316	216,544	2,450	13,290	405,285	—11,587	29,543	—41,152	12,056
Western Maryland	661	532,393	69,598	634,111	99,479	107,992	20,954	243,793	1,378	19,113	492,548	141,563	25,500	116,063	97,807
Western Ry. of Alabama	133	53,705	33,455	96,557	18,947	24,252	6,097	30,623	1,597	4,154	85,669	10,888	5,816	5,034	—29,797
Wheeling & Lake Erie	459	318,363	38,039	396,317	38,784	47,634	9,251	160,511	995	14,252	271,427	124,890	30,948	93,942	—117,432
Yazoo & Mississippi Valley	1,382	879,032	191,838	1,124,273	152,310	134,359	16,350	397,322	2,050	24,010	725,677	398,596	50,000	348,485	—166,647

Traffic News

The "Far Western Travelers' Association" will have its annual banquet at the Hotel Astor, New York City, February 9.

The White Audit System of checking passenger train collections was adopted on January 1, by the Pere Marquette, the Atlanta & West Point, the Georgia, the Toledo, St. Louis & Western and the Virginian.

Representatives of the passenger departments of the principal railroads operating in Indiana have held a number of meetings with business men's organizations in the larger cities of the state, asking their support for the plan to have the legal passenger fare advanced from 2 to 2½ cents per mile.

The principal railways of Virginia have joined in an application to the State Corporation Commission for authority to make a general advance of 5 per cent in freight rates throughout that state. The commission is giving public hearings on the question this week. The application does not cover coal and coke, nor iron ore and limestone used in making pig iron.

Shipments of anthracite coal are reported for the calendar year 1914 as amounting to 68,302,961 tons, which is 766,667 tons less than in 1913. The total output, including an estimated 3 per cent sold to local trade and to employees, was over seventy millions, and in addition to this an estimated quantity of eight millions was used in operating the mines.

A meeting of the Fiber Container Conference Committee, consisting of the chairmen of the Official, Southern and Western Classification Committees and the Uniform Classification Committee, will be held in Chicago on January 14, to consider subjects relating to fiberboard containers and the rules regulating them in the various classifications which have been presented since the last meeting of the committee.

The people of Pittsburgh now receive nearly or quite all of their milk in the latest designs of refrigerator cars, and the Department of Agriculture has issued a circular telling how the agents of the department have been chiefly instrumental in bringing about this improvement; much of the milk having formerly been brought in ordinary baggage cars where its quality was much impaired by the heat. The inspectors of the government had found that some of the milk contained 22,800,000 microbes (or other animals) per cubic centimeter.

According to the Des Moines Register and Leader, the Iowa Railroad Commission has reached an understanding with the state executive council, authorizing the commission to draw on the council until the legislature meets in January for expenses to be used in opposing before the Interstate Commerce Commission the proposed advances in freight rates on the Western Trunk Line roads. It is said that no limit is placed on the amount to be thus expended, but that the agreement takes the place of an appropriation of $5,000 which the commission had asked for, and that it is understood that the expenses are to be held as close to $5,000 as possible.

On January 4, a daily through package car service was established from Chicago to Havana, Cuba, by the Illinois Central, Nashville, Chattanooga & St. Louis, Central of Georgia, Atlantic Coast Line and Florida East Coast railways, in connection with the Florida East Coast car ferry service from Key West to Havana, on the new steamer Henry M. Flagler. For the first time freight can be carried from this country to Cuba without transfer of any kind. Trains leave Chicago at 10:30 p. m. daily, except Sunday, arriving at Atlanta at 12:05 p. m. the third day, Jacksonville at 12:30 p. m. the fifth day, Key West at 6:30 p. m. the sixth day, and Havana at 6 a. m. the seventh day. The through rates from Chicago and other northern and western points are based on the combination on Key West. A new tariff covering the rates from Key West to Havana has been published by the Gulf Foreign Freight Committee, effective January 1, and the rates include marine insurance from Key West to Havana. On shipments to Cuban points other than Havana arrangements can be made for the Cuban railway representatives to handle the entry papers and trans-ship at that point to through cars for the principal destinations beyond.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Examiner Eddy held a hearing at Chicago on January 4, on the adjustment of lake-and-rail rates to Chicago, Duluth and Minneapolis and St. Paul.

The commission has suspended from January 1 to April 30 tariffs of the Alabama & Vicksburg, the Chicago & Eastern Illinois, the Louisville & Nashville and other carriers containing increased rates on coal from mines in Alabama, Illinois, Kentucky and Tennessee to Memphis, Tenn., and other points.

Transit Privileges on Grain Products at Pittsburgh

Grain & Hay Exchange of Pittsburgh v. Pennsylvania Company et al. Opinion by the commission:

The commission finds that the refusal of defendants to provide certain transit arrangements on grain and grain products at Pittsburgh is not unreasonable or discriminatory. It is also found that the proposed withdrawal of certain features of respondents' present transit arrangements on grain and grain products at Pittsburgh is justified. (32 I. C. C., 409.)

Switching Charges at Baltimore

Opinion by Commissioner McChord:

In May, 1912, the Public Service Commission of Maryland entered an order by which the switching limits of Baltimore were extended and maximum rates prescribed upon a per car basis for interchange, yard, industrial and general switching on the lines of carriers in that city, these charges being as follows: $1 per car for "yard" switching and $5 per car for "industrial" switching. The commission's order prescribed these rates as maximum rates, but did not include the proviso that existing rates should not be increased. The various carriers at Baltimore have now issued tariffs establishing these rates and the commission finds that it is reasonable that they be applied on interstate business. (32 I. C. C., 376.)

Mississippi River Case

In its original decision in this case, given in 28 I. C. C., 82, and abstracted in the *Railway Age Gazette* of August 8, 1913, page 247, the commission held that the class rates between New York and the upper Mississippi river crossings, including Keokuk, Fort Madison, Burlington, Muscatine, Davenport, Clinton and Dubuque, in Iowa, ought to be no higher than between New York and the lower Mississippi river crossings. It refrained from fixing such equality of rates, however, because of the material reductions in the carriers' revenues which would thus be caused. It now appears that the findings in Revenues of Rail carriers in Official Classification Territory, and Rate Increases in Official Classification Territory, cannot reasonably be carried out without some change in the former order, or else some serious disturbance in the relationship between commercial cities. It is therefore ordered that the carriers file on not less than 10 days' notice rates applying on traffic between New York and the upper crossings, which shall not exceed the class rates contemporaneously maintained between New York and St. Louis. In other respects the order of June 17, 1913, shall remain in full effect.

Hearings on Western Rate Advances

The Interstate Commerce Commission has announced that hearings will be held in Chicago beginning on February 15, on the proposed increases in freight rates west of Chicago that have been filed by the roads in Western Trunk Line and Southwestern Tariff Committee territories. The hearings will be conducted by Commissioner Daniels. February 15, 16, 17 and 18 are to be devoted to the presentation of evidence by the railways supporting in general their claims for increased rates, but not including evidence in support of increases of particular rates. Beginning Monday, March 15, opportunity will be given for the

presentation of evidence in rebuttal of such general testimony. In addition, dates have been set for hearings on the rates on particular commodities involved, as follows: February 19 to 24, grain and grain products; February 25 to 27, livestock, fresh meat, packing house products and fertilizer; March 1 and 2, hay, straw and broom corn; March 3 to 5, cotton piece goods; March 6 to 9, coal and coke; March 10, salt; March 11 and 12, fruit and vegetables; March 13, rice and rice products.

Shipments on Packing-House Products in Peddler Cars

In re rules governing shipments of packing-house products and other freight shipped in peddler cars. Opinion by Commissioner Clements:

The commission finds that the carriers have not justified a proposed increase from 10,000 lb. to 12,000 lb., in the minimum weight applying on packing-house products and other commodities shipped in peddler cars between western trunk line territory. The commission states in its decision: "It appears that the service rendered in connection with peddler cars is generally not greater, and in some instances less, than the service rendered in connection with less-than-carload traffic handled through the freight houses; that for the peddler-car service the user pays the regular less-than-carload rates, guarantees the carrier a minimum per car earning, saves the carrier the expense of refrigeration, reduces loss and damage claims, and gives to the carrier a volume of traffic which could not be satisfactorily transported in its own equipment." The record also does not carry out the carriers' contention that the service is conducted at a loss. (32 I. C. C., 428.)

Stoppage in Transit to Finish Loading of Livestock Shipment

Hoyt & Bergen v. Chicago & North Western. Opinion by Commissioner Meyer:

The commission having made an investigation of the practice throughout western classification territory of stopping livestock shipments in transit to finish loading finds that the Chicago & North Western and other carriers are justified in refusing to provide for such stoppage. It is found that not more than three or four per cent of all shippers of livestock over defendants' lines availed themselves of the privilege when it was in effect, and it is held that the need for expeditious service distinguished the transportation of livestock from that of other commodities for which a stoppage service is provided. It is also found that the carriers' rule which makes applicable on mixed carloads of livestock, the rate prescribed for the highest graded class of stock in the car, subject to the highest minimum weight for any class of stock in the car is reasonable. (32 I. C. C., 319.)

The Tailboard Cases

Philadelphia Team Owners' Protective Association et al. v. Philadelphia & Reading et al. Opinion by Commissioner Harlan:

These proceedings represent an effort on the part of team owners in Philadelphia, New York and Cincinnati to bring about a change in the rules governing the receipt and delivery of less-than-carload freight. It is alleged that the carriers do not perform their full duty as common carriers in that they do not make a proper and complete delivery of freight at their terminals, and that they discriminate between persons and places. The relief prayed for is an order directing defendants to establish a rule providing for a so-called tailboard delivery and a tailboard receipt. By tailboard delivery is meant that the defendants shall make the goods really accessible, either by permitting the complainants to back their trucks to the place at the station where the goods have been placed or, if the arrangement of the platform or pier renders that impracticable, that the defendants, by their own employees, shall truck the goods to the tailboards of the wagons. By tailboard receipt is meant that the defendants shall promptly receive outgoing merchandise at the tailboards of the wagons, without requiring the complainants to remove the goods previously unloaded at that point by other shippers and that the complainants shall not be required to unload their shipments at more than one location upon the station platform.

The legal duties of common carriers in connection with the delivery of package freight have been clearly stated in numerous decisions of the courts. It appears that when the goods have been so placed in the warehouse at the point of destination as to be reasonably accessible to the consignee, open to his inspection, and permitting of their safe and convenient removal by the consignee or his agent, common-carrier liability ceases and the responsibility thereafter is that of a warehouseman only. Goods are not regarded as being ready for delivery if they are so placed as not to be obtainable by the person to whom delivery is to be made or if they are so mingled with or covered by other goods that the consignee cannot inspect or remove them without himself undertaking their selection and separation from the heap.

It is by no means conclusive that the carriers have willfully refused or neglected to effect the full delivery contemplated by law. On the contrary, the evidence shows that they are ready at all times to render any assistance that may be necessary to locate, uncover, and place in an accessible position any package that is called for, and will even assist in loading it if it is too bulky or heavy to be loaded by the consignee. The law requires no more than this, and to require of the carriers an additional movement of the freight from the floor of the warehouse to the trucks of the consignee or drayman would be unwarranted and arbitrary.

It is true that at Cleveland, Buffalo and a few other places a modified system of tailboard delivery is in effect, having grown up largely through competitive influences or peculiar local conditions. But even where this system is provided the teamsters are not excluded from the platforms, nor do the majority of them take advantage of it.

The teamsters in one city are not in competition with those of another, and it does not follow that because a form of tailboard delivery is maintained at a few places under peculiar and special conditions an order would be justified imposing this duty upon the carriers at all places.

In order to expedite the handling of the freight, as well as to conserve the floor space, the carriers have adopted the practice of segregating the shipments intended for the consignees or teamsters who receive daily a considerable volume of freight and who undertake to remove it early each morning. There is no discrimination in this practice, for any consignee or teamster who is able and willing to observe the requirements as to volume of traffic and prompt removal of goods may have his freight so segregated if he desires. This is held to be a reasonable practice, resulting not only to the advantage of the defendants through efficiency of station operation, but also to the general public and the teamsters who, under the prevailing system, are obliged to go upon the station platforms to obtain their goods.

The complaints respecting the defendants' methods of receiving outbound package freight refer particularly to the so-called "peddling system," in operation at a few of the stations. It appears that outbound freight is despatched on trains operating on regular schedules and departing soon after the published closing time of the station; the plan of partial segregation complained of has been found necessary in order that such freight may be forwarded the same day that it is received. The necessity for some such arrangement is obvious, for the record indicates that during the last hour and a half of the day more than 50 per cent of the outbound freight is received at the stations, the greatest rush being from 4 to 4.30 in the afternoon. If freight for all destinations were dumped indiscriminately at every receiving doorway, it would be manifestly impossible for the carriers at some of their stations to separate and load it into the proper cars between the time it is received and the time the trains depart.

The commission, therefore, finds that the methods which have been adopted by the defendants for the receipt and delivery of package freight are reasonable and non-discriminatory, and have been formulated through the experience gained in the operation of each individual station. It would appear that the teamsters and shippers are themselves responsible for much of the delay, in that the hauling to and from the stations is not more uniformly done throughout the day. The practice of hauling inbound freight in the early morning hours and outbound freight during the late afternoon results in congestion that would be greatly relieved if the hauling were distributed more evenly.

"In view of these conclusions the jurisdiction of the com-

mission and the power of the complainants to invoke that jurisdiction need not be discussed at length. It is sufficient to call attention to the fact that the complainants, acting in the capacity of draymen, have no interest in the goods transported nor in the payment of the transportation charges."

STATE COMMISSIONS

The Ohio Public Utilities Commission has issued a decision holding that the Lorain & Southern Railroad, which is owned by the Ohio Quarries Company, is a common carrier, and is entitled to divisions of through freight rates.

Representatives of eight western state commissions, including accountants, have been holding meetings at Des Moines, Iowa, preparing statistics to be used in opposing the proposed advances in freight rates on the western roads at the hearings before the Interstate Commerce Commission to be held in February.

COURT NEWS

The Supreme Court of the United States has dismissed an appeal of the Louisville & Nashville from a decision of the United States District Court, sustaining the Kentucky Railroad Commission's order reducing rates on grain and other supplies for Kentucky distilleries.

The Supreme Court has declared void the city ordinance of Covington, Ky., providing that street cars crossing the Ohio river to Cincinnati shall carry only a certain number of passengers (above their seating capacity). The court held that the ordinance was a burden on interstate commerce.

The Supreme Court of the United States this week set aside a judgment of the Court of Appeals, which had awarded to Sarah E. Holbrook and five children $25,000 for the alleged negligent killing of their husband and father, a bridge carpenter on the Norfolk & Western. The trial court had instructed the jury that little children were entitled to greater damages than adult dependents.

The question of the employment of alien labor in the construction of subways in New York City was the subject of a recent decision by the Appellate Division of the New York Supreme Court, in which it reversed the decision of the lower court and declared the right of contractors to employ laborers whether citizens or not. The court held without a dissenting vote that the State had no more right to impose the test of citizenship on the men employed in such operations than it would have if the entire enterprise was that of private citizens or corporations. In a long decision by Justice Scott and concurred in by all the members, the court says: "The subway is a business enterprise of the city through which money may be made or lost, the same as if it were owned by an ordinary railroad corporation. It is built and belongs to the city as a proprietor and not as a sovereign."

Immunity Only for Unwilling Witnesses

Judge William I. Grubb, in the United States court at New York, January 4, overruled the immunity pleas of John L. Billard, James S. Elton and William Skinner, directors of the New York, New Haven & Hartford, who are under indictment, accused of having conspired to control the transportation facilities of New England. They contended they were immune to indictment and prosecution because they had testified before the Interstate Commerce Commission concerning the matter in which the indictments were found. Judge Grubb says:

"My conclusion is that the immunity act was intended only to make available testimony compulsorily given and only to reward the unwilling giver of such evidence; that testimony given without the assertion of the constitutional privilege, or declined to be given upon any other ground than that of its incriminating tendency, is not compulsory testimony under the fifth amendment, and has always been available without new remedial legislation; and so, there being no necessity for conferring immunity on the giver of it, Congress will not be construed to have done so, where its language may be reasonably otherwise construed. . . ."

Railway Officers

Executive, Financial, Legal and Accounting

A. P. Cassile has been appointed auditor of the Pascagoula-Moss Point Northern with office at Moss Point, Miss.

A. W. Newton, chairman of the Valuation Committee of the Chicago, Burlington & Quincy at Chicago, has been appointed assistant to president with headquarters at Chicago.

Abraham Tracy Hardin, who has been appointed vice-president of the New York Central Railroad in charge of the operating department, embracing transportation, construction, roadway and equipment, with headquarters at New York, as has already been announced in these columns, was born in 1868, in South Carolina, and graduated from the University of South Carolina with the degree of civil engineer in 1894. Previous to graduation, he had been a telegraph operator in 1882, on the Richmond & Danville, and from 1882 to 1890 he was agent and stenographer on the same road. He attended college from 1890 to 1894, and then for four years was in the maintenance of way department of the Southern Railway. From 1898 to September, 1899, he was supervisor and division engineer of the Eastern division of the New York Central & Hudson River. He was then promoted to engineer of track, and from February, 1903, to July, 1905, he was engineer of maintenance of way, and then for about one year was assistant to the general manager of the same road. From June, 1906, to April, 1912, he was assistant general manager; he was then apponted assistant vice-president, and in April, 1913, became vice-president of the same road, which position he held until his appointment on January 1 as vice-president of the New York Central Railroad, which is the name of the new company which has taken over the New York Central & Hudson River and the Lake Shore & Michigan Southern.

P. E. Crowley, general manager of the New York Central & Hudson River, at New York, has been appointed assistant vice-president of the operating department in charge of transportation and equipment maintenance, of the New York Central Railroad, with headquarters at New York. He was born in August, 1864, at Cattaraugus, N. Y., and began railway work with the Erie as messenger boy in 1878. The following year he was promoted to telegraph operator, and was later station agent and then train despatcher on the same road. In 1890 he entered the service of the New York Central & Hudson River as train despatcher on the Rome, Watertown & Ogdensburg division, and was promoted to chief train despatcher in 1891. The same year he was made trainmaster, and in September, 1900, was appointed chief trainmaster of the Pennsylvania division. He was promoted to superintendent of the Pennsylvania division in August, 1901, and was made assistant general superintendent in December, 1904. Mr. Crowley was appointed general superintendent of the same company in June, 1905, and was promoted to assistant general manager in March, 1907, remaining in that position until April, 1912. He was then general manager of the same road until January 1, when he was appointed assistant vice-president of the New York Central Railroad which has taken over the New York Central & Hudson River and the Lake Shore & Michigan Southern.

P. E. Crowley

Grant Hall, general manager of the western lines of the Canadian Pacific at Winnipeg, Man., has been appointed vice-president and general manager, with headquarters at Winnipeg, of lines west of Port Arthur, and C. E. Stockdill has been appointed assistant to the vice-president and general manager with office at Winnipeg, in place of J. Manson, who has been appointed assistant to vice-president, with office at Montreal, Que.

It has now been announced that on October 23, 1914, Luis Cabrera was elected president of the National Railways of Mexico, succeeding E. N. Brown. Alberto J. Pani was elected vice-president and Charles R. Hudson was elected vice-president in charge of operation, all with headquarters at Mexico City, Mex. D. P. Bennett, vice-president, with office at New York, resigned on December 31.

Troy Pace, assistant attorney of the Missouri Pacific system, has been appointed general attorney for the Northern district of Arkansas, with headquarters at Little Rock, his territory consisting of all counties north of the Arkansas river, except the territory in the jurisdiction of General Attorney Thomas B. Fryor. E. B. Kinsworthy, with headquarters at Little Rock, remains general attorney for Pulaski county and all counties of the Arkansas river, and has jurisdiction over all matters in the state before the Arkansas Railroad Commission. Effective January 1.

As announced in our issue of December 25, Francis T. A. Junkin, general attorney of the Atchison, Topeka & Santa Fe system, has resigned, effective December 31, in order to be able to devote more time to his personal affairs and to study and travel. He will engage in private practice in Chicago and New York, giving special attention to matters involving the united corporate action of railroads where the interests of all are identical. His close personal relationship with the management of the Santa Fe system will continue and he will remain a director of Santa Fe subsidiary corporations. Mr. Junkin was born in Virginia on February 3, 1864. He was graduated from Kenyon College in 1884, from the Law School of Columbia University, New York, in 1887, and had conferred upon him the degree of LL.D. in 1913 by Kenyon College and also by Washington and Lee University. He was admitted to the New York bar in 1887, practiced law in Wall street from 1887 to 1898, and since that time has been with the Santa Fe as general attorney of the entire system. Mr. Junkin, during his whole professional life, has made a specialty of railroad and general corporation law. He is the author of many pamphlets on political subjects and the author of many addresses which he has given on various occasions.

F. T. A. Junkin

Operating

W. J. Warnick is appointed trainmaster of the Toronto, Hamilton & Buffalo with office at Hamilton, Ont.

J. F. Withrow, trainmaster of the Toledo Terminal Railroad, of Toledo, Ohio, has been appointed superintendent, and the former position is abolished.

A. M. Whiteford has been appointed trainmaster of the Lehigh and Susquehanna division of the Central of New Jersey with office at Mauch Chunk, Pa.

J. H. Patterson, acting assistant trainmaster, has been appointed assistant trainmaster of the Toledo division of the Pennsylvania lines west of Pittsburgh, with office at Toledo, Ohio.

B. B. Greer, assistant to general manager of the Chicago, Burlington & Quincy for the lines east of the Missouri river, at Chicago, has been appointed assistant general manager of the same lines with headquarters at Chicago.

W. H. Fogg, superintendent of the Northern division of the Chicago, Indianapolis & Louisville, with headquarters at La-Fayette, Ind., has had his jurisdiction extended over the Southern division, succeeding J. M. Baths, resigned.

W. J. Fripp, assistant general manager of the New York Central & Hudson River at Albany, N. Y., has been appointed general manager (east of Buffalo) of the New York Central Railroad, which is the name of the new company which has taken over the New York Central & Hudson River, the Lake Shore & Michigan Southern, and the Chicago, Indiana & Southern. Mr. Fripp will have his quarters at Albany; D. C. Moon, general manager of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed general manager of the new company in charge of the lines from Buffalo to Chicago, with headquarters at Cleveland; and the following general superintendents have been appointed: T. W. Evans, in charge of the lines between Buffalo and Syracuse, and from Montreal, Que., to Clearfield, Pa., with office at Syracuse, N. Y.; E. J. Wright, in charge of the lines between Syracuse and the electric zone in New York, including the line into the Adirondacks and the Harlem division, with office at Albany, N. Y.; Miles Bronson, in charge of the electrical division, with headquarters at New York; Albert S. Ingalls, in charge of the lines between Buffalo and Toledo, Ohio, with headquarters at Cleveland, and Frank H. Wilson, in charge of the lines between Toledo and Chicago, with headquarters at Chicago. (See an item in General News.)

W. J. Fripp, assistant general manager of the New York Central & Hudson River, at Albany, N. Y., has been appointed general manager of the lines from New York to Buffalo, inclusive, of the New York Central Railroad, with headquarters at Albany, and the position of assistant general manager has been abolished. He was born on August 25, 1863, at Albany, N. Y., and graduated from the high school of his native town in 1880. In July of the same year he entered the service of the New York Central & Hudson River at West Albany as a yard clerk, and eight years later was transferred as clerk to the office of C. M. Bassett, superintendent of the Mohawk division. In 1892 he was promoted to general despatcher in the freight yard at West Albany, and the following year was made freight trainmaster, becoming passenger trainmaster in 1898 on the Mohawk division, and in 1902 he was made assistant division superintendent. In 1906 he was division superintendent of the West Shore Railroad at Weehawken, N. J., and was subsequently assistant general superintendent and then general superintendent of the Boston & Albany at Boston, Mass. He returned to Albany in 1910 as general superintendent of the Eastern district of the New York Central & Hudson River, and in April, 1912, he was appointed assistant general manager at Albany of the same road, which position he held at the time of his recent appointment as general manager of lines from New York to Buffalo of the New York Central Railroad which has taken over the New York Central & Hudson River and the Lake Shore & Michigan Southern.

W. J. Fripp

J. E. Maun has been appointed acting assistant superintendent of the Montpelier, Barre and Williamstown lines, including Montpelier Junction, of the Central Vermont, in charge of passenger transportation, with headquarters at Montpelier, Vt.

J. M. Baths, division superintendent of the Chicago, Indianapolis & Louisville at LaFayette, Ind., has been appointed assistant division superintendent of the Chicago Great Western, with headquarters at Red Wing, Minn., in place of W. B. Harrison, resigned.

B. C. Cooper, trainmaster of the Vandalia at Logansport, Ind., has been appointed acting superintendent of the Michigan division, with headquarters at Logansport, in place of F. L. Campbell, superintendent, who has been granted a leave of absence on account of ill health.

D. C. Coleman, general superintendent of the Alberta division of the Canadian Pacific at Calgary, Alta., has been appointed assistant general manager of the western lines in charge of maintenance and operation, with headquarters at Winnipeg, Man. (See Executive, Financial, Legal and Accounting.)

Receiver E. B. Pryor of the Wabash announces that the resignation of Henry Miller as general manager for the receiver has been tendered and accepted. All business heretofore handled by the general manager will until further notice be handled by S. E. Cotter, general superintendent, St. Louis, Mo.

J. McCraw, superintendent of the Southern division of the Central Vermont at New London, Conn., having been assigned to other duties, E. J. Guthrie has been appointed superintendent of the Southern division, succeeding Mr. McCraw. Mr. Guthrie has been appointed also superintendent of the Central Vermont Transportation Company in charge of steamers operating between New London and New York, with office at New London.

Traffic

D. M. Rea has been appointed commercial agent of the Louisiana & Arkansas at New Orleans, La.

Peter Birrel, commercial agent of the Pere Marquette at Pittsburgh, Pa., has been transferred to Detroit, Mich., in a similar capacity.

M. J. Powers has been appointed general passenger agent of the Delaware & Hudson, with office at Albany, N. Y., vice A. A. Heard, resigned.

R. P. Buckingham, Jr., traveling passenger agent of the Missouri, Kansas & Texas, with headquarters at Houston, Tex., has been appointed commercial agent at Waco, Tex.

C. L. Thomas, freight traffic manager of the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, has been appointed also general traffic assistant of the Baltimore & Ohio.

F. A. Bell, general agent of the freight department of the Atchison, Topeka & Santa Fe Coast Lines at San Francisco, Cal., has been appointed assistant general freight agent, with headquarters at San Francisco, and the former office is abolished.

Engineering and Rolling Stock

N. M. Barker has been appointed master mechanic of the Copper Range, with office at Houghton, Mich., in place of J. A. Berg, assigned to other duties.

Norman Bell has been appointed master mechanic of the Minnesota and Iowa divisions of the Illinois Central, with headquarters at Waterloo, Iowa, succeeding Frank W. Taylor, resigned to go to another company.

E. E. Griest, assistant master mechanic of the Pennsylvania Lines at Fort Wayne, Ind., has been appointed master mechanic at that place, succeeding B. Fitzpatrick, deceased. F. T. Huston, assistant master mechanic at Pittsburgh, Pa., succeeds Mr. Griest.

OBITUARY

Thomas L. Chapman, formerly superintendent of motive power of the Chesapeake & Ohio, died on December 30, at the home of his son in Caldwell, N. J., at the age of 71.

Charles A. Thompson, formerly superintendent of motive power and equipment of the Central of New Jersey, died on January 4 at Jamaica, N. Y., at the age of 81.

William S. Napier, Sr., general baggage agent of the Sunset-Central Lines, died at his home in Houston, Tex., on December 24, aged 65 years. Mr. Napier had been connected with the Houston & Texas Central, one of the roads comprising the Sunset-Central Lines, since 1880, and had been general baggage agent of those lines for 24 years.

N. Parker Shortridge, who had been a director of the Pennsylvania Railroad since March, 1874, and a director of other Pennsylvania lines, died on January 3, at his home in Wynnewood, Pa., at the age of 85. Mr. Shortridge was born in Portsmouth, N. H., and was educated at Dover Academy. He was for many years in the wholesale drygoods trade in Philadelphia, but retired from active participation in the business of his firm in 1877. He was an important figure in other business and financial enterprises in Philadelphia; but during the whole of his term as a director of the railroad he had given to the road the greater portion of his time. He was active in the organization and promotion of the United States Centennial Exposition of 1876.

Lucian J. Irwin, president and general manager of the Louisville, Henderson & St. Louis, died at Louisville, Ky., on December 31, as a result of an operation for appendicitis. Mr. Irwin was born at Abbeville, Miss., on May 5, 1867, and had been in railway service since 1883. He held various clerical positions with the St. Louis, Arkansas & Texas, the Illinois Central and the Louisville & Nashville, until May, 1891, when he became agent for the Cumberland Gap Despatch at Louisville, Ky. He remained with that line until December, 1889, successively as traveling freight agent, western agent at Kansas City, Mo., and agent at Chicago. On the latter date he was appointed general freight and passenger agent of the Louisville, Henderson & St. Louis; in April, 1908, he was promoted to general superintendent, and the following September he was elected president and general manager.

A Swiss Solution of the Grade Crossing Problem.—The Zurich Sea Left Bank Railway, the grade crossings of which are soon to be eliminated, is crossed by the surface or grade crossings of 14 streets and 3 tram lines. Since surface crossings by tram lines are forbidden, the passengers are now compelled to step out of the tram cars at the railway crossings, walk across the tracks, and board tram cars waiting on the opposite side.

English Railwaymen Killed in the War.—Replying to applicants for accidental death benefit from branches, on behalf of members killed in the war, the executive of the National Union of Railwaymen announced, on December 17, that they had decided the union funds could not be charged with liability. Their reasons were: (1) The scale of contributions and benefits was not arranged to meet the liability of soldiers and sailors in war; (2) as war was an act of the nation for the nation's benefit, the consequence of war should be met by the government from state funds. The executive also assured members that they would press the government to make adequate provision to meet these cases.

New Railway in Brazil.—A railway has recently been opened between Itapuru, on the Rio Parana, and Porta Esperanza, near Corumba, which is the most important city of the state of Matto Grosso. Communication between Porto Esperanza and Corumba, both of which towns are on the Rio Paraguay, is effected by means of ferryboats. The new line is of considerable importance, since it puts the southern part of the state of Matto Grosso in direct railway communication with the state of Sao Paulo. The journey between Rio de Janeiro and Corumba by rail will occupy some six days, whereas previously the only means of communication between the two cities was by water, a voyage of from six to eight weeks.

Armored Trains in Warfare.—Something was said in a recent issue concerning the use of armored trains in the present European campaigns. One of the first and possibly the first armored train was that used during the Egyptian campaign of 1882. The train was put in service during the reconnaissance in force against Arabi Pasha's troops on August 5 of that year, and was employed on the Aboukir-Lake line. The train was in charge of Lord Charles Beresford, then commander, R. N., who shared in the conception of the idea if he did not originate it. The car employed was a truck protected by boiler plates, and armed with a 6-in. Armstrong rifled gun and a couple of Gatlings. This armored vehicle preceded the locomotive, the reverse of present practice, but it is not stated whether the locomotive was protected as well.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ILLINOIS CENTRAL has ordered 25 Mikado type locomotives from the Lima Locomotive Corporation.

THE DETROIT UNITED RAILWAYS have ordered 1 50-ton electric locomotive from the Westinghouse Electric & Manufacturing Company.

CAR BUILDING

SWIFT & Co. will build 300 beef cars in its own shops.

THE CHICAGO & MILWAUKEE ELECTRIC is in the market for 300 40-ton all-steel passenger cars.

MORRIS & Co. have ordered 250 34-ft. refrigerator cars from the Haskell & Barker Car Company.

THE PRUDENTIAL OIL COMPANY, New York, is in the market for 200 tank cars.

THE PENNSYLVANIA RAILROAD is said to be contemplating the purchase of a large number of freight cars.

THE BALTIMORE & OHIO has ordered 1,000 hopper cars from the Cambria Steel Company, and 1,000 box cars from the Mount Vernon Car Manufacturing Company.

IRON AND STEEL

THE LOUISVILLE & NASHVILLE has ordered 38,000 tons of steel rails from the Tennessee Coal & Iron Company.

THE ATCHISON, TOPEKA & SANTA FE ordered 500 tons of steel for its freight house at Los Angeles, Cal., from the McClintic-Marshall Company.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 20,000 tons of steel rails, the order being divided among the Pennsylvania Steel Company, the Lackawanna Steel Company and the Bethlehem Steel Company.

PENNSYLVANIA RAILROAD.—Official announcement was made on January 5 by the Pennsylvania Railroad that the steel rail requirements for the Lines East and West of Pittsburgh for the current year will amount to 170,000 tons, and that bids are now being requested and orders placed for early delivery for 150,000 tons of 100-pound section, in accordance with revised specifications of 1915, the balance of 20,000 tons to be ordered later. The total quantity of steel rails ordered by the company last year was 132,432 tons.

RAILWAY CONSTRUCTION IN NORWAY.—The Norwegian Storthing passed in the year 1908 a complete plan for railway construction for the ensuing 12 years, till 1920. It was intended that a new plan for continuing the development should be ready in good time. As the original plan has been abandoned in some respects, as for instance, in the building of the Rauma Railway and the Thelemark Railway, the drawing up of a new plan has now become a necessity. The preparatory work in this connection is progressing, and the railway authorities expect that they can get the new program ready to be laid before the legislature in the year 1918.

BRITISH RAILWAYS AND WAR RISKS.—Arrangements have been completed for insuring in the London market the railway property of Great Britain against all risks of war, including bombardment and damage by aircraft, but it is understood that these have now been cancelled and that other plans have been made for meeting the contingencies. The London Times reports that the insurance, which had been placed subject to confirmation, provided that the insurance companies should pay the cost of any damage in excess of $2,500,000 up to $5,000,000. Should, therefore, damage have been done to the extent of $7,500,000 the railways would have borne $2,500,000 and the insurance companies $5,000,000. The premium agreed upon was $62,500.

Supply Trade News

Harry C. Quest, for a number of years in the railway supply business, has been made general manager of the railway department of the Nubian Paint & Varnish Company, Chicago.

The Henry Giessel Company, Chicago, has appointed Frank N. Grigg, 1201 Virginia Railway & Power Building, Richmond, Va., as its southeastern sales agent. Mr. Grigg will represent the company in all territory south of the Ohio river and east of the Mississippi river.

J. B. Berry and S. S. Roberts announce the dissolution of the firm of Berry, Howard & Roberts and the continuance of business, in the general practice of civil engineering, under the firm name of Berry & Roberts, with offices in the Transportation building, Chicago.

C. B. Yardley, Jr., has been appointed representative of the Wm. C. Robinson & Son Company, Baltimore, Md., manufacturers of high grade lubricating oils and greases. Mr. Yardley will make his headquarters at the New York office, 12 Coenties Slip, and his territory will include the eastern railroads.

Arthur G. McKee, conducting an engineering and contracting business at Cleveland, Ohio, has formed an incorporation with Robert E. Baker and Donald D. Herr, his business associates for a number of years past, under the name of Arthur G. McKee & Company. The firm will have offices in the Rockefeller Building at Cleveland, Ohio.

The incorporation is announced of the National Brass Company, Houston, Tex., with the following officers: G. F. Cotter, president; J. W. Cain, vice-president and treasurer, and F. H. Littrell, secretary. The company will specialize in the manufacture of car and locomotive bearings, as well as general railway castings. It has been appointed, also, general sales agents for the National Brass Company.

E. H. Hinkens, superintendent of the Baltimore & Ohio reclamation plant at Zanesville, Ohio, has left the service of that road to enter the sales department of the Ingersoll-Rand Company and will be connected with the latter's Philadelphia office. Mr. Hinkens served his apprenticeship with the Westinghouse company and later entered Purdue University. He afterwards became a machinist on the Baltimore & Ohio and held various positions, including that of general foreman, assistant master mechanic and superintendent of the reclamation plant, as noted above.

Of the recent order for rails placed with the Lackawanna Steel Company by the New York Central Lines 2,000 tons of open hearth rails are to be treated with .10 titanium. Although the New York Central Lines have had several small tonnages of titanium treated open hearth rails for which the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has furnished the Ferro Carbon-Titanium free of charge for experimental purposes, this is the first bona fide order for titanium treated open hearth rails placed by the New York Central Lines and is the result of a long series of experiments which have been carried on under the general supervision of Dr. Dudley. The New York Central formerly used considerable titanium in the treatment of its Bessemer steel rails, the use of which has been practically abandoned during the last two or three years, and it has now gone over to open hearth rails almost entirely.

TRADE PUBLICATIONS

RAIL LOADER.—An 8-page pamphlet recently issued by James C. Barr, 30 Church street, New York, illustrates and briefly describes the Brown rail loader, and also gives a list of railroads using it.

VENTILATION APPARATUS.—The American Blower Company, Detroit, Mich., has recently issued a booklet describing an installation of the "Sirocco" heating, ventilating and cooling system in the plant of the Ford Motor Company at Detroit.

Railway Construction

Atlantic Harbor.—This company plans to build a railroad from Ft. George Island, Fla., and St. John river, in a northerly direction to a crossing of Sisters creek, thence westerly to a point located at or near Plummer, Duval county, with a branch from the main line to the northerly limits of the city of Jacksonville, in all about 30 miles. Application has been made to the War Department for permission to build a bridge over Sisters creek. The incorporators include A. H. Broderick and G. Washburn, Boston, Mass.; E. G. Phinney; R. G. Ross; P. D. Cassidey and F. B. McGarry, Jacksonville, Fla.; W. M. Wright, St. Augustine, and G. J. Percival, Atlantic City, N. J.

Canadian Northern.—The Canadian Northern and the Canadian Northern Ontario have applied to the Canadian parliament for an extension of time in which to build proposed branch lines as follows: From Strathcona, Alta., to Calgary, from near Swan river to the Saskatchewan river, from Regina, Sask., to Red Deer river, from Regina to Elbow, from Winnipeg, Man., to the eastern and southern boundaries of Manitoba; in Ontario, from Washago to Kincardine, Arnprior to Gananoque, Pembroke to Cobourg, Frenchman's bay to Owen sound, Niagara river to Goderich, Hawkesbury to Leeds or Lanary county, Parry sound to North bay, Berlin to Toronto, Berlin to Woodstock, Sarnia to Chatham and Orillia to Goderich.

Canadian Northern Ontario.—See Canadian Northern.

Erie & Ontario.—See Toronto, Hamilton & Buffalo.

Kansas City, Kaw Valley & Western.—Plans have been prepared for the extension of this line from Bonner Springs, Kan., to Linwood, 10 miles, and from Linwood, Kan., to Lawrence, 10 miles. This work will require excavation amounting to about 10,000 cu. yd. a mile. The maximum grade will be 1.5 per cent and the maximum curvature 4 deg. Three bridges of 100 ft., 120 ft. and 130 ft. lengths will also be required. Contracts will be let about March 1, 1915.

Northern Pacific.—An officer writes that the North Yakima & Valley, building from Spitzenburg, Wash., to the mouth of Cowiche canyon, 2.8 miles, with a branch to Tieton City 6.6 miles, during 1914 completed track laying on 2.93 miles between Spitzenburg and Weikel.

North Yakima & Valley.—See Northern Pacific.

Oregon-Washington Railroad & Navigation Company.—Announcement has been made by this company that on December 15, 1914, the new Point Defiance line, which is a portion of its Puget Sound route between Portland, Tacoma and Seattle, was opened for service. This line completes the double track between Portland, Ore., and Tacoma, Wash.

Toronto, Hamilton & Buffalo.—The Erie & Ontario, building from Smithville, Ont., via Dunnville to Port Maitland, has track laying finished to Dunnville on 14.9 miles, and is now making surveys on a section of 3.12 between Dunnville and Port Maitland.

RAILWAY STRUCTURES

Siloam Springs, Ark.—The Kansas City Southern will build a new passenger station at Siloam Springs in the near future. The building will be 24 ft. by 148 ft. in area and one story high, and will be of brick construction with a tile roof. The estimated cost is $10,000. C. E. Johnston, Kansas City, Mo., is chief engineer.

The Dalles, Ore.—The proposed freight terminal of the Oregon-Washington Railroad & Navigation Company at The Dalles will include six switching yard tracks, each 4,000 ft. long, a 12-stall roundhouse, a machine shop 40 by 40 ft., a power house 40 by 60 ft., a storehouse 40 by 80 ft., a water tank, coaling plant, cinder conveyor, turntable, etc. There will also be approximately two miles of new track. The excavation will amount to about 109,400 cu. yd., and 236 tons of steel will be needed. The estimated cost is $200,000. Work has not yet begun.

Railway Financial News

Chicago, Milwaukee & St. Paul.—The directors have authorized an issue of $29,141,300 5 per cent convertible debenture bonds, to be offered to the stockholders at par to the extent of 12½ per cent of their holdings. The bonds are secured by the new general and refunding mortgage of 1913, under which the present issues of 4 per cent debentures and 4½ per cent convertible debentures, are secured. The bonds will be underwritten by Kuhn, Loeb & Co. and the National City Bank.

Chicago, Rock Island & Pacific.—On Wednesday, January 6, the court confirmed the sale of the Railway company stock which is deposited under the Railroad 4 per cent collateral bonds, which now permits the distribution of the Railway stock to bondholders under the plan of the Wallace committee, which bought in the stock.

Delaware & Hudson.—This company has declared the regular 9 per cent dividends, to be paid at the regular quarterly periods in 1915.

Delaware, Lackawanna & Western.—Henry R. Taylor, who recently resigned as a director of the Delaware, Lackawanna & Western Coal Company, has been elected a director of the Delaware, Lackawanna & Western Railroad Company, succeeding H. C. Fahnestock, deceased. There is now one vacancy on the board of the railroad company caused by the death recently of Henry Marcellus.

St. Louis & San Francisco.—The 4 per cent refunding mortgage bondholders' committee, of which Frederick Strauss is chairman, announces that 87½ per cent of the outstanding bonds under this mortgage have been deposited with the committee and that the committee is advised that default will again be made by the receivers in the payment of interest. The last interest payment was due on January 1, 1915. The committee has arranged, in accordance with the agreement under which it asked deposits of bonds, to buy the coupons and claims for registered bond interest of January 1 and also those due July 1, 1914, some of which have not already been bought by the committee.

Toledo, St. Louis & Western.—The federal district court has ordered the receivers to pay the interest due January 1 on $9,500,000 prior lien gold 3½ per cent bonds.

The Cape to Cairo Railway.—The Cape to Cairo Railway project, naturally, is at rest at the present time. There was a piece of German territory through which the line would have to pass, or rather which blocked the line, but the English are hoping that this will be wiped out after the war. The railway has reached the heart of the Belgian Congo, a district which some of the railway officers believe will prove to be one of the greatest copper yielding countries in the world.

Russian Railway Bath Train.—Something was said in a recent issue about the bath train which the Russian government has equipped for the use of its troops at the front. It is stated that this bath train has met with the hearty approval of the men. This is to some extent surprising, because the Russian peasant has not always enjoyed the highest reputation for personal cleanliness. He is, however, greatly in favor of the steam vapor bath, which is said to be as much a feature of Russian village life as the public bathing establishments are characteristic of Japan. The train itself is a veritable Turkish bath on wheels. It is composed of 20 cars, and its accommodation comprises two steam bath-houses, each of which can accommodate 50 men at a time, shower baths, drying rooms for uniforms and underwear, a barber shop and even a tea car, where the men can refresh themselves after they have bathed and get into dry clothing. It has, of course, been proposed already that the idea be adopted for the men in Belgium and northern France, it being particularly true that the hot bath is one of the comforts of life most missed in the trenches.

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Contents

*Illustrated.

The Need for a Surplus

In an editorial in its issue of November 27 entitled "What Is the Matter with the Railways and Regulation?" the *Railway Age Gazette* presented data showing that the main trouble with regulation has been that it has been predicated on experience indicating that railway profits tend to increase, whereas since effective regulation was begun in 1906 economic forces have been at work which have tended to cause profits to decline. The same point is made in an entirely different way by John E. Oldham in his very interesting and able paper on "Railway Profits from the Investors' Point of View," most of which is published elsewhere in this issue. Not only does Mr. Oldham's paper show the tendency of railway profits to decline relatively, even when total earnings increase, as in 1913, but it is an extraordinarily clear, logical and convincing exposition of the need for railways to earn a surplus, and of the effects produced on their credit when their surplus earnings decline. Mr. Oldham's paper is a remarkable and highly original study of the relations between railway earnings, expenses, return to capital, surplus and credit, and will be read with interest and profit by every person who takes a serious and intelligent interest in the subject of railway economics.

Comparative Locomotive Tests

An interesting point brought out in the comparative dynamometer tests made between Consolidation and Mikalo type locomotives on the Chicago & North Western, as described elsewhere in this issue, is the fact that with a small number of tests the true efficiency of a locomotive is not shown by comparing the ton-miles per pound of coal. In this instance the Consolidation tests were made with an average resistance of 4.091 lb. per ton, while the average for the Mikado engines was 3.817 lb. per ton in Test II and 4.006 lb. per ton in Test III, a difference of about 5 per cent. In computing the tonnage rating for locomotives when dynamometer cars are used, if this difference is not allowed for it may result in underrating the engines. No matter how much care is exercised in making comparative tests there are factors in train resistance that cannot be maintained constant. For this reason it is evident that when dynamometer cars are not used and ton-miles per pound of coal is taken as the comparing item, a large number of tests should be made so that any of the variable features will be more nearly an average for the two locomotives.

Storage of Coal By Railroads

There are so many reasons why a railroad should store coal for its own individual use and why it should influence the dealers and consumers to store coal for their use that it is impossible to carefully cover the subject in a single editorial. Therefore, our effort here will be merely to point out briefly the advantages that may be obtained from the storage of coal by the railroads themselves. In the spring and summer months the demand for screenings, or the cheaper grades of fuel, greatly exceeds the demand for the larger sizes, which of course must be mined in order to get the screenings. In the fall and winter months the large sizes are in greater demand, which gives a surplus of the screenings. The actual cost of hauling coal is very much less in the warm weather than in the cold, and at that time there is much less coal purchased. In the colder months the coal traffic is very heavy, as the demands of the consumers then increase, and at the same time the actual cost of transportation increases. From this it is apparent that with the same rates the railroads can save money by hauling their own coal in the warm weather. It is also evident that if the railroads haul their coal when the traffic is light they can devote their equipment to the hauling of other revenue tonnage when the traffic is heavy. If a large part of the coal were moved when other traffic was light the car shortages which so often develop in the fall and winter months would be reduced or avoided, and the roads would find it possible to haul their annual traffic with a smaller number of cars. In connection with the question of the storage of coal arises the question of the deterioration of the coal in storage and the cost of rehandling. The deterioration that takes place in storage is believed to be over-estimated. Many roads have stored coal with success, while others have not. There is no question that the coal will slack and crumble to a greater or less extent, depending on the kind of coal, but with the opportunities of purchasing the larger coal at the storage seasons at a reduced price this trouble may be very largely avoided. The cost of handling is, of course, a subject that must be considered, but if all the conditions be taken into consideration it is believed that a method could be adopted that would not show a loss.

The coal producer will be benefited by coal storage, as it will enable him to have a more uniform market throughout the year, which in turn will reduce the cost of production and the price of coal. The private consumer will be benefited, as there will be less periodical congestion at the mines, the car shortage will not be so great and he will be able to get coal more readily when he needs it most. This subject was very thoroughly considered at the sixth annual convention of the International Railway Fuel Association, the papers and discussion being published in the proceedings of that association for this year. Other papers regarding the weathering, deterioration and spontaneous combustion of storage coal have been published from time to time by the University of Illinois and the Bureau of Mines.

THE SUSPENSION OF ADVANCES IN RATES

THE discussion which recent developments have started, of the exercise by the Interstate Commerce Commission of its authority to suspend advances in rates, will not be fruitful of the best possible results, unless it be carried on in the light of the history of our federal railway rate legislation. It should also be carried on with careful reference to the letter and spirit of the provisions conferring on the commission the authority to suspend rates. In view of the history of our rate legislation, and of the language of the provisions giving the suspension power, it can hardly be seriously denied that the commission has been abusing this power—and this regardless of its formal procedure in dealing with suspensions.

Those who have participated in the discussion of rate regulation since President Roosevelt started his agitation on that subject will recall that in the controversy preceding the passage of the Hepburn act it was always conceded, in the most express way, by the leading advocates of the act, that both as a matter of right and as a matter of public expediency the initiative in making rates should be left with the carriers. The railways rendered a public service, but their ownership was private. Therefore—so this reasoning ran—the managers for the owners had a right to determine what they would charge for the services they rendered, subject to interference by public authorities only when the rates fixed were excessive or unfairly discriminatory. Furthermore, it was conceded, the traffic managers of the railways, located in all parts of the country, and in touch with its multifarious conditions, would ordinarily know, better than any body of men at Washington could know, what rates ought to be made; and the competition between different railways and territories, and the desire to develop the largest possible traffic, ordinarily would impel the managers to make rates that were reasonable and best adapted to develop the country's industry and commerce, while at the same time securing for the railways fair profits. The Hepburn act was framed in conformity with this reasoning. It gave the commission only the authority to reduce rates already fixed by the railways after it had specifically found them to be unreasonable.

In 1910 the railways tried to make general advances in rates. The Mann-Elkins act, giving the commission power to suspend advance, was hurried through to head them off. Even in the excitement of the controversy preceding the passage of that act, however, the right of the railways ordinarily to initiate their rates, and the public expediency of permitting them ordinarily to do so, were not forgotten or ignored. The commission is not required by that act to suspend all proposed advances; in fact, it has never been required by the law to suspend the advance of a single rate. The law simply gives it the authority, *in the exercise of a sound discretion*, to suspend proposed advances. In addition, the Mann-Elkins act provides that in the case of an attack on any rate advanced after January 1, 1910, the burden of proving that the rate is reasonable shall be on the carrier. Many people think that the law requires the railways to prove the reasonableness of every *advance* made after January 1, 1910. This view is entirely erroneous. The law does not require them to prove the reasonableness of any *advance* whatever. It merely requires that when they have advanced a rate since January 1, 1910, or propose to advance one, they must show that the higher rate is or would be a reasonable rate; and if it is a reasonable rate—if it is not unfairly discriminatory or excessive per se—it is a lawful rate, whether it represents an advance of 5, or 100, or 1,000 per cent.

Manifestly, the commission should not exercise its power of suspension arbitrarily or capriciously. It should exercise it with a due regard to the developments which led up to the granting of the power, and to the avowals and intentions of those who drafted and passed the legislation conferring it as to the purposes which it was meant to accomplish and the way in which it should be administered. Now, nothing is made plainer by the discussions both inside and outside of Congress than that it was not the thought of those who advocated and passed the Mann-Elkins act that it would, to a great extent, reverse the policy of the Hepburn act and deprive the carriers of the initiative in fixing rates. Their right of initiative was to be abridged, but only to the smallest extent that might be clearly necessary to protect the rights of the public. The power of suspension was to be somewhat analogous to the power of the courts to issue injunctions, and was to be exercised only when failure to do so might cause irreparable harm to some interest. That the officers of the railways were ordinarily inspired by right motives, that it was ordinarily to the interest of their companies for them to make reasonable rates, and that they would ordinarily know a great deal better than anybody else what rates ought to be made, was still recognized and conceded. Furthermore, it was clearly recognized that to limit narrowly the initiative of the carriers in making rates would do them great and irreparable harm. As was repeatedly pointed out, if the carrier filed an unreasonable rate, and the commission let it go into effect, a shipper could complain and show its unreasonableness, and get reparation for all the time it was in effect. On the other hand, if the railway should publish an advanced rate, and the commission should suspend it, and the carrier should subsequently establish its reasonableness, the carrier could get no reparation, but would lose absolutely the difference between the old rate and the advanced rate during the period of suspension.

The spirit and intent of the law were and are plain. Have they been carried out by the commission? It seems clear that they have not been. The commission adopted a principle for its guidance which it stated in its annual report for 1912. This principle is, in brief, that when tariffs are filed carrying advances in rates which are of small consequence and which evidently have been made in the course of the minor readjustments of rates upward and downward which constantly become necessary in the ordinary course of business, the tariffs will not be suspended. But when tariffs are filed the evident purpose of which is to effect substantial advances they will be suspended. The law assumed that changes in rates initiated by the responsible managers of the railways, whether advances or reductions, would ordinarily be allowed to go into effect on the regular thirty days' notice, but the commission has adopted the practice of suspending practically all tariffs carrying material advances, thereby curtailing the carriers' right of initiative to an extent never contemplated by the law. The law, and those who advocated and passed it, assumed that the power of suspension would be exercised according to the sound discretion of the commission after careful deliberation in each case; but the commission has set up for the exercise of the suspension power, a purely arbitrary rule, the application of which constantly deprives the owners of railways of property rights that the law intended to recognize. What becomes of the recognized right of the managers of railways ordinarily to initiate their charges if every really *substantial* advance in rates is to be suspended? What becomes of the law's recognition of the fact that the officers of the railways ordinarily are prompted by good motives and ordinarily are the best judges of what rates they should make, if months of labor of numbers of the ablest railway traffic men in the country may be nullified by the mere stroke of a

pen at Washington? When, how and by whom are the railways to be compensated for unjust losses sustained by them as a result of the application of this arbitrary rule?

The situation would be bad enough if, after having thus abused its authority, the commission rendered decisions promptly in cases involving rates under suspension. But in many cases, especially those of importance, it does not do so. It disposed of the rehearing of the 5 per cent case with commendable promptness. But, as the public well knows, exactly the opposite must be said of its handling of the rate advance cases four years ago and the original 5 per cent case. And there are unconscionable delays in deciding other cases of which the public hardly hears at all. General statements regarding such matters are less instructive than specific examples, and, therefore we shall give one of the latter. The coal originating railroads leading into St. Louis and East St. Louis gave notice in January, 1913—just two years ago now—of an advance in coal rates from Illinois territory to the St. Louis group, effective on April 1, 1913. The commission suspended the tariffs until July 30, 1913, and later to January 30, 1914, when its statutory authority of suspension expired. The case was heard on December 1, 1913, and argued in February, 1914; and, at the request of the commission, on the ground that it was as yet unable to dispose of the case, the rates were further suspended until March 31, 1914. Then, on the ground that it could not decide the case before the summer recess the commission asked that the rates be further suspended until November 1, 1914, which also was agreed to. On still another request from the commission the rates were still further suspended until January 1, 1915; and now the commission has asked for another postponement to November 1, 1915! The railways are in no position to refuse such requests of the commission for the voluntary postponement of advances as were made in this case, and as are made in many others. If the commission should decide that these advanced coal rates are reasonable, the railways, because of its incapacity to keep up with its work, will have been deprived for three years of their right to charge reasonable rates, and will have suffered an irreparable loss amounting to many hundreds of thousands.

While rates are under suspension, while the commission delays to decide the cases involving them, not only the railway industry, but a large part of all the industries in the country wait upon it. And one of the worst features of the situation is that the commission does not seem to realize the results its delays are causing, and is therefore not asking Congress to grant it the means imperatively needed for facilitating its work and putting it on a businesslike basis.

The *Railway Age Gazette* opposed the provisions giving the commission authority to suspend advances in rates because we apprehended—and predicted—that it would lead to the very abuses and results to which it has led. It is still our opinion that the provision is indefensible on any sound ground whatever—that it imposes a restriction on the exercise of the railway manager's right to initiate rates, which is wholly unjust and inexpedient. Bad as the law is, however, the intention of those who passed it was not so bad, and if the commission would use in its administration the businesslike methods and sound discretion it was intended it should use, the harm done would be comparatively small. Unfortunately, the commission has thus far exercised its discretion in disregard of the intent of the law, and with the greatest injustice and unwisdom; and the effects on the railway business and business in general have been what might have been expected.

Perhaps if railway officers will present the conditions to the commission in its true light, and insist on a modification of its policy it will do something to relieve the situation. There is evidence that some members of the commission realize that the policy it has been pursuing is wrong. If the railways cannot secure a great change in the administration of the suspension provision they should appeal to the courts or begin a nation-wide campaign for its entire repeal. The law gives the commission no authority to order an advance, or to suspend a reduction in any rate; it is thus a wholly one-sided law; and as long as this is the case, for the commission to exercise its authority to order reductions in rates, and go on exercising its power of suspending advances proposed by the carriers as it has been doing, can spell only injustice and disaster. "This power (of suspending rates)" said the chairman of the commission in his dissenting opinion in the 5 per cent case, "is exercised, in my judgment, with unnecessary frequency, in view of the opportunity that shippers have of testing the reasonableness of increased rates, upon formal complaint filed with the commission; and, in my judgment, the Congress never intended so free a use of it when the power to suspend rates was granted to us." Let us hope that the other members of the commission will also come to see this subject in its true light.

THE ALL-AROUND SUPERINTENDENT

THE ambitious young man who believes that he is fit for promotion, but who sees others placed ahead of him, does some energetic thinking. He has forced upon his mind an important subject which cannot be thrust aside. Some thinking of this kind which a correspondent has put on paper, is printed in another column. He has not gone into the subject very deeply, and the brief essay that he has sent is laid before the reader in this way as a suggestion for further study.

Everybody knows about the evils of nepotism; the only remedy for that little vice is to engage in fasting and prayer for the enlightenment of the manager who pursues such a shortsighted policy. The other difficulty, the bringing in of men from other roads, is not so easily disposed of. A manager who does this from a mere selfish desire to save himself work is about as bad as the nepotist; but if, on the other hand, his fault is defective judgment of men, the only recourse of the aggrieved despatcher is to make his own merits so plainly apparent that the dullest or most distant manager will hear of them. This means hard work; assiduous study of superintendents' problems day and night—especially night. In other words, the study of the application of general principles to particular questions arising on your own division, balancing the relative virtues of one superintendent's way of solving such questions against another's way, deciding what you yourself would do, and how you would convince your boss that you were right—these things are enough to absorb all of one's surplus energy throughout the waking hours of the day.

Our friend's letter has little or nothing to say about other qualifications than experience. But experience does not always blossom out in versatility. One of the most noticeable mistakes among superintendents is the habit of continuing to live mostly in the department from which they came. A master mechanic sometimes retains such an absorbing love for locomotives that, when dealing with roadway matters or public relations, he makes a poor superintendent. The superintendent who has been trainmaster at a freight terminal sometimes seems to ignore his duties in relation to fastidious passengers in parlor cars. Cannot the anxious despatcher take a hint from these examples? If he has got well saturated with train-operation ideas, let him question himself as to his qualifications in other lines; as an after-dinner speaker at a meeting of aldermen, for instance. The superintendent who knows how to interview a congressman, successfully, has a great advantage, at times. The train despatcher who wishes to qualify for such a function must do something besides perfect himself as an efficient lieutenant to the superintendent *on the road*. Off the road, perhaps at a farmer's house, ten miles away, may be at times an important field.

In short, the despatchers are sometimes left behind for what, to the manager, seem very good reasons. They are competent to handle men and to manage trains, but they are not all-around men. The manager may, indeed, have poor success in going outside for new men; but the best way to cure him of this bad habit will be to convince him that he will be successful inside his own organization. The efficient despatcher, aspiring to advancement, must constantly study outside his own immediate field. Dealing

with men—and women—of all sorts is an important art for the superintendent, and one in which it is scarcely possible to become too skilful.

Another common mistake of men who are promoted to a superintendency, with a 50 per cent increase above their former pay, is in raising the standard of their hats and their neckties faster than they improve the things under their hats and cravats—their brains and hearts. The superintendent must, indeed, be a gentleman, and we mean no slur on new hats or neat clothes; but a sudden transition in those outward things, when, at the same time, observers notice a far less marked improvement in the quality of the man's work, is likely to make an unfavorable impression. Perhaps the idea may be better put by saying that the despatcher should cultivate the qualities of a gentleman very carefully for some years before he gets his promotion. Not that he should wear a silk hat to the office, or run in debt for better coats than he can afford; but there is real sense in Napoleon's idea of the marshal's baton in the private soldier's knapsack. The division superintendent's job is in some senses the biggest one on the road, and the man who aspires to fill such a job well during the first year, should do a good deal of rehearsing, in the privacy of his own breast, for a long time beforehand—and a great variety of rehearsing.

The foregoing paragraphs cannot be called a sure rule for success; there is no such rule, for despatchers, any more than for other classes; but the despatcher who follows the suggestions will have the satisfaction of having taken a good step toward doing *his* part.

MISSOURI, KANSAS & TEXAS

UNTOWARD and extraordinary circumstances decreased the Missouri, Kansas & Texas' revenues by about $775,000 in the fiscal year ended June 30, 1914, and increased operating expenses by $1,281,000. In addition, reductions in passenger and freight rates caused a further loss in revenue of $841,500. The company finished the year with but $539,000 over and above expenses and interest charges, which is a decrease from the previous year of $1,778,000; but had it not been for the extraordinary circumstances and the reductions in rates, the year's operations would have shown a substantially larger net income than in 1913, the net instead of being a little over $500,000 would have been something over $3,000,000. The untoward circumstances were severe droughts during growing time for grain and forage crops and unprecedented floods about the time of the maturity of the cotton crop.

Notwithstanding the disheartening interference with the freight business and the serious and costly interruption of train movement, operating results show up so remarkably well that it is easy to imagine how bitter the disappointment was that these operating results could not be reflected in net available for dividends.

The 40 Mikado locomotives which the Katy bought in 1913 were in service during the entire year under review. The total ton-miles of revenue freight handled amounted to 1,851,000,000 in 1914, an increase over 1913 of 1.1 per cent. The floods, the interruption to the seasonal movement of traffic and the movement of foreign cars empty being returned to their home lines, which latter was general all over the country, caused an increase in the empty car mileage of 5.4 per cent. Nevertheless, the trainload increased from 287 tons to 316 tons, or 10 per cent, and the tons per locomotive from 271 tons to 304 tons, or over 12 per cent. To accomplish this gain in average trainloading in the face of the larger empty car movement, the average number of empty cars per train north and east increasing by 10.5 per cent, and south and west by 21.3 per cent, is an accomplishment worthy of note. The gain in work done by locomotives is therefore greater than the 12 per cent indicated by the increased trainloading.

The Missouri, Kansas & Texas operates 3,825 miles of road, of which more than 1,000 miles is in Texas. One serious drawback to the economical operation of the system as a whole has been the attitude of the Texas public and the Texas laws in regard to the portion of the system operated in that state. Various suits had been brought against the company in connection with the ownership of the Texas company's stock, the lease of other lines in Texas, etc.; but in February, 1914, an agreed judgment was arrived at between the attorney general of Texas, the company and the courts, which disposes finally, it is thought, of the question which had been raised by the Texas authorities and permits a consolidation of operations which should be of lasting benefit both to the company and the public served.

Even in the difficult year ended June 30, 1914, considerable progress was made in the program which the present management of the Missouri, Kansas & Texas is engaged on of betterment of the property. The expenditures for additions and betterments, exclusive of new equipment, amounted to $1,232,000. Of this amount $291,000 was spent for ballast, new ballast being applied to 143 miles of track. In this connection, although, of course, it is a maintenance expenditure and not chargeable to capital account, it should be mentioned that 146 miles was reballasted. The condition of the Texas lines in regard to ballast two years ago was far from satisfactory. Considerable expenditures will be required to put sufficient ballast on these lines to make them meet in this particular the general standard which has been adopted. During the year 100 miles of new 85-lb. rail was laid to replace lighter rail in main line. Included in the additions and betterments is an expenditure of $246,000 for station buildings and fixtures. This, of course, is indicative rather of the efforts which are being made to please the communities served by the road than of progress in the policy of strengthening the plant to permit of more economical operation, but it is none the less interesting.

A detailed study of expenses in 1914 is not indicative of what might be expected under normal conditions. Total operating expenses amounted to $22,722,000, a decrease, as compared with 1913, of $86,000. The following table shows the proportion of each class of operating expenses to total operating revenues:

	1914	1913
Maintenance of way and structures	14.52	14.33
Maintenance of equipment	12.48	12.68
Traffic expenses	2.34	2.33
Transportation expenses	38.89	37.90
General expenses	3.86	3.27
Total	72.09	70.51

Maintenance of way cost $4,575,000, or very slightly less than in the year before, a large decrease in the cost of tie renewals being offset by increases in the expenditures for roadway and track labor, bridges, roadway tools and maintenance of joint facilities.

Maintenance of equipment cost $3,934,000 in 1914, $167,000 less than in the previous year. The decrease is accounted for by a large decrease in the amount spent for repairs of locomotives and smaller amounts spent for repairs of passenger cars, and of smaller amounts charged for depreciation. For one thing, of course, the addition of the new locomotives, with the retirement of light locomotives, would have reduced the cost of repairs in any case; but apparently also considerable work was deferred, since at the end of the year 18.48 per cent of the total number of locomotives owned were undergoing or awaiting heavy repairs. It is quite possible that larger charges will be made next year for depreciation. The company was engaged at the end of the year on rewriting its equipment records, and a new policy will be adopted which will probably be considerably more liberal in regard to charges for depreciation and will be in accordance with the Interstate Commerce Commission's requirements that sufficient be charged each year to write off the total cost of equipment by the time it is ready for the scrap heap.

Transportation expenses amounted to $12,258,000, or practically the same as in the previous year; but if it had not been for the economies effected by heavier trainloading, transportation expenses under conditions of operation existing in 1914 would have run up very much over the 1913 figures.

Taxes in 1914 amounted to $1,500,000, an increase over the

previous year of $212,000, or 16 per cent. This is a drain on the company's earnings which it is out of the power of the management to control, and it is a serious one.

The total tonnage of revenue freight carried by the Katy in 1914 was 9,122,000 tons. Of this total 39.13 per cent was furnished by products of mines, 22.24 per cent by products of agriculture, 15.19 per cent by manufacturers, 8.99 per cent by lumber and forest products, and 6 per cent by l. c. l. merchandise. The principal changes from the previous year were an increase in the tonnage of petroleum from 58,000 tons in 1913 to 199,000 tons in 1914, and an increase in the tonnage of forest products and lumber of 40,000 tons, the total in 1914 being 820,000 tons. This increase in lumber and forest products is very important, since this traffic is drag freight moving north, and if it can be developed will give the Missouri, Kansas & Texas what it so badly needs—a slow northbound tonnage.

At the end of 1914 the Missouri, Kansas & Texas had cash on hand of $1,459,000, with loans and bills payable amounting to $3,281,000. The company has $19,000,000 notes maturing May 1, 1915. The financing, therefore, which will have to be done in the immediate future presents a problem of considerable proportions.

The $19,000,000 notes are held, it is understood, in strong hands. In the five months since the close of the fiscal year the Missouri, Kansas & Texas has been making a remarkably fine showing. Net in these five months, after the payment of all fixed charges, was $1,118,000. The transportation ratio in these five months was 34.60, as against 37.90 in 1913, a normal year; 41.32 in 1912 and 39.25 in 1911. With this good showing it would appear to be the best interests of everybody to tide things over until the notes can be permanently financed. The fact that the notes are held in strong hands should facilitate such a solution of the problem to a very marked extent.

The following table shows principal figures for 1914 and 1913:

	1914	1913
Average mileage operated	3,825	3,677
Freight revenue	$20,228,337	$20,912,978
Passenger revenue	9,105,242	9,402,967
Total operating revenues	31,521,188	32,346,258
Maint. of way and structures	4,574,726	4,637,748
Maint. of equipment	3,934,119	4,100,819
Traffic expenses	737,766	755,120
Transportation expenses	12,258,499	12,255,845
General expenses	1,217,009	1,058,880
Total operating expenses	22,722,119	23,808,412
Taxes	1,499,521	1,287,903
Operating income	7,299,548	8,249,942
Gross income	7,516,827	7,966,160
Net income	539,227	2,316,985
Dividends	261,429	521,052

NEW BOOKS

Proceedings of the International Railway General Foremen's Association. Compiled and published by William Hall, secretary-treasurer of the association, Winona, Minn. 193 pages, 6 in. by 9 in. Bound in paper.

The tenth annual convention of the International Railway General Foremen's Association was held at the Hotel Sherman, Chicago, Ill., on July 14, 15, 16 and 17, 1914. This book contains the complete report of the proceedings, including committee reports, papers and discussions. The association is to be congratulated upon the shortness of the time which has elapsed between the publication of the proceedings and the closing of the convention.

Proceedings of the American Society for Testing Materials. Part I, Committee Reports; Part II—Technical Papers. Size 6 in. by 9 in., 484 pages and 678 pages, respectively. Illustrated. Published by the society at the office of the secretary, University of Pennsylvania, Philadelphia, Pa. Price $5.

For the first time the proceedings of the American Society for Testing Materials are published in two volumes, the constantly increasing size of this annual publication having made this advisable. Last year's volume contained 1,141 pages, and the combined volumes this year contain 1,162 pages. The division of the material has been made along natural lines, Part I containing the summary of the proceedings and all committee reports, and Part II, the technical papers. These proceedings cover the seventeenth annual meeting of the society and include many specifications, papers and discussions of interest to railway men.

Letters to the Editor

THE POSTOFFICE "SURPLUS"

CHICAGO, Ill.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I note in your issue of December 18, 1914, that the statement is made that there is an alleged surplus in the postoffice department of $3,600,000 for the last fiscal year. The only information available, to the humble voter, is such as an administrative head of a department may choose to give out. Calling a given item a surplus does not of course make it one and I have been curious, since this item has been given out for public consumption, as to the proper definition of the word surplus. Instead of surplus isn't this "net operating revenue?"

I have never seen a government report which gave a statement as to the amount of money invested in land, buildings and other similar facilities which must be utilized in the conduct of the business. The government must pay interest on money borrowed the same as anyone else and as long as we pay interest on a national debt, the item should appear as a charge against the so-called profits of operation. It is difficult to say how much money has been invested in postoffices, but I presume that such items are just as available for valuation as any other kind of property. Is there an item showing interest on capital invested?

There are a great many statesmen who will doubtless say that, as the property is used for the public benefit, this item should not be included. This sounds very well, but will not hold water. A public benefit is something in which all are or can be *equally* interested. When a public utility does not pay for itself the deficit is raised by taxation. This taxation has nothing whatever to do with the amount of service the utility gives to the person taxed. If the postoffice is not self-supporting, including the item of interest, then the many are being taxed for the benefit of the few. The extensive users of the mails, such as mail order houses, etc., are the largest beneficiaries, while the man with considerable property who gets 10 letters a week foots the bill.

PAUL M. LABACH,
Assistant Engineer, Rock Island Lines.

WHY DO NOT CHIEF DESPATCHERS RECEIVE MORE RECOGNITION?

KANSAS CITY, Mo.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

When a superintendent is required for a certain division a few employees on the line may be considered; but in many instances men from other railroads are brought in or possibly the position is given to some favored friend or relative. In either case a certain length of time is required for the new man to get his bearings. But who is the man most fitted for the place?

The chief despatcher is more closely associated with the detailed operation of the line than any one on it. He is in constant touch with the superintendent in all problems concerning transportation propositions—the handling of men, and of power, maintenance of way, distribution of cars, prompt movement of cars and trains. He is held personally responsible for all delays and overtime, and for efficient work on the part of the men handling the every-day business out on the line.

When there is an obstruction to traffic he is the man who is looked to to arrange detours, to see to the care of injured persons and of damaged freight, and to arrange for the quick clearing of the track. When a proposition comes up which demands an immediate display of executive ability he is the one to act. Often, of course, he can converse personally with the super-

intendent, but many times this is impossible, and he is obliged to act alone.

A chief requisite in a superintendent is ability to build up and maintain a good organization. Another is to be able to figure out the every-day operating expenses and analyze the items. Who on the staff would be better qualified to do this than the chief despatcher? His long association right by the side of the superintendent gives him a training and knowledge to fit him to handle the situation alone. In handling the men and dealing with the unreasonable demands of the labor organizations, who is better adapted to the task than the chief despatcher? His long experience along that line has been greater than that of the average man on the line. His experiences as a telegraph operator, agent, clerk and trick despatcher have given him an inside view of supervision which cannot be obtained from any other source.

After a man has mastered the telegraphic education and has reached the position of chief despatcher; and has served in that capacity five or six years, and sees no chance of advancement, he naturally loses the ambition kindled in him years before; and concludes very likely to try some other avenue of employment. He may take a small agency on the road, a position as trick despatcher, or may leave the railroad business entirely. But in that case has not the railroad lost many years of valuable experience which could be utilized to good effect? When a chief despatcher is promoted it inspires the entire rank of telegraphers and clerical force with new energy. The failures made by promoted chief despatchers are few and far between. All they want is a chance to demonstrate their ability. C. L. J.

THE INTEREST OF THE RAILWAYS IN A PROTECTIVE TARIFF ON STEEL

Columbus, Ohio.

To the Editor of the Railway Age Gazette:

To produce a ton of rails requires the digging of ore, the quarrying of stone, the burning of coke, the making of brick, etc., and the assembling of these materials at some convenient place, before the first operation of making steel rails can commence. The item of assembling—including largely the transportation charges—and the freight to place of consumption is more than one-third of the total cost. What is true of iron and steel is relatively true of every article included under the protective tariff.

In all discussion of the protective tariff, all the arguments have been in relation to the cost of producing steel after the materials have been assembled, and are ready for the furnaces; while sufficient prominence has not been given to this cost of assembling and the effect on the railroads and steamship lines. Not only must the transportation companies be protected in their rates, but they must be assured as to the volume of business, otherwise the cost of transporting every pound of freight in this country will be increased. For example, to make one ton of pig iron requires approximately:

Ore	1.85 tons
Coke	1.12 tons
Limestone	.50 tons
	3.47 tons

Freight charges for assembling this amount of material at Pittsburgh would be as follows:

Mesaba Range to Duluth	1.85 tons ore at $0.60 per ton	$1.11
Duluth to Lake Erie ports	1.85 tons ore at .55 per ton	1.02
Lake Erie to Pittsburgh	1.85 tons ore at .88 per ton	1.63
Connellsville to Pittsburgh	1.12 tons coke at .75 per ton	.84
One-half ton limestone, at approximately	.65 per ton	.32
		$4.92

To make one ton of rails requires one and one-fifth tons of pig iron.

Freight charges for assembling sufficient material to make one ton of rails at Pittsburgh	$7.77
Freight Pittsburgh to St. Louis, one ton rails	3.42
Freight Pittsburgh to New York, one ton rails	2.60

Using St. Louis as a central distributing point, the result would be as follows:

The transportation companies would receive on every ton of rails delivered at St. Louis from first to last	$11.19

If these rails were purchased abroad, they could be brought to St. Louis by way of New Orleans, and the railroads would receive about $1.50 per ton as their proportion of the through rate, so that there would be an actual loss to the transportation companies, as a whole, of about $9.15 per ton on every ton of steel rails purchased abroad and used in St. Louis and vicinity. Using New York as the point of distribution, the transportation companies would receive on every ton of rails made in this country and delivered at New York, $10.37 per ton.

This does not take into consideration the freight on refractories and miscellaneous material used by the furnaces, nor the miscellaneous freight required by communities where iron ore and coal are mined and where coke and steel are manufactured, which supplies would not be transported or consumed here if our steel were made across the water. In either case this would show a great loss to the transportation companies in this country, all of which would accrue to the benefit of the foreign railroads and manufacturers.

These figures, vast in themselves when considering the production of steel rails in this country alone, are small when compared with the total production of pig iron from which steel rails are made, which amounted in 1907 to 25,781,361 tons, the direct transportation charges amounting to the vast sum of approximately $200,000,000.

Can this country afford to have its material made abroad at such an enormous loss to American railroads, workingmen, farmers and manufacturers? It is impossible to employ men in any legitimate way without benefiting them and the community far more than their employers. Any individual, community or nation is wealthier each day only by the excess of what it produces over what it buys, and any individual in a nation that produces nothing, or less than what he consumes, is a burden on the nation to that extent.

A protective tariff must protect the nation as a unit; the division of the benefits among the individuals being an entirely different subject, to be treated absolutely apart and aside from any consideration of tariff schedules; but the benefits must practically all be eventually distributed, in the operation of the affairs of an enterprising community.

J. G. Battelle,
President, Columbus Iron & Steel Company.

ON TIME TWENTY WEEKS

Seattle, Wash.

To the Editor of the Railway Age Gazette:

I notice in your issue of December 11 an item to the effect that the Chicago, Burlington & Quincy, running 93 passenger trains from Denver to Chicago (1,034 miles) during the month of October brought in 92 of them exactly on time.

The "Oriental Limited" train of this company [the Great Northern], running between Chicago and Tacoma (a distance of approximately 2,400 miles), over two ranges of mountains, has arrived at Seattle and Tacoma—up to and including December 16—141 consecutive days on time. Schedule running time 72 hours, 11-car train.

J. H. O'Neil,
General Superintendent.

Railway Construction in Sweden.—In view of the war, attention has been directed to the improvement of transport facilities between the United Kingdom and Russia via Sweden. It is stated that the board of the Swedish State Railways has decided upon the best route for the proposed railway from Stockholm to Kapellskär, and Immingham Docks are mentioned as a suitable connection on the English side, although apparently nothing is settled as yet. The routes for traffic across Sweden to Russia are of special importance now, as the Baltic is practically closed. New regular lines have been started between Stockholm and Gefle and Finland, while the Björneaborg authorities are anxious to obtain a connection with Sundsvall. It is evident that Sweden, owing to its geographical position, will play an important part in the development of Russian trade with various countries.

St. Paul and Oregon-Washington Joint Terminals in Spokane

Extensive Grade Separation Work Required to Reach Passenger and Freight Stations in Heart of City

Although the transcontinental line of the Chicago, Milwaukee & St. Paul passes more than 25 miles south of Spokane, Wash., all of that company's through passenger trains are now run through Spokane over tracks used jointly with the Oregon-Washington Railroad & Navigation Company. This project, which enables the St. Paul to reach Spokane, involved the construction of about 20 miles of new line from Plummer Junction, on the main line 41 miles southeast of Spokane, to Bell Junction on the O.-W. R. & N., 21 miles from Spokane, as well as the work of building a new line through the heart of the city to reach the new joint passenger station. The through trains now run over the new line from Plummer Junction to Bell Junction, the old O.-W. R. & N. line to the Northern Pacific crossing in Spokane, the new St. Paul line to the union station, and the new O.-W. R. & N. Spokane-Ayer line as far as Marengo Junction, 61 miles. This route is about 14 miles longer than the main line and in places contains considerably higher grades than the older line, so that it is not expected that any freight traffic

Beginning at the Northern Pacific crossing the new St. Paul line extends east on a level grade as far as Erie street, all intermediate streets being carried under the railroad. A timber bridge about 750 ft. long carries the new line over Ivory street, Erie street, and the tracks of the Spokane & Inland Empire. West of Erie street the grade is 1.2 per cent, descending as far as the Trent avenue subway, the line skirting a bend in the Spokane river on a 200,000 cu. yd. rock fill made in 47 ft. of water. At the west end of this fill the line enters a solid rock cut with a maximum depth of 27 ft. A double track subway 850 ft. long was built in this cut to carry the Northern Pacific and Great Northern transfer tracks and Trent avenue.

From the west end of the Trent avenue subway the passenger tracks continue on a slight descending grade under Market street, which carries a double track line of the Spokane & Inland Empire and then under Division street, carrying a double track street railway line. From Division street the main line rises on a maximum grade of 1.24 per cent to the station, crossing Center

Typical Reinforced Concrete Street Subway Near the East End of the Work

except local business will move over the new loop. As the new O.-W. R. & N. line from Spokane to Ayer was described in the *Railway Age Gazette* of May 31, 1912, and the new joint passenger station in the issue of October 31, 1913, the present article will refer principally to the St. Paul construction work between the junction with the old O.-W. R. & N. line on the east side of the city and the new station.

The new joint line through the city was financed in three sections; one from the Northern Pacific crossing to Center street, built and paid for by the St. Paul; one from Center street to Monroe street, including the station building, paid for by both companies on an equal basis, and one extending from Monroe street to the western city limits, built and paid for by the O.-W. R. & N. The cost of the terminals and approaches in Spokane is about $7,500,000. The new station, built at a cost of about $600,000, and opened on September 15, is shown in one of the accompanying illustrations. The principal feature on the O.-W. R. & N. section is the high steel bridge spanning the falls in the Spokane river and crossing over the Monroe street concrete arch bridge.

street on an overhead structure. The tracks branch out from a point just west of Center street to eight station tracks. These station tracks are supported on a steel and reinforced concrete structure.

At the west end of the Trent avenue subway the yard tracks leave the main line, one team track being built to the north of the main line on an ascending grade to the west, crossing the Spokane & Inland Empire at grade in Market street and extending on the street level to Division street. The switch lead leaves the main line on the south and extends west to Division street on the grade of the main line, dropping from Division street to Center street, which is crossed at grade. At Division street four team tracks lead off from the switch lead extending to Center street. A warehouse track also leaves the switch lead near the west end of the subway and extends on the grade of the switch lead to Division street. West of Division street the switch lead descends, crossing Center street at grade and branching out to form two additional team tracks and three house tracks serving the freight house, which is located between Center and Washington streets. The house tracks and the two team tracks, as well

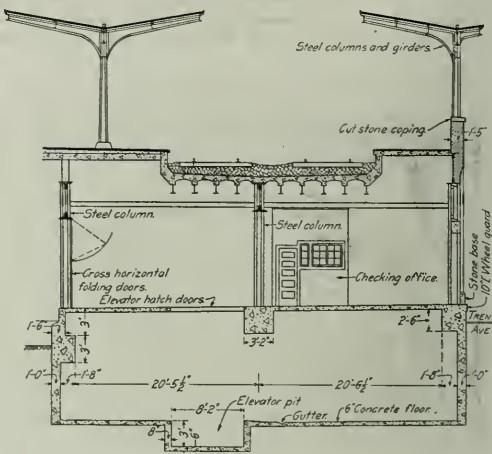
as a portion of the freight house, extend under the structure supporting the high level passenger tracks.

On the section east of the river fill, five reinforced concrete subways of the girder and slab deck type supported on four-post arch bents at the curb line and center line of street, were built to carry streets under the tracks. The reinforced counterfort abutments on these subways were poured continuously with double shifts to improve their appearance and to do away with the horizontal construction joints. One of these typical bridges is shown in an accompanying illustration. There are also four permanent alley crossings of reinforced concrete of the slab type on this section of the work. The slabs are supported by vertical barrel walls strutted at the base with cantilever type wing walls. Five timber bridges were also built east of the river, where the conditions at the present time are unfavorable to final construction.

The river fill was made from material excavated west of the Trent avenue subway which was hauled with 18-ton dinky engines and 4-yd. cars. The cars were dumped from two-post pile trestles constructed in the river. As this fill was built across the main channel of the river, there was a question as to the effect of the change of the current on the opposite bank. This led to the adoption of a plan to build the fill up to the elevation of low water and then build a timber trestle on this fill for the permanent work. When the low water level fill was completed and the river had reached its high stage, it was found that the current had been materially improved and instead of cutting diagonally across the river was now following the line of the fill parallel with the bank to the north.

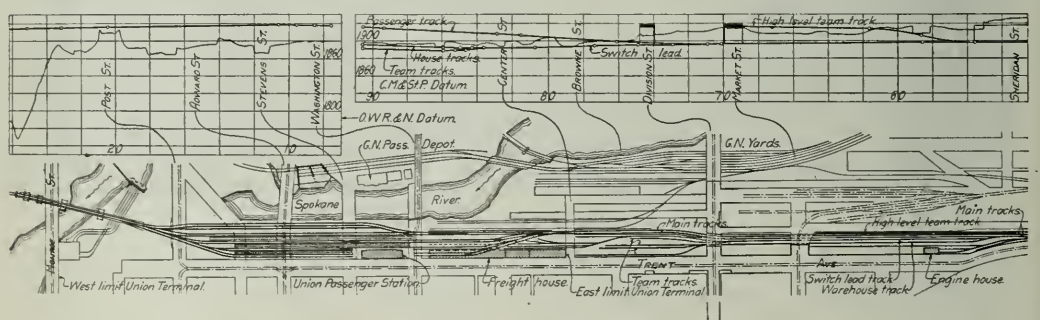
The bridge carrying the Great Northern-Northern Pacific transfer track which is contiguous with the Trent avenue subway, consists of side and center reinforced concrete walls supporting an I-beam deck encased in concrete. The subway, which is of the slab type construction has a span varying from 29 ft. to 45 ft. The walls are 12 to 22 in. in thickness. The excavation for the subway amounted to 46,000 cu. yd. of solid rock, the depth averaging about 22 ft. On account of the proximity of this work to the building of the Schade Brewing Company, a great deal of care was required and considerable expense involved in avoiding damage to the building. A powder inspector was kept constantly in sight, who noted on a plat furnished him each day, the location, size and depth of each hole, the charge and the type of shot, and the mat and timber protection.

A 24-in. sewer extending down the center of the cut was relocated on the south side of the excavation as far as the Northern Pacific-Great Northern transfer bridge, at which point it was dropped into a manhole and carried under the subway to the river on the east. At the intersection of Trent avenue and Sheridan street, it was necessary to keep the street open for its entire width on account of the Washington Water Power Traction Company's line and the exceptionally heavy street traffic using this main artery of travel from the business section to the east side of the city. This was accomplished by driving a cut 16 ft. wide, which was spanned with 32-ft. stringers covered by a plank deck. After this narrow preliminary cut was finished, a timber bent was erected under the center of the stringers, which were then pulled out on each side of the bent with their ends butting. It was then possible to widen the cut without delay to the street



Cross Section of West End of Milwaukee Freight House Showing Passenger Tracks and Platforms Supported on Roof

cars or team traffic. The concrete for the subway was poured from a single plant located in the center of the work, consisting of a ¾-yd. Smith mixer which was fed from a 30-yd. hopper. The material was loaded by a clam shell bucket from cars and the concrete was handled from the mixer in hopper cars dump-



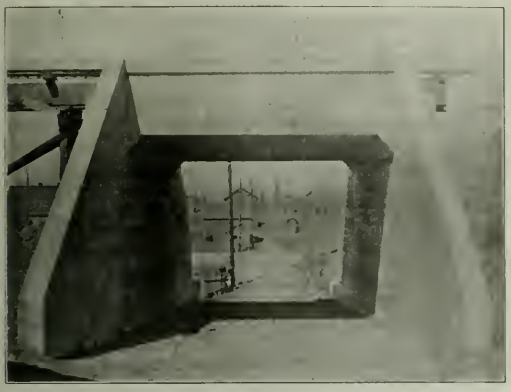
Plan of Milwaukee's Entrance to Spokane and Union Passenger Station Property

ing directly into the forms. As this work was done during the winter all of the material was heated, the forms were covered with canvas and the temperature was raised by steam.

A considerable length of retaining wall was built along property lines and between high and low level tracks in the territory west of the Trent avenue subway. The wall separating the main line and the northerly team track, the one along the Trent avenue property line from the subway to Center street, and the walls on both sides of the main line tracks between Division street and Center street, are of Cyclopian concrete, utilizing the stone removed from the cut. The wall along the team track is of a special section with a narrow base increasing in width up to approximately the mean height of the wall, from which it assumes the ordinary section. This design was adopted in order to re-

duce the amount of concrete and also the amount of rock excavation as the wall is founded directly on the solid rock. The other Cyclopian walls are of standard gravity section.

The Market street bridge is of the through girder type, the deck being encased with concrete. The rails of the Spokane & Inland Empire tracks are attached directly to the structure with cast iron dogs. The street over the bridge is paved with wood blocks. The west abutment is of Cyclopian concrete, poured flush against the rock at the back to the level of the bridge



One of the Standard Reinforced Concrete Alley Subways

seat. The east abutment consists of a face wall not more than 18 in. thick with a footing at the top of the abutment 2 ft. deep. This footing was anchored to the rock with 1-in. split rods set in poles in the rock. This type of construction was made possible by the fact that the rock at this point breaks in practically a vertical plane.

In order to avoid a grade crossing at Division street it was necessary to raise the street grade 11 ft. at its intersection with

higher than the finished street grade. A temporary street was also built across railway property from Browne street northeast to the Great Northern bridge. This temporary street, consist-

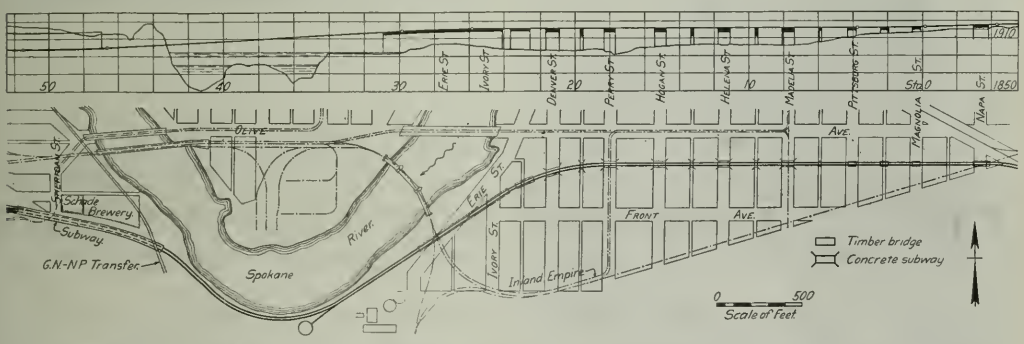
Making the Fill Across the Bend of the Spokane River

ing of a 40-ft. roadbed, was also carried on a timber trestle.

The regrading necessitated the raising of four water mains; one 12-in., one 16-in., one 24-in. and one 30-in. pipe. The 12

A Portion of the Temporary Trestles Carrying Street Cars and Team Traffic During the Regrading of Trent Avenue

and 16-in. mains were of cast iron and were raised by being jacked up as a unit and supported on small timber bents during



Plan of Milwaukee's Entrance to Spokane and Union Passenger Station Property

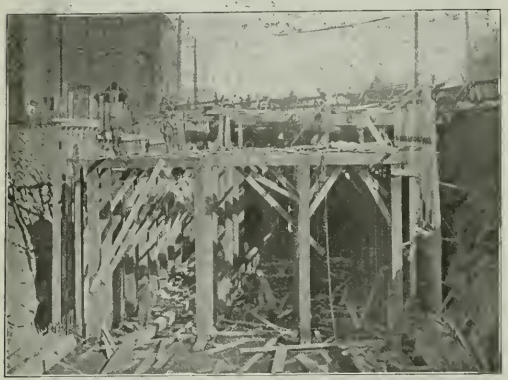
Trent avenue. As Division street is the main artery of travel from the business section of the city to the large and populous north and northeast sections, and as there was absolutely no other route by which travel could be diverted, it was necessary to handle this traffic throughout the construction work satisfactorily to the public and the Public Utility Corporations. This was done by building a double track standard timber trestle on railway property parallel to Trent avenue from Market street to Browne street, and on Division street from the south property line to the Great Northern bridge. These trestles were for the exclusive use of the street railways and to facilitate construction of the permanent work they were built approximately 10 ft.

the process of filling. The 24-in. and 30-in. mains were high pressure pipes supplying the south side of the city and business center. They required a great deal of special work. New pipe was placed in a permanent location over the right of way, the connections between the old and the new mains were made in five hours, and the old main was then salvaged.

Reinforced concrete walls of the cantilever type were built along all property lines in the regrade district. The fill was made of rock from the right of way excavation, a dirt and gravel pad being placed on top to receive the pavement. The buildings were raised to meet the new grade by the property owners, the railroad being assessed damages. The Division

street bridge is similar to that at Market street, with the exception that the abutments are of the reinforced counterfort type.

The St. Paul's new freight house is located along Trent avenue, between Center street and Washington street. It is 778 ft. long and 46 ft. wide with a full basement excavated in solid rock. A two-story office building 126½ ft. long separates the inbound and outbound sections of the house. The foundations



Trent Avenue Subway, Showing Wall Forms

and the street level floor are of reinforced concrete, the floor being of the girder and slab type construction. Above the street floor the walls are of a dark building paving brick. The house is of the continuous door type, horizontal cross folding doors being installed. Access is had to the basement for freight serv-

Front View of Recently Opened Union Passenger Terminal in Spokane

ice by four hydraulic elevators. The roof is of reinforced concrete carried on steel columns and girders. West of the office building the roof of the freight house carries two of the passenger tracks and one platform adjacent to the passenger station. The troughs in which these tracks are laid are waterproofed and protected by sand mastic. The platforms are finished with 1½ in. of asphalt mastic and are covered by butterfly sheds.

The following quantities show the amounts of materials used in construction:

Timber	2,114,885	ft. B.M.
Piling	32,053	lineal ft.
Bridge iron	81,949	lb.
Reinforced concrete	24,328	cu. yd.
Cyclopian concrete	21,803	cu. yd.
Plain concrete	2,219	cu. yd.
Rubble masonry	422	cu. yd.
Reinforcement	2,179,361	lb.
Paving asphalt	3,113	sq. yd.
Paving brick	4,476	sq. yd.
Paving vitrified block	12,635	sq. yd.
Excavation	230,400	cu. yd.
Structural steel	3,571	tons

The concrete work east of Center street, including the Trent avenue subway was built by the Bates & Rogers Construction Company, Chicago; the excavation west of the subway was made by Guthrie, McDougal & Company. The brick work and interior finish in the freight house was contracted to the Hurley, Mason Company. The concrete work west of Center street and all paving was handled by company forces, and all structural

Concrete Mixing Plant and Distributing Tracks for Placing Concrete in Trent Avenue Subway

steel was erected by company forces under Ed. Howell, general foreman, of steel bridge crews. The work was in charge of A. G. Holt, division engineer, until February, 1913. Upon his promotion to assistant chief engineer, with headquarters at Chicago, George M. Rice, division engineer, took charge, reporting to E. O. Reeder, assistant chief engineer at Seattle, and to C. F. Loweth, chief engineer, who handled all designs direct. Lyman M. Chase, who had charge of the field construction throughout the work, furnished a large part of the foregoing information.

Swedish-Russian Railway Built.—Press despatches report that on January 6 the railroad circling the Gulf of Bothnia, the northern extension of the Baltic Sea was virtually completed. Up to the present time there has been a gap of 10 miles over which passengers from Stockholm to Petrograd had to drive. Now this distance has been reduced to half a mile. The Russian line now runs to a point opposite the Swedish station at Karungi. Here passengers leave the train and go half a mile over the frozen river Tornea. This is instead of the previous journey between the towns of Tornea and Haparanda, a distance of 10 miles. The new arrangement is said to be working well. Between 500 and 800 passengers make the trip daily, the uncertainties of steamship travel between the Swedish coast and Russian ports near Petrograd having, of course, influenced many travelers to select the land route. Heavy freight also is being moved over land with little delay.

Railroad Rates from Investors' Point of View*

Relation That Should Obtain Between Gross Earnings and Various Kinds of Outgo for Satisfactory Credit

By John E. Oldham
Of Merrill, Oldham & Company, Investment Bankers

In the recent proceedings before the Interstate Commerce Commission in connection with the petition for an increase in railroad rates in Official Classification territory, there were submitted certain figures and statements bearing upon the earnings and capitalization of a group of standard railroads.

The purpose of these statements was:

First, to show the financial conditions which surrounded railroad securities of the highest grade during the period 1900 to 1909, when confidence in railroad investments of the better class was very general and capital was readily obtainable by roads of high credit.

Second, to determine whether the high credit which these roads had enjoyed was founded upon any well-defined economic principles or conditions which must be recognized in making fair and reasonable rates.

Third, to ascertain as far as possible, by a comparison of the financial statements of these railroads for the 10-year period above referred to with similar statements for 1913, whether these conditions had changed sufficiently to justify a weakening of confidence in the securities of these roads, and to account for the difficulty of obtaining new capital to meet their requirements.

To this end, examination was made of the financial affairs of several important railroads which were considered as having high credit. These included practically all the roads whose bonds had been admitted to savings bank investment under the general provisions of the laws of New York and Massachusetts, a few exceptions being made of companies which showed features not regarded as normal. It was believed that the companies finally chosen, if their operation were merged into an average, would form a concrete illustration of the kind of property in which investors formerly had confidence.

The following are the 19 roads from which the average property was made up: Atchison, Topeka & Santa Fe; Baltimore & Ohio; Buffalo, Rochester & Pittsburgh; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul; Chicago & Northwestern; Chicago, St. Paul, Minneapolis & Omaha; Delaware & Hudson; Delaware, Lackawanna & Western; Illinois Central; Lake Shore & Michigan Southern; Louisville & Nashville; Maine Central; Michigan Central; Nashville, Chattanooga & St. Louis; New York Central & Hudson River; Norfolk & Western; Northern Pacific; Pennsylvania.

An analysis of the average financial statement made by these roads for the period 1900 to 1909 shows that there was then outstanding an amount of capitalization—representing funded debt, rentals capitalized at 5 per cent, and capital stock—equal to $5.40 for every dollar of gross earnings. Or, in other words, for every $100,000 of gross earnings there was $540,000 of capitalization.

The statement also shows that every dollar of gross earnings received was so employed as to be divided into two parts, one representing the cost of service, including maintenance and taxes, incurred in earning the dollar, and the other the amount available for the capital employed in earning the dollar. For every $100,000 earned, this division was as follows:

Cost of service	$67,400
Available for capital	32,600
	$100,000

To the amount of $32,600 available for capital, there was added $4,200 income from outside operations and investments, which made a total of $36,800. Of this amount available for distribution, a part was used to pay fixed charges in the form of interest and rentals; another part was paid to stockholders in the form of dividends; and a third part was retained by the company in the form of surplus. This disposition of the $36,800 was as follows:

Fixed charges	$16,300
Dividends	10,900
Surplus	9,600
	$36,800

As there was $36,800 available for return on capital and as the capitalization was $540,000, the maximum which could have been paid would have been the entire $36,800, and this would have amounted to about 6.8 per cent on the amount of capitalization. It will be seen, however, that only $27,200 was actually paid, and that this amount was equal to about 5 per cent on the capitalization.

It may be inferred from these figures that the investors of the $540,000 were satisfied with the payment of 5 per cent on their investment at that time, and that, for actual purpose of distribution, the railroads needed to have available only $27,200. The existence of the surplus, however, instead of being a matter of indifference, as might be inferred, was actually a matter of the greatest consequence.

Necessity for the Maintenance of a Surplus

The railroads in the years 1900 to 1909 were growing rapidly, and in order to meet the requirements of this growth were constantly demanding new capital. The amount required could be raised permanently only by the issue of bonds or stocks to permanent investors. In order to attract these investors it was necessary for the railroads to show that investment in their bonds and stocks meant safety of income. The only way in which this safety of income could be demonstrated was by proving the existence of a margin of safety which the investor would consider sufficient to meet contingencies.

A company which made a financial showing equal to the average of the 19 companies could offer bonds to investors with the statement that all fixed charges were earned about two and one-quarter times over. It could offer stock to the public with the statement that its dividends were earned nearly twice over. Under these circumstances investors showed themselves satisfied with the terms offered, as is evidenced by the fact that high-grade bonds of these railroads sold at times during this period at prices which yielded less than 3½ per cent, and that, except for short periods of financial disturbance, standard issues seldom sold below a 4 per cent basis. Similarly, in the years 1900 to 1909, many of the best railroad stocks sold at times as high as a 4 per cent basis and, except in the periods of disturbance mentioned above, seldom sold below a 4½ per cent basis.

If the average company had paid, as has been shown, $16,300 for interest and $10,900 for dividends, but had had no surplus, it would have had to sell bonds on the strength of a statement showing the fixed charges earned only about 1.67 times over, instead of two and one-quarter times. This would have meant more expensive financing.

If the stock could not be sold at par or thereabout, and if it be assumed that, with good properties, capitalization should represent actual value, and that stock issued at a discount means over-capitalization, then bonds would have to be depended upon entirely, and as the amount of bonds grew while the stock remained stationary, the fixed charges would require an increasing

*Abstract of paper presented at the Third Annual Convention of the Investment Bankers' Association, at Philadelphia, November 13, 1914.

share of the amount distributed to security holders, the margin over fixed charges would gradually decrease, and the company of good credit would inevitably become a company of poor credit.

MAINTENANCE OF CREDIT

If it was desirable that these railroads should have the credit which they enjoyed in this period, it would seem also desirable that this credit should be maintained. And this leads to some consideration of what is meant by the maintenance of credit. In commenting on this point in its rate decision in 1911, the Interstate Commerce Commission used the following language:

> The general rate of interest has advanced and the price of a bond bearing a given rate has, therefore, declined. This by no means indicates an impairment of railway credit. There is no reason to suppose that railroad bonds bearing a proper rate of interest might not readily be disposed of today.

It appears to be a sound contention that a higher interest rate does not necessarily imply a loss of credit, and it would seem to be beyond question that a 5 per cent bond should be as desirable as a 4 per cent bond from the standpoint of security if it is equally well protected. This latter point, however, is of the greatest importance.

In order to maintain an equal credit over a period of years a company must maintain substantially the same ratio between net earnings and fixed charges. It is plain, therefore, that if the fixed charges increase, the protection in the form of surplus must increase proportionately if the same degree of protection is to be maintained. Generally speaking, the same consideration holds true as to dividends and their protection.

Consequently, it will be seen that the requirements of a company in the way of fixed charges and dividends cannot be considered independently of the surplus which is required to protect them. It has been shown in the figures for 1900 to 1909 that the capitalization of the average property received 5 per cent and that investors were satisfied with it. But it has also been shown that an additional 1.8 per cent was earned on this capitalization, and it may be assumed that the 1.8 per cent was necessary to keep the holders of the capitalization satisfied with the 5 per cent.

If it is true that the surplus is necessary in order to give investors assurance of protection to their income, and that a lack of surplus leads to a cessation of investment, it must be granted that a surplus is as much a part of the cost of capital as the part which is actually paid to the investors in charges and dividends. As charges and dividends must come from the current yearly earnings of a property, the surplus must also come from this source as surely as must the payments for the current operation of the property.

There has been in the past some lack of agreement as to the functions of a surplus, which has come from confusion between the ultimate disposition of a surplus and its reason for existence. As recently as the rate case decided in 1911, it was contended on the one hand that surplus earnings were needed to provide funds for improvements, and on the other hand that the users of the railroads ought not to be called upon to pay higher rates in order to provide the railroads with money which should properly be raised from new capital.*

The apparent lack of agreement, however, arises from the fact that the disposition of the surplus is merely an incident arising from its existence. The fundamental fact is that the railroads must prove to the investors that they are earning every year a sufficient surplus to serve as protection to the investors' income. When this surplus has once been earned it may be used to improve the property, or to reduce by means of sinking funds the obligations of the corporation, or to purchase additional property.

It may be assumed, then, that the investors will assess upon the railroads, as the cost of the capital which they supply, a fair return upon this capital in the form of annual payment, and a further amount by way of protection which, when earned, is left at the railroads' disposal. There is no assurance, however, that these requirements will remain the same over a period of years, because there is no assurance that the rates for money will remain stationary.

The tendency of rates of investment to fluctuate makes it inevitable that a return which was satisfactory to investors in the period from 1900 to 1909 may not be equally satisfactory in a different period. Where 5 per cent on the capitalization was at one time satisfactory, investors may at another time require 5½ per cent or 6 per cent, and may require this 5½ per cent or 6 per cent to be as well protected against contingencies as the 5 per cent had been.

Applying such a supposition to the case of the railroads, a demand by investors for 6 per cent instead of 5 per cent in the way of actual payment and a surplus proportionate to that which protected the 5 per cent payment would considerably increase the requirements of the railroads; and if added to the cost of service the total might amount to more than the available gross revenue. For instance, on the basis of $540,000 capitalization, and with the same allowance for other income as actually received in 1900-1909, a 6 per cent payment would result in bringing the cost of capital and service incurred in earning $100,000 up to $106,900, as follows:

Cost of capital	$39,500
Cost of service	67,400
	$106,900

The cost of service is, of course, liable to fluctuation from the effect of changes in wages, prices and other operating conditions. If either cost of service or cost of capital, or both factors, increase, while the revenue remains stationary, a case may be presented similar to that suggested, where $106,900 is required and only $100,000 is earned; and the railroads are put in the uncomfortable position of being unable to meet their requirements out of their earnings. Consequently, if relief from this impossible situation is to be had, it must come in one or another of two ways.

1. The cost of service, or the cost of capital, or both, must again be decreased to a point within the $100,000, or—

2. The $100,000 must be increased to a point which will cover the increased costs of service and capital as, for example, to $106,900 in the case shown above, after which each factor will resume its place as a proportionate part of the gross earnings and the parts will once more be in adjustment.

It appears, however, that under the conditions which actually existed in the period from 1900 to 1909, the $100,000 was sufficient to meet the demands upon it, and that the cost of service and cost of capital were adjusted in a manner which was satisfactory for that period, the test of successful adjustment being that capital flowed freely from the investors to the railroads, and the investors were apparently satisfied with the conditions surrounding their investments.

THE SHOWING FOR 1913

After the foregoing consideration of the figures for the years 1900-1909, and the conclusions which may be drawn from these figures, namely, that the various factors which determined the financial showing of the 19 companies appeared to be correctly proportioned according to the conditions then existing, reference may be made to similar figures for the year 1913, showing the operations of the same 19 companies in that year.

These figures show that for every $100,000 of gross earnings there was outstanding in 1913 $505,000 capitalization as against $540,000 in the period 1900-1909. Each $100,000 was divided as follows:

Cost of service	$74,300
Available for capital	25,700
	$100,000

To the $25,700 there was added $6,600 income from other in-

*Decision, February 22, 1911, p. 265.

vestments, making $32,300 in all, and this was disposed as follows:

Fixed charges	$14,200
Dividends	12,000
Surplus	6,100
	$32,300

The bearing of these figures will perhaps be better appreciated if placed in comparison with the figures for the period 1900-1909.

	10-Year Period	1913
Gross	$100,000	$100,000
Cost of service	67,400	74,300
Available for capital	32,600	25,700
Other income	4,200	6,600
Total available for capital	36,800	32,300
Fixed charges	16,300	14,200
Dividends	10.900	12,000
Surplus	9,600	6,100

The cost of service incurred in earning $100,000 in 1913 had considerably increased over that for the 10-year period. This increase was the final result of the increased cost of wages and materials and other operating factors in the face of the efforts of the railroads to obtain more economical operation.

It is assumed that the 19 railroads, being among the best in the country, commanded the services of managers who used their best efforts toward counteracting rising costs by increased efficiency. In fact the records of these companies show a greatly increased efficiency of operation; and in the absence of evidence that these railroads were burdened with lax and inefficient management, it may be assumed that the rise in cost of service from $67,400 to $74,300 was inevitable, and took place in spite of every reasonable effort on the part of the railroads to offset it.

This increase in the cost of service left a smaller amount available for capital, so that even with a slightly larger revenue from outside investments, the total amount available was $32,300 as compared with $36,800 for 1900-1909.

It has been shown above that there was in 1913 $32,300 available for capital as against $36,800 for the 10-year period. There were indications, however, that the requirements for capital in 1913 might be somewhat reduced from those of the 10-year period. In the first place the total capitalization was only $505,000 as against $540,000 for the earlier years. Of this capitalization, fixed obligations were only $320,000 as against $340,000 in 1900-1909, and the ratio of charges paid on these obligations was even less, the amount paid being only $14,200 in 1913 as against $16,300 in the earlier period. This would seem to indicate that the cost of capital would be less burdensome as there was a smaller amount on which to pay a return, and that the credit of the railroads should also be improved by the fact that fixed charges were somewhat reduced. A further apparent indication of the good treatment of capital came in the fact that while the amount of stock decreased from $200,000 to $185,000, the amount paid out in dividends increased from $10,900 to $12,000.

No conclusion can be drawn from these facts otherwise than that they have greatly assisted the railroads to exist on the revenue which they have been receiving at a time when costs for service were constantly increasing. No other conclusion is sought to be drawn from them. In order, however, to place them in their proper light as bearing on the present inquiry, it must be understood under what circumstances these facts came about.

The entire capitalization over the period was shown to have decreased somewhat, and this might be assumed to indicate a lower initial cost of financing the railroad business. It is necessary to remember, however, that the existence of substantial amounts of surplus has led to expenditures for improvements without increase of new capital issues, *first*, by the expenditure of the surplus itself, and *second*, by funds derived from premiums on stock made possible by high credit due to the existence of the surplus.

To the extent to which this can be carried out, the railroads are able to improve their position somewhat, as has in fact been done; but as normal growth of traffic leads to constant capital expenditures it should be plain that in years when substantial amounts of surplus are not available, recourse must be had to new capital for the entire expenditures required. The expense of financing the railroad business in order to gain $100,000 gross earnings is not stationary, any more than the cost of operation, and in view of the higher prices in recent years of labor and materials, and the increasing demands for improved service, the conclusion should not be hastily drawn that, because the face value of the capitalization was less, it required less actual investment to obtain $100,000 revenue in 1913 than in earlier years. The conclusion should perhaps rather be drawn that the necessary surplus earnings demanded by the investors have enabled the railroads to meet the requirements of their growth without incurring the fixed charges which would have been required by the issue of the entire amount in the form of new capital if the surplus had not existed. Expenditures for additions and improvements from surplus or premiums on stock are invested capital, as well as the amounts represented by the face value of capital obligations.

With regard to the lower rate paid in fixed charges, this would appear to be contrary to the tendency of the period under consideration as officially recognized by the Interstate Commerce Commission in the quotation already cited, and as evidenced by known facts. Some study of the obligations of these railroads will show, however, as a factor bearing upon this situation, that at the beginning of the period 1900-1909, the railroads were paying the cost of capital raised many years before, when money rates were high and railroad credit lower. Between 1900 and 1913 over $300,000,000 bonds bearings rates of 5, 6, 7 and even 8 per cent were refunded by these companies, and the replacing of these in a large measure by bonds bearing a much lower rate at a time when circumstances were more favorable than in the past or than now existing, provided a further means by which the railroads were enabled to offset higher costs of operation.

With regard to the higher dividends, the fact that the rate for 1913 was higher than that for the period 1900-1909 might seem at first glance to show that the stockholders had had their dividends raised in the face of rising costs of operation, and in a period when the railroads were actually asking relief in the way of higher rates for service. Consideration of the rates of dividend paid, however, shows that there has been very little change in the last few years and that the difference between 1913 and the 10-year period lies in the fact that during the earlier part of the 10-year period some of the 19 roads, in order to improve their credit and financial standing, were paying very low dividends, or none at all.

When these facts are properly understood and given their true value, they may be taken to show, as has been suggested above, that they permitted the railroads to have an easier task in meeting the higher cost of service than would have been the case if the conditions of the earlier period affecting capital had still been operative. The effect of these conditions was reflected to some extent in the figures for 1913, which showed that on $505,000 of capitalization there was an amount available for interest and dividends of $32,300, or 6.4 per cent. This compares with 6.8 per cent in the earlier period. Of this $32,300, $26,200 was actually paid out in interest and dividends, amounting to 5.2 per cent as against 5 per cent in 1900-1909. And this left a surplus of $6,100, or 1.2 per cent on the $505,000 as against 1.8 per cent surplus in 1900-1909. This may be more easily followed in the form of a table:

	1900-09	1913
Earned on capitalization	6.8 per cent	6.4 per cent
Paid on capitalization	5.0 per cent	5.2 per cent
Surplus on capitalization	1.8 per cent	1.2 per cent

It would not appear, in view of this statement, that the security holders of these railroads taken as a whole were worse off in 1913 than in the earlier period by way of return actually received on their investment. They were, in fact, receiving a

little more on the face value of their securities than the average received in the period 1900-1909. Owing to the reduction of fixed charges the railroads could still offer bonds with the statement that fixed charges were earned about two and one-quarter times over, and while the amount of margin over dividends was not so large as it formerly was, there was still a substantial margin.

It has been shown, however, in the period 1900-1909, that the test of the successful adjustment of revenue between cost of service and cost of capital was the fact that securities flowed freely from the railroads to the ultimate investors. If this test is applied to the conditions of 1913 it will be found that this feature was lacking. Instead of long-term bonds and stocks being taken readily by investors, it appears that the investors showed little enthusiasm for railroad securities. When bond issues were discussed the investors would only offer prices yielding a rate at which the managers of the roads thought it imprudent to finance permanently; and at the same time railroad stocks which had formerly sold well above par, now sold so near par, although receiving the same rate of dividend, that new offerings of stock at par no longer bore the character of bargains and were rejected as impracticable.

Accordingly, the flow of securities from the railroads to the investors was checked. And this showed itself by the appearance of a quantity of short-term notes representing temporary financing.

The failure of this test which was applied successfully to the earlier period indicated that some part of the delicate financial adjustment of the railroads was out of order; and a summary of the facts seemed to indicate that while these railroads were paying as large a return to capital in 1913 as in the earlier period, there was some question as to whether they should not be paying a still larger return in order to attract the necessary new funds.

To illustrate: In July, 1901, a Chicago, Milwaukee & St. Paul general mortgage 4 per cent bond due 1989, which is a fair sample of a high-grade railroad bond, sold at about 110, at which price it yielded about 3.62 per cent. In July, 1905, it sold at 111, yielding about 3.58 per cent. In July, 1909, it sold at 104, yielding 3.84 per cent. Whereas in July, 1913, it sold at 91, yielding 4.41 per cent.

Similarly, Pennsylvania Railroad stock, a standard investment, paying 6 per cent in each of the years named, sold in 1901 at 152, yielding about 3.95 per cent; in 1905 at 140, yielding about 4.30 per cent; in 1909 at 136, yielding about 4.40 per cent; and in 1913 at 111, yielding about 5.40 per cent.*

It is not necessary to multiply instances. The facts are plain that the yield which investors required from their investments was considerably in excess in 1913 of what it was in the period 1900-1909. Neither is it necessary to discuss whether this was more particularly true of railroad securities than of other forms of investment. Its application to the present inquiry comes in the fact that while the rate required by investors had advanced ½ per cent to ¾ per cent on bonds and 1 per cent to 1½ per cent on stocks, the advance in payment by the railroads on their capitalization had risen only from 5 per cent to 5.2 per cent, and in the further fact that it had been necessary to cut down the surplus which existed as protection from 1.8 per cent to 1.2 per cent.

It may be mentioned at this point that capital is perfectly independent. It will go into enterprises which appeal to it, and stay out of enterprises which do not. In order that it should be attracted its requirements must be met. In this particular instance, if it were necessary to figure 1 per cent on the entire capitalization of these railroads, as the measure of additional payment required by investors as the result of the tendencies noted above, the conditions would exist which were outlined at an earlier point in this discussion, where, instead of 5 per cent paid on capitalization, 6 per cent must be paid. As applied to $505,000 capitalization this would lead to a total cost of railroad service in 1913, which may be shown as follows:

Cost of service	$74,300
Cost of capital	34,300
	$108,600

It has previously been shown in a similar instance that if the gross revenue can be advanced to meet the $108,600 the component parts will take their proper proportion and the adjustment will again be satisfactory. In this case, however, the investors are confronted with the fact that the railroads are prevented from raising their revenue from the $100,000 to the $108,600. If this revenue cannot be raised, the machinery must stay out of adjustment until some forces bring about a lessening of the cost of service or the cost of capital. Pending such a readjustment, the investors prefer to withhold their capital, or invest it in other kinds of enterprise.

In attempting to look toward an adjustment, proper attention should be given to the fact that the accumulated capital expenditures made by the railroads in the last few years still await financing, existing at present in the form of short-term notes. Proper attention must also be given to the fact that the railroads, having for the most part issued mortgages on their properties, have in many cases exhausted the authorization of these mortgages and must pay for new capital on a basis of general and refunding mortgage bonds, which will be more expensive than that required by the high-grade bonds which have been sold in the past.

It must also be given proper consideration that the foregoing figures and conclusions relate not to railroads in general, but to a few selected roads of the highest credit, and represent, moreover, the conditions and problems of these roads as they existed in the year 1913. If there had been no unfavorable developments in the present year, it still appears certain that readjustments would have had to be made in order to bring the affairs of these railroads into a condition where capital would be readily obtainable. The events of 1914, and their effect upon the market for capital, intensify the conclusions reached as to 1913, and indicate that a sufficient readjustment to meet the conditions of that year would still fall short of meeting the conditions existing at the present time.

In noting the fact that these conclusions are drawn from the position of only the best railroads, it must be remembered that the readjustment necessary to maintain credit for these roads would still fail to give satisfactory credit to the average roads. Hence, such a readjustment must be regarded as a minimum for the railroad situation in general. In view of the conclusions reached, it would seem that this minimum would probably involve readjustment to a point where the return on capital—assisted by amounts of other income such as have been received in recent years—would require from 30 to 35 per cent of the gross earnings, and the cost of service from 65 to 70 per cent, as compared with an actual cost of service for 1913, as shown above, of 74.3 per cent.

It is believed that the events of 1914, following the tendencies shown in recent years, have made it possible to expect a return within any short period to the more favorable conditions of the years 1900-1909; and in view of these circumstances the railroads should seek a readjustment of rates to meet these conditions.

*Figures as of June 30 of each year.

Repairs to Damaged Railways in Argentina.—The Argentine government has presented to Congress a project authorizing the executive power to spend $1,700,000 in the repair of damage caused to government lines by recent floods and a further $850,000 to make up the deficit in operating these railways during the present calendar year. Rains and floods have destroyed many bridges and other railway properties in the provinces of Santa Fe, Catamarca, Tucuman, Salta and Jujuy. In the province of Santa Fe, where large tracts of land were under water and stations isolated, railway service on government lines is still irregular.

Locomotive Tests on the Chicago & North Western

Comparative Performance of Consolidation and Mikado Over 126-Mile District with 0.7 per cent Grade

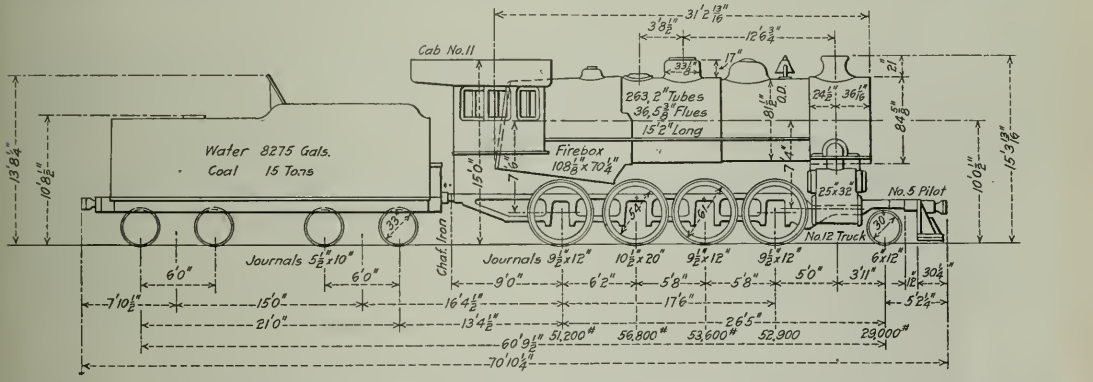
The Chicago & North Western has conducted comparative tests of Consolidation and Mikado locomotives in regular service, which showed the advantages of the Mikado locomotives for through freight service. Both types of engines carried the same boiler pressure, had the same diameter of drivers and length of piston stroke, the difference in power being obtained by a 2 in. larger cylinder for the Mikado locomotives. Two Consolidation engines and two Mikados were used in the tests, the Consolidations weighing 243,500 lb., with a tractive effort of 47,500 lb., and the Mikados 302,000 lb. with a tractive effort of 55,300 lb. The locomotives were built by the American Locomotive Company. The tests were made on the Galena division between Proviso, Ill., and Clinton. Every effort was made to have them as comparable as possible, and as will be noted in the table of results, the elapsed and running times were very nearly the same, and the mileages were practically identical.

The purpose of the tests was to determine the saving that could be made in hauling tonnage trains over this division with the Mikado type locomotive. The longest and heaviest grade going west is reached at La Fox, Ill., about 30 miles from Proviso. It is 1.7 miles long and has a grade of 0.7 per cent. Eastbound the hardest pull is encountered at Creston, Ill., for about five miles, the maximum grade being 0.7 per cent. A dynamometer car was used to record the speed and drawbar pull of the locomotive. Three sets of tests were made; the first, with two Consolidation engines hauling an average of 2,283.88 tons; the second, with two Mikados hauling an average of 2,804.96 tons; and the third with the same two Mikados hauling an average of 2,919.13 tons. The engines used in the respective tests made two round trips, and the tonnage hauled on each of the runs varied but little from the average as given above. The following table gives the average results obtained:

	Test I	Test II	Test III
Type of engine	Consolidation	Mikado	Mikado
Tonnage	2,283.88	2,804.96	2,919.13
Mileage	126.09	126.62	126.15
Time elapsed, hours	7.79	7.74	7.36
Time running, hours	6.15	6.28	5.87
Average drawbar pull, lb.	9,342.6	10,706.5	11,694.5
Average drawbar pull per ton of train, lb.	4.091	3.817	4.006
Coal used, tons	9.864	9.464	10.328
Water used, gal.	14,325	15,516	16,486
Average rate of working, hp.	512.14	577.57	671.33
Ton-miles	287,976	355,163	368,237
Coal used per drawbar hp. hr., lb.	6.254	5.203	5.237
Water used per drawbar hp. hr., lb.	37.96	35.77	35.03
Ton-miles per lb. of coal	14.81	19.26	18.12
Ton-miles per gal. of water	20.11	22.93	22.36

It will be noted that in the second series of tests the Mikado locomotives hauled 22.82 per cent more tonnage than the Consolidations, and in the third series the Mikados hauled 27.81 per cent greater tonnage. It will also be noted that the average drawbar pull per ton of train varied in each set of tests, although every effort was made to have conditions as nearly comparable as possible. For convenience, we will call the tests with the Consolidation locomotives, Test I; the first series of tests with the Mikado locomotives, Test II, and the second series of tests with the Mikado, Test III, as noted at the head of the columns in the table. Comparing Test II with Test I it will be seen that 4.06 per cent less coal was used, and at the same time a saving in the amount of coal per horsepower-hour of 16.81 per cent was obtained. In regard to the water, 8.31 per cent more was used, but a saving of 5.77 per cent was realized in water per horsepower-hour.

Comparing Test III with Test I it will be seen that 4.70 per cent more coal was used, but with a saving of 16.25 per cent in the coal consumption per horsepower-hour. At the same time



Consolidation Locomotive Used in Comparative Tests on the Chicago & North Western

15.09 per cent more water was used, although a saving was made of 7.72 per cent in the water per horsepower-hour.

Comparing Test II with Test III it will be seen that 4.07 per cent greater tonnage was hauled in Test III with an increase in the amount of coal and water used of 9.13 per cent and 6.25 per cent respectively. The coal per horsepower-hour also increased 0.65 per cent, but there was a decrease or a saving of 2.12 per cent in the amount of water per horsepower-hour. The following table gives in further detail the saving made by the Mikado type locomotive over the Consolidation:

PERCENTAGE INCREASE IN TESTS

	II over I	III over I	III over II
Pounds of water evaporated per pound of coal	12.94	10.08	*2.63
Average drawbar pull, lb.	14.60	25.17	9.23
Drawbar pull per ton of train	*6.72	*2.08	4.95
Average rate of working, hp.	12.78	31.08	16.23
Ton-miles per pound of coal	30.00	22.36	*5.87
Average drawbar-pull-miles per pound of coal	19.8	19.6	*0.19
Ton-miles per gallon of water	14.02	11.17	*2.50
Average drawbar-pull-miles per gallon of water	6.25	8.81	2.42

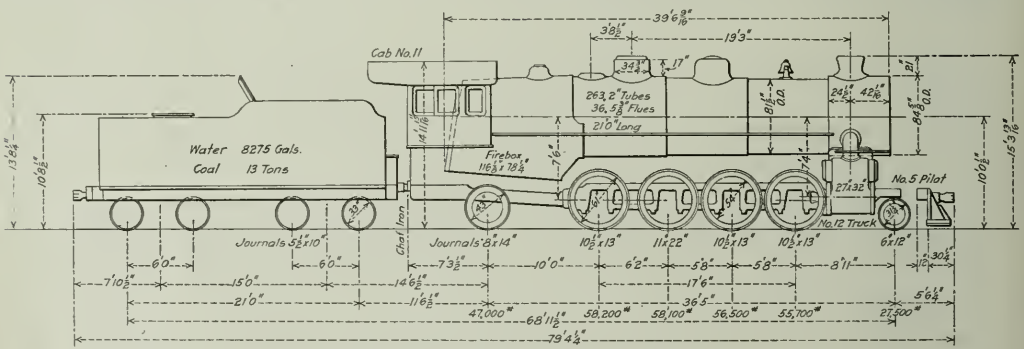
*Decrease.

The evaporation, the horsepower, and the ton-miles per pound of coal and water show a substantial saving for the Mikado locomotives. It will be noted that there is considerable difference between the percentage increase in ton-miles per pound of

coal of Test II over Test I, and Test III over Test I, which is all the more interesting when it is considered that the same engines made Tests II and III. This difference can be accounted for to a certain extent by the differences in the average drawbar pull of the train, or, in other words, the average train resistance. Therefore, if, instead of comparing ton-miles, the drawbar-pull-miles are compared, it will be found that the increase of Test II over Test I in drawbar-pull-miles per pound of coal is only 19.8 per cent, and in Test III over Test I the increase is 19.6 per cent, which shows less variation on account of the increase in tonnage.

Another important item shown in the second table is the percentage increase of the average drawbar pull of Test III over Test I, the amount being 25.2 per cent. Since there is only a difference of 16.2 per cent in the rated tractive effort of the two types of locomotive, this may be explained by the difference in their boiler capacities. According to the American Locomotive Company's method of calculation, the Consolidation has a 97.5 per cent boiler, while the same calculation for the Mikado gives 103 per cent, showing that the Mikado has a relatively larger steaming capacity. Further evidence that the Consolidation engines had more difficulty in generating the required amount of steam is shown by the fact that an average of 47.8 lb. of coal was burned per square foot of grate area per hour during the elapsed time in contrast to the Mikado locomotives burning

Ratios		
Weight on drivers ÷ tractive effort	4.52	4.12
Total weight ÷ tractive effort	5.13	5.45
Tractive effort × diam. drivers ÷ equivalent heating surface*	730	610
Equivalent heating surface* ÷ grate area	75	87.6
Firebox heating surface† ÷ equivalent heating surface,* per cent	6.1	5.49
Weight on drivers ÷ equivalent heating surface*	54	41.1
Total weight ÷ equivalent heating surface*	61.4	54.6
Volume both cylinders, cu. ft.	18.16	21.18
Equivalent heating surface* ÷ vol. cylinders	218.5	261
Grate area ÷ vol. cylinders	2.92	2.98
Cylinders		
Kind	Simple	Simple
Diameter and stroke	25 in. by 32 in.	27 in. by 32 in.
Wheels		
Driving, diameter over tires	61 in.	61 in.
Driving, thickness of tires	3½ in.	3½ in.
Driving journals, main, diameter and length	10½ in. by 20 in.	11 in. by 22 in.
Driving journals, others, diameter and length	9½ in. by 12 in.	10½ in. by 13 in.
Engine truck wheels, diameter	30 in.	31¼ in.
Engine truck, journals	6 in. by 12 in.	6 in. by 12 in.
Trailing truck wheels, diameter	.....	43 in.
Trailing truck, journals	.....	8 in. by 14 in.
Boiler		
Style	Straight	Straight
Working pressure	170 lb.	170 lb.
Outside diameter of first ring	81½ in.	81¼ in.
Firebox, length and width	108 in. by 70 in.	116 in. by 78 in.



Mikado Type Locomotive Used in the North Western Tests

38.8 lb., and 44.5 lb. in Tests II and III respectively. The pounds of water evaporated per square foot of heating surface per hour for the elapsed time shows substantially the same difference.

In comparing the ton-miles per pound of coal and per gallon of water of Test III with Test II it will be seen that the hauling of the increased tonnage in Test III was accomplished at a sacrifice of efficiency in the amount of coal and water used. However, this decrease in efficiency will not be as large if the difference in the train resistance or average drawbar pull per ton of train is considered. Making a correction in this case, as was done before, the loss would be only 0.19 per cent in the drawbar-pull-miles per pound of coal, and there would be an increase in drawbar-pull-miles per gallon of water of 2.42 per cent.

The principal dimensions and ratios of the two locomotives tested are given in the following table:

General Data		
Type	Consolidation	Mikado
Service	Freight	Freight
Fuel	Bit. coal	Bit. coal
Tractive effort	47,500 lb.	55,300 lb.
Weight in working order	243,500 lb.	302,000 lb.
Weight on drivers	214,500 lb.	227,500 lb.
Weight on leading truck	29,000 lb.	28,000 lb.
Weight on trailing truck	.....	46,500 lb.
Weight on engine and tender in working order	409,300 lb.	467,500 lb.
Wheel base, driving	17 ft. 6 in.	36 ft. 5 in.
Wheel base, total	26 ft. 5 in.	17 ft. 6 in.
Wheel base, engine and tender	60 ft. 9 in.	69 ft.
Tubes, number and outside diameter	263—2 in.	263—2 in.
Flues, number and outside diameter	36—5¾ in.	36—5¾ in.
Tubes, length	15 ft. 2 in.	21 ft.
Heating surface, tubes	2,838.7 sq. ft.	3,937.3 sq. ft.
Heating surface, water tubes	28 sq. ft.	29.60 sq. ft.
Heating surface, firebox	186 sq. ft.	230 sq. ft.
Heating surface, total	3,053 sq. ft.	4,197 sq. ft.
Superheater heating surface	610 sq. ft.	890 sq. ft.
Equivalent heating surface*	3,968 sq. ft.	5,532 sq. ft.
Grate area	53 sq. ft.	63.1 sq. ft.
Tender		
Tank	Water bottom	Water bottom
Wheels, diameter	33 in.	33 in.
Journals, diameter and length	5½ in. by 10 in.	5½ in. by 10 in.
Water capacity	8,275 gal.	8,275 gal.
Coal capacity	15 tons	15 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

CHRISTMAS RAILWAY TRAFFIC IN BERLIN.—The elevated and underground railways of Berlin carried on Christmas eve and during the Christmas holidays, in round numbers, 750,000 paying passengers against 1,028,000 last year.

RAILWAY SERVICE IN BELGIUM.—The German government in Brussels has announced that from the beginning of January railway traffic in Belgium will be greatly improved. Several new trains have already been added and traffic between Antwerp and Brussels is regular, though the journey still takes two hours. The Belgian railway lines have been exploited by the German authorities since November 19.

CAR POOLING ARRANGEMENT ON INTERNATIONAL & GREAT NORTHERN AND SUNSET-CENTRAL LINES

An interesting arrangement was entered upon on October 1, 1914, by the Sunset-Central Lines and the International & Great Northern under which the freight cars of both railways are used in common, for the purpose of increasing car efficiency and decreasing operating expenses. The plan was adopted experimentally and after a two months' trial it was found that it had equalled, if not exceeded, the expectations of both parties, to the extent that it is now deemed advisable to include other carriers. At least three others have expressed a desire to join in the plan, and it is likely therefore that an expansion for trial purposes will shortly take place. A joint statement outlining the working out of the arrangement during the months of October and November has recently been prepared by J. B. Heafer, superintendent of transportation of the International & Great Northern, and O. C. Castle, car service agent of the Sunset-Central Lines.

The agreement between the two roads provides that each may use as its own the freight cars of the other; that, is those bearing the initials of the International & Great Northern, the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, the Houston, East & West Texas, the Houston & Shreveport, the Iberia & Vermillion, the Louisiana Western, Morgan's Louisiana & Texas and the Texas & New Orleans. The agreement also provides that such cars may be loaded in any direction without regard to the car service rules and without incurring penalty under per diem Rule 19 of the American Railway Association. Either subscriber may include as its own, cars which do not bear its initials by filing with the other subscriber the authority of the owning road.

Each road undertakes to supply an equal number of cars under this agreement. When a road has provided an excess of cars equal to 10 per cent more than the other subscriber, the creditor road may make demand by telegraph or telephone upon the designated officer in charge of car distribution of the debtor road for an equalization within seven days, the demand to be confirmed by letter. The debtor road may then equalize by delivering to the creditor the requisite number either of the creditor road's cars or the debtor road's serviceable cars.

Failing to equalize within the prescribed period the debtor is to pay to the creditor $2 per car per day for the excess number of cars then or thereafter in the possession of the debtor, beginning after midnight of the sixth day following the date of the written demand, and continuing until equalization is made. This rate is to be in addition to the regular per diem rate.

If the records of the creditor and debtor subscribers differ as to the number of cars necessary to the equalization, it is to be made on the basis of the average of the statement of the two subscribing roads. Payment is to be made within 30 days after the close of each month, based on actual figures ascertained by joint check. The agreement provides that it may be terminated upon 30 days' advance notice in writing served by the subscriber desiring to terminate the agreement. Misunderstandings which cannot be promptly settled are to be referred to the per diem rules arbitration committee of the American Railway Association, as provided in the case of disputes under the regular per diem rules.

The joint statement prepared by Mr. Heafer and Mr. Castle is in part as follows:

"As illustrative of the cars involved at the commencement of the plan, namely October 1, and at the close of November, the following figures are presented:

	Nov. 30, 1914	Sept. 30, 1914
I. & G. N. cars on Sunset-Central	469	117
Sunset-Central cars on I. & G. N.	394	123
Bal. vs. I. & G. N.	..	5
Bal. vs. Sunset-Central	75	..

"The balance is kept account of daily. Each road furnishes figures showing the number of the other road's cars on its line. This maintenance of a practical balance throughout the two months' trial has been automatic, no demand for or offer of equalization having been made.

"From time to time local exceptions have been made to accomplish an economical distribution of cars for the two systems. For instance, at Houston the I. & G. N. received from the Sunset-Central Lines, coal cars loaded with gravel, stone, etc., for local delivery, which cars were not needed at or near Houston by the I. & G. N., and were needed by the Sunset-Central Lines. The I. & G. N., therefore, honored orders from the Sunset-Central Lines for a number of empty coal cars daily equal to the number of I. & G. N. and Sunset-Central coal cars delivered under load by the Sunset-Central Lines to the I. & G. N., at Houston, for local switching. At San Antonio the situation is reversed, coal cars being delivered by the I. & G. N. to the Sunset-Central Lines in switching service, and returned to the I. & G. N. empty on open orders. These empty returns, brought about by the local arrangements referred to, would have occurred even though the two lines had constituted one single system. These open orders are filled with cars of either ownership, which makes for economy in switching.

"As illustrative of cars interchanged in September, the month immediately preceding the inauguration of the plan, and November, under the agreement, the following figures are presented:

	November, 1914			September, 1914		
	Loaded	Empty	Per cent Empty	Loaded	Empty	Per cent Empty
I. & G. N. cars received by S.-C. L.	534	207	27.9	570	126	18.4
I. & G. N. cars delivered by S.-C. L.	472	189	28.6	217	465	68.1
S.-C. L. cars received by I. & G. N.	765	194	20.2	268	42	13.5
S.-C. L. cars delivered by I. & G. N.	521	382	42.3	103	176	63.1

"It will be noted that a striking reduction has taken place in the percentage of empty cars to the total deliveries. The delivery by the I. & G. N. of Sunset-Central empties dropped from 63.1 per cent to 42.3 per cent, and the delivery by the Sunset-Central Lines of I. & G. N. empties dropped from 68.1 per cent to 28.6 per cent.

The instructions issued by the Sunset-Central Lines governing the handling of International & Great Northern cars on the Sunset-Central Lines, signed by O. C. Castle, car service agent, with the approval of F. M. Lucore, assistant general manager, illustrate some of the details of the operation of the plan. They include the following:

1. Cars for Loading: Any I. & G. N. car may be placed for loading under the same conditions that govern the use of Sunset-Central cars. This includes loading to foreign lines when necessary.

2. Empty Cars: Good order I. & G. N. cars, when empty, will be handled the same as system cars. They will not be returned to owner unless so ordered by the car service agent, and when they are not needed for loading they will be stored at the nearest available point.

3. Bad Order Cars: Bad order I. & G. N. cars may be given the same attention as system cars, except when otherwise ordered by the mechanical department, but repair bills will be made under the M. C. B. rules the same as heretofore.

4. Acceptance from Foreign Connections: I. & G. N. cars not routing home via the Sunset-Central will be accepted from other foreign lines on special instructions from car service department.

5. Home Route Cards: The use of Form 4005, home route cards, will be discontinued on I. & G. N. cars.

6. Sunset-Central Cars Offered for Home: We will not receive our cars empty from the I. & G. N., unless they are moving under M. C. B. home route cards, for equalization or on orders for cars to load, advice of which must be received through the car service department.

7. Equalization: The car service department will keep a record of the car balance, and, when necessary to equalize, it will order the delivery or receipt of a given number of cars via various specified junctions. When such instructions are received equalization may be made in cars of either ownership or of any class, unless instructions provide otherwise.

LOCOMOTIVE SUPERHEATERS

The discussion of the report on "Steam Locomotives of Today" before the December meeting of the American Society of Mechanical Engineers brought out some interesting data on superheaters. Extracts from the discussion follow:

DISCUSSION BY GEORGE L. BOURNE

Geo. L. Bourne, vice-president, Locomotive Superheater Company: The locomotive boiler, when considered for the application of a superheater, presented many limitations that necessarily have an important bearing on the design and construction of the superheater. These limitations are more readily appreciated when it is remembered that the development of the locomotive, within certain fixed side and overhead clearances, has been dependent on the size of the boiler; that is, as the size of the locomotive has grown, each pair of wheels has been added to obtain proper weight distribution in order to accommodate increased boiler sizes. As a natural consequence of these conditions, the boiler is no larger than is absolutely necessary; in fact, in the majority of cases it is insufficient in evaporating surface and we have what is commonly termed a locomotive that is overcylindered.

The application of the superheater to this boiler, frequently inadequate as to heating surface, necessitates a reduction of about 15 or 20 per cent in the tube heating surface. This is occasioned by the use of the large flues in which the superheater units are located. Furthermore, a certain percentage of the gases which formerly were all available for evaporation of the water must now be used for superheating the steam, since the superheater does not provide for any increase in the maximum rate of combustion. Taking this boiler with

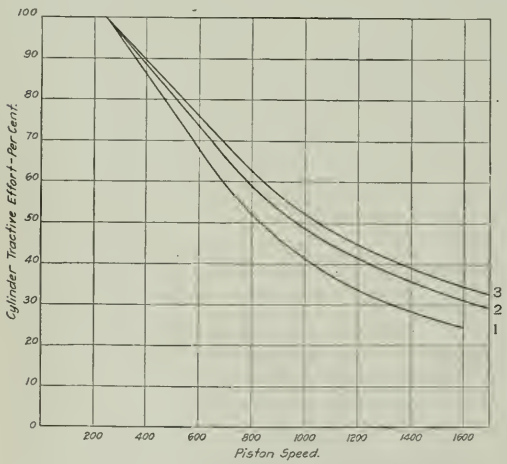


Diagram Showing Possibilities of Superheating

its deficiencies, the superheater designer has been able to produce an economy of 25 per cent in fuel, as a direct result of saving one-third of the total water evaporated per unit of power developed. As a result of this fuel economy, greater capacity of the locomotive has resulted.

As an illustration of this fact, the accompanying diagram is presented. It shows cylinder tractive effort in per cent plotted against piston speed. The lowest curve, No. 1, very fairly represents the speed factor for an average saturated steam locomotive. Curve No. 2 similarly represents the average modern superheated steam locomotive, using between 200 and 250 deg. of superheat. The greater tractive effort available is due to the fact that a longer cut-off is possible with the superheater engine at comparative speeds. The limiting factor at the usual speeds is the ability of the boiler to furnish steam.

These results have been accomplished in the face of boiler limitations, parts of the locomotive not adaptable to the use of highly superheated steam, and lack of experience in the organization which must handle the locomotive. The problems incident to these conditions are rapidly being worked out, and results shown by the superheated steam curve will soon be as basic as the saturated steam locomotive curve was a few years ago. The future then holds a possibility for further saving by increasing the degree of superheat.

The superheater engineer has only made use, thus far, of the same variety of flue sizes as was used by the locomotive designer for tube sizes. If the superheater designer is permitted the use of a size different from the two present standards, it is possible to obtain in a superheater boiler an evaporating surface practically as great as in the saturated steam boiler. The superheating surface in this case will be a net gain to the heat absorbing surface of the boiler. With a boiler and superheater thus arranged, greater capacity may reasonably be expected, and a curve approximately that shown as No. 3 may be confidently looked forward to in the near future.

Where the operation of superheater locomotives has become as much the standard practice as the operation of saturated steam locomotives was a few years ago, and where the question of coal economy is of vital importance, consideration of the possibility of reaching locomotive power to the amount represented by curve No. 3 cannot be refused. For some time past large passenger locomotives have been operated very successfully with steam chest temperatures running between 750 and 800 deg. F. Curve No. 3 is representative of locomotives using this degree of steam chest temperature, which means 350 to 400 deg. of superheat.

DISCUSSION BY C. D. YOUNG

C. D. Young, engineer of tests, Pennsylvania Railroad, stated: It has been proved that economy due to superheating increases almost directly with the degree of superheat, and the usual type of fire tube superheater produces its maximum superheat only when it is forced close to the limit of boiler capacity, these facts having been developed and recently published by the Pennsylvania Railroad in bulletin No. 24, entitled "Superheater Tests." This condition is not altogether desirable, as the maximum economy should be obtained when the locomotive is working under moderate or average conditions and at an economical cutoff. A superheater that would give a uniform superheat under all conditions of working would apparently produce ideal results.

If our materials in valves, cylinders and packing, as well as the lubrication, will withstand a certain high degree of superheat, there is no reason why we should not furnish this degree of superheat, regardless of the boiler rate, in order to effect the greatest economy in steam. With the usual Schmidt superheater we have observed steam temperatures as high as 670 deg., corresponding to a superheat of 291 deg. at the steam chest pressure, which was 180 lb., while the boiler pressure was 206 lb. With these conditions the steam rate per horsepower hour was 19.3 lb., the speed 47 miles per hour and the cut-off 50 per cent. With this superheat and a cut-off of 25 per cent it is reasonable to suppose that a water rate approximating 15 lb. could be obtained. For this reason, I am pointing out the desirability in future designs of superheaters to produce, if it is possible, a superheater that will give us a uniform superheat, regardless of the evaporation of the boiler, and until such a superheater has been produced, the maximum economy and capacity from the boiler cannot be obtained under all working conditions.

Arbitration of Engineers' and Firemen's Demands

Witness for the Employees Attempts to Show That Productive Efficiency Has Increased Faster Than Wages

The hearing before the board of arbitration on the wage demands of the engineers and firemen employed on the railroads west of Chicago, which had been adjourned over the holidays, was resumed at Chicago on January 4, and the principal witness throughout the week was W. J. Lauck, statistician for the engineers and firemen. Mr. Lauck's testimony was based mainly on a series of elaborate statistical exhibits. He said the engineers and firemen never have conceded that the settlement of 1909 and 1910 was full, complete or satisfactory. "It was simply the best we could get at that time under the existing conditions," he said, "and without resorting to the drastic measures of a strike, so that the question before this board today is not an arbitration of the conditions of 1914 over 1910, but of questions that have been in dispute since 1890."

Warren S. Stone, grand chief of the engineers, said it was proposed to show by these exhibits that during the past 24 years the western railroads have made remarkable gains in productive efficiency, which have been followed by a threefold effect upon engineers and firemen, increasing their labors and rsponsibilities, increasing their productive efficiency, and reducing their earning capacity even at the increased rates of payment. He said that the tendency is to add still further to the trainloads and make still further increases in the labor and responsibilities of the engineers and firemen, and that the revenue gains arising from the advances in efficiency have been sufficiently great to pay all increases in operating costs, as well as reasonable returns on additional capital investment, and in addition to leave an ample surplus to remunerate engineers and firemen. He said it was expected to show also that the increased operating costs have not been due to additional outlays for labor, and that as a matter of fact labor costs of operation have actually declined.

The witness first introduced three exhiibts entitled "Increased Work and Productive Efficiency of Locomotive Engineers and Firemen," for the periods 1890 to 1913, 1900 to 1913 and 1909 to 1913. The comparative statement for 24 western roads from 1890 to 1913 showed that freight ton miles had increased 343 per cent, ton miles per freight train mile 163 per cent, freight train miles 68.8 per cent, and coal consumed 305 per cent, while the ton miles for each $1,000 of outlay for engineers, or their "productive efficiency," had increased 161 per cent, and for firemen 141 per cent. The number of engineers and firemen in freight service had been obtained by dividing the total number in freight and passenger service on the revenue train mile basis. Comparing 1900 with 1913 the exhibit showed that the ton miles per $1,000 compensation to freight engineers had increased 18 per cent and to firemen 14 per cent, for 40 representative western roads. Comparing 1909 with 1913 the exhibit showed that the ton miles per $1,000 compensation to freight engineers had increased 4.68 per cent, and in the case of freight firemen had increased 4.55 per cent, for 78 representative western railroads. "This exhibit shows," he said, "that freight train, freight locomotive and total revenue train mileage have not increased proportionately with other factors. As a consequence, although the rate of pay per locomotive mile may have increased, the earnings of employees are smaller now than formerly because of the impossibility of making more mileage."

Mr. Lauck was questioned at considerable length by members of the board of arbitration as to his views as to how wage increases should be related to the "productive efficiency" of the men and of the roads. He thought the men ought to share in the increased productivity of a road, and that in the case of "an economic advancement" labor should participate in the productive gain, even though it may be an unearned increment, but in the case under discussion he thought increased requirements had been placed upon the men and that they have a reasonable ground for requesting to participate further in results of the productive efficiency which had grown out of the co-operation of both labor and capital. He said he did not believe in leveling up people by the force of bargaining power, but that if standardization were based on the size of the engines and applied to average conditions a man would be required to perform the work required by the size of his engine, that the railroads should see to it that they do not have men below the average of competency, and that an unusually efficient man should be compensated in some way for his increased efficiency.

James B. Sheean, attorney for the General Managers' Conference Committee, asked if there should be some consequent reduction in the pay of men because of decreased efficiency in the passenger service. Mr. Lauck replied that he did not think the engineers should be held responsible for the lack of productive efficiency, if the railroads through competition ran too many passenger trains. That was a condition over which the engineer had no control.

Mr. Lauck's exhibits also gave figures for individual roads and groups of roads as to increases in efficiency, but by applying the same methods to the operations of the Chicago, Rock Island & Pacific it was shown that notwithstanding the increased efficiency of the road the ton miles per $1,000 outlay for engineers and firemen had decreased. Mr. Sheean asked many questions in the effort to bring out why this condition existed, and the witness said he was unable to give any satisfactory explanation, except that there was something the matter with the financial management. The Rock Island for the period 1890-1913 showed an increase in freight trainload of 106 per cent, an increase in ton mileage of 302 per cent, handled by an increase in freight train miles of only 73.27 per cent, but there was a decrease in the number of ton miles hauled per $1,000 of outlay for engineers and firemen.

In an exhibit on "Revenue Gains Arising from Increased Productive Efficiency," Mr. Lauck gave figures to show, for 24 representative western railroads, the increased cost of engineers and firemen and revenue gains per revenue train mile from 1890 to 1913. These showed that while the cost of engineers had increased 2.20 cents per train mile and firemen 1.59 cents, and the total cost of engineers and firemen 3.79 cents, total operating expenses per revenue train mile had increased 68.53 cents, and total operating revenue 95.4 cents, making a net gain in operating revenue of 26.87 cents per revenue train mile. "The increased productive efficiency of labor and capital engaged in conducting transportation on these railroads, therefore," he said, "not only reimbursed the company for added costs but also yielded a handsome profit. It is at once evident that reasonable wage increases to enginemen would absorb only a very small portion of the net gain realized during the period under consideration." In an exhibit giving similar figures for the period 1900 to 1913, he showed an increased outlay per revenue train mile for locomotive engineers and firemen of 4.08 cents. During the same period there was an increase in total operating expenses of 57.46 cents, and in operating revenues per revenue train mile of 73.48 cents, leaving a net gain in operating revenue over and above all additional expenses of operation for 48 representative western roads of 16.02 cents. Mr. Byram commented on the fact that in these tables he had figured increases in cents instead of in percentages. Another exhibit gave the same comparisons for 1909 to 1913.

Three exhibits entitled "Increased Operating Costs of Western Railroads Not Due to Wage Payments to Locomotive Engineers and Firemen," covered the periods 1890 to 1913, 1900 to 1913, and 1909 to 1913. The first exhibit showed that the ratio of total

cost of engineers and firemen to total operating expense in 1890 was 9.89 per cent. In 1913 the proportion was 8.06 per cent. Mr. Sheean showed, however, that there had been a considerable change in the accounting methods affecting operating expenses during the period. The exhibit comparing the years 1909 and 1913, showed that total labor costs constituted a larger proportion of operating expenses in 1913 than in 1909, but Mr. Lauck said that the advance was not due to added outlays during this period for engineers and firemen. The ratio of the cost of engineers and firemen to total operating expenses was given as 7.85 per cent in 1909, and 7.94 in 1913. Moreover, the ratio of the cost of engineers and firemen, as well as the ratio of the total labor cost of transportation to the total labor cost of operation, he said, was less in 1913 than in 1909. The advance in labor costs, he said, has been primarily due to additional payments to labor engaged in maintenance work.

Mr. Lauck was asked both by Mr. Sheean and by Mr. Nagel whether, on account of the increased efficiency of a road, employees should receive additional compensation, whether or not they were employed in the department in which the increased efficiency was shown, or whether or not they personally contributed to the increased efficiency. He cited the case of the Ford Motor Company as one of remarkable productive efficiency developed by managerial ability, in which a large part of the profits were distributed among the employees, although he said, they probably did not contribute very much to the increased efficiency. "If we are going to have industrial progress," he said, "we ought to give participation to the worker after a fair remuneration has been given to capital for risk and managerial ability."

One exhibit was made up of quotations from the article published in the *Railway Age Gazette* of April 10, 1914, on "The Possibility of Future Increases in Train Loads," which the witness said was to show that the railroad presidents expect a further increase in freight trainloads.

An exhibit entitled "Revenue Gains by Representative Western Railroads Available to Compensate Locomotive Engineers and Firemen for Increases in Work and Productive Efficiency," showed that for 43 representative western roads the average gross corporate income per year had increased for the five years ending with 1913 over the five years ending with 1908, by $122,321,295, and that after subtracting $26,116,487 for "deductions except interest on funded debt and appropriations for reserves, etc.", there was left $96,204,808 a year, which the witness called "net amount available for distribution to capital because of additional investments; to labor because of increased efficiency, and to reserves for emergency purposes." Of the $96,000,000 the witness allowed 48 per cent, or $45,663,679, "for a fair return to capital for additional investment, at 4 per cent," but in obtaining the "additional investment" he subtracted from the expenditures for road and equipment the amount appropriated from income, which was $89,912,702. The remaining 52 per cent of the $96,000,000, or $50,541,120, the witness said was the "balance remaining to compensate increased labor efficiency and to appropriate for reserves." If an advance of 10 per cent be allowed on the total labor costs for engineers and firemen on these railroads during the year ending June 30, 1913," he said, "it would amount, approximately, to only $6,748,600; an advance of 15 per cent to only $10,122,900; of 20 per cent to $13,497,200; and of 25 per cent to only $16,871,500. It is, therefore, clear that even if capital, including commitments made from earnings during the five years, 1908-1913, were allowed a much larger return than 4 per cent, there would still be an ample amount of net revenues remaining to grant reasonable advances to engineers and firemen and other classes of labor."

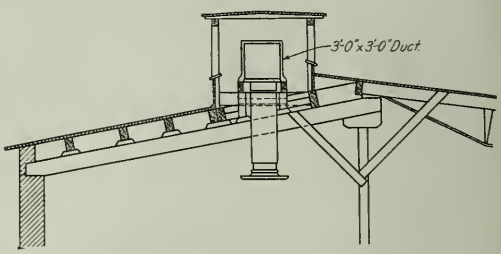
Mr. Byram asked how much of the $50,000,000 the witness thought should go to the engineers and firemen, in view of his statement that their productive efficiency had increased about 5 per cent in 1913 over 1909. Mr. Stone interrupted and said that there "would still be plenty for the board to divide up after allowing for necessary reserves."

SMOKE EXHAUSTER FOR THE ST. PAUL ENGINE HOUSE AT CHICAGO

By W. S. Lacher

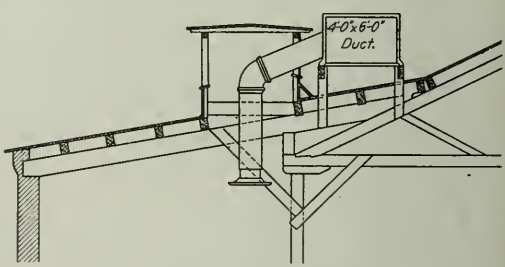
Office Engineer, Chicago, Milwaukee & St. Paul, Chicago, Ill.

The Franklin boulevard engine house of the Chicago, Milwaukee & St. Paul is located, as the name suggests, on a boulevard of one of the park systems in the city of Chicago and within a short distance from a high grade residence district. The house



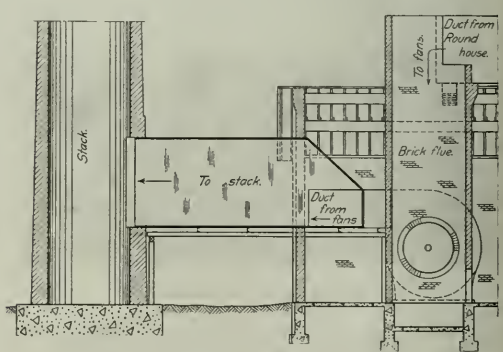
Section Through New Part of Roundhouse

contains 35 stalls and is used almost exclusively for passenger locomotives, the smoke from which is greatest in the early hours of the afternoon when the engines are being fired-up for through and suburban trains departing from Chicago between 5:00 and



Section Through Old Part of Roundhouse

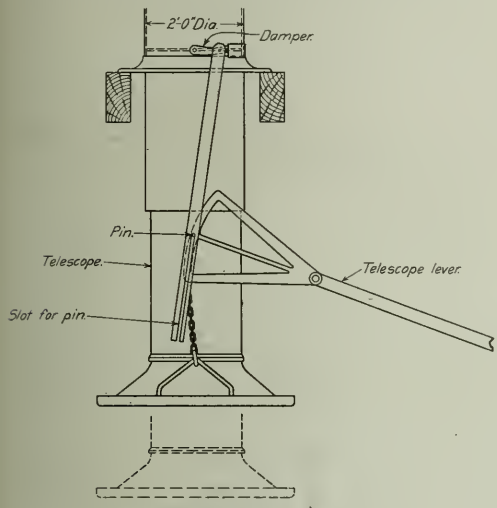
7:00 p. m. In order to overcome this nuisance it was decided to install a plant for diluting the smoke by means of steam and air, at the same time retaining the soot within the plant.



Section Through Fan House and Chimney

The equipment consists of a system of ducts for collecting the discharge from the various smokejacks, two exhaust fans, a chimney to discharge the gases at a good height above the street,

and dampers for all smokejacks so that they may be shut off when not in use, thereby reducing the load on the fans. Non-corrosive material was adopted for all parts of the apparatus where practical. The ducts are of cast iron, the blades of the fan are made 50 per cent thicker than the standard and the chimney and smoke flues are of brick. The fans and chimney are located outside of the roundhouse, about equi-distant from each end, which made it necessary to have two branches of



Automatic Damper for Smoke Jack

ducts. These vary in size, diminishing as they get farther from the stack. The roundhouse consists of an old section, with a new section added to each end. It was necessary to place the smoke ducts for the old section on the roof, as indicated in the drawing, but in the new sections they are placed in the monitors. It has been found that the cold winter air will condense the steam conducted through the exposed ducts, and the water

Smoke Ducts on the Roundhouse Roof

mixing with the soot will form a black fluid which leaks through the joints of the ducts to the roof; on account of this it is planned to house them in.

Various materials were considered for the construction of the ducts, including steel sheets or plates, reinforced concrete, vitrified pipe, metal lath and plaster, asbestos boards and cast iron. The latter was adopted, the considerations affecting the selection being permanence, first cost, strength and weight to be carried. The ducts were manufactured and erected by the Paul Dickinson Company, Inc., Chicago, from its own detail plan, based on the general plan supplied by the railway company. They are provided with expansion joints at proper intervals. These ducts terminate in a brick structure, as shown in the photograph, which is provided with two flues, one for each branch of the ducts. The partition between these flues extends below the level of the fans, one fan being connected to each flue. Dampers are arranged in the flues so that the fans may be used either together or alone.

The fans were made by the New York Blower Company and have a rated capacity of 46,000 cu. ft. per min. at a speed of 206 r. p. m. They discharge into a duct which leads to a radial brick chimney, 10 ft. in diameter and 100 ft. high. Above this duct a 1¼-in. steam pipe, which feeds a perforated coil with live steam, is tapped into the chimney. This has been found necessary in order to sufficiently dilute the smoke. Automatic dampers, as shown in one of the illustrations, are provided at each of the smokejacks; these open and close automatically with the raising and lowering of the jack. The damper will open with 3 in. initial downward travel of the jack, the mechanism being so arranged that it will not interfere with the lowering of the jack to its full travel.

The plant was placed in operation about a year ago, and experience has shown that it is quite necessary to have the dampers closed when the jacks are not in use in order to properly catch all the gases from the smoking engines. The nature of the discharge from the chimney varies with the number of engines smoking and the quantity and density of the smoke from each. In winter it has the appearance of white or dirty-white steam. As there are still some complaints from the residents in the neighborhood it has been recently decided to install a smoke-washing device in the chimney, the details of which are still in a preliminary state. As anticipated, there is an accumulation of soot in the ducts, but as yet it has not been found necessary to remove it. Manholes are provided in the ducts at each stall for this purpose. No deterioration of any part of the plant has been noted thus far. The engineering department of the Chicago, Milwaukee & St. Paul, under the direction of C. F. Loweth, chief engineer, designed the plant and supervised all of the construction work.

REPORT OF THE DIVISION OF SAFETY, I. C. C.

The Interstate Commerce Commission has issued a pamphlet of 44 pages containing the annual report of H. W. Belnap, chief of the division of safety. The inspectors of the division during the last fiscal year inspected 790,822 freight cars, 26,746 passenger cars and 32,761 locomotives. The percentages found not complying with the laws in regard to safety appliances are exceptionally low. The usual tables are given showing the percentages of each class of defect; and roads on which 500 or more cars were inspected during the year are shown in a separate table, giving the number of defects of each kind found on each road. A similar table, by roads, gives the results of terminal tests of air brakes, in trains. A fifth table shows the amounts of penalties paid, since the enactment of the safety appliance laws, and up to October 1, 1914, by all roads, for violation of the safety appliance laws. These amount to $643,844. This list names about 275 roads.

The inspectors find that many roads are not diligently fitting their cars, as required by law, so that by July 1, 1916, they will conform to the safety standards prescribed by the commission. The report recommends that all carriers be required to report the condition of their cars, in this respect, every three or six months.

The report discusses difficulties at points where freight cars are interchanged between roads, and intimates that the inspectors at these places do not always have a sufficiently thorough knowledge of the safety appliance acts and of the orders which

the commission has issued concerning their administration. The use of conductors' valves and air gages in cabooses is increasingly important, because of the increasing length and weight of trains. This part of the report ends with the declaration that the railroads generally have manifested "an admirable spirit of co-operation which has contributed immeasurably to an effective administration of the law."

The division of safety investigates automatic train stops and other inventions presented to the commission, following the plan that was in vogue during the life of the Block Signal and Train Control Board, which was abolished in 1912. Out of a large number of devices presented the Division has examined 184, and opinions regarding them have been transmitted to the proprietors. Of these devices 22 were held to possess merit sufficient to warrant experimental tests, provided the proprietors should present installations prepared free of cost to the government. Of these 22 devices, seven are automatic stops presented by the following: Willson-Wright Safety Appliance Company, Spokane, Wash.; Automatic Train Control & Signal Company (Gray-Thurber), Pittsburgh, Pa.; A. D. Pond, New Britain, Conn.; Railway Automatic Safety Appliance Company, Philadelphia, Pa.; Jones Safety Train Control System Company, Baltimore, Md.; Gollos International Automatic Train Control & Recording Co., Chicago, Ill.; B. F. Wooding, Denver, Colo. Automatic train pipe connectors were presented by J. R. Cobb, Los Angeles, Cal.; Furbin Automatic Train Pipe Connector Company, St. Louis, Mo.; W. C. White, Baltimore, Md. Other inventions in the list are a car coupler, a gasket for hose coupling, an air-brake system, a rail brace, a side-clearance telltale, etc. The Division has made favorable reports on the Gray-Thurber automatic stop and the Robinson connector. The automatic stop of the Jones Signal System Company of Atlanta, Ga., was tested, but without favorable results. The Miller automatic stop on the Chicago & Eastern Illinois was inspected last March.

The report includes a dozen pages of matter which has already been published, in the annual report of the commission.

ELECTRIC TRAIN STAFF ON THE CANADIAN PACIFIC

By E. S. Taylor

Assistant Signal Engineer, Canadian Pacific, Montreal

The Canadian Pacific has in service a number of installations of electric train staff on single-track sections where traffic is heavy, notably on the Lake Superior division, which is not completely double-tracked and where the staff system was installed on all single-track portions in order to eliminate the delays and inconveniences due to the use of train orders. On other sections, for the purpose of providing for certain junctions and intermediate sidings, several modifications have been devised.

The staff instruments are type S miniature instruments, made by the Railway Signal Company, of Liverpool, England. Metallic circuits are used, and to prevent the possibility of a careless maintainer reversing the polarity, current for the operation of the instruments is furnished by magneto-generators equipped with two tapper keys, so that one magneto provides current for the block on either side of the station. These keys are mechanically interlocked to prevent the current from being sent in both directions at the same time. Each instrument is equipped with an indicator showing "staff out; line blocked," when a staff has been withdrawn from either instrument, and "staff in; line clear," when no staff is out. The train staffs are made in such a manner that it is impossible for the staff belonging to one block to be inserted in the instrument of an adjoining block. Permissive movements are made by means of a staff which is divisible into two parts. These parts must be screwed together before the staff can be replaced in the instrument. The capacity of each instrument is 40 staffs, and at stations where the permissive feature is used, 20 of these are divisible. Each station has a telephone, which is worked over the staff line wire.

On staff sections where there are few train movements at night, an "automatic operator" has been installed. A stick relay, the armature of which is balanced and on which there is one

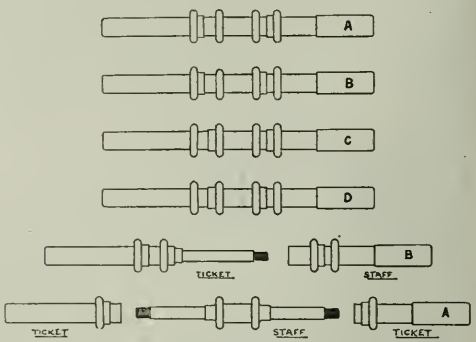


Fig. 1—Divisible Electric Train Staff

normally closed and one normally open contact, the other members of these contacts being on pivoted weights, provides the automatic feature. When the relay is energized the armature is rotated in a direction to cause it to lift the weight

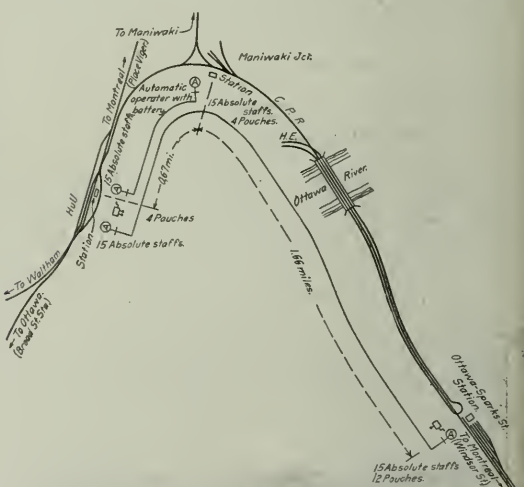


Fig. 2—Hull-Ottawa Staff Section

on which the normally closed contact is fixed, and when current is broken, the weight causes the armature to rotate in the opposite direction a sufficient distance to close the

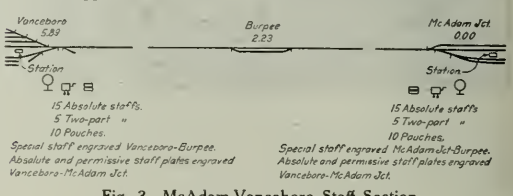


Fig. 3—McAdam-Vanceboro Staff Section

other contact and cut in a local battery which energizes a coil to release the staff at the opposite end of the block. It is possible to operate a staff block without an operator at either station, by using this attachment at both ends.

In a staff block between Hull and Sparks street station, Ottawa, it was necessary to install an auxiliary pair of instruments at Manawaki Junction on account of a branch line connecting at that point. The four instruments are alike and a staff from one may be deposited in any other; and a train obtaining a staff for this block may move between any two of the instruments. When all staffs are in the instruments one or the other of the two pairs of instruments is out of phase, and a staff can be obtained only from the pair which is in phase. Thus when a train starts from one block instrument, having taken a staff out of the only pair which is in phase, this throws the remaining pair of instruments out of phase at the opposite end of the block so that no staff can be obtained at that end. This arrangement could be used with a greater number of auxiliary pairs.

A special staff block has been installed at Burpee, between McAdam Junction, N. B., and Vanceboro, Me. When it is desired to have two trains meet at Burpee, special staffs are used. At McAdam, which is the initial station, a special instrument is provided, having two drawers. The top drawer, containing the special "passing staff," is mechanically locked in the closed position, while the bottom drawer is normally open and cannot be closed until a regular staff has been inserted. At Vanceboro, a similar instrument is provided, but the top drawer is normally open. This is called the dummy drawer, as it is used only for the operation of the circuit controller and no staff is ever placed in it. The bottom drawer contains the special passing staff and is mechanically locked in a closed position.

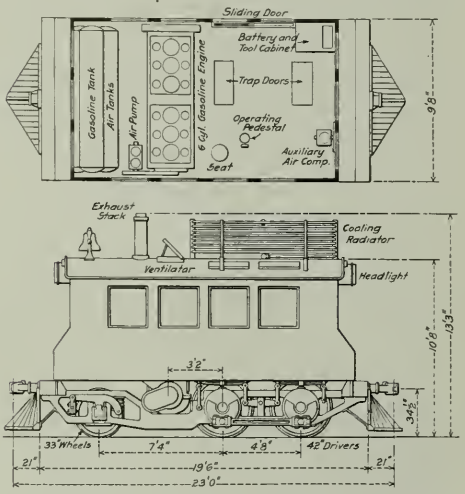
To obtain the special passing staff McAdam, the "initial" station, first withdraws an ordinary staff and inserts it in the bottom drawer of the special instrument at that station. The drawer can then be closed, which mechanically unlocks the top drawer, from which the special passing staff can then be taken. Opening the top drawer operates the circuit controller which connects one of the keys of the magneto-generator to the line wire, operating Vanceboro's special instrument. Vanceboro then closes the dummy drawer, which operates the circuit controller on that instrument, cutting in the lock-coil which releases the drawer at McAdam containing the special passing staff. McAdam then unlocks the bottom drawer at Vanceboro by turning the handle of the magneto. Both special staffs and a regular staff have now been withdrawn from their respective places, but the regular staff is locked in the drawer of the special instrument at McAdam. The special passing staffs are then delivered to the trains which are to pass at Burpee. These staffs confer right only to that station. When the two trains reach Burpee, they exchange staffs, and proceed. The special staffs are thus always returned to the stations from which they were originally issued.

A pusher staff is provided for the use of an engine assisting a train through a portion of a block. The instrument provided for this purpose has two drawers, one of which is open and the other, containing the special pusher staff, mechanically locked in the closed position. The regular staff is withdrawn and deposited in the open drawer of the pusher attachment and the drawer closed, which mechanically releases the other drawer. After the pusher staff is withdrawn, the regular staff is again withdrawn. The opening of the pusher staff drawer opens the line circuit; and when the pusher returns and replaces the pusher staff and closes the drawer, the line circuit is closed; and the regular train, continuing on to the instrument at the opposite end of the block, inserts the regular staff at that point.

Oil for Railway Fuel in Honduras.—The Vaccaro Bros. & Company Railroad, operating from Ceiba into the banana lands, has equipped one locomotive for burning oil instead of coal, the present fuel, to ascertain the desirability and economy of oil as a fuel. If the experiment proves a success, it is possible that not only the locomotives but the shops and various kindred enterprises controlled by this company will be equipped for the use of fuel oil.

GASOLENE SWITCHING LOCOMOTIVE

The Motley County (Tex.) Railway recently purchased a 300-horsepower gasolene switching locomotive from the McKeen Motor Car Company, Omaha, Neb., to be used in freight and switching service between Roaring Springs Junction, on the Quanah, Acme & Pacific and Matador, Tex. It has a tractive effort of 12,000 lb. at a speed of six miles an hour, and is mounted on six wheels, four of which are driven by a six-cylinder, Type C,



Gasolene Switching Locomotive of 12,000 lb. Tractive Effort

gasolene engine, having cylinders 11 in. by 15 in. The frames are of cast steel, and the cab is an all-steel structure extending the entire length of the locomotive. The usual locomotive type of spring suspension with equalizers is used to transfer the weight to the wheels.

The engine bed is attached to the side frames, acting as an efficient brace and reinforcement. It is of the company's latest

McKeen Gasolene Switching Locomotive for the Motley County Railway

model, being provided with an increased water circulation around the valves and cylinder head, tungsten steel valves, triple piston rings and water-jacketed intake pipes. Special provision has been made to enclose the flywheel, crank case, cam shaft, water and air pump driving mechanism. The engine is lubricated by a combination splash and automatic lubricating system.

All the gears are of the herringbone type. The engine is equipped with an air-reversing mechanism and straight air brake, and is also provided with a Gregory brake valve by which the automatic brakes on a train may be operated. Compressed air is provided by two 5-in. air compressors attached to the engine crank shaft. In addition to this there is an auxiliary air compressor in the cab for emergency service.

The forward and intermediate wheels form the driving unit, being connected to each other by side rods, as shown in the illustration, counterbalance crank disks being applied to each pair of drivers. The power from the engine is transmitted by a Morse chain to a sleeve which runs free on the rear driving axle. This sleeve is connected to a sprocket wheel by a multiple-disk friction clutch, also provided with a Morse chain for driving the forward axle, where, by means of an octoroon clutch, the power is increased through gears to produce the heavy tractive effort required for starting. After starting the gears are cut out and the power is delivered direct to the driving wheels. The clutches are operated by compressed air.

Locomotives of this type have a field in many locations on a railroad where but little switching is required. With a gasolene switching locomotive, the cost of fuel will be in direct ratio to its time in use. Its availability for the 24 hours will not cost any more than its availability for six hours, whereas it would be necessary to maintain steam pressure on steam switching locomotives in most cases at an excessive cost. Following is the table of dimensions of the gasolene switching locomotive:

Gage	4 ft. 8½ in.
Driving wheels, diameter	42 in.
Driving wheel base	4 ft. 8 in.
Total rigid wheel base	12 ft.
Length over bumper beams	19 ft. 6 in.
Length between pulling faces of couplers	22 ft. 5½ in.
Length over-all	22 ft. 11½ in.
Height, rail to top of exhaust pipe	13 ft. 3 in.
Height, rail to top of cab	10 ft. 8 in.
Width over cab	9 ft. 8 in.
Width over cab eaves	10 ft.
Center to center of frame	6 ft. 9 in.

A FORMER RAILROAD COMMISSIONER'S VIEWS ON PASSENGER FARES

C. V. McAdams, of Lafayette, Ind., who was a member of the Indiana Railroad Commission before that body was succeeded by the Indiana Public Utilities Commission, and who aided in drafting the two-cent passenger fare law now in effect in Indiana, has written a letter to the Indianapolis News giving reasons why he believes the passenger fares in the state should now be advanced. The letter is, in part, as follows:

"I hold no brief for the railroads. I was never and am not now employed by any railroad. I am under no obligations to them nor they to me. I spent three years in the state's service (at too low rates) trying to do my duty as a railroad commissioner, not only to the state, but to the railroads. Most of these three years was devoted to rates and rate conditions. During this time I came to some definite conclusions about passenger rates on steam railroads in this state. Time has not changed, but has more deeply impressed the conclusions at which I had then arrived. I think I should now speak and I do so with the same sense of responsibility that I was then under, although I voluntarily quit the state's service.

"First, I am thoroughly convinced that the passenger rates on steam railroads should be increased by some reasonable and appropriate legislation. Second, that they should not be increased in the manner and method pursued in the 2-cent fare act of 1907.

"The reasons justifying increased rates are numerous, well founded, and for many of them the public, who must pay the increase, is directly responsible. Almost all the recent improvements forced upon the railways by state legislation came about from a consideration of the passenger traffic as viewed by the public. Each collision or other accident tends to arouse the public, and this is so because they look to the safety of the public when traveling. The public generally, does not concern itself greatly about the safety of train crews or their movement, other than as it affects passenger traffic.

"The public, therefore, has, and justly so, demanded greater safety, and this demand has been met and is being met by the railroads, partly voluntarily in response to the public demand, and partly in response to legislation enacted at the demand of the public.

"These things have all come to pass in the last 10 years, and during that time the rates were reduced notwithstanding these additional burdens. In addition to these added expenses, during the same time economic changes and the action of labor bodies have added other burdens, namely, the wages of all railway employees have been greatly increased, and the cost of railway equipment has also largely increased and there has been a tremendous advance in the cost of the millions of dollars' worth of materials which the railroads must buy annually to maintain their ways and structures in a safe and usable condition. These latter, increased costs of labor, equipment and supplies, are the direct result of economic changes which have affected all the industrial and producing life of the country during this period.

"Although I aided in drafting the 2-cent fare law now in effect, I can truthfully say that, in my judgment, as I now and for years have seen things, a more crude, inelastic and unsuitable piece of legislation was never enacted. It was a misfit from the start. The passenger service of a railroad is indicative, so to speak, of the aristocracy of the line, while its freight service is the barometer whereby you determine its efficiency as a railroad, and its capacity as a dividend payer to the people who own it.

"The measure of a railroad's opportunity is the density of its available traffic. The measure of its responsibility is an efficient service to move that traffic. The efficient service is due to all communities and on all the lines. It can be and is enforced by law. The density of the traffic is controlled by the state's development. It can not be added to nor taken from by law or the action of the commission. If the road operating in a sparsely settled country has an efficient service and is given an income upon its property, the same as a like efficient road operating in a densely settled community, then there must be a different rate adjustment on these two lines and these two communities. Nothing in economics can be more simple and plain than this proposition.

"The railroads many years ago did things that don't look well in print. They were manipulated for the private gain of the officers and to help their especial friends over the line. That day has passed in Indiana. They are now under absolute control and are managed by a class of honorable and conscientious men who are doing their best, under distressing conditions, to weather the business depression, preserve their properties and perform the public service. It is suicidal to badger or buffer them about. The railroad interests in the state constitute its greatest enterprise which is controlled by legislation. Their every act is subject to the control of the Public Service Commission, a body created by law and constituted of able, honest and hard working men in whom the public and the railroads have confidence.

"In view of these conditions, the assembly, without a dissenting vote, should enact a law permitting an increased passenger rate on steam lines in Indiana. This law, however, should provide that after a petition is filed, notice given and a hearing had the Public Service Commission should have authority to authorize rates in advance of those created by the act and reduce those created by the act. Such a law would be in keeping with the law of the federal government and of the state which regulates the freight rate business, which is of vastly greater volume and importance, and such laws have proven effective and are satisfactory.

"Under such a law the short and poorly patronized line can have a remedy to meet its situation and if times again become prosperous and business grows and people travel the public can also go before the commission and ask to have the trunk line

rates reduced. All that has ever been said in favor of a tariff commission can be truthfully said in favor of such a law. It should be elastic and subject to changes to meet different situations and changing conditions.

"Another view of the passenger service is worthy of consideration. There is a continuous demand for a finer, safer and better equipment; a more speedy service, with fewer stops; Pullman cars, electric lights, diners, observation cars, barber shops, bathrooms, drawing rooms, valets and servants. This demand is being met. Mobile hotels dart across the state in a stream of light at aeroplane speed on a nonstop schedule. The people who demand this service should be and are willing to pay for it. It can not in reason be furnished for all the business of the line. It has come to meet a demand. The demand should respond to the service. I can see no reason why authority should not be given by the commission to operate an excess fare train or trains on any of the trunk lines where conditions and the service warrant it.

"It is a rule of commerce and business the world over to pay in accordance with what you get. The hotel, the restaurant, the merchant, the doctor, the lawyer, the barber and candlestick maker all charge you for what you get in merchandise or accommodation or service—why not the railroad? Those who demand should pay for the extra service.

"I should make the public pay extra for what it demands in the shape of excess speed, nonstop trains, elegant equipment and high cost modern refinements. He who wants the Twentieth Century Limited must have the twentieth century price or take a slower train; then why not make him who jaunts with the White City special he white with the railroad? Why not make him who joy rides on the Royal Palm come along with the revenue to pay for it? Why not make him who glides with the Hoosier limited put up something for the elegance, comfort and speed of his journey? Why not bring the twenty-four-hour St. Louiser across with something to make him remember that he has been safely, elegantly and speedily carried from Terre Haute to Richmond? Why should the Continental limited speeder object to a limited charge for his limited ride? Why should the Knickerbocker knock on being held up for extras?

"Yet all these folks travel at the same price under our senseless law and regulations as the man pays who bumps and bangs from Attica to Covington and he who is jerked into Corydon on the B. & O., or he who rides the chute-the-chutes on a hundred different spur and branch lines in this good state.

"There is no sense or justice in it, and it should be stopped."

THE BOSTON & MAINE SITUATION

The following is an abstract from the inaugural address of Governor Walsh of Massachusetts in regard to the Boston & Maine:

The condition of the Boston & Maine is the gravest question in our ever-present transportation problem. That railroad system still remains in its unstable state, whereby the stockholders of the Boston & Maine have but a small equity in the whole Boston & Maine system. The fluctuations in railroad prosperity thus fall with crushing weight upon a very small portion, when, with a sound financial structure, the weight would be borne equally by the whole. About 80 per cent of the Boston & Maine system is comprised of roads leased to the Boston & Maine upon terms out of proportion to its present financial condition. For several years past it has been paying dividends without earning them. During the year ended July 1, 1914, it paid no dividends and failed to earn the amount of its fixed charges, showing a deficit of $2,044,742.

It is obvious to any intelligent citizen that all of these losses cannot continue to fall upon the stockholders of the Boston & Maine without precipitating an undesirable disintegration of our distinctively New England transportation system. The disjoining of this railroad system would not only be harmful to the public interest of New England, but would be especially harmful to the component parts of the system itself. I know it is claimed by some of those interested in subsidiary roads that the owners of these leased lines could take their property and successfully operate it separately. But it is not probable that this claim is either sound or ingenuous. Certainly such an attempt would be difficult if the public should decline to render any assistance to these now debilitated roads. And if by insisting upon their pound of flesh they ignore the public interest, refusing to participate in a reorganization of the railroad system in a spirit of compromise and concession, they cannot expect the assistance of the public either through increased rates, a loaning of public credit or otherwise.

I have reason to believe that many of the parties directly interested in this situation realize their responsibility and are now working out a plan of reorganization which may put this railroad system upon firmer ground. The five trustees who now control the Boston & Maine, may confidently be expected to meet the situation if they are properly supported by those most concerned in it. I conceive it to be the duty of the general court this year to help the Boston & Maine whenever and wherever the greater public interest will permit us so to do. It is peculiarly a New England institution, and the business morale and prestige of New England have been greatly harmed by its present condition. Its real interests are not different from the interests of the New England public, and recent railroad misfortunes are teaching investors that when those who manage their property propose to do anything harmful to the general public interests they are proposing something that is also harmful to the real interests of the railroad. It is to be hoped that the realization of this fact now forced upon railroad investors will tend to make the relation between the active railroad managers and the faithful public servants much easier. We all fervently hope that the five trustees who really represent the public will be able to work out the salvation of this railroad.

CAB SIGNALS IN ENGLAND

At the meeting of the Institution of Mechanical Engineers, London, December 18, papers on cab signals were read by W. C. Acfield, Midland Railway; L. P. Lewis, Caledonian; V. L. Raven, North Eastern; W. A. Stanier, Great Western, and W. Willox, Metropolitan.

Mr. Acfield treated the subject mainly from a theoretical standpoint. The Midland has fitted two engines with the system in use on the Great Western, and has had satisfactory results from this experimental use. This road has made some experiments with the "railophone," a wireless or inductive telegraph or telephone used for communicating with moving trains; but no results are given.

Mr. Lewis also discussed the subject from a theoretical point of view. Mr. Raven, who is chief mechanical engineer of the North Eastern, described his cab signal which has been in use to some extent on that road for several years. The latest form of this apparatus is now fitted to 36 locomotives. Mr. Raven's system was briefly described in the first annual report of the Block Signal and Train Control Board, November, 1908, and also in the *Railroad Gazette* of February 21, 1908. He says that "the design of the apparatus is such as to give the fullest possible indication of failure of the equipment."

The Great Western Railway signal is well known to the readers of the *Railway Age Gazette*. Mr. Stanier's paper indicates that the brake-applying apparatus is now considered a regular feature of the system. For several years it was a cab-signal only. The description has five pages of drawings. In his conclusion the author says that "the device has proved so satisfactory in service that about 180 miles and 90 engines, up to the present time, have been equipped; and its use is rapidly being extended." This cab signal has been giving satisfactory service on the Fairford Branch, 22 miles long, for about eight years.

Mr. Willox's paper described the mechanical trip train stop in use on the Metropolitan, which is similar to that in the Interborough tunnels, New York City.

General News Department

The engineers who made preliminary surveys for a government railroad in Alaska have returned and have made an informal report to President Wilson.

Senator Pomerene, of Ohio, has introduced in Congress a bill for federal regulation of railway securities, patterned after a bill on the same subject which was discussed last year, but consideration of which was abandoned. It does not appear that Mr. Pomerene expects to have his bill passed at this session of Congress.

G. D. Lankford, of Dallas, Tex., a car inspector of the Trinity & Brazos Valley, has received from the Carnegie Hero Commission a bronze medal, and $1,000 in cash, for bravery in saving the life of Conductor L. A. Dozier in June, 1913. Dozier fell from the platform of a car to the rails and Lankford snatched him from in front of a moving train.

The South Jersey Commuters' Association has presented to the New Jersey legislature a petition, from citizens of 44 cities and towns, asking that the Public Utilities Commission be granted ample power to regulate fares to Camden, Hoboken and Jersey City. The petitioners declare that they suffer injustice in being obliged to buy season tickets to New York and Philadelphia when they desire to stop on the New Jersey side of the river, in both cases.

The Atchison, Topeka & Santa Fe has put in the field ten engineering parties to make a complete survey of one million acres of land which the road owns in the state of Arizona. This land is situated along the main line of the railroad, lying in alternate sections of 640 acres each. One purpose of the survey is that application for patenting the lands may be made. It is reported that steps will be taken for the agricultural development of parts of the land.

The House Committee on Interstate and Foreign Commerce has reported to the lower House of Congress the Stevens bill for the regulation of matters of safety on railroads. This bill was introduced on May 27 last and was noticed in the *Railway Age Gazette* of June 12, page 1343. The report of the committee is a pamphlet of eleven pages giving a summary of the arguments for the general introduction of the block system; for the use of automatic train stops as an additional safeguard for passenger trains, and for the use of steel cars and high power headlights.

At Altoona, Pa., petitions have been circulated asking the legislature of Pennsylvania to repeal the full crew law of that state. It is said that 90 per cent of the employees of the Pennsylvania Railroad in the shops at Altoona have signed the petition and have done so freely; but those who do not sign are making loud complaint. The language of the petition is the same as that in the letter of President Rea of the Pennsylvania road, in his recent appeal to the citizens of the state to abolish this oppressive law. At Harrisburg, Pa., the leaders of the brotherhood have announced that they are going to oppose the repeal of the full crew law.

The New York State Public Service Commission, First district, following its investigation of a collision on one of the elevated lines in Manhattan in December, and of the suffocation of passengers in the subway last week, has ordered the Interborough Rapid Transit Company to take measures to have only steel cars in the subway from December 1 next. At present there are between 400 and 500 cars used in the subway which have wooden bodies with metal sheathing. In the discussion between the commission and the officers of the Interborough there has been a proposal to use these wooden cars on the elevated lines; but there are some obstacles to this plan and the matter seems to be still unsettled.

Senator LaFollette on Monday of this week introduced in Congress a resolution aiming to nullify the action of the Interstate Commerce Commission in its recent order allowing a general increase of 5 per cent in freight rates. The resolution declares that the commission did not make sufficiently thorough inquiry, and that the increase was made without good reasons. It appears to be the general opinion in Washington that the resolution will not be adopted; but that its discussion will probably bring out questions as to the fitness of Interstate Commerce Commissioner Hall, whose nomination for another term is now pending before the Senate. This nomination has been reported favorably, but Senators La Follette, Cummins and Clapp had voted against it in committee.

The Alfalfa Route

The Alabama, Tennessee & Northern, known as the "Alfalfa Route," has made a trackage agreement with the Southern Railway by which trains will be run over the Southern tracks into Mobile, Ala., beginning February 1.

The main line of the Alabama, Tennessee & Northern extends from Reform, about 80 miles west of Birmingham, southward 185 miles to Calvert, on Mobile bay. At this point connection is made with the Southern Railway. In Mobile the A. T. & N. has its own terminal grounds, owning extensive water-front property on both sides of the bay. Terminal tracks aggregating about 7 miles in length have been built to connect with other railroads and with industrial sections.

Better Inspection of Freight Trains

Following the suggestion of one of its employees, C. F. Rudolph, telegraph operator at Stafford, N. Y., the Lehigh Valley has issued the following order:

"When freight trains are pulling out of sidings, or away from inspection points, or water stations where a stop has been made to take water, the engineer will move the train not to exceed six or eight miles an hour to permit a member of the crew to make a running inspection of the entire train.

"At such points, one or more members of the train crew must be at the head end of the train before it starts and inspect the train as it passes, watching closely for bent axles, broken flanges, brake riggings down, defective brake riggings, defective arch bars, defective drawheads, wheels sliding, brakes sticking, loose wheels, hand brakes applied, car doors loose, or any other defects that can be detected."

Prosecutions Under Cattle Laws

The Department of Agriculture reports the following convictions for violation of the 28-hour live stock law during the month of November: Baltimore & Ohio Southwestern, fines and costs, $200; Cleveland, Cincinnati, Chicago & St. Louis, $975; Pittsburgh, Cincinnati, Chicago & St. Louis, $100; Chicago & North Western, $200; Pennsylvania, $125; Philadelphia, Baltimore & Washington, $1,800; Cincinnati, Lebanon & Northern, $100; Baltimore & Ohio (21 cases), $4,250; Chesapeake & Ohio, $100; Chicago, Milwaukee & St. Paul, $150; Chicago, Burlington & Quincy, $100; total (48 cases), $8,100.

Under the quarantine law the following fines were reported during the month of November, most of the convictions involving additional payments for costs: A. D. and John Clemant, $200; Galveston, Harrisburg & San Antonio Railway, $300; Houston & Texas Central, $100; Louisville & Nashville, $100; Chicago, Rock Island & Pacific, $100; Mobile & Ohio, $200; San Antonio & Aransas Pass, $100; Vicksburg, Shreveport & Pacific, $200; total (12 cases), $1,300. All of these 12 convictions were for interstate shipment of cattle infested with Texas-fever ticks.

Block Signal Mileage

The statement of mileage of road block signaled, as of January 1, 1915, as made up for the Southern Railway, did not reach us in time to be used in the table published January 1, page 29.

The figures, showing a large increase in the mileage of road equipped with automatic signals, are as follows:

	Single track	Double track	Total
Automatic	6.3	286.8	293.1
Manual	1,803.1	156.0	1,959.1
Total	1,809.4	442.8	2,252.2

Forty-one miles, automatic, double track, represents a line used jointly with the Atlantic Coast Line; and 154 miles of manual—114 single track and 40 double track—also is to be classed in the same way; a total of 195 miles of road used jointly with the Atlantic Coast Line. The total mileage of road operated for passenger traffic by the Southern is 6,929 miles. The plans of the Southern for the current year include 142 miles of road to be equipped with automatic block signals.

On the Chicago, Milwaukee & St. Paul, the mileage of road block signaled, double track, manual, should be 145 miles, instead of 245, as given in the annual statement.

American Society of Mechanical Engineers

The Chicago Section of the American Society of Mechanical Engineers held a "railroad night" at the La Salle hotel, Chicago, on January 8, 1915, papers being presented on Locomotive Superheaters and Locomotive Stokers by R. M. Ostermann, Locomotive Superheater Company, and Clement F. Street, Locomotive Stoker Company, respectively. Mr. Ostermann gave an illustrated description of the locomotive superheater and quoted from tests showing how the steaming capacity of a locomotive boiler may be increased by the use of the superheater. As a rough average a coal saving of 25 per cent and a water saving of 35 per cent can be obtained from a superheater engine as compared with a saturated engine of the same class. He stated that there were 32,000 locomotives equipped with the top-header type superheater, of which there are nearly 12,000 in use on this continent.

Mr. Street clearly showed the importance of the locomotive to the earnings of a railroad and how by the use of the stoker on large engines their capacity may be increased 10 per cent. He also briefly discribed the different types of stokers in general use on American railways, and stated that there were nearly 1,000 locomotive stokers in use today. These two papers were discussed by R. Quayle and H. T. Bentley of the Chicago & North Western.

Willard A. Smith of the Railway Review gave a talk on Railway Economics, in which he questioned the policy of some of the railways in adopting the modern heavy rolling stock before their traffic demanded such equipment. He stated that the general adoption of this policy has led to an increase in maintenance of equipment costs which has become a serious burden to the railways of this country. He attributed the increase in operating ratios mainly to this cause. As another reason for increased maintenance costs he mentioned the lack of proper shop facilities, stating that in many cases equipment was purchased by roads that did not have the proper facilities for maintaining it. He believed there is a more fruitful field in developing the efficiency of the locomotive than its size. He also advocated a bureau of railway engineering, which could be created by the government, private institutions or the railways themselves, for the purpose of studying scientifically and experimentally railway problems that are now being threshed out individually by the railways with necessarily an economic loss.

American Society of Engineering Contractors

The annual meeting of the American Society of Engineering Contractors will be held in the United Engineering Societies Building, 25 West Thirty-ninth street, New York, on January 15, 1915. The annual reports of the officers will be presented and a number of important questions will be brought before the society for consideration. The annual banquet will be held in the evening. Mr. Roland, of the metallurgical department of the National Tube Company, will present an illustrated lecture on the manufacture of "National Pipe."

American Association of Railroad Superintendents

At a recent meeting of the executive committee of the American Association of Railroad Superintendents it was decided to postpone the 1915 convention of the association to be held in San Francisco, Cal., from May 20 and 21, the date previously arranged, until August 19 and 20. Saturday, August 21, will be American Association of Railroad Superintendents' day at the Panama-Pacific International Exposition.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. Hereafter the full list of meetings and conventions will be published only in the first issue of the Railway Age Gazette for each month.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August. Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meetings, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St. New York.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—C. Marlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next regular meeting, January 21, 1915, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except, June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

Month of November, 1914

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Atlantic City	171	$60,843	$59,305	$132,375	$58,403	$24,226	$1,297	$83,080	$105	$756	$167,867	—$35,492	$13,500	—$48,992	—$16,850
Bingham & Garfield	27	75,681	3,106	79,283	6,642	8,496	869	13,895	61	1,905	31,868	47,416	1,892	45,524	—52,881
Central of New Jersey	678	1,762,989	408,744	2,290,344	169,893	408,696	29,180	802,294	15,725	49,481	1,475,206	815,138	117,083	698,042	—77,779
Central Vermont	411	215,675	64,708	303,094	30,863	50,318	7,951	149,020	2,375	6,605	247,132	55,961	15,760	40,193	42,060
Chicago Great Western	1,429	814,556	243,170	1,157,911	141,323	221,351	46,212	438,189	6,618	37,998	891,381	266,530	48,668	217,784	17,905
Chicago, Indianapolis & Louisville	618	322,087	128,418	496,030	46,872	113,616	20,552	200,206	116	15,728	397,059	98,971	26,687	72,265	—67,323
Colorado & Southern	1,092	610,127	96,405	755,903	73,431	146,227	10,692	222,294	4,022	20,660	477,337	278,576	35,600	242,971	101,535
Delaware, Lackawanna & Western	960	2,761,829	649,116	3,753,900	312,549	562,412	66,899	1,194,475	26,995	71,162	2,215,192	1,538,707	185,000	1,353,646	—16,649
Denver & Rio Grande	2,586	1,428,062	339,735	1,875,121	141,558	339,394	38,128	536,904	21,938	49,780	1,127,402	747,719	90,000	657,555	—6,054
Denver & Salt Lake	255	128,673	19,123	154,317	16,553	21,341	1,792	51,001	.....	5,921	96,585	57,731	6,000	51,731	44,323
Detroit, Toledo & Ironton	441	157,664	12,986	180,806	26,386	30,993	3,945	117,813	.....	5,606	184,742	—3,936	6,000	—9,936	—7,890
Duluth, Winnipeg & Pacific	185	74,187	18,789	95,558	11,662	20,432	2,686	35,686	1,462	5,724	77,652	17,906	4,778	13,128	55,997
Galveston, Harrisburg & San Antonio	1,346	636,335	207,030	896,838	140,521	199,506	29,678	422,523	8,598	34,438	835,044	61,793	30,511	31,081	—118,864
Georgia, Southern & Florida	395	108,030	53,236	184,630	26,154	37,277	6,720	72,003	.....	9,949	152,104	32,526	6,124	26,274	—7,954
Great Northern	8,043	4,455,738	1,065,426	6,056,762	483,123	563,742	89,824	1,545,109	68,541	114,221	2,853,670	3,203,092	378,741	2,824,193	—486,235
Houston, East & West Texas	191	77,774	22,390	106,323	16,889	9,686	2,006	57,208	.....	3,233	89,024	17,299	2,351	14,933	—23,771
Houston & Texas Central	857	450,105	116,880	599,193	101,406	54,776	19,833	242,894	1,772	17,767	432,114	167,079	22,366	144,629	10,255
Minneapolis & St. Louis	1,647	668,127	143,698	858,559	103,006	120,286	16,975	326,073	79	19,362	585,781	272,778	42,423	230,354	60,483
Missouri & North Arkansas	365	71,375	27,945	106,936	29,297	24,211	4,307	51,533	.....	6,072	115,420	—8,484	6,000	—14,519	—22,514
Missouri, Oklahoma & Gulf Ry. of Texas	19	10,587	228	10,940	1,352	1,100	234	4,381	.....	506	7,573	3,367	197	3,170	—3,680
New York Central & Hudson River	3,692	5,396,784	2,347,157	9,119,096	1,079,731	1,745,650	153,707	3,293,312	160,226	203,111	6,635,736	2,483,360	551,373	1,931,192	675,706
Northwestern Pacific	401	109,860	124,892	274,820	61,908	38,385	5,447	114,930	.....	7,430	223,694	51,126	15,985	35,105	—19,598
Philadelphia & Reading	1,120	3,165,232	548,306	3,891,280	339,452	745,838	39,293	1,399,653	10,827	63,118	2,598,180	1,293,101	99,701	1,192,752	—271,284
Pittsburgh, Shawmut & Northern	294	158,374	9,293	169,450	18,057	33,965	1,631	50,972	.....	3,812	108,437	61,012	1,602	59,411	50,738
Port Reading	21	107,611	.....	130,136	10,038	5,892	38	40,293	.....	171	56,433	73,704	12,000	61,704	971
St. Joseph & Grand Island	258	87,172	22,782	119,799	18,428	20,875	4,947	45,601	.....	4,713	94,563	25,235	7,034	18,201	—2,999
St. Louis Southwestern	943	491,266	98,576	625,338	75,550	106,664	28,389	175,905	3,114	24,547	413,869	211,469	35,580	175,803	—141,804
St. Louis Southwestern of Texas	811	243,135	75,763	344,914	81,196	87,558	13,770	159,534	809	17,817	356,367	—11,453	13,500	—25,083	—71,501
Southern in Mississippi	281	63,193	26,616	98,050	20,244	7,659	2,160	42,655	.....	3,581	76,297	21,753	6,208	15,530	—20,184
Southern Pacific	6,522	4,595,305	2,093,532	7,437,984	784,286	991,716	162,397	2,486,762	133,745	240,120	4,773,629	2,664,355	425,541	2,237,309	—629,670
Spokane International	163	35,655	12,991	51,712	11,685	4,383	2,232	20,614	.....	3,285	42,199	9,512	4,019	5,493	—41,467
Spokane, Portland & Seattle	556	225,587	98,058	355,904	39,859	35,821	7,082	87,736	3,170	13,384	187,053	168,852	53,400	115,398	—30,285
Texas & New Orleans	469	201,595	79,343	320,387	32,484	65,720	8,094	72,697	4,107	10,579	193,531	126,855	15,082	111,613	61,790
Toledo, St. Louis & Western	451	302,212	23,075	352,419	53,524	56,423	15,491	154,843	.....	8,991	289,272	63,147	17,864	45,283	—71,411
Trinity & Brazos Valley	315	80,536	13,251	99,826	20,427	12,587	2,488	41,604	.....	7,867	84,973	14,854	2,740	12,114	—19,608
Virginia & Southwestern	240	121,628	11,917	137,530	24,572	35,892	1,930	44,350	.....	3,632	110,376	27,154	6,666	20,488	—21,981
Wabash	2,519	1,618,951	484,506	2,318,595	278,967	447,603	89,294	992,743	12,958	62,593	1,882,965	435,630	79,057	356,193	—83,321
Western Pacific	943	327,793	78,964	432,979	77,000	60,171	23,372	155,857	9,832	20,354	346,586	86,393	26,970	59,423	—18,869

Five Months of Fiscal Year Ending June 30, 1915

Alabama & Vicksburg	143	$405,456	$191,167	$659,172	$107,096	$167,548	$18,249	$243,825	$15,973	$27,619	$580,310	$78,862	$35,960	$42,902	—$110,328
Alabama Great Southern	309	1,396,881	490,015	2,061,493	239,735	541,328	69,117	701,489	16,485	48,899	1,617,053	444,440	77,465	366,900	157,129
Ann Arbor	301	716,548	261,105	1,045,272	123,310	143,421	25,499	391,944	2,402	36,057	722,633	322,639	69,400	253,006	—10,295
Arizona Eastern	367	678,903	139,974	884,342	135,833	125,592	10,781	240,939	4,587	49,541	567,250	317,092	66,138	250,667	—130,096
Atchison, Topeka & Santa Fe	8,514	28,976,691	10,082,571	42,480,281	6,202,832	7,098,678	825,783	11,489,485	.....	763,440	26,359,002	16,121,279	1,986,809	14,129,187	1,413,671
Atlanta, Birmingham & Atlantic	646	782,137	253,690	1,131,517	175,642	219,331	64,825	490,588	.....	50,031	1,000,416	131,101	65,347	65,467	—176,107
Atlanta & West Point	93	249,377	193,538	507,183	82,842	121,097	26,568	158,190	7,484	22,323	418,503	88,680	35,624	52,888	—55,735
Atlantic & St. Lawrence	167	384,550	164,075	599,989	112,301	85,484	20,226	256,160	.....	14,745	488,915	111,074	54,000	57,074	34,896
Atlantic City	170	356,075	894,506	1,309,628	216,931	125,595	14,373	590,352	424	8,092	955,767	353,861	67,500	286,272	—49,747
Atlantic Coast Line	4,697	7,845,063	3,141,122	11,933,646	2,070,387	2,422,101	283,479	4,638,717	34,080	387,129	9,808,132	2,125,514	690,000	1,431,930	—1,373,695
Baltimore & Ohio—System	4,516	30,651,466	6,845,963	40,464,360	4,273,732	7,648,155	802,557	15,392,810	240,199	901,651	29,258,805	11,205,555	1,331,636	9,867,710	—1,027,890
Baltimore & Ohio Chicago Terminal	79	.....	3,362	710,257	79,352	104,477	4,476	287,875	13,136	23,106	512,422	197,834	95,106	107,729	—14,924
Bangor & Aroostook	631	1,037,345	311,084	1,434,710	251,987	242,911	13,136	446,993	6,331	47,771	1,008,928	425,781	43,750	381,991	—85,366
Belt Ry. Co. of Chicago	24	.....	.....	1,392,647	88,275	118,500	4,484	446,209	.....	30,669	688,137	704,510	55,556	648,954	251,742
Bessemer & Lake Erie	204	4,641,834	202,088	4,917,109	345,706	836,245	51,793	954,724	10,101	56,172	2,240,196	2,676,913	94,002	2,582,893	460,163
Bingham & Garfield	27	490,360	20,027	513,672	54,819	70,453	4,581	90,941	414	9,400	230,609	283,063	8,915	274,148	—179,189
Birmingham Southern	44	210,205	5,487	383,167	96,249	67,138	2,260	141,868	.....	17,385	324,900	58,268	12,686	45,581	—140,036
Boston & Maine	2,302	11,681,771	7,503,962	21,014,459	3,438,298	3,199,968	196,218	8,673,910	90,358	466,248	16,065,000	4,949,459	786,710	4,162,750	—133,113
Buffalo & Susquehanna R. R. Corporation	253	586,489	36,538	638,454	124,898	185,839	5,742	188,985	.....	26,865	532,229	106,225	13,000	93,225	.....
Buffalo & Susquehanna Railway	91	79,441	39,385	131,801	27,200	46,359	2,556	61,898	188	12,205	150,407	—18,606	8,000	—26,606	51,973
Buffalo, Rochester & Pittsburgh	586	3,636,075	529,967	4,326,018	627,396	1,025,050	57,301	1,343,666	6,744	87,934	3,148,091	1,177,927	100,000	1,077,746	—477,559
Carolina, Clinchfield & Ohio	248	823,533	86,686	933,261	84,461	115,703	34,113	177,482	.....	44,108	449,731	483,530	71,250	412,236	—221,701
Carolina, Clinchfield & Ohio of S. C	18	45,337	8,147	54,813	4,553	455	8,893	10,681	.....	3,008	27,589	27,224	3,750	23,466	—17,202
Central of Georgia	1,924	3,309,217	1,403,238	5,230,919	753,489	1,011,728	175,516	1,838,195	6,424	170,064	3,939,835	1,291,084	240,485	1,048,986	—395,130
Central of New Jersey	678	9,199,837	2,919,171	12,792,862	1,138,075	2,140,721	155,658	4,238,752	67,757	245,293	7,985,881	4,806,981	585,774	4,221,169	—275,775
Central New England	304	1,302,708	215,699	1,590,303	447,297	180,789	5,474	541,326	.....	20,198	1,194,790	395,513	56,000	339,480	—319,517
Central Vermont	411	1,131,119	433,249	1,696,321	257,756	273,535	40,110	749,508	14,153	32,831	1,367,892	328,429	78,800	249,621	128,127
Charleston & Western Carolina	341	556,067	149,193	744,385	156,263	148,330	19,835	276,871	.....	21,782	623,081	121,304	25,000	96,304	—86,885
Chesapeake & Ohio Lines	2,367	12,881,751	2,716,665	16,583,244	2,015,527	3,603,022	277,268	5,315,618	107,935	362,912	11,682,281	4,900,963	549,610	4,350,759	—232,298
Chicago & Alton	1,033	4,064,266	1,810,080	6,379,974	719,181	1,394,832	183,617	2,149,594	51,413	147,790	4,646,427	1,733,547	224,250	1,508,529	303,371
Chicago & Eastern Illinois	1,282	4,610,342	1,254,869	6,365,015	743,881	1,346,296	114,113	2,292,463	38,305	179,863	4,712,767	1,652,248	284,500	1,367,412	400,269
Chicago & Erie	270	1,955,547	273,677	2,439,372	412,770	—1,348	97,513	1,141,989	10,968	65,975	1,697,663	741,709	85,643	656,023	847,466
Chicago & North Western	8,108	23,519,354	9,775,349	37,024,940	5,642,267	5,783,054	560,772	12,636,816	269,555	717,818	25,510,141	11,514,799	1,875,000	9,637,930	—924,642

REVENUES AND EXPENSES OF RAILWAYS

Five Months of Fiscal Year Ending June 30, 1915—Continued

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Operating revenues: Passenger.	Operating revenues: Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Operating expenses: Maintenance: Of equipment.	Operating expenses: Traffic.	Operating expenses: Transportation.	Operating expenses: Miscellaneous.	Operating expenses: General.	Operating expenses: Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Chicago, Burlington & Quincy	9,377	$28,852,850	$9,681,476	$42,065,065	$4,640,315	$6,768,299	$676,615	$12,456,899	$335,004	$861,227	$25,738,360	$16,326,704	$1,637,531	$14,689,173	—$170,134
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	280,816	89,056	426,817	64,319	59,484	9,034	211,345	....	7,069	351,251	75,567	14,350	61,204	—17,629
Chicago Great Western	1,428	4,257,001	1,429,744	6,203,261	920,641	1,031,109	238,602	2,123,309	33,866	178,526	4,519,686	1,683,575	243,342	1,438,629	—53,941
Chicago, Indiana & Southern	359	1,594,072	140,850	1,798,732	245,109	453,848	36,551	595,850	8,332	58,886	1,398,575	400,157	97,555	302,446	147,292
Chicago, Indianapolis & Louisville	618	1,921,857	767,368	2,933,383	349,729	566,170	105,022	1,041,282	738	85,996	2,146,989	786,393	133,350	652,956	—146,521
Chicago Junction	12	....	....	823,788	111,640	88,176	5,047	429,919	....	22,990	657,772	166,016	11,019	154,942	—110,874
Chicago, Milwaukee & St. Paul	10,067	28,737,081	8,613,045	41,507,825	5,464,374	5,713,698	764,530	15,426,514	331,323	731,645	27,392,288	14,115,537	2,035,224	12,065,216	—396,350
Chicago, Peoria & St. Louis	255	450,383	108,585	593,064	99,234	100,850	23,802	237,045	....	21,027	481,957	111,108	22,800	88,308	115,792
Chicago, Rock Island & Gulf	477	941,489	263,696	1,299,967	164,634	193,192	48,584	494,512	9,013	38,387	948,322	351,644	39,080	312,289	—13,122
Chicago, Rock Island & Pacific	7,852	20,774,724	8,151,419	31,046,385	4,697,533	5,065,265	728,582	11,642,294	210,995	675,837	22,994,835	8,051,550	1,335,201	6,714,499	180,526
Chicago, St. Paul, Minneapolis & Omaha	1,753	5,109,208	2,414,953	8,122,283	1,059,091	1,044,732	145,185	2,824,983	78,659	180,402	5,329,199	2,793,085	453,514	2,338,259	59,895
Chicago, Terre Haute & Southeastern	374	849,925	89,216	968,225	151,022	239,207	17,913	280,685	4,375	48,314	741,516	226,708	57,500	169,208	53,873
Cincinnati, Hamilton & Dayton	1,015	3,338,401	711,905	4,516,978	638,041	796,095	103,309	1,914,025	....	92,297	3,543,767	973,212	195,578	776,049	192,010
Cincinnati, New Orleans & Texas Pacific	337	3,042,319	742,810	4,008,447	429,806	1,139,201	125,907	1,239,638	26,843	106,383	3,067,778	940,668	155,000	785,668	—449,659
Cincinnati Northern	246	582,642	106,247	719,136	102,398	126,007	13,905	221,784	....	16,900	480,993	238,143	28,000	209,883	232,724
Cleveland, Cincinnati, Chic. & St. Louis	2,361	10,604,201	3,864,637	15,880,673	1,735,293	3,006,427	410,082	5,865,943	126,980	303,012	11,425,197	4,455,476	644,500	3,802,800	2,039,780
Colorado & Southern	1,092	2,566,100	706,379	3,514,472	476,513	769,512	54,551	1,058,255	23,930	95,393	2,478,154	1,036,318	173,841	862,123	—61,591
Colorado Midland	338	701,919	131,072	918,028	151,751	189,043	39,519	354,525	7,106	28,602	770,546	147,482	42,650	104,833	84,428
Cumberland Valley	164	928,334	307,538	1,308,043	260,670	168,586	22,149	437,767	3,907	37,796	930,875	377,169	29,552	347,617	—63,663
Delaware & Hudson Co.—R. R. Dept	881	8,095,398	1,463,309	10,112,775	723,894	1,524,526	134,918	3,502,246	64,252	297,383	6,236,654	3,876,121	281,250	3,594,524	....
Delaware, Lackawanna & Western	960	13,432,620	3,879,265	19,101,978	2,285,590	2,967,236	344,874	5,741,540	166,133	364,015	11,764,669	7,337,308	925,000	6,411,861	—48,538
Denver & Rio Grande	2,586	7,687,367	2,236,378	10,565,875	1,568,533	1,851,684	195,056	2,945,912	154,842	267,982	6,974,906	3,590,970	450,000	3,140,452	—81,567
Denver & Salt Lake	255	580,987	184,975	809,900	97,401	135,009	12,861	252,873	....	27,784	522,930	286,971	26,000	260,971	53,023
Detroit & Mackinac	400	300,150	150,803	489,839	64,555	78,021	11,767	171,608	1,021	13,457	340,430	149,410	46,696	102,713	—36,166
Detroit & Toledo Shore Line	79	598,661	....	600,166	79,455	45,517	9,087	165,341	....	13,713	313,113	287,053	29,900	257,153	55,514
Detroit, Grand Haven & Milwaukee	191	699,000	309,000	1,169,639	200,440	168,385	36,200	557,588	5,080	23,796	991,488	178,151	16,800	160,641	—75,856
Detroit, Toledo & Ironton	441	774,654	88,341	915,582	124,620	118,321	19,396	497,180	....	29,412	788,928	126,654	30,000	96,654	270,549
Duluth & Iron Range	292	2,470,886	97,529	2,663,010	447,950	360,448	5,613	530,398	15,782	42,355	1,402,546	1,260,464	141,414	1,119,049	1,395,201
Duluth, Missabe & Northern	364	2,918,238	149,260	3,134,476	349,843	355,305	10,792	551,294	14,599	57,509	1,339,343	1,795,133	162,779	1,632,354	—1,551,750
Duluth, South Shore & Atlantic	628	727,098	443,428	1,302,212	264,091	180,582	40,372	481,283	20,736	55,463	1,042,526	259,686	95,000	164,618	—89,056
Duluth, Winnipeg & Pacific	185	433,988	98,641	547,313	120,934	103,864	12,588	199,909	5,058	30,145	472,497	74,816	27,366	47,450	—122,928
El Paso & Southwestern Co	1,027	2,391,262	521,401	3,167,605	393,877	449,173	90,039	843,805	28,567	113,991	1,907,268	1,260,337	176,053	1,069,075	86,964
Elgin, Joliet & Eastern	778	3,518,804	29	3,743,813	378,993	688,176	28,046	1,059,683	....	90,791	2,245,354	1,498,459	164,165	1,334,294	—444,149
Erie	1,988	17,891,538	4,250,985	24,229,084	2,693,028	5,446,230	459,444	8,447,134	165,311	494,529	17,642,168	6,586,916	758,380	5,816,143	—438,496
Florence & Cripple Creek	87	410,322	89,543	509,265	59,154	46,744	10,512	151,852	....	21,311	289,573	219,691	28,346	191,345	—60,023
Florida East Coast	696	883,673	555,304	1,663,323	302,424	258,872	31,837	607,746	14,138	91,814	1,290,858	372,465	98,000	274,420	252,404
Fort Worth & Denver City	454	1,538,904	718,448	2,383,513	222,564	326,511	39,976	915,722	18,626	70,546	1,593,944	789,568	57,034	732,534	229,603
Galveston, Harrisburg & San Antonio	1,346	3,446,608	1,290,347	5,084,622	666,151	894,458	140,217	2,085,425	45,253	177,770	4,005,790	1,078,832	188,213	889,910	—159,703
Georgia	307	828,833	342,124	1,268,100	150,696	253,011	60,044	545,676	658	39,120	1,049,204	218,896	19,461	199,198	—101,730
Georgia, Southern & Florida	395	562,995	297,600	985,219	134,307	210,412	37,305	387,205	23	50,179	819,431	165,789	49,895	114,571	—32,309
Grand Rapids & Indiana	575	1,294,031	948,339	2,453,400	264,237	364,623	56,704	967,963	13,330	69,565	1,736,422	716,979	121,252	595,727	90,303
Grand Trunk Western	347	2,022,000	884,000	3,119,885	530,276	583,267	103,880	1,268,055	40,827	72,162	2,598,467	521,418	179,600	341,600	—48,886
Great Northern	8,043	25,818,094	6,747,389	35,684,397	3,339,184	3,159,282	503,156	8,420,214	392,855	538,283	16,319,877	19,364,520	2,010,423	17,352,652	358,327
Gulf & Ship Island	308	523,468	138,469	704,922	90,099	148,359	12,412	185,118	1,266	35,418	472,671	232,251	36,393	195,813	—110,518
Gulf, Colorado & Santa Fe	1,937	5,296,440	1,445,331	7,095,752	906,514	1,003,034	136,225	2,389,822	....	170,721	4,606,317	2,489,435	243,628	2,243,877	819,931
Hocking Valley	351	2,499,019	401,799	3,124,859	402,865	582,056	41,989	940,748	....	70,160	2,037,819	1,087,041	194,000	893,041	277,436
Houston & Texas Central	857	2,071,038	715,864	2,968,655	527,622	400,647	75,355	1,159,408	8,472	87,012	2,256,771	711,884	118,553	592,813	—99,635
Houston, East & West Texas	191	391,835	147,616	570,591	117,177	89,116	9,653	235,266	....	15,314	466,274	104,217	19,348	84,857	—50,134
Illinois Central	4,769	19,454,810	5,843,634	27,368,362	4,018,867	6,120,727	517,343	9,575,419	152,311	626,696	20,872,314	6,496,049	1,369,000	5,117,129	15,600
Indiana Harbor Belt	105	....	....	1,447,077	196,385	151,041	13,619	581,243	....	38,328	980,616	466,461	38,925	427,140	131,267
International & Great Northern	1,160	2,852,368	881,378	4,015,491	679,872	631,207	120,644	1,738,615	14,155	149,649	3,334,142	681,349	145,000	536,051	840,012
Kanawha & Michigan	177	1,184,939	160,463	1,380,568	193,361	314,613	12,466	393,742	12	33,961	948,155	432,413	58,351	374,048	—58,864
Kansas City Southern	827	3,353,423	672,156	4,449,165	500,374	537,563	150,284	1,443,528	....	218,699	2,838,913	1,610,252	237,109	1,371,801	—169,169
Lake Erie & Western	906	2,031,700	361,973	2,521,463	364,501	414,912	61,278	966,893	....	59,726	1,867,310	654,153	122,026	531,161	136,721
Lake Shore & Michigan Southern	1,852	13,885,741	5,673,544	22,496,636	2,406,297	4,474,973	416,451	7,500,578	259,748	608,074	15,666,121	6,830,514	1,004,500	5,821,314	134,696
Lehigh & Hudson River	97	706,659	51,154	769,249	118,391	98,856	6,541	274,248	....	17,947	515,983	253,266	20,750	232,516	95,458
Lehigh & New England	294	1,129,993	7,050	1,183,989	154,450	157,650	8,925	274,287	....	29,368	624,681	559,308	28,349	530,959	203,750
Lehigh Valley	1,444	15,858,987	2,006,345	18,906,153	2,041,830	3,770,485	[illegible]0,287	6,369,120	67,050	340,657	12,958,429	5,947,724	697,000	5,244,552	—182,150
Long Island	398	1,647,545	3,903,087	6,365,196	611,477	583,516	77,777	2,435,500	35,660	131,931	3,865,861	2,499,335	326,185	2,172,109	484,378
Louisiana & Arkansas	279	587,914	102,122	710,769	141,075	119,216	13,204	190,157	....	21,835	485,046	225,723	31,250	194,473	—40,604
Louisiana Ry. & Navigation	351	654,388	113,449	820,035	167,678	87,065	28,524	321,490	....	26,302	631,059	188,975	39,500	149,475	1,491
Louisiana Western	208	589,269	290,848	938,090	99,191	176,548	33,313	285,147	14,914	32,434	641,477	296,613	47,479	249,076	35,447
Louisville & Nashville	5,034	16,218,137	4,941,618	22,707,356	3,628,257	4,687,020	551,939	7,753,203	76,277	514,246	17,187,745	5,519,611	921,375	4,595,497	—1,621,798
Louisville, Henderson & St. Louis	200	403,350	180,927	624,532	129,358	88,130	26,646	200,256	....	15,399	459,788	164,744	19,000	145,707	—13,534
Maine Central	1,219	2,999,501	1,749,955	5,113,389	729,072	746,024	61,511	1,843,021	33,480	130,877	3,543,987	1,569,402	255,964	1,313,295	179,728
Michigan Central	1,800	8,744,706	4,083,935	14,546,090	1,569,438	2,220,597	327,034	5,728,960	250,835	271,836	10,368,700	4,177,391	670,000	3,504,372	900,213
Midland Valley	380	412,749	188,899	639,622	129,475	117,311	10,400	205,359	....	28,105	490,649	148,973	32,910	115,793	—25,112
Minneapolis & St. Louis	1,646	3,293,715	902,703	4,444,122	531,542	656,201	91,179	1,599,512	404	101,949	2,980,788	1,463,334	196,992	1,266,341	123,626
Minneapolis, St. Paul & Sault Ste. Marie	4,102	9,531,781	2,939,026	13,436,801	1,668,476	1,816,202	237,866	3,966,178	78,906	251,449	7,980,225	5,456,576	576,015	4,880,561	—51,015
Missouri & North Arkansas	365	331,692	178,110	548,199	146,326	107,368	19,212	255,565	....	29,583	558,054	—9,855	30,000	40,078	—110,511
Missouri, Kansas & Texas System	3,865	9,462,562	3,794,655	14,271,148	1,878,001	2,119,950	284,615	4,938,148	136,422	448,609	9,717,366	4,553,782	559,057	3,992,397	209,515
Missouri, Oklahoma & Gulf	334	387,076	105,740	518,380	107,056	83,558	20,550	219,507	512	26,677	457,859	60,521	32,354	27,813	—31,671
Missouri, Oklahoma & Gulf Ry. of Texas	19	48,573	1,890	51,473	5,640	8,778	1,075	21,641	....	2,539	39,673	11,800	983	10,816	2,931
Missouri Pacific	3,920	9,932,631	2,206,733	13,176,096	1,657,557	2,401,292	320,668	4,716,852	40,239	316,069	9,452,678	3,723,418	492,950	3,225,896	1,158,855

REVENUES AND EXPENSES OF RAILWAYS

FIVE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Mobile & Ohio	1,122	$3,899,974	$584,727	$4,762,014	$542,995	$930,284	$208,302	$1,848,534	$13,757	$148,393	$3,692,264	$1,069,750	$153,926	$915,418	—$282,866
Monongahela	75	421,453	11,076	441,654	86,784	33,842	2,988	114,451	.....	10,020	248,086	193,568	8,580	184,988	—198,116
Morgan's La. & Tex. R. R. & S. S. Co.	405	1,322,311	452,216	1,920,224	233,855	363,356	56,497	736,846	12,945	59,330	1,462,484	457,740	98,879	357,576	22,261
Nashville, Chattanooga & St. Louis	1,231	3,255,830	1,164,921	4,820,495	654,257	981,791	220,662	1,903,937	45,841	147,723	3,954,210	866,285	136,065	729,953	—291,061
Nevada Northern	165	391,655	47,575	457,660	87,040	68,897	2,247	112,408	318	19,333	290,242	167,242	26,589	140,829	—189,586
New Orleans & North Eastern	204	1,102,611	234,895	1,468,330	163,734	324,118	48,638	516,650	29,473	59,139	1,141,752	326,578	73,400	253,178	—94,567
New Orleans Great Northern	283	494,525	134,002	689,711	84,784	102,047	13,473	209,693	863	32,519	443,379	246,332	15,333	230,987	—90,895
New Orleans, Mobile & Chicago	403	593,581	138,255	774,538	147,906	114,030	19,457	265,902	1	33,896	581,192	193,346	30,924	162,347	—177,082
New Orleans, Texas & Mexico	286	547,916	101,524	681,801	147,564	81,718	19,818	261,041	.....	43,656	553,798	128,003	8,105	119,899	15,915
New York Central & Hudson River	3,692	27,031,668	14,891,666	49,173,222	5,761,707	8,882,232	769,998	16,689,648	899,446	1,091,859	34,094,890	15,078,332	2,607,709	12,468,709	1,935,274
New York, Chicago & St. Louis	568	3,876,968	670,710	4,771,956	649,990	571,928	208,546	2,080,152	27,205	96,510	3,634,331	1,137,625	210,000	927,329	—39,414
New York, New Haven & Hartford	2,003	12,926,722	12,165,826	28,080,222	3,655,661	4,112,376	188,964	10,396,264	234,344	648,319	19,226,408	8,853,813	1,179,000	7,673,051	—165,056
New York, Ontario & Western	568	2,750,550	933,843	4,266,533	599,645	731,048	41,733	1,530,220	.....	76,225	2,978,870	1,287,662	98,332	1,189,300	14,688
New York, Philadelphia & Norfolk	112	1,302,852	233,240	1,682,189	165,623	320,419	21,445	703,451	23,421	48,047	1,282,406	399,784	46,800	352,963	12,731
New York, Susquehanna & Western	140	870,804	233,431	1,237,404	137,372	143,544	10,386	540,530	.....	27,339	859,070	378,334	65,625	301,308	25,868
Norfolk & Western	2,044	15,547,082	2,171,080	18,424,958	2,725,266	3,593,621	295,837	5,363,588	49,157	341,461	12,114,822	6,310,136	715,000	5,595,135	—244,469
Norfolk Southern	900	1,009,810	496,401	1,634,625	231,750	265,118	37,877	596,025	361	99,836	1,230,967	403,658	58,525	345,130	—119,842
Northern Pacific	6,458	21,540,165	6,729,213	30,900,085	4,481,326	4,163,601	476,181	8,608,590	441,669	450,861	17,974,256	12,925,829	2,057,764	10,867,440	—1,153,517
Northwestern Pacific	401	721,718	904,116	1,819,440	313,753	204,435	24,089	612,254	.....	44,338	1,173,131	646,309	79,925	566,348	—68,320
Oregon Short Line	2,162	6,783,680	2,109,893	9,652,072	1,425,729	1,176,918	145,409	2,259,867	143,140	278,651	5,367,178	4,284,894	563,028	3,720,942	—784,789
Oregon-Washington R. R. & Nav. Co.	2,023	4,701,106	2,070,594	7,363,507	843,899	816,220	193,367	2,314,536	67,584	280,917	4,461,282	2,902,224	477,582	2,424,109	205,328
Panhandle & Santa Fe	668	1,330,719	287,189	1,698,341	305,245	328,230	18,685	527,735	.....	43,399	1,223,294	475,047	44,897	429,792	255,859
Pennsylvania *Company*	1,757	17,996,295	4,390,290	24,885,403	3,656,343	4,336,411	385,384	8,695,496	189,924	551,252	17,814,811	7,070,592	1,341,382	5,728,844	—1,525,639
Pennsylvania *Railroad*	4,519	56,387,789	17,455,924	81,145,947	10,319,454	15,187,856	956,986	29,363,093	1,171,915	2,013,355	59,013,658	22,133,289	3,367,077	18,756,664	355,521
Pere Marquette	2,319	5,347,041	1,940,655	7,929,009	731,697	1,492,160	161,064	2,873,351	26,676	233,207	5,515,353	2,413,656	265,404	2,147,732	1,364,387
Philadelphia & Reading	1,120	16,197,559	2,980,116	20,101,126	2,044,470	3,638,533	227,412	6,946,491	54,816	342,416	13,254,138	6,846,988	501,556	6,342,958	—830,276
Philadelphia, Baltimore & Washington	717	4,460,150	3,606,776	8,954,680	1,350,974	1,589,763	127,300	3,695,941	63	219,416	6,983,456	1,971,223	285,756	1,685,177	318,471
Pittsburgh & Lake Erie	224	5,630,153	761,776	6,667,027	886,460	1,423,878	70,611	1,730,171	17,336	137,557	4,266,013	2,401,014	259,850	2,141,164	—1,260,132
Pittsburgh, Cincinnati, Chic. & St. Louis	1,472	11,567,414	3,593,048	17,116,266	2,259,548	3,218,905	329,587	6,080,509	126,021	385,417	12,399,987	4,716,280	844,876	3,870,826	225,724
Pittsburgh, Shawmut & Northern	294	719,195	57,114	786,954	192,234	229,123	7,704	255,705	.....	20,765	705,531	81,422	8,203	73,219	179,320
Port Reading	21	513,133	.....	621,510	86,630	45,899	195	196,259	.....	2,074	331,056	290,454	60,000	230,454	1,825
Richmond, Fredericksburg & Potomac	88	595,752	379,150	1,121,028	100,555	150,396	17,299	429,684	17,708	35,350	753,993	367,036	37,023	329,875	—5,646
Rutland	468	866,262	533,828	1,592,242	198,912	266,359	41,968	600,841	6,469	27,174	1,141,724	450,519	85,740	364,779	—89,797
St. Joseph & Grand Island	258	545,811	137,256	734,435	142,470	104,609	24,226	251,717	.....	26,705	549,726	184,709	35,199	149,483	53,494
St. Louis & San Francisco	4,746	12,077,809	4,750,962	17,975,712	2,522,548	2,784,055	324,484	5,929,300	.....	429,635	11,990,022	5,985,690	518,530	5,461,998	—406,138
St. Louis, Brownsville & Mexico	548	574,264	329,334	990,427	183,847	104,688	26,108	370,825	52,676	—7,913	730,231	260,196	33,750	226,446	23,646
St. Louis, Iron Mountain & Southern	3,365	9,867,263	2,426,462	13,311,419	1,889,560	2,356,783	275,427	4,118,286	45,325	297,466	8,982,849	4,328,571	565,160	2,758,977	—768,413
St. Louis Merchants' Bridge Terminal	9	.....	985	790,339	107,920	34,154	3,825	385,957	.....	35,175	567,030	223,309	38,900	184,403	85,777
St. Louis, San Francisco & Texas	235	388,707	147,343	571,058	136,576	86,371	11,304	240,938	.....	23,794	498,983	72,075	6,748	65,305	—142,543
St. Louis Southwestern	943	2,371,817	555,855	3,106,670	371,302	531,168	130,295	836,081	17,356	126,750	2,011,909	1,094,761	154,084	940,384	—370,349
St. Louis Southwestern of Texas	811	1,063,831	450,037	1,643,558	399,422	413,115	60,622	731,650	4,982	87,993	1,690,750	—47,192	67,500	—115,226	—187,316
San Antonio & Aransas Pass	724	1,195,962	532,563	1,842,791	316,881	338,293	33,531	840,998	.....	57,628	1,587,321	255,470	60,002	195,270	—502,645
San Pedro, Los Angeles & Salt Lake	1,132	2,532,161	1,061,686	3,954,901	449,728	633,722	159,899	1,273,737	66,935	90,220	2,674,242	1,280,660	204,125	1,076,038	94,636
Seaboard	3,101	5,720,083	1,893,756	8,525,040	1,050,481	1,324,104	329,129	3,171,982	34,254	267,734	6,175,425	2,349,615	455,000	1,892,734	—685,626
Southern	7,036	17,496,681	7,612,056	27,481,328	3,806,014	4,921,366	953,727	10,027,463	178,398	855,349	20,694,655	6,786,672	1,093,487	5,685,777	—2,414,280
Southern in Mississippi	281	272,538	152,040	464,353	114,674	46,034	12,137	207,493	.....	18,113	398,451	65,902	35,651	30,177	—28,472
Southern Pacific	6,510	27,059,421	11,944,531	42,961,415	4,225,205	5,922,873	792,255	13,302,774	694,805	1,161,758	26,027,906	16,933,509	2,125,776	14,797,520	—2,252,268
Spokane International	163	263,568	83,388	365,307	64,324	25,105	11,505	111,151	.....	17,594	229,679	135,628	19,801	115,790	—95,928
Spokane, Portland & Seattle	556	1,281,287	709,508	2,188,653	244,819	177,384	40,505	462,083	18,195	67,259	1,010,245	1,178,409	267,000	911,204	—41,189
Tennessee Central	294	434,263	179,877	655,884	154,309	87,648	27,939	253,893	.....	33,548	557,326	98,559	22,366	76,106	—101,047
Terminal R. R. Ass'n of St. Louis	35	.....	910	1,165,249	101,011	60,351	4,532	387,539	.....	26,000	579,433	585,816	145,044	440,772	147,682
Texas & New Orleans	469	1,068,004	476,138	1,712,507	283,500	412,467	38,119	663,313	61,124	53,034	1,510,809	201,698	78,254	122,167	—52,086
Texas & Pacific	1,887	5,361,722	1,916,070	7,879,824	814,556	1,242,216	187,031	3,173,366	73,060	192,979	5,678,468	2,201,356	343,500	1,856,232	—190,433
Toledo & Ohio Central	446	2,066,331	287,785	2,512,292	348,729	415,799	34,542	867,830	9,009	49,564	1,725,464	786,828	110,707	674,376	164,997
Toledo, Peoria & Western	248	305,243	204,720	544,740	86,380	136,944	12,486	224,303	.....	17,972	478,085	66,655	30,500	36,155	15,279
Toledo, St. Louis & Western	451	1,652,812	157,135	1,947,508	255,175	303,786	80,761	724,197	.....	43,555	1,407,474	540,034	137,524	402,510	224,704
Trinity & Brazos Valley	315	353,539	105,229	496,874	102,844	50,357	17,208	217,728	.....	41,194	429,331	67,544	22,340	45,059	15,220
Union Pacific	3,615	17,940,245	4,560,738	24,968,800	3,114,499	3,121,108	451,113	5,765,057	374,685	589,111	13,475,866	11,492,934	919,594	10,571,563	—187,015
Union R. R. of Baltimore	9	565,327	117,859	692,285	68,338	.....	.....	23,019	.....	11,400	102,757	589,528	31,051	558,477	—48,976
Union R. R. of Pennsylvania	31	.....	.....	1,773,718	215,008	509,756	509	672,744	.....	14,215	1,412,231	361,487	15,738	345,750	—257,566
Vandalia	910	3,282,682	1,087,204	4,890,421	733,544	930,112	119,065	1,825,430	57,805	105,997	3,771,953	1,118,468	158,990	959,478	—219,943
Vicksburg, Shreveport & Pacific	171	345,846	218,072	629,856	108,786	140,039	17,418	237,918	12,576	25,001	541,738	88,117	33,800	54,317	—88,750
Virginia & Southwestern	240	721,222	77,721	823,360	122,105	186,759	11,651	235,298	.....	19,095	574,907	248,453	31,666	216,787	—29,789
Virginian	503	2,185,794	183,296	2,524,824	319,653	454,664	27,291	572,758	52,426	51,589	1,458,701	1,066,122	112,500	953,390	—327,809
Wabash	2,519	8,891,663	2,965,849	12,986,951	1,535,365	2,251,305	431,246	4,923,208	78,101	304,614	9,507,878	3,479,072	408,809	3,069,217	—151,267
Washington Southern	36	181,261	185,518	497,925	64,592	77,594	6,540	204,021	7,313	14,816	374,356	123,069	16,516	106,546	—8,406
West Jersey & Seashore	356	820,706	2,262,121	3,372,364	475,112	439,696	64,626	1,255,213	14,439	65,970	2,315,056	1,057,308	141,186	915,969	115,671
Western Maryland	651	2,918,358	478,344	3,559,359	525,200	583,910	105,700	1,305,900	9,076	96,197	2,621,098	938,261	123,500	814,761	268,794
Western Pacific	943	1,976,750	566,662	2,699,187	640,533	329,346	122,729	842,683	60,659	107,213	2,103,161	596,026	147,032	447,982	—272,685
Western Ry. of Alabama	133	290,750	192,390	531,722	98,279	131,062	29,496	161,591	7,421	22,372	450,222	81,501	27,463	53,681	—88,650
Wheeling & Lake Erie	459	2,054,540	271,531	2,545,945	288,447	406,128	44,148	898,375	6,957	76,380	1,720,435	825,509	161,443	664,066	—420,916
Yazoo & Mississippi Valley	1,382	3,569,092	1,034,247	4,887,872	776,045	741,529	85,192	1,811,855	6,619	115,749	3,532,253	1,355,619	250,000	1,104,961	—184,531

Traffic News

It is reported that the Canadian railways are preparing to make an application to the Board of Railway Commissioners for Canada for authority to make a general five per cent advance in freight rates east of the Great Lakes.

The Pennsylvania and the Philadelphia & Reading have begun proceedings in the County Court at Harrisburg, Pa., to contest the recent order of the Pennsylvania State Commission reducing by 40 cents a ton the freight rate on anthracite coal from the mines to Philadelphia.

Passenger officers of the Ohio railroads who appeared at meetings before commercial associations last week at Cleveland, Columbus, Youngstown and Toledo, asking support for the proposed repeal of the two-cent passenger fare law in Ohio, plan to continue their conferences with commercial associations at Ashtabula, Kingsville, Elyria, Sandusky, Norwalk, Fremont, Wauseon and Bryan in northern Ohio, and a number of other cities and towns in southern Ohio.

Representatives of the railroads and the grain shippers have decided to refer to the Interstate Commerce Commission the controversy regarding the payment of demurrage charges at Galveston, Tex., on grain shipments which were held up at that port in August on account of the difficulty in getting ships to take the grain away. An amount estimated at between $125,000 and $150,000 in demurrage charges is in dispute. The grain men and ship agents claim that demurrage should be waived because the European war rendered it impossible to get ships promptly.

The western railways have appointed a committee of five lawyers to prepare their case for advances in interstate freight rates on a number of commodities. Hearings are to begin before Commissioner Daniels in Chicago on February 15. The committee consists of C. C. Wright, general solicitor of the Chicago & North Western; T. J. Norton, general attorney of the Atchison, Topeka & Santa Fe; W. F. Dickinson, general attorney of the Chicago, Rock Island & Pacific; C. S. Berg, commerce attorney of the Missouri, Kansas & Texas, and A. P. Humburg, commerce attorney of the Illinois Central.

Effect of Panama Canal on Rail Traffic

Railway and Marine News of Seattle, Wash., publishes an interview with a railroad man, stating that recently he saw on the side tracks at Huntington, Ore., 11 cars of Idaho wheat bound for Portland, to be sent from there by way of Panama canal to the Atlantic seaboard. This, he said, was the first shipment of Idaho wheat ever carried by the Oregon Short Line to tidewater bound for another seaport. He also mentioned that dried fruits are now moving from the Pacific coast to Atlantic ports at a rate of 26 cents per 100 lb., and canned goods at 30 cents; and large shipments of salmon from Alaska, which have gone principally by rail to Chicago and the eastern seaboard are now going by way of the canal. He also mentioned the case of a piano manufacturing concern in Chicago that has found out that it can ship in carload lots to New York and then by the canal to the Pacific coast cheaper than by rail from Chicago to the same point of destination; and that shipments of household furniture from Rockford, Ill., have moved to Pacific coast points by the same route.

The same publication reports an enormous demand for cold storage space on boats running through the canal, from the fruit and vegetable shippers along the Pacific coast. The steamer Ohioan of the American Hawaiian fleet, which sailed from San Francisco on December 23, was offered 8,000 tons of fruit and vegetables, fish and other products, which are best carried in cold storage rooms. The boat only had a capacity of 1,500 tons in its refrigerating rooms, and apples and fish had been offered at the Puget Sound ports which would fill this space. F. A. Hooper, district freight manager of the American Hawaiian Steamship Co., is quoted as saying that he has never seen anything to equal the demand for refrigerating space for the New York trade, and that it has been necessary to allot the available space to the various districts to avoid complaints of discrimination.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The Dallas (Texas) Chamber of Commerce Freight Bureau and the Fort Worth Freight Bureau have filed a joint petition with the Interstate Commerce Commission charging discrimination in the rates from St. Louis and Kansas City to Shreveport, La., as compared with the rates to Texas points.

Rating on Live Poultry in Western Trunk Line Territory

Opinion by Commissioner Meyer:

For many years live poultry in carloads has been rated second-class in the western classification, but under exception to the classification the traffic has moved in western trunk line and trans-Missouri territories under fourth-class rates. The commission finds that the carriers have justified a proposed increase from these fourth-class rates to third-class rates. Live poultry should move under a higher rate than many other similar commodities because the traffic is light and requires equipment constructed especially for its movement, which equipment cannot be used for any other traffic, so that the empty car movement is at least equal to the loaded car movement. (32 I. C. C., 380.)

Rates on Lumber from Memphis to New Orleans

Bellgrade Lumber Company et al v. Illinois Central et al. Opinion by Commissioner McChord:

The commission reaffirms its decision in Lumber Rates from Memphis to New Orleans (27 I. C. C., 471), that the carriers were justified in increasing the rates on lumber of all kinds from Memphis, Tenn., to New Orleans, La., from 10 cents to 12 cents in order that the rates on hardwood lumber and gum should be the same. It is found, however, that the present rates on hardwood lumber, other than gum, from points south of Memphis to New Orleans are unreasonable, and the carriers are ordered to maintain a rate not in excess of 11 cents from the territory north of the Southern Railway and 10 cents from the territory south of the Southern Railway to New Orleans. (32 I. C. C., 403.)

Switching Charges on Coal within the Chicago Switching District

Opinion by Commissioner Clark:

The Chicago & North Western, having proposed to cancel tariffs which grant the Chicago rates on coal and coke in carloads from mines in Ohio, Pennsylvania, Virginia and West Virginia to Greenwood street, Weber, Crawford avenue, and Peterson avenue, stations on the carrier's "Mayfair cut-off," which change would increase the charges 25 to 30 cents per ton, the commission holds that the increase is not justified. It is found, however, that the rates to Peterson avenue and Crawford avenue may reasonably exceed the rate to Chicago by not more than five cents a ton, minimum $2 per car, and to Weber and Greenwood street station not more than ten cents a ton, minimum $4 per car. (32 I. C. C., 444.)

Rates Between Points in Minnesota Via Interstate Routes

In re freight rates between points in Minnesota via interstate routes and between points in Minnesota and other states. Opinion by Commissioner Harlan:

The commission finds that the carriers have justified proposed increased class rates and increased commodity rates except on cement, lime and plaster between Duluth, Minn., and related points on the one hand, and St. Paul and Minneapolis, Minn., and related points on the other, except in so far as violations of the long-and-short-haul rule of the fourth section would result from such increased rates. The commission states that it is evident from the record that the proposed class rates are more nearly in line with the class rates in effect generally throughout this territory than are the present rates, and that no good reason has been suggested why the rates between Duluth and the twin cities should be lower than rates in other parts of the same territory. (32 I. C. C., 361.)

Rates on Cotton in Round Bales

American Round Bale Press Company v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Daniels:

Cotton shipped from gin points in Arkansas, Oklahoma and Texas to Houston, Tex., and the ports of Galveston and Texas City, Tex., and New Orleans, La., is usually compressed in transit, for which service the railroads pay to compress companies 10 cents per 100 lb. Upon cotton which is already compressed when offered to the carriers for transportation, and will, therefore, cost them nothing in the way of compress charges, they make a rate 10 cents per 100 lb. less than that upon cotton to be compressed in transit. The net revenue to the carriers is the same in both cases. Complainants, however, who are interested in the manufacture of machines for the compressing of cotton at the gin into bales of especially high density, and shippers of cotton so compressed, attack the existing any-quantity rates as unreasonable and discriminatory when applied to bales of high density which will load 50,000 lb. to a car, and ask that carload rates with a 50,000 lb. minimum be established.

The commission finds that the existing any-quantity rates on cotton are not unreasonable nor discriminatory, even when applied to bales of high density. It is also held that the cotton industry in the southwest is so organized that the existing any-quantity rates are best suited to its needs, and that the establishment of carload rates, though they might effect some economies in transportation cost, would tend unduly to concentrate the cotton-producing industry, especially in the light of the facts that the average product of a cotton farm of this region is not over 11 bales, and that a carload of cotton represents an investment of several thousand dollars. (32 I. C. C., 459.)

Supplementary Order in the Five Per Cent Case

The commission has entered an order in the eastern rate advance case, directing the railways to maintain their existing grouping in the eastern rates and to grade all the rates in accordance with the measure of the New York-Chicago and Montreal-Chicago rates, even though by so doing some rates are increased slightly more than five per cent.

The order states in part: "It is further ordered that in establishing the said rates approved in the said reports the rates from Chicago, to New York and Montreal, and from New York to Chicago may be increased five per cent, and those increased rates may be scaled to or from percentage points or groups upon the established percentage groupings and percentages; that the rates via ocean-and-rail and established all-rail differential lines may be made the same differentials under the standard all-rail rates as now exist; and that the established groupings or points of origin or of points of destination under common rates may be preserved; even though so doing results in increasing some rates slightly more than five per cent."

Rates on Livestock from Points in Arizona

American National Live Stock Association et al. v. Southern Pacific et al. Opinion by Commissioner Clark:

In American National Live Stock Association v. Southern Pacific Company (26 I. C. C., 37) the commission prescribed a schedule of distance rates on live stock in carloads from points in Arizona to points in California. It was found that the rates on stock cattle and on sheep for feeding should not exceed 85 per cent of the rates on beef cattle and fat sheep respectively, and that there might be added to these rates not to exceed $5 per car for a two-line haul of 500 miles or less, and $2.50 per car for a branch-line haul. The commission now finds in addition that the defendants should establish through routes and joint rates on live stock in carloads from all points in Arizona on their lines from which joint rates are not now in effect to all feeding and slaughtering points on their lines in California, whether the haul be over two lines or three lines. It is provided, however, that the Southern Pacific shall not have to join in any through route or joint rate permitting the Santa Fe to participate in the transportation of live stock from points on the Arizona Eastern or the El Paso & Southwestern to points reached by the Southern Pacific over its own rails. It is also provided that the Santa Fe shall not be required to join in through routes via Phoenix and Maricopa from points on the Santa Fe main line. The rates prescribed as to be the same as before, $5 per car for a two-line haul and $2.50 per car for a branch-line haul, with that exception that the requirement that the $5 rate apply over a two-line haul of 500 miles or less is omitted in order to avoid higher charges for 500 miles than for 525 miles over the same route in the same direction. (32 I. C. C., 438.)

Switching Charges at Baltimore

Merchants' & Manufacturers' Association et al. v. Pennsylvania Railroad et al. Opinion by Commissioner McChord:

In its original report in this case, given on May 14, 1912 (32 I. C. C., 474) the commission found that the charges for the interchange of interstate traffic in carloads in Baltimore, Md., should not exceed the flat Baltimore rate by more than five cents per 100 lb. on first and second classes, or by more than two cents on third, fourth, fifth and sixth classes. It was also found as to commodities not moving under class rates that the charges should not exceed the flat Baltimore rate by more than two cents per 100 lb. An extension of the switching limits and the fact that intrastate switching charges have been placed on a per car basis, both in accordance with decision of the Public Service Commission of Maryland, having changed the situation to some extent since the previous decision and with a view to uniformity of switching charges the commission now finds that the charge for interline switching movements in Baltimore in no case should exceed the flat Baltimore rate by more than two cents per 100 lb. as applied to commodities moving under either class or commodity rates and that any higher charge would be unreasonable. (32 I. C. C., 434.)

Rates on Grain from Kansas City to Memphis

Board of Trade of Kansas City, Mo., v. St. Louis & San Francisco et al. Opinion by Commissioner Meyer:

The commission finds that the proportional rates from Kansas City to Memphis, of 14 cents per 100 lb. on wheat and products of wheat, and 13 cents per 100 lb. on coarse grain and products are not unreasonable per se, nor discriminatory as compared with rates from Omaha to Memphis one cent per 100 lb. higher than from Kansas City, thus following the decision in Kansas City Transportation Bureau v. Atchison, Topeka & Santa Fe (16 I. C. C., 195) where the same rates were attacked.

The commission notes in its decision that the changes asked for would affect not merely the grain traffic from Kansas City and Omaha to Memphis and the southeast, but would also have a bearing upon the traffic from numerous competing markets to the destination territory here involved, as well as to other destinations.

It is also noted that the proportional rates are such that when the total charge from the grain fields to Memphis via Kansas City and via Omaha is considered, the former is not at an undue disadvantage. In this connection reference is made to the statement in the previous case that "A proportional rate means a part of or a remainder of the through rate, or it means nothing at all; and in a case of this kind there must be an examination and consideration of the entire rate from point of production to ultimate destination. It is not sufficient to consider the rates to an intermediate market nor alone the rates from such market, if the question of discrimination between such markets is to be determined."

With reference to the statement that there has been a decline in the shipments from Kansas City to Memphis and through Memphis to the Mississippi valley and southeast during recent years, it is noted that a large part of this change is due to the increase in corn production in the southeastern states. The commission quotes from a former decision to the effect that it is not within the power of this commission to equalize economic conditions or to place one market in a position to compete on equal terms with another market as against natural advantages. It has the power to require railroads in the face of varying trade conditions, to adjust their rate schedules in such manner as to insure to a market the continuance of a trade it has once enjoyed." (32 I. C. C., 297.)

STATE COMMISSIONS

The Railroad & Warehouse Commission of Minnesota has issued an order calling for the abolition of switching charges on extensive freight traffic at Minneapolis and at Minnesota transfer. A charge of $1.50 a car on grain taken to elevators is the principal feature that will be changed by the order.

In connection with the application of the roads for authority to make a general increase of 5 per cent in freight rates, the Virginia commission has directed the chambers of commerce of the different cities to file, within ten days from January 7, any objections which they may have to offer. It is expected that objections will be received from Richmond, Petersburg, Norfolk and Alexandria.

The State Corporation Commission of Virginia has authorized the railroads of the state to make, in Richmond and Lynchburg, a "track storage" charge, on bulk freight, in addition to the usual demurrage charge. The track charge, in addition to the demurrage charge will be for the first two days after the expiration of the free time, one dollar a car each day; and thereafter two dollars a car each day.

The Minnesota Railroad & Warehouse Commission has ordered the Chicago, Rock Island & Pacific to limit the speed of passenger trains in Minnesota to 30 miles an hour. This order appears to have been a result of the investigation of the derailment at Northfield, on December 13, in which a passenger was killed. The commission holds that the tracks of the company are not in sufficiently good condition.

The New York State Public Service Commission, Second district, has authorized all railroads operating under its jurisdiction to make a 5 per cent advance in freight rates, on ten days' notice, to correspond with the advances which have been authorized in interstate traffic by the Interstate Commerce Commission. None of these advances affect coal, coke or iron ore. The Pennsylvania commission, to which a similar application on the part of the roads appears to have been made, decided not to permit any increase in less than the statutory thirty days' notice.

The New Orleans, Mobile & Chicago has been fined $13,000 by the Mississippi railroad commission for discontinuing certain trains after a petition for permission to do so had been refused. After the commission's refusal W. F. Owen, receiver for the railroad, took the matter to the federal court and was granted permission to discontinue the trains both in Mississippi and Alabama. The commission, in assessing the fine says that the road failed to obtain an injunction against carrying out the commission's order before the federal court acted on the case and that it still had jurisdiction in the matter. The company was fined $500 for each day the commission's order was violated.

The California Railroad Commission has rendered a decision holding that the Standard Oil Company, the Associated Oil Company, the Producer Transportation Company, the Associated Pipe Line Company and the General Pipe Line Company of California, are common carriers and public utilities, and subject to the public utilities act of California. The commission finds that these companies are controlled by five interests, which together control 95 per cent of the entire oil production of the state. The pipe lines are held to be public utilities in the transportation of crude oil, petroleum or the products thereof by means of pipe lines from the San Joaquin valley oil fields.

COURT NEWS

The sixth court of civil appeals at Texarkana, Tex., has rendered a decision holding that the International & Great Northern has violated its contract with the city of Palestine, Tex., in moving its general offices and shops from Palestine to Houston, after it had been given a bond issue of $160,000 to locate at Palestine. Officers of the road say that the case will be appealed to the supreme court of the state.

In the Federal Court at Philadelphia, January 6, the grand jury returned three indictments against the Philadelphia & Reading concerning irregularities in the transportation of coal. On 51 counts the road is charged with having engaged in transportation of coal without having filed tariffs. The transportation was in part by the Philadelphia & Reading Transportation line of barges, owned by the Reading between Philadelphia and New England points. Another indictment of 50 counts charges the road with granting concessions to certain shippers by holding their coal at Woodlane yard, eight miles from the Port Richmond coal piers, when it was destined to Port Richmond, and then not charging demurrage for such detention. The third indictment of 25 counts charges failure to collect demurrage on 25 shipments from the mines to Port Richmond.

Railway Officers

Executive, Financial, Legal and Accounting

F. B. Sheldon has been appointed vice-president of the Toledo & Ohio Central and the Zanesville & Western, with headquarters at Columbus, Ohio, succeeding J. J. Bernet.

R. N. Hudson, general manager of the Louisville & Atlantic at Versailles, Ky., has been elected president, general manager and a director of the Louisville, Henderson & St. Louis, succeeding L. J. Irwin, deceased.

R. E. M. Cowie, manager of the American Express Company at Denver, Colo., has been appointed vice-president and general manager of the eastern department, with headquarters at New York, succeeding H. S. Julier, resigned. Mr. Julier, who is 73 years old, has been with the American Express Company for 56 years.

C. F. Daly, who was vice-president in charge of the traffic department of both the New York Central & Hudson River and the Lake Shore & Michigan Southern retains his same duties with the consolidated company, the New York Central Railroad, with headquarters at New York; and Albert H. Harris, who was general counsel of the New York Central Lines east of Buffalo and vice-president of the lines west of Buffalo, has been appointed vice-president of the New York Central Railroad with headquarters at New York. Mr. Harris also retains the vice-presidency of those lines west of Buffalo which are not affected by the consolidation. The other executive officers of the New York Central & Hudson River, except those recently mentioned in these columns, retain the same duties with the consolidated company.

A. W. Newton, whose appointment as assistant to the president of the Chicago, Burlington & Quincy, was announced in our issue of January 8, was engaged in general engineering practice from 1892 to 1900, and entered the service of the Chicago & Alton in 1900 as assistant engineer, with headquarters at Kansas City, Mo. He was transferred to Bloomington, Ill., in 1902, and in March of the following year he went to the Chicago, Burlington & Quincy as engineer of construction on lines in the Missouri district. In 1904 he was transferred to the Illinois district as assistant engineer, returning to the Missouri district as district engineer in December of that year. In 1907 Mr. Newton was appointed general inspector of permanent way and structures on the staff of the vice-president at Chicago. On January 1, 1914, he was appointed chairman of the committee on Federal Valuation, and in connection with these duties was appointed on the Engineering Committee of the Presidents' Conference Committee on Valuation. He now becomes assistant to the president, as above noted, having, in addition to his duties pertaining to federal valuation, such other duties as may be assigned.

A. W. Newton

Albert Hall Harris, general counsel of the New York Central Lines East of Buffalo, N. Y., and vice-president of the New York Central Lines West of Buffalo, with office at New York, has been appointed vice-president of the consolidated company, the New York Central Railroad, with headquarters at New York; he also retains the vice-presidency of those lines west of

Buffalo, which are not affected by the consolidation. Mr. Harris was born on July 4, 1861, at Rochester, N. Y., and graduated from the University of Rochester in 1881, with the degree of A.B. In April, 1905, he was appointed general attorney of the New York Central & Hudson River, and since December, 1906, has been general counsel. In December, 1906, he was appointed also vice-president of the Michigan Central; the Lake Shore & Michigan Southern; the Cleveland, Cincinnati, Chicago & St. Louis; the Lake Erie & Western, and the Pittsburgh & Lake Erie.

Operating

E. V. Brogan, assistant division superintendent of the Lake Shore & Michigan Southern at Buffalo, N. Y., has been appointed assistant superintendent of the Buffalo division of the New York Central Railroad.

F. M. Thomson, assistant engineer of the Houston & Texas Central at Ennis, Tex., has been appointed assistant superintendent of the El Paso division at El Paso, Tex., of the Galveston, Harrisburg & San Antonio, succeeding C. R. Morrill, promoted.

C. R. Morrill, assistant superintendent of the El Paso division of the Galveston, Harrisburg & San Antonio at El Paso, Tex., has been appointed superintendent of the Second division of the Houston & Texas Central, with office at Austin, Tex., succeeding W. L. Bisbee, resigned on account of ill health.

R. N. Hudson having resigned to accept service with another company, the office of general manager at Versailles, Ky., of the Louisville & Atlantic, a subsidiary of the Louisville & Nashville, is discontinued, and all duties heretofore assigned to that office will, in future be performed by J. R. Pates, superintendent, at Richmond, Ky.

W. A. Mather, superintendent of the Manitoba division of the Canadian Pacific at Kenora, Ont., has been appointed superintendent, with office at Medicine Hat, Alta., in place of J. M. Cameron, promoted, and J. N. Murphy has been appointed trainmaster, with headquarters at Medicine Hat, in place of A. F. Hawkins.

J. L. McCollum, superintendent of the Atlanta division of the Nashville, Chattanooga & St. Louis, at Atlanta, Ga., has been appointed general agent of the operating department; J. A. Baldwin, assistant superintendent at Atlanta has been appointed acting superintendent, and J. Q. Bowden has been appointed assistant superintendent, all with headquarters at Atlanta.

Arthur Hatton, superintendent of car service of the Canadian Pacific at Winnipeg, Man., has been appointed general superintendent of car service, with office at Montreal, Que., in place of George S. Cantlie, who, at his own request, has been granted leave of absence for an extended period, in order that he may take command of the Montreal unit to be organized for service with the third contingent of the Canadian expeditionary force.

The following officers of the Lake Shore & Michigan Southern, which is now consolidated with the New York Central Railroad, have had their jurisdiction extended over the Illinois division of the New York Central, formerly the Chicago, Indiana & Southern; F. H. Wilson, general superintendent, Chicago; H. J. Merrick, superintendent of freight transportation, Cleveland, Ohio; S. T. Gage, superintendent of passenger transportation, Cleveland, and F. F. Riefel, superintendent of telegraph, Cleveland.

J. M. Daly has resigned as general superintendent of transportation of the Illinois Central and the Yazoo & Mississippi Valley, to engage in other business. J. F. Porterfield, general superintendent of the lines south of the Ohio river at New Orleans, La., succeeds Mr. Daly; L. W. Baldwin, superintendent of the Kentucky division, succeeds Mr. Porterfield; L. A. Downs, superintendent of the Minnesota division, succeeds Mr. Baldwin at Louisville, Ky.; William Atwill, trainmaster of the Minnesota division, at Dubuque, Iowa, succeeds Mr. Downs at Dubuque; H. G. Duckwitz succeeds Mr. Atwill; J. M. O'Day, superintendent of transportation, has been appointed car accountant, and will report to the controller at Chicago.

B. B. Greer, whose appointment as assistant general manager of the Chicago, Burlington & Quincy lines east of the Missouri river, has already been announced in these columns, was born in Chicago in 1877. He attended Armour Institute 1893-97 and Dartmouth College 1897-98. He began railway work in 1899 with the Great Northern, and remained with that road until 1908, filling various positions, including roadmaster's clerk, chief clerk to superintendent, roadmaster and assistant superintendent. Mr. Greer then became connected with the Chicago, Burlington & Quincy as transportation inspector on the general manager's staff, and has since been consecutively superintendent of terminals at St. Louis, Mo., division superintendent at Hannibal and St. Joseph, and assistant to the general manager of the lines east of the Missouri river. From the latter position he was on January 1 promoted to assistant general manager, with headquarters at Chicago, as above noted.

Edward J. Guthrie, whose appointment as superintendent of the Southern division of the Central Vermont, also as superintendent of the Central Vermont Transportation Company, with headquarters at New London, Conn., has already been announced in these columns, was born on March 1, 1866, at Erie, Ont., Canada, and was educated in the country schools of western Ontario. He began railway work on October 1, 1889, with the Grand Trunk as a switchman, remaining in that position for a year and a half. He was then telegraph operator for nine years; agent at various places on the Grand Trunk for nine and one-half years, and in 1907 entered the service of the Central Vermont as freight agent at St. Albans, Vt. Three months later he was transferred to Palmer, Mass., and subsequently served at Brattleboro, Vt. He was then appointed general agent of the same road at New London, Conn., four months later he was transferred to New York as agent of pier 29, East river, and now becomes superintendent of the Southern division of the same road, also superintendent of the Central Vermont Transportation Company, in charge of steamers operating between New London and New York, with headquarters at New London, Conn.

E. J. Guthrie

Traffic

William Warner has been appointed general agent of the San Pedro, Los Angeles & Salt Lake at Chicago, succeeding George M. Sargent, deceased.

R. L. McKibben has been appointed general baggage agent of the Sunset-Central Lines, with headquarters at Houston, Tex., succeeding W. S. Napier, deceased.

Albert K. Curts has been appointed district passenger agent of the Union Pacific at Des Moines, Iowa, vice J. W. Turtle, traveling passenger agent, deceased. William R. Alexander has been appointed general agent at Detroit, Mich., succeeding J. C. Ferguson, resigned.

W. H. Cundey, general agent, passenger department, of the Denver & Rio Grande, the Western Pacific, the Missouri Pacific and the St. Louis, Iron Mountain & Southern, at Colorado Springs, Colo., has been appointed assistant general passenger agent, with headquarters at Denver, Colo. A. C. Wilson, commercial freight agent at Colorado Springs, has been appointed general agent at that place.

B. H. Hartley, commercial agent of the Seaboard Air Line, at Atlanta, Ga., has been appointed general agent of the Seaboard Air Line and the Carolina, Atlantic & Western, with office at Charleston, S. C., in charge of freight and passenger traffic in Charleston territory, and D. P. Hartley has been appointed commercial agent of both roads, with office at Charleston, S. C. J. F. Cheney has been appointed commercial agent of the Seaboard Air Line, with office at Atlanta, Ga., succeeding B. H. Hartley. W. A. Fulwiler, commercial agent at Oklahoma City, Okla., has been appointed general agent at Tampa, Fla., in charge of freight and passenger interests at Tampa and at

points in the Tampa territory, and J. T. Baird has been appointed commercial agent, with office at Oklahoma City, Okla., succeeding Mr. Fulwiler.

Engineering and Rolling Stock

J. P. Dolan has been appointed master mechanic of the Apalachicola Northern, with office at Port St. Joe, Fla., succeeding R. A. Billingham.

W. Malthaner has been appointed master mechanic of the Baltimore & Ohio, with headquarters at Newark, Ohio, succeeding O. J. Kelley, assigned to other duties.

F. G. White has resigned as signal engineer of the Chicago Great Western, and the duties of that office have been assumed by G. O. Perkins, superintendent of telegraph, with headquarters at Chicago.

Frank W. Taylor, division master mechanic of the Illinois Central at Waterloo, Iowa, has been appointed superintendent of machinery of the International & Great Northern, with headquarters at Palestine, Tex., succeeding C. H. Seabrook, resigned.

Joseph Keller has been appointed to the new position of general fuel inspector of the Lehigh Valley, with office at South Bethlehem, Pa. Mr. Keller was previously a member of the board of examiners for enginemen on the Lehigh Valley at South Bethlehem.

The following officers of the Lake Shore & Michigan Southern, which is now consolidated with the New York Central Railroad, have had their jurisdiction extended over the Illinois division of the New York Central, formerly the Chicago, Indiana & Southern. D. R. MacBain, superintendent of motive power, Cleveland, Ohio; G. C. Cleveland, chief engineer, Cleveland.

F. J. Barry, general inspector of air brakes, steam heat and lighting of the New York, Ontario & Western, with office at Middletown, N. Y., has been appointed master mechanic, with office at Mayfield Yard, Pa., vice W. H. Kinney, resigned, and his former position has been discontinued. Matters relative to steam heat and lighting will in future be in charge of A. Kipp, general car inspector, and matters relative to air brakes will be in charge of B. P. Flory, superintendent of motive power.

E. Ben Carter, whose appointment as chief engineer of the Florida East Coast, with headquarters at St. Augustine, Fla., has already been announced in these columns, was born on June 11, 1853, at Branford, Conn. After leaving high school he was a student at an academy and then took up special engineering studies. He began railway work in June, 1871, with an engineering corps making surveys for the Chicago, Decatur & St. Louis, and subsequently was engaged in making miscellaneous surveys and in construction work in Illinois, Wisconsin, Michigan, Nebraska and Missouri on the Kansas City extension of the Chicago & Alton, also in Ohio. From 1881 to 1887 he was locating and construction engineer of the Jacksonville, Tampa & Key West, now a part of the Atlantic Coast Line on the Jacksonville-Tampa division. From 1887 to 1892 he was engaged in miscellaneous engineering work in Florida, and since that time has been in the service of the Florida East Coast; for two years as division engineer on construction until April, 1894, then engineer and general roadmaster until January, 1909, and as superintendent of maintenance of way until January, 1915, when he was appointed chief engineer of the same road. From 1894 to 1915 Mr. Carter performed the duties of chief engineer.

Special

E. E. Pettibone, real estate agent of the Lake Shore & Michigan Southern, which is now consolidated with the New York Central, has had his jurisdiction extended over the Illinois division of the New York Central, formerly the Chicago, Indiana & Southern.

Purchasing

E. G. Goodwin has been appointed fuel agent of the Southern Railway, the Virginia & Southwestern and the Northern Alabama, with headquarters at Knoxville, Tenn., and subsidiary offices at Birmingham, Ala., and Princeton, Ind.

The following officers of the Lake Shore & Michigan Southern, which is now a part of the New York Central Railroad, have had their jurisdiction extended over the Illinois division of the New York Central, formerly the Chicago, Indiana & Southern. G. R. Ingersoll, purchasing agent, Cleveland, Ohio; J. P. Murphy, general storekeeper, Cleveland.

OBITUARY

Samuel M. Inman, formerly a director of the Southern Railway, died on January 12, at Atlanta, Ga.

Edmund P. Henderson, formerly a master mechanic of the Southern Pacific, died at San Antonio, Tex., on January 4, aged 75 years.

Chauncey Ives, formerly chief engineer of the Cumberland Valley Railroad, and later engaged in construction work on the tunnels in New York City, died on January 4, at Hood River, Ore.

A. B. Hinkle, assistant to division engineer of the Chicago division of the Baltimore & Ohio, died at his home in Albion, Ind., on January 2. Mr. Hinkle had been continuously in the service of the B. & O. since 1885.

William J. Young, formerly for many years commercial agent of the Illinois Central at Chicago, died at his residence in Evanston on January 11, aged 73 years. He was retired three years ago under the pension rules of the Illinois Central, having reached the age of 70 years.

Sidney B. Liggett, secretary of the Pennsylvania Lines West of Pittsburgh, died on January 9 at his home in Pittsburgh, Pa., at the age of 65. He entered the services of the Pennsylvania company in 1871, as a clerk in the auditor's office, and since February, 1881, was secretary of the Pennsylvania Lines West of Pittsburgh.

Alphonse Feldpauche, who was formerly chief engineer of the Philadelphia, Wilmington & Baltimore, and later secretary of the Association of Transportation Officers of the Pennsylvania Railroad, died on January 5, at Philadelphia, Pa., at the age of 66. Mr. Feldpauche remained in charge of the engineering department of the P. W. & B. for some years after the road came under the control of the Pennsylvania. He was appointed secretary of the transportation officers' association in 1903.

Joseph McCabe, formerly from February, 1898, to June, 1906, vice-president and general manager of the Washington & Columbia River, now a part of the Northern Pacific, died recently at the age of 59. He began railway work in 1870 with the Chicago, Milwaukee & St. Paul, and was consecutively telegraph operator and agent on that road. He subsequently served as train despatcher and chief train despatcher on different roads, until 1888, when he was appointed superintendent on the Northern Pacific, and in February, 1898, he became vice-president and general manager of the Washington & Columbia River.

Thomas C. Keefer, one of the most prominent civil engineers of Canada, died at his home in Ottawa, January 7, at the age of 94. He commenced his career as an engineer at the age of 17 on the Erie canal. He was engaged for several years on the Welland canal, and had a prominent part in the improvement of the Ottawa and St. Lawrence rivers. He took part in the preliminary surveys for the Grand Trunk between Montreal and Toronto, and in the preparation of plans for the Victoria bridge at Montreal. Besides being an eminent engineer, he was a capable writer, and his "Philosophy of Railways," published in 1849, had a marked influence on the policy of the Canadian government. He had been a president of the American Society of Civil Engineers, and was one of the founders of the Canadian Society of Engineers in 1887.

Christopher S. Gadsden, second vice-president of the Atlantic Coast Line, with headquarters at Charleston, S. C., died at Summerville, S. C., on January 12. He was born on August 15, 1834, at Summerville, and was educated at the South Carolina Military Academy. He began railway work in 1853, as rodman in an engineer corps of the New Orleans & Great Northern, now a part of the Illinois Central. He was subsequently engineer on the Franklin & Warren, now a part of the Erie, and later was in the service of the Port Royal & Augusta, in South Carolina, now a part of the Charleston & Western Carolina, and of the Charleston & Savannah. He was superintendent of the Charleston & Savannah until October, 1900, when he became president of the same road. Mr. Gadsden was also third vice-president of the Atlantic Coast Line to November, 1902, and since that time was second vice-president of that road.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Cleveland, Cincinnati, Chicago & St. Louis has ordered 5 Pacific type locomotives from the American Locomotive Company.

CAR BUILDING

The Mather Stock Car Company has ordered 500 stock cars from the Haskell & Barker Car Company.

The Chicago & Milwaukee Electric is in the market for 15 all-steel passenger cars instead of 300 as reported last week.

The Long Island has ordered 20 steel passenger cars from the Standard Steel Car Company, for use on its Atlantic Avenue division.

The Interborough Rapid Transit has ordered 12 all-steel passenger cars from the Pressed Steel Car Company for operation in the Steinway tunnel.

IRON AND STEEL

The Nashville, Chattanooga & St. Louis has ordered 3,000 tons of steel rails from the Tennessee Coal, Iron & Railroad Company, for use in the improvement of the roadway of the Western & Atlantic.

The Khedive and the Mariout Railway.—It is stated that one of the last efforts of the ex-Khedive was an attempt to sell, to an Italo-German syndicate, his private railway through the Mariout district, with the intention that it should be connected up with a new line from Benghazi on the Tripolitan coast. There would thus have been direct railway communication with Alexandria, and it was the hope of the promoters that the Indian and Australasian mails would be sent by this route because the distance by sea from Brindisi to Benghazi is a little more than half that from the former port to Alexandria, while it was also believed that tourists would take advantage of the saving of time in the journey between Europe and Egypt. Lord Kitchener, however, strongly opposed the scheme, and the Mariout Railway was bought by the Egyptian government, chiefly in consequence of military considerations.

Indian Railway Operation.—A narrow-gage line about 30 miles in length, from Broach to Jambusar, has recently been opened for passenger traffic, and is now incorporated in the Bombay, Baroda, and Central India system. At the close of March the South Indian Railway was operating 1,753 miles of line, viz.: broad gage, 446 miles; metre gage, 909 miles; narrow gage, 99 miles; and meter-gage lines, other than state lines, 299 miles. A connection established between India and Ceylon by the South Indian Company is now in operation. A viaduct establishes communication between the mainland of India and the Island of Rameswaram, and a Scherzer rolling-lift bridge carries trains over the Pamban Pass. Passenger traffic over the new lines is now in full operation, but there has been some delay as regards goods traffic, and the Ceylon government still restricts despatches to three days a week, and refuses altogether the carriage of live stock. In consequence of a heavy and abnormal fall of rain, the main line of the meter-gage section was recently washed away between Capper Quarry and Coleroon. The normal rainfall of the district is about 49 in. per annum, but in one month alone rain fell to the extent of 41 in., of which 25 in. fell in 48 hours. The consequence was that numerous canals and tanks burst their banks, and all the rivers, of which there are four in the district affected, overflowed their banks. The railway was breached almost continuously for 10 miles; none of the bridges was seriously damaged, and only one culvert was carried away. The damage, however, was so extensive that all traffic over the 10 miles had to be suspended for a month, and the restoration of communications cost nearly $33,500.—*Engineering.*

Supply Trade News

Benjamin G. Fernald has been appointed district manager of the New York office of the Kerr Turbine Company, Wellsville, N. Y.

R. M. Nicholson, advertising manager of the Kimberly-Clark Paper Company, Neenah, Wis., has been placed in charge of the advertising of the Berger Manufacturing Company, Canton, Ohio, succeeding G. P. Blackiston.

C. P. Howard, formerly a member of the firm of Berry, Howard & Roberts, which was recently dissolved, announces the opening of an office as consulting engineer in the Transportation building, Chicago. He will specialize in railway work.

The item in this column last week announcing the incorporation of the National Brass Company, Houston, Tex., was incorrect in that it omitted to state that the G. F. Cotter Supply Company, Houston, Tex., had been appointed general sales agents for the National Brass Company.

The Beaver Dam Malleable Iron Company has been reorganized and incorporated under the corporate name of the Western Malleable Company, and continues the operation of the plant at Beaver Dam, Wis. The officers are: Lawrence Fitch, president and treasurer, with headquarters at Milwaukee, Wis.; E. E. Smythe, vice-president and general manager; M. A. Jacobs, secretary, and A. W. Wilbrandt, assistant secretary.

In a recent decision handed down by the Honorable Learned Hand, justice of the United States district court of the southern district of New York, in the suit of the Chadeloid Chemical Company, New York, against the Wilson Remover Company and John MacNaul Wilson, it is held that the varnish remover made by the defendant company is an infringement of Ellis patent No. 714,880, controlled by the Chadeloid Chemical Company.

Joseph T. Ryerson & Son, Chicago, are offering a prize of $100 in gold for the best trade name for the line of tool steel which the company is selling. The company has been selling a complete line of tool steel for many years, but has had an outside manufacturing connection for the steel, and in consequence adopted the name used by the manufacturer. It has since been found necessary to either manufacture or control the manufacture of the steel, which the company has now been doing for some time. In addition to the $100 first prize, those who send in the 100 next best names will be given a copy of a loose-leaf leather reference book of steel and engineering data, and for the next best 200 names bound volumes of the same book will be given.

Charles Silverman Price, for many years general manager of the Cambria Steel Company, and later its president, died at his home at Westmont, Pa., on Sunday, January 10, of heart disease. Mr. Price was born at West Chester, Pa., on August 27, 1852. He was educated in the private schools and received the degree of Bachelor of Civil Engineering from Cornell University in 1872. After graduating from college he was first employed by the Detroit Bridge & Iron Works, Detroit, Mich., as a draftsman. Shortly after, he was elected city engineer of Lock Haven, Pa., serving for three years. In June, 1876, he entered the service of the Cambria Iron Company as a draftsman in the engineering department. He supervised the construction of the first open-hearth plant of the company, and after its completion became turn foreman, serving as such from 1878 to 1881. He was promoted successively to the positions of superintendent of the open-hearth works, 1881-84; superintendent of the Bessemer, open-hearth and blooming departments, 1884-86; superintendent of the metallurgical department, 1886-90, and general superintendent of manufacture, 1890-92. He subsequently became general manager, vice-president, and on March 15, 1910, was elected president of the Cambria Steel Company. He remained in that position until September 26, 1912, when he resigned on account of ill health.

A decision has just been rendered by the United States Circuit Court of Appeals for the Seventh circuit in the suit of The Rail-

road Supply Company versus the Hart Steel Company and Guilford S. Wood, appealed from the United States District Court for the Northern district of Illinois, Eastern division, reversing the decision of the District Court and deciding in favor of The Railroad Supply Company. This case has been stubbornly contested in the courts for six years and has attracted a great deal of attention because of the principles at issue. The suit involved the validity of three patents covering the designs of tie plates issued to B. Wolhaupter in 1895, 1902 and 1903 and assigned to The Railroad Supply Company, the essential features of these patents being combined in the design of one tie plate. The claims outlined in the patents cover a railway tie plate with flanges more or less sharpened on the under side to penetrate and engage the wood fibres of the tie and with a series of corrugations on the upper surface supporting the rail. This design not only provides a bond between the tie plate and the tie, but the corrugations on the upper surface give increased strength for the amount of metal employed. The evidence introduced in this case showed that the merits of this design have been recognized by many railroads as indicated by the fact that they are being used in large quantities. In sustaining the validity of these patents this decision of the Circuit Court of Appeals ordered an accounting on the claims of the first and primary patent and ordered an injunction and an accounting on the second and third patents containing supplementary features of design later included in this tie plate. This decision is of special importance to the railway supply field, establishing as it does a further precedent for the sustaining of the validity of patent claims against infringements.

TRADE PUBLICATIONS

FORGING PRESSES.—The Mesta Machine Company, Pittsburgh, Pa., has issued bulletin L, descriptive of the Mesta quick-acting, steam-hydraulic flanging press, with single lever control.

ASBESTOSTEEL.—The Asbestos Protected Metal Company, Beaver Falls, Pa., recently issued bulletin No. 54, a 32-page booklet, devoted to a description and illustrations of the use of Asbestosteel for roofs and walls. It gives in detail the uses to which this product may be put and the method of application, also specifications for roofing, slabs, etc., and tables showing safe loads in lb. per sq. in., and sizes of purlins required for various spans. The illustrations show typical cases where the material has been used.

THE STORY OF LA CARTE.—This is the title of an attractively illustrated booklet recently issued by the passenger department of the United Fruit Company to indicate the excellencies of the á la carte dining service on the steamships Pastores, Tanadores and Calamares of the Great White Fleet. The booklet contains several varicolored views of ships of various ages. It also gives a brief outline of the methods of supplying food to those "who went down to the sea in ships" from early times to this, the story being supplemented with interesting items relating to a number of famous dinners on sea and land.

BOILER CIRCULATION.—The Q & C Company, New York, has recently issued a catalog descriptive of the Ross-Schofield System of Circulation for Locomotive Boilers. The bulletin is gotten up in a very attractive manner and on the whole is somewhat out of the ordinary, it being illustrated with both photographs and colored engravings. This system, formerly controlled by the Ross-Schofield Company, has recently been taken over by the Q & C Company. It has been installed on stationary boilers on the Philadelphia & Reading, as well as on locomotive boilers on that road and on the New York, Ontario & Western. A full description of the system was given in the *Railway Age Gazette* of December 18, 1914, page 1131.

ELECTRIC APPLIANCES.—The General Electric Company has recently issued the following bulletins descriptive of some of its electrical appliances. Bulletin No. 42,010, entitled "Small Turbo-Generator Sets," 7 kw. to 300 kw., illustrates and describes in considerable detail the horizontal turbine sets of small capacities manufactured by the company. These machines are largely used for supplying light and power in mills, machine shops and other places, as well as for train lighting. Bulletin No. 42,300 describes the General Electric Company's line of small direct connected generating sets of sizes ranging from 2½ kw. to 75 kw. Bulletin No. 45,602 deals with the subject of the protection of series lighting circuits by lightning arresters.

Railway Construction

ALBERTA CENTRAL.—See Canadian Pacific.

BLACK MOUNTAIN & EASTERN.—We are told that under this name a logging road is being built from Combs in Madison county, Ark., south to Cass in Franklin county, 18 miles. The line is being built for the Phipps Lumber Company, Fayetteville, and 16 miles of track has been laid. The general contract has been given to the Burke Construction Company, Fort Smith. (March 27, p. 767.)

CANADIAN PACIFIC.—The Alberta Central has asked the Canadian Parliament for an extension of time to build lines as follows: from Rocky Mountain House, Alta., to the Grand Trunk Pacific, near Yellow Head Pass, also for three branch lines of 30 miles each, and two branch lines of 35 miles each, to be built into the Big Horse range and along the Brazeau river. (September 25, p. 587.)

The Kootenay Central, which is operated as the Kootenay Central Sub-division of the Canadian Pacific, has completed the section between Edgewater, B. C., and Fort Steele, and the line is now in operation from Golden to Colvalli, 166.7 miles, where a junction is made with the main line of the Crowsnest route. Additional second track was opened for operation in December, 1914, between mileage 0.4 and 24.8 on the Shuswap-sub-division between Revelstoke, B. C., and Taft, making the double track mileage of the British Columbia division 139 miles.

CAROLINA, GREENVILLE & NORTHERN (Electric).—This company plans to build about 75 miles of railway, it is said, from Newport, Tenn., northeast via Greenville to Kingsport. There are to be three bridges on the line. Bids for the work will probably be asked for about May 1. H. S. Reed, president, Los Angeles, Cal.; J. L. Callanan, vice-president, New York; E. R. Eaton, treasurer, Greenville, Tenn., and F. A. H. Kelly, chief engineer, Greenville.

FLORIDA ROADS.—According to press reports a railway is to be built from Green Cove Springs, Fla., on the Atlantic Coast Line west across Clay county to Starke on the Seaboard Air Line in Bradford county, about 30 miles. The Dowling-Shands Lumber Company, Green Cove Springs, is said to be interested.

ILLINOIS CENTRAL.—The construction of the 2.6 miles of spur track extending south from Oak Ridge, Ill., and serving the Peabody Coal Company, has been completed.

KANSAS & OKLAHOMA SOUTHERN.—Financial arrangements are being made for the completion of the 61-mile extension from Caney, Kan., to Vinita, Okla. It is planned to resume construction work about April 1, 1915.

KOOTENAY CENTRAL.—See Canadian Pacific.

LULA HOMER.—This company, which was recently organized in Georgia to build from Lula, Ga., southeast to Homer, about 14 miles, has plans about completed, it is said, and construction work will be started at once. D. G. Zeigler & Sons, Lula, may be addressed. (November 27, p. 1029.)

MARIETTA-PARKERSBURG INTERURBAN.—Application has been made for a charter in West Virginia, it is said, by this company, with a capital of $10,000. The plans call for building an electric line from Parkersburg, W. Va., north to Marietta, Ohio, about ten miles. J. Kaiser and M. M. Rose, Marietta; K. B. Stephenson and H. H. Archer, Parkersburg, W. Va., are interested.

MASSACHUSETTS ROADS.—The Walworth Manufacturing Company has asked for authority to build two miles of railway along the South Boston (Mass.) waterfront from the freight yards of the New York, New Haven & Hartford on West First street, through that street to a point between F street and Dorchester street, thence along East First street to Marine Park.

MONROE & TEXAS.—Incorporated in Louisiana with a capital of $40,000, it is said, to build or lease a railroad from Monroe, La., southwest through Ouachita, Jackson, Winn, Natchitoches and Sabine parishes to a point on Sabine river, about 125 miles.

Authority is also given to build branch lines and to extend the railroad outside of Louisiana. F. R. Pierce, president, St. Louis, Mo.; L. Brandt, vice-president; C. S. Chesbro, secretary; and A. B. Pierce, treasurer.

Montana Waumandee.—Surveys are being made for the proposed line which is to extend from a point on the Chicago, Burlington & Quincy, through Waumandee, Wis., to Montana, Buffalo county, Wis. The exact route has not yet been determined and no contracts for construction have been let. A few small pile trestles will be required. A charter was granted this company November 13, 1914. H. G. Hawley, Waumandee, Wis., is chief engineer.

Montreal & Southern Counties (Electric).—This company has asked the Canadian Parliament for an extension of time in which to build from Montreal, Que., via. St. Lambert to Granby and other points south of the St. Lawrence river. The line is now in operation from Montreal to St. Cesaire, 35 miles, and construction work is now under way between St. Cesaire and Granby, 15 miles. (July 3, p. 39.)

Palm Beach & Everglade.—Under this name a company has applied for a charter in Florida to build a railway from Palm Beach, Fla., west to Lake Okeechobee, about 45 miles. The projected route is along the West Palm Beach canal for some distance, thence southwest to Lake Okeechobee. The line may eventually be extended to a point on the west coast of Florida. C. H. Baker, president, New York; H. G. Geer, vice-president; J. A. Moore, general manager; W. H. De Camara, secretary, and T. J. Campbell, treasurer, West Palm Beach, Fla.

Tennessee Roads (Electric).—Plans are being made, it is said, to build an electric line from Knoxville, Tenn., northeast via Newport to Bristol, about 120 miles. M. K. Bell, Knoxville, represents eastern capitalists who are interested in the project. Some of the right of way has been secured. S. E. Hodges, Knoxville, is the attorney.

RAILWAY STRUCTURES

Buffalo, N. Y.—The city officers of Buffalo have approved the contract entered into between the city of Buffalo and the Lehigh Valley for the construction of this railway's new terminal in Buffalo. This removes the last obstacle to the carrying out of this improvement. The railway company is now preparing the specifications for the new terminal. (July 17, p. 148.)

Camden, N. J.—An officer of the Atlantic City Railroad writes that the company has not yet decided on the plans for a new terminal to be built at Camden to replace the structure which was recently destroyed by fire.

Connersville, Ind.—The Cincinnati, Hamilton & Dayton has just completed a $12,000 brick passenger station at Connersville.

Galveston, Tex.—The grain elevator of the Southern Pacific Terminal Company at Galveston, Tex., which was destroyed by fire November 17, will be replaced by a new elevator of reinforced concrete construction, and supported on a concrete mattress over piling. The work house will be 98 ft. long and 47 ft. wide, with a capacity of 212,000 bu., and will be equipped with the most modern grain handling facilities. The storage annex will consist of 48 bins, 15 ft. inside diameter and 98 ft. high. The total capacity of work house and storage annex will be 1,004,000 bu.

Michigan City, Ind.—The Michigan Central is preparing plans for a new station at Michigan City, to replace the one recently destroyed by fire.

Springfield, Ill.—A committee consisting of representatives of the various railroads entering Springfield, Ill., with H. T. Douglas, Jr., chief engineer of the Chicago & Alton as chairman, has been formed and is now making a study of the railroad situation at Springfield. The separation of grades and a union station have been proposed by the Springfield Commerce Association as a means of improving the situation. A belt line has also been suggested. The committee has drawn up some preliminary plans, but as yet nothing definite has been decided upon.

Virginia, Neb.—The Chicago, Rock Island & Pacific, it is said, will build a new station at Virginia, Neb., at once to replace the one destroyed by fire on December 23.

Railway Financial News

Buckhannon & Northern.—See Monongahela Railroad.

Chicago, Milwaukee & St. Paul.—The Railroad Commission of Wisconsin has approved of the issue of $29,141,300 additional stock to provide for conversion at par of a like amount of convertible bonds which the directors have authorized, as recently announced in these columns.

Kansas City, Ozark & Southern.—F. C. Braden, of St. Louis, has been appointed receiver of the Kansas City, Ozark & Southern on the application of two officers of the company. The road runs from Ava, Mo., to Mansfield, 16 miles.

Monongahela Railroad.—Stockholders have approved a consolidation with the Buckhannon & Northern.

Nashville, Chattanooga & St. Louis.—This company has declared a semi-annual dividend of 2½ per cent, payable February 1. This reduces the annual rate from 7 per cent to 5 per cent.

National Railways of Mexico.—A special general meeting of stockholders has been called for February 20 at the offices of the company in Mexico City.

Southern Railway.—The last payment was made on January 4 by the Southern Railway to the state of Georgia for the line which runs from Athens to Lula. The state had guaranteed the bonds of the old Northeastern Railway Company, which originally built the line, and the state came into possession of the road through its inability to earn its fixed charges and sold it to the Southern Railway for $307,000, payments being made $50,000 annually.

Peat Used as Insulating Material on the Berlin Elevated.—The construction of the Berlin elevated railway, which in places had to pass through blocks of houses, necessitated the use of sound insulating material, and several experiments proved that compressed peat-litter possessed exceptionally good qualities for this purpose. It was applied in plates 1 in. thick, weighing 1.3 lb. to 2.5 lb. a sq. ft., according to the degree of compression (the more firmly compressed, the more efficient it is). As such peat plates can withstand a pressure of from 280 lb. to 1,400 lb. per sq. in., according to the method by which they have been made, they are also suitable as sub-layers for asphalt in gateways, for linoleum, and even for machinery foundations, and can be used to reduce expensive cork plates (peat plates cost barely 50 cents per square yard). These plates have also proved most efficient insulation material for heat and cold. The plates are protected against damp and insects by means of molten asphalt, which is used for attaching them to each other.—*Engineering.*

New Electric Railway for Bolivia.—The representation from the Department of La Paz to the Bolivian Chamber of Deputies has submitted to the consideration of that body a project for the construction of an electrical railway from the city of La Paz to the Yungas district of the department. The project has been reported on favorably by the committee on highways and finance, and it appears as though it would be voted on favorably by a large majority. The district through which the proposed line is to pass is probably the richest agricultural part of the department of La Paz under actual cultivation, producing very large quantities of coca-leaves, fine woods, coffee, cocoa, sugar cane and many other valuable crops, besides being wealthy in minerals. The roads leading from La Paz to the district are good and the territory, which will be served by the railway, is well provided with large amounts of water power. The maximum cost of the line is calculated at $2,500,000 United States currency. The work is to be directed by the Public Works Department of the Bolivian government, its cost being defrayed from the treasury of the Department of La Paz. Surveys have been made by the Bolivia Railway and by the public works office, and the work is to be carried out in accordance with their surveys and plans.

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Contents

MAINTENANCE OF WAY SECTION

*Illustrated.

One of the most interesting and significant facts disclosed by the reports of the Interstate Commerce Commission is that recently the commission has been causing more prosecution of patrons of the railways for violating the laws than of railways themselves. The commission's annual report for 1913 shows that between December 1, 1912, and the time it compiled its report it had caused the return of 61 criminal indictments for violations of the Act to regulate commerce and of the Elkins Act, and that of these 34 were against shippers for misbilling shipments, securing rebates, etc., and against passengers for violations of the anti-pass provisions. Between the same dates 72 prosecutions for similar offenses were concluded, and of these 46 were against patrons of the railways. We understand that the complete report for 1914 will show an even larger proportion of indictments and prosecutions against patrons of the railways in that year, and that of 25 indictments returned between October 1 and December 1, 1914, no less than 21 were against shippers. These statistics seem to indicate two important points. One is, that the railways are abiding by the law much better than the shipping and traveling public—for in many cases the violations of law by their patrons are of such a nature that the railways cannot prevent them. The other point is, that the commission is showing a commendable disposition to enforce the law impartially as well as vigorously. It has been urged as an objection to the present system of regulation that it makes the commission a prosecutor as well as a judge of the railways. It has been often overlooked that the commission occupies exactly the same dual relation to law-breaking patrons of the railways as to law-breaking railways; and doubtless its knowledge of the offenses of the latter class tends to prejudice it as much against them as its familiarity with the misdeeds of the former tends to prejudice it against them. This, of course, is not to say that the general principle of having the commission act as both prosecutor and judge is not a bad one.

Enforcing the Law Against Railway Patrons

We publish in another column a letter from a railroad officer who criticizes the detail into which the Interstate Commerce Commission is going to make an inventory of the properties of the railways for its valuation, and also criticizes valuation as a basis for rate making. We agree with most of the exceptions which our correspondent takes to valuation as a basis for rate making and also with most of what he says regarding the needlessness of going into minute details in making an inventory in connection with valuation. But criticisms of this kind should not be directed against the Interstate Commerce Commission. They should be directed against the courts and Congress. It is the courts which have established the principle that the fair value of the property is the chief basis for determining the reasonableness of rates. In thus holding, the courts have not indicated all the factors which should enter into a valuation or how much weight should be given to each of them. They have, however, indicated that much weight must be given to the original cost of construction and the probable cost of reproduction, and have in so many cases criticized valuations for not going into enough detail regarding these matters as to have justified the Interstate Commerce Commission in thinking that it must go into a very great deal of detail in order to make a valuation which the courts will uphold. Furthermore, Congress in the legislation requiring that the valuation be made, directed the commission to collect an enormous amount of information of various kinds. It is quite true that Congress did not fully realize what it was doing when it passed the law, but that is no good reason why after Congress has passed the law the commission should not carry it out. In the main, the commission is handling the valuation as well as it probably can in

Criticism of Valuation Methods

view of the instructions under which it is acting and the resources which have been placed at its disposal, and those who criticize the use of valuation as a basis for the regulation of rates or the general plan which the commission is following should have recourse to Congress and not to the commission.

A COMPARISON THAT IS SLIGHTLY INACCURATE

WHEN one stops to think how marvelously perfect the operation of the Interborough Rapid Transit's system must be to handle the enormous crowds which jam into the subway and elevated trains at rush hours, a certain amount of enthusiasm is permissible. When, however, the Interborough's statistician bursts into half-page newspaper advertisements with a comparison of one passenger killed in 842,620,000 carried, on the Interborough, as against one killed by the steam railroads in 2,610,000 passengers carried, with the implication that the Interborough handles its passenger business something over three hundred times as safely as the steam railroads, statistical enthusiasm has reached the point of intoxication.

The Interborough's figures for its own record are for the five years, six months and twelve days ended January 12, 1915. The figures for the steam roads are for the five years ended June 30, 1913. The Interborough's statistician gives the number of fatal accidents to passengers on steam roads, excluding trespassers, for the five years, as 1,862. The Interstate Commerce Commission's records show 1,534 of all classes of passenger train passengers killed by all sorts of accidents, including falling off cars and engines, getting on or off cars or engines, being struck or run over by cars and engines, etc., and including probably a few victims of accidents on station platforms and stairs. The Interborough's figures for steam roads probably include passengers on freight trains. The mere fact, however, that the Interborough does not operate freight trains is a bagatelle compared with the other factors which make the comparison wholly misleading. Since it is impossible to get from any disinterested source the Interborough's figures down to the minute of the accident week before last, it is fair to compare the records for the latest year for which there is officially published information.

The annual report for 1912 of the New York Public Service Commission, First district, shows 37 passengers (which term, of course, excludes trespassers and employees) killed on the Interborough Rapid Transit's lines. During that year 607,244,697 passengers were carried by the Interborough. There was, therefore, approximately one passenger killed in 16,410,000 carried. Of course it is not number of passengers, but passenger miles which should be compared to measure varying degrees of safety. There are no figures available for the average length of haul on the elevated, but in 1912 the average length of haul on the subway was 5.75 miles. The elevated probably has a shorter average haul than the subway.

In 1912 the average passenger journey on steam railroads was 33.18. To be quite liberal to the Interborough, assume that the steam railroad journey was five times as long as the Interborough journey. The steam railroads in 1912 carried 1,004,081,346 passengers, with a total of 270 passenger-train passengers killed. This figure again excludes trespassers and employees, but includes passengers run over in crossing tracks, falling under trains, etc. This makes one passenger killed in about 3,720,000. Since the average journey was five times that of the Interborough, the two figures that should be compared are one passenger in 16,410,000 for the Interborough and one passenger in 18,600,000 for the steam railroads. Of course the Interborough's figures include suicides, which are accidents which cannot be avoided by any imaginable vigilance on the part of the company; but some of the people killed by steam railroads undoubtedly also were suicides. The above figures are not meant to show that the Interborough is not a safely operated road, but simply to show the low esteem in which the Interborough's statistician must hold the public intelligence in making a comparison between steam roads and the Interborough such as that appearing in the advertisements which it has issued this week.

It is obvious enough what the Interborough was trying to get at insofar as the figures for *their own number killed* is concerned; that is, passengers actually killed in train accidents. Both the figures showing 37 passengers killed on the Interborough and 270 killed on the steam roads include persons not killed in train accidents. If a correct comparison were made including only persons killed in train accidents, undoubtedly the Interborough would show up very much better than the steam roads, but conditions of operation on the Interborough are widely different from on the steam roads.

"PRODUCTIVE EFFICIENCY" AND WAGES

THE foundation for the arguments for an increase in the wages of the engineers and firemen of western roads which have been advanced before the arbitration board sitting at Chicago by the spokesman of the employees, is the claim that there has been an increase in the "productive efficiency" of the railways; that as a result the "productive efficiency" of the engineers and firemen has increased; that there have been additions to the engineers' and firemen's labors and responsibilities; and that they should benefit accordingly.

If this "productive efficiency" theory is a valid argument for higher wages for engineers and firemen, it is an equally valid argument for advances in the wages of all classes of railway employees. It is easily demonstrable that there has been an increase in the traffic units moved, not only for each engineer and fireman, but also for each conductor, brakeman, station agent, section foreman and track laborer—not to mention general managers, vice-presidents and presidents. Therefore, on this theory, the wages of all who work for any railway on which there has been an increase in the traffic units handled per employee should be increased.

But what if there are certain classes of employees who have contributed to the increase in "productive efficiency" unwillingly and under protest? What if some of them have made demands the granting of which would have prevented an increase in "productive efficiency"? What if, when these demands have been refused by the managements, they have gone to regulating commissions, legislatures and Congress, to get orders or legislation the purpose and effect of which would be to prevent the increase in "productive efficiency"? Would it be entirely logical for such employees, after these efforts of theirs had been defeated, to come in and base demands for advances in wages on the very increase in productive efficiency which had been made in spite of all their protests to the managements and in spite of all the lobbies they had maintained at the state capitals and at Washington?

We are not discussing an imaginary case. This is exactly what has happened. The firemen have demanded that the managements put two firemen on large engines. They are making this demand in the arbitration proceeding now pending. In some states they have sought legislation on the subject. But is it not obvious that the "productive efficiency" of each fireman—in other words, the ton-miles moved per fireman—will be less when a train is pulled by an engine having two firemen than when it is pulled by an engine having only one? If the firemen should get an advance in wages in this case based on their increased productive efficiency, would their leaders go off at once to the state legislatures to get legislation requiring two firemen on an engine—in other words, legislation to abolish the very productive efficiency on which had been based their advance in pay?

And, then, there is the demand for more men in a train crew. If a freight train hauling 1,000 tons is manned by five men, the productive efficiency of each man is greater than if it were manned by six men. Therefore, to seek legislation to require the railways to put on a sixth man is to seek legislation to re-

duce the productive efficiency of each man in the crew. Yet this is just what the Brotherhood of Railroad Trainmen has done in its agitation for "full crew" legislation. The Brotherhood of Railroad Trainmen recently has been meeting bad success in its campaign for train crew legislation. It has therefore taken a new tack. It is now agitating for legislation to restrict the number of cars in a freight train to 50. Suppose that a railway had been hauling 75 cars in a train, and that such a law were passed. This would reduce by 33 1/3 per cent. the productive efficiency of every employee in the train crew—engineer, fireman, conductor and brakemen. The engineers and firemen claim that where there is an increase in productive efficiency they are entitled to benefit by it. It is a poor rule that won't work both ways. If legislation were passed reducing the productive efficiency of each man 33 1/3 per cent, would the engineers and firemen agree to a reduction of 33 1/3 per cent. in their wages?

That would be logical. But the engineers and firemen are not logical. This is shown by the nice distinction which they draw between "productive efficiency" in freight service and "productive inefficiency" in passenger service. The statements they have introduced all relate to freight service. This is because there has not been the same increase, or perhaps any increase, of "productive efficiency" in passenger service. Nevertheless, they are asking for advances in the wages of engineers and firemen in passenger as well as freight service. Manifestly, on their own theory, logically applied, there should be no advance in wages in passenger service. But, their spokesmen say, the failure to increase productive efficiency in passenger service has been the fault of the management, and employees should not be made to suffer for it. But if the failure to increase productive efficiency in the passenger service should be debited to the management, may it not be that the success attained in increasing productive efficiency in the freight service should be credited to the managements? And if, on the other hand, both the managements and the employees deserve credit and compensation for the increase in productive efficiency in the freight service, why should not the employees participate with the owners of the railways in the unprofitableness of the passenger service?

Again, as the employees have shown, some western roads are prosperous. But it can also be quite conclusively demonstrated that some other western roads are not prosperous; indeed, a number are bankrupt. The theory of "productive efficiency" would seem to require that if the employees should share in the prosperity of the more successful roads they should go into "hock" with those which are bankrupt. But this reasoning does not appeal to the employees. On their theory, they should share in the profits of the prosperous roads, but only the stockholders and bondholders should go "broke" with the railways which fail.

The principle of the relation between productive efficiency and wages being advanced in this case is practically a principle of profit-sharing; and it does not appeal to a rational mind as wholly logical for those who advance and advocate such a principle to contend that they should be allowed to share to a very large extent in the results of the progress of an industry, but should not be expected to share at all in its reverses.

However, it is gratifying to find that the engineers and firemen have at last discovered that there is a relationship between productive efficiency and wages. Labor of all kinds has been remarkably slow to learn that in the long run there can be no increase in real wages for labor as a whole which does not result from increases in productive efficiency; and that there can be no increase in real wages for any class of labor which does not result either from an increase in the productive efficiency of that class or from the imposition of a burden on all other classes of the public for the benefit of that class. When one class of labor gets an advance in wages which is not counterbalanced by an increase in productive efficiency in the industry in which that class is employed, it must be offset by an increase in rates or prices which must be paid by those who buy the services or commodities produced in that industry. The trouble with the railway industry today is that there already have been large increases in wages which have not been offset by increases in the productive efficiency of labor. If the union labor leaders of this country will actually study the relationship between productive efficiency and real wages, profits and prices, instead of merely jockeying with it, as the leaders of the engineers and firemen are doing, they will learn some things which it will be greatly to the interest of their followers and society for them to learn. Perhaps, then, they will quit encouraging their followers to "make" work, to secure train crew legislation, and to adopt other methods intended to prevent increases in productive efficiency. When labor finds out that it cannot eat the cake of productive efficiency, and at the same time prevent it from being baked, labor and everybody else will be much better off.

ST. LOUIS & SAN FRANCISCO

THE St. Louis & San Francisco has been in the hands of receivers since May 27, 1913. At the time the receivers took charge the physical property was suffering from the results of economies in maintenance so rigid as to make some of the lines of the system barely safe for operation. While it was no part of the receivers' duties to add anything to the property except additions and betterments needed for preservation of earning power, it was imperatively necessary to bring the physical condition of the plant up to a point which would permit of reasonably economical and safe operation. This the receivers have succeeded in doing very largely from earnings. There have been $3,000,000 receivers' certificates issued and sold, and at the end of June, 1914, there was $4,570,000 interest and rents in default, and cash on hand amounted to $1,535,000 as against $4,430,00 on June 30, 1913. But, on the other hand, loans and bills payable had been reduced from $5,784,000 on June 30, 1913, to $1,385,000 on June 30, 1914, and outstanding equipment trust obligations had been reduced from $13,469,000 on June 30, 1912, to $8,406,000 on June 30, 1914. In the short period from May 27 to June 30, 1913, the receivers could, of course, only make a start in their program of rehabilitation, so that the fiscal year ended June 30, 1914, shows the results obtained during the early part of the period of the work of rehabilitation, and it will not be until the results of operation in the 1915 fiscal year are available that any comprehensive record will have been made of the effect of the receivers' policy on expenses and earnings.

Notwithstanding this fact, however, the comparison between the 1914 and 1913 fiscal years is quite striking in the change shown in expenditures on maintenance and economies in transportation expenses.

Total operating revenues in 1914 amounted to $44,924,000, a decrease of $1,127,000, or 2.4 per cent, from the previous year, the revenue ton-mileage in 1914 being 3,028,000,000 as compared with 3,127,000,000 in 1913, a decrease of a little over 3 per cent, and the passenger miles being 535,000,000 in 1914 as compared with 490,000,000 in 1913, an increase of over 9 per cent. Total operating expenses amounted to $33,271,000, an increase of $2,560,000, or 8.3 per cent; but, whereas maintenance of way expenses increased 35 per cent and maintenance of equipment 23 per cent, transportation expenses decreased 4.5 per cent. The following table shows the percentage of each class of expenses to total operating revenues in 1914 and 1913:

	1914.	1913.
Maintenance of way and structures	17.28	12.50
Maintenance of equipment	16.68	13.23
Traffic expenses	2.07	2.18
Transportation expenses	35.08	35.84
General expenses	2.95	2.94
Total	74.06	66.69

In 1914 $1,476 per mile was spent for maintenance of way, comparing with $1,095 in 1913 and $977 in 1912. In 1914 3,269,000 ties were used in renewals as against 1,600,000 in the previous year; there were 13,082 tons of 90-lb. rail put in track as against 16,146 tons in the previous year, and 186 miles of track was ballasted as against 296 miles in the previous year. Total figures for money spent on maintenance of way fail entirely, of course, to give any indication of the effectiveness of each

dollar spent, and even figures showing the quantity of material used in renewals give an indication of only the probable betterment of track conditions.

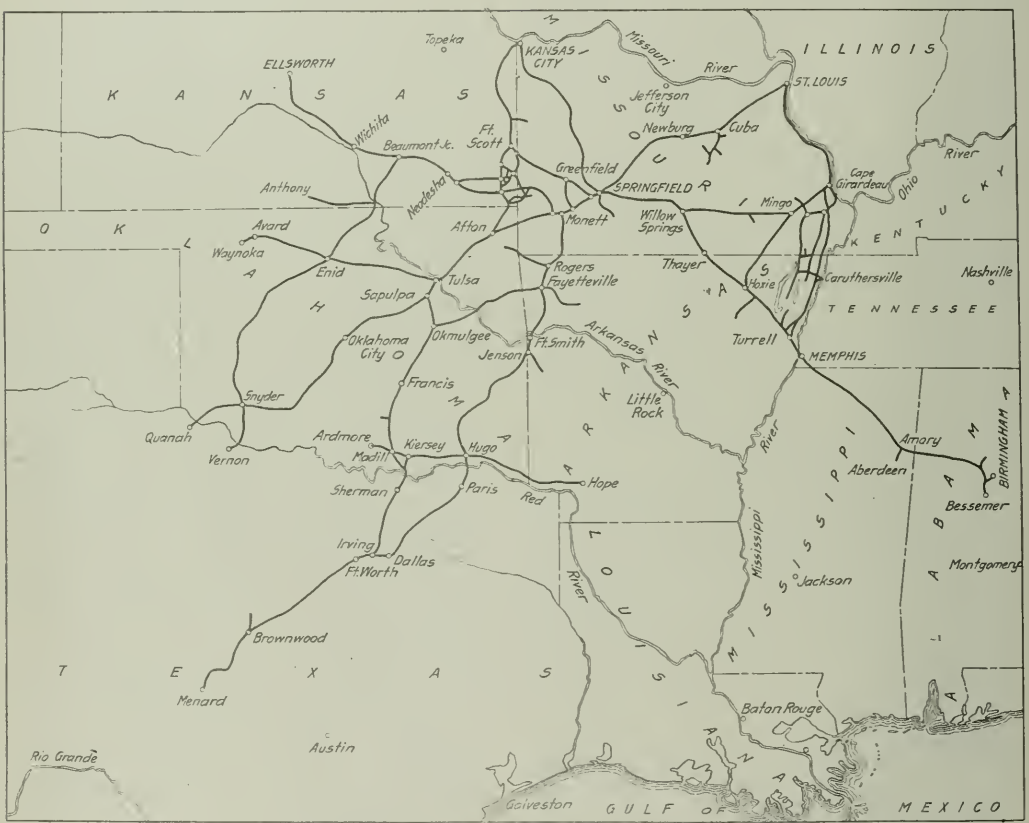
In 1914 $2,518,000 was spent for roadway and track labor, an increase of 29.8 per cent over the previous year. Steps have been taken which will undoubtedly greatly increase the efficiency of track labor for the fiscal year 1915. Early in 1914 the policy was inaugurated of having the engineering officers and the roadmasters meet in conference to discuss the details of carrying on the work. At the spring meeting, when considerable expenditures were to be made for improving the track and roadway, the greater part of the meeting was given over as to a discussion of how the expenditure might be utilized to

The average expenditure per unit of equipment in 1914 and 1913 is shown in the following table:

	1914.	1913.
Repairs per locomotive	$2,578	$2,460
Repairs per passenger car	774	728
Repairs per freight car	107	64

The increased expenditure on repairs of freight cars is striking. The total for repairs, renewals and depreciation of freight cars spent in 1914 was $3,655,000, an increase over the amount paid in the previous year of $1,365,000, or 59.6 per cent.

Total transportation expenses amounted to $15,761,000 in 1914, which is $744,000, or 4.5 per cent, less than in 1913, and was, of course, affected by the 5 per cent smaller ton-mileage and 9 per cent greater passenger mileage. With the decrease of 5



Map of the St. Louis & San Francisco, Including the North Texas Lines, Which Lie South of Paris, Tex., and Sherman, and Are Under a Separate Receivership

the best advantage. At a meeting held this fall the problem was more of how the individual efficiency of the men might be increased to secure the greatest returns for the money expended for labor. One very radical step has been taken which promises to greatly increase the efficiency of the section forces. A minimum force, consisting of four men and the section foreman, has been established and will be maintained throughout the entire year. This will make it possible to keep the roadway up to a high standard throughout the year as compared with the previous practice, where the forces were cut during certain seasons of the year and special gangs were required to do extra work at other times.

per cent in ton-mileage the mileage of freight locomotives was decreased by 861,000, the total in 1914 being 10,176,000 and the percentage of decrease being 7.8. With the increase in passenger mileage of 9 per cent, passenger locomotive mileage was reduced by 353,000, totaling 9,762,000 in 1914, the percentage of decrease being 3.5. Receivers are generally a little less at the mercy of state commissions in respect to unprofitable passenger trains than are railroad officers representing the owners.

The average total trainload, including company freight, was 351 tons in 1914, an increase of 27 tons over 1913. The ways in which this increase in trainload was obtained were considered at length in an article in the *Railway Age Gazette* of

March 13, 1914, page 501. The improvement is largely due to an educational campaign which was started in September, 1913. It is expected that the developments in this campaign will insure an even greater increase in the 1915 figures as compared with 1914 than was true of those of 1914 as compared with the previous year.

The two items in transportation expenses showing the largest reduction in 1914 as compared with 1913 are fuel for road locomotives, the cost of which in 1914 was $2,768,000, or $361,000—11.5 per cent—less than in 1913, and injuries to persons, which was $355,000 in 1913, or $238,000—40 per cent—less than in 1913. Of course the fuel economy was partly the result of a smaller locomotive mileage, but the cost of fuel per mile run in 1914 was 12.69 cents as compared with 13.53 cents in the previous year. A description of the methods used to effect these economies in the use of fuel appeared in the *Railway Age Gazette* of November 7, 1913, page 874.

The reduction in payments for injuries to persons is particularly noteworthy. Of course payments on this account on the Frisco, as well as on other lines operating in the Southwest, have been entirely too high, partly the fault of public opinion, which led juries to award preposterously high amounts in damage suits, and partly to the recklessness of employees and to physical conditions. The Chicago, Rock Island & Pacific, which operates about 50 per cent more mileage than the Frisco, spent $1,046,000 for injuries to persons in transportation service in 1914. Probably the best convenient unit of comparison for expenditures for injuries to persons is the total, including maintenance of way, maintenance of equipment and transportation per employee. On this basis the St. Louis & San Francisco spent $22 in 1914, and the Rock Island $36.

In the reorganization of the St. Louis & San Francisco there will, it would appear, have to be a quite radical scaling down of fixed interest charges. The present policy which is being pursued by the receivers will result in further very considerable economies in transportation costs per unit of business handled, and the present expenditures on maintenance are probably a little higher than will be found necessary after the property is once gotten into good shape; but in 1914, despite the fact that payment was unnecessary on the trust certificates of the Chicago & Eastern Illinois, which payments amounted in 1913 to $1,121,000, nor did the Frisco have to bear the loss on the New Orleans, Texas & Mexico, which loss in 1913 cost the Frisco $1,214,000; nevertheless, the Frisco had a deficit, after making interest charges, of $2,828,000 for the year 1914.

As has been so often demonstrated in American railroad history, the best operating officers in the country can only do a certain amount toward making the business as a business profitable, and the future of the Frisco will depend very largely on the wisdom, conservatism and courage which is shown when the time comes to put forward a reorganization plan by those who will formulate this plan.

The following table shows principal figures for 1914 and 1913:

	1914.	1913.
Average mileage operated	5,259	5,255
Freight revenue	$30,202,499	$31,272,807
Passenger revenue	11,563,844	11,651,258
Total operating revenues	44,923,569	46,050,290
Maint. of way and structures	7,762,324	5,755,477
Maint. of equipment	7,492,700	6,091,069
Traffic expenses	929,037	1,007,326
Transportation expenses	15,760,663	16,505,019
General expenses	1,325,876	1,352,202
Total operating expenses	33,270,600	30,711,094
Taxes	2,149,215	2,057,440
Operating income	9,503,754	13,281,756
Gross income	10,253,665	14,660,779
Deficit	2,828,142	667,348

NEW BOOKS

Power and Power Transmission. By E. W. Kerr, professor of mechanical engineering, Louisiana State University. Third edition, revised. 373 pages, 6 in. by 9 in. Illustrated. Bound in cloth. Published by John Wiley & Sons, Inc., New York. Price $2.

This book is primarily designed to be used as a text book by students of mechanical engineering and the treatment of the subject is elementary throughout. The book was published in 1901, a second edition appearing in 1907. In the present edition the entire text has been resct and much of it rewritten. It contains 24 more pages of matter and 61 more illustrations than the previous edition. The text is divided into three parts. Part I is devoted to machinery and mechanics. The first chapter contains definitions of the fundamental terms used in mechanics and descriptions of elemental forms of machines. Other chapters are devoted to descriptions of various means of transmitting motion, the section closing with a short chapter on pipe fittings. Part II, on steam power, covers the whole field of steam generation and its use in power plants as completely as could be expected in so limited a space. The treatment is largely descriptive of steam power plant equipment and appliances, with brief analyses of the principles of operation. Rotary engines and steam turbines, as well as the various types of reciprocating engines and valve gears, are described. A chapter of valve diagrams is devoted entirely to the Zeuner diagram, which the author prefers on account of its simplicity and adaptability. Part III deals with pumps, gas engines, water power, compressed air and hot-air engines. The treatment is the same as used in Part II. Several short tables on the properties of saturated steam, the flow of compressed air through pipes, etc., are grouped together at the close of the book, for use in solving the problems given at the close of a number of the chapters.

Statistics of Common Carriers, Preliminary Abstract, 1914. 187 pages, 9¼ in. by 11½ in. Issued by the Interstate Commerce Commission, Division of Statistics; copies to be had of the Superintendent of Documents, Government Printing Office, Washington, D. C., at 25 cents each.

This is the usual preliminary abstract, made up from reports of the principal operating railway companies but with no aggregates for the country as a whole. The pamphlet contains also a preliminary statement of income account and profit and loss account of the principal express companies, and one of the Pullman Company.

Railway Development Association Proceedings. Published by the association, H. O. Hartzell, assistant general industrial agent, Baltimore & Ohio Railroad, Baltimore, Md., secretary. 62 pages. Bound in paper.

This book contains the proceedings of the semi-annual meeting of the Railway Development Association held at the LaSalle hotel, Chicago, on November 10, 11 and 12, 1914. The first 15 pages are devoted to the report of the business meeting, and the remaining pages, designated as Section 2, are devoted to the papers presented at the meeting and the addresses presented at the banquet by W. L. Park, vice-president of the Illinois Central, and Samuel O. Dunn, editor of the *Railway Age Gazette.* Some unusually interesting papers discussing various phases of railway development work along the lines of industrial, agricultural and immigration development are included in the proceedings, most of which have been abstracted in the *Railway Age Gazette.* The papers include: "Personal Work with Farmers," by M. V. Richards, industrial and agricultural commissioner of the Southern Railway, and H. M. Bainer, agricultural demonstrator, Atchison, Topeka & Santa Fe Railway; "Diversified Farming and its Relation at this Time to the Cotton Grower," by J. C. Clair, industrial and immigration commissioner of the Illinois Central, and J. F. Jackson, Central of Georgia Railway; "Ways and Means to Increase a Railroad's Agricultural Tonnage," by H. B. Fullerton, agricultural director, Long Island; "The Railway Terminal and Its Relation to Industrial Development," by F. A. Spink, traffic manager, the Belt Railway of Chicago; "The Effect of the European War on American Industries," by R. W. Cooke, industrial agent, Pennsylvania Lines West; "Getting City People Back to the Country," by F. H. LaBaume, agricultural and industrial agent, Norfolk & Western; "Securing Desirable Immigration," by L. J. Bricker, general immigration agent, Northern Pacific; "Efficient Marketing of Farm Produce," by D. G. Mellor, manager of the food, order and commission department, Wells, Fargo & Company, and William Gourlay, general traffic agent, American Express Company.

Letters to the Editor

POETRY ON THE B. & O.

Baltimore.

To the Editor of the Railway Age Gazette:

In connection with your editorial of November 20 on "Safety First for School Children," you will be interested in the results which we have obtained by the use of some rhymes by Edward Tinker called "Nevers for Children," which we reprinted from Leslie's Weekly, in our Baltimore & Ohio Magazine.

I called the particular attention of the magazine correspondents, one on each division of the road, to these verses, and suggested that they might be used. In response to numerous calls we had about 2,000 copies distributed at various points; and as a result of this I am informed that they have been read to hundreds of thousands of school children in day schools, Sunday and parochial schools, and children's courts. In some of these courts the sheet has been posted up. I also note that the verses have been reprinted in dozens of papers in smaller towns on our lines.

R. M. Van Sant.

NEVERS FOR CHILDREN

Never cross the tracks by night or by day,
Without stopping to listen and look each way.

Never walk along the railroad ties—
You can't always trust your ears and eyes.

Never hop a freight, for nothing quite heals
The wound received under grinding wheels.

Never, on a hot or sunny day,
Sit beneath a box car to rest or play.

Never crawl under a car of freight,
When the crossing's blocked—play safe and wait.

Never board, or alight from, a train that is moving,
Accidents daily its dangers are proving.

Never play games 'round the tracks at the station—
There are much safer places to seek recreation.

Never leave on the rail any spikes or bars,
Because, in this way, you may wreck the cars.

Never a railroad bridge should you cross,
A train may come and result in your loss.

Never pick up coal 'round the railroad yard,
A train may catch you off your guard.

A "REASONABLE" VALUATION

Fort Worth, Tex.

To the Editor of the Railway Age Gazette:

Director Prouty of the department of valuation of the Interstate Commerce Commission says that it will probably cost $50,000,000 to complete the federal valuation, 70 per cent of which must be borne by the railroads directly, in adidtion to their share of the taxes to pay the other 30 per cent. It is understood that certain items, such as real estate, location, good will and securities, must be estimated, comprising possibly between 20 and 30 per cent of the total valuation. It may be five or more years before the work is completed, and when done it will be nothing more than a stupendous estimate, made at such a heavy expenditure that if Congress had even expected it to cost half as much as it will, the bill never would have been passed. With the present conditions existing—the railroads starving, the tax payers paying income or war taxes, and with the imperative need of economy, it is advisable to abandon the costly methods of surveys which can only be considered approximate estimates and resort to a method of estimates which will give very nearly the same results as surveys. Enough surveys have been made or can be finished on typical roads to form a basis or guide. The present office organizations should be maintained, but all field work should be discontinued. Two of the government district engineers and one man appointed by each railroad can make as close and honest an estimate based on data which can be furnished by most railroads as final surveys and estimates of value now being made by the government's present methods.

Including actual personal inspection of conditions, a final report could be made by about 20 engineers for the commission. Two engineers could be assigned to the New York Central, and two more to the Pennsylvania Lines for a year's work; the Southern Pacific and Santa Fe Lines could be assigned to another staff, and the lesser lines could be divided on a basis of about 25,000 miles to each board. There are many miles of lines where records are full and complete, requiring little more than auditing to get a close valuation. When such a board will have finished its work it will not vary materially from a detailed careful survey. By this plan the work can be completed in one year.

The assumed reason for making the valuation is to get data for regulation of rates and securities. It will be of no value for rates, because the four track, $250,000 per mile, road can charge no more or less than the $25,000 per mile road, between common points for the same service. There are very few roads on which the value of the securities can be measured by a survey of the track. Possibly it might be well to complete surveys of lines that have become notorious for financial conditions, to satisfy the public. The Panama canal will influence transcontinental rates and the value of railroads has no influence whatever. The Interstate and State Commissions have never considered the cost of a road for one minute, when they suspended a rate.

The only value of the results of this $50,000,000 job will be a figure showing the size of the debt incurred if the government takes over the roads. It is very easy to see what a fright these figures will give the tax payer. The valuation is not going to be worth $50,000,000. When first proposed it was to cost comparatively little, but are we now sure that $50,000,000 will be final cost? Therefore, under present conditions, why not apply the rule of reason and measure the valuation by a cheaper method equally effective?

Railway Officer.

THE FIRST ARMORED TRAIN

New York.

To the Editor of the Railway Age Gazette:

In a short note in the *Railway Age Gazette* of January 8, page 76, it is stated: "One of the first and possibly the first armored train was that used during the Egyptian campaign of 1882." I know of at least one armored train which was in use at least 20 years earlier. This train had two cars; the principal one being built of heavy timbers on a flat car in the Atlantic & North Carolina shops at Newberne, N. C., in 1862, about two months after the city had been captured by the Burnside expedition. The armor consisted of old rails spiked on the outside of the planking composing the sides and front of the car. It was provided on the sides with slits for musketry fire, and at the front end was a port hole covered with a shutter behind which was mounted a gun from one of the field batteries. The second car was similarly constructed, but armed with a naval howitzer. These cars were run ahead of the engine and were used in reconnoitering along the railroad line west of Newberne. On one occasion, at which I was present, the two cars were run up the railroad within a few miles of Kinston, 22 or 23 miles from Newberne. For that distance, the Confederates had not injured any of the track, the only portion destroyed having been a small bridge near Newberne.

I was quite familiar with these cars, having assisted in the construction and design of both. The officer in charge was a captain in the Twenty-third Massachusetts Regiment, whose name I cannot now recall, but who had been in the motive power department of the Boston & Providence. I was, at that time, in the Ninth New Jersey Regiment and was detailed for some months in the railroad service of the Department of North Carolina.

I do not know whether any other cars of this description were built or used during the Civil War; at any rate, I never saw any.

Frederick Hobart.

Associate Editor, Engineering and Mining Journal.

Large Steam Locomotives, Present and Future

Possibilities in the Use of Three Cylinders; Compounding; Effect of Trailer Trucks on Boiler Capacity

Several of those who discussed the subject of "Steam Locomotives of Today" at the annual meeting of the American Society of Mechanical Engineers, held in New York, December 2, 1914, dealt with the large locomotive. Parts of this discussion follow:

LARGE STEAM LOCOMOTIVES

J. B. Ennis, chief mechanical engineer, American Locomotive Company.—The large steam locomotive of the future will probably not be the locomotive of the past. Today we can see possibilities toward further refinement in design; further economies that may be obtained so that the locomotive designer is not yet ready to acknowledge that all has been accomplished that can be.

For freight and pushing service on heavy grades past performances show the adaptability of the articulated compound locomotive. This type is still in the course of development and it will, without doubt, be the generally accepted type for these conditions for some time to come. With the exception of one experimental articulated locomotive, locomotives recently built for the Virginian Railway are the largest of the type. A few particulars of their performance may be of interest. Designed originally for pushing service on grades of over two per cent and normally rated at 115,000 lb. tractive effort, working compound, these engines have proved themselves capable of hauling on a grade of .6 per cent, a train load of 7,180 tons, requiring a drawbar pull of approximately 110,000 lb. On lighter grades and at higher speeds indicated horsepowers of over 3,000 have been recorded. Work of this magnitude necessitates locomotives of exceptional weight and power, and yet the possibilities of this type have by no means been exhausted. As conditions arise in the future in which more power will be required, the use of the articulated engine can yet be extended.

For freight service on easy grades where the capacity of the articulated type is not required, we already have exceptionally large locomotives of the six, eight and ten-coupled types. Simple cylinders operating at 200 lb. pressure have reached a diameter of 30 in., and in order to transmit this power a main axle 13 in. in diameter has been used. Main crank pins, connecting rods and other details are of enormous size. With the increase in the diameter of cylinders, the cylinder centers have gradually been increasing, and frame centers decreasing. This has resulted in higher stresses than those caused by piston thrust only. The weight of revolving and reciprocating parts has reached the point now where, in some cases, proper counterbalancing becomes very difficult. It is doubtful whether much more capacity can be obtained in these types if designed along the present lines, and here it would seem that attention could profitably be given to refinement in design and its relation to the careful selection of materials.

The modern passenger locomotive has reached a high state of development, but there is one problem still to be solved that has been recognized for many years, that of the effect on the rail of the vertical unbalanced forces in a two-cylinder engine. At present, our largest and most powerful passenger locomotives have two simple cylinders, 27 in. to 29 in. in diameter, giving maximum piston thrusts of approximately 117,000 lb., with static wheel loads higher than ever before and, with few exceptions, reciprocating parts of much greater weight. The four-cylinder balanced compound was introduced about ten years ago as a possible solution, and for a few years large numbers of these locomotives were built. There is no doubt as to the results obtained, as far as balancing is concerned, but recently very few have been constructed. Four-cylinder simple locomotives have also been tried out, but in both of these types the capacity is limited on account of the available space between the frames, making it practically impossible to provide the power now given by the largest simple two-cylinder engines.

Little consideration has been given to the advantages of the three-cylinder arrangement, although a few locomotives of this type are in successful service today. As compared with the four-cylinder engine, either simple or compound, the three-cylinder type offers the possibility of increased power. With one cylinder located between the frames ample room is provided for a properly designed crank axle and main rod which cannot be arranged for in the four-cylinder type beyond a certain limit. As compared with the two-cylinder engine, the advantages are, briefly, a more even turning moment, an ideal counterbalance condition, and the opportunity to furnish maximum power with the minimum destructive effect on the rail. The power obtained in a two-cylinder engine with cylinders 27 in. in diameter and a maximum piston thrust of 117,000 lb. can be obtained in a three-cylinder engine with cylinders 22 in. in diameter and a maximum piston thrust of 78,000 lb. This decrease of 33 per cent in thrust means a corresponding reduction in the individual weights of all of the machinery, particularly the weights of reciprocating parts.

It is true that considerable progress can yet be made in the two-cylinder engine toward reducing the weights of reciprocating parts by the careful selection of materials and proper design. The three-cylinder engine, however, offers advantages possessed by no other arrangement, and it would seem that for high speed passenger service, at least, this type is well worth considering for the future.

COMPOUNDING

C. J. Mellin, consulting engineer, American Locomotive Company.—When the first Mallet compound to be used in the United States was built for the Baltimore & Ohio, it was generally considered that it was too large an engine and far in advance of its time, but hardly had its success been established before inquiries came in for even greater power, and since that time practically all locomotives of this class (except for narrow gage roads) are larger than the original Baltimore & Ohio engine. At present 115,000 lb. in tractive effort in compound and 138,000 lb. in emergency are being produced in very successful service and plans are worked out, ready when required, for engines of this type giving 140,000 lb. tractive effort in compound and 168,000 lb. in emergency power.

The next step for heavy power, where road conditions permit, is triple articulation, using the tender as the third unit. One locomotive of this type has been built, though without any emergency power, having a tractive effort of 160,000 lb., but as yet it may be considered as experimental. On account of the limitation in the boiler capacity on such engines it may be necessary to make the tender engine independent of the two other units, subject to regulation at will, in order to get the maximum amount of steam for fanning the fire, as the exhaust from the tender engine has little effect by the time it reaches the stack and may therefore be carried direct to the atmosphere. As a further means of increasing the boiler capacity at the slow speeds at which such an engine would naturally operate, mechanical draft could probably be applied to advantage. By this means a tractive effort of over 200,000 lb. could be obtained.

The superheater has proved to be of great advantage in compounding, still further promoting its economy, since

practically all the superheat in the steam can be utilized before its final exhaust, besides eliminating condensation during the latter part of its extended expansion. This combination of compounding and superheating, when proper cylinder proportions have been observed, affords the greatest economy in locomotive operation, especially in freight service. It is also probable that mechanical draft in combination with a feed water heater will be an additional feature in the direction of economy and improvement of the locomotive, because of the possibility of working the boiler to its required capacity regardless of the speed of the engine. It also removes the unavoidable loss of power caused by the back pressure in the cylinders, which loss increases with the size of the engine.

THE USE OF TRAILER TRUCKS

H. V. Wille, Baldwin Locomotive Works.—In sketching the development of the locomotive with respect to increase in capacity, sufficient stress is not laid on the development of the trailer truck locomotive with the attendant possibilities of improvement in boiler design. It is now generally recognized that the use of trailer trucks has permitted the use of boilers of great capacities. Were it not for the development in boiler design rendered possible by the use of trailer trucks, there would be a very limited use of superheaters in the modern locomotive because of the restriction in boiler capacity; and yet when the first trailer truck locomotive was built, but a short decade ago, it was received with a storm of criticism and the builders stood almost alone as the advocate of this type. The use of the trailer truck is a logical development of the use of wide fireboxes.

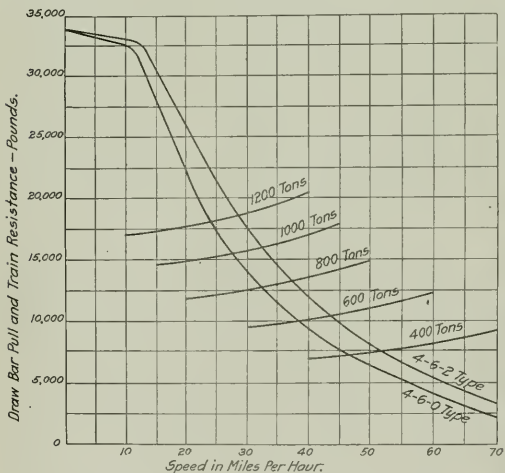


Diagram Illustrating Hauling Capacities of Ten-Wheel and Pacific Type Locomotives at Various Speeds

The mother of the trailer truck locomotive is probably the engine "Columbia" designed by the Baldwin Locomotive Works and exhibited at the Columbian Exposition in 1892, as a novel type of construction, but this design was in advance of the times. The Atlantic (4-4-2) type was accordingly designed in 1895, and the first one was employed by the Atlantic Coast Line, and derived its name therefrom. While at first the design was received with criticism, the advantages of the type for the development of large fireboxes and large boilers were so manifest that it was rapidly followed by the design of a 2-6-2 or Prairie type engine for the Burlington. The Pacific (4-6-2) type was naturally developed from this type. This engine was designed in 1901 for the New Zealand government railways to burn inferior fuel. The development of the trailer truck engine logically followed that of the wide firebox and renders possible the wonderful performance and great capacity of the modern American locomotive.

POSSIBILITIES OF THE FUTURE

G. R. Henderson, Baldwin Locomotive Works.—There is one subject which has not been referred to except by the committee, and that is the question of powdered coal. I think in a few years we will have largely extended its use. Powdered coal will also assist in lengthening the firebox and give a greater amount of evaporative surface in that way. These things must be considered as increasing the length of the locomotive. In increasing the length, fortunately, we can put a heavier engine over our present bridges without having to remodel their construction. By lengthening we do not put any more unit load on tracks and bridges, and I think in that way it is possible to build a locomotive of 250,000 to 300,000 lb. tractive effort.

RAILWAY AFFAIRS IN OTHER COUNTRIES

The British railways have supplied a number of ambulance trains for carrying wounded men from the sea coast to the various inland hospitals, as has been noted previously in this column. The illustration herewith is an interior view of a train supplied by the Midland Railway. While the railways have almost vied with each other in the provision of these hospital and ambulance trains, the necessity for such ameliorations of warfare has not been lost sight of by other large organizations. The flour millers of the United Kingdom, through their association, are about to present two hospital trains to the British Red Cross. These trains are for service in France and Belgium, respectively, and are the last word in hospital trains. Their equipment consists of kitchen and stewards' stores cars, an infectious diseases car, a dispensary car, complete with operating room, a staff car which will accommodate three doctors, four nurses and an interpreter, and five ward cars, each of which will take 20 "lying-down" cases. Altogether, each train will accommodate 108 such cases, while the five French coaches which are to form an additional part of the equipment will provide accommodation for a total of 250 "sitting-up" cases. Each train will also have attached to it two baggage cars and two French coaches for the staff, etc.

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An Interior View of the Ambulance Train Used for Transporting Wounded Soldiers on the Midland Railway

Arbitration of Engineers' and Firemen's Demands

Employees' Case Concluded, Attorney Sheean Makes Opening Statement Outlining Position of Railways

The evidence presented on behalf of the engineers and firemen before the board of arbitration at the hearing in Chicago was concluded on Monday, January 18, and James B. Sheean, attorney for the General Managers' Conference Committee, presented his opening statement outlining the case for the railways. Mr. Sheean said in part:

"At the outset it should be made clear that the conference committee of managers recognize fully that the engineers and firemen perform important and responsible duties. They heartily concur in the view that men selected for these positions should measure up to the responsibilities which their duties impose upon them, and that their scale of wages should be commensurate with and give due recognition to the importance of those duties and responsibilities. The conclusion was reached by the Conference Committee of Managers that either by comparison with employees in other trades, or by comparison with their brethren of other districts, there was no good ground for complaint on the part of the western engineers and firemen. In making that statement I appreciate that the question may be asked as to why it should be that certain rules found in a majority of schedules may not be made of universal territorial application. When standardization is proposed, the party purportedly offering standardization must enable standardization to be made, not upon a basis of retaining the high points given by some other method of computation, entirely inconsistent with the one now in vogue, but in order to standardize must be willing to proceed along the line of wiping out the high points incident to that standardization, as well as the lower points that are incident thereto."

Mr. Sheean then proceeded to enumerate briefly the way in which it is proposed to present the proof of the railways. First, he said, an analysis would be offered of the railroad schedules of the United States so that the board will be able to see at a glance on just what roads and in just what territory and on what percentage of the mileage there are rules which bear relationship to the different requests that have been made. Secondly, he said, "we shall present statements showing what these demands mean in money to the railroads involved. This exhibit shows that during the month for which it is presented, the railroads involved paid their engineers and firemen under existing schedules over $7,200,000 in wages, and if the proposals had been in effect during that month the railroad would have been required to pay over $11,000,000, or an increase of about $3,700,000 in that one month, an increase of approximately 51 per cent. The total payroll of the railroads involved for engineers and firemen for the fiscal year ending June 30, 1913, amounted to over $75,000,000, so that if the same rate of increase applied to the year's operation the proposals would mean an added burden to the companies involved of nearly $40,000,000."

"We shall present," he continued, "statements of revenues, expenses and income during the fiscal years 1910, 1913 and 1914, going back to the last adjustment, in order to ascertain what has been the actual operation upon the productive efficiency or revenue theory during this period of time, and these show a constantly declining net revenue and a constant increase in taxes. Although over 8,000 more miles were operated in western territory in 1914 than in 1910, the net income from operations in 1914 was $15,000,000 less than in 1910, while in 1914 the net operating revenue from operations was nearly $40,000,000 less than in 1913.

"In 1914 there was declared $22,000,000 less in dividends than in 1910, and in 1913 $14,000,000 less than in 1910. In 1914 there was carried to surplus $24,000,000 less than in 1910, while the surplus in 1913 was $12,000,000 less than in 1910. In five months of the current fiscal year there has been a drop of $29,000,000 in gross revenue.

"We face this situation as to the income of the railways involved, although in three years to June 30, 1913, they spent over $660,000,000 in improvements and extensions to property, and out of this devoted over $220,000,000, or practically one-third, toward the purpose of increasing efficiency and safety and expediting train movements.

"Our next exhibit will summarize various legislative enactments and orders of railway commissions which affect railway operations, all necessitating expenditures of large sums of money, and will also show proposed legislation in many western states which if enacted into law will limit economical and efficient operation and render impossible economies which should be legitimately brought about as a result of elimination of grades and curves, the improvement of roadbed and the purchase of larger and better power. The board should be advised in connection with a wage movement seeking to have wages based upon the proposition of 100 per cent efficiency in tractive effort, that at the same time it is also proposed and urged in legislative circles that there shall be a legislative limit placed upon the length and size of the trains hauled, no matter how level the road or how high the power.

"Our next exhibit was prepared to ascertain whether there was justification for the claim that large power and increased tonnage have retarded the movement of traffic and thereby kept the men longer on the road. This exhibit shows that with the elimination of grades and curves, the improvement of roadbed and motive power, the employees have been able with the larger power, and therefore with higher rates of pay, to haul heavier trains at the same speed as in previous years. In October, 1910, about 76 per cent of the mileage was made at a speed greater than 10 miles per hour, and in October, 1913, this had increased to over 77 per cent. In October, 1910, the average length of time on the road in through freight service was 9.41 hours on runs averaging 113.2 miles in length, while in October, 1913, the average length of runs was 112.6 miles, and the average time of making the run in through freight service was 9.31 hours.

"Confirmatory of the exhibit introduced by the men that the instances of employees being on the road longer than 16 hours are of rare and exceptional occurrence (averaging once in every 18 months per employee) an exhibit has been prepared that shows for the year ending December 31, 1913, only .59 per cent of the trains run exceeded the 16-hour limit, and only 0.6 of one per cent of the total trains run were tied up on account of the 16-hour law.

"Another exhibit has been prepared to show the payments under present schedules to engineers and firemen for which no actual service either in miles or hours was rendered by the men, and by this exhibit it is shown that for the fiscal year ended June 30, 1913, these payments on the roads represented aggregated over $1,000,000. An exhibit will also be introduced which shows the comparison between the eastern, southern and western districts, and from this comparison it is shown that the average freight train load and the average tractive power in both eastern and southern districts are higher than in the western district. This, notwithstanding the fact that rates of pay and compensatory rules are generally higher in western districts than in any other part of the United States.

"We shall also lay before the board the actual payroll figures as to what the men can and do earn in each class of service, so as to give the board as best we can, not simply state-

ments of hypothetical men, but actual earnings of actual men, of all the men for the entire month for which the claims are presented, as well as actual payroll figures for the entire fiscal year of about 5,000 typical men covering each class of service on every seniority district in the territory, and these payroll figures show that in the month in which the demands were presented engineers in regular passenger service earn from an average of $185 to a maximum of $341.60 per month, and in freight service from an average of $170 to a maximum of $358.70 per month; that firemen in regular passenger service earn from an average of $115.54 to a maximum of $209.89 per month, and in freight service from an average of $110 to a maximum of $221.05 per month; that other firemen in combination freight and passenger service earn even higher than this.

"Of about 5,000 men whose wages for the entire year to June 30, 1913, will be shown, there is a maximum of $3,725.20 for passenger engineers; $3,342.30 for freight engineers; $1,752.20 for passenger firemen and $1,890.32 for freight firemen. Against these maxima, the governors of seven states receive $3,000 or less per year, while those of seven other states receive $4,000, or only slightly above the engineers' maximum earnings.

"As against the maximum earnings of the firemen, Sunday's newspapers state that at the final session of the association of American Colleges held on Saturday, it was stated 'For $1,500 a year a college can get a fairly good professor, not a well of wisdom, it is true, but a fairly good man.'

"A careful investigation into the increased cost of living in the West shows that prices have not advanced so fast as have the wages of engineers and firemen under the schedules awarded in 1910.

"Comparison of their wages with those of any other craft, or of any other railway employees, or of engineers and firemen in other parts of the country, show that they are receiving already a higher compensation in both rates of pay and rules.

"Through the elimination of grades and curves and other improvements, the employees have been able with the larger engines, and consequently with higher pay, to haul trains at the same speed as light trains were formerly handled. With heavier power there has been constant improvement in labor-saving devices such as automatic stokers, automatic doors, coal pushers, sloping tanks, power grate shakers and automatic ash pans operated by compressed air, which relieve the firemen of the danger of going beneath the locomotive.

"It is the intention that the chairman of the Conference Committee of Managers will take up on the witness stand article by article, the requests submitted, and explain from an operating standpoint the practical effect of splitting the working day into numerous arbitrary divisions, and for purposes of compensation segregating each of these items so as to produce arbitrary and punitive payments on every run, to show the inequity of imposing punitive payments in matters which cannot always be controlled in transportation service, and of attempting to impose inflexible rules of universal application, the conditions which must of necessity vary widely in a territory so vast as the one involved, in which there are over 50,000 men working as locomotive engineers and firemen, and 64,000 men on the seniority list, who would be directly or indirectly affected on the over 148,000 miles of railroad main lines.

"Nor should the board be under the impression that assent is given to the suggestion that there is any element of piece work payment in the wage schedules of engineers and firemen. The unit of output of regularly assigned men in road service is the runs or trips covered by their assignments. The units of output the engineers and firemen (unlike the piece worker) do not regulate or control, either as to the number or as to the time of production. These units of production, the run or trip covered by the assignment, are all that bear resemblance to the 'piece' of the piece worker. And for this unit, conveniently measured for purposes of compensation by its mileage, payment is made at an agreed mileage rate. But more fortunate than the piece worker, whenever this unit is not produced within the limits of a working day, the engineer and firemen have an added guarantee, both of a minimum daily wage of a minimum hourly rate for every hour they are on duty, whether productive or non-productive for his employer."

Cross-examination of W. J. Lauck, statistician for the engineers and firemen, whose testimony before the board of arbitration at Chicago was abstracted in last week's issue, was taken up on January 11, by J. B. Sheean, attorney for the General Managers' Conference Committee and occupied two days. He showed that in most of the statistics presented by Mr. Lauck to show great increases in the efficiency of the railroads from 1890 to 1913, on which Mr. Lauck mainly based his arguments for increased wages, no consideration had been given to the change in mileage of the roads or the amount of investment or changes in accounting methods. The witness said he did not claim his statistics to be strictly accurate, but simply developed the tendency by the best available means.

Mr. Sheean asked a number of questions to bring out the efficiency of firemen, as measured by tons of coal shoveled instead of ton miles of freight, and from one of Mr. Lauck's exhibits showed for 19 roads that have no oil-burning locomotives that in 1909 the tons of coal consumed were 15,140,994, for which the firemen received $6,651,373, or 2,280 tons of coal per $1,000 paid to firemen. In 1913, on the same roads, the total coal consumed was 19,136,488 tons, for which the firemen received $8,774,150, or 2,180 tons per $1,000 of compensation. Mr. Lauck said he was at a loss to understand these figures because of the increase in fuel consumption per locomotive mile. Mr. Byram and Mr. Sheean said that it was explained entirely by the increase in the firemen's wages in 1909.

"If, during this time," said Mr. Sheean, "in addition to the actual increase in money there had been improvements in the way of automatic stokers, automatic fire doors, sloping tanks, provisions for breaking coal to proper size, automatic shakers, power coal pushers, and other things, that would simply show not only that less coal was consumed, but that it was done with less physical effort, would it not?" "If that could be shown, yes," said Mr. Lauck, "but I do not know anything about that."

Mr. Lauck had said that the men's pay should not be affected by decreased productivity in passenger service, because it was not their fault that there were no more passengers in a train.

Mr. Byram observed that on the larger engines which are producing the greater number of ton miles, a higher rate is paid to the engineers and firemen, and that the fact that the increase in productive efficiency of the men per $1,000 in the period 1909 to 1913 was less than in the former period might be due to the fact that the instrumentalities which produced the greater efficiency are already compensating the men by paying a higher rate. Mr. Lauck said he was not trying to establish any definite relation between the increased productive efficiency and rates of pay, but that he was simply trying to show the tendency that because of the increased productive efficiency there should be some increase in pay.

A. H. Hawley, general secretary and treasurer of the Brotherhood of Locomotive Firemen and Enginemen, testified regarding accident statistics of the firemen. He said that 47 per cent of the deaths of members of the organization in the 10 years from 1904 to 1913 were the result of railroad accidents while the men were in service. Of the 5,026 deaths in 10 years, 1,292 were engineers, 2,663 were firemen, 105 were hostlers and 866 classed as others, which he said means men who have passed out of the railroad service, or at least out of the engine service. In 10 years the organization has paid on 2,360 claims a total of $3,270,169 for railroad accidents. Mr. Hawley said that the percentage of increase of railroad accidents was not so great as the increase in the membership, for the reason that a large pro-

portion of the membership is drifting from the railroad service. He also gave figures to show that there had been decreases in accidents of certain classes brought about by the safety appliance laws. This, he said, was to show that the purpose of the men was not frivolous in agitating for the passage of the laws. Cross-examination by Mr. Sheean showed that the mortality rate in the organization was decreasing; that in 1904, with a membership of 4,434, there were 453 deaths, and that in 1913 with a membership of 91,108, there were 589 deaths; in 1904 there were 236 deaths on account of railroad accidents, and in 1913, 243 deaths on account of railroad accidents.

Dr. Henry J. Harris testified regarding a large number of statistical exhibits showing the hazard of the engineer's occupation, based on figures taken from various insurance companies' records and other actuarial records. He said that the engineer in many respects is a select risk, in that he is a man who has passed a rigid physical examination, and in other respects is above the average, but that many insurance companies will not insure engineers at all, and others do so only at a higher rate than normal. He said that the New York Life Insurance Company charges locomotive engineers a rate based on eight years more than the actual age, and that insurance companies estimate that the risk in the case of engineers is 160 per cent of the normal. He presented various statements to show that engineers have a higher accident and death rate than many other occupations, and classed them as a risk with coal miners and structural iron workers. He said that the average working life of an engineer was from 11 to 12 years. In the railroad service, he said, the brakemen have a higher accident and death rate than engineers.

W. E. Futch, president of the Locomotive Engineers' Mutual Life and Accident Insurance Association, which is connected with the Brotherhood of Locomotive Engineers, testified that the association is now carrying $145,590,750 of insurance, and last year paid out in claims $3,063,318. All of the members are now required to carry insurance. He said his records showed that 11 years and 7 days was the average working life of an engineer. Asked regarding the number of men affected by the pension system, he said that on December 31, 1911, the association had 92 members 72 years of age, and 1,781 out of a total membership of 63,647, between the ages of 60 and 70. The average age of all members was 41 years. Out of a total of $3,424,213 paid in claims in two years, he said only $2,146,213 was paid on account of natural causes, and $870,750 was paid on account of death caused by railroad accidents.

G. N. Deguire, a fireman employed on the Chicago & North Western, described the physical examination required of engineers and the elaborate application blanks they are required to fill out, and said that it was not intended to object to the rigid requirements, but to show what a high class of men the railroads require for engineers and firemen. He did object to what he called "black-listing," saying that the information secured by the roads from other roads was improperly used. On cross-examination as to what changes he would make in the application blanks the chief objection seemed to be that they gave the roads an opportunity to find out whether a man had left the service of another road on account of a strike, and he said that a man might be discharged for insubordination simply for losing his temper on account of the action of some minor official, and would then be deprived of an opportunity of working on another road. Many men, he said, are working under assumed names because they left the service on account of a strike or some minor offense. He thought sufficient information could be obtained by an examination and investigation into whether a man was in the habit of using intoxicants. "So far as we are concerned you cannot go too strong on Rule G," remarked Mr. Stone, "but I would like to see it applied to officials as well as employees."

Mr. Deguire also introduced an exhibit based on information furnished by the local chairman of the firemen's organization to show the effects of larger engines and the business depression on the firemen. Eighty per cent of the chairmen had reported 6,312 firemen who had been taken off the firemen's list, and were either out of work or had gone into some other work, and he read various letters showing the condition of distress many of them and their families were in.

David B. Robertson, vice-president of the Brotherhood of Locomotive Firemen and Enginemen, presented an exhibit made up of quotations from the proceedings of the Master Mechanics' Association, the Traveling Engineers' Association, the *Railway Age Gazette*, Locomotive Engineering and the Railway World. These included statements by leading railway authorities as to the effect of the introduction of larger engines and superheaters in the way of producing a greater tonnage at a less wage cost per ton mile for crews, and included statements by W. L. Park, vice-president of the Illinois Central, who is a member of the board of arbitration, as to the increased responsibility and efficiency of engineers with the larger engines.

W. S. Stone, grand chief of the engineers, introduced correspondence he had had with the Interstate Commerce Commission regarding a statement made by Mr. Park which Mr. Stone said indicated that the Interstate Commerce Commission favored surprise tests. He and Mr. Carter had written to the Interstate Commerce Commission enclosing a copy of the testimony bearing on surprise tests and asking for a statement of the commission's position. The reply written by Commissioner McChord said in part: "The commission does not attempt to interfere directly or indirectly with the railroad companies or their officials in the exercise of their discretion affecting the personnel of their employees. The commission is absolutely without the authority of law to interfere between the railroad company and its employees in any matter affecting the physical fitness, competency or discipline of such employees, nor has the commission ever attempted to exercise any such jurisdiction."

Mr. Stone also presented evidence regarding a number of surprise tests which he considered unfair and also a large amount of testimony regarding the moving of terminals which had compelled the men to move their homes, often at a great sacrifice, he said.

D. H. Bremerman, of the Chicago, Burlington & Quincy, testified regarding an exhibit consisting of 326 large pages comparing schedule rates and rules of engineers and firemen in the west, east, and southwest, in detail, together with 16 articles comprising the men's demands which showed that western rates generally were higher than those in the east.

LOCOMOTIVE HEADLIGHTS IN VERMONT

The Public Service Commission of Vermont has issued an order, effective April 1, 1915, concerning the use of headlights on locomotives and also the providing of cab lights to illuminate the air, water and steam gages and to permit the reading of orders. After hearings and a study of the problem the commission came to the conclusion that a headlight with power sufficient to project light plainly 450 ft. in front of the locomotive would be amply sufficient to perform the following functions of a headlight:

1. Marker to designate the front end of the train.
2. Warning to the public and employees of the approach of a train.
3. Illumination of numbers on the headlight case.
4. Illumination of the track ahead of the locomotive sufficient to allow the engineman to readily perform his duties while operating in and out of terminals, siding, switching, and to pick up the various signs and signals on the run. Also illuminate the track for a fair distance ahead.

The commission, however, was of the opinion that the specification for such a light should be more definite than merely stating that the light should show plainly for 450 ft. in advance of the engine and arrived at the conclusion that a headlight producing not less than 2,500 apparent beam candle-power when measured with the aid of a reflector, the rating being in accordance with the average of the center readings between 500 and 1,000 ft. ahead and upon a reference plane 3 ft. above the

rails, will produce a sufficient light to illuminate the track for at least 450 ft. ahead of the locomotive and to properly perform the functions above enumerated.

No evidence whatever was adduced at the hearing in any way referring to cablights.

It is ordered that every railroad corporation doing business within the state shall equip, maintain and use upon its locomotives operated within the state, excepting locomotives used exclusively in yard service and locomotives operated exclusively during the period from one hour before sunrise to one hour after sunset, headlights of not less than 2,500 apparent beam candle-power when measured with the aid of a reflector, rated in accordance with the average of the center readings between 500 and 1,000 ft. ahead and upon a reference plane 3 ft. above the rails; and shall equip, maintain and use upon all locomotives operated within the state cablights of sufficient intensity to plainly illuminate the air, water and steam gages and to permit the reading of orders thereby.

TRAIN ACCIDENTS IN DECEMBER[1]

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of December, 1914:

Collisions

Date	Road	Place	Kind of accident	Kind of train	Kil'd	Inj'd
9.	Phila. & Reading	Royersford	xc	P. & F.	2	2
24.	Southern Pacific	Imlay, Nev.	rc	P. & P.	0	16
26.	Pere Marquette.... K. L. S. & C.....	Hartford, Mich.	xc	F. & P.	0	6

Derailments

Date	Road	Place	Cause of derailm't	Kind of train	Kil'd	Inj'd
10.	St. Louis & S. F.	Joplin	.....	P.	0	19
†13.	C., Rock I. & P.	Northfield	b. rail	P.	1	22
17.	Baltimore & Ohio	Weston, W. Va.	.....	F.	0	2
17.	Western Maryland	Thomas, W. Va.	runaway	F.	1	3
†18.	Southern	Jetersville	d. track	P.	1*	20
19.	Pennsylvania	Dotter	ms	P.	0	3
19.	Western & Atlantic	Emerson	.....	P.	2	9
26.	Gulf C. & S. F.	Blum	b. rail	P.	0	2

The trains in collision at Royersford, Pa., on the 9th were the Williamsport express and a freight train headed in the same direction. The freight was moving out of a side track to the main line, and its engine was struck by the passenger engine. Both engines were overturned. Both enginemen were killed and two other employees were injured. This collision occurred in the night. The men in charge of the freight assumed that the passenger train had passed by when in fact the train which had passed was another; and it appears that they moved their train from the siding to the main track in the face of an indication in the switch indicator showing that the main track was occupied by an approaching train.

The trains in collision at Imlay, Nev., on the 24th were the first and second sections of westbound passenger No. 19. The second section ran into the rear of the first, and eight passengers in the observation car of the leading train were injured. The collision was due to disregard of distant and home automatic block signals. Besides this the engineman entered the yard not under control and the flagman of the leading train used neither torpedoes nor fusees.

At the crossing in Hartford, Mich., on the evening of December 26 a freight train of the Pere Marquette ran into a passenger train of the Kalamazoo, Lake Shore & Chicago, and the rear car of the passenger train was overturned and fell down a bank. Six passengers were injured.

The train derailed near Joplin, Mo., on the morning of the tenth was westbound passenger No. 9; three passenger cars were ditched. Seventeen passengers and two trainmen were injured.

The train derailed near Northfield, Minn., on the 13th was southbound passenger No. 68; and five cars fell down a bank. One passenger was killed and twenty passengers and two trainmen were injured. The cause of the derailment was a broken rail.

The train derailed near Weston, W. Va., on the 17th was an eastbound freight and 27 cars were wrecked. Two trainmen were injured. The train became uncontrollable on a steep descending grade because of trouble with the air brakes on account of intense cold weather, and the engine ran off the track at a curve.

The train derailed at Thomas, W. Va., on the night of December 17 was a westbound freight and the engine and 10 cars fell down a bank. The train became uncontrollable on a steep descending grade and the engine jumped the track at a curve. One brakeman was killed and the engineman and two other trainmen were injured. It appears that on this grade, which is 3 per cent, the rule is to limit the speed by the use of the hand brakes; that this was not effectively done, and that in addition to this the engineman lost control of the air, presumably by a slow leak.

The train derailed near Jetersville, Va., on the 18th was southbound passenger No. 13, which, however, was running backward, having exchanged passengers with a northbound train because of a blockade on the road. The engine of No. 13 was running backward, and the tender was the first vehicle to leave the track. One passenger was killed and 13 passengers and seven trainmen were injured. The immediate cause of the derailment was a soft spot in the road bed.

The train derailed at Dotter, Pa., on the 19th was northbound passenger No. 73 and the baggage car and mail car were overturned. Three trainmen were injured. The cause of the derailment was a misplaced switch and failure to flag. Work train Extra 6323 took the siding at Dotter to clear for train No. 73. The conductor instructed his brakeman to go ahead and couple the engine onto some cars, stating that he would attend to the main track switch. This conductor reported his train clear of the main track with switch closed and locked before actually doing so, it being his intention to do this afterwards. He continued his conversation with the operator relative to the work he intended doing after No. 73 had passed, and allowed No. 73 to run into the open switch. On account of the weather conditions, the engineman and fireman of No. 73 failed to notice the position of the main track switch target.

The train derailed near Emerson, Ga., on the 19th, was southbound passenger No. 93, and the engine and two cars fell down a bank. Two firemen were killed and three trainmen and six mail clerks were injured. The cause of the derailment was a loose rail.

The train derailed near Blum, Tex., on the morning of the 26th, was passenger No. 16, and five cars left the rails. Two passengers were injured. The cause of the accident was a broken rail.

Electric Roads.—Of the accidents to electric cars reported in December, two were notable, one at Leith, Pa., where a trolley car with 54 passengers was overturned in a creek (15 persons injured), and the other in New York, where, in a rear collision of passenger trains on the Sixth avenue elevated line, December 9, one passenger and one trainman were killed and 15 or more passengers were injured. This accident was reported in the *Railway Age Gazette* of December 18, page 1158.

Canada.—In a rear collision of freight trains of the Wabash, on the Grand Trunk, at Darling Road, Ont., December 10, three trainmen were killed.

[1]Abbreviations and marks used in Accident List: rc, Rear collision——hc, butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

Protected Railway to the Suez Canal.—It is reported from Copenhagen that advices have been received from Berlin to the effect that the Turks, under the direction of German engineers, are constructing a military railroad from Maan to the Suez canal.

Are You Making Friends for Your Railroad*?

An Appeal to Every Employee Concerning the Vital Necessity of Directing His Efforts Toward This End

By Roy V. Wright
Managing Editor, *Railway Age Gazette*

President Rea, of the Pennsylvania Railroad, in an address before the New York Chamber of Commerce last month, made this statement: "The railroads, as an act of self-preservation, will always endeavor to make their service and facilities satisfactory and rates reasonable, because only in this way can they *make friends*, encourage business and earn profits."

Senator Root, in addressing the Pan-American Congress at Washington, February 11, 1911, said: "The basis of all intercourse, commercial as well as social, necessarily lies in a genuine good understanding that cannot be simulated; people trade with those with whom they have sympathy; their disposition is to *trade with their friends*, the basis of all permanent commercial intercourse is benefit to both parties—not that cut-throat relation which may exist between enemies, where one is trying to take advantage of the other—and a relation based upon mutual respect, good understanding, sympathy and friendship."

In speaking before the National Association of Corporation Schools at its annual convention in Philadelphia last June, A. E. Corbin, assistant sales manager of the Packard Motor Car Company, said: "It is necessary for the Packard, as any other manufacturer, to sell goods in the right place, to the right man, under right conditions. You can't buy salesmen clever enough to overcome a sore customer, and the basic principle of our sales organization is to earn the good will and confidence of our patrons."

The business of the railroads is to sell transportation, and to carry on this work effectively they must follow the same fundamental principles that have made for the success of any other business which depends upon successful salesmanship. In studying the problem of salesmanship one cannot but be surprised at the very outstart by finding that in spite of the large proportion of our people who are engaged in this occupation and the tremendous amount of capital which is involved, the psychologists have almost entirely overlooked the field and are only just beginning to seriously turn their attention to it. We do know, however, something of the general principles which have been responsible for the success of our leading business concerns. Walter Dill Scott, in his "Psychology of Advertising," makes this observation: "The modern business man does his utmost to minister to the pleasure of the customers in his store. He knows that they will place a larger order if they are feeling happy than if they are feeling otherwise. . . . The merchant attempts to please the customer by the appearance of the store, by courteous treatment and by every other possible method."

Stated in another way, the successful salesman realizes the necessity of having the prospective purchaser in a proper mental attitude, and to this end does everything he can to gain his interest and friendship. If you will stop a moment and try critically to analyze the feelings and conditions which cause you to give your trade to the various concerns with which you deal, you can gain some idea of the way in which you are specially attracted by those that seem to take a personal interest in you and have gained your good will and, to a certain extent, your friendship.

The railway's sole business is to give service to the public, and with its forces scattered over hundreds or thousands of miles, it must depend on the good will and friendship of the people along the line to even a greater extent than does the department store or other commercial business; and this is true even where there is no competition. The politician, for instance, stands ever ready to push himself into the limelight, and where the attitude of even a small part of the community is antagonistic to the railway, and the others are largely indifferent, untold damage may be done almost thoughtlessly by the promotion of unwise legislation or regulation. We all know also of the unreasonable and often ridiculous jury awards which have been made against the railways in unfriendly communities.

It therefore behooves railway executives to bend every energy toward making friends with the public. This is a stupendous task—a man's job—and yet not an impossible one; nor can it be accomplished in a brief period of time. Every employee who comes at all in contact with the public in the discharge of his duties—and practically all of them do to a greater or less extent—must be made to feel a broad and, at the same time, intense interest in the work of the road and must realize the necessity of dealing courteously with those with whom he comes in contact, thus doing his part to develop a friendly feeling toward the road. If the employee is unaccommodating or too busy to be courteous, or, as is true in some cases, is willing to criticise and abuse his employer, then the public is sure to develop a feeling of indifference and antagonism toward the road. We may express this in even stronger terms and say that ordinary acts are sure to cause friction unless courtesy is used as a lubricant. The public knows the spirit of the railroad only as it is reflected through the actions and attitude of its employees. It is a realization of this that has inspired the railway employees' magazines to unceasingly preach courtesy and to draw attention to especially noteworthy acts of thoughtfulness or courtesy on the part of employees.

COURTESY A REAL ASSET

Who can estimate the value to the Pennsylvania Railroad of the following item which appeared recently in its employees' bulletin under the head of "Making Traveling a Pleasure?":

> This letter tells its own story: "Permit me to call your attention to the courtesy of your clerk, J. C. Simpson, at Scottdale, Pa., in forwarding to me my spectacles, which I carelessly left in the waiting room on Tuesday. His thoughtfulness, in obtaining my name and address from Mr. Blank, with whom he saw me talking, is, in my opinion, commendable. It is such incidents as this that tend to make Pennsylvania Railroad traveling a pleasure."

In the same bulletin, under the title of "Making Friends for the Railroad," the story of a courteous performance of duty on the part of Conductor Frank Burns, of the Erie division, is introduced with this paragraph: "The kind of treatment passengers and shippers receive in the ordinary day-to-day affairs from those on the railroad with whom they come in contact largely determines the number of friends made for the railroad that day."

Every employee in every department can help make friends for the railroad, and the examples which follow are intended to be suggestive to that end. The field, however, is entirely too broad to be covered in any single article or discussion. My only hope is to bring out not so much the concrete methods which should be followed by the members of each department, as the spirit which should dominate every one of the employees of a progressive railroad.

The other morning, while crossing the Hudson River on the ferryboat, I met a friend who is in business in New York City and receives a large amount of material in carload lots. He has always impressed me with his good business judgment and broad-minded views. Much to my surprise when the question came up as to the railway situation, he expressed himself strongly as being entirely out of sympathy with the roads. Questioning soon developed the reason for this. Much of the material which he receives is shipped in standard size packages which are practically

*From an address on "Making Friends," before the New England Railroad Club, January 12, 1915.

uniform in weight. Because of errors which have been made in the past in the freight bills, it is the custom before accepting a car to check over the bill carefully. If there is an overcharge it is the practice to refuse to accept the car, because if it is accepted and the freight is paid it requires many months, possibly more than a year, to secure the rebate, and even then it is not always paid. If the car is refused, someone higher up gets busy and has the weights checked at once and the freight bill is corrected accordingly. Can you blame the merchant for looking at things as he does?

Contrast this with the practice of handling loss and damage claims on another road. The agents are authorized to pay such claims up to $50 from the cash drawer. I happened to make an inspection trip with the general manager of the road several months ago, when he was informed of a bad freight wreck in which 20 cars had been derailed, the contents of all of them being more or less damaged. Several men were at once put to work in listing up the freight shipments in the cars, and the parties to whom they were consigned. The agents were immediately notified to advise the consignees that their shipments had been delayed because of the wreck, but would be forwarded as quickly as possible. They were also advised to go over each shipment with the consignee when it was received and determine the exact amount of damage and pay for it in cash.

The practice of having special traffic representatives solicit business in the territory served by the road and give promises of performance and delivery is not always conducive to the best interests in making friends among shippers. At least one road, realizing this, has placed the solicitation of business in the hands of the operating department. The station agent is given additional help so that he can devote a considerable part of his time to keeping in touch with the business men of the community. He reports to the division superintendent on all matters concerning operation and traffic, and is regarded by the community as the railroad's representative at that place. Because he understands the conditions of operation he is able to deal more satisfactorily with the shippers and receivers of freight, and the co-operation which he receives from the other members of the operating organization makes it possible to give the very best service possible.

THE DEVELOPMENT DEPARTMENT

The remarkable work which has been done on a number of roads in attracting desirable immigrants and industrial establishments to the territory served, and in demonstrating the advantages of better agricultural, horticultural and dairying methods, and developing market bureaus, has been a most important factor in making friends for these roads. Here is a striking instance of this: The fence along the right-of-way of a certain railroad became defective and a cow strayed out on the track and was killed. The station agent who was authorized to settle the claim interviewed the owner. It is the practice on this road in this particular district to settle with the farmers on the basis of $75 a head for cattle thus killed. Much to the surprise of the agent, the farmer made this proposition: He said that two or three years before he had had the opportunity of buying the cow at a big bargain, and that while he considered it to be worth from $75 to $100, he would be glad to call the deal square if the railroad would pay him $50, or the amount he had paid for the cow in the first place; this because the demonstrator for the railroad had assisted him greatly in securing better results from his land, and he felt that it was only fair to deal with the road in the same spirit. The railroad must, of course, exercise proper care in making settlement for damage of this sort, in order that it will not be imposed upon; but there is little excuse for the haggling and unbusinesslike methods which are sometimes employed.

A certain railway advertises a natural wonder on its lines so thoroughly that it is known almost the world over, and Americans as well as foreigners make a point of visiting it if they have occasion to pass anywhere within a few hundred miles of it. The passenger station at this point, through which thousands and thousands of travelers from home and abroad pass each year, is old and usually in an untidy condition. Naturally while visiting this place for a few hours you want to check your hand baggage and be free of its care. Twice when I have done this I have been forced to miss my train because, although I allowed a generous amount of time in which to secure the baggage, the check room was being handled by ridiculously inefficient help. The contrast between the magnificent scenery which one had left a few minutes before and the filthy, ill-kept waiting rooms is such as to disgust the traveler and put him in anything but a good humor toward the corporation which operates the station.

On the other hand, consider a railroad which runs through a sparsely settled territory and has a large number of small stations to maintain. It awoke to the realization that if it wished to attract newcomers and business it would be a good idea to make the stations and the station grounds as attractive as possible. Usually the district around the railroad station is the least attractive part of a town or city. It was remarkable how quickly the movement on the part of the railway seemed to influence the industries located near the station, and the resulting improvement was soon commented on most favorably by the commercial men who had occasion to visit the towns. More than this, the stations themselves, and particularly the toilet rooms, were so improved and maintained that the commercial travelers began to talk about the better service and thus boost the railroad.

THE TIMID TRAVELER

Railroad men become so accustomed to traveling that it is difficult for them to realize the timidity and fear with which the occasional traveler starts out on a journey. The chief operating officer of one of the large systems, in speaking to a group of his subordinates, emphasized the necessity for keeping a lookout for these timid people, both in the stations and on the trains, and trying to make them feel at home. A pleasant word or a little friendly advice to travelers of this kind may often be returned many times over in the friendly interest which may be created toward the railroad. A surly conductor or a grouchy station employee may often needlessly drive business away by a simple act of discourtesy—business which the traffic representatives can only regain at a considerable expenditure of time and energy, if at all. It is difficult to train and coach the thousands of employees scattered over hundreds of miles of railroad to be courteous. It can only be done by making it a distinct matter of policy and having it religiously observed from the highest officer down. The employee in trying to deal courteously with the public often has his good nature strained near the breaking point, let alone the elastic limit. He must remember, however, that there are many small people in this world and that he cannot afford to let himself drop to their level.

Handling personal injury claims is one of the most troublesome problems of railway operation. Listen to the advice given by H. B. Bull, chief claim agent of the Illinois Central, in his address at the convention of the National Association of Railway Claim Agents, held in St. Paul last May:

> I know but one rule that may be safely followed in the adjustment of personal injury claims—that negotiations should be conducted upon the high plane of openness and fairness. A railroad company, with its property constantly exposed and subject to attack, must for its protection and defense rely upon its own reputation for fair dealing with its employees, its patrons and the public. The deportment of its claim agents, who are constantly in touch with the public, has much to do with placing the reputation of a railway company. If they go about their work inspired by high and honorable resolutions, their efforts will not only be rewarded as they go along, but will assist most materially in establishing for their company a good name, which is the most valuable asset a railway company can have and which, when once enthroned, is as immutable as virtue and truth. A corporation can only act through its agents, and unless their acts are scrupulously correct it deserves to be condemned.

For the claim agent to preserve this attitude and at the same time prevent his company from being imposed upon by sharp practices is not an easy or a simple task.

The "safety first" movement has done much to secure the interest of the public generally, and this is particularly true in connection with the campaigns which some of the roads have waged to educate the school children and the employees of shops and factories near the tracks, to the necessity of keeping off railroad property and in using reasonable intelligence in guarding against accidents.

One way in which the operating officers can do much to hold the confidence of the public is to be very jealous of anything which interferes with the giving of good service. Fast freight train schedules are all well enough, but they are a detriment in that they cause disappointment and friction if they are not strictly lived up to. Regular dependable service, even if slower, usually keeps the patrons in a much better frame of mind.

SELECTION OF EMPLOYEES

Far greater care should be given to the selection and training of employees. In the first place, men should be selected from the immediate territory served by the railroad. Every employee should be carefully trained and his qualifications and progress should be a matter of record, so that he can have every opportunity for advancement and not be pushed aside to make way for a newcomer from some other road. This will accomplish two things: Not only will it encourage the best type of young men to enter the service and strive for advancement, but the communities from which they come will watch their progress with constant interest and will naturally be more friendly to the railroad.

Welfare work as it is promoted by many of the roads means much to the communities served, as well as to the men. The railroads were among the first of our industrial concerns to establish old age pensions and relief funds. Untold benefit has been done to many communities because of the establishment of railroad Y. M. C. A.'s at the terminals. These, in addition to providing clean, comfortable and inspiring surroundings for the men at their lay-over points, have meant much to the communities in which they have been placed because of their influence for good upon the immediate neighborhood. Saloons, cheap and uncomfortable rooming houses and other evils have been driven out with the advent of institutions of this sort.

Railroads have been known to place their medical staffs at the disposal of communities in efforts to drive out infectious diseases. We know also of their generosity when floods, earthquakes or fires have come, in rescuing the imperilled people and their goods and bringing them to places of safety. All of these things have been influential in making good friends.

Railroads sell transportation for cash. Unfortunately they do not all pay for the material which they purchase in the same way. I have in mind one road which has lost some very good friends because of long and apparently inexcusable delays in paying bills.

The purchasing agent is an important factor in making friends of the manufacturers on the system which he serves, by as far as may be consistent ordering material from them rather than from foreign concerns. I have seen a chief purchasing officer go into a manufacturer's plant, after explaining to him that the cost of his product was too high, and show the manufacturer how he could design and produce his device in a way which would bring it within the reach of the railroad.

Nothing is more annoying to a merchant than to receive a shipment of goods in a damaged condition, and this even if his claim is paid immediately and in cash. Much of this damage is caused by the carelessness of employees in handling and loading the freight, rough handling in switching, or the use of defective cars. What a wonderful thing it would be from the standpoint of making and keeping friends for the road if all the employees would co-operate to better these conditions. The St. Louis & San Francisco has already started a movement for the prevention of freight claims along the lines of the safety first campaign. I am wondering whether the actual saving in money, much as it may be, will not be of less importance than the satisfied patrons who will be protected from the annoyance of useless delays and damage.

Very little has been said in the foregoing as to how the employees of the maintenance of way and mechanical departments may lend their aid in making friends for the railroad. This does not mean, however, that these men cannot give very valuable service in that direction. For instance, the division engineer, roadmasters, section foremen and section men continually come in contact with the people along the line and by their attitude can do much to encourage a friendly feeling on the part of the public. This is true also of many of the employees of the mechanical department. Cleanliness and tidiness of yards, engine terminals and shop plants may exert a strong moral influence upon the immediate neighborhood and set a higher standard for the community. Too much care cannot be taken to prevent or minimize nuisances, such as excessive smoke, unnecessary noise and things of that sort. Railway employees should also be encouraged to take an active interest in the welfare and upbuilding of the community in which they work and live.

Have you ever had a glow which warmed you up all over when the man behind the stamp window at the postoffice said, "Thank you," or really acted as if he were human? Government employees can possibly afford to act like autocrats, but railway employees cannot. What a shock it would be to some railroad officers if they could disguise themselves and drop into the reception rooms of their offices and try to call on themselves or secure information from their clerks and door tenders.

During the course of a recent trip on a certain railroad, I had occasion to take breakfast in the dining car. When the waiter handed me the menu card, he also placed a small cup of coffee before me. I explained that I had not ordered it. His reply was "That's all right, boss, we furnish each guest with a demi-tasse free of charge. People seem to enjoy it while waiting for their breakfast." It was a small courtesy, costing practically nothing, and yet unconsciously it raised that road to a much higher place in my estimation. Does it pay? Do you like to be treated like a human being? The public, distant and cold as it may seem, is made up of individuals, each one of whom likes to be treated with consideration and courtesy, and is usually quick to respond to the spirit of such treatment.

IN A NUT SHELL

In July, 1911, a large group of distinguished representatives of the iron and steel industry from all over the world met in Brussels to consider the formation of an organization to discuss the economical, ethical and sociological problems connected with their business. Judge Elbert H. Gary, chairman of the United States Steel Corporation, was asked to preside over the meeting, and in an address in which he advocated the very highest ideals in business, *and as a matter of business*, he said: "There should be established and continuously maintained a business friendship which compels one to feel the same concern for his neighbor that he has for himself. It is no less in principle than the Golden Rule applied to business."

This is very different from the homely philosophy of Dave Harum—"Do unto the other fellow the way he'd like to do unto you, an' do it fust"—and yet if we study Dave's actions closely we find that except as they related to horse trading, he lived far more nearly in accord with the ideals expressed by Judge Gary than his modesty allowed him to admit. One thing we must realize, and that is that the day of sharp practice in business is fast passing away—in fact is already a matter of history with many of our better class institutions and commercial organizations. There can be no question as to the handwriting on the wall. To my mind the really vital problem of our railroads today is a full realization of the necessity for "making friends" of the public by inspiring each one of the employees to follow the spirit of the slogan "The Public Be Pleased," which after all is only a literal application of the Golden Rule to the transportation business.

True Theory of Railroad Operating Records

Slow Progress Made in Railroad Statistical Science; the Importance of Educating Railroad Statisticians

By F. Lincoln Hutchins

To be efficient records must be true to facts; they must cover all needed facts; they must be in hand as soon as the condition of transmission permits; and they must be of low cost. To be true to facts they must be of simple units; to cover all the facts they must be prepared for all units separately; to be available they must be aggregated daily; to be of low cost they must be under the supervision of one competent man.

A simple unit is any exactly defined element, a knowledge of which may be had by simple sorting and counting. Records must be self-proving, that is, the number of subordinate units must agree with the number of general elements of which they are parts. Money units cannot be used to measure physical operation, as they contain too many variables. Physical operation can only be known by units of physical elements.

Judged by these laws railroads have few, if any, satisfactory records; while they are staggering under a mass of reports which give little basis for correct judgments and cause great waste of revenue in needless expenditure.

The attention of American railroad officers should be directed to the most important thing in connection with their efforts to secure efficient operation. Proper management of records would result in a better knowledge and hence in better control of operation, as well as a greater saving of money now wasted in clerical work and report forms. Efficient operation cannot be measured by the amount of expenditures; money units contain too many variables to satisfy a stable "bench mark"; a difference in wage scale seldom affects the efficiency while greatly changing the costs; a reduced pay-roll may be, and often is, accompanied by a much greater loss in efficiency, as when a low-priced man is cut off requiring a higher-priced man to do the work. On the other hand an increased pay-roll may result in increased efficiency and lessened cost, through effective supervision and the relief of high-priced men from cheap work through the employment of lower-grade assistants; in both of these cases a money unit would produce a mistaken judgment.

An increase in revenue should not, per se, justify an increased cost. A change in the character of traffic, or in rates received for the same traffic, should cause no change in cost. An increase of revenue caused by acquisition of new traffic flowing in a direction opposite to that already in hand should result in a decreased cost per unit, and does not call for an increase in total expense. On the other hand a diminution in revenue does not justify neglect of proper maintenance, or even of operating costs per unit. A large part of the cost is entirely independent of revenue, being in the nature of a fixed charge having no relation to the amount of the revenue.

Genuine efficiency depends upon the proper use of accurate records. No efficient action in human affairs is knowable until records of results determine what is efficient. The art of railroading is too recent to have accumulated a fund of exact records. Only in the most superficial sense can it be said to have any records. The progress of rail transportation has been too rapid to permit of careful attention to securing records; the emphasis has been placed on doing the work immediately in hand as best it could be done under the personal direction of those having more or less experience to guide them; there has been no thought of seeking records of others' experiences, or of making records for the guidance of others in similar work.

Again, the men who have developed the art of rail transportation have not been statisticians; their training and inclinations have been antagonistic to statistical information; there still exists among railroad managers a veiled contempt for any statistical determination of the efficiency of operation. This attitude results, in part, from their knowledge of the multiplicities and ever-changing conditions of operation, in part from their experience with current practice in report-making, through which partial, complex, and misleading conclusions are drawn, unless they are supplemented by personal observation and knowledge.

No railroad in the United States has a comprehensive, adequate statistical method by which to control its operations. The reason is obvious, for in the days of short lines, over which the superintendent could make daily trips, thus keeping in personal touch with all of its details, there were few other than the financial reports. As lines became extended and the new combinations lengthened the jurisdiction of the manager, information supplementing personal observation was found necessary, and this was secured through reports made upon blank forms sent out to the party upon the ground to be filled in and returned. Such report blanks were hastily prepared, to cover the particular need then in mind, by men who had no statistical training; and by different departments independently, leading to duplication and conflicting reports; no attempt was made to correlate or co-ordinate these report forms to fit them for other use; such reports were often continued long after the particular need had passed, or was better supplied in other ways, lumbering up the files and entailing needless clerical costs. Such reports, being unscientifically prepared and lacking the exact definitions needful to inform the makers as to just what was to be included, failed to convey exact information, and when new information was needed the effort to secure it led to the formation of new blanks, prepared in the same illogical manner, until to such an extent has this grown that the roads in the present day are staggering under a tremendous accumulation of reports, of which many are worthless so far as the giving of exact and reliable information is concerned.

It may be observed that the railroads are in an exceptionally favorable situation to obtain ideal statistical records. The units are few and simple, so that they may be exactly defined. The power to secure accurate figures of such units is ample and complete. These two fundamentals comprise the main requisites of scientific statistics, which require only the correct application of statistical methods to produce accurate results. Railroads are manufacturing entities producing a service; this product is passengers and merchandise transported; the units are passengers and freight tons carried one mile; the efficiency is determined by the time and effort expended to produce the results, not by the money received for that service, which varies through causes entirely unconnected with the ratio of effect produced to the energy expended in producing it.

It follows, then, that performance records must be divorced from financial reports; bookkeepers, accountants, and auditors make poor statisticians, because their training is wholly along the line of monetary values, and this becomes too ingrained in their natures to permit them to think in other terms; they are also too much involved in watching financial results to enable them to take a broad view of purely operating statistics. From the absolute fact that with every increase in efficiency there follows a lessened cost per unit, even when the total cost is increased, it is seen that to compare costs is entirely misleading. This is a thing that the financial man has great difficulty in realizing.

Point of view is perhaps the most important thing in the establishment of statistics. To the president and directors the single point of view is net earnings. Not so to the operating man, whose point of view should be focused upon operating methods which will directly affect the net earning result. Hence

the present tonnage records are very defective in that they do not induce the proper point of view for the operating man. For instance, credit for gross tonnage, including resistance allowances, has no direct relation to earnings, for it is only the paying load which yields earnings. Revenue tonnage is the only business which affects earnings, and hence should be the unit view point. A superintendent having this as his goal will be intensely interested in the efficient loading of cars and in his revenue train-loading, to avoid all light hauls so far as possible.

He will, if encouraged, criticize the direction of the transportation office in the matter of moving empties and routing loads, which criticisms may show that damaging practices are prevalent. Another correlative viewpoint is the tractive power used to haul that earning tonnage within the time in which it is in use. A railroad has a very heavy overhead expense dominated by the element of time, and this expense should be brought home to the operating man. With his viewpoint fixed upon the greatest possible number of revenue tons, with the least possible tractive power time, the operating man would work toward the goal of the president, namely, increased net earnings.

To obtain accurate statistical knowledge it is necessary to obtain the facts by means of an individual unit record, which may be counted; this means that the unit must be so exactly defined as to enable the illiterate to comprehend it, and the record must be the number of times that it occurs in time and space. Such a unit record aggregated gives the basis from which any deductions may be obtained; combined with other aggregates, similarly obtained, results may be obtained to answer any inquiry that may be made. Such unit records suffice for all needs, hence it is possible to abolish all duplication by any department and simplify the statistical effort. To be exact records must be made currently with the performance, by the party intimately associated with the work; such records should carry notations of any abnormalities, or unusual situations, to the end that it may never be necessary to make inquiry as to the cause of any departure from normal results; this feature would afford great relief to all departments that are now so burdened with efforts to explain past occurrences.

The post-mortems, now so largely indulged in, are costing the roads a prodigious and unappreciated amount of money, with no resulting benefit; further than that, they divert the minds of the supervising officers from attention to the immediate pressing problems of operation and thus detract from their efficiency. It is doubtless true that at some points there is great efficiency as regards some unit of performance; unit records would bring this into view and a study of causes would serve to raise the efficiency of this element upon every part of the system.

Competent arrangement of records upon the statistical plan makes all records self-proving; that is, each group of records must be arranged in a descending order from the most general to the particular, wherein the total of the particulars must agree with the total of the general if the records are correctly made; here is a current proof of accuracy, and with daily aggregations, errors would be immediately discovered and corrections applied.

With proper unit records it is as simple and easy to aggregate the particulars separately, as to first mix up incongruous elements as is now done; having aggregates of each particular permits of every possible combination from which to deduct the answer to any question; not only so but the aggregates still remain to furnish the answer to any other question arising at any time, without seeking new information by means of special reports.

The accumulation of all data should be by means of simple sorting and counting; the facility with which sorting may be done is evidenced by the rapidity and accuracy with which mails are handled by the United States postal department. In postal cars with 80 separations the average is 25 sortings per minute, in post offices from 45 to 50 pieces of matter per minute when making primary separations. With uniform records of railroad data it would be much more rapid because of the absence of irregular addresses and puzzling writing.

Having fixed the units the next step is to determine what information is necessary for an adequate and effective control of operation. Care must be taken to eliminate all reports which simply satisfy curiosity, an element which is quite dominant in many of the reports now in use. Doing away with these would materially reduce the cost and make more efficient the unit data obtained. The original record having been made it should pass immediately out of the hands of the party making it into a record bureau, and all subsequent use of that record should be developed by the record force, trained to the efficient handling of it; having no incentive to blur or misuse it, a condition that now vitiates some reports. Relieving the operating department of all record work would liberate more clerks than would be required by a record department performing the same functions. Record bureaus, conveniently placed, could make efficient use of mechanical devices to expedite and cheapen the work, the co-ordination of records making it possible for the bureau to answer any inquiry with the least time and expense. This method would abolish all petty reports now made by the departments, divisions and localities; relieve local parties from all report making, now so indifferently performed, and—which is most important—would save the mass of correspondence, now indulged in, to clear up doubtful points, correct errors and to obtain explanations. The ultimate aim would be to have daily recourse concurrently aggregated so that accurate results may be available as soon after performance as the time for the transmission of the data permitted.

Substituting scientific records for the present unscientific reports may be made a very gradual process during which the present official routine may be least disturbed. After the complete scheme has been worked out, with a definite unit place provided for every possible refinement in records, it only remains to gradually introduce the new as the existing reports are exhausted or become obsolescent. Only when the plan has been sufficiently instituted will there be a necessity for the creation of a distinct record bureau. It is plainly evident, however, that a competent man must be given supervisory control of all records in order that co-ordination may be secured and a gradual approach made to the ideally efficient method.

An important part of a statistical method is the adoption of adequate symbolization. Provision against duplication is secured by using mnemomic letter symbols for verbs of action, such as—Ad for adjust, Av for advise, Ap for approve, Cl for classify, Cm for communication, Dm for demand, Es for establish.

Differentiation of function is secured by using Roman numerals, such as (1) organization, (2) financial, (3) construction, (4) maintenance, (5) procuring business, and (6) transportation.

Division between the three classes of service may be secured by using a following letter, such as H for personal service, M for material service, C for capital service.

These symbols may be continued down to the last refinement so that simple sorting of the individual units produces an exact result upon which accurate judgment may be obtained.

RAILWAY CONSTRUCTION IN CHILE.—The Chilean government, despite the stringency of its financial resources, has resolved to proceed with the construction of the following new lines: Paine to Talagante; a line to connect the Traiguen branch with the main line; the Iquique and the Antofagasta extensions to the Longitudinal Railway; a line from Melpilla to Las Cabras; Valparaiso to Casablanca; San Vicente to Perallilo and Parronal; Valdivia to Los Canelos; Freire to Cunco; Los Angeles to Santa Bárbara and Quillaco; San Clemente to Colorado, with a branch to Queri; San Bernardo to Puente Alto; Quilpe to Melipilla; San Carlos to San Fabian; Artificio to Quincolmo; El Alamo to Molina; Cauquenes to Chanco; Quirihue to Coelemu; Yumbled to Rio Claro; Bulnes to San Ignácio and thence to El Recinto.

PACIFIC AND MIKADO TYPE LOCOMOTIVES FOR THE NEW ORLEANS & NORTHEASTERN

In order to obtain the greatest economy in the maintenance of motive power much attention has been given during the last few years to interchangeability of the detail parts. A majority of the parts subject to wear may very frequently be made interchangeable on locomotives differing widely in type. This is evidenced by a lot of five Pacific and three Mikado type locomotives recently built by the Baldwin Locomotive Works for the New Orleans & Northeastern. With these two types it is not difficult to arrange the wheel base so that interchangeable boilers may be applied. By using driving wheels of suitable diameter duplicate cylinders may also be applied and the proper ratio of adhesion maintained in both types. Among the important details which have been made interchangeable on the New Orleans & Northeastern locomotives are the boilers and accessories, the cylinders, cylinder and valve chamber heads, cross heads, pistons and rods, piston valves, driving boxes, trailer trucks, foot plates and cabs.

The boilers, which are of the straight top type, are equipped with the Gaines locomotive furnace. A combustion chamber is used in combination with a brick arch supported on water tubes. The superheater is made up of 24 elements and provides a superheating surface of 564 sq. ft. The fittings include power operated fire doors and grate shakers.

The cylinders on both types are simple with a diameter of 22 in. and a stroke of 28 in. With 68 in. driving wheels on the Pacific and 57 in. on the Mikado type, tractive efforts of 33,880 lb. and 40,420 lb., respectively, have been obtained with but slight variations in the factor of adhesion. Piston valves 13 in. in diameter are used, being driven by Walschaert gear.

Vanadium steel has been used in the frames, driving axles and engine truck axles of both types. This material has also been used in the main and side rods of the Pacific type locomotives. All rods for both types are rectangular in section. The rear truck is of the improved Hodges type so arranged as to give a maximum amount of clearance under the ash pan.

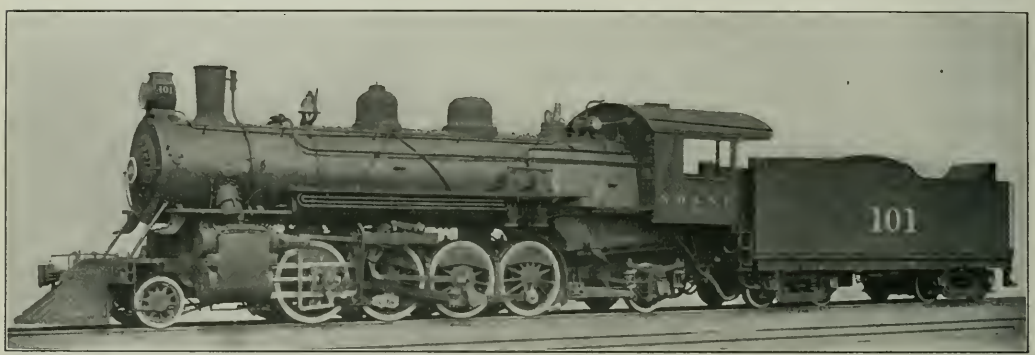
These locomotives are built to operate on 75 lb. rails. The grades and curves are generally light, the steepest grades on the main line being 1 per cent. and the sharpest curve 6 deg. The principal dimensions and ratios of both types are given in the following table:

General Data

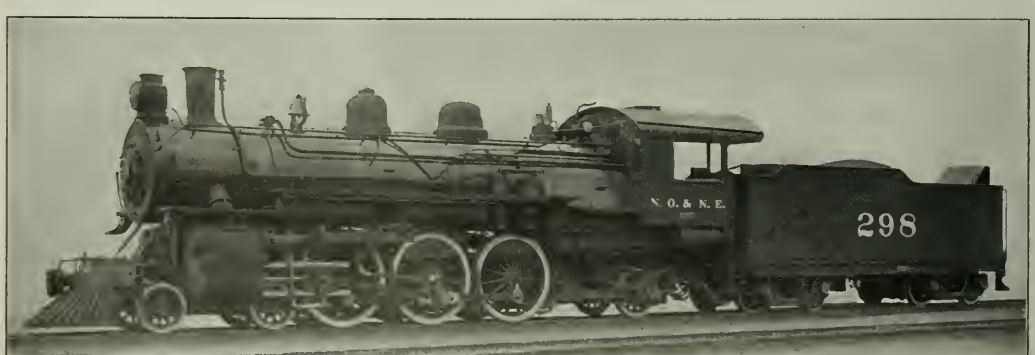
	Pacific	Mikado
Gage	4 ft. 8½ in.	4 ft. 8½ in.
Service	Passenger	Freight
Fuel	Bit. coal	Bit. coal
Tractive power	33,880 lb.	40,420 lb.
Weight in working order	206,700 lb.	209,500 lb.
Weight on drivers	130,500 lb.	160,000 lb.
Weight on leading truck	43,800 lb.	19,700 lb.
Weight on trailing truck	32,400 lb.	29,800 lb.
Weight of engine and tender in working order	352,000 lb.	355,000 lb.
Wheel base, driving	12 ft. 0 in.	15 ft. 0 in.
Wheel base, total	32 ft. 11 in.	33 ft. 6 in.
Wheel base, engine and tender	67 ft. 0 in.	67 ft. 7 in.

Ratios

Weight on drivers ÷ tractive effort	3.84	3.96
Total weight ÷ tractive effort	6.14	5.18
Tractive effort × diam. drivers ÷ total equivalent heating surface†	679.2	679.2
Total equivalent heating surface† ÷ grate area	73.7	73.7
Tube equivalent heating surface† ÷ firebox heating surface	19.8	19.8



Mikado Type Locomotive, Many Parts of Which are Interchangeable with the Pacific Type



New Orleans & Northeastern Pacific Type Locomotive

Weight on drivers ÷ total equivalent heating surface†	38.5	47.2
Total weight ÷ total equivalent heating surface†	60.9	57.6
Volume both cylinders	12.3 cu. ft.	12.3 cu. ft.
Total equivalent heating surface† ÷ vol. cylinders	275.3	275.3
Grate area ÷ vol. cylinders	3.7	3.7
Cylinders		
Kind	Simple	Simple
Diameter and stroke	22 in. x 28 in.	22 in. x 28 in.
Valves		
Kind	Piston	Piston
Diameter	13 in.	13 in.
Lead in full gear	¼ in.	¼ in.
Wheels		
Driving, diameter over tires	68 in.	57 in.
Driving, thickness of tires	4 in.	3½ in.
Driving journals, main, diameter and length	9½ in. x 11 in.	9½ in. x 11 in.
Driving journals, others, diameter and length	9 in. x 11 in.	9 in. x 11 in.
Engine truck wheels, diameter	33 in.	33 in.
Engine truck, journals	6½ in. x 10 in.	5½ in. x 10 in.
Trailing truck wheels, diameter	40 in.	40 in.
Trailing truck, journals	7½ in. x 12 in.	7½ in. x 12 in.
Boiler		
Style	Straight	Straight
Working pressure	200 lb.	200 lb.
Outside diameter of first ring	66 in.	66 in.
Firebox, length and width*	110 3/16 in. x 76 in.	110 3/16 in. x 76 in.
Tubes, number and outside diameter	172—2 in.	172—2 in.
Flues, number and outside diameter	24—5¾ in.	24—5¾ in.
Tubes and flues, length	19 ft. 3 in.	19 ft. 3 in.
Heating surface, tubes	2,373 sq. ft.	2,373 sq. ft.
Heating surface, water tubes	29 sq. ft.	29 sq. ft.
Heating surface, firebox	171 sq. ft.	171 sq. ft.
Heating surface, total	2,573 sq. ft.	2,573 sq. ft.
Superheater heating surface	546 sq. ft.	546 sq. ft.
Total equivalent heating surface†	3,392 sq. ft.	3,392 sq. ft.
Grate area	46 sq. ft.	46 sq. ft.
Tender		
Tank	Water bottom	Water bottom
Wheels, diameter	36 in.	36 in.
Journals, diameter and length	5½ in. x 10 in.	5½ in. x 10 in.
Water capacity	7,500 gal.	7,500 gal.
Coal capacity	14 ton	14 ton

*Gaines locomotive furnace; length of grate 87 in.
†Total equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

THE NEW ERA FOR RAILROADS*

By Daniel Willard
President, Baltimore & Ohio Railroad

The two decisions in the Eastern rate case, taken as a whole, may be truly said to mark the beginning of a new era for the railroads, and I believe that the decisions, when they become better understood, will have, and justly so, the support of all men who think carefully concerning matters of that kind and desire only that fair and reasonable treatment and consideration shall at all times be accorded, with equal impartiality, to all individuals and interests.

While the commission in its two decisions fully recognized the needs of the railroads in Official Classification territory for additional net revenue, and while the chairman of the commission specifically stated that in his opinion the needs of the carriers were even greater than the full amount to be obtained from a 5 per cent increase as requested, it should be kept in mind that the increase immediately granted was, approximately, only one-half of the amount asked for; but other findings and suggestions contained in the decisions are of great potential value, provided the railroads are enabled by the co-operative and affirmative action of the various state commissions, as well as of the federal commission, to put the changes and the reforms suggested into effect. The federal commission, for instance, admitted the contention of the carriers that their expenses had become inelastic, due largely, as shown in the record, to the effect of legislation, such as full crew bills, hours of service laws, increased taxes, etc., and that it was not possible now, as in the past, for the carriers to keep their expenses in harmony with their gross earnings. They found also that it was not true, as claimed by some, that the railroads had spent unduly large amounts in recent years upon maintenance; on the contrary, they expressed the view that the amount so spent was perhaps even less than it might well have been, and definitely stated that they would view with disfavor efforts to increase net earnings by keeping maintenance charges lower than they ought to be.

They approved the principle of a small uniform and general increase as urged by the railroads, by permitting such an increase to become effective on approximately half of the freight earnings in the Eastern territory. The commission also found that the higher rates of interest which the carriers would undoubtedly be required to pay in the future because of conditions brought about by the European war would be an element which should be considered in determining a fair and reasonable basis of rates. In other words, the commission clearly recognized all the contentions of the carriers concerning the general railroad situation, and specifically stated that it was the duty and the purpose of the commission to assist so far as it properly might in the solution of the whole problem. In furtherance of that thought the commission pointed out various ways in which it expressed the belief that assistance might be looked for, and if our political structure had been developed along the lines that were later on followed in the Dominion of Canada—that is to say, if the federal power had been all-embracing, except as limited by special restrictions, instead of being just the contrary—it would be possible, I believe, with the assistance and support of the federal commission to work out without unreasonable delay a solution of the railroad problem along the lines suggested by the federal commission.

It should be remembered, however, that each one of our forty-nine states, or, more specifically, each one of the eighteen states located in what is known as Official Classification territory, has its own policy concerning the regulation of railroads. In some of the states it is not possible to advance local freight rates, for instance, without the consent of the railroad commission in that state, and in many of the states there are laws limiting passenger fares generally to two cents per mile, although it was very clearly shown by the able counsel retained by the Interstate Commerce Commission to assist it in the development of the rate case that a two-cent passenger rate was clearly unremunerative under most circumstances.

In order, therefore, that the policy outlined by the Interstate Commerce Commission in the Eastern rate case, and which I believe is a broad and constructive one in its possibilities, may be given effect and that the railroads may without undue delay obtain the relief proposed, it will be necessary to have also the friendly and affirmative co-operation of the several states, and this, in view of the searching and prolonged investigation of the federal commission into the whole subject, I think we may fairly expect to be forthcoming. If this is done, I believe the future outlook for the railroads is distinctly more promising than it has been at any time during the last decade.

Undoubtedly, in the actual working out of what may be called a large reformatory program such as is presented, it may, and no doubt will, come about that certain of the carriers as well as certain localities will be required, in the general good, to give up special advantages which may have accrued to them under conditions such as have existed in the past, and this it is to be hoped they will consent to do, having in mind the larger interest of all, and also the certainty that a policy based upon a recognition of the principle of fair and reasonable treatment for all will in the long run and in some way assure to all the rights and privileges to which they are justly entitled.

It has been a source of constant satisfaction to me that the press generally should have taken the attitude it did toward the question as a whole, and while what is said in this letter is simply a personal expression of my own views, I believe that railroad managers generally feel very largely as I do concerning the matters above referred to, and I hope now

*From a letter to the New York Times, published in its issue of January 20, 1915.

that the public, because better informed, has come to appreciate more clearly the necessities of the railroads, as well as the intimate relationship which exists between the prosperity of the railroads and the prosperity of all others, that we may be able to so work out the problems of the future as to perpetuate the friendly understanding which now seems to be established.

THE FARMING CODE

A harassed railroad officer has sent us the following, showing that he at least might be willing to share his blessings with other classes of citizens. It is rumored that Congressman Whackem may not introduce this bill in the near future.

ARTICLE ONE

Charges and Prices

Sec. 1. Only one price for a given commodity shall be lawful. A farmer desiring to change a price shall file a schedule thereof with the commission hereby created, which shall go into effect thirty days thereafter unless suspended by the commission at the instance of any consumer.

Sec. 2. No prices shall be increased, however, except upon due proof, the burden whereof shall be upon the farmer, that existing prices are confiscatory of his goods and gear. In its discretion, the commission may refuse to permit any such increase until a valuation by its engineers and accountants shall have been taken. In such valuation, the farmer shall have no credit for past profits invested in new fields or improved structures, but shall be allowed only original cost plus borrowed money invested.

Sec. 3. "Commodity," as used herein, includes all grains, vegetables, livestock, dairy articles, excepting sand, gravel and manure.

ARTICLE TWO

Conduct of Operations

Sec. 4. Every hired man shall work eight hours only per day, not including the Sabbath, and shall not recommence work unless he has completed a period of not less than eighteen hours of absolute rest and quiet. He shall not work on the Lord's Day, nor on legal holidays, nor on Jack Love's birthday.

Sec. 5. Every farmer shall hire one more hired man than his work requires.

Sec. 6. The only permissible exceptions to the two foregoing sections shall be periods of stress resulting from earthquake, Halley's Comet or European invasion.

Sec. 7. All wagons, and all poles and double-trees, shall be provided with couplers, coupling by impact, so that the hired man need not go between the wheels of the wagon and the heels of the horses.

Sec. 8. All wagons shall be supplied with suitable brakes, grab-irons, stirrups and platforms of standard dimensions to be fixed by the commission.

Sec. 9. All bulls, when moving on the highway or in unfenced areas, shall be equipped with a bell of not less than fifty pounds weight, a steam whistle and an electric headlight of at least 1,100 candle power.

Sec. 10. Sheds shall be built over all fields where hired men have to work in summer.

Sec. 11. All field engines and machinery shall be fenced in; all belting shall be encased in metal housings; and all grindstones, churns, hay-cutters, bulls' horns and other moving parts shall be strongly encased in sheaths for the protection of the hired men.

Sec. 12. All barns, sheds and other outbuildings shall, in cold weather, be adequately heated, and at all times shall be well lighted and policed.

Sec. 13. If a calf is delayed in arriving or is born dead, the farmer shall instantly provide another cow whose calf shall be born that day.

Sec. 14. The commission's inspectors shall weekly inspect all gasoline automobiles. If a cylinder is missing, the farmer must find it before he runs on the road again.

Sec. 14a. The right to mortgage real estate is a franchise reserved to the state. No farmer shall make any mortgage nor incur any indebtedness extending for a period of more than one month, without the written approval of the commission, obtained upon petition and hearing, and upon paying the state treasurer 10 cents for each $100 of such indebtedness. Indebtedness incurred without such consent shall be void.

ARTICLE THREE

The Commission

Sec. 15. To enforce this act, a commission of five persons shall be selected by the governor with a view to placating as many shades of political opinion as possible. No commissioner shall, however, be deemed disqualified by lack of previous political or other experience.

INTERLOCKING AT NORTH PHILADELPHIA

By W. M. Post,

Supervisor of Signals, Pennsylvania Railroad, Jersey City, N. J.

The Pennsylvania recently added four tracks to its four-track line at North Philadelphia, making eight tracks through the station, and also increased its station facilities, which made it necessary to replace the old electro-pneumatic interlocking plant at that point. A 47-lever type F electric interlocking machine, furnished by the Union Switch & Signal Company, was installed, 43 working levers controlling 41 switches and 58 signals east and west of the station. At the same time the automatic block signal sections in the immediate vicinity were shortened from an average

North Philadelphia Passenger Station and Interlocking Plant—Looking East

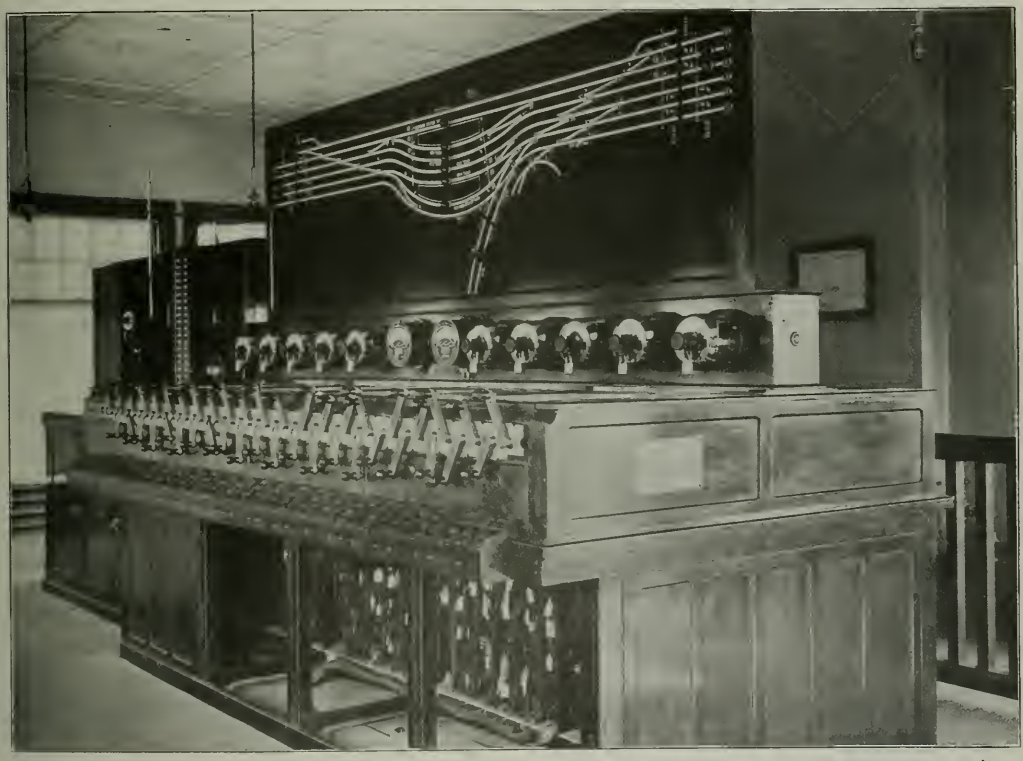
of 4,088 ft. to 3,052 ft. to enable trains more quickly to get away from this congested district; and the automatic signals were changed from two-arm, lower-quadrant, two-position, to one-arm, upper-quadrant, three-position. The distant indication was carried back two blocks, the first distant signal indicating "proceed, prepared to stop at next signal," and the second distant signal indicating "proceed, prepared to pass next signal at medium speed." The interlocking station is a two-story brick building 38 ft. by 20 ft. outside dimensions, with red tile roof, and brick walls covered with concrete, the design harmonizing with the appearance of the bridges and the station surroundings. The relay and indicator rack is directly under the interlocking machine, on the ground floor.

The machine is of the electro-pneumatic design modified for use with electric power apparatus. Each signal lever controls several signals by means of selection over contacts on switch levers, and through other devices. Both ends of a crossover are controlled by one lever and if one is a slip, the slip and movable point frogs are included in the control of the lever.

Indication lights located directly under the levers in the machine show whether the track circuits which control the electric switch locking and the automatic feature of the signals, are occupied. Electric lights on the track model, on which is painted a diagram of the track layout, indicate the approach of trains and also which one of the station tracks is occupied. Clockwork slow releases, ground detectors and ammeters are mounted in a cabinet over the machine. Mercury slow releases are connected to levers controlling all dwarf signals which are less than 100 ft. from facing-point switches. At one end of the machine there is a telephone test board.

The switch mechanisms are Union B 3 electric type. The switch is operated through a worm gear direct connected to the operating motors by reduction gears of 25 to 1 for single switches, and 45 to 1 for slips and movable-point frogs. The indication circuit is alternating current and was developed by the Pennsylvania signal department to eliminate the possibility of false indication. All signals are electrically lighted with two 2½-watt 12-volt Mazda bulbs, connected in multiple.

Power is supplied by the Philadelphia Electric Company at 220-volts, 60-cycle, single-phase a. c. Two sets of Edison storage batteries, 100 cells each, of 300 ampere-hours capacity, supply the direct current for the signals, switch motors and indicators. These sets are charged alternately by two mercury arc rectifiers of 30 amperes d. c. capacity, connected in multiple.



Electric Interlocking Machine at North Philadelphia

The alternating current for track circuits, switch indication circuits and electric lights is transformed from 220 to 110 volts at the interlocking station and is conducted through the plant on No. 6 feeders. Transformers located at convenient points step down the current again.

All wires were put underground in cypress wood conduit and the wires surrounded with R. S. A. Parolyte (petroleum asphaltum) to protect the insulation and guard against damage by rats and mice. The boards were covered with ⅜ in. of this material before the conduit was built; the cables and wires were then pulled through, and Parolyte heated to about 200 deg. F. was poured in until the wires were covered.

The interlocking is completely equipped with approach, route and electric switch locking. It is nearly a mile from the farthest east to the farthest west interlocked switch and a large share of the operations in the cabin have to be carried on without hav-

ing a good view of the trains that are being dealt with; that is to say, wholly by observing the indication lights in the interlocking machine. The plant was designed by the signal department of the Pennsylvania, A. H. Rudd, signal engineer, and the installation was made by the New York division forces.

STATE COMMISSION REPORTS

The New York, New Jersey and New Hampshire public service commissions have this week completed their annual reports. As yet only that from New Hampshire has been published in complete form, however, and our reports of the others are made up from advance notices which have been issued. There have been added notices of two special reports from Massachusetts.

NEW YORK

The New York State Public Service Commission, First district, has presented its eighth annual report to the legislature. The principal activities of the board have to do with the construction of new subway and elevated railroads in New York City, and during the 12 months of 1914, the commission awarded 24 construction contracts, which aggregated in value about $52,000,000. This is more than double the amount of the contracts given out in 1913. Payments by the city and by the operating companies for new lines aggregated in 1914 about $26,000,000. The contracts on which work is now in progress total about $142,000,000. The commission has 2,100 employees and its running expenses for the year were about $3,000,000. Of this amount $2,500,000 was chargeable to rapid transit, the preparation of plans, supervision of construction, etc. For the fiscal year ended June 30, 1914, the total number of passengers carried by all street railroads in the First district, that is, elevated, subway and surface lines, was 1,813,204,692, an increase of 43,328,184 over the previous year. The total receipts of such companies for the year were $94,153,673, an increase of $2,012,068. Estimating the population of the greater city at 5,400,000, this is $17.43 per capita for street car fares.

The New York State Public Service Commission, Second district, sent its annual report to the legislature January 15. A detailed account is given of the volume of work which has been done by the commission during the past year, and it is estimated that 25 per cent more work has been done than during any similar period in the past. The number of hearings held during the year was 630, occupying 298 whole days, and 2,195 formal and informal cases have been settled since March 16, the day when the present personnel of the commission was organized.

The commission recommends legislation to give it further authority to suspend proposed rates; a law to amend the long and short haul clause of the railroad law and one to require carriers to furnish shippers with a written statement of rates when called for. The commission has granted 142 certificates of public convenience and necessity for auto-bus lines on the highways. The commission believes that the highway department could attend to this matter, which takes the time of the members from more important things.

The commission also recommends a more businesslike and economical management of the contributions made by the state to the abolition of highway grade crossings. No appropriation for this purpose has been made by the state legislature for three years past, and cases are now pending where the state (which usually pays 25 per cent of such improvements) ought to contribute $1,000,000. Of the 8,679 grade crossings in New York State, a large share are on state and county highways, and some of the money for abolishing crossings can be taken from the highway funds. The commission strongly recommends the adoption of a definite program of appropriations in order that this great problem may be systematically dealt with.

MASSACHUSETTS

The Public Service Commission of Massachusetts, in a special report to the legislature, estimates that the amount invested in the electric railroads of the state is $226,253,407, including the sum of $25,982,695 for subways built by the city of Boston. The order of the legislature in this matter was the result of a discussion of proposals to have the electric lines taken over by the state, the cost of which, it will be seen, would be about two hundred millions, plus an annual return of 10 per cent on the investment, which is stipulated in the laws under which most or all of the companies were organized. To get an accurate estimate of the value of the roads, says the commission, it would be necessary to have first a physical valuation of the property, which would cost $230,000 or more. The commission gives a negative answer to the proposal broached in the legislature, to assess the property adjacent to existing street railway lines for the purpose of raising money with which to purchase them.

NEW JERSEY

The Board of Public Utility Commissioners of New Jersey has issued advance sheets of that part of the board's annual report which includes its recommendations. During the past year the board has approved issues of stocks, bonds and other securities in 59 cases, the par value of these issues amounting to $88,106,750. The report gives an outline of the rules under which the commission acts in cases of this kind so as to avoid giving any approval which may be taken as a guarantee of either stocks or bonds to the investor. The number of complaints submitted to the board during the year was 606, and hearings have been held in 456 proceedings. The action of the commission has resulted in numerous reductions in freight rates, but most of these proceedings have been of an informal nature.

Plans have been made for the elimination of 30 grade crossings, and hearings have been held in 21 of these cases. The Pennsylvania during the past year has eliminated 13 grade crossings at Rahway, in connection with its extensive elevation of tracks through that place. The West Jersey & Seashore has begun work which will abolish 11 crossings in Camden. The Lackawanna has eliminated seven crossings in Chatham and is doing similar work in South Orange and other places which will cost nearly $500,000. Ten crossings are to be abolished in Madison.

The board has ordered automatic bells at some crossings where the cost of maintaining an attendant was deemed unwarranted; and action has been taken looking to the erection of uniform signs at all crossings which are not attended by flagmen throughout the 24 hours. The Central of New Jersey has put in the hands of its crossing watchmen warning disks bearing the word "Stop" and reports satisfaction from their use. They have been obeyed without question by travelers on the highway. In a conference between the commission and different roads, with a view to making this plan universal throughout the state, opposition developed; though the board believes that the experience of the Central of New Jersey has answered all of the criticisms which were made by the other roads.

The board recommends the amendment of the law empowering it to fix rates, so as to clearly define the policy of the state as forbidding the commission to value the franchise of a utility in excess of the sum which has been legitimately spent in procuring it, and repeats a number of recommendations which were made to the last session of the legislature, but which were not adopted by that body.

NEW HAMPSHIRE

The New Hampshire Public Service Commission has sent to the governor and the legislature its report for the two years ending August 31, 1914. The scope of the activities of the commission has greatly broadened during these two years, and the commissioners feel that this has been one of the most useful departments of the state government. They believe that if there should never again be a single reduction in the price of public service, the cost of the commission would be justified by the single item of the reduction in the price of gas in four principal cities; and in three of the four cases the reduction was accomplished by adjustment without any public hearing.

Of the 1,031 grade crossings in the state, 826 were unprotected when the commission took up the work of investigating them; and of these, 469 have been improved by cutting down trees and brush, 15 are to be protected by flagmen, 30 will have automatic gongs and lights, and 25 will be made safer by restricting the speed of trains. For the first time in the history of the state there has been a reasonably thorough inspection of steam and other power boats carrying passengers on inland waters.

The commission has recommended to town and city officers to erect uniform signs at the approaches to highway grade crossings, fixed at a standard distance from the track; and somewhat more than half of the towns in the state have adopted the recommendation and have ordered over 900 signs. Other towns have declined to take action, some of them because crossings are already protected by signs put up by a maker of automobile tires. The commission condemns these signs as being inadequate. The advertising matter obscures the words of warning. They are not at uniform distances and are placed at only a few crossings.

The commission reports its expenditures for the past year, and in connection with this statement gives some information received from other states most of which is summarized in the following table (the figures being, presumably, in each case for twelve months):

	Cost of State Commissions			
	No. of commissioners	Salaries of commissioners	Expenditures*	Total cost of department
New Hampshire	3	$10,700	$14,851	$25,551
California	5	40,000	270,066	310,066
Connecticut	3	15,000	35,000	50,000
Illinois	5	50,000	130,000	180,000
Indiana	5	30,000	75,763	105,763
Kansas	3	12,000	33,856	45,856
Maine	3	14,000	44,000	58,000
Maryland	3	16,000	58,995	74,995
Massachusetts†	8	54,500	147,752	202,252
Missouri	5	27,500	83,100	110,600
Nebraska	3	9,000	40,920	49,920
Nevada	3	11,500	20,863	32,363
New Jersey	3	22,500	147,500	170,000
New York (both districts)	10	150,000	783,563	933,563
Ohio	3	18,000	180,000	198,000
Oklahoma	3	12,000	52,281	64,281
Pennsylvania	7	70,000	.....	.....
Rhode Island	3	11,000	8,000	19,000
Vermont	3	5,600	12,700	18,300
Washington	3	14,000	71,391	85,491
Wisconsin	3	15,000	170,204	185,204

*Appropriations given when expenditures are not known.
†Gas and Electric Light Commission included.

WESTERN MASSACHUSETTS TRANSPORTATION COMMISSION

The report of the Western Massachusetts Transportation Commission, L. C. Hyde, chairman, a special commission appointed by the governor last year, has submitted its report to the legislature of the state. A large part of the report is devoted to highways. That part which deals with railroads recommends the construction of a line from Williamsburg westward to Hinsdale, about 20 miles, the estimated cost of which would be $1,200,000. This route is through a very hilly section, and traverses the center of the largest single region in the state which is not already supplied with railroad facilities. There are in the state 36 towns without either steam or electric transportation facilities; and 33 of these towns are in the five wesern counties, which is the territory dealt with in the report.

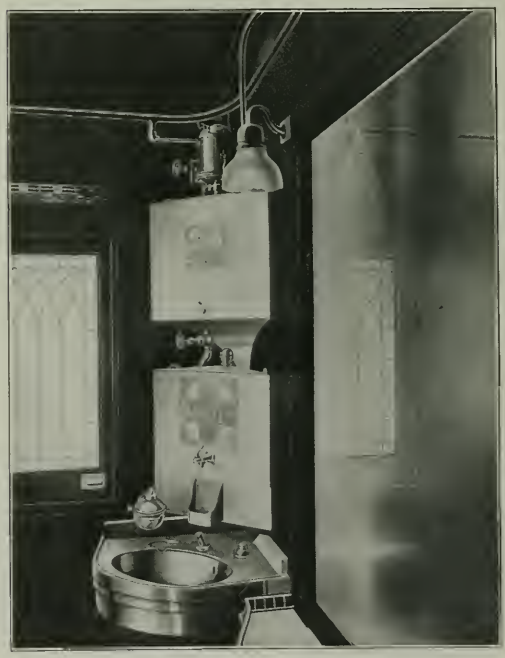
The commission recommends that the Public Service Commission be authorized to order the extension of street railways into adjoining towns which have no street railways; also to order street railways to carry freight and express. From Huntington westward to Lee, about 25 miles, there is an electric road, built last year and nearly finished; the commission asks that this road be required to begin operation by May 15

GERMAN CONTROLLED RAILWAYS.—According to Amsterdam advices the Cologne papers state that seven Russian, nineteen Belgian and three French railway lines are now managed by German railway boards.

SANITARY DRINKING FOUNTAIN

A new type of drinking fountain which provides filtered water for passenger cars has been developed by Henry Giessel & Co., Chicago, and has given good service on one of the western roads. It is known as the "North Pole" sanitary drinking fountain, and consists of a filter, a storage tank for the filtered water, a cooling pan and an ice box. The fountain occupies a space 14 in. by 17 in. by 48 in., and all parts are accessible for inspection. Water from an overhead tank flows to the filter at the top of the fountain and is filtered through Tripoli rock, passing to the storage tank directly below. From this tank it passes to the cooling pan in the ice box, which is a water-tight vessel of small capacity. The ice surrounding the cooling pan lowers the temperature of the drinking water to a desirable degree without permitting any of the ice water to become mixed with the drinking water.

The metals used in the construction of the fountain are noncorrosive. The filter case is made of galvanized malleable iron and heavy tinned sheet brass. The storage tank and cooler are



"North Pole" Sanitary Drinking Fountain for Passenger Cars

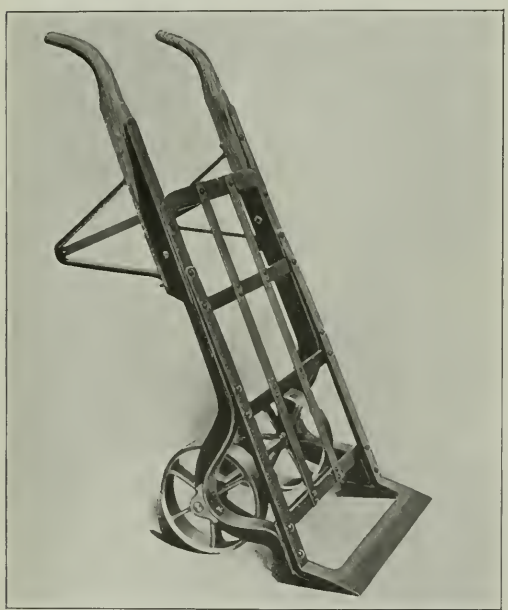
made of heavy galvanized iron sheets. The cooling pan is made of galvanized gray iron. All the pipes and fittings are also galvanized and the parts exposed to view are finished in German silver. The filter is in the shape of a cylinder with its core removed; the water seeps through from the outside to the inside and passes directly to the storage tank. The filter material does not absorb the impurities of the water, and may readily be cleaned by scrubbing in water with a stiff brush. It may easily be removed and cleaned in about five minutes and should be cleaned every few days.

The principal features of this drinking fountain are its sanitary characteristics and the cheap grade and small quantity of ice that may be used. Comparative tests made with it and an ordinary water cooler in passenger cars between Chicago and Kansas City showed a saving of 73.6 per cent in the amount of ice used and 80 per cent in the cost of the ice in favor of the

filtered water, the temperature of the drinking water averaging 49 deg. for the filtered water and 38 deg. for the ordinary water cooler. Less care is required in the maintenance of this cooler than of the ordinary cooler, a general cleaning being necessary only when the cars are shopped. Provision is made for draining the entire system when the car is not in use and not supplied with heat in the cold weather.

STEEL FRAME TRUCK

The freight handling truck shown in the illustration has recently been developed by the Edwards Manufacturing Company, Cincinnati, Ohio. The frame is made from 2½ in. by 2½ in. by 3/16 in. angle bar, the two sides and top crossbar being formed in a continuous piece. The side bars are dropped at the axle boxes, which are small castings bolted to the frame. This forms an especially rigid construction by reducing the height of the axle boxes and the leverage on the bolts. The crossbars are of 1½ in. by 1½ in. by 3/16 in. T-section, and are riveted to the



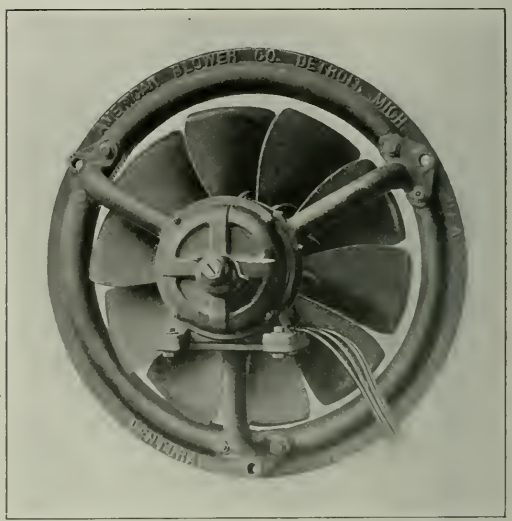
Freight Handling Truck with Structural Steel Frame

frame. The handles are of wood, reinforced with angle bars, and are readily detachable. Rivets are used in the construction throughout with the exception of the handles and axle bearings which are secured by bolts. The truck illustrated is designed for general purpose work, but the same construction is used in trucks of several other styles designed for handling special classes of freight.

Electrification of an Italian Railway.—Electric traction has just been introduced on the Turin & Savona Railway, for passenger traffic only, on the section of the line across the Apennines, between the latter town and Coval, a distance of 29 miles. This section, which is the heaviest part of the line, includes the Belbo tunnel, about 3 miles in length, with maximum gradients of 1 in 40. The maximum speed is 31 miles per hour. Savona, after Genoa and Venice, is the principal coal port in Italy; it is also an important manufacturing town, with large steel works.

VENTILATING FAN

A type of ventilating fan which is claimed to be especially effective has recently been placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The distinctive features are the wide central disk upon which the blades are mounted and the unusually large number of blades used. The ends of the blades are abruptly turned up causing the air to be thrown straight forward at a high velocity instead of being widely spread out, and the design of the



Ventilating Fan with Center Designed to Prevent Back Flow

fan at the center prevents a back flow of air at this point which often takes place with other designs.

The motor is specially designed for fan service. Being entirely enclosed it is protected from dust and moisture; it has a high overload capacity in order that no difficulty will be experienced in driving the fan against strong back pressure should it be located where affected by the wind. The motor is designed to run for long periods without attention and is claimed never to require more than an occasional inspection and lubrication. Power may be obtained from the electric light circuit.

An English Classification Scheme.—The Machine Tool and Engineering Association, Ltd., of London, has issued an alphabetically arranged list showing the railway classification of freight primarily shipped by its members. The list is a summary of the General Railway Classification of Goods, and it contains some very useful information relating to the carriage of machinery, etc., by rail.

Technical Schools in the United States Navy.—Technical schools maintained by the navy, wherein instruction and training are given in trades that are useful both in the service and in civil life, include the following: The machinists' school at Charleston, S. C., in which men are fitted for the duties of machinists, ashore and afloat; the electricians' (radio and general) schools at New York and Mare Island (graduates of these institutions are ready to perform the many duties that fall to the lot of those charged with the care of the dynamos and radio plants used in the service); the artificers' school at Norfolk, which gives instruction and training in carpentry, blacksmithing, painting, plumbing and shipfitting.—*American Machinist.*

Maintenance of Way Section

It is the experience of practically all associations that it is difficult to secure concise but complete committee reports. A committee will frequently go at length into the discussion of one phase of a subject to the neglect of other equally important phases. While this may be permissible, or even advisable when the committee is to be continued for several years, most committees exist for only one year. One cause for the defect in reports referred to is the improper selection and wording of the subjects assigned. Officers are prone to choose topics which are too broad to be covered in the work of a single year or are not sufficiently specific to indicate to the committees the scope and limits of their investigations. This is very likely, especially with inexperienced committeemen to result in the preparation of incomplete reports. The first step in the preparation of a committee report is the proper selection of a subject.

Efficient Committee Work

While not primarily a railroad organization, the American Wood Preservers' Association bears an important relation to the railways, as they are the largest users of treated timber. Its proceedings are therefore receiving more attention from railroad officers from year to year. This association is somewhat unusual, in that its membership is composed very largely of two groups of men, those in charge of commercial treating plants whose largest customers are the railroads, and those connected with the operation of plants owned directly by the roads. As a result the commercial operators are meeting with railway men who include their principal customers and competitors. Considering the narrowness of the field few associations have made as great a growth in membership or in the strength of programs presented as has this one in the 13 years of its existence. The wide range of subjects in its field covered by it is indicated by the program for its convention this week at which papers were presented by the engineers connected with commercial and with railway treating plants, consulting timber engineers, government experimental officers, a professor of pharmacology and efficiency experts. The association occupies a special field in railway maintenance of way work for, with the continually expanding uses of treated timber and the changing conditions in methods of preservation, there is a growing demand for expert knowledge on this subject.

The American Wood Preservers' Association

While there has been a great deal of independent study regarding the adaptability of various woods for treatment, the most practical methods of seasoning timber and the relative merits of the different timber treating processes for use in various parts of the country, there has been little concerted study of any extensive nature by any representative group of men, with the result that there is a wide diversity of practice and much money has been expended unwisely for timber treatment. This problem has been accentuated by conditions existing within the industry. The advocates of the different processes have in some cases urged the merits of their respective methods unwisely, while numerous commercial plants have been committed to certain processes to the exclusion of others which were better adapted to the needs of some of their clients. The American Railway Engineering Association and the American Wood Preservers' Association have endeavored to assemble the results of these different studies and to collect further information to determine the merits of disputed points from the standpoint of the user. While only a start, the report of the committee of the American Wood Preservers' Association on Specifications for the Purchase and Preservation of Treatable Timber presented at the convention this week contain much valuable data regarding the merits of the different timbers and processes of treatment for varying local conditions of climate and service. Such information is of direct value to the railroad engineer endeavoring to determine the relative adaptability of different timbers and methods of treatment for local conditions which he has to meet. The work of this committee should therefore become of increasing importance and value as it is continued from year to year.

Standardization of Timber Treating

One of the broadest fields for the exercise of engineering ability lies in the working out of economical and expeditious plans for the handling of bridge work. Every problem has characteristics of its own which influence the selection of the best method. In renewing a span, the character and depth of the stream, the prevalence of floods, the design of the structure, the density and distribution of the traffic and the amount and kind of construction equipment available are among the conditions which must be considered. Variations in these conditions make numerous methods possible. We publish two interesting descriptions of bridge work elsewhere in this issue, which, while perhaps local in their application and possibly not even unique, are examples of methods of general interest. Many other ways of handling various problems involved in the construction, maintenance or reconstruction of bridges, including the renewal or strengthening of spans, the building, rebuilding, strengthening or protection of piers, etc., are of equal or greater interest. It is our desire to publish descriptions of the manner in which problems of this nature have been handled. We therefore announce a contest on "Bridge Construction Methods" to cover descriptions of methods not generally used or known for handling any feature of bridge construction, maintenance or reconstruction work on steel, concrete, or masonry bridges, including substructures. Contributions should describe in detail the methods employed and be accompanied by sketches or photographs to make the operations clear to the reader. We will pay $25 for the best and $15 for the second best articles contributed, the awards being based on the practical value and originality of the methods adopted. All contributions should be sent to the Engineering Editor, *Railway Age Gazette*, 608 South Dearborn street, Chicago, and must be received not later than March 10.

Contest on Bridge Construction Methods

THE EFFECT OF HEAVY WHEEL LOADS ON TRACK

A FEW years ago locomotives with wheel loads of 30,000 lb. would have been considered impracticable, but today they are used in considerable numbers and the indications are that they will meet with increasing favor. Their adoption brings up a question of live interest to the maintenance of way department, especially since these locomotives are designed to operate at as high speeds as those they have replaced. The problem may be further complicated by the introduction of heavier cars, such as the 90-ton cars of the Norfolk & Western, with wheel loads of 21,950 lb., and the 70-ton cars of the Chesapeake & Ohio, with wheel loads of 26,310 lb. None of this equipment has been in service long enough for the full effects on the track to be evident.

Many men now believe that we have gone beyond the reasonably safe limit of wheel loads with present-day track construc-

tion, while others are of the opinion that these increased loads need cause no concern on a properly maintained track. Viewing the problem from another angle, there is a wide difference of opinion between those who believe that the saving resulting from the reduced cost of transportation will be more than offset by the increased cost of maintenance of the track and structures; and those who believe that, while the cost of maintenance will necessarily increase somewhat, it will consume but a small proportion of the reduction in operating costs.

The question of safety requires careful consideration. Our accident statistics show a condition far from favorable, which is not exhibiting a tendency to improve. At the same time, it is doubtful if there is any cause for alarm on properly maintained tracks, and only such tracks should be considered in the discussion of this question, for if the tracks are not properly maintained, the error lies in the installation of these heavy locomotives. From the standpoint of ultimate economy it is evident that any increased service required of the track will necessitate increased expenditures. However, it is difficult to see how on properly constructed and maintained track, these expenditures should show any marked inclination to rise. In fact, on the Norfolk & Western, where heavy locomotives and the 90-ton cars have been operated in solid trains, the track has not been observed to require any unusual increase in cost of maintenance. There is a distinct need for the collection of accurate data showing the relation between increased wheel loads and maintenance of way expenditures. Such data would be of great value to a road considering the advisability of purchasing heavier locomotive and equipment.

ORGANIZATION FOR EMERGENCIES

RAILWAY work is largely associated with the heroic in the popular mind and many stories have been built about the methods by which various emergencies have been met. In no department do such special conditions arise more frequently, or require more radical treatment than in the maintenance of way department. When a line is washed out, all other work must be sacrificed for that of getting the destroyed line back into service. Material must be secured with seeming indifference to cost and every measure taken to restore the tracks and bridges to a condition for operation.

No better examples of this nature can be offered than the records of the forces participating in the reconstruction of the roads involved in the floods in Ohio and Indiana in 1913. In view of the magnitude of the destruction, the manner in which these unusual and extreme conditions were met by the roads involved and the rapidity with which the lines were returned to service were highly creditable to the organizations of those roads. Almost equally severe conditions are created by heavy snow storms. Men and equipment must be concentrated in the blockaded area and every effort be exerted to reopen the lines, entirely disregarding hours of service and physical comfort. Although generally less serious because of the possibility of detouring traffic over other lines, wrecks require similar concentration of all energies of the maintenance forces to the clearing of the line and in a smaller way call for the same thorough organization and knowledge of the work.

While any or all of these conditions are not met with every day, they do develop with sufficient frequency to form a part of the regular routine of railway operation which must be expected at any time. Therefore, the maintenance of way forces must be so organized that they will respond to any such emergency without delay or confusion and work with the greatest efficiency, for an hour saved under these conditions is worth several hours at any other time. The maintenance of way forces of the Long Island are so organized that every man from the engineer maintenance of way down to the signal maintainer or track laborer knows where he is to go and what he is to do at the approach of every winter storm. A gang foreman of the Pennsylvania has so organized his men that none of them leaves the headquarters when off duty without reporting to him, so that they can be reached immediately if needed. These organizations are typical of those existing at many other points, although they are by no means universal or even common.

Of equal importance with thorough organization in the meeting of emergencies is the proper maintenance of the necessary equipment fully fitted with tools and other necessary supplies at all times at certain definite and well established points. The unusually severe snow storms in western Kansas two years ago found a number of the roads with snow fighting equipment in bad repair or incompletely fitted with tools and other supplies, with the result that entirely unnecessary and serious delays followed in the opening of these lines to service. It would seem evident that if the dangers of blockades are sufficiently important to justify the purchase of equipment they are also of sufficient importance to cause the equipment to be kept in the best possible condition, even though it may not be needed for several years at a time.

The results of a thorough organization of forces and equipment for emergencies are not confined to the handling of such work, but are reflected as well in the conduct of the ordinary routine duties. It may be argued that it is difficult to organize maintenance of way forces to such a degree, and it must be admitted that this is a serious problem. At the same time the fact that such organizations have been perfected with the average class of employees shows that it is possible. Also, such organizations are not confined to any one road or group of roads, but are to be found on different divisions on many roads, indicating that they result largely from the attention given to this subject by the supervising and local officers. The roadmaster or supervisor who feels that he cannot take the necessary time from the details of signing payrolls and requests for transportation is overlooking one of his most important duties, for the thorough organization of his forces will aid materially in developing a class of foremen who will require less attention on his part, giving him more time for the larger problems.

NEW BOOKS

Preservation of Structural Timber. By Howard F. Weiss, director, Forest Products Laboratory, United States Forest Service. Size 6 in. by 9 in., 312 pages, illustrated by 23 plates, 32 figures and 43 tables. Bound in cloth. Published by the McGraw-Hill Book Company, New York City. Price $3.

The "Preservation of Structural Timber" will doubtless receive special attention from railway men and those engaged in other industries using large quantities of timber since it represents the first attempt to discuss this increasingly important subject in a comprehensive manner. In connection with his work in the Forest Products Laboratory, the author has had an excellent opportunity to come in touch with all phases of the wood preserving industry. While a great deal of the material is original discussion, the book includes a large amount of data previously published in technical journals and society proceedings which are here conveniently grouped for reference. The book is designed for use as a text as well as a reference book and the fact that it is compiled in large part from notes used in a lecture course given to students in civil engineering at the University of Wisconsin, shows that it can readily be adapted to instructional work. A complete enumeration of the chapter headings would include many subjects of direct interest to railway men, among which are the following: Factors Which Cause the Deterioration of Structural Timber; The Effect of the Structure of Wood Upon Its Injection with Preservatives; The Preparation of Timber for Preservative Treatment; Processes Used in Protecting Wood from Decay; Preservatives Used in Protecting Wood from Decay; The Construction and Operation of Wood Preserving Plants; Prolonging the Life of Crossties from Decay and Abrasion; The Protection of Timber from Fire; The Strength and Electrolysis of Treated Timber, and The Use of Substitutes for Treated Timber. In addition, the appendices include references to the minor wood preserving processes and the patented and proprietary preservatives, lists of the manufacturers of zinc chloride and of creosote.

Letters to the Editor

A CROSSING OF STANDARD AND NARROW GAGE TRACKS

PERRYVILLE, Md.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Without detracting from the utility of the ingenious scheme developed by T. C. Herbert and described in the *Railway Age Gazette* of December 18, I would suggest that the spacing of the switch points 5 ft. apart does not give the best alinement possible. These points take the place of movable point frogs and manifestly should not be farther apart than twice the distance of the actual from the theoretical point of switch. The smoothest curve will be secured by establishing a tangent line between the heel of the end switches, or, if preferred, between the points where the planing of the switch points terminates. This line will be fixed by the switch angle, and the distance heel to heel shown as A B on the accompanying sketch will be equal to the difference between the two gages plus twice the heel distances, divided by the tangent of the switch angle. The sketch shows the dimensions as worked out for No. 6 frogs with 10-ft. switch points and for No. 8 frogs with 18-ft. points on the above basis.

"SUPERVISOR."

ORGANIZATION FOR TRACK MAINTENANCE

HAILEYVILLE, Okla.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

It occurs to the writer that the ground was not entirely covered in the article in the *Railway Age Gazette* of December 18, entitled "A Suggested Organization for Track Maintenance." There are many other things to be taken into consideration which will work against the economy of such a gang. The time lost in going to and from the work each day, by 20 men on a 25-mile territory, will more than offset the increased supervision on a 6-mile section, even if motor cars are used. Also, the efficiency of the gang will be reduced, since a foreman and an assistant foreman with 25 men will not secure as much work per man as a foreman with 6 men, as they are unable to devote as much time to the supervision of each man. Again, in case of accident, there will be a greater delay at times in locating and securing the assistance of a large gang, which might be 25 miles away, while a small gang could not be more than 6 miles distant. There is also a great deal of other work which is taken care of by section men, such as transferring bad-order cars at stations, unloading fuel, loading cotton, bedding stock cars, etc. Under the large gang system the greater part of the gang would have to be employed on other work, possibly 15 miles away, as only a few men are required for such work.

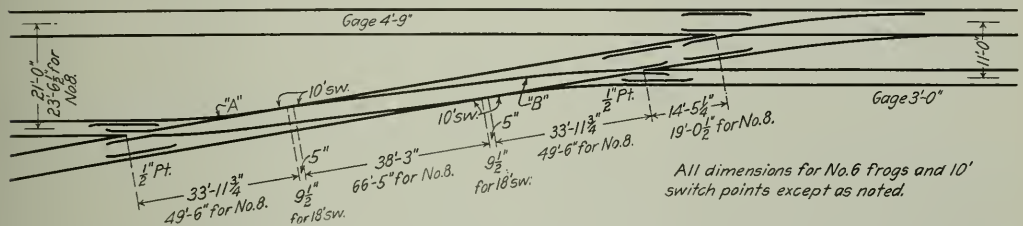
A foreman with six men and six miles of dirt track will be able to maintain his section in first class shape during the open season, do the odd jobs of station repairs, and keep up right of way fences, farm gates, etc. When the work has been advanced to the proper point, or when bad weather sets in, the gang may be reduced and the foreman will still be in charge of a territory with which he is more familiar than a man could be with 25 miles. In a gang of 20 men there is more chance for dissatisfaction and a greater tendency to create disturbances of various kinds. The large amount of traveling to and from the work on a 25-mile territory on motor cars with 20 men adds to the chances for personal injuries. The larger the gang, regardless of the supervision, the greater are the chances for the men to shirk their work. If the physical condition of the line requires it, an extra gang with boarding cars may be moved about to handle heavy ballasting or to renew ties, etc., on any particular section, the number of men in the gang being governed by the amount of extra work in sight.

From an economical standpoint I believe the small gang is the better for all purposes.

J. L. COSS.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since December 18, 1914:



Dimensions for the Best Arrangement of a Narrow Gage and a Standard Gage Crossing Using No. 6 and No. 8 Frogs

Apportioning Grade Separation Cost.—An editorial commenting on the tendency of state commissions to apportion grade separation costs more equitably between the railways and the municipality benefiting from the work was published in the issue of December 25, page 1167.

Methods of Handling L. C. L. Outbound Freight.—A discussion of the relative merits of two-wheel, four-wheel and motor trucks including cost data gathered in an exhaustive study of this subject by E. H. Lee, vice-president and chief engineer, Chicago & Western Indiana, was abstracted on page 1181 of the issue of December 25, from a bulletin of the American Railway Engineering Association.

Pennsylvania Coal Docks at Sandusky.—The design and methods of construction of a new dock and coal handling machine for loading coal on lake vessels were described and illustrated in the issue of December 25, page 1189.

The Influence of Carbon on the Properties of Rails.—The effects of varying carbon contents on the physical properties of rails was made the subject of an investigation by the Rail committee of the American Railway Engineering Association and the result was published as an appendix to the report of that committee. An abstract of this report was published in the issue of December 25, page 1196.

Railway Construction in 1914.—The annual statement of new mileage reported built during 1914 showed a startling decrease, this figure being less than for any year since 1895 and less than one-half of the amount built in each of the three preceding years. The details of the new mileage completed in 1914 with a summary of the construction figures for each year since 1893 were published in the issue of January 1, page 23. An editorial commenting on these figures and the general tendency in construction was published in the same issue, page 3.

Instructions for Federal Valuation.—An abstract of the second tentative draft of instructions for the guidance of roadway and track parties engaged in the valuation of railway property recently issued by the Interstate Commerce Commission was published in the issue of January 8, page 62. An editorial commenting on the amount of detail required in this work and raising the question whether in some cases the records already kept by the carriers would not suffice, was published in the same issue, page 44.

New Chicago & Alton Shops at Bloomington, Ill.—An illustrated description of the new locomotive shops, blacksmith shops and storehouse recently completed by the Alton as an enlargement to its Bloomington shops was published in the issue of January 8, page 49.

St. Paul and Oregon-Washington Joint Terminals in Spokane.—The Chicago, Milwaukee & St. Paul and the Oregon-Washington Railroad & Navigation Company have recently completed a joint terminal in Spokane in connection with which new entrances to the city were built by both roads, involving heavy grade separation work. An illustrated description of the grade separation problems on the Milwaukee entrance was published in the issue of January 15, page 85.

Methods of Handling Snow on Northern Roads

Discussions of Precautions to Be Taken in Fall and Ways to Keep Tracks Open During Winter Storms

On account of the importance and the present timely interest to railway men of the subject of handling snow and ice to keep the tracks open during the winter, we publish below three discussions of the various phases of this problem by men experienced in this work. Mr. Lewis has been actively engaged in maintenance work in the northern part of the United States for the last 10 years, being division engineer of the Michigan Central at Bay City, Mich., for six years and assistant to the general manager of the Duluth, South Shore & Atlantic in charge of maintenance for the last three years. On both of these lines snow fighting is a serious problem. Mr. Whitney is roadmaster on the Canadian Pacific at Medicine Hat, Alta., a point suggesting bad weather in the mind of the average man. Mr. Clough is a supervisor of track on the four-track main line of the New York Central & Hudson River in northern New York, a locality noted for the number and severity of its winter storms.

THE WINTER'S CAMPAIGN

By E. R. Lewis

Assistant to General Manager, Duluth, South Shore & Atlantic, Duluth, Minn.

In localities where frost is little known, track work is a continuous performance with only the wet season to interfere with the excellent results obtainable, insofar as weather is concerned. Railways in colder climates are not so favored. There is no doubt that winter will bring to them snow and ice in plenty. The long snow campaign is a foregone conclusion and it is anticipated, prepared for and fought to a finish. In localities further south there is the gambler's chance of getting through the winter without a snow fight. There is the tendency after a mild season or two, to neglect organization and equipment, to forget to repair tools, to fail to buy what is needed to fight snow; with sooner or later the inevitable costly result of hiring large, untrained emergency forces, of trains stalled and tracks blockaded, of damage to perishable freight and loss of connections, of congested yards and the wide-spread chaos which it takes so long to wholly overcome.

PRECAUTIONS

Preparations for the winter's snow fight should be made in advance. Thorough organization and rigid discipline enter very largely into the successful program. A preliminary early autumn meeting of all the officers concerned, at which a program is discussed and definitely detailed, is of primary value. Standards of equipment and tools needed in the work may then be definitely adopted. Each officer and man should understand exactly where he is expected to be, and when, and what tools are to be in his direct charge. He should know what he is expected to do in every emergency. To this end meetings of supervisors and their subordinates may be held before snow falls, when the orders necessary to carry out the officers' program are explained, and the employees and their foremen receive instructions in detail.

Equipment on hand should preferably be inspected and repaired in the early fall. After repairs have been made it should be re-inspected and tested by the men who are to actually use it. Small tools and spare parts should be given in direct charge of the employees who will be concerned in their use. Experience has proven that spare tools put into a snow plow in summer get away before winter, that fuel and cylinder oil, bell cord and wood alcohol are better kept in the roadmaster's locker than in a Russell plow until winter comes. Experience has also proven that flanger shoes are not always set at exactly the right height and that air brake equipment is not always in order after disuse. Therefore tests are necessary preliminaries. The locations of snow plows and flangers, not merely the stations, but the tracks where they are to be found, and the position of the plows on the tracks, should be prescribed. It is often of the utmost importance to know which way a plow is headed and whether it is first out on a certain siding.

Not only the track employees and officers need organizing, but the intelligent co-operation of the entire staff is necessary to the success of snow and ice handling. The heads of other departments should be organized so thoroughly and so early, that they may transmit to their subordinates uniform instructions for taking precautions against the common enemy in advance of the campaign. Every division engineer and supervisor in charge of snowy territory should be required to make minute inquiry into the matter of tools and equipment for snow and ice handling, and to present, as a result of his investigations, his recommendations of the most suitable types for use.

Quantity is as important as quality in the matter of tools and equipment. That which is on hand should be put in the best condition early. Sections should be supplied with suitable substitutes for worn-out tools returned. Additional tools of proper quality should be requisitioned at such time and in such quantity as will insure that at the beginning of winter each foreman will have a reasonable supply and no more in first class condition for use. Someone should be detailed to examine each carhouse in turn, and to take account of quantities and conditions of tools. When resulting requisitions have been filled, a second inspection should be made to make sure all is in readiness, and especially that the condition of tools is as formerly ordered.

The tools and equipment used necessarily vary on railways in different localities, but some or all of the following equipment is used probably by all companies whose lines traverse territory subject to freezing temperatures: Flangers, pilot plows, push plows, snow crabs, rotary plows, levellers and spreaders. Tools and auxiliary equipment in common use include matched plank housing over locomotive tenders, tarpaulins for locomotive gangways, rubber coats for locomotive crews in snow service, hose attachment to steam dome and hose for clearing snow and ice from locomotive trucks and running gear; snow sheds, snow fence, track shims, rattan brooms with chisel end handles, salt, sand, hand car brooms and broom holders, spud bars, snow shovels, picks, mattocks, spades, lanterns and wood alcohol.

The proper setting of snow fence, both portable and permanent, is of importance and requires constant vigilance and periodical changes. Improperly placed snow fence may cause obstructions to traffic where no trouble would exist if the fence were removed. In early winter, before snow or frost comes, the snow fence should be placed to best advantage according to the experience of former years. It will probably be found necessary to remove the planks from farm and highway crossings to prevent heaving due to frost.

EARLY WINTER OPERATIONS

In early winter, snow at first gives little or no trouble. If pilot plows or even Priest flangers are used on locomotives the rail may be kept clear during the first few storms. Trouble begins when there is no more room for new snow; when the tracks in places become grooves through deep snow banks; when the new, light snow drifts swiftly into rail flangeways and behind switch points. Then "winging back" becomes the order of the day. Oftentimes snow must be shoveled away from around switchstands and from about buildings located close to the track, to make room in advance of impending storms. Old snow packs hard and some of it turns to ice or is ice covered. The frequent use of flangers leaves a high ridge of unmoved snow in the track center. This becomes hard or freezes after a thaw

unless thoroughly removed by a snow plow. High center snow track is one of the dangers to be treated with great respect in early winter. If plowed out quickly no danger ensues. If neglected, anyone of several weather conditions may tie up the road. Winging back snow from the sides of the track before it becomes hard is quite as necessary.

After the snow drifts of early winter have formed in front of portable fence panels, the fence may be moved to a new position and made to do double duty, usually behind its first location. Stakes may be driven for fence anchors with the aid of frost bars, or the fence may be dug into the drifts. Tracks in yards, and at track and other tanks, should receive special attention on account of accumulations of ice due to locomotives dripping while taking water, and to locomotives and coaches dripping while switching in yards. Salt and sand play an important part in preserving the safety of persons about platforms and crossings. It is possible to construct a flat car snow plow flanger strong enough and weight it down sufficiently to nose ice from frozen track centers. Such a flanger should, of course, have extra heavy steel shoes which should be raised and lowered by means of air, and should be very heavily weighted and skillfully manipulated.

MIDWINTER OPERATIONS

"As the days begin to lengthen" and "the cold begins to strengthen" the troubles of the snow fighter multiply. It is imperative that section forces get shims in the track to avoid slow orders. The sharpest lookout must be kept for broken rails. Snow accompanied by high wind fills switches and rail flanges faster than they can be cleared. It is well that permanent employees are seasoned to cold weather and out-of-doors work. Their number must be augmented by temporary forces of laborers when the long continued, severe midwinter storms strike. Then the battle is on in earnest. With shovel and pick, with salt and sand and broom, by day and by night, the struggle continues. In times of direst stress, freight trains are abandoned and all efforts directed to keeping the lines open to passenger traffic. Snow plows are run ahead of each train. Locomotives are double headed behind the big plows. Occasionally a rotary or a Russell plow has three or even four locomotives behind it. Between storms the struggle goes on in preparation for the next blizzard. Wherever a car stands idle it is snowed in. A string of flats becomes only a long snow bank in a few hours. When the storm subsides there is weary work with shovel and switch engine to get the cars out, preparatory to plowing the snow off the track. Here, as always, judgment counts. One or two or three cars at a time may be cleared and moved, when a longer string could not be handled.

Turntables now give trouble. The pits blow full of snow. This snow and that which drifts in between the table and roundhouse is ordinarily loaded on trains and thus removed from the yards. Some turntable pits are covered with planked decks which revolve with the tables, while stoves set half through the decks keep the pits warm and melt the snow. A better device is a concrete floored turntable pit into which water of condensation flows from the roundhouse steam plant. A steam pipe also furnishes exhaust steam to heat the water which flows into the pit to a level of a few inches below the center. When full of hot water, snow from the surrounding tracks is shovelled into the pit, melted and carried off through an overflow pipe to the sewer system. Success depends on having the pit full of hot water before any snow is added.

The small hose connected to the steam domes of freight locomotives may be used to thaw ice from water-tank spout connections as well as to clear the locomotive running gear of snow and ice. If snow plow wings are manipulated by air, efficiency is more than doubled over hand-worked wings. It is necessary to run fast to throw snow. Wings must be taken in and extended quickly when traveling at 40 to 50 miles an hour to avoid obstructions and to do the necessary work, without leaving long stretches of unmoved snow at grade crossings and passing tracks.

Clearing yards of snow is often best done with a leveller that will push snow sidewise from track to track till all are finally cleared. It is, of course, necessary to clear at least two adjacent parallel tracks of all cars before such a process is started, and to proceed in the same manner, shifting cars to the cleaned tracks as each string is moved from the tracks yet to be cleaned of snow. The snow ridges between parallel tracks, if allowed to accumulate, soon become hard. Handling it onto cars by shovel and carrying it from the yard by train is often necessary and always expensive. When necessary to handle by train, the unloading should be done by plowing off a nearby bridge if possible.

LATE WINTER OPERATIONS

Shimming is usually continued during late winter, as everyday conditions alter the track level in places. Replacing snow fence is often imperative during the later months of winter. A second line of movable fence is sometimes placed on top of, or further from the tracks than the first line of fence, when the first fence has been completely drifted over. Brush and snow cakes are sometimes made to serve this purpose when additional panels of movable fence are not at hand. Hard snow in narrow cuts may most readily be plowed onto the track with the snow crab, from thence to be cleared from the cut with the rotary plow. Rotary plows are expensive machines. They are of value only in very heavy snow drifts. Therefore only those railways which have to combat the severest snow conditions are equipped with them. Blizzards are occasionally encountered which blow the snow so fiercely that a rotary plow must be quickly turned to avoid being snowed in itself.

SPRING OPERATIONS

The warm middays and the cold nights and mornings of early spring produce alternate thawing and freezing, which result in conditions peculiarly dangerous to track. Water from melting snow banks fills the rail flanges at midday and freezes solid over night. Drains dug to carry off snow water freeze, overflow and flood the space between the rails. Under extreme conditions many miles of track have been known to be under water at sundown and under a glare of solid ice next morning, with a resultant tie-up of traffic and extraordinary expense for pick and shovel work. Diligent winging back, spreading and draining of snow banks will prevent or minimize this danger. In early spring, track conditions alter hourly and demand more frequent track patrol and alterations of shims. The safe lowering and final removal of shims in spring is even more difficult than placing them in winter. Traffic should proceed with great caution, the engine and trainmen realizing that in an hour the weather may heave a hundred miles of track, making it impossible to re-shim the whole length in any short space of time.

Thorough and prompt co-operation and utmost caution is necessary to carry a railway through a severe northern winter without serious accident. Railways exist primarily for the purpose of transporting persons and property from place to place safely and expeditiously. If climatic conditions so alter that it becomes unsafe to maintain in winter the speed of trains prescribed in summer schedules, the schedules should be changed. It is important to keep track in such condition that trains will be on time, but it is of vastly greater importance that trains be kept on the track. No person is so competent to judge of the safety of track as the maintenance officer and foreman. It is therefore the first duty of these men to know and to give warning of track conditions incompatible with safety to traffic under existing weather conditions and schedules.

THE SNOW PROBLEM AT ITS WORST

By H. O. WHITNEY

Roadmaster, Canadian Pacific, Medicine Hat, Alta.

In this part of the country where snow and wind combine to make trouble and expense for railroads we have learned from past experience to be prepared in time, and with this end in view snow fighting begins in September. An extra gang is started out repairing permanent snow fences and putting up portable

fences that have been removed in the spring to allow land to be cultivated. Each winter careful note is made of points where improvements can be effected by the building of additional fences or the relocation of old ones, these changes being made by the repair gangs. To avoid moving fences in the spring and fall and also to protect them from cattle, this company is buying additional right of way, moving the fences back and building permanent snow fences. This reduces maintenance charges for fence repairing and moving and allows the building of stronger fences, thereby not only affording better protection, but also improving the appearance of the right of way. A few years ago tree-planting for snow protection was started. This will in time be a great assistance, although not entirely taking the place of snow fences.

During the summer, snow plows, flangers, ice cutters, etc., are overhauled in the shops and by September are in their assigned stations, spotted on spurs of their own where they will be easily accessible when needed. As this is considered a bad district for snow trouble, not so much for the depth of snowfall as for the wind that accompanies it, we have three snow plows, besides flangers and spreaders, one at each end of the sub-division and one at an intermediate point. All new plows are of solid steel, operating both wings and nose points by air, and are equipped with electric headlights. I equipped each plow with a set of tools, lanterns, two mattresses and blankets. I also have a chart made and framed which is hung in front of the man operating the plow which shows all crossings, bridges and other obstacles which fail to clear wings or flanges. At points where the plows are stored, an experienced section foreman is stationed who is familiar with the district. He is sent over the road on the locomotive of a passenger train to refresh his knowledge of all obstacles and to note any new ones.

At the first signs of snow all private crossings that are not used during the winter months are taken up. As a rule no regular extra gangs are kept on this district during the winter months. However, to be prepared for any emergency we have a set of boarding cars and tools fitted up ready to take care of men at a minute's notice. These cars are the best of our boarding equipment, the bunk cars being sheeted and floored and containing stoves, good bunks and other necessary fixtures. Cook, dining and store cars are also fitted up for winter service.

Experience has taught us the value of snow fences, and with this in view we try not to allow them to become filled with snow. When this condition occurs, the line of portable fence is moved back. This can generally be done with section crews, but if necessity demands, an extra gang is put at this work. Snow walls can be built if conditions become acute, but where possible it pays to move back fences. This will mean a saving in expense for running the snow plow, and the longer this can be put off the better. Running the plow when not absolutely necessary should be discouraged, as it will form snow cuts and increase the number of places needing protection. Snow plows should always be run with the wings opened to prevent making a trough which each succeeding storm renders more difficult to widen. When snow cuts begin to gain such a height that it is difficult to operate a plow they should be widened out. There are several methods of doing this work. One of the cheapest is to run a drag through the cuts. This drag operates by air at the rear of a car and throws the snow into the center of the track, the rotary then following to throw it out. This operation is repeated until the cut is the desired width.

Clearing out snow and ice in yards and terminals makes a large item of expense. Mechanical means of late have been employed and labor charges reduced to a great extent. At two of our terminals, natural gas is used to clean switches and the cost is reduced thereby to a minimum. It has been found that a flame from crude oil and residue of Pintsch gas with a blower is economical and satisfactory for cleaning snow from interlocking plants and switches. Salt is supplied and in the larger terminals ice cutters are also furnished. Spreaders are used for cleaning tracks of snow and it has become the exception rather than the rule to use labor for these purposes.

IMPORTANCE OF ORGANIZATION IN FIGHTING SNOW

By A. M. Clough

Supervisor of Track, New York Central & Hudson River, Batavia, N. Y.

Although conditions in different parts of the country no doubt have something to do with the different methods of handling snow on various railroads, the preparations should be the same whatever method is used. Our first care is to see that plenty of good equipment is provided, that it is thoroughly repaired and tested, and placed at required points and on tracks so as to be easily available at any moment. The repairing and testing are done at the division car shops, where equipment is all assembled during the summer months, but in addition to the car department men testing it, a representative of the maintenance of way department oversees the repairs and tests, and again after it is returned to the supervisor's headquarters it is tested by a work train crew to make doubly sure that it is in perfect condition. This refers to snow plows with wings and flangers, rotary plows, flangers, cars and roadbed spreaders—all equipment used with power for handling snow.

We organize the men who are competent to handle the different equipment with special reference to their knowledge of the territory they are to run over, sending these men over the different lines to familiarize themselves with the different marks and obstructions before the winter sets in. We also have a thorough understanding with the division superintendent's office and despatchers in regard to furnishing locomotives and crews with the least possible delay when called upon to man our snow fighting equipment.

Our next care is to see that all obstructions to flangers—such as crossing plank, temporary guard rails, or anything not needed between the rails—are removed during the winter months and to properly mark all places that would interfere with the operation of flangers or the wings of snow plows. These marks are specially designed targets, made of wood, painted black and white and placed in permanent metal sockets where needed or placed for the winter and removed in the spring.

We then prepare for emergency where men are needed for handling snow either by keeping a foreman and a small force of men at division headquarters as a nucleus of a larger force when needed, or by having a foreman who knows where to find men when wanted. The necessary tools and boarding cars are provided to take care of laborers and provisions made for feeding them when working long hours away from home. In this way a very heavy storm can be handled promptly and economically.

As the switches and the signaling apparatus are the most vital parts of a railroad, it is always to those that the regular track forces give their immediate attention at the first sign of a storm, being reinforced by a number of extra men at times. Formerly, when switches were operated on the ground by hand, one man, sometimes the switch tender, could care for a number of switches, cleaning them as they were needed for train movements, but this is entirely changed by the advent of the central control of switches from a tower, either by hand or power, so that it now requires a man at nearly every switch to keep them clean at all times. This is a most important part of handling a severe storm, as the free and uninterrupted movement of trains from one track to another at interlocking plants helps materially to prevent trains from having to stop at block signals in outlying cuts, where they might be stalled and would have to be dug out.

The use of hydro-carbon is gradually coming into favor in large terminals for melting the snow around slip switches and large layouts, and is now being very successfully used on our lines, but the old method of the snow shovel and broom is still most widely used. It is a very essential duty of foremen in charge of men to choose the very best men to do this work and to protect them while doing it. Apart from cautioning them to look out for train or locomotive movements, a foreman should, if possible, have other men working close to the actual switch cleaners to call to them to get out of the way.

The hardest part of the fight with any snowstorm is to dig

trains out that have become stalled. The snow plow with a good force of men should be run as close up to the stalled train as possible, the men should be unloaded to commence digging out the train and the snow plow taken back to the nearest spur track. When the snow plow crew returns, a portion of the train will be ready to be pulled out of the snow. The cars released should be drawn to the nearest siding and the operation repeated until the whole train is released. The men should shovel out the snow in such cuts until the banks are sufficiently widened so that the wing of the snow plow will have full play.

Immense benefits can be secured by properly placing snow fences at troublesome cuts where snow drifts badly, and a small sum for the privilege of placing portable snow fence 50 ft. or more from the top of the cut on adjacent property will pay for itself many times over during a severe winter.

In the dead of winter when storms follow each other closely, the snow which has accumulated in large quantities in yards should be hauled away immediately, all drains opened up and everything made ready for another storm. Sometimes it looks unnecessary when the weather is mild and the sun shining, but to be prepared is half the battle.

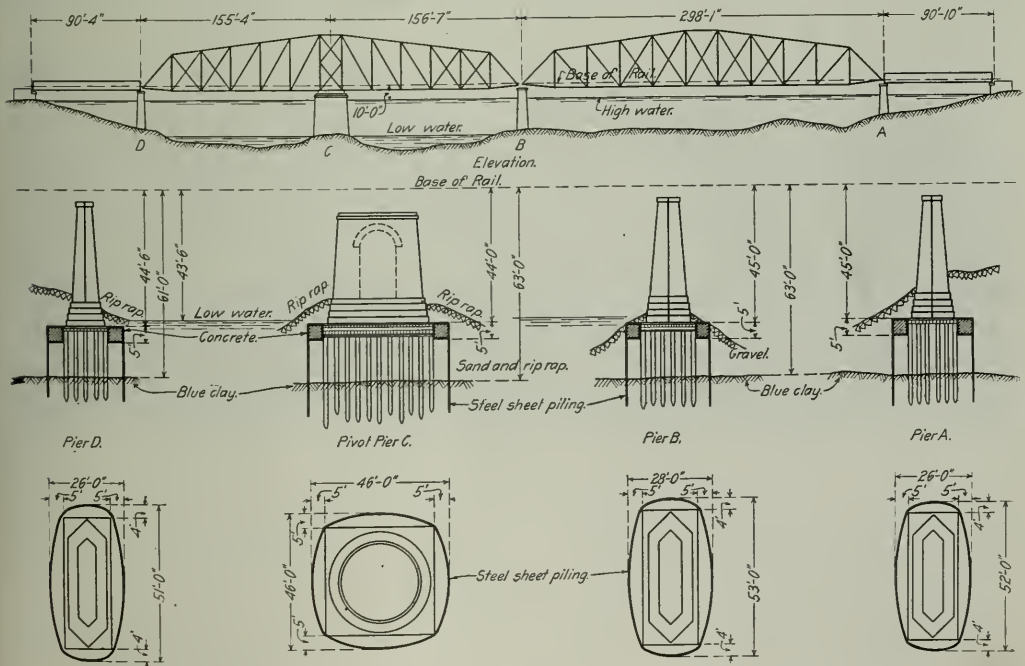
AN INTERESTING PIER PROTECTION PROBLEM

The St. Louis, Iron Mountain & Southern has just completed the protection of the bridge piers at its crossing of the Red river at Fulton, Ark., which involved several features of special interest. This bridge consists of a swing span 311 ft. 11 in. long, a through truss span 298 ft. 1 in. long and two 90-ft. approach girder spans. The piers are of masonry supported on timber grillages on piles, and, although the superstructure has been replaced once since the construction of the bridge about 1879, the piers are still in excellent condition to carry any load which may be placed on them for some time to come. The bed of the river at this point is of alluvial material which scours easily. Within the past two or three years levees have been constructed on both sides of the stream, reducing the flood channel from 10 or 12 miles in width to about 1½ miles, and as a result the river now scours badly. While this condition has not endangered the piers up to the present time, it has been owing to the absence of high floods since the construction of the levees. However, such floods may be expected at any time and trouble might result.

To eliminate any danger of failure of the bridge through the scouring of the foundations a caisson of steel sheet piling was driven entirely around each pier, as shown in the drawing, the caisson being sealed to the grillage with a 5 ft. layer of concrete. In the construction the piling was first assembled and completely interlocked before driving. It was then driven one or two feet at a time, the hammer moving from pile to pile around the pier. When the piles had been driven some distance into the bed of the river, but while the tops were still above water forming a cofferdam about the pier, the interior was pumped out, riprap and other material excavated 5 ft. below the top of the grillage and a 5-ft. layer of concrete placed with tar paper between it and the piling. Any sand which ran out of the grillage was also replaced with concrete, but no attempt was made to force concrete into the grillage or to strengthen it as it had ample support. After this concrete had set properly, the piling was driven down to its final position, extending several feet into a hard, blue clay.

After the piling had been driven to place for the two shore piers light puddle cofferdams were erected around the walls, the water was pumped out and the piling was cut off with a Blau-gas flame. Because of the increased depth of water a light timber cofferdam was erected at the center pier, and at the pivot pier, which was driven last, the piling was cut off, before driving, to the desired length as determined by information secured in driving the caissons at the other piers.

Thirty-five pound Lackawanna and United States steel sheet piling was used. The driving was started with a drop hammer which was replaced with a No. 2 Vulcan steam hammer as soon as sufficient room was secured. This work was done under contract by the Kansas City Bridge Company, Kansas City, Mo., under the direction of C. E. Smith, chief engineer, Missouri Pacific System, and F. L. Wonson, bridge engineer.

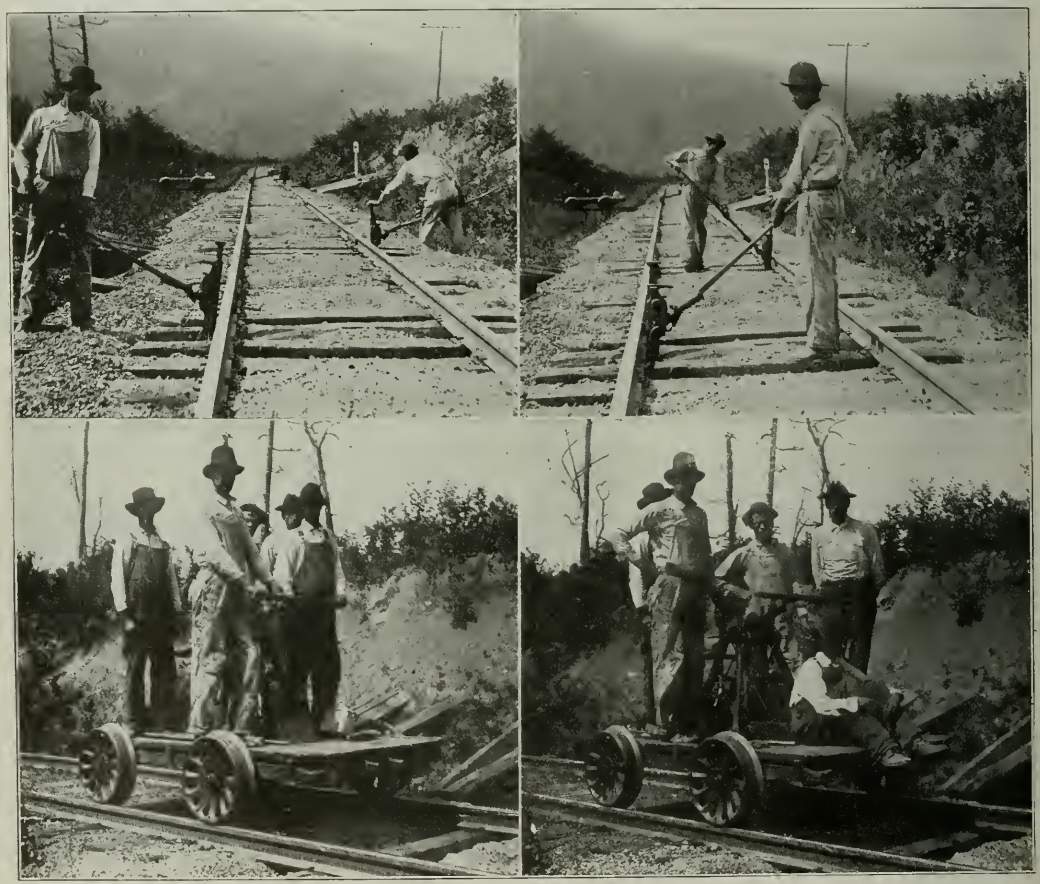


Method of Protecting Four Piers from Scour in the Iron Mountain Bridge Over the Red River at Fulton, Ark.

Promoting Safety in the Maintenance Department

Some Methods That Have Given the Best Results in Reducing Injuries to Track and Bridge Employees

The success of any attempt to increase the safety of railway employees depends largely on the effort and tact with which the movement is pushed in the departments having the largest number of employees and in which the work performed involves the greatest hazard. Since nearly one-fourth of all employees of American railways are in the maintenance of way department, the number aggregating somewhat over 400,000, and since the hazard connected with track, bridge and other maintenance work is at least as great as that in most other departments, it is evident that an active safety campaign must pay special attention to maintenance department employees.



Pictures Used by the Carolina, Clinchfield & Ohio in Emphasizing Safe and Unsafe Methods for Trackmen. Above—the Use of Jacks; Below—the Arrangement of Men on a Hand Car

It is difficult to arrive at the exact hazard in any branch of railway service on account of the manner in which the official accident figures of the Interstate Commerce Commission are classified, but it can be shown that the number of fatal accidents to maintenance men bears as high a ratio to the total number of fatal accidents to all employees as the number of men in the maintenance department does to the total number in all departments. In some cases the hazard connected with maintenance work has been considered higher than the average for all railway employment, as in 1912 when the Pennsylvania found that a large proportion of the fatalities to its employees were in the track forces, and in England some years ago when a royal commission placed track work among the three most hazardous occupations on a railway after a careful study of the general problem of safety to employees. In England, where the hazard is accurately determined, the latest figures, those for 1913, show that one track man in 611 was killed and one in 19 injured during the year. The nearest comparable figures for accidents on American roads show a hazard practically the same as that found in England.

APPLICATION OF GENERAL SAFETY CAMPAIGNS TO MAINTENANCE MEN

The safety departments of a number of roads are carrying on active campaigns in the maintenance department, but in gen-

eral, this work has followed that in the train service and shops and in many cases is still only partly developed. It was natural that when the promotion of safety became of active interest to railway officers a few years ago the first and most vigorous effort should be directed at the classes of employees among which the best results could be expected and where the number of accidents was the greatest. The train and shopmen could be easily reached in large numbers at the terminals and numerous methods of presenting safety cautions to them were devised, including lectures, stereopticon pictures, posters, safety committee meetings, etc. The excellent results that followed the agitation among these men on the roads that have taken up the matter seriously soon prompted the officers in charge to extend the efforts to cover employees in the maintenance and other departments.

On terminal roads or other lines with small mileage somewhat similar methods of agitation among the track men have been employed successfully, but on the larger systems it is at once evident that safety work among maintenance men is accompanied by numerous difficulties. These men are scattered over the entire line in small groups, often at isolated points, and can rarely ever be congregated in large bodies. The other difficulties are practically all caused by the type of men which predominate among these employees. The work of educating track men either by printed matter or by personal contact, is hampered by the fact that a majority of these employees on many roads cannot read or understand English. Many of these foreign laborers are ignorant to a surprising degree, as illustrated by a section man on the Grand Trunk, who found a torpedo, placed it on the rail and hit it with his pick to see what would happen. Further, a large number of laborers in the maintenance department are transient. This applies not only to foreign-born laborers, but also to hobo extra-gang men who never conquer the desire to move on continually. This makes it necessary for the roads that are pushing the safety work to direct their appeals to a constantly changing force, a large part of which has previously been employed on other roads where little is done along safety lines, so that there is not the cumulative effect of repeated agitation.

CAUSES OF ACCIDENTS AND METHODS OF PREVENTION

The measures necessary to promote safety vary with the causes of accidents. The causes of avoidable accidents to maintenance men can be classed roughly as defects of equipment, structures, or track, which the company alone is responsible for; wrong methods of performing work, which both the company and employees should strive to correct; and carelessness, thoughtlessness or indifference on the part of the employees. A very large proportion of all accidents fall in the last group. The Chicago & North Western, for example, has determined that over 75 per cent of all accidents to employees on duty are caused by carelessness of the individual or a fellow employee. The Pennsylvania found that in 1912 about 80 per cent of the fatalities to track men were due to being struck by trains, and the Interstate Commerce Commission accident reports show that on the average about 85 per cent of the maintenance men killed and 37 per cent of those injured are struck or run over by cars or engines. Practically all such accidents are due to carelessness, thoughtlessness or indifference, as the men are violating the rules when they fail to clear the tracks on the approach of a train. It has been repeatedly shown that the hazard to track men increases in much greater proportion than the number of main line tracks, on account of the tendency of the men to step from one track to another rather than to clear all tracks. In England, where a board of trade rule requires a "lookout man" to be provided when there is special danger of men being struck by trains, the accident statistics show that a majority of all those killed and injured in the track force were struck while working on the right of way, or walking, crossing or standing on the tracks. While this class of causes accounts for a large majority of the accidents, it is at the same time the most difficult to eliminate, because improvement in this respect can be made only through the

Safety Cautions for Trackmen

Don't take chances. Think what "Safety First" means to you and to your family. Do your work the safe way and be careful to avoid injury to yourself and others.

Always be on the watch for trains in both directions and when you step from one track to another, ALWAYS LOOK IN BOTH DIRECTIONS FIRST. Do not stand close to rail of track while train is passing.

When your foreman signals you to step from track do so AT ONCE. Don't wait. Don't try to remove an extra shovelful of dirt first. That last shovelful of dirt may cost you your life.

Never stand or walk upon the tracks except when necessary in the performance of your work, and then watch for trains in both directions, as trains are liable to be run against current of traffic or run in either direction at any time.

Never use tools that have battered heads or are otherwise defective or unsafe for use. As soon as you discover a tool that is defective, put it away and call it to the attention of your foreman and get a good one in its place.

Always put tools or material of any kind where it cannot be struck by a train. Be particular about cleaning up rubbish you find lying near the track and never leave anything lying about for other men to stumble over.

Never overload handcars either with material or men. In operating handcars be sure you afford yourselves all the protection that is required by the rules.

Never get on and off moving cars or trains Your duties do not require it, you are not accustomed to it and it is a dangerous practice.

Always play safe. Think about what you are doing and don't forget that you are working on a railroad.

Obey the rules. They were made for the protection of yourself and others and they should be observed to the letter.

Safety Poster Printed by the New York Central in Sixteen Languages

active effort of the men themselves, and the necessity for this effort is difficult to impress on them for the reasons explained above.

The promotion of safety by the correction of wrong methods of performing work is less difficult than through the eradication of carelessness because methods are largely controlled by the foremen and to change them it is only necessary to reach this smaller and more intelligent body of men. Improved methods that are being emphasized on a number of roads at present, include the proper use of hand and motor cars, the observance of a safe distance in piling material along tracks, greater thoroughness in cleaning up scrap and debris in yards and along the line, the spurring out of bunk cars, or the protection of such outfits by derails, and the requirement that bunk car doors face in the opposite direction from the main line. In any successful safety campaign, the men in the ranks must be encouraged to make suggestions freely as to methods that ought to be changed in the interest of safety, and constant vigilance is required on the part of the maintenance officers after a change in practice has been ordered to see that the foremen understand and enforce it.

Of the three classes of accidents, those caused by defects of equipment, structures, etc., are most easily eliminated, as an order from the management is sufficient to correct an unsafe condition existing on this account. The most necessary safety measures of this kind, such as the placing of foot guards in frogs and refuge niches in tunnels, have become almost universal, and on the roads which are devoting the most attention to safety numerous steps are being taken to correct conditions involving much less danger. On at least one road, the Chicago Great Western, special care has been taken to provide bridge gangs with standard sizes of timber for scaffolding, and this road has also provided handholds on motor cars to prevent the men falling off when the car is derailed. The practice of placing footwalks and railings on deck bridges is becoming more general and partially on account of the added safety secured, machines are being used on many roads to handle rail, frogs, ties and other heavy materials wherever possible. There is also a growing tendency to secure better tools and to keep them in better repair, thus partially eliminating a fruitful source of accidents. The function of the safety department in the correction of unsafe conditions of this kind is to encourage the men to report such conditions freely, to provide an organization for considering such reports properly and for putting into effect the adopted suggestions.

A safety organization should work along several different lines in its endeavor to reduce the number of accidents to maintenance employees. It must first educate all employees as to the necessity for co-operation in the prevention of accidents, impress on them the results of carelessness, thoughtlessness and indifference, secure suggestions for improved methods, see that the suggestions adopted are carried out properly, induce the men to report unsafe conditions of equipment, structures, track, etc., and see that such reports receive the attention they deserve. In addition to these lines of effort which directly affect the maintenance men, the safety movement in other departments can be furthered materially by enlisting the hearty co-operation of maintenance department employees in reporting unsafe conditions that might endanger other men, such as insufficient clearances, defective brake rigging, hot boxes, etc., on the cars of trains that pass them. The latter practice is required on the Southern Pacific, partly to discover the defects and partly to insure closer attention to trains by the track men, thereby reducing the likelihood of their remaining in position to be struck by a train.

The system of promoting safety, adopted extensively on American roads, is to place a special officer or a committee of general officers in charge of the safety campaign, under whom are organized various district, division, or local committees composed of employees representing all departments. The principal distinction between the forms of this system used on various roads is that in some cases the committee members are appointed and in others they are elected by the employees with certain restrictions to insure a full representation of all departments. On the Baltimore & Ohio the central committee is composed of seven men devoting full time to this work, one of whom is a former supervisor and division engineer, representing the maintenance department.

Southern Pacific Section Men Watching a Passing Train for Defective Parts and a Typical Attitude of a Gang on the Approach of a Train Before This Order Was Issued

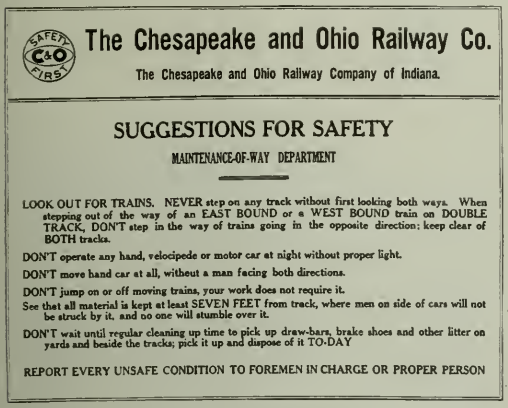
The officer in charge of the safety work or the central committee usually issues all safety literature for the road, distributes pictures, conducts meetings, etc., in the general campaign of education. Every member of all the committees is supposed to keep the safety campaign constantly in mind and strive to eradicate carelessness by any method possible. The discussions brought out in the local committee meetings are relied on to furnish suggestions both as to methods and equipment which should be changed in the interest of safety, and these suggestions are in turn reported to the higher committees until the best and most feasible are sorted out and adopted. On some roads postcards are also furnished the men on which to report any unsafe conditions which they discover, and on the Baltimore & Ohio, in order to overcome the reluctance of the men to report infractions of the rules and other matters involving safety, each track supervisor, master carpenter and signal supervisor has been appointed chairman of a sub-committee composed of his men. The discussions

at these sub-committee meetings have helped materially to draw out the desired reports. As an example of the number of suggestions received and acted on by the safety committees of the large roads, the Chicago & North Western has adopted nearly 10,000 suggestions in the last two years.

On roads where no safety committees are organized the safe condition of equipment, structures, track, etc., is made a matter of special observation on the regular inspections of the engineering department, and an effort is made through the regular officers to impress the men with the necessity for taking care and to insure the observance of all safety rules.

LITERATURE, PICTURES AND SPECIAL METHODS

Whether safety committees are used or not, some form of printed matter is usually found the most effective in presenting


The Chesapeake and Ohio Railway Co.

The Chesapeake and Ohio Railway Company of Indiana.

SUGGESTIONS FOR SAFETY

MAINTENANCE-OF-WAY DEPARTMENT

LOOK OUT FOR TRAINS. NEVER step on any track without first looking both ways. When stepping out of the way of an EAST BOUND or a WEST BOUND train on DOUBLE TRACK, DON'T step in the way of trains going in the opposite direction; keep clear of BOTH tracks.

DON'T operate any hand, velocipede or motor car at night without proper light.

DON'T move hand car at all, without a man facing both directions.

DON'T jump on or off moving trains, your work does not require it.

See that all material is kept at least SEVEN FEET from track, where men on side of cars will not be struck by it, and no one will stumble over it.

DON'T wait until regular cleaning up time to pick up draw-bars, brake shoes and other litter on yards and beside the tracks; pick it up and dispose of it TO-DAY

REPORT EVERY UNSAFE CONDITION TO FOREMEN IN CHARGE OR PROPER PERSON

Safety Poster Conspicuously Displayed on the Chesapeake & Ohio

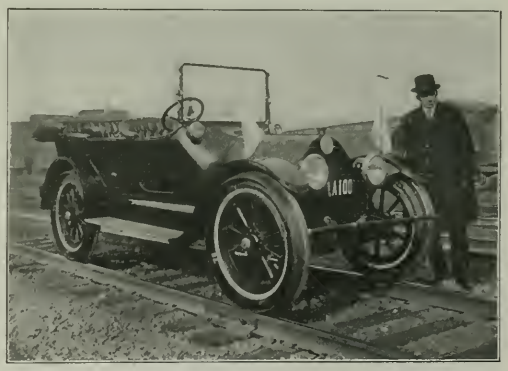
safety messages to the men, particularly those in the maintenance department who cannot be reached in person by the higher officers. Ingenious minds have discovered innumerable ways of keeping the idea of "safety first" before all employees until now one reads the slogan on pay checks, coat lapel buttons, tool houses, telegraph poles, bulletin boards, hand cars, lead pencils, etc. Other methods applying in general or specifically to the maintenance department include courses of instruction in safe methods, articles in employees' magazines, the publication of special safety papers or regular bulletins, special safety rule books and cards to be presented to every new employee warning him to be careful. It is frequently necessary to publish such literature in several languages in order to reach the foreign-born laborers. At least one road, the Queen & Crescent, requires the foremen to post all circular letters in their tool houses so the men may have a chance to read them. This road also issues statements of all injuries, showing those among the men of each track and bridge supervisor, thus creating a healthy competition. The general manager of the San Pedro, Los Angeles & Salt Lake issues a monthly bulletin calling attention to causes of accidents and their prevention, and the Chicago & North Western issues circular letters to the division superintendents at intervals, each taking up all recent accidents of a certain class and showing how each could have been prevented. Several companies have issued special rule books covering the operation of motor cars.

The use of pictures either framed or projected from a lantern is an important feature of safety work, especially with foreign-born laborers who are often difficult to reach in any other way. The Southern Pacific shows stereopticon pictures in its examination car, traveling over the entire system, covering safety methods in the maintenance and other departments. The El Paso & Southwestern, in attempting to reach the Mexican laborers on its lines, framed a series of pictures showing right and wrong methods of handling work and hung these pictures in every tool house and in every extra gang commissary car on the road.

The Atchison, Topeka & Santa Fe recently undertook to present safety talks in Spanish to Mexican track men by means of phonographs, which many of them own and all are fond of listening to. The commissioner of safety on this road plans to travel over the system in a motor car giving this talk to every gang he meets. If a phonograph is found, extra cylinders are to be left for the repetition of the talk, these records being returned later to be used again.

The Chicago, Burlington & Quincy has converted a passenger car into a lecture car for the use of the "safety" department. This car is equipped with a stereopticon lantern and screen, while numerous quotations relative to the work of this department with statistics are posted on the sides. During the past summer this car and lecturer were assigned to work in the maintenance of way department. The car was set out on a siding with the camp cars of an extra gang and a lecture was given in this car in the evening. During the following day the car was moved to the next camp and the lecture repeated. In this way the car covered several divisions during the past summer.

In the campaign against carelessness a number of special methods have been worked out. On the Elgin, Joliet & Eastern one man is selected, called a "departmental safety man," from each gang, to give special attention to safe practice on the part of his fellow workmen. He is instructed carefully by the foreman and serves as a check on any careless men. The Pennsylvania uses a system of efficiency checking to see that the safety rules are being obeyed. Several roads, including the Queen & Crescent, discharge a man immediately who has been injured several times through carelessness and also instruct foremen to dismiss men even before injuries occur if they show themselves to be habitually careless. The Baltimore & Ohio instructs the officer next above



Car Used on the Santa Fe to Take the Safety Message to the Maintenance Forces

the injured man to talk over the injury with him as soon as he returns to work, so that both may have the result of carelessness impressed upon them. Whistles to warn men are used by foremen on a number of roads, including the Lehigh Valley, the Pennsylvania, the Baltimore & Ohio, and the Chicago & North Western. These whistles are found to be more efficient in attracting the men's attention than a call. As an illustration of the methods used to encourage the men to make suggestions, the foreman on the Lehigh Valley who suggested the use of a special type of whistle for this purpose was placed on the year's honor roll, consisting of one man from each department, and was given a month's leave with pay.

Some special forms of safety work undertaken by various roads are the investigation of sanitary conditions in bunk cars and lodging houses on the Baltimore & Ohio; the special weekly cleanup days instituted in the yards on the Belt Railway of Chicago; the special man detailed on each section to pick up obstructions from

the tracks of the Chicago Junction, a short terminal and switching road, and the provision of goggles by the New York Central for men engaged in chipping rails or other work endangering their eyes.

RESULTS

The results of the safety campaign already undertaken in the maintenance department are certain but difficult to measure accurately. The accident statistics of the Interstate Commerce Commission do not indicate any marked decrease in the number of accidents to maintenance employees, but as stated above, these figures are subject to question and the best indication of work so far done and the possibilities of future work along this line is furnished by the reports of individual roads that have carefully studied this subject. The following typical examples are not necessarily the record performances, even on the roads quoted, but indicate in a general way what results are being secured. On the Baltimore & Ohio the number of injuries to maintenance men reported to the Interstate Commerce Commission during the first half of 1914 was reduced 66 per cent as compared with the same period in 1913. On the Chicago & North Western the reduction in accidents during the fiscal year 1914 as compared with the fiscal year 1910, when the safety work was started, amounted to 39.3 per cent in deaths to track men, 27.7 per cent in injuries to track men, 33.3 per cent in deaths to bridge men and 38.8 per cent in injuries to bridge men. The average decrease in accidents to all employees was 41.1 per cent, showing that the effectiveness of the movement in the maintenance department has been very nearly up to the average. On the Chicago Great Western the safety work in the maintenance department has decreased accidents until the maintenance men sustain only 29 per cent of the accidents, although they form 43 per cent of the total number of employees. The El Paso & Southwestern safety department has succeeded in reducing the number of fatal accidents to track men 37.5 per cent and the injuries 16 per cent during the fiscal year 1914 as compared with the previous year. Similar figures on the Wabash show a decrease of 46 per cent in fatal and 11 per cent in non-fatal injuries.

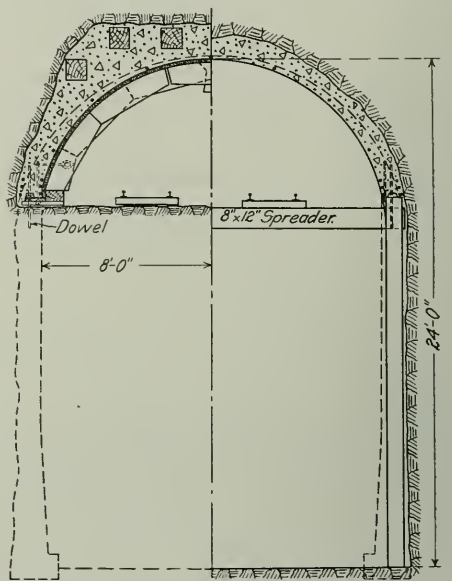
LINING THE SNOQUALMIE TUNNEL

In the construction of the Snoqualmie tunnel through the summit of the Cascade mountains about 60 miles east of Seattle, Wash., the Chicago, Milwaukee & St. Paul is placing the concrete lining for the arch section before excavating the bench material, for a distance of about 3,000 ft. near the east end. The general details of construction of this 2¼-mile tunnel were described in the *Railway Age Gazette* of May 29, 1914. The greater portion of the tunnel was driven from the west portal where the European or bottom-heading method was adopted. At the east end the approach cut was not completed at the time it was desired to start the heading and a top center heading was driven at this end. This heading was then widened out on each side to the full arch section.

The rock at the east end is badly stratified in many places, the seams being filled with talc, and the tunnel bore requiring immediate support. The reason for placing the permanent lining before the removal of the bench was to save the expense of the customary timbering under such conditions and to provide additional safeguards for the men. Sectional forms were built, the concrete was brought in in ½-yd. cars which were dumped into boxes between the tracks, and it was then shoveled into the forms. In some instances the character of the material made it necessary to support the roof temporarily with crown bars which were concreted in place.

After the arch ring was completed, shafts were driven to grade along one side of the tunnel at intervals of 1,000 ft. and connected with a 9 ft. by 8 ft. drift on grade. The drift was then provided with temporary stoping timbers and the remaining bench material was removed by cars, after which the side walls were poured in the usual manner through a chute. The closure between the side walls and the arch was made as far as possible by placing the concrete by hand and before the forms were removed the joint was grouted, the grout gaining entrance to the joint by means of a 2-in. pipe placed in the arch lining. For a part of this work a Ransome grouting machine was used and on the remainder a small gun was employed which was built on the job.

All of this bench has now been removed below this arch without any settlement or indication of cracks and the lining has



Sections Showing Method of Placing Concrete Arch Lining Before Removing Bench Excavation

been completed within the past week. It has, therefore, resulted in a considerable saving in timber and in cost of construction. The tunnel was placed in service for the regular passage of trains on January 15. In common with other details of this project, all of which are being handled by company forces, this method was developed by J. I. Horrocks, engineer and superintendent of construction, under the general supervision of E. O. Reeder, assistant chief engineer, and C. F. Loweth, chief engineer, of the St. Paul.

EARLY CAST IRON.—At a recent monthly meeting of the Ipswich Engineering Society, of England, an interesting lecture was delivered by Robert Buchanan, of Birmingham, on "The Origin and Development of the Foundry Cupola." Mr. Buchanan said that he owned what he believed was the oldest piece of iron in the world, a portion of a gully grate from the floor of some ruins at Ephesus, which still showed the iron crystals. The first record of cast iron being used was in 1543, when in Sussex a man named Hogg made cannon. Personally he believed that the system must have been discovered before, because in 1595 it was stated that cannon of 6,000 lb. weight were made, and he did not think such progress could possibly have been made in 50 years. The first record of a cooking-pot being made of cast iron was 160 years after cannon were first cast, so that it seemed that in those days armaments led the metallurgical world as they did in a great degree at the present day.—*Engineering.*

Development of P. R. R. Track Inspection System*

Narrative of Consecutive Steps Taken to Secure an Equitable Method of Judging the Track Conditions

By Joseph T. Richards†
Consulting Engineer Maintenance of Way, Pennsylvania Railroad, Philadelphia, Pa.

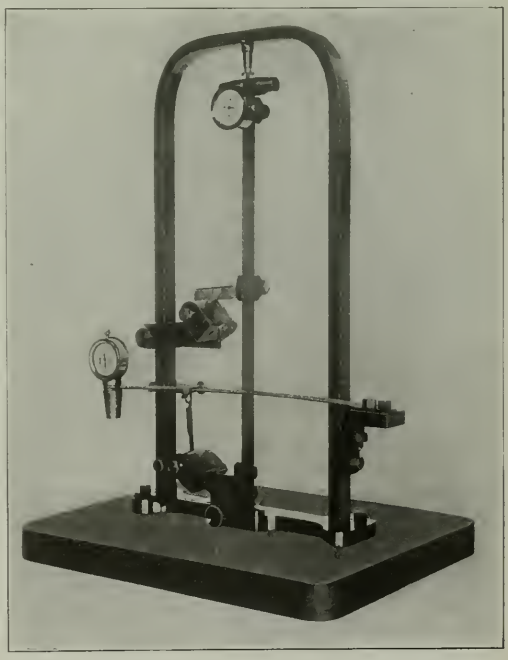
As far back as 1873, when Thomas A. Scott was president and A. J. Cassatt was general manager, the Pennsylvania Railroad had inaugurated "the General Manager's Annual Main Line Track Inspection." At first the inspecting party was limited to employees of the maintenance of way department, but in later years it was made to include invited guests from all the other departments. It was an occasion well suited to bring together a large company of track men, and was more or less of a social and educational event, making for good fellowship, and at the same time gave a favorable

The Track Inspection Car on the P. R. R. Which Is Intentionally Made Hard Riding

opportunity for the discussion of track subjects by all the experts in that line. Thus the inspection, lasting nearly a week, was found to be a model method of teaching that which was not found in books. It had a tendency to broaden the views of the men and prevented them from becoming localized; it gave them a knowledge of the geography of the road; it brought them to know each other, it aided largely to create an *esprit de corps;* it introduced the men of lower rank to the higher officers, and it furnished the opportunity for one member to tell something about a good practice on his division in exchange for what his companion could tell of his discoveries and practice. This exchange of views, in many cases, continued throughout the year by correspondence, and in all it established a devotion to the common cause which made interested and painstaking men and soon convinced the management that a large inspection once a year was money well spent.

The annual inspection was made in the fall after the summer's work had been done and the year's appropriation spent, to bring the track up to its best, as it should be, at the beginning of the winter season. It was the practice in the early years of the inspection to assemble the entire party at the New York end of the line and for the first day to make a fast run west to Pittsburgh, the train consisting of first-class Pullman cars and coaches for the purpose of testing the riding qualities of the track under high speed and also for trying out the staying qualities of the best class of locomotives on a long run. There was considerable merit in this fast, one-day run, but after some years it was abandoned.

The second day the party started east in improvised inspection cars made by building tops or shelters over ordinary gondola cars, with seats, one raised above the other in gallery style, each car seating about 35. These cars were pushed ahead of locomotives at a slow speed to allow the inspectors to see the good and bad features of the roadbed, track, station grounds, ditches, etc. They were divided into committees, each having the task of marking on cards the grades for as many features as they had time to observe. One committee was for line and surface, one for switches and signals, another for ditches, ballast and spacing ties, and another for sidings, road crossings, station grounds and policing. The inspection occupied one day on each superintendent's division



The Present Type of Device Used for Measuring Horizontal and Vertical Movement of a Car

or four days in all from Pittsburgh to New York. From the marks turned in on the inspector's cards each supervisor's section received its rating and the premiums were awarded accordingly.

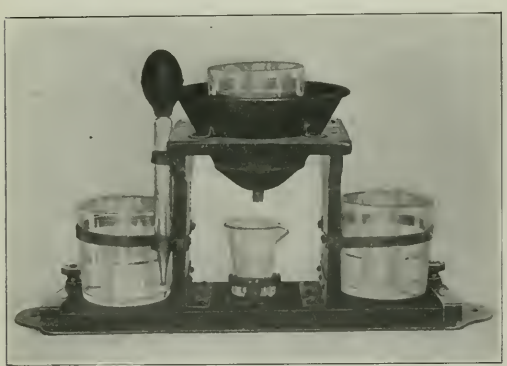
SPECIAL TRACK INSPECTION COMMITTEE

Each year there were naturally some changes made in the method of inspection, following changes and improvements

†Mr. Richards has been intimately connected with the maintenance of way department of the Pennsylvania Railroad almost continuously since August, 1869, holding the position of engineer maintenance of way for ten years, and chief engineer maintenance of way for ten years, before his appointment as consulting engineer maintenance of way in 1913.

made in the track standards. The old popular annual inspection of 1873 had been in practice for about a quarter of a century; the amounts paid for meritorious work had increased year by year, and a feeling had grown among the maintenance of way men that more frequent inspections should be made, for various reasons, and that a small committee of experts on line and surface, acting frequently, would produce better results than a party of, say, 300 making an inspection but once a year, and, furthermore, that the inspections should be made at times unknown in advance to the track men. This was about 1897, when Frank Thomson became president. Mr. Thomson had been perhaps the most critical general manager on track that the road ever had and when he became president he lost very little of his sensitive touch which made him an expert in detecting rough tangents or swinging curves as his car would pass over the line.

In order to advance the efficiency of the service and meet the views of various officers, the president, in 1897, requested the general manager to appoint a special committee for the purpose of inspecting the track periodically, to be done about once a month or not less than once in seven weeks. After careful consideration it was decided that the committee was to inspect and report as to the riding of all of the cars of the train, not merely of their inspection car, but noting the



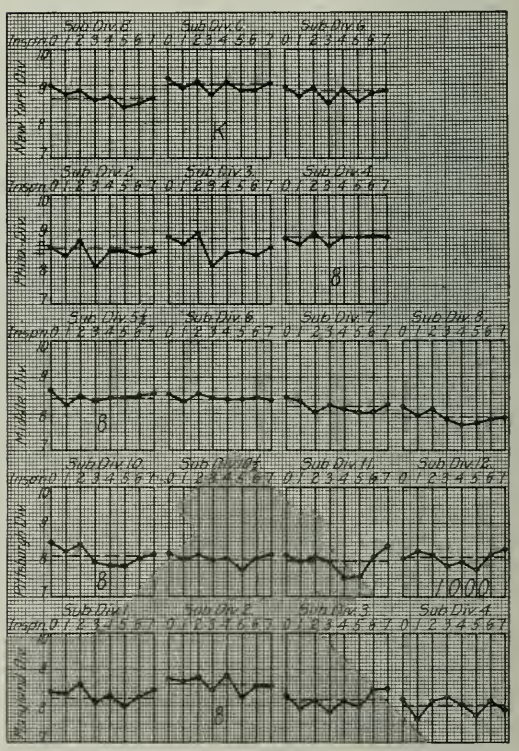
The Present Improved Form of Water Spiller Arranged with a Basin to Catch the Spill and a Graduated Measure to Determine Its Amount

differences, if there were any, between the cars in the front end of the train, those in the middle, and those in the rear. While track work belonged entirely to the maintenance of way department the committee could with propriety criticize the riding of a car and take up and discuss with the motive power department any defect in the car, wheels, trucks, springs, gaging of wheels, etc., that they thought necessary.

The committee consisted of the chief engineer maintenance of way as chairman, with the engineer of maintenance of way and three division superintendents of branch roads, who, having started in the service as rodmen in the maintenance of way department, had passed through the grades of supervisor and division engineer to superintendent. This service well qualified them as judges of track and train and made them efficient and critical members of the committee. Furthermore, as this committee's work was confined wholly to the main line tracks, those superintendents, being from branch lines, were naturally impartial in their judgment, as they were not called upon to criticize their own divisions.

The committee soon organized for business and adopted a working program which still continues. For a tour of inspection on a western run, starting from Jersey City, they pick up the division engineer and take him along over his division from Jersey City to Philadelphia. It is his duty to take notes of the riding of the cars on each section of his track and particularly note any jar or unusual motion given to the cars, recording the exact location. Upon arriving at the end of his division he is allowed to return to get in touch with his supervisors and track men to remedy the defects promptly, so that at the next inspection the committee may expect to find the track improved and the uneven riding of the train eliminated. It is to be noted that the responsibility for defects in track is placed where it properly belongs, upon the division engineer and his supervisor, just as the president had placed the responsibility on the special inspection committee and expected them to bring him the results he was asking for, supplementing the resident officer's experience by their own larger and wider training.

Each division engineer in turn is taken on the inspection



A Typical Chart Showing the Special Inspection Committee's Marks at Each of the Seven Inspections for One Year, Indicating Also the Prize Winning Supervisor's Divisions

car with the committee to ride over his division. On the return run, the eastbound track is inspected in the same manner so as to cover both passenger tracks, and frequently a run is made on the freight tracks to determine their relative condition. The members of the special track committee also take notes carefully and rate the various divisions, using marks of merit ranging from 1 to 10—10 denoting perfect condition; 5 medium, and 1 very bad. This record is kept in a book, with numerous side notes and comments made for each inspection, and a comparison shown of each supervisor's division. There is also a chart made to show graphically the rating given for each inspection.

Upon the result of these inspections the committee awards the annual prizes to the supervisors having the best line and surface on their respective superintendents' divisions. These prizes and the honor attached are sufficient to create competition and a healthy rivalry among the supervisors. In addition, for the division having the best track of all during the entire year, a prize of $1,200, termed the "Klondike," is awarded, $800 going to the supervisor and $400 to the assistant supervisor of that division, together with a complimentary letter from the general manager. For the division having made the greatest improvements during the year $1,000 is awarded, $700 going to the supervisor and $300 to the assistant supervisor. The award on each superintendent's division amounts to $800—$600 going to the supervisor and $200 to the assistant supervisor. The general manager, through this inspection committee, distributes annually $5,400 to the trackmen as the result of these main line inspections. This amount, however, is only about one-half of the premiums paid to track men on the P. R. R. system, including 21 other divisions operating under the general manager of Lines East of Pittsburgh and Erie.

DEVELOPING MECHANICAL AIDS FOR JUDGING TRACK CONDITIONS

The awarding of these premiums placed a serious responsibility upon the special inspection committee, which from the beginning made the members extremely anxious that the prize should not go amiss, as it would be manifestly unfair for a supervisor to receive the prize when not entitled to it, and just as unfair for a supervisor to miss the prize who was entitled to it. It was recognized that there must be an unmistakable way of determining the movement of the car, both horizontally and vertically. A good judge of track by observation and through the sensibilities can very well determine when something is radically wrong in the swing of a car, but it was important that the number of vibrations on each division and the degree of same should be told with the greatest of accuracy, so the committeemen busied themselves in finding aid through some mechanical means. This idea was not a new one, but none of the mechanical inventions had quite filled the requirements.

The latest production had been in use on the Pennsylvania for some years, and, in fact, it was still in existence—a small car called the track indicator car, which was made specially to inspect track. It weighed 25,100 lb. and cost about $5,000. Somewhat similar cars have been made and used by other railroads. In its use a special run was made over the road at slow speed with several attendants in charge, and through mechanical contrivance would, if operated at a speed to suit its purpose, detect and register the rough places in the track such as badly worn rail or low joints in the surface; it was also supposed to give the elevation of the curve, the width of the gage, etc. This car turned out a paper ribbon of great length on which, by means of a fountain pen, those features of the track were registered, being located with reference to mile posts. The ribbon was taken off in sections, given to the division engineer as a guide for his supervisors and from the supervisors to the track foremen. But it was quite annoying to the ordinary track man to take this ribbon, marked with curve elevations, width of gage, low joints, etc., and attempt to apply it to the right spot on the track, so they generally condemned it. Like all things, it was fallible and the possibility of error with its annoyance made it very unpopular. The track foremen stated that after all they had to find the defect in the track in their usual way and could not depend upon the ribbon reports turned out for them by the track indicator car. The car was given several years of patient trial, but, besides annoying the practical track men, it created no incentive for good work. It was too far removed from the conditions governing a passenger car at the speed of a scheduled train. It had a slow speed of its own at which there was no means of telling how a curve suited the passenger trains using it every day. Its report was confined to its own irregular movements, and was of little consequence. It was a "wet blanket" everywhere it appeared and when it finally got into a wreck and was broken up all the track men were happy.

The members of the committee were quite willing to cut out the ribbons, but they recognized that it was no easy task to tell always whether the defects were in line or surface, on curves or tangents, etc. So they started with some other old principles that had been used. At first they suspended a hammer by a flexible steel stem fastened to the roof of the car. They watched the track for defects and the steel hammer for oscillations. When it was steady it showed that the track was good; when it would swing violently the track was bad and the car was riding roughly. They then put a bell on each side of the two-faced hammer and counted the number of bell taps on each supervisor's division. The division having the fewest number would get the best mark. The committee also filled glasses with water to within a quarter of an inch from the top, placed one on each side of the car on a window sill and counted the number of water spills. After this the committee had the distinctive appellation of "the water spillers." There were many errors in the water spills, but the track men would work very hard to get a report showing as few as possible. It was amusing and had some points of merit.

These contrivances, however, were poorly developed and did not tell nearly enough. They may have been better than the judgment of a sensitive committeeman, depending upon his eyes and nerves, but something better was looked for and the committee soon abandoned the long suspended heavy hammer and made a small one on a vertical flexible steel stem, and fixed it in a wooden base. This they placed on the floor of a car, with the usual bell on each side of the hammer, and counted the bell taps. This device was criticised, however, because the bells were a fixed distance from the hammer and the hammer had to swing the whole distance to give a bell tap, and it was noticed that the hammer would vibrate on its stem very many times without striking a bell. It was then decided to abandon the bells and put a pedometer on the hammer stem, near the top, which would count the number of vibrations. This was quite an improvement over the bells. Besides, it relieved the committeemen of the work of counting the bell taps. This arrangement was criticised because the number of vibrations is not as important as the distance the hammer stem travels. One section of track might be in fairly good condition and yet have a great number of small vibrations registered against it, while another section in poor condition would get larger vibrations, but not so many of them. Therefore, it was decided to get the distance that the hammer stem traveled per division or per mile of track, and for this purpose a cyclometer was added, with a ratchet attachment to wind up and give the distance the hammer stem traveled, while the pedometer remained to count the number of vibrations. Thus the committee was gradually closing in on a method to tell the actual condition of the track from the movements of the car.

In the next analysis of the mechanical contrivance it was found that the pedometer and cyclometer on a vertical stem would give the swinging movement of the car, but the vertical movements were not yet registered. A car might go up and down very quickly and a vertical hammer stem almost stand still, so to get the vertical movement of the car on the same instrument, a horizontal stem and hammer were added to the frame and equipped like the vertical one with pedometer and cyclometer. Thus the committee now has a small compact instrument of the greatest simplicity with but few parts, weighing about 22 lb., that can be picked up, easily carried about and placed with its wood base on the floor of any car.

RATINGS AND PRIZE AWARDS

After taking the reading of the two pedometers, two cyclometers and two water spillers, the committee considered

several methods of getting a figure that would represent the condition of the track, and finally adopted the easy formula of taking the sum total of all of the readings and dividing by the miles traveled. The result may be called the vibrations per mile of track. From these figures the divisions are rated, and the committee, taking them as a guide, makes a chart to record the several inspections of the year and from which the prizes are awarded. By a reference to this chart it will be seen that the division marked "K" is the best, and consequently entitled to the "Klondike" prize of $1,200; that those marked "8" are the best on each of the superintendent's divisions and are entitled to the $800 prize, and the one marked "1,000" takes the $1,000 improvement prize. In this case the graphical method does not indicate so clearly all the conditions which affect the result and on which the awards are based.

While the original plan of a general inspection once a year is still adhered to, the markings do not determine the prize winners. These tours are held in high esteem by all departments. The influence is far reaching, extending to all classes of employees and their neighbors as well. On this day schools in villages adjacent to the railroad give a recess to the children for the hour of the passing of the several inspection trains, flags are waved and men and women stand in groups at the stations to greet and cheer the railroad men as they pass. The first day's run ends at Harrisburg, and the prizes are announced and delivered soon after the arrival. Up to this time no one outside of the general manager and his staff officers are supposed to know who are the successful men in the year's competition. The announcement is made at a meeting of the entire party by the chairman of the special inspection committee, representing the general manager. The successful supervisors and assistant supervisors are invited to come forward to the platform and receive checks for the money and complimentary letters from the general manager. The letter is much appreciated, for it is looked upon as conveying as much honor and distinction as the money—besides, it is found to stay with the men longer than gold.

This in brief tells the story of the development of one item in the maintenance of a reliable track standard. Although this is one of the smallest subjects in the maintenance of way department, its history is written from a mental library of the work of a quarter of a century in the Pennsylvania Railroad service, with the hope that it may be of possible interest to the outsider, including the traveling public, to see how much study, vigilance and care is expended by railroad men to insure smooth riding cars to carry them with the greatest comfort and safety.

A UNIQUE METHOD FOR THE REPLACEMENT OF TRUSSES

A unique method for the replacement of several through truss spans was adopted recently in the renewal of the Ponniar bridge on the South Indian Railway. This bridge was renewed in the dry season when, in common with other streams in this country, there was little or no water in the river. This condition permits the laying of temporary tracks across the river bed for construction purposes and even in some instances for main line operation during reconstruction.

In the replacement of the Ponniar bridge the trusses were assembled in a yard near one end of the bridge. To convey them to their position in the structure, a device known as a river trolley was employed, two being required for each span. Each trolley consists of two six-wheel trucks running on parallel tracks and carrying a framework of steel girders supporting a timber platform, as shown in the accompanying photographs. These parallel tracks extend from the place of erection of the span out across the river bed to a point opposite their final location. The top of the framework corresponds in height with the elevation of the piers of the bridge.

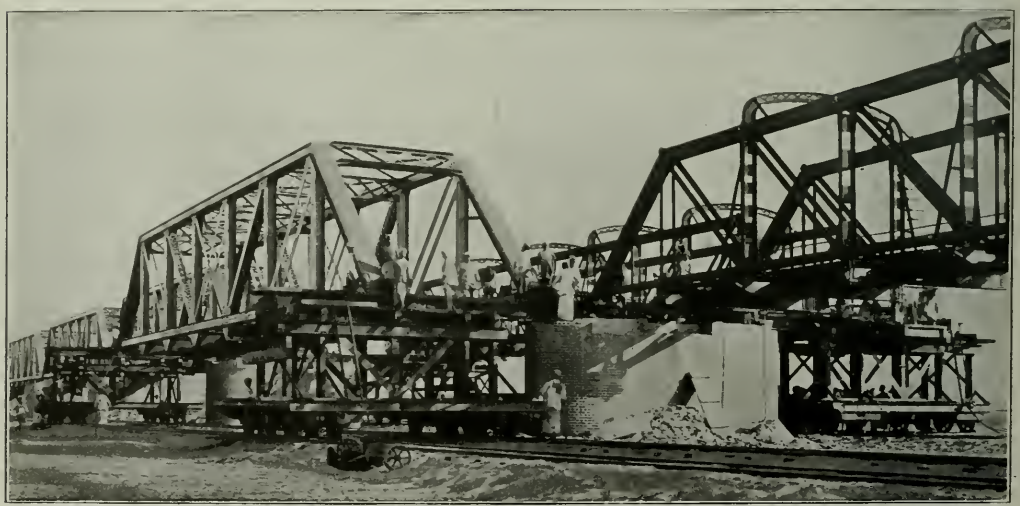


Fig. 1—River Trolley on the Left to Transfer New Span to Pier. The One on the Right to Receive the Old Span

The principal point of interest lies in the method employed to raise the completed spans from the level at which they were assembled to the deck of the river trolley. To accomplish this two ramp trolleys were employed for each span. They are built up similarly to the river trolleys with steel girders carried on eight wheels. Within this framework is gearing that engages with a rack railway. Outside the trolley is located a worm gear which consists of two worm wheels with corresponding worms on a shaft which is turned by eight men, four of whom sit between the worm wheels and two at each end, as shown in Fig. 2. The framework is inclined to the angle of the ramp

with the upper deck horizontal, to maintain the span in a vertical position during its transference to the river trolleys. Cables lead from each end of the ramp trolley to a winch to serve as brakes.

After being transferred the span is drawn along the track to its required position at the bridge by two gangs of men. Prior to the arrival of the new span at the structure, the old span is run onto river trolleys laid on a track on the opposite side of the bridge, as shown in Fig. 1, preparatory to its removal to the banks for dismantling. The old span is lowered to the ground by means of the ramp trolleys.

Fig. 2—Raising and Moving a New Span onto the River Trolleys

RESULTS OF ANNUAL TRACK INSPECTIONS

THE ROCK ISLAND

The Rock Island Lines have awarded prizes to those roadmasters and section foremen whose track showed the greatest improvement during the past year. A prize of $100 was awarded to one roadmaster on each division and a prize of $50 to one section foreman on each roadmaster's division. The names of the successful roadmasters and their divisions are as follows: Illinois division, J. L. Jensen, Bureau, Ill.; Iowa division, J. B. Pugh, Atlantic, Ia.; Missouri division, E. Sullivan, Washington, Ia.; Cedar Rapids & Des Moines Valley division, C. Linehan, Cedar Rapids, Ia.; Minnesota division, C. H. Gruver, Manly, Ia.; Dakota division, T. W. Brown, Dows, Ia.; St. Louis division, V. B. Simpson, Eldon, Mo.; Kansas division, J. G. Hutchinson, Clay Center, Kan.; El Paso division, J. H. Logan, Pratt, Kan.; Nebraska division, W. E. Brown, Fairbury, Neb.; Colorado division, J. D. Sullivan, Colorado Springs, Colo.; Arkansas division, D. B. Griffin, Booneville, Ark.; Indian Territory division, James Bolton, Haileyville, Okla.; Louisiana division, R. T. Gollehon, Eldorado, Ark.; Pan Handle and Amarillo divisions, George Woods, El Reno, Okla.; Oklahoma and Southern divisions, J. O'Connor. In addition, 48 prizes were awarded to section foremen on as many roadmasters' districts.

THE LEHIGH VALLEY

The Lehigh Valley has recently completed a report of its annual track inspection made on November 4, 5 and 6. This inspection was made by two committees, one of which observed the condition of line, surface, guide posts, anti-creepers and insulated joints, while the other observed the condition of ties and tie spacing, ballast, sod line, drainage and general appearance. While no prizes were awarded, the results of the markings of the committees were compiled on a sheet giving the rating of each section, subdivision and division. Supervisor J. Sheehan on the New York division received the highest rating of 97.51 and Supervisor M. J. Greeney on the Buffalo division was second with a rating of 96.69. The highest rating given any section was that at Oak Island on the New York division which received a mark of 97.83.

THE LACKAWANNA

The annual track inspection of the Delaware, Lackawanna & Western was made in November, 1914. The results of this inspection, which have just been made public, show that J. Sexton, roadmaster on the Morris & Essex division at Hopatcong, N. J., received the highest rating of 91.16, while P. Quinlivan, roadmaster on the Buffalo division at Buffalo, was second with a standing of 90.19. The average for the entire road was 88.6. The ratings were made by a committee of three experienced engineers not connected with the Lackawanna.

English Railway Plans to Encourage Beet Sugar Production.—The London & South Western is taking steps to encourage sugar beet culture in its territory. That sugar beet could profitably be cultivated in Great Britain has long been an article of faith with the up-to-date agriculturist, and it is felt that the present time is very opportune for the establishment of the industry on a practical basis. What the South Western has done is not only to make an extensive survey in Surrey, Wilts, Hants, Somerset, Dorset, Devon and Cornwall, and to ascertain which areas are suitable, but also to secure co-operation between farmer, carrier and manufacturer. A large meeting of Wiltshire farmers and land owners has already been held at Salisbury for the explanation of the scheme, and similar meetings are to be held early this year at such typical centers as Yeovil, Winchester and Basingstoke. An English contemporary remarks: "Hitherto, one of the stumbling blocks in the way of the British beet sugar industry has been the difficulty of raising sufficient local capital in the various districts when it was impossible to guarantee an adequate permanent output, but that difficulty is now believed to have disappeared, and it will certainly be possible to obtain all the capital required. Experience on the other side of the Atlantic shows that the policy of helping the farmer benefits the railways as well as the agriculturists, and there is no reason to doubt the mutual advantage that will result from the South Western's patriotic scheme."

American Wood Preservers' Convention at Chicago

Report of the Eleventh Annual Meeting Held This Week Including Abstracts of Papers and Discussions

The eleventh annual convention of the American Wood Preservers' Association was held in the Congress Hotel, Chicago, January 19, 20 and 21, 1915. Steady progress in all the affairs of the association has been shown during the year under the leadership of the executive committee composed of George E. Rex, manager treating plants, Atchison, Topeka & Santa Fe, president; Carl G. Crawford, general manager, American Creosoting Company, first vice-president; R. S. Manley, president, Creosoted Wood Block Paving Company, second vice-president; F. B. Ridgeway, third vice-president, and F. J. Angier, superintendent of timber preservation, Baltimore & Ohio, secretary-treasurer. The registration of 120 members was the largest in the history of the association.

BUSINESS SESSIONS

A business session was held at the opening of the convention on Tuesday morning at 10 o'clock and another at the close on Thursday.

In his opening address President Rex called attention to the effect of the European war on the wood preserving industry and the opportunity which is now presented to the Association to meet the problems presented by this calamity through conservative and unanimous recommendations as to the best practice in the treating business. He urged the members to lay aside personal considerations in the adoption of standard specifications and emphasized the importance of concerted efforts on the part of committee members in making the committee work of the greatest possible value.

The secretary's report showed an increase in membership during the past year of 90 This brings the total membership up to 265, the increase over last year amounting to more than 50 per cent. There are now 38 railroads represented in the association by 75 members.

A committee on Constitution and By-Laws recommended a number of changes in the constitution. The most important changes were the addition of a junior membership grade with an entrance fee of $5 and annual dues of $3, the extension of the list of those eligible for corporate membership to include city engineers, professors and instructors in institutions of learning, railroad, consulting, forestry, county, highway, contracting and inspecting engineers, engineers of tests and city chemists; the change in associate membership eligibility to "any person interested in the sale of material or equipment used in the wood preserving industry"; the addition of five members to the executive committee in addition to the five officers making a total of ten members, and the specification that the annual meeting shall always be held in Chicago.

The annual banquet was held on Wednesday evening. On Thursday afternoon a trip was made to the Field Museum and on Friday a number of the members went to Madison, Wis., for an inspection of the Forest Products Laboratory.

TIMBER TREATING PLANT OPERATION

Four sessions were held for the presentation of committee reports and individual papers and their discussion. General topics for these four sessions were: Plant Operation and Miscellaneous; Preservatives and Specifications; Ties, Timber, Piling, Crossarms and Wood Block Paving. In addition to the papers abstracted below the program included a number of papers and committee reports of general interest to railway men which are briefly mentioned.

The committee on Plant Operation, composed of H. M Rollins (Gulfport Creosoting Company, chairman; C. D. Batson (Republic Creosoting Company); F. H. Stewart (Central of Georgia), and A. M. Smith (Ayer & Lord Tie Company), presented a list representing standards of practice in plant operation. This included statements of the methods of determining the amount of oil injected, the specific gravity of creosote, the fractionation of creosote, the preparation of zinc chloride and the proper seasoning of the various classes of timber before treatment.

The recommendation in the committee's report that a minimum of one-half pound of zinc chloride be injected per cubic foot of timber aroused considerable discussion. F. D. Mattos (Southern Pacific) stated that the Southern Pacific secures 10 years of life from timber treated with from 0.25 to 0.3 lb. of zinc chloride per cubic foot of timber using a two and one-half per cent solution and treating to refusal. The timber used is mainly Douglas fir with 85 per cent heart wood. The Atchison, Topeka & Santa Fe injects 0.4 lb. of zinc chloride per cubic foot of timber, using a 3.5 per cent solution for long leaf yellow pine. The Chicago & North Western injects 0.5 lb. of zinc chloride per cubic foot. This road recently inspected one lot of ties after nine years of service, and found that 98 per cent were still in the track. An analysis showed that these ties still contained .23 lb. of zinc chloride per cubic foot of timber. They had been treated by the Wellhouse process. It was the consensus of opinion that the amount of zinc chloride used should depend upon the class of timber being treated and the section of the country where it was used.

Several members reported that they had had trouble with wooden tanks lined with lead for holding concentrated solutions of zinc chloride. Steel tanks were reported as giving satisfactory service at several plants where they had been painted inside with coal tar. J. B. Card stated that he had found paint unnecessary. Zinc chloride attacks steel only when it is heated, and if some spelter is placed in the bottom of the tank the action is concentrated on the spelter leaving the steel immune.

The "Economical Use of Steam in Connection with Wood Preserving Plants" was discussed by A. M. Lockett, president, A. M. Lockett & Co., New Orleans, La. This paper called attention to the desirability of paying some attention to the steam economy in a plant, which in many cases will increase the output and reduce the cost per unit. He suggested a number of practical methods of increasing steam economy, some of which are not generally practiced in wood preserving plants. All steam pipes should be covered by a suitable non-conductor and radiation from the retorts should be reduced in the same way. By the use of an ample quantity of water to condense the vapor in a retort after the steam is blown down, a material saving in the steam required to operate the vacuum pump can be effected, as in this way the pump is not required to bail out the steam and vapor by actual displacement. Steam traps should be used on all heating coils; live steam should never be used for heating oil in tanks or for heating the plant and offices when exhaust steam can be secured from air compressors, pumps or engines. The water supply used in the condenser need not be elevated to the storage tank if a low service pump is operated in connection with the condenser in starting; long steam lines supplying hoisting engines in the yard must be very carefully insulated; the condition of all pumps must be carefully watched to economize steam; by the use of a storage tank for feed water, exhaust steam can be used for heating it when available.

A series of experiments for determining the temperature changes in wood under treatment was described by George M. Hunt, chemist in forest products, Forest Products Laboratory, Madison, Wis. The tests were made on sawed maple, red oak, loblolly pine and hemlock ties, representing ring-porous and diffuse-porous hardwoods and slightly resinous and highly resinous conifers. The treatments were made in

the laboratory cylinder, 3½ ft. wide by 11 ft. long, the heat being applied by saturated steam at atmospheric pressure, saturated steam at 20 lb. pressure and hot creosote at atmospheric pressure. The heating was continued until the rise in temperature, as shown by a thermometer, inserted in a 1¼ in. hole 26 in. long along the axis of the tie, was not more than 1.8 deg. F. in 10 minutes. At the conclusion of the heating period the vacuum of 26 in. was applied for one hour. These tests showed that during the first 30 or 40 min. heating there was very little rise in the temperature in the interior of the tie. After the heat penetrated through the interior a steady rise in temperature began, most rapid at first and gradually becoming slower, but in no case reaching the temperature of the heating medium. The average time required to bring the ties to a temperature of 212 deg. F. was 4 hr. 20 min. with the 20-lb. steam treatment. The rate of increase of the interior temperature was greatest with this treatment and least with the creosote.

TREATMENT OF RED OAK TIES

The committee on Miscellaneous Subjects, composed of J. H. Waterman (Chicago, Burlington & Quincy), chairman; M. K. Trumbull (National Lumber & Creosoting Company), A. G. MacIntyre (McGill University) and S. B. Lindley (Western Wood Preserving Company), presented a discussion of the treatment of red oak ties. A list of questions was sent to the membership and from the replies to these questions the following conclusions were drawn:

1.—Red oak ties can be treated satisfactorily, when air seasoned for ten months, if the summer months are included.
2.—Red oak ties may be treated satisfactorily when air seasoned for six months, provided artificial seasoning is employed as an adjunct.
3.—For practical reasons the period of seasoning should govern, in determining whether red oak ties are ripe for treatment: If a boring test is used, the core withdrawn with an increment borer should appear dry for a depth of two inches; if weight is used, the weight per cubic foot should not exceed 52 lb.; if moisture determination is resorted to, a test should indicate not to exceed 22 per cent of moisture in the ties.
4.—Artificial seasoning of red oak ties apparently has not been sufficiently developed to justify a conclusion from the replies.

The committee did not feel, however, that the above conclusions were satisfactory, and therefore, drew up the following list, which they felt would better represent the judgment of the members and the practice of the association.

1.—Red oak ties should be air seasoned for at least one year before attempting to treat them.
2.—It is practically impossible to season a red oak tie so as to render it dry throughout.
3.—For practical reasons the period of seasoning, to determine whether red oak ties are ripe for treatment, should govern.
4.—Artificial seasoning of red oak ties fails to give the desired result.
5.—Penetration of the heart wood of red oak ties can be secured practically with the same success as in the sap wood.
6.—The use of an increment borer in determining the penetration of an antiseptic treatment in red oak ties fails to give conclusive results. A tie showing insufficient penetration when inspecting the core which is withdrawn by an increment borer, will in the majority of cases show satisfactory penetration when the tie is sawed and then split.
7.—Red oak ties may be treated satisfactorily with any standard process.

L. B. Moses reported the results of a test conducted at Madison, Ill., in which eight red oak ties were weighed monthly, beginning in February, and showed the greatest seasoning at the end of six months. Another member stated that in Arkansas it was necessary to season red oak ties one entire summer regardless of the time of cutting.

C. M. Taylor (Philadelphia & Reading) read a paper advocating cutting off the ends of ties and piling not bored or adzed, to be sure that there was no internal rot, this being particularly necessary with pine. The idea was heartily approved by the convention.

The Committee on Preservatives and Specifications presented a report consisting of a review of the specifications for materials previously adopted by the association. In discussing the report E. B. Fulks, of the American Tar Products Company, condemned the present hysteria regarding the present shortage of creosote, stating that although all the nations at war had placed an embargo on the exportation of creosote when the hostilities began, this embargo has since been raised from all countries except Germany, and only 15 per cent of our creosote comes from Germany. Seven cargoes of oil have been imported into this country since the war began. The present difficulty is lack of boats and it is expected that in a few months these conditions will be normal except for the embargo on German oil, as the American producers are making increases in domestic production which will offset the German shortage. S. R. Church, of the Barrett Manufacturing Company, stated that a revival of the steel industry will increase the production of coal tar from which more creosote can be produced.

TOXICITY OF CREOSOTE FOR MARINE BORER

Experiments to determine the comparative toxicity of creosote and its constituents for the marine wood borer, xylotrya, were described by L. F. Shackell, M.D., assistant professor of pharmacology, St. Louis University School of Medicine. The creosote used was distilled from coal tar between the temperature limits of O deg. and 400 deg. C. The characters of the fractions distilled from this creosote, as shown by the Forest Service reports, are as follows:

Fraction 1—Light oils .....Up to 205 deg. C.
Fraction 2—Naphthalene solids .....205 deg. to 250 deg. C.
Fraction 3—Deal oil or golden oil.....250 deg. to 295 deg. C.
Fraction 4—Anthracene solids .....295 deg. to 320 deg. C.
Fraction 5—Residue .....Above 320 deg. C.

A series of tests made with 1 per cent gum arabic emulsions of the creosote and of each fraction tested showed fraction 1 to have the greatest toxicity and the others to stand in the following order: Fraction 2, fraction 3 and creosote practically equal, fraction 4 and fraction 5. Experiments with undiluted aqueous extracts of creosote and of fractions 1 and 5 showed the same order of toxicity obtained as with the emulsions. The high toxicity of fraction 1 in connection with the present published observations of C. H. Teesdale, who found that experimental piling treated with 18 lb. of fraction 1 per cu. ft. lost practically 35 per cent of the oil by volatilization in two months and were severely attacked by the borers in 13 months, led to experiments to determine to what extent the loss of the more volatile constituents would affect the toxicity of creosote and its fractions. These tests showed that the volatilization of fraction 1 definitely lessened its toxicity and similar, although less noticeable, results were secured with the residue and with fraction 3. Addition tests showed that the light oils of creosote, such as benzene and its congeners, are very toxic for xylotrya, that naphthalene and anthracene are only very slightly, if at all, toxic and that the tar acids are toxic in varying degrees. One of these, alphanaphthol, which is highly toxic, is manufactured at relatively low cost from the abundant but practically non-toxic naphthalene.

Clyde Teesdale (Forest Products Laboratory) stated that tests made at the Forest Products Laboratory showed that the toxicity was exactly reversed from that reported by Dr. Shackell, and that in the tests fraction 1 apparently lost toxicity, while fraction 3 retained it indefinitely.

ANNUAL CHARGES FOR TIES

A paper by Harrington Emerson and T. T. Bower discussed a "Method for Finding the Annual Charges for Ties." The various assumptions upon which the investment in ties could be charged off before renewals were discussed and a diagram was presented showing graphically the effect of these various assumptions. A diagram was also included showing the annual charge per tie, the life of the tie and the original cost plotted from the formula

$$A = \frac{C}{Y} + C\ (I + T)$$

in which A equals the annual maintenance charge and C the first cost of the tie and track, Y the average life, I the rate

of interest on the investment and T the tax rate on the investment. In discussing methods to reduce the annual expense for ties the following five rules were suggested:

Buy the ties carefully.
Spend all on protection that the gain in life justifies.
Use them at once.
Do not take them out before they are used up.
Assort them for proper use.

It was stated that careful buying insures a price reduction of about 10 per cent and a quality increase of about 20 per cent. To allow ties to lie for two years before placing in the track adds about $0.14 to the first cost.

LIFE OF TREATED TIES

J. H. Waterman, superintendent of timber preservation, Chicago, Burlington & Quincy, presented some observations he has made during the past year on the service of treated ties. Out of 550 red oak ties treated with zinc chloride which were placed in the Burlington experimental track near Mystic, S. D., in 1900, 50 were taken out at the last inspection on October 7, 1914, on account of decay. Previous to this time three had been taken out for the laboratory and 18 on account of decay, making a total of 71 removed or a little less than 13 per cent. These ties are laid on a 3 per cent grade and a 12 deg. curve. All gave a life of 12 years, 87 per cent will certainly give 15 years' life and there is reason to believe that 50 per cent will be in track at the end of 18 to 20 years. In the two mile section between Sidney, Neb., and Peetz, Colo., 6,354 ties were laid in the fall of 1900 and the winter of 1900-1901. These ties were also treated with zinc chloride and are laid on a tangent in gravel ballast. Up to and including 1913, 285 of these ties had been removed on account of decay, and at the last inspection on October 6, 1914, 103 additional were removed, making a total of 388. This means that 94 per cent of these ties have already given 14 years service in a dry western climate.

On the Chicago & Eastern Illinois 24,271 red oak ties treated by the Wellhouse process using zinc, glue and tannin, were inserted in 1900 between Cypress, Ill., and Joppa. A count of these ties in June, 1914, showed 18,045, or practically 75 per cent still in the track. Mr. Waterman also reported that he had observed that ties treated with creosote or with a mixture of creosote and zinc chloride show less mechanical wear under the rail than ties treated with zinc alone on account of the action of the oil on the surface which lubricates the tie and the rail and results in less rail cutting and surface wear.

H. E. Horrocks (Pacific Creosoting Company) read a short paper protesting against the conclusions reached in bulletin 101 of the forestry department entitled "Relative Resistance of Various Conifers to Injection with Creosote," in which it was stated that Douglas fir is not suitable for creosote treatment. He cited the success in treating this material for more than 20 years as proof that such treatment is feasible.

Howard Weiss, director of the United States Forest Products Laboratory, took exception to Mr. Horrock's criticism of bulletin 101.

SPECIFICATIONS FOR TREATABLE TIMBER

The committee on specifications for the purchase and preservation of treatable timber, consisting of E. A. Sterling (consulting engineer), chairman; Carl G. Crawford (American Creosoting Company); Hermann von Schrenk (consulting engineer; C. T. Winslow (Forest Products Laboratory); William A. Fisher (A. C. L.); Lowry Smith (N. P.), and A. C. Becker (G. T.) reported on five subjects: A, The Purchase of Treatable Wood; B, Preparing Timber for Treatment; C, Preservatives and General Methods of Application; D, Summary of the Fundamental Principles Underlying Efficient Treatment, and E, Regional Consideration.

Under the first heading they recommended the new grading rule of the Yellow Pine Manufacturers' Association for yellow pine and the specifications of the American Railway Engineering Association for general requirements. A number of suggested modifications from these specifications were given. With the exception of the requirements as to heart wood, the A. R. E. A. specifications for size, form and manufacture of track ties were approved. Modifications in regard to heart wood and a few other points were included. The A. R. E. A. specifications for piles were approved with the exception of the requirements for sap wood for which suggested modifications were given, particular attention being called to the necessity for selecting piles with a view to the service for which they are required.

Under the second heading a discussion of the best practice in air-seasoning ties and timber was presented, in which it was recommended that hardwood track ties be given a minimum of eight months' seasoning and preferably 12 months; yellow pine seasoned in the south, 4 to 6 months; and hemlock, tamarack and jack pine, 12 months. The use of steaming or boiling was also referred to for artificial seasoning when there is not sufficient time for proper air seasoning. Under the head of preservatives, creosote and zinc chloride were discussed, it being recommended that a full cell treatment with the former be used for piling and marine timbers where subject to the attacks of teredo and other marine borers, in permanent structures not subject to mechanical wear, when conditions of moisture, climate or humidity are favorable to wood-destroying fungi, and particularly where the cost of renewals or replacements would be high. The empty cell creosote treatment was suggested for all track ties used in moist climate or under such conditions that the mechanical life is limited to 11 to 15 years, also for structures of a limited life or subject to superficial mechanical wear and elevated so as to be exposed to the wood-destroying influences of weather conditions. A full impregnation of zinc chloride was recommended for arid and semi-arid regions, particularly on track ties and other material with mechanical life limited to 11 years; also for wood resistant to creosote. It should not be used when mechanical wear is eliminated nor in situations where the treated timber is in permanent or intermittent contact with either stagnant or flowing water.

The summary of fundamental principles included the following: Preservative treatment should be limited to kinds of wood which are not in themselves resistant to decay, thus making timber available which otherwise would be useless and which is obtainable at low cost as compared with durable species. The moisture content of the wood before treatment should be reduced, preferably by air seasoning, to not more than 20 per cent of its oven-dry weight or to a constant weight basis. The efficiency of treatment should be based primarily on the extent of distribution of a stated amount of preservative rather than on the final retention of cubic foot.

A SPECIFICATION FOR A COAL TAR CREOSOTE SOLUTION*

By Hermann von Schrenk and Alfred L. Kammerer
Consulting Engineers, St. Louis, Mo.

The results of some tests made with mixtures of refined coal tar and creosote were presented last year which indicated that when such mixtures consisted of about 20 per cent coal tar and 80 per cent creosote, an oil was produced which could be successfully used for the impregnation of ties. It was found that such an oil penetrated timber to the same extent as the usual heavy creosote oils, provided the mixture or solution was kept at about 180 deg. F. It was recommended that the mixture be made at the treating plants.

During the past year it has become somewhat difficult to obtain the usual supply of high grade foreign creosotes, and there have been increased inquiries for the mixture of coal tar and

*By courtesy of the Committee on Wood Preservation, A. R. E. A.

creosote. It was suggested that the solution of the two substances could be more readily achieved at the plants where the creosote was made than at the treating plants, because it was easier to filter the mixture and thereby reduce the carbon percentage. This brought up the question of a specification for the finished product to make it possible for a prospective consumer to buy the mixed oil. In co-operation with the Barrett Manufacturing Company, a number of tests were made by the writers to determine distilling points, specific gravities and viscosities of various mixtures. Several coal-tars were selected and these were mixed in different proportions with various light creosote oils.

As was to have been expected the specific gravities and viscosities gradually rose as the percentage of coal tar was increased. Based on these and similar determinations, the following specification was submitted:

"The oil shall be a pure coal-tar product, consisting only of coal-tar distillates and oils obtained by the filtration of coal tar. It shall contain no admixture of crude tar. Water shall not exceed 2 per cent. Specific gravity at 38 deg. C. shall not be less than 1.06 or more than 1.10. Matter insoluble on hot extraction with benzol shall not exceed 2 per cent. Viscosity (Engler) at 82.3 deg. C. (180 deg. F.) shall not be more than 59 for 200 cc. No variation above 59 seconds shall be allowed. On distillation by the standard method of the A. R. E. A., it shall yield the following fractions, based on dry oil: Not more than 1 per cent at 170 deg. C.; not more than 5 per cent at 210 deg. C.; not more than 30 per cent at 235 deg. C. The residue at 355 deg. C. shall not exceed 26 per cent."

In presenting this specification it should be understood that we regard it by no means final. It is a frank attempt to describe in as few words as possible an oil made up of coal tar creosote, with a certain percentage of coal tar. The writers have had occasion to examine a number of samples purchased under this specification, and found that they came within the prescribed limits. The justification for such a specification lies in the fact that a mixture of the two substances was being prepared for general use and sold in large quantities. This has previously passed more or less as creosote oil. The present specification states in so many words that a mixture is contemplated. It is hoped that the writing of this specification will bring forth suggestions as to improvements.

Discussion.—This paper caused a discussion between the advocates of coal tar creosote mixtures and straight creosote. A. L. Kuehn, of the American Creosoting Company, advocated less secrecy in the manufacture of creosote and especially recommended an inspection of the manufacture of creosote by representatives of the railroads or other consumers. The consensus of opinion was that the industry demanded the abandonment of the present secretive attitude of the creosote manufacturers and commercial treating plants.

THE MECHANICAL LIFE OF TIES AS AFFECTED BY BALLAST

By E. Stimson

Engineer Maintenance of Way, Baltimore & Ohio, Baltimore, Md.

The wooden cross tie, transmitting the heavy axle loads from the rail to the ballast is subjected to mechanical wear not only from the action of the rail on top of the tie, but also from the action on the sides and bottom of the tie of the ballast which supports it. Tie destruction from mechanical wear of ballast seldom occurs to any appreciable extent excepting in occasional stretches of crushed stone, or other forms of hard ballasted tracks where a soft roadbed or a sink requires continual raising of track and tamping of ties in order to maintain good track surface. The wearing away of ties by ballast is the result of tamping the ballast under the tie and the action of the tamping tool striking the side and edge of the tie rather than the action of the tie bearing upon and working in the ballast under trainloads. There is but little mechanical wear due to the tie working in the ballast.

After ties are first put in the track and tamped to surface on hard ballast, the necessity for retamping to surface and consequently the wear of the ties by ballast depends largely on the nature of the sub-grade. Good surface and sub-surface drainage usually insures a solid road bed where the normal bearing value of the material qualifies it for heavy loading. Where such conditions prevail, track surface is maintained with a minimum amount of tamping and the mechanical effect of the ballast on the ties is negligible.

Ties which are removed after service in hard-ballast tracks are found to be pitted or indented on the bottom and sides from contact with the stone or other material. These indentations are a valuable factor in holding the track in line and surface as long as they are not increased by frequent tamping. The continual tamping of the ballast under the tie soon rounds off the edges of the ties, leaving little or no flat bearing surface for support. When this happens the tie acts as a wedge and tends to force the ballast out into the cribs instead of receiving full support from it. The greatest wear occurs from 6 to 8 in. either side of the rail and there is practically none directly under the rail. In track maintenance the best practice is to tamp the tie for its full bearing upon the ballast outside of the rail and for an equal distance inside. In spite of close supervision, however, this is not always done but instead, the trackman expends his efforts toward tamping solidly as near the rail as he can work with a tamping pick. This wears off the edge of the tie for some distance each side of the rail and leaves a short unworn edge directly under the rail. When a tie becomes rounded on the bottom at the most essential tamping point and becomes difficult to maintain to surface, it is then found more economical to replace it with a new tie having a flat bottom that will necessitate less tamping. The average trackman feels little hesitancy about removing a tie for this cause when he has difficulty in keeping it tamped. Even in cases of most excessive tamping, wear from ballast does not become objectionable until the tie has been in service from 50 to 75 per cent of its normal life. The kinds of ballast and ties used and the standard at which a track is maintained, are all important factors. Slag and stone when crushed, form hard, sharp, angular fragments that appear from observation, to be more destructive when tamped under wooden ties than gravel, burnt clay, cinders, granulated slag or other similar forms of ballast. Ballast of the last named materials has little or no effect in wearing down the sides and bottoms of the ties nor is the tamping of this kind of ballast so destructive to the ties, as the particles are smaller, generally of softer material and rounded in form. There is a perceptible difference in the resistance offered against mechanical wear by ties made from the different kinds of wood. Hard wood ties of rough texture withstand the action of the rail cutting and of excessive tamping much longer than ties of soft wood. It has been observed that these ties which are most durable under the mechanical wear of the rail also last longer under the wear of ballast; for instance—white oak, chestnut oak, black walnut, maple and beech are more suitable than yellow pine, fir, catalpa, cedar and red wood.

It is important to mention the extent to which some forms of ballast increase the abrasive action of the rail upon the tie. Granulated slag, gravel, cinders, chatts and other forms of ballast carrying fine gritty particles contribute largely to this action between the rail and the tie or between the tie plate and the tie thus greatly accelerating the mechanical wearing away of the wood. It has been observed that the cutting of the rail into the tie is much greater where fine ballast is used than where coarse hard ballast is employed. This trouble has been largely overcome by the use of flanged bottom plates which become embedded in the tie, and by plates fastened directly to the ties by lag screws, independent of the rail spiking, thus reducing the movement between the plate and tie to a minimum. However, many ties are removed from track each year because of deterioration from rail wear and a large amount of this deterioration can be assigned to the effect of the fine particles of ballast grinding under the rail.

Regarding the use of treated ties where extraordinary wear by ballast is known to exist; the same rule might apply that is observed when the mechanical wear under the rail limits the life of the tie. Treatment to prevent decay does not give the tie in-

creased resistance to abrasion, and ballast abrasion that is so severe as to wear out an untreated tie would preclude the possibility of any benefit from the use of treated ties at locations where such abrasion occurs.

AIR SEASONING OF CROSS TIES

By A. H. Noyes

Ayer & Lord Tie Company, Chicago

The ever increasing shortage of oak timber of all species makes the adoption of softwoods for ties a necessity. As the character of this timber requires careful handling to insure the delivery of sound material to the treating plant, and thereby a serviceable tie to the consuming road, the proper methods of handling such ties, particularly of beech and gum, are worthy of consideration.

Owing to the structure of the timber, beech ties are nearly always sawed. They are too hard to hew, and on seasoning, get rough or scaly. On the other hand, gum timber hews easily and makes a smooth, pretty tie. When gum or beech ties are produced tributary to a railroad, it is advisable that they be shipped into the treating plant as promptly as possible, after being made, and seasoned at the plant in preference to seasoning on the line of the road, as, in this event, the ties can be stacked for seasoning under more satisfactory conditions, and can be loaded for treatment at the proper time; in fact, the entire process kept under more complete supervision and control than under other conditions and in this manner avoid the possibility of damaged timber reaching the treating plant.

It is an accepted fact that all ties, softwood especially, should be carefully piled, never on the ground, but on sound stringers, and either with spacing strips between layers, or that they be piled so that the faces do not have full bearing against each other, as experience has shown that ties piled too close soon show damage.

Experience on river territories shows that it is not safe to buy softwood ties while the sap is up, no matter how carefully the ties are piled for proper seasoning, as transportation during the summer is not to be counted on with any amount of security and ties are liable to be damaged before they are loaded for shipment. Besides this, softwood ties piled on river landings are, in some cases, in deep shade, or, where in the open, are frequently surrounded with a rank growth of weeds, that tends to hold the moisture, creating conditions favorable to rapid damage. For this reason, the practice of buying softwood ties at small landings should be avoided, and ties should be hauled to such landings only where they are handled in large quantities, where the timber will be exposed to sunlight and free air currents, where landings are free from weed growths and where shipments can be made by date rather than by appearance of the timber.

SILL TIES

By F. J. Angier

Superintendent Timber Preservation, Baltimore & Ohio, Baltimore, Md.

Seasoning conditions in tie storage yards vary considerably. One yard may be nicely drained and ballasted, another may harbor conditions which are conducive to the decay of timber. It is fair to assume that there can be found in all tie yards more or less decayed timber, and, generally speaking, this decayed timber will be in direct contact with the ground. To reduce this useless waste of good material ties should be seasoned on sills that will not decay. These sills may be of wood chemically preserved, or they may be of concrete.

To compare the cost of the various kinds of sill ties, the following data has been prepared for the tie storage yard of the Baltimore & Ohio at Green Spring, W. Va. The present trackage provides for the storage of approximately 600,000 ties. This is calculated on a basis of cribbing ties in lots of 100, making four cribs to a pile and 1,500 piles. This will require 12,000 sill ties to season the maximum number of 600,000 ties. Every sill tie is in direct contact with the ground.

Approximately 75 per cent of all ties received for treatment at this plant are purchased as No. 1 and 25 per cent as No. 2 ties. The cost varies in different localities, but we can assume that the average price paid for No. 1 ties is 60c and for No. 2 ties 40c. We believe it conservative to say that 10 per cent of the untreated sill ties check or are damaged to such an extent that they can be used only as No. 2 ties and 2 per cent of all sill ties are broken or decayed to render them practically worthless. Using the above estimate as a basis, we may obtain the following comparisons:

Cost of Untreated Sills

10% of No. 1 ties, or 900, are made No. 2 at a loss of 20c each.		$ 180.00
2% of all sill ties are made worthless.		
180 No. 1 @ 60c each		108.00
60 No. 2 @ 40c each		24.00
Labor of turning over 12,000 sill ties and cleaning for treatment at ½c each		60.00
Restacking yard for locating sill ties		30.00
Disposing of worthless ties		6.00
Cost for six months		$ 408.00
Cost for one year		$ 816.00
Interest and taxes one year on 12,000 sill ties ($6,600.00 @ 7%)		462.00
Total cost for one year		$1278.00
Or, per sill per year		0.1065

Cost of Treated Sills

No. 2 ties each	$0.40		
Cost of treating and laying	0.18		
	$0.58		
Interest and taxes (6% plus 1%)		$0.0406	
Renewal cost (assuming 20 years life)		0.0290	
Annual cost per sill		$0.0696	
Total cost for one year			$835.20

Cost of Concrete Sills

12,000 at an estimated cost of 80c each	$9,600.00		
Labor, installing	300.00		
Total cost 12,000 sills	$9,900.00		
Cost per sill	$ 0.825		
Interest and taxes (6% plus 1%)		$	0.05775
Renewal cost (25 years' life)			0.03300
Annual cost per sill		$	0.09075
Annual cost (12,000 sills)			$1,089.00

These estimates show an annual saving in using treated sills over untreated of $443.00, and over concrete of $252.00. The cost of concrete sills may vary, but the estimate shown above is believed to be conservative.

An indirect saving should be credited to the treated and concrete sills on account of the following: (a) no infection of sound ties from contact with decaying untreated sill ties; (b) less injury to valves and pumps by cinders and other foreign matter carried into the retorts on ties that have been in contact with the ground, and (c) untreated sill ties that have been in contact with the ground are not as well seasoned as other ties in the same pile; therefore, when loaded in same charge they may be under-treated and their life shortened.

The cost of ties and their treatment will vary. Some plants may use cull ties, which cost practically nothing. The Baltimore & Ohio will not purchase cull ties at any price; and, therefore, sill ties must be made from the ties in stock, and these must be charged to stock account at the prices paid.

DESTRUCTION OF TIMBER BY MARINE BORERS

By E. S. Christian

General Manager, Norfolk Creosoting Company, Norfolk, Va.

It is conceded that marine borers do not thrive in foul water, and that they prefer the uncontaminated water of the ocean, hence, Hampton Roads, which is an arm of the Atlantic, offers an ideal environment for the growth of the teredo and its kindred borers. I have frequently seen specimens of xylotrya and other teredo, 3 ft. long and ⅝ in. in diameter, although the more destructive borer is much smaller and by far more numerous.

In this connection, the history of the Chesapeake & Ohio pier No. 6, formerly No. 1, at Newport News, Va., on Hampton Roads, just below the mouth of the James river, is interesting, not only because it tells the story of how timber treated with 12 lb. of dead oil per cu. ft. has withstood the attacks of marine borers for

32 years, but it also relates that in these same waters timber not creosoted was destroyed in two years. This pier is 800 ft. long and 200 ft. wide, requiring about 4,000 piles. It was first built in 1879 on charred pine and cypress piles. Charring at that time was thought to make timber immune from all marine borers, but upon examination one year later the piles were found to be damaged to such an extent as to make the pier unsafe. After wasting much time and money experimenting with patented substitutes, a contract was entered into with E. R. Andrews, of Boston, a protege of the Bethels, of Becton, England, to move his experimental creosoting plant from Boston to Money Point and to supervise the construction of a new plant at that place. This plant was completed in the early autumn of 1882 and the first creosoted piles used on the Atlantic coast were treated there and used in rebuilding this pier in October of the same year, the construction being completed in February, 1883.

The writer was appointed inspector on that work, probably for the same reason that many young men are now appointed, but he obeyed his orders, which were to see, as far as possible, that every cubic foot of each of the 4,000 piles absorbed 12 lb. of oil. One of the tests made to determine this was to bore each pile in six places and if any boring showed a penetration of less than 1½ in., the pile was rejected and treated again.

The oil was bought by the railroad company under the following specifications: "It must be distilled from the coal tar derived from Newcastle coal, and must be of a greenish yellow color when liquefied. It shall not contain any water, not over 8 per cent of tar acids, not less than 60 per cent of naphthalene, not less than 20 per cent of anthracene and anthracene oil. Not less than 5 per cent shall remain in the flask after it has been heated to a temperature of 320 deg. C."

This pier is today in daily use as one of the 14 units which comprise the terminals of this road at Newport News, 32 years after it was rebuilt on creosoted piles.

Analysis of test pieces of a pile taken from this pier in 1912 showed that after 30 years' service, there remained 10½ of the original 12 lb. of oil, and of this quantity, 55 per cent was naphthalene. All of these pieces were taken from the pile between the high water and the mud lines.

I have recommended 16 lb. of oil per cu. ft. for marine work in Hampton Roads because of the difficulty in obtaining oil with more than 35 per cent of naphthalene. I know that I am at variance with a great deal of expert opinion, but my experience tells me that I am right. I believe, however, that in the treatment of cross ties and bridge timbers, the naphthalene fraction may be lowered providing that the percentage of pitch is increased. It is well to note that piles not creosoted, when used in Hampton Roads or its adjacent waters, will be destroyed by marine insects in two years. I have known of untreated piles driven in April near the Virginian Railway piers, to be entirely destroyed at the low water mark by the following September. It is, however, a well known fact that the destructiveness of the teredo will vary from one year to another.

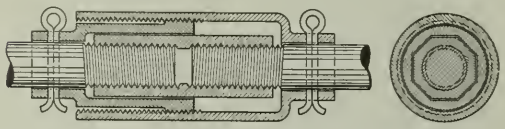
An illustration of the value of timber treated with oil containing over 50 per cent of naphthalene, is found in the Manatee river bridge on the west coast of Florida, built by the Seaboard Air Line in 1900. The chief engineer consulted me as to the advisability of using creosoted piles, and at the same time warned me that the Government engineer in command in that district who had had a great deal of experience in the use of creosoted timber on the west coast, advised against using it and stated that it would not last three years. Knowing, however, that his experience was based entirely on long leaf pine indifferently treated, I assured Col. Gwathmey that sap pine treated with 25 lb. of oil per cu. ft. would stand, and now, after 14 years, I am told that these piles are in perfect condition.

CLOSING BUSINESS

It was decided to hold the next annual meeting, beginning the third Tuesday in January, 1916, at Chicago.

A NEW TURNBUCKLE FOR SWITCH ADJUSTMENT

One of the minor but nevertheless important details of track work is the maintenance of the proper head and switch rod adjustments. To simplify this work, The Hardick Locked & Covered Turnbuckle Company, 14 East Jackson boulevard, Chicago, has devised a turnbuckle for insertion in these rods by the use of which it is claimed that the attention required will be materially reduced. This device consists of a long octagonal nut or turnbuckle proper enclosed in two separate casings, making three distinct parts. The inner bore of the inside casing



A Cross Section of the Hardick Locked and Covered Turnbuckle

is also octagonal to engage the nut or turnbuckle while the outer casing or sleeve is threaded on the inside to correspond with the outside surface of the inner casing. Both sleeves are also slotted at the ends to permit cotter pins to pass through the casings and the rod, locking them into one unit. In this way the turnbuckle is encased to protect it from corrosion. To adjust the turnbuckle, the cotter pins are removed, the outer casing unscrewed from the inner one, the casings pushed back out of position and the turnbuckle adjustment made in the ordinary manner. The outer end of each casing is hexagonal in shape to permit the use of a wrench if desired. As small an adjustment as 1/48 in. can be secured. To further simplify the switch con-

A Head Rod on the G. R. & I. Equipped with the Hardick Locked and Covered Turnbuckle

nections, the switch and head rods are made in one piece, having simple connections with the switch rails, which reduces the number of bolts and the connections ordinarily required.

One of these turnbuckles was removed from a track of the Grand Rapids & Indiana at Grand Rapids, Mich., after 14 months and although the outer casing was marred, showing that it had been struck by picks in cleaning ice and snow from the track, the threads on the inside showed no deterioration and the oil which was put on at its installation was still evident. The accompanying photograph shows a complete head rod which has now been in service on the same road for four months.

RAILWAY GATES AT ANTWERP TO BE MADE INTO SHELLS.—According to reports, the German authorities have taken the great bronze gates of the Central Railway station at Antwerp in order to make ammunition.

General News Department

The Missouri Bankers' Association has appointed a special committee to study conditions affecting the Missouri railroads.

Telegraph operators and station agents on the Texas & Pacific have filed a demand with the management for an increase of 15 per cent in pay and certain changes in working conditions.

The Snoqualmie tunnel through the Cascade mountains on the Chicago, Milwaukee & St. Paul, was formally opened for traffic on January 15, and the transcontinental passenger trains, the Olympian and the Columbian, passed through the tunnel on that day.

Two bills have been introduced in the legislature of New York to repeal the full crew law, which was passed in 1913. This is the law concerning which a copy of a letter was published in the newspapers wherein William Sulzer, afterward elected governor virtually promised beforehand to give the act his approval.

The new electric interlocking plant at Aulon, Tenn., near Memphis, at the crossing of the Nashville, Chattanooga & St. Louis, the Louisville & Nashville and the Illinois Central was put in service this week. In connection with the interlocking an "automatic flagman," made by the L. S. Brach Supply Company, of New York, was installed at the Poplar Boulevard grade crossing.

A bill has been introduced in Congress by Mr. Goeke, of Ohio, H. R. No. 17,894, to amend the Boiler Inspection Act of February 17, 1911, so as to provide for the inspection by government inspectors of all parts of the locomotive and tender; and it has been passed by the House. A law of this nature was recommended by the Interstate Commerce Commission. In the Senate the bill was referred to the committee on interstate commerce.

The New York State Public Service Commission announces the conclusion of an agreement for the purchase of the easement under the property of the New York Central, at the northwest corner of Lexington avenue and Forty-second street, New York. This easement is required for the construction of the diagonal subway which is to connect the existing subway in Park avenue with the new subway in Lexington avenue. The consideration for the grant is $902,500, of which $500,000 is for the easement, and the remainder for the construction of the subway underneath the New York Central property. This part of the new subway is to be finished in about three years.

The Farmers' Union has given out a signed statement by President W. D. Lewis and Peter Radford, national lecturer, urging opposition to the passage of a full crew law by the Texas legislature. The article says "there is no payroll in civilization that does not rest upon the back of the farmer. He must pay the bills all of them." The article goes on to argue that the farmer in the long run pays a large part of the expenses of the railroads, including any unnecessary expenditures, whether caused by laws or by errors of the management. The full crew law is cited as an example of one of the unnecessary expenses which have been saddled on the railroad managements in various states.

The question when the Grand Trunk Pacific shall begin operation of the National Transcontinental Railway, the new Canadian line between Winnipeg and the Atlantic seaboard, has been under discussion between the government and the officers of the Grand Trunk during the past week, but it is said that no agreement has been reached. The road was mostly finished last autumn, and it is said that, according to the contract, the G. T. P. should have begun its operation on November 1. It is believed that the railroad officers are demanding a change in the terms of the contract, on the ground that the exorbitant cost of the new line has made a capital charge which will be greater than the traffic of the line can be made to pay.

Charles S. Whitman, the new Republican Governor of New York, has endorsed a proposition to consolidate the two public service commissions of the state and to reduce the salaries of the members from the present rate of $15,000 a year. A bill has been introduced in the legislature by Mr. Green of Kings county, designed to effect the proposed consolidation. Mr. Green would have the commission consist of an electrical engineer, a civil engineer, a "practical" railroad engineer, two attorneys experienced respectively in corporation and financial law, and two business men. Three members of the proposed new commission would be chosen from the political party casting the second highest number of votes at the last election. The terms of office would be reduced from five to two years.

A "Square Deal to Railroads" meeting was held by the Springfield Club of Springfield, Mo., on Friday, January 15, which was attended by 300 members of the civic and commercial organizations of the city and officers and employees of the railroads running through Springfield. All three of the receivers of the St. Louis & San Francisco, J. W. Lusk, W. C. Nixon and W. B. Biddle, were present, while the Missouri Pacific was represented by E. J. Pearson, vice-president, and Alexander Robertson, assistant to the president. Short speeches were made by these and other railroad men, by officers and members of the Springfield Club, and by W. C. Turner, vice-president of the Order of Railway Conductors; and the keynote of the entire meeting, as indicated in the speeches, was that under present legislative regulation the railroads are unable to make a reasonable profit, that in the prosperity of the carriers is bound up the prosperity of the American people, and that the best interests of both will be served by a more liberal treatment of the railroads. H. B. Hornsby, vice-president and general manager of the United Iron Works, was chairman of the committee in charge of the dinner.

Efficiency; the Very Latest

At Sayre, Pa., an important division terminal of the Lehigh Valley, a stranger, whiling away a half hour in a moving picture house, was surprised, following a western photo drama, to see thrown on the screen an announcement like this:

"James Brown, Thomas Jones, William White and John Black boarded for 10 p. m."

This announcement apparently did not cause the least ripple of curiosity in the house, unless it was on the part of the visitor. The men named were members of a freight train crew. The division superintendent at Sayre has made an arrangement with the moving picture theatre men so that freight crews can be called on their screens at any time. Thus the men can amuse themselves when they are in Sayre without fear of causing trouble for the call boys.

Proposed Additional Accident Statistics

The Interstate Commerce Commission has issued a tentative draft of revised rules governing monthly reports of railway accidents, and at Washington, last Monday, held a hearing to receive criticisms and suggestions. The forms prescribed for use in giving the details of individual accidents have been rearranged, calling for additional details; and there are three new forms: one for locomotive accidents, another for "non-train" accidents and a third for reporting cases where persons reported injured have subsequently died. The term "train accident" is amplified to include all accidents to persons happening in connection with the movement of cars or engines. Industrial accidents, so-called, which now are reported only in a single item, giving the total for the month, will have to be reported in detail, like those more closely connected with train operation. Each monthly statement must include a summary of train accidents compared on the basis of locomotive miles and a summary of industrial accidents compared on the basis of man-hours of employees. No general summary is required; the commission will attend to that in its own offices.

In place of the present four-page sheet of instruction, there is a pamphlet of 16 pages. Persons involved in accidents, whether causing accidents or injured by them, must be de-

scribed so that the statistician at Washington can assign them to the right one of 80 classes; 68 classes for employees, 1 for employees not on duty and the other 11 for passengers and outsiders. Accidents to men in shops, etc., are to be divided into 12 classes, according to causes and the injury to the person,

Operating Revenues and Expenses of Express Companies for September

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for September, 1914. (The express companies have three months in which to make reports.)

A—For the Month of September

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered	44,812	38,445	73,475	61,213	9,677	7,080	2,840	2,840	9,569	9,278
Charges for transportation	$3,022,451	$3,089,673	$4,169,588	$3,896,043	$296,134	$348,353	$76,277	$77,767	$279,711	$314,926
Express privileges—Dr.	1,620,252	1,639,918	2,068,054	1,921,039	150,184	159,542	39,176	38,715	170,115	191,268
Operations other than transportation	42,804	30,014	213,682	188,263	5,187	13,018	874	951	5,147	4,620
Total operating revenues	1,445,003	1,479,769	2,315,217	2,163,267	151,137	201,329	39,975	40,003	114,743	128,278
Operating expenses	1,571,648	1,410,145	2,135,381	1,993,410	132,607	152,808	31,428	32,937	92,402	92,103
Net operating revenue	* *126,644*	69,624	179,835	169,856	18,529	49,021	8,547	7,066	22,341	36,175
Uncollectible revenue from transport'n.	648	.....	276	.....	.....	.....	.....	.....	.....	.....
Express taxes	18,101	16,538	35,966	30,450	4,000	2,850	1,100	1,200	4,069	4,181
Operating income	† *145,394*	53,085	143,591	139,405	14,529	46,171	7,447	5,866	18,271	31,993

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named ‡	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered	8,118	8,080	34,680	33,527	112,117	99,467	5,174	5,009	300,461	297,889
Charges for transportation	$251,322	$302,321	$1,039,851	$1,165,769	$3,186,755	$2,808,338	$100,469	$112,015	$12,424,592	$13,920,638
Express privileges—Dr.	136,252	162,347	529,493	592,334	1,634,057	1,399,845	54,191	64,120	6,401,777	7,095,442
Operations other than transportation	3,824	3,752	26,313	26,902	56,677	53,174	3,388	2,357	357,901	349,383
Total operating revenues	118,894	143,726	536,702	600,337	1,609,375	1,461,668	49,667	50,251	6,380,716	7,174,578
Operating expenses	92,643	95,822	522,158	531,868	1,530,872	1,285,668	53,074	52,830	6,162,217	6,538,998
Net operating revenue	26,251	47,903	14,543	68,468	78,502	175,999	* *3,407*	* *2,578*	218,499	635,580
Uncollectible revenue from transport'n.	2	1	10	18	453	.....	4	.....	1,396	19
Express taxes	5,000	4,500	15,075	14,265	36,885	33,000	1,125	789	121,323	116,677
Operating income	21,249	43,401	† 542	54,164	41,163	142,999	† *4,537*	† *3,368*	95,779	518,882

B—For the Three Months Ending with September

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation	$8,676,229	$8,721,325	$12,004,228	$11,036,279	$906,213	$946,750	$231,487	$223,325	$943,484	$957,275
Express privileges—Dr.	4,480,512	4,488,199	5,971,900	5,470,523	461,035	443,656	115,736	111,501	572,021	580,870
Operations other than transportation	133,481	90,497	570,055	564,572	15,824	31,887	2,476	2,700	14,966	13,718
Total operating revenues	4,329,198	4,323,623	6,602,382	6,130,328	461,001	534,982	118,227	114,524	386,430	390,122
Operating expenses	4,607,975	4,242,160	6,560,282	5,942,783	415,423	444,472	92,586	96,147	278,629	279,169
Net operating revenue	* *273,776*	81,463	42,100	187,544	45,578	90,509	25,640	18,377	107,800	110,953
Uncollectible revenue from transport'n.	1,361	.....	387	.....	.....	.....	.....	.....	.....	.....
Express taxes	53,103	48,233	110,021	93,995	12,000	8,450	3,300	3,600	12,928	12,609
Operating income	† *333,242*	33,229	† *68,308*	93,548	33,578	62,059	22,340	14,777	94,872	98,343

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named ‡	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation	$852,284	$960,116	$3,182,631	$3,299,264	$9,571,210	$8,209,973	$308,069	$343,931	$36,675,838	$39,969,613
Express privileges—Dr.	454,658	512,853	1,622,811	1,680,916	4,916,631	4,100,086	165,874	189,232	18,761,182	20,229,058
Operations other than transportation	10,425	10,391	72,684	72,003	176,736	166,898	9,068	7,220	1,005,719	1,039,769
Total operating revenues	408,051	457,653	1,632,504	1,690,351	4,631,315	4,276,785	151,264	161,920	18,920,375	20,780,324
Operating expenses	286,190	292,626	1,572,285	1,592,262	4,556,737	3,816,573	162,096	151,740	18,532,266	19,533,511
Net operating revenue	121,861	165,027	60,218	98,069	274,517	460,211	* *10,832*	10,179	358,102	1,246,813
Uncollectible revenue from transport'n.	32	9	10	26	1,169	.....	30	.....	2,992	35
Express taxes	15,000	13,500	44,665	41,638	111,332	96,000	3,380	2,344	366,132	350,028
Operating income	106,326	151,518	15,543	56,414	161,615	364,211	† *14,243*	7,835	18,984	896,749

* Indicates deficit. † Indicates loss. ‡ Includes previous year's returns of United States Express Co.

which must be reported in detail. For example, paragraph 38 says:

"In reporting any nontrain accident, the accident should be clearly described and the cause shown wherever practicable. In case of any permanent injury to arm or hand, state whether right or left arm or hand; in case of loss of any part, state exact extent, as, e. g., tip of index finger on right hand, two middle fingers to second joint on left hand, right arm to elbow, loss of sight in right eye, etc. If the accident was due to any defect in structure or machine, state what steps have been taken to correct the defect; if due to lack of guards over rapidly moving parts of machinery, state that fact. . . ."

It is proposed to apply the new rules to all accidents occurring since the beginning of 1915. In addition to bodily injuries heretofore reported, the commission, according to the new rules, would call for reports of cases where the injury disables the man for only two or three days.

At the hearing on Monday the railroads were represented by Messrs. J. Kruttschnitt, W. W. Atterbury and W. G. Besler, a sub-committee of the executive committee of the American Railway Association, and by W. C. Wilson of the Lackawanna, F. V. Whiting of the New York Central, and others. After brief statements on the part of the commission and of the railroads it was decided to defer action until a conference could be held, probably within a month, between the railroad representatives and W. J. Meyer, statistician of the commission. A representative of the federal bureau of labor statistics and one or more from the railway employees' unions will probably take part in the conference. It is expected that Mr. Kruttschnitt's committee will keep the railroads informed of all developments.

The United Engineering Society

The trustees of the United Engineering Society, representing the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, and with the co-operation of the American Society of Civil Engineers at a meeting to be held in the auditorium of the Engineering Societies building, New York, on Wednesday, January 27, at 8:30 p. m., will inaugurate the Engineering Foundation. This foundation, inaugurated by the United Engineering Society, is a fund to be "devoted to the advancement of the engineering arts and sciences in all their branches, to the greatest good of the engineering profession and to the benefit of mankind." The speakers at the meeting will be as follows: Gano Dunn, president of the United Engineering Society and past-president of the American Institute of Electrical Engineers; Dr. Henry S. Pritchett, president of the Foundation for the Advancement of Teaching; Dr. Robert W. Hunt, past-president of the American Institute of Mining Engineers, and Dr. Alexander C. Humphreys, past-president of the American Society of Mechanical Engineers.

The Railway Club of Pittsburgh

At the regular meeting of the Railway Club of Pittsburgh, to be held at the Monongahela House, Pittsburgh, Pa., on Friday evening, January 22, an illustrated address will be given by H. T. Herr, vice-president and general manager of the Westinghouse Machine Company, dealing with recent developments in

steam engineering, and more especially with turbines for driving electric generators and as used for marine propulsion.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. Hereafter the full list of meetings and conventions will be published only in the first issue of the Railway Age Gazette for each month.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, March 2-3, San Francisco, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August. Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lyiton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meetings, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next regular meeting, January 21, 1915, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except, June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

The Grand Trunk and the Canadian Pacific have taken off each one train in each direction between Montreal and Ottawa, on account of the shrinkage of business.

The Michigan railroads have announced their intention of urging a repeal of the state two-cent fare law and the substitution of a law which will permit fares on the basis of 2½ cents a mile.

The railways of Illinois have definitely decided to ask the legislature to make a change in the law so as to allow an increase of passenger fares to the basis of 2½ cents a mile, and have appointed a committee to conduct a campaign, of which S. G. Hatch, passenger traffic manager of the Illinois Central, is chairman.

The commissioner of agriculture of Virginia is this week running an instruction train over the New York, Philadelphia & Norfolk, stopping at Oak Hall, Bloxum, Onley, Nassawadox and Cape Charles.

The Chicago, Burlington & Quincy has announced that during the calendar year 1914 it carried 24,445,911 passengers without a fatality to a passenger for which the railroad could be held legally responsible.

A bill has been introduced in the legislature of North Carolina to repeal the long and short haul clause of the intrastate freight rate act which was passed last year. A number of short railroads complain that the enforcement of the long and short haul provision has deprived them of important competitive traffic formerly enjoyed.

The Illinois Central has given out a statement that during the two years ending January 1, 1915, it carried 26,271,000 passengers without a fatality to a passenger. In its Chicago suburban trains, which carry 40,000 passengers a day the company says it has not killed a passenger for 53 years, or since the beginning of the suburban service, and it is also stated that no revenue passenger has been killed on the Illinois Central proper, exclusive of the Yazoo & Mississippi Valley, since March 6, 1910.

It has been estimated this week that the grain in cars at New York and Jersey City terminals awaiting trans-Atlantic shipment amounts to more than 7,000 carloads; and the Pennsylvania is said to have 3,000 cars awaiting vessels at Baltimore. That road has been obliged to place an embargo on grain for export through Baltimore. The road is holding 1,379 cars of export freight in yards west of Altoona. Ocean freight rates to Europe are said now to be three or four times the normal rate prior to the war. Many shiploads of grain are lying in English ports waiting to be unloaded. The scarcity of ships is attributed to the unusually large quantity of grain being offered for export and also to the detentions due to the strict regulations of the British government in regard to contraband goods.

The receivers of the Pere Marquette have addressed to the Michigan legislature a petition for a repeal of the state two-cent passenger fare law and the substitution of a law allowing rates of 2½ cents a mile. The petition states that during the last fiscal year the average rate per passenger mile on the Pere Marquette was 1.89 cents, while the actual cost of handling passenger traffic was 2.2 cents. The application says that this road asks no favors for itself that are not granted to all roads in the state on an equitable basis. It is claimed that the freight rates on this road are as low as any in the United States. The receivers declare that they have carried economy to the limit. It is reported that a majority of the members of the Michigan legislature are willing to advance the passenger fares of the Pere Marquette, but that they do not wish to advance rates on certain other roads. Senator Kelley has advocated the passage of a law to require that fares for passenger transportation be made different on the different roads, according to their earnings per mile.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has set March 14 as the date for the hearing on the proposed order authorizing the railroads to divide their primary accounts so as to meet the requirements of the different states. Briefs are to be filed before February 27.

It is announced that hearings will be held by Examiner Attorney Brown on the proposed charges for trap car service, which have been filed by the railroads and have been suspended by the commission, as follows: Detroit, March 1; Cleveland, March 3; Buffalo, March 5; Philadelphia, March 8; Pittsburgh, March 11; Cincinnati, March 15; St. Louis, March 18; Kansas City, March 22, and Chicago, March 25.

Class and Commodity Rates to and from Quincy, Ill.

Opinion by Commissioner Clements:

The carriers having proposed to increase class and commodity rates between Quincy, Ill., Hannibal and Louisiana, Mo., and points taking the same rates, on the one hand and points in trunk line and central freight association on the other, the commission finds that such increase is not justified. In the Mississippi River case (28 I. C. C., 47) the commission held that there was no reason why all the crossings from St. Louis to Dubuque should not be on the same basis with respect to traffic from seaboard territory. For reasons stated in the opinion in that case the rates to the upper crossings were not reduced to the St. Louis basis. To increase rates now to Quincy, Hannibal and Louisiana, to the upper crossing basis, leaving St. Louis the only crossing taking lower rates, would not benefit the upper crossings and would have a serious effect on the business interests of the three cities involved and would redound only to the benefit of St. Louis. (32 I. C. C., 471.)

Rates on Cement from Points in Illinois

Opinion by Commissioner Harlan:

The commision finds that the carriers have justified an increase from eight cents to 10 cents per 100 lb. in the rate on cement in carloads from Chicago group points to St. Paul. A similar increase of 8.5 cents to 10.5 in the rates from St. Louis to St. Paul is likewise found justifiable. An increase in the rate on cement from Mason City, Ia., to St. Paul from 5 cents to 7 cents is held to result in an unreasonable rate, but the commission allows an advance to 6 cents. In the case of the rate from Des Moines to St. Paul the commission refuses to allow an advance from 7 cents to 9 cents, but will permit the carriers to make an advance to 8 cents. A proposed increase from 15 cents to 17 cents in the rate from Iola, Kan., to St. Paul is not justified. (32 I. C. C., 369.)

Transcontinental Commodity Rates to San Jose, Santa Clara and Marysville, Cal.

Opinion by Commissioner McChord:

The commission in Santa Rosa Traffic Association v. Southern Pacific (24 I. C. C., 46, and 29 I. C. C., 65) found, with respect to the physical condition surrounding the delivery of transcontinental freight, that there was no dissimilarity sufficient to justify the defendants in giving "terminal" commodity rates to San Jose, Santa Clara and Marysville and at the same time denying such rates to Santa Rosa. The defendants were therefore required, so long as they applied "terminal" commodity rates to San Jose, Santa Clara and Marysville, to apply no higher rates to Santa Rosa, it not being stated, however, whether similar rates should be granted to Santa Rosa or withdrawn from the other three points. The carriers elected to withdraw the terminal privileges granted the other three points. The commission now finds that the carriers have not justified this proposed change, it being held that the withdrawal of terminal commodity rates to San Jose, Santa Clara and Marysville which are not directly reached by Atlantic-Pacific ocean lines while continuing such rates to other interior California points not directly reached by said ocean lines would subject these three points to discrimination. The commission in its decision states that there can be no question about the great commercial advantages which accrue to the towns having these terminal rates and that in the contest for the new factories and industries looking for locations on the Pacific coast the town with these rates has an advantage which cannot be overcome by its rivals without them. "In one sense, the competition between towns for new factories and industries is more important than the competition between factories and industries already in those towns for trade. New factories mean more workers, more money, more houses and more people in general, and, after all, the struggle between these Pacific coast cities is essentially one for population." The rule is laid down that when the question of freight rates enters into the competition of cities and towns in any respect whatsoever, whether that competition is one for trade, factories, or people, complaints alleging unjust discrimination will be entertained by the commission. (32 I. C. C., 449.)

Rates on Lumber from Anoka, Minn.

In re rates on lumber from Anoka, Minn., and other points to stations in South and North Dakota. Opinion by Commissioner McChord:

The commission finds that the Chicago, Milwaukee & St. Paul has not justified proposed increased rates on lumber in carloads from Anoka and other points in Minnesota to points in South Dakota and North Dakota. "The justification offered for the proposed increased rates is hardly more than an expressed desire to secure uniformity in the rate relationship. There are doubtless cases where increased rates may be proper for this purpose, but it is to be remembered that uniformity may be secured in many cases by reduced rates as well as by increased rates. The mere fact that a relation of rates requires readjustment in the interest of uniformity is not proof that rates increased to the level of the relatively higher rates are reasonable." (32 I. C. C., 494.)

STATE COMMISSIONS

New Mexico.—See Court News.

The New Jersey Public Utility Commission has issued an order looking to the abolition of 15 highway grade crossings in Paterson.

The Railway Commission of Canada has notified the railways that changes in schedule time of passenger trains must be announced at stations ten days in advance.

The Southern Pacific, the Atchison, Topeka & Santa Fe and the Western Pacific have notified the California Railroad Commission that they will abolish all switching charges on cars delivered from or taken to industry tracks, when incidental to a line haul.

J. M. Atkinson, chairman of the Missouri Public Service Commission, has issued a statement saying that if the Missouri legislature seeks to pass a bill increasing the state passenger fare from 2 cents to 2½ cents a mile the state commission will put no obstruction in the way.

The Colorado Public Utilities Commission has summoned six railroads to appear on February 16, to show cause why the intrastate rates on coal should not be reduced. The same roads also have been ordered to appear on February 8, to show cause why certain of their passenger fares between mountain points should not be reduced.

The Railroad Commission of Louisiana has authorized the Tremont & Gulf to take up the track of its Pyburn branch, extending from Menefee, La., to Pyburn, 11 miles. The commission has examined the track and says that it is in such bad condition as to be unsafe for the operation of trains. It is estimated that the rails are worth $26,000.

Although the Minnesota Railroad & Warehouse Commission issued an order limiting the speed of passenger trains on the main track of the Chicago, Rock Island & Pacific in Minnesota to 30 miles an hour on the recommendation of an inspector of the commission, as stated in our issue of January 15, an inspection of the track by the commission itself showed that this order was unnecessary and it was annulled immediately after this in-

spection. The commission found the track to be safe for the speed at which trains were being run over it.

PERSONNEL OF COMMISSIONS

John H. Roemer has resigned as a member of the Wisconsin Railroad Commission, effective February 1.

Nathaniel S. Ketchum, a member of the Board of Railroad Commissioners of Iowa, died at his home in Marshalltown, Iowa, on January 17, aged 75 years.

Carl D. Jackson, of Oshkosh, Wis., former district attorney of Winnebago county, has been appointed a member of the Wisconsin Railroad Commission, to succeed John H. Roemer, resigned.

COURT NEWS

The Supreme Court of Virginia in a case involving the transportation by express of liquors from Virginia into North Carolina holds that the carrier cannot refuse to transport when the goods are intended for personal consumption and not for sale.

The Texas Cattle Raisers' Association has filed suit in the Federal Court at Kansas City, Mo., against 10 railroads, to recover alleged excess freight rates paid by shippers on cattle shipments from 1903 until the rates were reduced by the Interstate Commerce Commission in 1908.

The Wisconsin Supreme Court last week rendered a decision holding unconstitutional the local taxation of property of the Minneapolis, St. Paul & Sault Ste. Marie, consisting of ore docks and freight terminals in Douglas county, on the ground that this property cannot be separated from the other property of the railroad in the state and be subjected to local taxation at a higher rate than the rate applied by the state tax commission. The court said that terminal facilities constitute property necessarily used in the operation of a railroad and hence become part of the entirety.

The Supreme Court of the United States has affirmed the judgment of the Supreme Court of Georgia, sustaining the railroad commission of that state in imposing a fine of $1,000 on the Wadley Southern for discrimination in the distribution of shipments of freight which were to go beyond its own line. Certain shippers had complained that the Central of Georgia was favored, as against the Macon & Dublin. The statute authorizing the commission to punish disobedience of its orders by a fine, allows cumulative fines in such a large sum that the defence argued that this law, in effect, denied the railroad due process of law, as carriers would obey an unreasonable order rather than take the risk of an excessive penalty. The federal court held, however, that the law was not unconstitutional, as another statute of Georgia provides for a hearing before the imposition of a fine.

Judge Putnam, in the United States Circuit Court of Appeals, at Boston, last week, decided in favor of the Boston & Albany Railroad in its suit to be exempted from the provisions of the Federal corporation tax law. The court holds that the road's property being leased to the New York Central, it does not come within the terms of the law imposing a corporation tax for "doing business." The road receives an annual income of $2,000,000 from the New York Central; but the receipt of this money and the payment of dividends are not to be understood as "doing business" within the meaning of the statute.

The Supreme Court of New Mexico, in a decision by Chief Justice Roberts, has sustained the corporation commission of that state in dismissing a complaint of the New Mexico Woolgrowers' Association, asking that the Atchison, Topeka & Santa Fe be required to maintain scales, on which to weigh livestock, at five principal points on the line of its road in that state. The commission held that as livestock is carried by the carload, and not by actual weight, the weighing of the animals is not a feature of transportation and therefore the railroad is not called upon to maintain scales for that purpose. At all of the places which figured in the complaint scales are available on which animals can be weighed for a small fee. It appears that the shippers desire free scales, not in connection with transportation, but to enable them to ascertain actual weights for use in making out the bills to be paid by the buyer.

Railway Officers

Executive, Financial, Legal and Accounting

E. L. Parker has been appointed treasurer and paymaster of the Texarkana & Ft. Smith, with headquarters at Texarkana, Ark., succeeding I. C. McGee, resigned.

I. C. McGee, treasurer of the Texarkana & Ft. Smith, has been appointed treasurer of the Kansas City Southern, with headquarters at Kansas City, Mo., succeeding H. Visscher.

C. J. Kulp, assistant treasurer of the Lehigh Valley, with headquarters at Philadelphia, Pa., has been elected treasurer. J. M. Baxter, who retires as treasurer, has been in poor health for the past two years and requested that he be not re-elected. Mr. Kulp was born in Philadelphia, Pa., and has lived there all his life. He has been connected with the Lehigh Valley for 28 years, having entered the accounting department as a clerk in the disbursing office under Isaac McQuilkin, who was auditor of the railroad at that time. In 1903, when the treasury department of the Lehigh Valley was reorganized, Mr. Kulp assisted in that work and was selected as teller for the reorganized department, in which position he remained for four years, when he became chief clerk of the department. In 1910 he was elected an assistant treasurer, with office at Philadelphia, Pa., which position he held at the time of his recent election as treasurer of the same road, as above noted.

C. J. Kulp

Operating

Frank Hanning Wilson, whose appointment as general superintendent of the New York Central, in charge of the lines between Toledo and Chicago, with headquarters at Chicago, has already been announced in these columns, was born at Indianapolis, Ind., on November 12, 1873. He was educated in the public schools at Indianapolis and began railway work when 14 years of age as a messenger for the Indiana, Bloomington & Western. Subsequently until 1894 he was clerk to the trainmaster and to the superintendent of that road and the Cincinnati, Indianapolis, St. Louis & Chicago, and then until December, 1902, was secretary and chief clerk to the general superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, successor to the Cincinnati, Indianapolis, St. Louis & Chicago, and trainmaster of the Peoria & Eastern division. Mr. Wilson became connected with the Lake Shore

F. H. Wilson

& Michigan Southern in January, 1903, as special representative to the general manager. In February of the following year he was appointed trainmaster at Toledo, Ohio; in February, 1905, he was advanced to assistant division superintendent at Chicago, and in November of that year he was promoted to superintendent of the Western division, with headquarters at Chicago. He was made assistant general superintendent at Cleveland in January, 1910, and is now promoted to general superintendent of the New York Central and the Lake Shore & Michigan Southern, as has been previously stated in these columns, having become a part of the consolidated New York Central Railroad.

J. F. Tracy, trainmaster of the Northern Pacific at White Bear, Minn., has resigned, and the position is abolished.

W. E. Welch, assistant superintendent of the Fort Smith & Western and the St. Louis, El Reno & Western, has been appointed superintendent of those roads, with office at Fort Smith, Ark.

J. H. Curry, assistant trainmaster of the Lehigh Valley, at Delano, Pa., has been promoted to trainmaster of the Seneca division, with headquarters at Sayre, Pa., succeeding John Pickley, who has been transferred to the Board of Examiners of Enginemen and Firemen, and T. J. Burke, division engineer at Hazleton, Pa., has been appointed assistant trainmaster of the Mahanoy & Hazleton division, with headquarters at Delano, succeeding Mr. Curry.

J. F. Porterfield, whose appointment as general superintendent of transportation of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago, has already been announced in our columns, was born at Pulaski, Ill., on February 23, 1871. He was educated in the public schools and began railway work in May, 1883, with the Illinois Central, with which road he has remained ever since. He was successively messenger boy, telegraph operator, and agent, until 1890, and the following seven years was chief clerk on various divisions. From 1897 to 1905 he was trainmaster on different divisions, and from that date until May, 1912, was division superintendent at Vicksburg, McComb, Miss., at Memphis, Tenn., and at Carbondale, Ill. Mr. Porterfield was then appointed general superintendent of the lines south of the Ohio river, with headquarters at New Orleans, La., from which position he is now promoted to that of general superintendent of transportation, as above noted.

J. F. Porterfield

Engineering and Rolling Stock

James F. Donovan, supervisor of the Lehigh Valley at Delano, Pa., has been appointed division engineer, with headquarters at Hazleton, succeeding T. J. Burke, transferred to the operating department.

B. F. Beckman, superintendent of the Fort Smith & Western and the St. Louis, El Reno & Western, has been appointed engineer of those roads, with headquarters at Fort Smith, Ark.

J. K. Brassill, general master mechanic of the Northwestern Pacific at Tiburon, Cal., has been appointed superintendent of motive power and marine equipment of the Northwestern Pacific lines, with headquarters at Tiburon.

E. T. Reisler, division engineer of the Lehigh Valley at Buffalo, N. Y., has been transferred in the same capacity to Auburn, and L. P. Rossiter, assistant engineer of the Chicago, Rock Island & Pacific, at Manly, Iowa, has been appointed division engineer of the Lehigh Valley, with office at Buffalo, N. Y., succeeding Mr. Reisler.

Traffic

R. C. Campbell, agent of the Georgia Railroad at Athens, Ga., has been appointed general agent, with headquarters at the same place.

C. M. Swan has been appointed assistant general freight and passenger agent of the Mississippi River & Bonne Terre, with office at Bonne Terre, Mo.

W. S. Mitchell, commercial agent of the Missouri Pacific, the St. Louis, Iron Mountain & Southern, the Denver & Rio Grande and the Western Pacific, at Portland, Ore., has been appointed general agent at Seattle, Wash., succeeding J. M. Norton, deceased. E. B. Duffy succeeds Mr. Mitchell.

Michael J. Powers, whose appointment as general passenger agent of the Delaware & Hudson, with headquarters at Albany, N. Y., has already been announced in these columns, was born on June 9, 1882, at Albany, N. Y., and graduated from the Albany Business College in 1899. The following year he entered the service of the Delaware & Hudson as a clerk in the office of the auditor of revenue. Six months later he became a stenographer to the chief clerk in the office of the general passenger agent. In 1905 he became stenographer to the assistant general passenger agent, and was also given charge of the ticket room and the advertising department. Mr. Powers was promoted in January, 1910, to chief clerk, which position he held at the time of his recent appointment as general passenger agent of the same road, with headquarters at Albany, N. Y., as above noted. Mr. Powers' entire service has been with the Delaware & Hudson.

M. J. Powers

OBITUARY

John B. Laurie, purchasing agent and general storekeeper of the Central Vermont, with headquarters at St. Albans, Vt., died on January 16, at his home in that city after an illness of many months. Mr. Laurie was born on February 22, 1862, at Sarnia, Ont., and began railway work with the Grand Trunk. He served as storekeeper on the Grand Trunk at London, Ontario, until September, 1899, when he left that road to enter the service of the Central Vermont and since that time until he was compelled on account of poor health to give up active work had been purchasing agent and general storekeeper of the Central Vermont, with headquarters at St. Albans, Vt. Mr. Laurie is survived by one sister, who is a resident of St. Albans.

J. B. Laurie

John M. Brewer, freight claim agent of the Southern Pacific at San Francisco, Cal., died in that city on January 18.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Servian Government is reported to have ordered 7 small locomotives from the American Locomotive Company.

The Illinois Central, as has been noted in these columns, has ordered 25 Mikado type locomotives from the Lima Locomotive Corporation. These locomotives will have 27 by 30 in. cylinders, 63 in. driving wheels, a total weight on drivers of 217,000 lb., a total weight of 280,000 lb., and a tractive effort of 51,700 lb. The diameter of the boilers will be 82 in. at the smallest ring. The boiler will be built to carry a working pressure of 200 lb., but will be operated at a pressure of 175 lb.

CAR BUILDING

The Illinois Central is in the market for 5 gondola cars.

The Interborough Rapid Transit is in the market for 478 steel car bodies.

The Union Pacific is asking bids on 750 40-ton capacity steel underframe stock cars.

The Minneapolis, St. Paul & Sault Ste. Marie is in the market for 3 postal cars.

The Grand Trunk is reported to be planning to build a number of freight cars in its shops at Chicago.

The Delaware, Lackawanna & Western is in the market for 5 combination passenger train cars with mail compartments.

Stang, Chalfant & Co., Pittsburgh, Pa., are asking prices on ten 150,000 lb. capacity flat cars and six 80,000 to 100,000 lb. capacity hopper cars.

Swift & Company are reported to have ordered 250 freight cars from the Haskell & Barker Car Company. This item has not been confirmed.

IRON AND STEEL

The New York Central has ordered 20,000 tons of steel rails, the total being divided among the Steel Corporation, the Bethlehem Steel Company and the Lackawanna Steel Company.

The New York, New Haven & Hartford has ordered 20,000 tons of steel rails, the total being divided among the Maryland Steel Company, the Lackawanna Steel Company and the Bethlehem Steel Company.

The South Manchurian Railway Retrenches.—The South Manchuria Railway because of the present war has so retrenched as far as new construction is concerned that contractors are all suffering from depressed business. Several of them are reported to be planning to go to Korea.

A Bill to Further Railway Construction in Argentina.—A bill recently presented by the public works committee of the Argentine senate proposes to authorize railways to undertake or continue under the most economical conditions possible, with due regard to security of traffic, branch lines already approved or to be approved. The project would permit postponement of construction of stations and other permanent equipment and employment of used or lighter materials than those prescribed for main lines. Facilities for operating such lines would also be granted, such as stopping between stations, observance of only such measures of safety as are necessary to meet local requirements, and extension of delays for carrying passengers and merchandise. The project would also suspend periods stipulated for surveys and construction of lines already authorized until such time as the executive power considers the financial situation normal. The difficulty of securing capital has made railway extension impracticable in most instances, and in a number of cases additional delays have already been granted by the government for the construction of lines.

Supply Trade News

W. H. Arkenburgh, for a long time publicity manager of the Union Switch & Signal Company, has joined the sales department of the National Carbon Company, Cleveland, O., and will have charge of railway and signal work in Canadian territory.

R. M. Nicholson, former advertising manager for the Kimberly-Clark Paper Company, Neenah, Wis., and also former space buyer for the Cramer-Krasselt Company, Milwaukee, has been placed in charge of the advertising of the Stark Rolling Mill Company, Canton, Ohio.

A fire on the night of January 18 totally destroyed the insulated wire department of the John A. Roebling's Sons Company, Trenton, N. J., at an estimated loss of $1,000,000. No part of the wire mills or wire rope works was damaged, and the work performed by the plant destroyed will be taken care of in other shops.

H. H. Seabrook, formerly district manager of the Westinghouse Electric & Manufacturing Company in Baltimore, has been appointed district manager of the company at Philadelphia, succeeding J. J. Gibson, who has become manager of the tool and supply department at East Pittsburgh. Owing to a consolidation of territories the Philadelphia offices will hereafter embrace that previously covered by the Philadelphia and Baltimore offices.

Announcement is made that on January 1 the John Seaton Foundry Company and the Locomotive Finished Material Company, Atchison, Kan., were consolidated, and that they will hereafter continue the business of both companies under the name of the Locomotive Finished Material Company. The directors of the consolidated companies are as follows: John C. Seaton, H. E. Muchnic, Clive Hastings, W. S. Ferguson and G. L. Seaton.

TRADE PUBLICATIONS

Cork Insulation.—"At War with Heat" is the title of a little booklet issued by the Armstrong Cork & Insulation Company, Pittsburgh, Pa., describing the company's Nonpareil Corkboard Insulation for refrigerator plants and similar facilities.

Railway Buildings.—The National Fire Proofing Company, Chicago, recently published a 24-page booklet describing the use of the Natco hollow tile in railway structures. Numerous buildings are illustrated in which this fireproof material is used.

Lumber.—The Gum Lumber Manufacturers' Association, Memphis, Tenn., has issued a 16-page booklet discussing the use of Red Gum lumber as a cabinet wood. It describes the structure of the wood and illustrates the uses for which it is adapted.

Fuel Oil Burners and Equipment.—The Production Engineering Company, Philadelphia, Pa., has recently issued pamphlet O, entitled "Facts About Fuel Oil," which treats of the company's Peco Oil Burner, and names its advantages for various kinds of service.

Heat Treating Furnaces.—The Quigley Furnace & Foundry Company, Springfield, Mass., has recently issued bulletin No. 7, an illustrated folder illustrating and describing the company's underfired accurate temperature heat-treating furnaces using gas or oil fuel.

Screw Cutting Tools & Machinery.—The Wiley & Russell Manufacturing Company Division, Greenfield Tap & Die Corporation, Greenfield, Mass., has issued catalog 36, containing illustrations, sizes and price-lists of the company's "Lightning" and "Green River" screw cutting tools and machinery.

Valve Gears.—A booklet recently received from the Southern Locomotive Valve Gear Company, Knoxville, Tenn., contains some interesting data regarding the Southern valve gear. A number of indicator cards are included, taken from locomotives fitted with this type of gear as well as data taken from the results of tests of locomotives to which this gear has been applied. Illustrations of the gear itself as well as locomotives fitted with it are included.

Railway Construction

CANADIAN NORTHERN.—The Railway Commission of Canada has authorized this company to open for traffic, its line from a junction with the Battle River subdivision north of Camrose, Alta., to a junction with the Canadian Northern Western near Strathcona (South Edmonton) a distance of 46 miles.

ELECTRIC SHORT LINE.—The laying of steel and ballasting on the 22 miles of new road of this company is nearly completed, and it is expected to be ready for service by February 10, 1915. This stretch will complete the line from Minneapolis, through Stubbs Bay, Lyndale and Watertown to Winsted. The first 18 miles from Minneapolis to Stubbs Bay have been under operation since May, 1914.

HORSE CREEK LAND & MINING COMPANY'S ROAD.—An officer writes that a contract has been given to Board & Duffield, Charleston, W. Va., for building the first section of three miles from Woodville, W. Va., on Horse creek up Peter Cave Fork. About 10 per cent of the work will be rock work, and there will be about 10,000 cu. yd. of cut and fill to the mile. The maximum grade will be 4 per cent and the maximum curvature 12 deg. The line is being built to carry coal, and when completed will be operated by the Chesapeake & Ohio. W. L. Ashby, president; L. E. Poteel, general manager, and Romaine & Snyder, chief engineers, Charleston, W. Va.

HOUSTON & TEXAS CENTRAL.—A strip of land was recently purchased by this company at Hempstead, Tex., to provide room for removing of some unnecessary curvature in yard tracks at that point.

KANSAS CITY, MEXICO & ORIENT.—The cities of Cristobal, Tex., and Sonora have agreed to give bonuses amounting to $315,000 to the Kansas City, Mexico & Orient upon the completion of the branch line from San Angelo, Tex., through Sonora to Cristobal. It is said that this line will eventually be extended to Del Rio, 175 miles from San Angelo.

PENNSYLVANIA LINES WEST.—Improvements are to be carried out at Midland, Pa., to double the capacity of the yards at that place. The work at Midland will include the building of an entirely new yard, and laying additional tracks leading to the yard, a new freight terminal, two overgrade crossings, culverts, water stations and passing sidings.

PENNSYLVANIA ROADS (Electric).—According to press reports from Chambersburg, Pa., a company will ask for a charter in Pennsylvania to build a line from McConnellsburg, Pa., east to Fort Loudon, about eight miles. It is understood that preliminary surveys for the line will be started soon. E. J. Post, H. A. Duffey and D. H. Patterson are said to be interested.

According to press reports New York capitalists have secured an old right of way between Youngsville, Pa., and Sugargrove, 9 miles, and will build an electric line between these two places. Surveys are now being made and it is expected that construction work will be started in the spring.

SOUTHERN RAILWAY.—We are told that bids for grading work were asked for recently, and that this company will at once revise and double track the 28.7 miles of its Washington-Atlanta line between Orange, Va., and Charlottesville. The work will be heavy and will cost $1,500,000. The revision work between Orange and Charlottesville will eliminate 1,303 deg. of curvature, and will give a maximum grade northbound of 0.9 per cent and southbound of 1 per cent as against 1.41 per cent in both directions at present. On the completion of this work, together with other work now under way, the Southern will have a total of 338.7 miles of double track between Washington and Charlotte, leaving only 41.3 miles of single track between these places.

UNITY RAILWAY.—Under this name a company has recently been incorporated at Harrisburg, Pa., with a capital of $190,000 to operate a steam railway in Allegheny and Westmoreland counties, Pennsylvania. The incorporators are all residents of Pittsburgh, and Boyer, Jones & Morton, Pittsburgh, are attorneys for the company.

VIRGINIA-BLUE RIDGE.—This company, which projected a line last year from Tye river, Va., which is on the Southern Railway, north via Lowesville to Massies Mill, about 22 miles, has started construction work, it is said, with its own forces. J. W. Dwight, president, Ithaca, N. Y.; A. K. Murrell, chief engineer, Tye river, Va. (June 19, p. 1565.)

WISCONSIN & NORTHERN.—A proposed new line, extending from Van Ostrand, Wis., north through Lily to Crandon, is being built by this company. The new road will be 30 miles long and will connect existing portions of the main line. Grading will amount to about 16,000 cu. yd. a mile. Six miles have been graded. The maximum gradient will be 0.8 per cent and the maximum curvature 5 deg. One bridge with a span of 70 ft. and about 1,100 lineal feet of pile bridging will be required. Peter Nelson & Co., Minneapolis, Minn., have been awarded the contract for grading. C. H. Hartley, Oshkosh, Wis., is general manager.

RAILWAY STRUCTURES

CHICAGO, ILL.—Following a meeting of the directors of the Union Station Company, last week, a statement was given out that suggestions were made at the meeting as to procuring funds, which make it probable that sufficient money can be obtained to make an early start on the work on the Pennsylvania Company's freight terminal, and that it is proposed to start work as soon as possible on the passenger terminal. Plans for beginning work on the Pennsylvania freight terminal have been delayed by negotiations for some property owned by the Baltimore & Ohio Chicago Terminal, which is involved in an ordinance pending before the council committee.

FALSE CREEK, VANCOUVER, B. C.—In accordance with a contract with the city of False Creek, the Great Northern will construct terminal facilities at that point. Plans, however, have not yet been formulated.

HARRISBURG, PA.—We are told that the Cumberland Valley will start work soon on a new arch bridge over the Susquehanna river at Harrisburg, to replace the present steel deck truss bridge which is a single track structure of 25 spans on stone piers. The new bridge is to carry two tracks; it will have 46 spans and will be 4,000 ft. long. The present piers will be utilized and a number of additional ones built. The work will cost about $750,000. The railroad's forces have already completed the foundations from bed rock to an elevation of about one foot above the normal elevation of the water, and the rest of the work will be placed under contract within a short time. In connection with this improvement the railway will build undergrade crossings at Front and Second streets in Harrisburg. The grades of these streets have been depressed and concrete abutments constructed to support solid floor steel bridges, which will be covered with concrete. This work will eliminate all the grade crossings of the Cumberland Valley in Harrisburg.

JACKSONVILLE, FLA.—We are told that a contract has been given to Hillyer & Sperring, Jacksonville, for building a viaduct which is to carry Duval street over Hogans creek and the tracks of the St. Johns River Terminal Company and the Seaboard Air Line. The viaduct is being built jointly for the St. Johns River Terminal Company and the Seaboard Air Line. It is to be of reinforced concrete construction on pile foundation and is to have a 30-ft. roadway with two 6 ft. sidewalks. There will be 31 spans, varying in length from 18 ft. to 41 ft. each; the length of the viaduct, not including approaches, will be 800 ft., and the fill and approaches 1,335 ft.

SPARTANBURG, S. C.—In connection with its modern export coal terminal, now under construction at Charleston, the Southern Railway announces that on February 1 it will begin work on important additions to its Spartanburg yards and will also extend a number of passing tracks between Spartanburg and Charleston. It is expected that the terminal will be completed by May 1 and the additional track facilities will also be ready by that time. Two additional receiving tracks will be constructed at the Spartanburg Junction classification yard and two at East Spartanburg. Passing tracks will be extended at Carlisle, Alston and Herbert on the Spartanburg division, and at Riley and Fort Motte on the Charleston division.

Railway Financial News

Baltimore & Ohio.—A semi-annual dividend of 2½ per cent has been declared, payable March 1. This reduces the annual rate from 6 per cent to 5 per cent. In making this announcement President Willard commented on the directors' decision as follows:

"When in July last consideration was given to the question of dividend then to be declared we had been hopeful that the railroads in the eastern territory might at an early date be permitted to generally increase their freight rates full 5 per cent as requested, in which event with normal conditions as to business, the Baltimore & Ohio in my opinion should and could with its present facilities, pay 6 per cent on its common stock with a reasonable surplus over.

"Just what the ultimate effect of the recent decision may be cannot now be stated, but it is estimated that with the direct increases allowed, which will largely become effective by February 1, the Baltimore & Ohio should realize an increased net income, based on business of 1914, of from $2,225,000 to $2,500,000 a year, or a sum equal to about 1½ per cent on the common stock.

"Having in mind the effect of these increases on the future revenue of the company, even should the volume of business continue for a time to be only on the basis of the past six months, it is felt that the results in the future, with a proper consideration of the interests of the company's more than 35,000 shareholders, will justify the action taken at this time in declaring a 2½ per cent dividend, although the earnings for the first six months fell somewhat short of the amount necessary for this purpose."

See also President Willard's comments on the general situation printed elsewhere in this issue.

Chicago, Milwaukee & St. Paul.—Kuhn, Loeb & Company and the National City Bank, both of New York, have underwritten the offer of $29,141,300 5 per cent convertible bonds of the Chicago, Milwaukee & St. Paul which was made to stockholders at par.

Chicago, Rock Island & Pacific.—Former Judge Walter C. Noyes has been appointed receiver of the Chicago, Rock Island & Pacific Railroad, the Iowa holding company, maker of the collateral trust mortgage bonds under which the Railway company stock was deposited. This is one of the final steps in the winding up of the affairs of the holding companies.

The bondholders' committee has sent a notice to depositing bondholders reading in part as follows:

In order to carry out the purchase of 713,535 shares of Chicago, Rock Island & Pacific Railway stock, the committee has borrowed the entire amount of the cash requirements under the plan, for which the committee has pledged the stock required, as well as all deposited bonds and coupons.

Bonds in excess of $61,354,000 have been deposited with the committee under the plan so that if no additional bonds are deposited with the committee and if none of the undeposited bonds avail themselves of the right of exchange given by the court order, the amount of excess stock cannot in any event reach $10,000,000. The entire amount of stock available for distribution under the plan is distributable among depositors againts payment of their pro rata share of the cash requirements of the plan.

The committee deems it of the utmost importance to depositors that, so far as practicable, distribution of stock should be made as soon as possible so that depositors may exercise the rights of stockholders at the annual meeting, which now stands adjourned to March 15, 1915, and in the meantime be in a position to take such action looking toward their mutual protection as they may deem wise. The committee, therefore, proposes at once and Central Trust Company is now ready to make distribution of stock equal at par to the face amount of the deposited bonds against payment by depositors of their pro rata of the costs of foreclosure and the expenses of the committee ($4.45 per bond), leaving the excess stock to be distributed as soon after March 15, 1915, as possible. The excess stock available for distribution to depositing bondholders will be distributable at the price of $10.42 per share (which includes interest and cost of federal and state transfer stamps). The amount realized from such distribution, together with the payment by depositing bondholders of $4.45 per bond and the amounts to be received from non-depositing bondholders under the court order of December 21, 1914, will, in the aggregate, suffice to meet the cash requirements of the plan.

Missouri, Kansas & Texas.—One of the provisions of the agreed judgment by which the affairs of the Missouri, Kansas & Texas, of Texas, was adjusted with the state of Texas was that joint auditors should be appointed to investigate the charge that the Texas company had been unfairly treated by the Kansas company.

This report has just been filed in the district court. O. H. Bowers, auditor of the company, was selected to represent the railroad, and W. S. McFarland, a chartered accountant of Nashville, Tenn., was appointed by Attorney-General B. F. Looney to represent the state of Texas. These two auditors are unanimous in their findings that the Missouri, Kansas & Texas of Texas has never at any time been made to bear an undue or illegitimate burden for the benefit of its parent company; on the contrary, the Texas property has been favored in several important respects, particularly in the matter of using the cars of the Missouri, Kansas & Texas of Kansas, the latter making no rental charge for such equipment. As to division of earnings, the report says they were found to have been fair and in accordance with the best practices. The joint expenses of the two properties are prorated on the basis of gross earnings, which the report says is fair. The Missouri, Kansas & Texas of Kansas furnishes its Texas subsidiary supplies at actual cost. The joint auditors say that the Missouri, Kansas & Texas of Texas owes the Missouri, Kansas & Texas of Kansas $23,000,000 on open account. This is a just claim, the report says.

Missouri Pacific.—The Wall Street Journal published an article last week stating on what was said to be the best authority that the Gould family and Gould estate had practically sold all of their stockholdings of Missouri Pacific, various members of the family retaining only sufficient stock to qualify as directors.

A committee has been formed which is asking for proxies for the annual meeting. The committee consists of Alexander J. Hemphill, chairman of the board, Guaranty Trust Company, New York; Otto H. Kuhn, of Kuhn, Loeb & Company; Seward Prosser, president, Bankers' Trust Company; James N. Wallace, president, Central Trust Company, all of New York, and Robert Winsor, of Kidder, Peabody & Company, Boston.

New York, New Haven & Hartford.—The Connecticut superior court has overruled demurrers filed by the defendants in the suit by the New York, New Haven & Hartford against John L. Billard and others to recover $3,825,147 claimed to be the profit in the transfer of the Boston & Maine stock to and from the Billard Company.

Pennsylvania Railroad.—The company has published notices that it is prepared to dispose of its surplus real estate holdings. The surplus real estate holdings in New York alone are estimated to be worth in the neighborhood of $10,000,000, and the company has large quantities of valuable real estate in other cities.

West Jersey & Seashore.—A special meeting of stockholders has been called for February 4 to authorize the issue of $3,000,000 additional stock and the creation of a mortgage to secure $13,000,000 bonds. Sufficient bonds under the new mortgage to retire $6,373,000 first consolidated mortgage bonds now outstanding will be reserved.

Travel to Switzerland and Italy.—Daily railway service is now in operation between Paris and Switzerland and Italy, by way of Basle. First, second and third-class through cars run between Paris and Basle, dining cars from Bologna to Florence and vice versa, and from Milan to Venice and Bologna to Milan, and sleeping cars from Rome to Florence and Brindisi to Milan.

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Contents

*Illustrated.

Fuel Economy on the Great Western

An interesting feature of the fuel economy campaign being conducted on the Chicago Great Western, a description of which is published elsewhere in this issue, is the success attained in determining the amount of coal used by each engine crew. In contrast to the results obtained on some roads the automatic recording scale for weighing the coal delivered to locomotive tenders has given satisfactory service. The method of estimating the amount of fuel left on the tenders on arrival at terminals by means of metal strips on the sides of the coal space is also giving good results. This estimating is done by one man at each roundhouse, who becomes sufficiently experienced to give a close estimate. The secret of the satisfactory use of the scales is in their periodic inspection and careful maintenance. Another thing in favor of the plan adopted by this road for the economical use of fuel is its organization. The superintendent is supreme on each division over every department. He is held responsible for the fuel record on his particular division; and because of his absolute authority he is in a position to enforce the proper co-operation between the different departments. The economical use of fuel is a live issue all over the road, and the enginemen display a friendly rivalry in seeking to head the published list each month. The fuel potential is not placed so high but that it may be beaten by some of the more careful crews, with the result that the crews have faith in the figures and know that the management desires to give them a fair chance. The success of any system is dependent largely on the faith the men concerned have in it, and from all reports the one in effect on the Great Western has the confidence of the enginemen as well as of the officers of the road.

An Achievement by Private Ownership

On Monday of this week Mayor Mitchel of New York talked by long distance telephone directly with Mayor Rolph of San Francisco. This inauguration of direct long distance telephone service between the Atlantic coast and the Pacific coast is the result of a successful achievement by private ownership of a public utility unaided by government and in spite of restrictive legislation. To get a telephone connection with a number in London from anywhere outside of a radius of 25 miles takes fully half an hour, and when the connection is at last obtained it is so bad, 50 per cent of the time, and so interrupted, as to try the patience of a saint. In England, as in France and other European countries, the telephones are operated by the government. The establishment of direct telephone service between New York and San Francisco cannot help but stir the imagination even of a people who have become casehardened to the achievements of modern science. As a matter of fact, however, it is no more of an achievement and no more deserving of admiration and praise than is the perfection of the kind of telephone service that is given in a single city like New York or Chicago. If it were possible to make a statistical compilation showing the percentage of avoidable annoyances in telephone connections to the total possibilities of annoyance through some slight error or carelessness on the part of operators, the minuteness of this percentage would be striking. The perfection of training of the telephone operators generally in a city like New York is a stupendous task and its successful accomplishment is undoubtedly in very large measure due to the will of one man impressing on the minds of subordinate officers that courteous service by telephone operators must be attained. Such a result under government ownership is inconceivable.

The Long Island and the Pennsylvania

Dick Brothers, a brokerage house of New York, after having offered to sell to the Pennsylvania their holdings of the minority stock of the Long Island at par, which offer was, of course, refused, have sent out a circular to Long Island minority stockholders charging the Pennsylvania with mismanagement of the Long Island. In an attempt to show that this is not an ordinary case of holdup, Evans R. Dick has drawn attention to the fact that in 1900 the Long Island was prosperous, and in 1913 showed a deficit of more than $1,000,000. As a matter of fact, 1900 happened to be one of the most prosperous years in the history of the Long Island and in that year it earned $59,000 above interest and fixed charges, or half of one per cent, on its $12,000,000 stock; and even in that year, after crediting this $59,000 to profit and loss, it was carrying a debit balance in the profit and loss account of $844,000. The charges against the Pennsylvania should be dismissed without mention were it not that they call attention in a rather interesting way to the inadequacy of passenger rates at a time when this subject is particularly interesting to the Interstate Commerce Commission and rail-

road managers all over the country. The Long Island is dependent for more than half of its total gross revenue on passenger business. The road does a very large commutation business, but its commutation rates are generally higher for short distances than on the other roads doing a large commutation business out of New York City. The road is particularly well managed, Mr. Thornton's "call" by England being a commentary on the management of the Long Island. Passenger business is dense and in some respects analogous to the business on English railroads. Nevertheless, the Long Island has been adding, almost without exception, each year to its deficit, the Pennsylvania really standing the losses. The particular minority stockholders who have raised the protest are not in need of sympathy, but railroad stockholders generally, and also the Interstate Commerce Commission and especially the state commissions, should carefully study the Long Island situation. The Interstate Commerce Commission has shown in various ways that it is aware of the inadequacy of passenger rates, but state commissions are still either wilfully or ignorantly unaware of the facts.

WHAT SHALL BE DONE REGARDING THE VALUATION?

SOME people believe and allege that the railway managers are opposed to the continuance of the federal valuation of railways. They are mistaken. The leading railway managers are divided in opinion on this subject. Some of them believe that the valuation should be discontinued at once, on the ground that it would not afford a practical basis for the regulation of rates, and that therefore to carry it to a completion would be a waste of both the railroads' money and the public's money. Others advocate making a valuation of only some group of roads, to determine the practicability of using valuation as a basis for the regulation of rates.

Still others favor carrying the project through to completion. No railway manager regards valuation as a desirable or practicable basis for regulating all rates. But a large part of the public still believes that the railways as a whole are overcapitalized, and that a valuation of their properties should be made to determine whether their net earnings and rates in general are reasonable. The railway managers who favor completing the valuation are confident that as to a large majority of individual roads it will exceed their capitalization, and that as to the railways as a whole it will greatly exceed their capitalization; and they wish to see it finished as a means of confuting those who charge that the railways are overcapitalized, and of establishing their right to larger net earnings and advances in rates.

A highly interesting discussion of the question of the continuance of the valuation work was contributed to the *Railway Age Gazette's* annual review number, published January 1, by Charles A. Prouty, director of valuation of the Interstate Commerce Commission. Mr. Prouty makes a very able and persuasive argument for the continuance of the valuation. He points out that, regardless of anybody's opinion concerning the practicability of using valuation as a basis for the regulation of rates, the courts have held that it is the chief standard for measuring their reasonableness as a whole. He concedes that it would be folly for the Interstate Commerce Commission to hold that it could not act on petitions of the railways asking for advances in rates until after the valuation is done; and he also concedes that after the valuation is finished the commission probably should not restrict the railways to a return on their valuation so low as barely to avoid confiscation. But, he argues, the commission and the courts should have a valuation to serve as a guide in the regulation of rates as a whole, and the problem of regulating them will never be solved until a valuation is made.

While we recognize the force of Mr. Prouty's argument, we believe that there is much force also in the contention that instead of trying to make a valuation of railroads in all parts of the country at once, as the commission is now doing, it would be best for it to confine its work for the present to some one group of railways, and, if a valuation of all is to be made, to take them up group by group. Suppose that it goes on making simultaneously valuations of one road in the East, of another in the South, of another in the Northwest, of another in the Southwest, and so on, as it is now doing. It has been estimated that it will take ten years to finish the appraisal of all the lines in the country. If so, by pursuing its present policy, in ten years from now the commission will report a valuation for all railways which will not be as of the same date for any two roads in the same group. It will report a valuation as of one date for the Baltimore & Ohio and as of another date for the Pennsylvania. It will report a valuation as of one date for the Great Northern, and as of another date for the Chicago, Milwaukee & St. Paul. This procedure, it would seem, would render it impossible to regulate the rates in any territory with reference to the valuation until it was entirely finished, because rates must be regulated, if they are to be fairly regulated, on groups of railways, and not on individual railways. Another result might be, it would seem, that it would be impossible to use the valuation as a basis for the regulation of rates at all because of the differences between the dates on which it would be finished on different railways in the same group. Suppose that the valuation on the Baltimore & Ohio were finished in 1916, and that on the Pennsylvania in 1924. Could valuations of these two roads finished eight years apart be used as bases for the regulation of their competitive rates? It is true that it is planned after the valuation of a road is made to keep it up to date by accounting methods, but the courts hold that the measure of the reasonableness of rates fixed by public authority is the value of the property at the time they are fixed, and it is very questionable whether a valuation made five or ten years ago and kept up merely by bookkeeping methods would be accepted as a satisfactory valuation today.

Suppose, on the other hand, that the commission should take the railways a group at a time. There would be no serious difficulty in dividing them into groups. The New England lines naturally fall into one group, the Eastern Trunk lines into another, the Central Freight Association lines into another, the Trans-Missouri lines into another, and so on. It would take nowhere near as long to make a valuation of one group as to make a valuation of all groups. Under this plan the valuation of all the railways in a group would be made as of the same date. When the valuation of one entire group was finished the commission could at once begin to regulate rates with reference to it. The legal questions which the making of the valuation, and the attempt to use it as a basis for the regulation of rates, are sure to raise can be raised just as well in respect to the valuation of a single group of roads as in respect to the valuation of all the railways. If the valuation of a single group were begun now and pushed to completion these legal questions might be raised and settled before the valuations of most of the other groups were finished, or perhaps even begun. The settlement of these questions would be of immense value to congress and the commission in dealing with the valuation of the other groups.

Furthermore, if the commission should evaluate the roads group by group it would be only a comparatively short time until some practical use could be made of the valuations of one or more groups—assuming that the valuation will be of any practical use at all; whereas, if the commission continues its present policy of making valuations of roads scattered all over the country, little or no use, it would seem, can be made of the results until the entire work shall be finished, and all the legal questions shall be fought out in the courts, which would be years in the future.

The argument in favor of taking up the railways group by group seems overwhelmingly strong, and it is to be hoped that this plan will be given early and serious consideration by the commission. It seems to be the right plan, whether the matter be viewed from the standpoint of those who question the desirability and practicability of valuation as a basis for the regulation of rates, or from the standpoint of those who, like Director Prouty, have no doubt of its desirability and practicability. If

valuation is undesirable and impracticable, then the valuation of the railways by groups will prove this sooner than the policy now being pursued. If valuation is desirable and practicable, then valuation by groups will prove this sooner, and produce results which will be of practical use sooner, than the policy now being followed.

THE WORK OF THE BOARD OF MEDIATION AND CONCILIATION

THERE is a fundamental difference between the work which can be done by the Board of Mediation and Conciliation and that which can be done by an arbitration board. The United States Board of Mediation and Conciliation can never arbitrate any question. If it does its usefulness has begun to be impaired on the claim that it has taken sides. Neither can the Board of Mediation and Conciliation be concerned solely with abstract justice. A sound judgment of expediency and an absolute impartiality are more important to it than a theoretical knowledge of abstract justice.

The board appointed by President Wilson, of which Judge Chambers is the commissioner, Judge Knapp the other member and W. W. Hangar the assistant commissioner, has held office for a little over a year. Its first annual report was made public recently and an abstract of it is given elsewhere in this issue. On the whole the working of the new law has been a material improvement over that of the Erdman act, and the board's work may fairly be considered a success. Few railroad men, however, really understand the nature of the work of this board, and there is nothing in the board's report describing what this work is. The procedure of the board in a dispute is in most cases substantially as follows: One or both sides to the controversy call on the board to intervene. The board then goes first to one side and then to the other, becoming the confidant of both. Of course neither side is willing to show its hand to the other side, but is willing to indicate to the mediation commissioner the nature of the concessions which it is prepared to make and the points on which no concessions will be made. It then becomes the duty of the commissioner to decide whether or not there is any possibility of agreement short of arbitration. If there is his work lies in getting the necessary concessions from each side so as to make the two parties to the controversy approach a common level, each one, however, being kept in ignorance of how far it is necessary for that side to go and how far the other side has already gone. Shrewd judgment, impartiality, a knowledge of human nature and of the prejudices and idiosyncrasies of labor leaders and employers are essential, and with all must go great firmness. Both the employer and the labor leader are often engaged in playing a game partly with the backing of the cards which they actually hold and partly on the strength of their ability to bluff. It is no part of the commissioner's duties to help either side win this game. His duty consists in preventing a deadlock.

If a Board of Mediation and Conciliation were once to arbitrate a particular question it would have made a ruling amounting to a precedent on which one or the other side would bank in a future controversy, while one or the other side would refuse to accept mediation because their point had already been decided against them.

In this connection the board's report says:

"In not a few instances the parties have requested and even urged the board to settle their controversies as if in arbitration, but this the board has declined to do; because, in the first place, in its opinion, the language of the law did not confer such authority, and, secondly, because it would jeopardize if not destroy mediatory efficiency of the board. The board advises, and makes rulings, but always without binding the parties to accept the same."

It will readily be seen, therefore, that the Board of Mediation and Conciliation can never make public either the justice or the injustice of the position taken by either party to a controversy.

The annual report of the present board is almost, if not quite, unique among recent reports of government administrative bodies in that it specifically asks that no further powers be conferred on the commission. The very thought must be positively stunning to the great majority of state and federal commissions. However, in this particular case, although the board is unquestionably right in asking that no further powers be assigned to it, there is a function in connection with labor disputes, the exercise of which should be productive of much good, but which is not provided for in the Newlands act. The Board of Mediation and Conciliation can attempt to bring together two parties to a controversy. If it fails an arbitration board can decide the specific points at issue; but only incidentally does the public hear an impartial exposition of the merits of the whole controversy. What is there to keep railroad officers, on the one hand, from refusing arbitrarily an obviously just demand of employees, or labor leaders, on the other hand, from making preposterous and utterly indefensible demands, trusting that in the case of bluff which follows they may gain something, having nothing to lose. With impartial publicity given to the merits and demerits of both sides of a controversy, public opinion would act strongly to deter either side from taking an indefensible position. Since the Board of Mediation and Conciliation is entirely barred from giving away the secrets of either side, there might be some commission or commissioner whose duty it would be to make a thorough, impartial investigation of the merits of any controversy which was serious enough to lead either to open hostilities, a call for arbitration or a call for mediation; and after such an investigation had been made to make public the facts in an entirely impartial and non-partisan statement.

ONE EFFECT OF RETRENCHMENT IN MAINTENANCE OF WAY EXPENDITURES

IT is common knowledge that the past year has been one of severe retrenchment for the railroads. When reductions in expenditures are necessary, the maintenance of way department suffers particularly, for almost invariably it is felt that retrenchment can be effected here without the detrimental results becoming evident as quickly as elsewhere. While no one believes that such a reduction results in ultimate economy, there are times when it becomes absolutely necessary to cut expenses somewhere. In addition to the fact that the detrimental effects are not evident at once, the impression frequently exists that the results of retrenchment in maintenance of way expenditures are confined to the track and structures themselves. But, there is an increasing realization of the fact that the neglect of maintenance of way is reflected directly in increased transportation expenses arising from increased delays to trains and ultimately in a decrease in trainloading, etc.

Deterioration in the condition of the track also contributes to increased charges for the maintenance of equipment. The figures given below show the expenditures for maintenance of way and for maintenance of equipment and the gross earnings of 15 representative roads with over 77,000 miles of line for the first three months of the present fiscal year, and for the same periods of the two preceding years.

EARNINGS AND EXPENDITURES, JULY 1–SEPTEMBER 30

	Maintenance of way per mile of line	Maintenance of equipment per mile of line	Gross earnings per mile of line	Cars in shop (all roads)	Per cent of cars in shop to total (all roads)
1912.....	$528	$645	$3,951	157,090	6.84
1913.....	574	688	4,042	177,114	7.50
1914.....	511	688	3,966	212,930	8.84

Thus, while the expenditures for maintenance of way for the first three months of the fiscal year 1914 were 3 per cent *below* those for 1912, the charges for the maintenance of equipment have *increased* 7 per cent, with practically the same business handled, while the number of cars in the shops increased almost 56,000. Comparing 1913 with 1914 maintenance of way expenditures decreased 11 per cent and gross earnings 1 per cent, while the charges for maintenance of equipment remained

stationary, although the number of cars in the shops increased almost 36,000.

Since it is to be assumed that the same policy of retrenchment is being followed in the mechanical as in the maintenance of way and other departments, as in fact is shown by the accumulation of bad order cars, it is evident that it would require an even greater expenditure to maintain the equipment in its normal condition.

It is entirely reasonable to assume that there is some definite relation between this *increase* in the expenditures for maintenance of equipment and the *decrease* in charges for maintenance of way. Although many items entering into the cost of maintaining equipment, such as the painting of cars, are entirely independent of the condition of the track, other items, such as the cost of locomotive maintenance, the repair of broken trucks, etc., are dependent to a certain extent upon the condition of the track.

Railway managements can well afford to analyze their maintenance of equipment charges to ascertain to what extent these fluctuate with the condition of the track. Such a study may show that severe retrenchments in expenditures for maintenance of way do not secure even an immediate economy, owing to their effect upon other accounts, and that it might be more economical to make reductions in expenditures in other departments. Such a study would be most instructive if made at a time like the present, following an extended period of retrenchment.

THE SITUATION IN NEW ENGLAND

PEOPLE often speak of the "railway situation." There are really several "railway situations" in this country. The railways naturally divide into groups, and the conditions with which they are confronted vary from group to group.

One of the most complex, puzzling and difficult situations is that in New England. The roads formerly comprising the New Haven system, the principal of which, of course, are the New York, New Haven & Hartford and the Boston & Maine, were in some ways badly mismanaged during the regime of Charles S. Mellen. The worst feature of his administration was the abuse of the road's credit. The management of the operating and traffic departments was generally efficient; but the use made of their financial resources was unwise and even scandalous. There is a lesson here for stockholders in railways generally. This is, that it is most unsafe to turn over the running of their business to a board of directors, and then pay no attention for years to what the directors do. The stockholders have their responsibility for what happened in New England as well as the directors and Mr. Mellen.

However, the stockholders, the directors and Mr. Mellen are all paying pretty dearly for their parts in the business. Mr. Mellen has been retired in disgrace. The directors have been denounced and are being prosecuted for many things they did and for some things they did not do. The stockholders are paying for their more or less guilty quiescence and acquiescence through the loss of their dividends.

But, though justice may require that the stockholders shall suffer for what the managers of their properties did, it does not impoes on them also the penalties for developments for which neither they nor the managers were in any way responsible. And, as a matter of fact, the present position of the New Haven and the Boston & Maine, while largely attributable to the faults of the Mellen regime, is also largely due to the peculiar conditions in New England, and to a series of developments which have affected all the railways of the United States, but which, because of the conditions in New England, have affected the railways in that section with special force.

One respect in which New England differs from practically all the rest of the country is that its population and industry have reached a stage of development comparable to that reached in the leading countries of Europe. Because population and industry have reached this stage there they do not grow as fast in proportion as in most other parts of this country. It results, of course, that railway traffic, and especially freight traffic, does not grow as fast in proportion as in other territories. Furthermore, the traffic of the New England lines is of a character unique in the United States. The proportion of high-grade to low-grade freight is much greater than in other sections, and the ratio of passenger to freight traffic is also much greater.

Now, every one of these conditions renders it especially difficult to make physical improvements in railways except at great cost, or to introduce economies in operation. In a territory where the population is so dense, where towns and cities are so close together, the real estate is extremely valuable, and the cost of acquiring the property needed to enable a railway to expand its facilities is especially great. Furthermore, a traffic which grows relatively slowly, and which is composed to so very large an extent of high-grade freight and passengers, does not yield readily to those methods for increasing carloads and trainloads which are the most effective means—where they can be adopted—of bringing about operating economies. For these and other reasons the difficulties in the way of making physical improvements and economies in operation on the railways in New England have been in the past, are now, and will be in the future, greater in proportion than those encountered in other parts of the country. Whatever tends to make necessary increases in capital investment or in taxes, in the wages of employees or the prices of material, must, therefore, increase both the capital cost and the operating cost of handling each unit of traffic more in proportion in New England than elsewhere.

Now, the New England lines have not been and will not be immune from those influences which render it necessary for the railways to increase their property investment in order to handle their business satisfactorily or from those which cause large increases in wages, taxes, and so on. President Hustis of the Boston & Maine, in a statement before the Public Service Commission of Massachusetts on January 6, said that during the five years 1910-1914, inclusive, $3,000,000 was spent on this property for betterments and charged to operating expenses; and he estimated that during the next five years $16,000,000 should be spent for necessary improvements. He also stated that between 1901 and 1914 the operating expenses of the road had been increased $5,000,000 a year by increase in wages.

These figures illustrate the trend of things, not only on the Boston & Maine, but on the New Haven, the Boston & Albany and other lines in New England. They must make investments in improvements; they must meet increases in wages and taxes as the other railways of the country must; but, for reasons already indicated, their physical conditions are such that they cannot offset the increases in expenses by the introduction of more economical methods to the same extent as most of the other railways of the country can.

But the very same conditions in New England which make it very difficult to introduce extensive economies in railway operation also make it imperative that that section shall have good railway service; for, of course, the larger the extent to which the traffic of a section is composed of high grade freight and passengers, the more imperative is it that every practicable measure shall be adopted to put and maintain its railway service on the highest plane. Furthermore, if New England's factories, which are the very foundation of her prosperity, are to continue to live and meet the competition of the factories of other parts of this country and of the world, good railway service they absolutely must have. All the conditions have conspired to make necessary important readjustments and increases in rates.

The people of New England and their railroad commissions have, in the main, shown a remarkable appreciation of the situation confronting them. The New Haven scandal was enough to disgust and enrage any intelligent community. But as soon as the New Haven and the Boston & Maine were turned over to new managements, and the new managers began to take the

public into their confidence, the people and most of the commissions began to give them a sympathetic hearing and hearty support. Plans have been worked out and accepted for general readjustments of both freight and passenger rates. But, as often occurs in such matters, a snag has been struck. The Massachusetts commission has held up an advance in passenger rates in that state which has been allowed in other states. If the advance were disallowed in the state of Massachusetts this might interfere with advances in all the other New England states.

It is to be hoped that the public and regulating authorities of New England will continue to take an intelligent and sensible view of the situation with which they and the railways are confronted. Doubtless the investors in the railroads should pay for the mistakes made and offenses committed by the old management of the New Haven. But the old management is gone. The New Haven and the Boston & Maine are now in the hands of men who deserve and should receive the unqualified confidence and support of the public. New England wants and needs good transportation more than almost anything else. The new managements of the New Haven and the Boston & Maine want to give this, and they are competent to do so if properly supported by the public which they serve. But they cannot do for New England what New England wants them to do for it unless New England backs them up.

New England is confronted, not with a theory of abstract equity, but with a condition of industry which presents a problem of the hardest and most practical kind. It may be that still other advances in rates besides those already asked and granted will have to be made in order to put its transportation system in the condition that it ought to be in. It will pay New England to inform itself fully as to the facts, and then to act accordingly. New England's future depends on this.

NEW BOOKS

Poor's Manual of Railroads for 1915. Published by Poor's Railroad Manual Company, 535 Pearl street, New York. 2,046 pages.

The 1915 Poor's Manual of Railroads is the forty-eighth number of this standard compilation of railroad statistics. It contains abstracts from the statements of all of the 1914 annual reports which have been issued, and the general information contained in it is revised to December, 1914. Poor's Manual has had an enviable reputation for accuracy for nearly half a century and in the last few years more effort has been put into getting it out as soon after the close of the year as is possible. The 1915 number is gotten out earlier in the year than any previous number. The Manual is, of course, an indispensable part of all statistical libraries and if a railroad executive officer were to have only one book in his library that book ought to be Poor's Manual.

Brass Furnace Practice in the United States. By H. W. Gillett. 287 pages, illustrated, 5¾ in. by 9 in. Bound in paper. Published as bulletin No. 73 of the Department of the Interior, Bureau of Mines, Washington, D. C.

This bulletin is issued as a contribution to the increase of safety and efficiency in the preparation and utilization of the mineral resources of the United States. The object of the investigation of brass furnace practice was to find out the melting and fuel losses in brass melting as practiced at present and to indicate as far as possible the methods by which the losses may be reduced. The investigation deals with the general types of furnaces in use and gives the result of the investigation in detail. General factors affecting the operation of brass furnaces are carefully considered and considerable space is devoted to remarks on furnace types and parts. Possible improvements in furnaces and accessories are discussed as well as some furnace problems which are awaiting solution. The latter part of the book is devoted to various causes of disease and danger and essentials for health and safety.

Letters to the Editor

OPPORTUNITIES FOR TRAIN DESPATCHERS

WARREN, Ark.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to C. L. J.'s article in the issue of January 15, asking why chief despatchers do not receive more recognition, I would like to say that I believe I am making a low estimate when I say that 75 per cent of the presidents, general managers, general superintendents, superintendents and trainmasters on the railroads of this country were once chief despatchers. If I am right, where is there any cause for complaint?

W. S. HOBBS,
General Manager, Warren & Ouachita Valley Railway.

[Certainly, a very large percentage of railroad operating officers gained their early experience in the telegraph and despatching service. The following is a list picked out at random of the names of 25 prominent railroad officers who have been despatchers: F. C. Batchelder, president, Baltimore & Ohio Chicago Terminal; H. A. Boomer, general manager, Lake Erie & Western; S. M. Braden, general superintendent, Chicago & North Western; F. H. Britton, president, St. Louis Southwestern; D. L. Bush, vice-president, Chicago, Milwaukee & St. Paul; E. E. Calvin, vice-president and general manager, Oregon Short Line; E. H. Coapman, vice-president and general manager, Southern; W. S. Cooper, general superintendent, Chicago, Milwaukee & St. Paul; H. O. Dunkle, general manager, Erie; A. J. Earling, president, Chicago, Milwaukee & St. Paul; H. B. Earling, vice-president, Chicago, Milwaukee & St. Paul; J. A. Edson, president, Kansas City Southern; T. J. Foley, general manager, Illinois Central; F. C. Fox, general manager, Atchison, Topeka & Santa Fe; W. A. Gardner, president, Chicago & North Western; Marvin Hughitt, chairman, Chicago & North Western; C. W. Kouns, general manager, Atchison, Topeka & Santa Fe; D. C. Moon, general manager, New York Central; H. U. Mudge, president, Chicago, Rock Island & Pacific; G. L. Peck, fourth vice-president, Pennsylvania Lines; W. B. Scott, president, Sunset-Central Lines; Milton H. Smith, president, Louisville & Nashville; W. S. Tinsman, chairman, General Managers' Association of Chicago; J. J. Turner, vice-president, Pennsylvania Lines; Frank Walters, general manager, Chicago & North Western.—EDITOR.]

A PRACTICAL CAR POOLING PLAN

HOUSTON, Tex.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read J. S. Marvin's article entitled "Shipper Advocates Car Pooling," which appeared in the January 1 issue of the *Railway Age Gazette*. It is a thoughtful article, and the ideas advanced are clearly brought out. It is probably true that generally speaking Mr. Marvin has accurately stated the shippers' point of view the country over in this matter of car handling, and it occurs to me that the carriers owe it to the shippers to state at this time what has been done recently to meet their views in a concrete way.

On October 1 of the year just closed, the roads comprising what is known as the Sunset-Central Lines have, by written agreement, permitted their cars to be used in common by a direct connection, which is in keen competition with the Sunset-Central Lines. The road which has been given this permission has, in turn, extended to the Sunset-Central Lines, a like privilege. Under the terms of the agreement, the provisions of the car service rules of the American Railway Association, which rules are pointed out by Mr. Marvin as imperfect both in times of car surplus and of car shortage, are waived. Both parties to this agreement were prompted to act in the matter in a de-

sire to please their patrons, and in the hope of decreasing operating expenses. For fear it might not work out satisfactorily, the public has not been informed of the experiment. Knowing as we do how directly concerned the shipping public is in any move of this kind, and knowing also how anxious the public is that the carriers shall make progress in the matter, we should perhaps have made this experiment public from the outset. Even if it had not worked out well, the public would at least have known that an active effort was being made.

For the further encouragement of those who feel that "the shipping public is entitled to have the railroads make a definite start," I will state that on the very day the January 1 issue of the *Age Gazette* reached us, our people executed a formal agreement with another direct connection, which also is an active competitor, whereby cars of that line and of the Sunset-Central Lines will be used in common by both parties to the agreement.

It will be of further interest to know that in waiving the provisions of the car service rules of the American Railway Association, which is done in arranging the pooling plan, both parties are guarding against any unfairness on the part of either.

It is not an unregulated car pool, such as exists all too generally.

A copy of the agreement follows, and there is no reason why the public should not be made entirely familiar with its contents.

Car Equalization Agreement

Each subscriber to this agreement may use as its own, box, stock, flat and coal cars of each other subscriber, the initials of which hereinafter appear and are made a part of this agreement. Such cars may be loaded in any direction, without regard to the Car Service Rules, and without incurring penalty under Per Diem Rule 19 of the American Railway Association.

A subscriber may include, as its own, cars which do not bear its initials by filing with the other subscribers the authority of the owning road.

Each subscriber shall undertake to supply an equal number of cars under this agreement. When a subscriber has provided an excess of cars, equal to 10 per cent more than another subscriber, the creditor subscriber may make written demand upon the transportation officer in charge of car distribution of the debtor subscriber for an equalization within seven days.

The debtor subscriber may equalize by delivering to the creditor subscriber the requisite number of

(a) Creditor subscriber's cars, or

(b) Debtor subscriber's serviceable cars.

It is agreed that the Sunset-Central Lines will, upon demand made by the S. A. & A. P., return within seven days to the S. A. & A. P. as many S. A. & A. P. special fruit and vegetable cars needed for loading fruit or vegetables, which may be in the possession of the Sunset-Central Lines, as may be called for by the S. A. & A. P.

Failing to equalize within the prescribed period, the debtor subscriber shall pay to the creditor subscriber $2 per car per day for the excess number of cars then or thereafter in the possession of the debtor subscriber, commencing after midnight of the sixth day following date of written demand, and continuing until equalization is made. This rate shall be in addition to the regular per diem rate.

If the records of the creditor and debtor subscribers differ as to the number of cars necessary to the equalization, it shall be made on the basis of the average of the statements of the two subscribing roads. Payment shall be made within thirty days after the close of each month, based on actual figures ascertained by joint check.

This agreement shall become effective January 1, 1915. It may be terminated upon thirty days' advance notice in writing, served by the subscriber desiring to terminate the agreement, upon the subscriber with which the agreement is to be terminated.

Misunderstandings, which cannot be promptly settled, shall be referred to the Per Diem Rules Arbitration Committee or the American Railway Association, as provided in the case of disputes under the regular per diem rules.

The essential difference between the plan described, which we hope will eventually bring substantial relief to shippers as well as to carriers, is that the car owner is at all times assured of a square deal; in other words, is protected by an iron-clad agreement.

And this move to afford shippers substantial relief in car handling is not confined to Texas, even though it has chanced to take more concrete form here than elsewhere. An advance sheet from the minutes of the Association of Transportation and Car Accounting Officers, just at hand, which association is composed of representatives of railroads of the United States and Canada, shows that at the regular fall meeting held in Richmond, Va., on December 8, 1914, the matter was discussed fully, both from the standpoint of the car pooling plan, already started, and from the standpoint of creating "conference committees," some half dozen all told, to cover the various sections of America, to promote improvements in car handling. It is understood the conference committee plan has been passed to the American Railway Association within the last few days.

It is obvious, therefore, that real progress is now being made, and it is gratifying to find how fully it meets the views of the shippers. Possibly it will be found expedient to expand the conference committee idea to include the representatives of shippers. At any rate the carriers realize the public's intense interest in such matters, and are trying to meet their view. It is barely possible that the public has, in a way, mistaken the silence of the carriers as an evidence of indifference. The carriers are extremely anxious to make progress, and it is a little unfortunate that they have not advertised their attempts to improve this phase of the service, even though the attempts have not been particularly fruitful, except possibly within the last few months.

F. M. Lucore,
Assistant General Manager, Sunset-Central Lines.

LEGISLATION AND RAILWAY DEVELOPMENT

Globe, Ariz.

To the Editor of the Railway Age Gazette:

After serving for over twenty years as a railroad employee in the mechanical, accounting, engineering, construction and transportation departments, I have been engaged for the last three years by a civic organization composed of the taxpayers of Gila county. Among the duties required of me is that of making annual inspections of the various industries throughout the county, which contains 4,525 sq. mi. of mineral, grazing, agricultural and timber lands; and no better illustration can be given of the railroad situation today than this county presents.

The resources of Gila county can best be judged by a comparison of the assessed valuation in 1911 and 1914. This figure in 1911 was $6,900,000, and in three years had increased to $36,300,000. During this period, however, there was scarcely ten miles of railroad built in the county. This is not alone applicable to Gila county, but to the entire state of Arizona with an area of over 113,000 sq. mi. and an assessed valuation of over $411,000,000. In the last two years there has been less than 20 miles of railroad constructed in the state, and the sole cause is attributed to federal and state legislation unfriendly to the railroads.

There are thousands of acres of the finest tillable land in Gila county that is now being used for stock raising, which if it were reached by railroad facilities would afford homes for hundreds of families. Our state laws have made it almost prohibitory to operate the few miles of railroads within the county, and there is therefore no incentive to railroad capital to construct further mileage. Until the rank and file of the electorate of Arizona are educated to their own best interests and give the railroads a square deal, we have no hope for any further railroad construction in this state.

I certainly believe the time has arrived when the country should adopt a more liberal attitude toward railroads, and in fact in the new western states all encouragement possible should be given to the railroad capitalist in order that our large, sparsely settled areas can be settled, and our wonderfully rich mineral wealth can be developed.

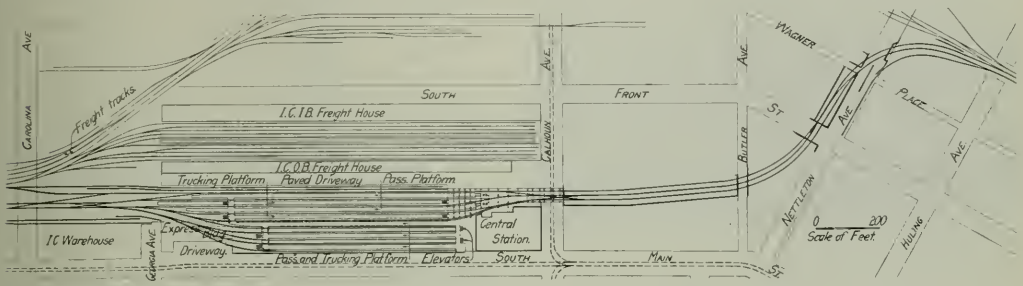
W. H. Keegan,
Secretary, Globe (Ariz.) Chamber of Commerce.

Dutch Railroads Aid Relief Work.—The representatives of the American Commission for relief in Belgium at Rotterdam report that the Dutch government has given the commission permission, when the canals are frozen to send by rail, for which they will make no charge, the full quantity of supplies needed, amounting to 3,000 tons daily. In addition, it has refunded the amounts previously paid by the commission for freight sent over the railroad.

New I. C. Station and Track Elevation at Memphis

Passenger Terminal for Four Railways and Elimination of Six Grade Crossings Have Cost Over $1,400,000

An important passenger terminal improvement has recently been completed by the Illinois Central at Memphis, Tenn., including the construction of a new central station and office building and the elevation of about ¾ of a mile of line, part of which is on a new location. The Illinois Central has maintained two stations for its trains and those of its subsidiary, the Yazoo & Mississippi Valley, one located at Poplar street, near the river front, just north of the main business section of the city, and the other at Calhoun street, about one mile south, the latter being used also by the St. Louis & San Francisco and the Chicago, Rock Island & Pacific. Under the old arrangement, engines were changed on through trains and all breaking up was handled at the Poplar street station, only a passenger stop being made at Calhoun street. The Y. & M. V. trains, all of which terminate at Memphis, ran through to Popular street. Since the completion of the new station, which replaces the old one at Calhoun and Main streets, all switching of cars and changing of engines are handled at the new station, the Y. & M. V. trains terminate there, and I. C. trains only make a passenger stop at Poplar street. All Rock Island trains terminate there, as well as a portion of the trains of the Frisco, and those of the latter road which pass through Memphis, make a reverse movement, entering and leaving the south end of the terminal. The combined traffic of the four roads amounts to about 45 trains per day, of which more than two-thirds terminate there. The old line from Calhoun street north to a connection with the freight line at Huling avenue was a single track and crossed all streets at grade, while the new line has three tracks part of the way and two tracks for the remainder, elevated above the streets. Just south of the station the Rock Island and the Frisco connect by wyes with the east and west line of the latter road.



Location of New Illinois Central Line Through Memphis, Tenn., Reaching New Central Station at Calhoun Street

In order to handle traffic during construction work a temporary station was built west of the old one, fronting on Calhoun street. The old baggage facilities were used for a time, but later new temporary quarters for baggage were provided south of the temporary station and west of the old building. The old station was then demolished and the new one started. The west wall to support the new fill on which the station tracks were to be laid was built first, then the tracks were brought up to the new level in stages, always keeping a sufficient number of tracks open for service. At times during

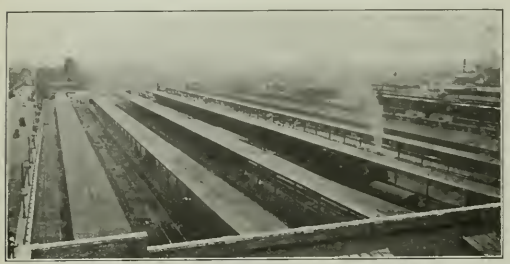
New Central Station and Office Building Recently Completed by Illinois Central in Memphis, Tenn.

Main Concourse of the New Memphis Station, Looking Toward Train Concourse

the work some of the operated tracks were on the upper level and some on the lower. Temporary platforms and sheds were built on the new grade in the position of the permanent ones and will be used during the life of the timber.

STATION BUILDING

The new building is rectangular in shape, 208 ft. by 141 ft., exclusive of the express quarters. The first two floors are occupied by the public rooms, the third, covering only a portion of the total area along the two street faces, is occupied by offices, as are the five floors above this, which cover only the Main street side of the building. Structurally, the building is



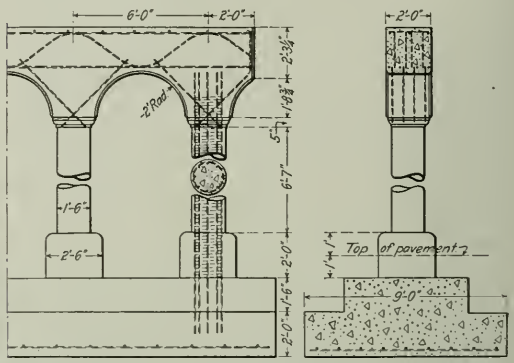
The Station Tracks and Train Sheds from the Top of the New Station

a steel frame with Bedford stone walls up to the fourth floor and brick trimmed with stone and terra cotta above that level. The face of the third story is treated as a broad frieze, supported by a colonnade of fluted pillars extending the full length of the street faces of the building. The upper stories are severely plain in treatment, but this effect is relieved by the rich cornice and parapet which surmount the office building.

Two main entrances are provided, one for white passengers from Main street and the other for colored passengers from Calhoun street. A cab entrance on the west side of the building is reached from Calhoun street. The lobbies just inside each

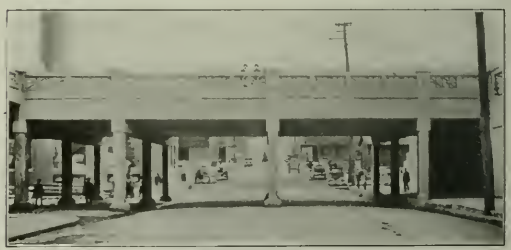
Cantilevered Retaining Wall Along Main Street Adjacent to the New Station

entrance connect directly with the white and colored ticket lobbies, separate baggage-checking counters and separate lunch rooms. These lobbies are finished with mosaic tile floors, Tennessee marble wainscot, plaster walls and ceilings. The main waiting room is located on an intermediate level between the ground floor and the track level. Stairways leading up from the respective entrance lobbies provide easy access to this room from opposite sides. The main concourse is 75 ft. by 100 ft., and the roof, which is carried on steel trusses, is 35 ft. above the floor. The finish is practically the same as that on the lower floor. A portion of this room along the west side is railed off to form a passage for colored passengers from the main stairway to the passenger concourse, which extends across the south end of the waiting room and can be entered directly from the main waiting room by white passengers. A broad



Details of Reinforced Concrete Columns and Arched Girders Used in Front Street Viaduct

stairway leads from this concourse up to the track level, providing direct access to the platforms between the stub tracks and a passageway extends from the passenger concourse under the through tracks west of the building to stairways which



The Calhoun Street Subway Adjacent to the New Station

lead up to platforms between these tracks. A separate exit to Main street opens from the east end of the passenger concourse and another exit is provided along the west side of the building leading down to the cabstand.

Three general waiting rooms fitted with seats adjoin the

The Steel Encased Structure Carrying the Tracks Over Nettleton Avenue and Wagner Place

main concourse and are reached from it by short flights of stairs. These rooms are assigned to white, colored and immigrant passengers and have a combined seating capacity of about 400. The usual toilets, rest rooms and smoking rooms are con-

nected with these waiting rooms. The equipment of the station includes 15 clocks on the two lower floors and about 20 more on the office floors, controlled by a master clock, wiring for 48 Musalophones for train announcing, and eight telautograph stations.

The first office floor has an area of about 15,000 sq. ft., and the five floors above that about 7,000 sq. ft. each. The building is designed to allow the extension of the upper stories over the Calhoun street wing if the added space is needed. Two stairways and two Standard Plunger Company's elevators provide access to the office floors.

The baggage and mail facilities are located on the ground floor of the main station building and the express companies occupy quarters in a separate building at the south end of the train shed facing on Main street and Georgia avenue. The old express building, which occupied a similar location, was moved out into the space to be used for a drive in the new layout and was continued in service during the construction of the new building. This building is one story in height and about one-third of it is located under the station tracks. It has a concrete foundation, a concrete floor, steel columns, brick walls on the street faces and wall-bearing beams supporting a concrete slab roof. The north and west walls of the building are of concrete, serving also as retaining walls for the fill under the station tracks. A trucking tunnel of reinforced concrete, 16 ft. wide and 12 ft. high, extends from the baggage room to the express building under the tracks, connecting with two cross tunnels, one near each end of the station platforms. Baggage, mail and express matter can be brought through these tunnels to seven hydraulic elevators which raise it to any desired platform, thereby eliminating most of the trucking at the track level. The pressure pumps for these elevators and other equipment needed for the station plant are located in a power house across the tracks from the station, the pipes and conduits being carried to the station in a tunnel under the tracks.

The station track layout consists of nine tracks used exclusively for passenger trains and one jointly for passenger and freight. Five of these are stub and five are through tracks. The umbrella sheds are supported on pedestals set on creosoted piles driven in the fill. The tracks are laid with 90-lb. A. R. A. type A rails, creosoted pine ties, and rock ballast.

TRACK ELEVATION

Under the ordinances authorizing this improvement, four streets were closed and six carried under the new tracks in subways. The railway paid the entire cost of this work, in addition to that of the station, including damages, changes to mains, street conduits, etc., aggregating more than $1,400,000, exclusive of property. The track elevation required the handling of about 165,000 cu. yd. of embankment, the placing of 30,000 cu. yd. of concrete in retaining walls and subways, the driving of about 1,500 creosoted piles and the laying of 10,000 sq. yd. of paving. The average raise in grade was between 10 and 15 ft., giving a clearance of 12 ft. at streets, except at Calhoun street, where 14 ft. headroom was provided. Where the right of way was limited, retaining walls were built to contain the fill, these being of gravity section where space for a toe was available, and of the counterfort reinforced type where the space necessary for the former design was lacking. A cantilever wall with a four-foot overhang was built along Main street between the station building and the express building.

The subways are not uniform in design, owing to the varying conditions at the different streets, but include no essential features that differ from those commonly adopted. In general, supports are provided at the curbs and in the centers of the streets. When the spans were short enough to make a reinforced concrete deck economical, slabs were used. In some cases these were cast in a yard and handled into place by a derrick car and a wrecker, and in a number of cases the slabs were cast in place. The heaviest slab handled weighed about 65 tons. Where concrete slabs were not feasible, I-beam decks encased in concrete were adopted, placed transversely and supported on through girders where the length of span required. Reinforced concrete columns and cross girders were used for two of the bridges and built-up steel columns and cross girders encased in concrete for the other subways. Spread footings in sandy clay were obtained in most cases, although at Calhoun street, piling was driven under the pedestals. Little depression of the streets was required, except at Carolina street, where the grade was lowered about 12 ft., with approaches of four per cent. This necessitated the underpinning of the Illinois Central warehouse on the north side of this street, just east of the tracks, and the cutting of new doors through the basement walls at the new street level.

The details of the circular reinforced concrete columns and the arch girders used at Front street, illustrated in the accompanying drawing, are among the most interesting features of the bridge work. These columns and girders were cast in Blaw steel forms purchased by the railway company and turned over to the contractor during the time the work was in progress. Another minor feature of interest is the type of base casting used to support the pipe railings along the parapets of subways and on retaining walls in order to bring the center line of these railings out to the face of the concrete and thereby increase the clearance alongside the track. These castings are secured by bolts extending into the concrete through horizontal and vertical projections. After the railing was lined up the castings were grouted in place through a hole left for that purpose. A reinforced concrete balustrade of ornamental design was placed on the Calhoun street subway. The posts were cast in place, the mullions and panels were cast in a yard and set in place, after which the top rail was cast over the assembled parts.

The entire improvement in Memphis was carried out under the direction of A. S. Baldwin, chief engineer of the Illinois Central, and F. L. Thompson, assistant chief engineer. The bridge designs were prepared under the supervision of Maro Johnson, engineer of bridges and buildings, and the construction work in the field was in charge of F. R. Judd, assistant engineer. The design for the station was prepared by Graham, Burnham & Co., architects, Chicago. The contract for the building was handled by the Alexander Construction Company, Memphis, and George B. Swift & Co., Chicago, built the power house and express building. The fill was made by railway company forces, the steel work was erected by the Strobel Steel Construction Company, Chicago, and the general masonry and excavating contract was executed by the Bates & Rogers Construction Company, Chicago.

THE SUPERINTENDENT—PAST, PRESENT AND FUTURE*

By E. H. DeGroot, Jr.
Superintendent Transportation, Chicago & Eastern Illinois

The superintendent of the past looms large in the history of the American railroad. He was a pioneer, and if his chips seem crude in comparison with the shavings of today, let us not forget that, figuratively speaking, the axe and the adze were the tools for his work and that he can neither be judged with fairness nor properly appreciated other than in the setting of his own day.

The country was new, the roads short, poorly constructed and meagerly equipped, the methods experimental. Each little line was being developed according to the ideas of its own management, with scant regard for what was being done by its neighbors. Co-operation was an unheard of theory and there were no associations like this for the exchange of ideas. There was no attempt at uniformity, even in signal codes, and men changing employment were not infrequently expected to ascribe to hand and lantern movements, and ball and target displays, meanings

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diametrically opposed to those with which they were familiar. Writing of this condition in 1878, Kirkman, in his Railway Service: Trains and Stations, the modest forerunner of his excellent series, The Science of Railways, says, "Are any of these disasters brought about by an improper understanding of the meaning of particular signals, or by employees getting the rules and regulations of different companies confounded? Who can tell? The lamp raised and lowered upon one road says back up; upon a parallel line, not ten feet away, it may, and very likely does, mean, go ahead." And commenting on the joint use of a track by two companies whose rules were different, making it necessary for the trains of the tenant line to be governed by the rules and signals of the owning road, he writes, "These employees must, therefore, at a particular place, be it day or night, lay aside the rules and regulations that they are familiar with by study and practical use, and adopt in their stead other rules dissimilar in form and application."

The little volume from which these quotations are made was given to me by my father who bought it many years ago. As a boy, I read it with eagerness, long before I had come into contact with the genus superintendent, and I am sure that you will pardon me for this personal reference when I add that this book was largely responsible for the awe with which I regarded that official during the first years of my own service. You will scarcely wonder at this when I quote from Chapter One, for example: "They (the employees) know that there is hidden away somewhere in the dark unoccupied recesses of the superintendent's apartments, a mysterious chart, whereon at intervals he works. They have had surreptitious glimpses of this wonderful chart through partly closed doors, but their view has been obstructed and their mental processes deadened by the form and austere presence of the superintendent, as he paced the room with measured stride, or bent over his work, pencil in hand, with absent air and corrugated brow, like one who sought in vain for the solution of some difficult problem," etc. Truly, to have been a superintendent in those days must have been worth while!

As has been suggested, the superintendent of the past was largely isolated. Frequently, his superior, the president, was not versed in operating matters, and there is evidence that the operating officer was quite generally left to work out his own salvation. Byers mentions this in the preface to his Economics of Railway Operation, where he says, "The railroads were small, the traffic was not dense, and the official in charge headed his forces in much the same manner as King Henry of Navarre at the celebrated Battle of Ivry."

It was, then, the superintendent's business to operate, and operate he did with a courage and a fervor which compel admiration. It is not strange that under these conditions he was autocratic, or that he had scant patience with those changes which have come with recent years.

And now he is no more! To me the tragedy of railroad development lies in the fact that so many of these men who had builded well in the past were unable to adapt themselves to the world of today. Their labors and those of their predecessors form the foundation upon which has risen the superstructure of our present day operating organization. All honor to the superintendent—past! Verily there were giants in those days. It is, however, with the superintendent of the present that we are chiefly concerned. His problems are ours and they are before us for solution. The small roads have been united in larger units and systems—competition is keen—the demands for economy becoming more and more insistent and the work of the superintendent correspondingly exacting. The extensive work of the pioneer has given place to intensive development. Standards are higher, more is expected, a wider outlook required; the question of the limits of true economy is still pressing for an answer. Well has Major Hine put it in one of his letters, "You can never get beyond watching the company's dollars and cents, any more than a successful musician can omit practice."

Then, too, the public relations of the railroad are at last receiving some of the attention which, if given a few years ago, might have prevented much of the flood of vindictiveness which has been so costly to both railroads and people. As Morris strikingly says in his Railroad Administration, "There cannot be the smallest doubt that a persistent condition which may be described as corporate bad manners was in large measure responsible for the exceedingly bitter attack upon railroads which characterized the so-called Granger period in the seventies, and more recently, in Roosevelt's administration." Then he adds, "General harmony, from day to day, is best promoted by the watchfulness of division officers, and they are sure to be watchful if the president and general manager really want them to be."

Watchfulness, however, to be effective must be intelligent watchfulness, active as well as passive, and there is much error abroad concerning railroads which all railroad men should understand and refute. With this in mind I want to recommend two books which I believe every superintendent should read carefully. These are, Dunn's American Transportation Question, which treats of rates, service and financial return as three vital and related factors, and his Government Ownership of Railroads, the title of which is self-explanatory. These books are comprehensive without being too lengthy for the busy man and will provide reliable ammunition for the needed campaigns of education.

With all these and other important matters claiming his attention, it will be clear that the superintendent can no longer head his forces after the manner of King Henry. He must work through an organization whether he wants to or not. This is especially true under the divisional plan which makes him responsible for maintenance of equipment and maintenance of way results, as well as for those of transportation.

The superintendent, then, must select men, train them, vest them with authority commensurate with their responsibility, and supervise their work. This requires time and the exercise of good horse sense, applied psychology, knowledge of men. Call it what you will; when your boy comes home from school talking about H_2O, and you tell him to try a little on his hands and face, you are both talking about water. And, by the way, the efficiency of an organization is more often limited by failure to delegate adequate authority, than by the granting of too much. Further, supervision and meddling are not synonymous.

But the superintendent must not only be an organizer; he must be a diplomat, too; a diplomat of the American type, fairminded and direct, a man of convictions and with the courage thereof, but withal considerate of others both employees and public. So much for the superintendent of the present. He is, perhaps, too close at hand for an accurate estimate of his contribution to railroad development, although we know that that contribution is a substantial one.

And now just a word as to the superintendent of the future. He will, of course, like his predecessors, be a logical answer to the transportation requirements of his times, and a survey of the past and present for prophetic purposes discloses a trend toward what we hope will prove to be more wholesome economic conditions as well as the development of railroad operating practices along scientific lines. The superintendent now has, and will have in greater measure hereafter, a generous share in bringing about and maintaining better public relations and an enviable opportunity to work out important operating betterments. Unless all signs fail, costs are destined to play an important part in the work of the very near future and the superintendent who is wise will, in bulletin language, be governed accordingly.

What kind of men will our successors be? High grade, without doubt. They will build on the cumulative results of both past and present, and, like the men who precede them, will be clean, competent and confident—a fine type of American citizenship, contributing their share toward the common weal of our beloved country.

Government Regulation of Railway Operation*

To Be Successful Regulation Must Be Carried on in a Broad Spirit of Cooperation with the Railways

By Samuel O. Dunn

It is, to regulation of what we ordinarily understand as operation, namely, the construction, equipping and maintaining of railways and the moving of their engines, cars and trains that I shall confine myself.

There are some phases of this subject which it would be a waste of time to discuss. It would be a waste of time to discuss whether the government has power to regulate operation. It has been settled by the courts that both the states and the nation have that power. It would be a waste of time to discuss whether there should be some regulation of operation. There is already much of it, and everyone agrees that, so long as the railways are owned by private companies, there always will be and always ought to be a good deal of it. In fact, it is one of the advantages of private ownership that under it the government can regulate the management of railways, and one of the disadvantages of public ownership that under it the government cannot do so, simply because under public ownership the government is the manager. The large questions as respects regulation of operation which remain to be settled are, what its purposes should be, how comprehensive its scope should be, what form it should take, and by whom the regulating should be done.

A good many people have done little else for some years but evolve theoretically complete and perfect schemes for the regulation not only of railway operation, but of all parts of the business of all kinds of public service corporations; and the less experience they have had in connection with the business of such concerns the more assurance they have shown in setting forth how they should be regulated. We shall never get very far by following such people. A satisfactory and helpful policy of regulation can be developed only by a painstaking study of the conditions to be dealt with by both railway officers and regulating authorities, and by co-operation between them in cautiously trying out regulatory measures until experience shall show what ought to be done and what ought not to be done, what can be done and what cannot be done. But frank discussion of the problem may, at least, tend to help bring about the needed study of the conditions and the needed co-operation between railway officers and the regulating authorities; and, therefore, frank discussion may do good, even though those participating in it may, as I do, express their views with many inward questionings and with the reservation of the privilege of changing them if they are shown to be wrong.

Some Shortcomings of Railway Plants and Service

The great requisites of good railway service are reliability, convenience, comfort and safety. Our railway service has many shortcomings as respects all these matters. This is not saying that it is all bad; that it is worse than that of other railways; or that its shortcomings are due to any particular class or classes of persons. The service of some of our railways is better than that of others; in many respects our service is better than that of any other railways; and many of the shortcomings which it has are due to the special conditions under which it has been developed and is carried on. But after all, it must be conceded that we have much poor track, much defective equipment, many lines that are without block systems, many whose trackage, terminals and equipment are not adequate in normal times to the demands of their business, numerous unprotected grade crossings, many employees who have not been properly trained and disciplined or on whom training and discipline have been lost. In consequence, we have many trains that ride uncomfortably, many that are late, congestions and delays to traffic when business is good, and an accident record that is discreditable. This is but an incomplete enumeration of our railways' shortcomings of plant, personnel and service. It is desirable from the standpoint of all that these things shall be improved. If government regulation will help improve them, then government regulation is desirable. But if government regulation is to do this it must courageously and effectively attack the primary causes of the unsatisfactory conditions. What, then, are some of these primary causes, and how may the government effectively attack them?

Causes of Unsatisfactory Railway Conditions

The primary causes of the defects of plants and service are numerous and various. Among them is excessive competition. Many assume that competition always is wholesome and regard it as the specific for all commercial and industrial ills. But, in the railway business at least, its effects are mixed, some being good and some bad. Competition between railways often tends to stimulate them to improve their track, equipment and train service. But when the competition in service becomes unequal because, for one reason or another, the financial resources of the competitors are unequal, it often does harm which largely offsets its good. The stronger lines are able to put and keep their track, structures and equipment in relatively good condition; to build second tracks where they are needed; to install block systems, and so on. The weak roads are not able to do all these things, and in the effort to get and hold business they are likely to do the things which attract the most favorable notice from the public and neglect those things failure to do which attracts the least unfavorable notice. The ordinary traveler judges railways chiefly by their passenger equipment and train schedules. Therefore, not a few railways are tempted in the competitive struggle to neglect their track, to refrain from installing block systems, and at the same time to buy and operate heavy modern passenger equipment and to publish as fast schedules for their trains between competitive points as are published by rival lines with better track and structures. Among the results are numerous late trains; running that is too fast for the track, with all its attendant discomforts and dangers, and contributions to the statistics of collisions and derailments published by the Interstate Commerce Commission, and especially to those regarding derailments, which within recent years have shown alarming increases.

Unrestricted competition in other lines of business may not so plainly have bad effects. In other businesses it results in the long run in the elimination of the weaker; and whether one regards that as good or bad depends on his economic philosophy. But unrestricted competition between strong and weak railways always has some bad effects, because in the railway business the weaker competitor never is and never can be entirely eliminated. The ultimate result of unrestricted competition is to reduce the weaker lines to a position where they will go on indefinitely rendering a service which is unprofitable to their owners and managers and unsatisfactory and unsafe to the public.

The most important reason for the shortcomings of the physical properties, and for many of the resulting defects of the service, of the railways of the United States is their relatively small earnings; and their relatively small earnings are due partly to their relatively light traffic, but more to their low rates. The railways of Germany earn over $22,000 gross per mile; those of Great Britain almost $27,000; those of Belgium over $22,500; those of Switzerland $15,000; those of France over

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$14,500; while the average for our roads has never been $13,000. Now, everything a railway buys must be paid for, directly or indirectly, from gross earnings. Furthermore, our railways have to pay wages twice as high as those of European railways. As the railway dollar of the United States will not go nearly as far as the railway dollar of Europe, and as the number of dollars earned per mile here is somewhat less than in France and Switzerland, only a little more than one-half as great as in Belgium and Germany, and less than half as great as in England, the opportunities our railways have had for putting their properties in good shape have been relatively much smaller than those of the other railways named. In their earlier history their earnings were small because most of them were built into undeveloped territory where the traffic was sparse, and as soon as a competing road was built they began destructive rate wars. Their earning capacity has continued to be too small because just when they very sensibly began to make traffic arrangements or community of interest arrangements to increase and maintain their rates and earnings government regulation stepped in and destroyed the arrangements or forbade the increases in rates.

Another important cause of the relative want of safety and other defects of our railway operation and service is the shortcomings of their personnel. We have been told by an authority whose views carry great weight with the public, viz., the Interstate Commerce Commission, that "The most disquieting and perplexing feature of the problem of accident prevention is the large proportion of train accidents caused by dereliction of duty by the employees involved." To the lamentable tendency of employees to disregard operating rules and take risks is also attributable a great majority of the casualties and fatalities—other than those to trespassers—which result from accidents other than train accidents. For example, while the application of automatic couplers to practically all engines and cars has largely reduced the accidents occurring in connection with coupling and uncoupling, there are still many of them; and their continuance is due mainly to the risks carelessly or recklessly taken by employees. The many accidents resulting from employees stepping in front of moving cars, engines and trains are due to the same causes. Probably the blame for such accidents should not be visited entirely on the employees. It is the duty of the managements to use all available disciplinary and educational means to instruct and train employees so that they will not be careless or reckless. But the employees individually, and their organizations also, owe a duty to themselves and others; and the state has its duty; and few who are familiar with the conditions would say that the employees, their organizations and the various governments have done as much in proportion to reduce this fatal carelessness and recklessness as have the railway managements.

The same laxity which causes so many accidents is responsible for numerous other defects of service. While the frequent lateness of trains is often due to the policy of managements in publishing schedules which cannot be maintained, it is also often due to delays at stations which can be stopped only by greater alertness and celerity on the part of the station and train employees.

The statistics which constitute the worst feature of the accident reports of the Interstate Commerce Commission are those regarding fatalities to trespassers, which every year number more than one-half of all the fatalities reported. While the deaths of trespassers are charged up against the railways, as a matter of fact, the municipal and state governments, which do not make and enforce proper laws against trespassing, and not the managements of the roads, are responsible for them. They are not really railway accidents at all; and, therefore, the statistics regarding them should not be included under that head.

What has government regulation already done?

What has government regulation done about the various defects of the physical properties, of the operation and of the service of our railways? What can and should it do about them? And what form should the regulatory legislation be given, and to whom should its administration be entrusted?

There have been many laws passed by state legislatures and Congress, and many orders issued by state commissions and the Interstate Commerce Commission, for the regulation of operation. These relate to numerous and varied subjects, including safety appliances on locomotives and cars, drinking cups on trains, locomotive headlights, block systems, the drinking of intoxicating liquors on trains, the frequency with which employees must be paid their wages, the number of hours they may be kept on duty, the number of them that must be employed on trains, the elimination of grade crossings, the speed of live stock trains, the clearances between tracks and overhead and lateral structures, and so on *ad infinitum*. At almost every session of a state legislature some new kind of law, and at almost every session of some state commissions some new kind of order, for the regulation of operation is produced. It would be astonishing if all this mass of regulatory measures did not contain some that were good. But those which have been conceived in intelligence and public spirit and brought forth in justice are so few compared with the total that you will have great difficulty in finding them. Having found them you are apt to think they are adventitious and not the result of deliberate thought and choice. Of all the subjects to which our law-making and law-administering bodies have applied themselves, to none have they devoted more stupidity, ignorance and unfairness than the regulation of railway operation. In most cases they have not tried to ascertain the conditions to be dealt with, the real evils to be remedied or the results their laws or orders probably would produce.

The character and the fruits of their labors have corresponded. If a bonfire were made of every state regulation in existence the operation of our railways would be made more economical and their service better and safer; and there are some federal regulations which might well be added to the conflagration.

I have referred to excessive competition as one of the causes of the shortcomings of our railway service. Have the regulators perceived this and acted accordingly? On the contrary, the various anti-trust laws, and especially the federal anti-trust law, have been applied to railways in all their rigor. Every consolidation, agreement or arrangement designed to moderate the fury of competition has been treated as a crime. Some such arrangements, as, for example, that regarding differential passenger fares between Chicago and New York, under which the fares charged are adjusted to the service and schedules of the different roads and trains, have been tolerated. But the general tendency of regulation has been to encourage fierce competition, whereas the public welfare demands that such competition shall be discouraged. It would be to the interest of both the railways and the public for the roads to be permitted to make binding and enforceable agreements regarding both competitive rates and competitive service subject to the supervision of competent regulating bodies. The spirit of our laws is hostile to such action.

In some cases when railways with bad track have been running trains at unsafe speeds to meet the competition of roads having better track, state commissions have fixed maximum speeds to be observed until their tracks were improved. Such action is justifiable and desirable. But the need for it is created chiefly by excessive competition. Why continue to stimulate the cause while trying to nullify the effect?

Furthermore, such action by the commissions merely substitutes one kind of poor service for another, and does not go to the root of the evil. It is better that trains should be slow than that they should be unsafe, and our accident record would be better if some railways had fewer trains with schedules too fast for their track and facilities. But a reasonably fast service is desirable on all railways; and when the passenger trains of a railway cannot make good speeds safely the primary evil consists, not in their attempts to run their trains fast, but in the conditions of track, structures, equipment, signals and so on, which make it unsafe to do so. In that case the true function of regulation is, not merely to fix some low maximum speed, but to ascertain the causes of the unsatisfactory physical conditions and stimulate and co-operate with the railway management in removing them. So as to all other deficiencies of roadway, equipment and service.

Now, while there has been much regulation purporting to be intended to cause physical improvements in railways, there has been very little which has been adapted to that end. Probably the best legislation for the regulation of railway operation ever passed was the safety appliance law enacted by Congress in 1893, together with the subsequent amendments to it. This law required the railways to equip their trains with power brakes, automatic couplers, secure grab irons and other safety appliances. But it did not require them to do anything which the investigations of their own officers had not shown was practical, or which the practice of many of the more progressive lines had not indicated was desirable; and it gave the Interstate Commerce Commission a broad discretion in administering the law, which made it possible for the railways and the commission closely to cooperate. Such co-operation was secured, and the result has been a steady improvement of the safety appliances on equipment of all kinds from the passage of the law until the present time.

In this case it was right and desirable that the legislation passed should apply uniformly to all roads, because, as freight cars circulate freely throughout the country, it would be dangerous to have those of different roads equipped in different ways. But in many cases to apply the same provisions to large groups of roads or to all of them is unjust and injurious. The needs and deficiencies of different roads may be wholly different. One may have bad track and a good block system; another, bad track and good equipment; another good track, but neither good equipment nor a good block system. Evidently if the same requirement, as for steel cars or block signals, is imposed on all, the results to the roads themselves and to the public will be widely different. If a road has bad track a law requiring it to install heavy steel equipment is almost certain to increase the number of accidents on it. Similarly, there is not the same need or justification for requiring the elimination of grade crossings on a road operating through a sparsely settled district as for requiring it on one operating through a densely populated territory.

In the preparation of most of the regulatory legislation such points have not been considered. The same requirements have been imposed on many, or even all, roads without reference to their differences in conditions. Railways have been required to use high power headlights regardless of whether they did not have greater need for block signals. They have been required to increase their clearances regardless of whether it would not have been more in the interest of safety for them to have spent the money on their tracks. They have been required to waste millions in employing useless men in train crews, when they needed the money to properly maintain their equipment. Even when improvements which were needed have been required the legislation regarding them often has been wholly unjust. In the city of Chicago the roads are being forced to bear the entire cost of elevating their tracks, which it is estimated will be $150,000,000, and this in spite of the fact that many more of their grade crossings have been created by streets being opened across their tracks than by their tracks being opened across streets.

REGULATION OF OPERATION LARGELY A FINANCIAL QUESTION

Finally, law-making bodies and commissions are disposed to require all kinds of expensive improvements, while persistently ignoring the fact that it will be impossible to put the railways of this country in satisfactory condition without increases in their rates and net earnings. When the roads ask for increases in rates an attempt always is made to show that they are earning enough on their *present* investment. The Interstate Commerce Commission in its decision in the Eastern rate advance case conceded that this was not true of the eastern railways. But even if it were true of all the railways, this would not show that there ought not to be general advances in rates. If the roads are now earning barely a reasonable return on their present investment, clearly they cannot, with present rates and earnings, raise the billions which must be invested if block systems are to be generally installed, grade crossings to be eliminated, tracks to be strengthened, better equipment to be provided and so on. Most of the investment for such purposes would add nothing to their earning capacity. But a return must be paid on the additional investment; the means of paying it cannot be obtained except by increasing earnings; and the necessary increase in earnings can be gained only by increases in rates.

The question of regulation of railway operation is chiefly a financial one. The railways would gladly make every kind of improvement which the public demands. But the various regulating bodies control what they may earn, and, therefore, what funds they can raise. Therefore, the financial problem of regulation of operation is squarely up to the regulating bodies. As long as the earning capacity of the railways is limited as it is now, to require many of them to make one improvement is in effect to forbid them to make others which may be more needed, simply because they have not enough money and cannot raise enough to make all the improvements that are needed.

Besides regulation to compel the railways to make improvements in their tracks, structures, and equipment, there has been a good deal affecting their relations with their employees. The federal government and many of the states have passed laws fixing the maximum hours that certain classes of employees may be kept on duty. Many of the states have passed laws requiring increases in the number of men employed in train crews. All of the legislation affecting the relations of railways and their employees has tended to increase expenses, and most of it has purported to be in the interest of safety. But a large majority of the so-called "safety" laws have been promoted by the brotherhoods of railway employees, and usually their real purposes have been to increase the number of men that must be employed by railways, and to promote the political interests of the lawmakers passing them. The enactment of the provision prohibiting employees from being kept on duty more than 16 hours was justifiable, although the number of accidents traceable to the overworking of employees always has been negligible. The provisions of the federal and the various state laws prohibiting telegraphers concerned with the operation of trains from being kept on duty more than from eight to nine hours, regardless of the extent to which they are concerned with train movement are, as safety measures, indefensible. The same thing is true of the train crew laws.

It is notable that while government regulation has meddled with matters of this sort it has been conspicuously careful to abstain from taking any steps to deal with those derelictions of their duty by railway employees to which the Interstate Commerce Commission attributes a large majority of train accidents. When a railway employee in England or Germany is guilty of an infraction of duty which causes an accident he is pretty sure to be taken in hand by the government itself. Not so here. The noble and disinterested patriots who regulate railways and enforce laws in this country seldom forget for a moment the voting power of organized labor.

Why has past regulation of operation been what it has been? Too much of it has been inspired by prejudice and vindictiveness. Too much of it has been inspired by the representatives of labor brotherhoods seeking to promote the supposed interests of their members at the expense of the railways and the public, and adopted by lawmakers and commissioners who were thinking very little about the rights of the railways and the welfare of the public and very much about the votes they hoped to get by showing subservience to the labor brotherhoods. Too much of it has been inconsistent or conflicting because the several states and the nation have dealt with the same subjects in wholly different ways. Too much of it has been adopted in ignorance or disregard of whether the railways were able to bear the financial burdens imposed. Finally, most of the regulatory legislation has not been either drafted, adopted, or administered by persons possessing any expert knowledge of the matters with which they were dealing.

HOW REGULATION SHOULD BE REFORMED

Lawmaking bodies are more likely than commissions to be inspired by prejudice and political motives. They are less able

than commissions to adapt their regulation to circumstances and conditions, for laws must be broad and sweeping in their terms. The commissions are more likely to act with knowledge, for their members have opportunity to study the conditions to be dealt with and to consider the probable effects of their measures, while lawmakers have not. Therefore, as far as is constitutional and practicable, the regulation of operation should be delegated to commissions. So long as the various states and the nation attempt to regulate operation independently, there will be inconsistencies and conflicts between the regulations adopted by the states, and between those adopted by the states and the nation. Therefore, either the states should be divested of their regulating authority or its exercise should be made subject to the control of the central government. Most of our regulation of railway construction, maintenance or transportation causes an increase in railway expenses, and, therefore, such regulating should be either done or controlled by the body which chiefly controls railway earnings in order that a proper relationship between income and outgo may be maintained. For all these reasons, and for others that might be mentioned, the Interstate Commerce Commission should be given paramount authority to regulate, not only interstate operation, but all operation.

The Stevens bill, now pending in Congress, apparently would confer on the commission the large discretionary authority over operation which it seems desirable it shall be given in order that the railways and the public may escape from still worse evils. It would, however, be folly to assume that the mere passage of this or some similar measure would solve the problem. The way laws are administered is as important as their provisions; and the character of their administration depends on the characters, attainments and abilities of those who administer them. Now, as to the personal character and ability of the present members of the Interstate Commerce Commission there is no question. But as to their fitness to administer a law giving them extensive authority to regulate railway construction, maintenance and operation there is serious question. The problems with which they would have to deal would be highly technical and extremely difficult. They are problems with which many men of great experience in railway affairs and of great ability have grappled for years with only partial success. They are problems of which no man can get even a fairly good working understanding without living in the closest touch with them for years. Now, the commission contains only one man who has had experience in the operation of a railway, and he was not a railway officer. Two of its members were economists in our universities; and the other four were lawyers. Men with their training and experience cannot know enough about railway mechanical engineering, maintenance and transportation matters to regulate them intelligently; and it is hard to believe that anybody ever could learn enough about them to regulate them merely by serving on a commission.

THE COMMISSION'S ORGANIZATION FOR REGULATION

It would seem, therefore, that if the commission is to be given this extensive authority over operation a great effort should be made to secure the appointment to it of men with official experience in the operating departments of railways. As the commission deals with a diversity of subjects doubtless it is not desirable that it should be composed entirely of such men, but certainly at least two of its members should be railway experts, one being, perhaps, a technical man of the caliber of chief engineer or superintendent of motive power, the other an operating man of the caliber of general superintendent or general manager. The British Railway and Canal Commission never has more than three members sitting at once, but the law requires at least one of these to be "of experience in railway business." The Railway and Canal Commission is merely a court which passes on rate cases. How much more important it is that a body such as the Interstate Commerce Commission should have members of railway experience!

Besides having members of railway experience the commission, if it is to regulate operation extensively, probably should have a subordinate body composed of experts in railway engineering, mechanical, maintenance and transportation matters to look after the details of this part of its work. It already has some subordinate bodies which devote themselves to such details. There is a chief locomotive boiler inspector with two assistants and district boiler inspectors throughout the country. There is a chief inspector of safety appliances with inspectors throughout the country. Unfortunately, almost all of these men have been selected because they were members of and were backed by railway labor brotherhoods. Very few of them have received a technical training, and almost none has risen in railway service above the rank of employees. This does not demonstrate that some of them are not men of ability and of special fitness for their duties. A large proportion of the operating and executive officers of our railways have risen from the ranks. A good many even of the technical experts of the railways, including chief engineers and superintendents of motive power, have done so. And there is no reason why men taken from the ranks by the Interstate Commerce Commission should not likewise demonstrate the possession of more than average ability and develop into experts. In fact, some of them have done so. But plainly, if the commission should organize a board to deal with the problem of regulating construction, maintenance and operation, it would be preposterous for it to fill it with locomotive engineers, conductors and mechanics. Those appointed to such a board should have demonstrated their fitness beforehand; and men who had not risen in the railway service above the rank of employees would not have done this.

When the commission was directed to undertake the stupendous task of making a valuation of all the railways it did not organize an engineering board composed of railway employees. It organized one composed of the president of the American Railway Engineering Association, of the chief engineer of one of the state commissions, of a man who was both a professor of civil engineering in one of the state universities and chief engineer of the railway commission of his state, and of two consulting engineers. In completing the engineering organization of its valuation department it has drawn men of recognized ability and expertness from the official ranks of railways all over the country. The example the commission has set itself in organizing the engineering branch of its department of valuation should be followed if it should ever organize a board to have direct charge of its work of regulating operation. It should likewise be followed in selecting the men who doubtless would be employed in making inspections and investigations for it. Its inspectors and investigators should be chosen solely because of their special fitness to do their work fairly and intelligently, and not because they may happen to have the backing of some politician or labor organization.

THE VARIOUS STEPS IN REGULATION

When the commission shall have thus formed its organization, how should it proceed with its work of regulation? It would seem that it should lay the foundation for it by causing careful investigation to be made as to the conditions of railway plants or service which may be at fault and as to the causes of them. For example, if the statistics of the commission continue to show an increase in the number of derailments it would obviously be the function and duty of the commission to make or cause to be made an investigation to determine whether this was due to general or local causes and what remedy or remedies should be applied. If the Brotherhood of Railroad Trainmen should petition the commission for an order requiring increases in the number of brakemen employed on trains, or if the state legislatures should continue to pass so-called "full crew" laws, it would obviously become the duty of the commission to make or cause to be made a careful and comprehensive investigation of the question whether a general increase, or local increases, or any increase at all, in the number of men employed on trains was required by the public welfare.

When the commission believed that it had found bad conditions which demanded some action it would seem that its next step should be to arrange for conferences between its members or representatives and officers of the railways to ascertain whether the proper remedies could not be agreed upon and

then applied by the managements of the railways themselves without the commission issuing any formal order. The commission in the past has had such conferences with representatives of the railways and of the railway labor brotherhoods regarding the administration of the safety appliance, hours of service and other laws. And in most cases they have led to agreements which were measurably satisfactory to the parties most directly concerned and have secured better results than would have been obtained by the issuance of arbitrary, formal orders which might have and very likely would have resulted in protracted litigation. It is probable that in a large proportion of all cases the railway managements and the commission could agree as to what each of them ought to do, if they would confer more frequently, more frankly, more fairly and with a minimum of suspicion of each other's good faith. If after investigation and conference the commission could not get any individual road or all roads to do what it thought should be done it would not follow that it must needs immediately issue some mandatory order. It would in a good many cases, if it exercised a salutary self-restraint, simply make public the facts, and then, for awhile at least, await developments. Publicity seems to many persons not to be a very sharp or heavy weapon, but, with all due respect to the Interstate Commerce Commission, the publicity which its hearings and reports have given to facts about the railway business which were previously unknown has, in my judgment, done a great deal more to raise the economic and moral standards of railway management in this country and to improve railway service than the formal orders it has issued. The power of common sense exercised by making public facts and drawing suitable conclusions from them "does not," as A. T. Hadley has said in discussing the subject of railway regulation, "seem as strong as statutory power to prosecute people and put them in prison, but in the hands of a man who really possesses it it is actually very much stronger." Only when other resources fail will a wise regulating body resort to the issuance of mandatory orders. And when it does so it will take the greatest pains to make them as little arbitrary as possible and as well adjusted to the special conditions of each case as possible.

When the commission shall have completed its organization and set it to work it will be necessary, if its regulation of operation is to be fair and successful, for it to consider every time it issues an order whether the earnings of the lines affected are sufficient both to bear the additional expense its order will cause and to enable them to expend all the money in the maintenance and improvement of their properties which they would have needed to have spent if it had not issued the order. It will not be sufficient for the commission merely to inspect, to find fault and to issue orders. The managers of most railways know the defects in their properties and service as well now as the commission will ever know them. And most roads whose earnings are sufficient go ahead as fast as is practicable remedying these defects. Most railway managers are as anxious as the public or any railway commission to see their properties put and kept in the best conditions. Their great problem is to find the necessary money; and this is the greatest problem which the commission will have to face and help the managements solve, when it undertakes the extensive regulation of operation; and if the commission does not face that problem courageously and co-operate intelligently with the managements in solving it its regulation of operation will be a failure or worse.

WILL REGULATION BE SUCCESSFUL?

Suppose state regulation is entirely subordinated to federal regulation. Suppose federal regulation is placed entirely in the hands of the commission. Suppose the commission is given a large enough appropriation by congress properly to perform its functions. Will regulation of operation then be made fair, constructive and beneficent? Will the politicians let the commission alone so that it can do its work right, and will the commission prove big enough for the job? These are questions no one can answer. The only way to find out will be to try the experiment, as we are now trying that of making a valuation as a basis for the regulation of rates. If it is tried, like the experiment of valuation it will cost the public and the railways large sums; and the new burdens of the commission, together with its present burdens, will give it the heaviest duties and responsibilities ever imposed on any body of men in this country. If the commission tries merely to regulate the railways and not to manage them the experiment may succeed. If it tries to manage them, as it now seems to be trying to manage them under the guise of regulating rates, the results of the experiment will be widely different. In its regulation of rates the commission, instead of confining itself to the duty imposed on it by law, that of determining the reasonableness of rates in view of the actual situation of the railways, is trying to tell their managers all about how they can do their work better so as to change the situation and thereby effect savings that will make unnecessary advances in rates, which, under present conditions, are conceded to be needed. Now, while the commission may be able by purely corrective measures to protect the public from abuses which arise in connection with the financing of railways, the making of their rates and the rendering of their service, it never will be practicable for any single body of men, however able they may be and however much expert knowledge they may have, successfully to control the policies and direct the management of all the 250,000 miles of railways in this country.

Let us, therefore, hope that the more authority the commission is given the more self-restraint and the more disposition to confine itself to its proper functions it will show. Let us hope that it will avoid letting its judgment be warped by the egotistical assumption that because it possesses superior power it must also possess superior wisdom—an assumption which seems rapidly to destroy the sense of proportion of every bureaucracy and which in the long run always has made every form of paternalistic government a failure and a curse to mankind. The commission might do a great deal more good with its present powers if it would exercise them with a somewhat franker recognition of its own limitations and in a broader spirit of co-operation with the railway managements. And it may do very little good and much harm with much larger powers unless it shows the greatest patience, forbearance, expertness and courage in exercising them. Wisdom is demonstrated, not by the possession, but by the manner of the use of power; and the success of government regulation of railway operation will not be determined by the amount of power conferred on the commission, but by the way in which the power that is conferred is exercised.

ECONOMY IN SIGNAL OPERATION

One large system has found that despite the higher first cost, as compared with direct current, it is cheaper to use alternating current for automatic block signals on its steam lines through the western desert country, and that this type of apparatus would still be the most economical, even were the cost of maintenance and operation more, under ordinary conditions, than would be the case were direct current used. The reason for this is that there is little water in the country, and water is essential to the life of any kind of battery. It costs less to transmit alternating current than it does to transport the same amount of energy confined in a storage cell from a central charging plant to the point of application. Labor of all kinds, and skilled labor especially, is scarce, and it is hard to make men stay in the country; therefore, wages are high. One man can look after a much greater mileage of alternating current than of direct current signals, as there are no batteries to be renewed and changed and the lamps can be electrically lighted, at very little cost, with metallic filament lamps. This arrangement eliminates lamp maintenance entirely, and provides a much more reliable and satisfactory type of illumination.—W. H. ARKENBURGH, in *The Signal Engineer*.

NEW CAR FERRY OF THE FLORIDA EAST COAST RAILWAY

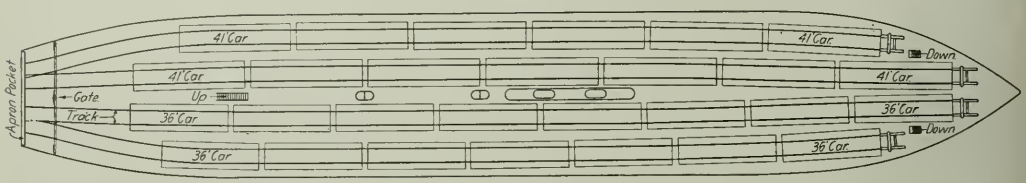
It was the ambition of Henry M. Flagler to establish an "all rail" route between the United States and Cuba whereby freight could be handled between points in the United States and the interior of the adjacent island without the necessity of transfer from cars to boats. The first step in this project was completed by the opening of the Florida East Coast Railway to Key West on January 20, 1912. Although Mr. Flagler has since died, the second and final step in this project was completed on January 7, by the inauguration of regular service by car ferry between Key West and Havana.

To provide this service the Florida East Coast has built a car ferry, the Henry M. Flagler, which is said to be the largest boat of its type in the world. It will make the trip between Key West and Havana, a distance of about 100 miles, in a scheduled time of eight hours. The Henry M. Flagler was built at the yards of the William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., from plans and specifications prepared by M. C. Furstenau, consulting naval architect for the road, under the supervision of Robert W. Parsons, assistant to the president of the Florida East Coast. The keel for this boat was laid on April 20, 1914, and it was launched on September 22.

This ferry is 360 ft. long and 57 ft. wide on the car deck. There are four standard-gage tracks on this deck with a capacity of 26 41-ft. or 30 36-ft. cars. In addition to this there are three cargo holds which may be loaded directly either from the cars or through cargo ports at the side of the vessel. Each hold is served by an independent Williamson double-drum electric cargo hoist of two tons capacity. The dry cargo capacity of the ferry is about 3,000 tons.

The vessel is divided into watertight compartments, 10 of which are known as "deep tanks" and are used for ballast purposes, having a water capacity of 3,000 tons. They are connected by a system of pipes for filling and discharging which are served by two 12-in. centrifugal pumps with a capacity to discharge 3,000 tons of water in 75 minutes. In this way the steamer can be loaded to its load draft although no cargo is carried. One of the forward ballast tanks has been provided with the necessary apparatus for filling and discharging so that it is capable of carrying a cargo of molasses.

The power plant consists of two triple-expansion engines with cylinders of 20-in., 32½-in. and 54-in. diameter by 36-in. stroke. These engines are designed to develop 1,500 indicated hp. each at 100 revolutions per minute under 170-lb. steam pressure furnished by a battery of four Scotch marine boilers 13 ft. 2 in. in diameter by 12 ft. long, fitted with two 48-in. Morrison corrugated furnaces operated under the Howden system of forced draft. Complete auxiliary equipment, including feed, circulating and ballast pumps and an electric plant, is provided in duplicate. Running hot and cold fresh water is furnished in each room in the quarters for the officers and the crews, with four individual baths for the officers and four shower baths for the crews' quarters, which may also be supplied with cold salt water.



Plan of Car Deck of Florida East Coast Car Ferry

The New Key West-Havana Car Ferry of the Florida East Coast Railway

THE CHANNEL TUNNEL.—A letter from the Deputy M. Goubhier de Clagny has recently appeared in several Paris papers, making an appeal to the British nation in favor of the construction of a tunnel under the English Channel. M. de Clagny emphasizes the advantage such a tunnel would be to the Allied armies at the present moment, owing to the increased facility of communications between the two countries which it would afford, and in conclusion urges that the work should be begun at Dover and Calais before the signature of peace.

Electric Towing Locomotives for the Panama Canal

Designed for Operation on a Rack Rail and Grades of 44 per cent. Between Locks; Four Engines for Each Boat

After a thorough study of the problem of maneuvering ships through the locks of the Panama canal, it became evident that they should not proceed under their own power, and that a substitute for the ship's power should embrace the following requirements: Ability to place the ship in proper relation to the lock; capability of keeping the ship to its course; accelerating and retarding the ship without breaking the lines; all the electrical apparatus for operating the locks, were built by the General Electric Company, Schenectady, N. Y.

In passing through the canal from the Atlantic to the Pacific a vessel enters the approach channel in Limon bay, which extends to Gatun, a distance of about seven miles. At Gatun it enters a series of three locks in flight and is raised 85 ft. to the level of Gatun lake. It may then steam at full speed through

United States Submarine Tender "Severn" in the Middle East Chamber of Gatun Locks, with Four Towing Locomotives Ready for the Lowering of the Water

the lines when once attached should be used without change for lockage in flight; a small number of skilled operators rather than a large number of unskilled men to co-ordinate.

The towing system employed was designed and patented by Edward Schildhauer, electrical and mechanical engineer of the Isthmian Canal Commission; and the 40 towing locomotives and the channel in this lake, for a distance of 24 miles, to Bas Obispo, where it enters the Culebra cut. Passing through this cut, which has a length of nine miles, it reaches Pedro Miguel, where it enters a lock and is lowered 30 ft. It then passes through Miraflores Lake for a distance of 1½ miles until it reaches Miraflores, where it is lowered 55 ft. through two locks, to the sea

Electric Towing Locomotive Used at the Locks of the Panama Canal

level, after which it passes out into the Pacific through an 8½ mile channel.

The main features of all the lock sites are identical and a brief description of the layout and methods at Gatun Locks will give an idea of the docks in general. There are two ship channels, one for traffic in each direction. The channels are separated by a center wall, the total length of which is 6,330 ft. There are two systems of tracks, one for towing and the other for the locomotive when returning idle; this, however, refers only to the outer walls. For the center wall, there is only one return track in common for both the towing tracks. The towing tracks are naturally placed next to the channel side, and the system of towing utilizes normally not less than four locomotives running along the lock walls. Two of them are opposite each other in

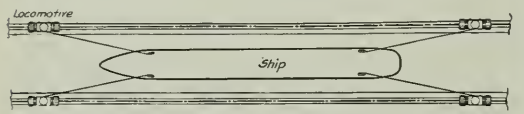
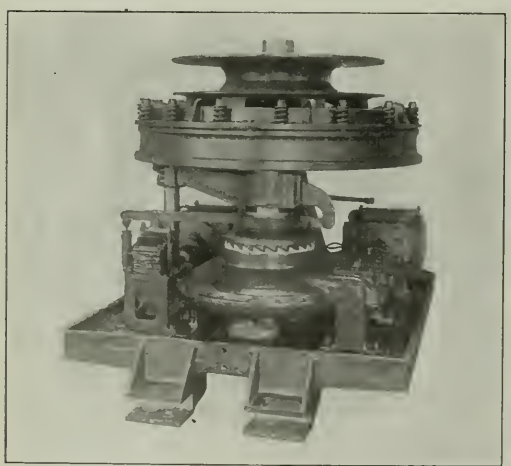


Diagram Showing the Relation of the Towing Locomotives to the Ship

advance of the vessel, and two run opposite each other following the vessel, as shown in the diagram. The number of locomotives is, however, increased when the tonnage of the ship demands it.

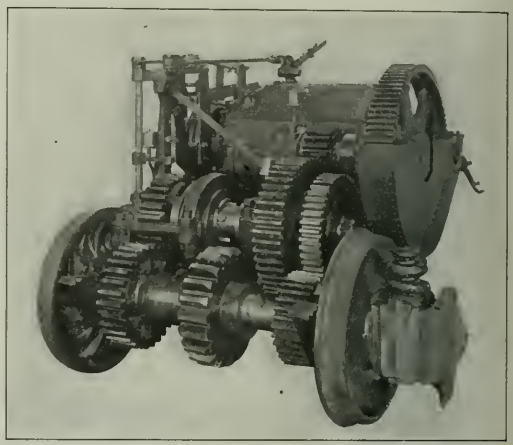
Cables extend from the forward locomotives and connect with the port and starboard sides respectively of the vessel near the bow, and other cables connect the rear locomotives with the port and starboard quarters of the vessel. The lengths of the various cables are adjusted by a special winding drum on the locomotive to place the vessel substantially in mid-channel. When the leading locomotives are started, they tow the vessel, while the trailing locomotives follow and keep all the cables taut. By changing the lengths of the rear cables, the vessel can be guided; and to stop the vessel, all the locomotives are slowed down and stopped, thus bringing the rear locomotives in action



Arrangement of the Windlass and Base on the Towing Locomotives

to retard the ship. Therefore, the vessel is always under complete control quite independent of its own power, and the danger of injury to the lock walls and gates is very greatly lessened.

The towing tracks have a specially designed rack rail extending the entire length of the track and located centrally with respect to the running rails. It is through this rack rail that the locomotive exerts the traction necessary for propelling large ships and climbing the steep inclines. A rack rail is also provided on short portions of the return track so as to lower the locomotives safely from one level to the next. The steepest slope is 26 deg., or 44 per cent, hence the need will be seen for a



Front View of Traction Motor Unit, with Journal Box in Place

rack rail even on the return track, it being noted that any traction locomotive with the usual wheel drive, even with the brakes set, would begin to slide on a 16 per cent grade, and therefore could not be controlled. With a rack rail, however, traction is limited only by the capacity of the driving motors and not by the adhesion of the wheel treads on the rails. The rack rail is

Locomotive Ascending the Incline Between Locks

made with an approach section that can be depressed on the approach of the rack pinion of the locomotive. The teeth of the approach section are undersize and shaped off at the extreme end so that the teeth of the pinion will mesh properly and prevent excessive strain on the pinion and the axle. A spring restores the approach to the proper position after the locomotive has passed over. The rack rail is of the shrouded type, and

each tooth space has a drain hole cast in the bottom so as to carry off water and other accumulations to suitable drain pipes or ducts set in the concrete of the walls. A further feature is projecting edges, which permit thrust wheels attached to the locomotive to run along the under side and prevent overturning of the locomotive, in case some unforeseen operating condition should produce an excessive pull on the towline. These thrust wheels serve to counteract the lateral component of the towline pull and the flanges act for emergency only, as the weight of the locomotive is sufficient to prevent overturning with a normal pull of 25,000 lb. on the towline.

Three-phase, 25-cycle, 220-volt alternating current is used for operating the locomotives, and the current is supplied to the locomotives through an underground contact system. Two T-rails form two legs of the three-phase circuit and the third leg is formed by the main track rails. A specially designed contact plow slides between the two T conductors and transmits the power from the rails to the locomotive. This contact plow also passes through a slot opening in the conduit cover and is flexibly connected to the locomotive in such a manner as to follow all irregularities in the tracks and crossovers.

The working parts of the locomotive are supported by two longitudinal upright side frames of cast steel, connected by transverse beams. These frames are in effect deep rigid trusses, having upper and lower members connected by posts and diagonal braces. The middle portion of each frame has its upper and lower members parallel and horizontal, but the end portions have their lower members inclined upwardly towards the ends of the frame. The pedestals for the wheel axles are located at the junction of these end portions with the middle portion, and are of the usual locomotive type, having vertical parallel jaws between which the journal slides. The locomotive is mounted on four wheels, the wheelbase being 12 ft. and the over-all length about 32 ft. Each axle is driven by its own motor, independent of the other and the construction is identical at both ends.

The motors are of the three-phase, slip-ring type, enclosed, and are geared by a pinion and spur gear to the countershaft, which carries a pinion meshing with a spur gear keyed to the jack shaft. On the outer side of the spur gear are formed clutch teeth which co-operate with similar teeth on the adjacent side of a gear, which is sleeved upon the jack shaft and can be slid lengthwise thereon to engage and disengage the clutch teeth. The means for sliding this gear consists of a disc secured to the gear and having a central hub fitting over the end of the jack shaft. A pinion is keyed to the axle and is wide enough to mesh always with the gear, so that when the clutch teeth are engaged, the motor will propel the locomotive by the adhesion between the wheels and the rails of the track, and this only when running without load and between inclines.

When the locomotive, however, reaches one of the inclines between the locks, the grade of which may be as much as 44 per cent, or when it is towing a ship, the cog rail system is utilized to enable the locomotive to climb the grade and exert the traction necessary for pulling large ships. The cog or rack rail is laid between the track rails; and the locomotive is provided with a cog wheel or rack pinion secured to or integral with a sleeve, which rotates freely on the axle.

In connection with each motor a powerful brake is installed; and, as during operation the motors are at all times geared either to the axles or to the cog wheels, the truck wheels are not provided with any brake rigging. In addition to this automatic brake, means are provided for applying the brakes manually in order to supplement the action of the automatic feature, if necessary, when descending a grade or where approaching a rack rail.

Each of the two main traction motors has a rating of 75 hp., and is of the slip ring induction type, operated by a system of contactors with a master controller in each cab. The motors, by means of the change in gearing from straight traction to rack rail towing, drive the locomotive at a speed of 2 miles an hour when towing and 5 miles an hour when returning idle. These motors act as induction generators running above synchronous speed when the locomotive is passing down the steep inclines and thereby exert a retarding brake effect to keep the speed uniform.

The locomotives are provided with a windlass which will pay out or wind in the towing cables at the low rope speed and at the full tow line pull of 25,000 lb., either when the locomotive is running or at rest.

These locomotives have a net weight of 86,300 lb. During the first three months of commercial operation of the canal, from August 15 to November 15, 1914, the cargo transported through the canal and towed through the locks by the locomotives amounted to 1,079,521 tons. During the fiscal year ending June 30, 1914, the Panama railroad carried 643,178 tons of through freight between the two seaboards, and in the preceding fiscal year 594,040 tons. From this it is seen that between six and seven times as much cargo is passing over the isthmus now as passed over the route when goods were transshipped by rail.

B. L. WINCHELL ON PERSONAL EFFICIENCY

B. L. Winchell, director of traffic of the Union Pacific System, addressed his New Year's greeting to traffic department employees, including officials, in the form of a circular letter on "Personal Efficiency." He said in the letter that his purpose in issuing the circular was to ask every person employed in the traffic department of the system "to give earnest and honest consideration to his own habit of thought and life; to make a simple self-test of efficiency and to start the new year determined to reach higher levels of effort and accomplishment." "Self-examination is usually profitable," he said, "and but few of us do enough of it." The circular included a "personal efficiency test" taken from an article by Edward Earle Purinton, published in The Independent of November 30, 1914, which included a series of 30 questions on personal efficiency, with a space in which to record the percentage of efficiency after a self-analysis. Some of the questions are as follows:

"Do you like your work?

"Have you learned the best, quickest and easiest way of doing it?

"Do you know where your greatest power lies?

"Have you a fixed goal, in line with your supreme talent?

"Do you believe absolutely in your own future?

"Have you learned how to get well and keep well?

"Have you made an inventory of your mental and moral traits?

"Are you correcting your own weaknesses; mental, financial, social or spiritual?

"Have you discovered which foods, baths and exercises increase your energy and heighten your mentality?

"Are you independent, fearless, positive?

"Are you tactful, cautious, courteous?

"Have you secured the best possible advisers and associates?

"Do you wish your rivals well, and never speak ill of them?

"Do you work harder than anybody else in the business?

"Have you learned the science of planning your day ahead?

"Can you relax entirely in your leisure hours?

"Are you saving money systematically?

"Do you enjoy art, music, literature and the presence of little children?

"Does your highest ambition include some real service to humanity?"

The letter continued: "I do not ask or expect that the result shall be shown to any officer or employee of these companies. I do recommend that you show it to your wife or mother, if, fortunately, you have one or both. If the result of this taking stock shows that you can do better (as it will show to any man of good conscience) will you?"

United States Board of Mediation and Conciliation

The Annual Report of a Commission Which Specifically Asks That No Further Power Be Conferred on it

The following is a very full abstract of the report of the United States Board of Mediation and Conciliation:

The immediate cause for the passage of the present law [the Newlands act] grew out of the demands of the conductors and trainmen in "Eastern territory" which had been presented, in a concerted movement, some months previously to 42 eastern railroads in what is known as eastern associated territory. The 22,752 conductors involved in this movement were represented by the Order of Railway Conductors, A. B. Garretson, president, and the 69,697 trainmen were represented by the Brotherhood of Railroad Trainmen, W. S. Lee, president. The 42 railroads were represented by a conference committee of managers of which Elisha Lee, of the Pennsylvania, was chairman. The direct negotiations between the parties resulted in a refusal by the railroads to grant the demands of the men on the ground that the rates of wages then prevailing were adequate and that the employees were working under favorable conditions. A strike vote had been taken resulting in some 97 per cent of the employees voting to withdraw from the service of the railroads unless their demands were complied with. The situation was an aggravated one and reached an acute stage early in July, 1913, which threatened a complete tie-up of all the railroads in that territory to the serious detriment of the public interest, incalculable losses to both parties to the controversy, and widespread financial disaster to the country. The public mind was excited and the bill which had been pending in Congress for some months was, upon the advice of the President, promptly enacted into law to meet the emergency.

Immediately upon the appointment of the officers as authorized by the act the services of the United States Board of Mediation and Conciliation were tendered to both parties to the controversy and promptly accepted. As all of the parties to the controversy were assembled in New York City the mediation conferences were opened there on the day following the appointment of the mediators.

The mediators met the representatives of the two parties in separate conferences and early in these sessions ralized that the only method of amicable adjustment would be through arbitration, and thereupon directed their efforts to induce the parties to submit their controversy to a board of arbitration, in accordance with the provisions of the act. This was done and the award of the board was rendered on November 10, 1913, and went into effect upon the entry of judgment thereon by the district court of the United States for the Southern District of New York ten days thereafter, and subject to certain interpretations by the reassembled board, has since been in practical application throughout the affected territory.

During the pendency of the foregoing arbitration the services of the Board of Mediation and Conciliation were requested in 10 other cases. In seven of them amicable settlements were secured by the Board through mediation. In two of the remaining cases many of the points in controversy were settled by mediation, the points remaining unsettled going to arbitration. while in one case all of the matters in controversy were settled by arbitration.

Case No. 2 was a concerted movement by the engineers, firemen and trainmen against the Chicago & Western Indiana and the Belt Railway of Chicago. The application in this case was made by the railroads and the services of the board were promptly accepted by the employees; mediation was conducted in Chicago beginning August 4, 1913, and the unsettled points of the controversy were submitted to arbitration, the award of the arbitration board being rendered September 17, 1913.

Case No. 4 was a concerted movement by the engineers, firemen, conductors and trainmen against the Southern Pacific (Pacific system) the request for mediation coming from the railroad on July 31, 1913. Mediation conferences were held in San Francisco, Cal., and resulted in the settlement of all points of difference save one. This question—the determination of what constitutes street car service as distinguished from suburban electric service—both parties agreed to leave to the decision of an independent board of three umpires of which Hon. John F. Davis of San Francisco was selected chairman. Their decision was rendered October 17, 1913.

Case No. 6 was a concerted movement on the part of the conductors and trainmen against the Chicago, Burlington & Quincy, with 150 points of difference between the employees and the railroad. The application to the board was made by both parties. Mediation conferences were begun in Chicago on August 21, 1913, which resulted in the amicable settlement of 111 of the contentions, and the remaining 39 disputed points were submitted to arbitration November 3, 1913. This was an exhaustively contested case. A board of six arbitrators was demanded by the parties, the railroads choosing as their representatives on the board Fairfax Harrison, president of the Chicago, Indianapolis & Louisville, and P. H. Morrissey, assistant to the vice-president of the Chicago, Burlington & Quincy. The employees named as their arbitrators E. R. Curtis, vice-president of the Order of Railway Conductors, and E. L. Harrigan, general chairman of the grievance committee of the Brotherhood of Railroad Trainmen of the Northern Pacific. The Board of Mediation and Conciliation appointed Hon. Gerrit J. Diekema, of Holland, Mich., and Hon. Henry S. Boutell, of Washington, D. C., as neutral arbitrators. The arbitration board organized with Mr. Boutell as chairman and appointed H. S. Milstead secretary. Pending the arbitration Mr. Harrison was elected president of the Southern Railway which necessitated his removal from Chicago and his residence in Washington, and Hon. Pierce Butler of St. Paul, Minn., was chosen as his successor on the arbitration board. The award of the board was rendered on February 19, 1914. The history of these cases, which arose in the early workings of the law, has been given in some detail to briefly indicate the methods adopted by the board in the adjustment and settlement of controversies.

In all there have been 28 cases similar in character and importance to the foregoing brought to the attention of the board during the year by one party or the other, or jointly in some instances, in each of which the controversy was of such a nature that a tie-up or suspension of train movements would have resulted except for the settlements which were reached through the services of the board. In all of these cases, with the exception of two, strike votes had actually been taken before the services of the board were requested. In three of the most serious cases the services of the board were tenderd, without the request of either party, resulting in amicable adjustment in two cases by mediation and the other by arbitration.

There have been only two cases since the passage of the law where the strike votes became effective. In one of these cases the request for mediation services was not received until late in the evening and the strike already set for 6 o'clock the next morning. Previous to the request the board had no knowledge of the situation. The controversy in that case was between the engineers, firemen, conductors, trainmen and telegraphers and one of the heaviest traffic roads in eastern territory, serving a densely populated industrial section with terminals in several of the largest cities of the country. It was practically impossible to get in touch with the officers of the railroad and the general officers of the labor organizations in charge of the strike during

the night, and the strike went into effect as ordered, resulting in a complete tie-up of train movements. By 11 o'clock, within five hours of the inception of the strike, all the parties representing the contesting interests had been reached by telegraph and met in conference with one of the mediators at the headquarters of the railroad company, and before the close of that day, within twelve hours of the commencement of the strike, full train movements were resumed and the question in controversy were promptly adjusted through mediation.

In the other case the application for mediation was received from one of the parties to the controversy but mediation was declined by the other a few hours before the hour set for the strike. The controversy in that case was a peculiarly difficult one for the board to handle because it involved the refusal of the railroad company to meet the representatives of the five organizations connected with transportation, acting in concert, and it was not until this impediment was removed through the services of the board that the parties were brought together. In the meantime the strike had become effective and the interruption of transportation was practically general throughout the system for three days. In connection with the agreement to meet the representatives of the labor organizations, both parties agreed to refer to future mediation any of the matters in controversy which they were unable to settle by direct negotiations, agreeing to the condition, required by the board, that uninterrupted train movements should be resumed in the meantime. This was done promptly and an amicable adjustment in this case was reached, without any destruction of property and with comparatively slight detriment to the public interest.

It is interesting to know that of the 28 cases in which the board's services were required, 21 were wholly adjusted through mediation; two by arbitration after many of the points in dispute had been disposed of through mediation; while in only five cases was it necessary to submit all the matters in controversy to boards of arbitration.

The list of cases herewith furnished embraces only the classes of controversies that threatened to interrupt, or were actually interrupting, the business of the railroads to the serious detriment of the public interest, and is therefore but a partial statement of the labors of the board.

A custom has grown up among both employers and employees to refer their controversies of a less serious nature also to the board, and while the board has not unduly encouraged this practice it has readily, as far as practicable, employed its services wherever by so doing it was considered in the public interest. Such services, perhaps, are not strictly within the letter of the organic law but are undoubtedly within its spirit, and the readiness with which both parties invoke the services of the board is a very high testimonial to the wisdom of the law and the benefits resulting from its administration. Controversies of this nature generally involve the interpretation of schedules and contracts which cover both rates of pay and conditions of service; and, in some instances questions of discipline, notwithstanding the generally recognized principle that the railroads reserve and exercise the undisputed right of discipline. In matters of discipline purely, the customary course, before the passage of the Newlands act, was by way of appeal through the employees' committees from an unsatisfactory decision of a minor official to officials of higher grade of the railroads, and in case the decision was sustained the brotherhood organizations had no recourse except through a strike or a threatened strike. Since the passage of this act, however, while either of the parties could refuse a proposal from the other to submit a controversy growing out of a matter of discipline to the board on the ground that it was not a subject of mediation in the contemplation of the law, it is a significant fact that questions of discipline are not infrequently brought to the board by the requests of both parties, and in such cases, as well as in many other controversies, involving interpretations of schedules and working contracts, the board has yet to learn of an instance where its advice has not been accepted and amicable settlement reached.

Mediation is wholly a voluntary procedure in the contemplation of the law. Both parties, even, may decline to invoke it, and where the services of the board are requested by one of the parties the other may decline to accept them, and both may decline where the board tenders its services in the absence of application. There have been, however, only three instances so far where the conditions were such that the board exercised its authority to volunteer its services without request from either party, and there has been no case in which either party has refused to accept the services of the board when requested by the other. In eight cases the requests have been the joint action of both parties; in six cases application was made by the roads and services accepted by the employees and in 11 cases application was made by the employees and services accepted by the roads. Notwithstanding, therefore, the fact that mediation of disputes is a voluntary procedure and that the board has only advisory authority, the law has been administered so as to meet substantially all the conditions that the advocates of a compulsory arbitration law demand. In fact, it is questionable whether a compulsory mediation law would operate as satisfactorily as the present law, which depends primarily for its success upon the voluntary action of the parties to a controversy.

In not a few instances the parties have requested and even urged the board to settle their controversies as if in arbitration, but this the board has declined to do; because, in the first place, in its opinion, the language of the law did not confer such authority, and, secondly, because it would jeopardize, if not destroy, the mediatory efficiency of the board. The board advises, and makes rulings, but always without binding the parties to accept the same.

Perhaps the most difficult work the board has encountered has been in the execution of that provision of the law which requires it to "at once endeavor to induce the parties to submit their controversies to arbitration" when its "efforts to bring about an amicable adjustment through mediation and conciliation shall be unsuccessful." When all mediation and conciliation efforts have failed, arbitration is the only recourse for a peaceful settlement of the controversy, and both of the parties feeling equally the justness of their cause naturally hesitate to submit their contentions to an arbitration board, because it is an arbitration board and not the Board of Mediation and Conciliation that has authority to render an award which, under the terms of the law, becomes the judgment of a court. The law requires the filing of the award, on the day of its rendition, in the district court of the United States for the district in which the arbitration is held, and if not successfully appealed from within ten days judgment is entered thereon.

There has been only one appeal from an award during the year, and in that case the award was successively affirmed by the district judge and by the circuit court of appeals.

The operations of the board both in its mediation features and in arbitrations brought about through its advice, have directly affected every railroad east and several of the largest systems west of the Mississippi river. Perhaps three-fourths of the railroads of the country in capital and trackage have been involved in these controversies, in which the organizations representing the engineers, firemen, conductors, trainmen, switchmen, telegraphers and maintenance-of-way men, aggregating 124,503 employees, have been concerned, in some cases in single movements and in other cases in concerted movements.

The administration of the law, it is believed, has demonstrated the wisdom of its enactment. Through its salutary influences, as a federal statute, it has evoked popular approval and the sympathetic co-operation of the railroad managers and the vast army of their employees, without which approval and support the efforts of those to whom its administration has been intrusted would have been far less successful.

The first federal law providing for the mediation and arbitration of controversies between the railroads and their employees (Act of October 1, 1888) was practically a dead letter. It was invoked only once during its existence, and in that case by the

President of the United States acting without the request of the parties; and this notwithstanding the fact that during the years 1881-1898 there were an average of 22 strikes affecting an average of 29 railroads each year.

The second enactment of Congress (June 1, 1898, commonly known as the Erdman law) undertook to correct the defects of previous legislation. Although it was the result of long agitation and embodied the proposals largely of the railroads and labor interests immediately concerned, its provisions during the first years of its existence were rarely availed of. The records of the department of commerce and labor (report of the commissioner of labor, 1906) show that from the year 1901 to 1905 there were 329 strikes affecting railroad transportation, while during that period there was only one instance in which the provisions of the Erdman law were invoked, and in that case the request for mediation made by the employees was declined by the companies, and the record of the department does not show how the controversy was finally disposed of.

From 1906 down to the enactment of the present law there were in all 48 cases settled on request of the parties either by mediation under the Erdman law or by arbitrations in accordance with its provisions. Seven of these cases were concerted movements, involving many of the various classes of employees and involving in each instance a large number of railroads, in one case as many as 64 roads. Of these 48 cases coming under the Erdman law during the fourteen years of its existence, 20 were settled through mediation, eight were settled by mediation and arbitration, and four by arbitration alone. In the remaining 16 cases the services of the mediators, requested by one of the parties, was either refused by the other, or direct settlements were reached between the parties after the services of the mediators were invoked without employing them or resorting to arbitration.

It is, perhaps, too early in the administration of the law to suggest amendments, and no action has been taken by the board either in support of or in opposition to various amendments that have been suggested, some of which have been introduced in Congress. The policy of the board has been to let well enough alone until time and longer experience should demonstrate the necessity for changes in the law. Complaints and criticisms of the law, so far as the board is advised, do not relate to the methods of mediation or to arbitration procedure, but relate to the application of awards. Complaint is urged by the employees that the application of an award, being wholly within the control of the employer, they have no recourse except through an appeal which in effect brings the subject-matter again back to mediation. The attitude of the employees in this connection is that while mediation and arbitration under the law are properly voluntary movements, the application of an award when the court's judgment has been rendered thereon should be compulsory, and that some method should be provided, through legal machinery, for its prompt and proper application by the railroads. On this subject the board feels that it is relieved from making any remedial suggestion except that in no event should methods of application of an award or its enforcement be committed to or imposed upon the board. Its duties have been wisely confined to mediation and conciliation, and those remedies failing, to use its best endeavors to induce the parties to arbitrate their controversies, and the duty of the board in future, as now provided by law, should be confined exclusively to these fields of operation.

The organic act carried an appropriation of $25,000 which was found to be about sufficient to cover the salary of the commissioner and the assistant commissioner, office employees, office rent, cost of traveling, and general miscellaneous administrative expenses. The expenses incident to arbitrations are all borne by the government, and as these increased during the year it became necessary for Congress to provide additional funds, and two deficiency appropriations, one of $10,000, and another of $40,000 were granted. Of these appropriations aggregating $75,000 there was expended in the eleven and one-half months from the organization of the board to the close of the fiscal year the sum of $20,567 for salaries and for what may be termed purely administrative purposes, and the sum of $33,645 for expenses of arbitrations. The present law provides for either three-member or six-member boards of arbitration, as the parties may desire, and the policy of the Board of Mediation and Conciliation to limit an arbitration board to three members where the controversy is between one class of employees and a single road has generally been agreeable to the parties. In the concerted movements where more than one class of employees or a number of roads are involved an arbitration board of six members is employed. The expenses of arbitrations are carefully guarded by the Board of Mediation and Conciliation, and while the amount in the aggregate may appear large the work in reality has been accomplished on economical lines. The surplus of $20,788 of appropriations over expenditures which was conveyed back into the treasury at the end of the fiscal year, resulted from the fact that certain arbitrations which were anticipated at the time the last appropriation of $40,000 was granted, did not take place before the expiration of the year. An appropriation of $50,000 has been granted for the year 1914-15 and may or may not prove sufficient, depending upon the number and cost of arbitrations held during that period. The normal administration expenses will continue through the year without material change.

A COMPARISON OF THE OLD AND NEW LINES OF THE CANADIAN PACIFIC AT ROGERS PASS, B. C.

In our issue of December 11 the location and construction of the five-mile tunnel which the Canadian Pacific is driving through the summit of the Selkirk mountains, at Rogers Pass, B. C., was described. Since the publication of this article a comparison of the operating characteristics of the old and new lines has been made available in an article by J. G. Sullivan, chief engineer of the Canadian Pacific, in the Cornell Civil Engineer for December, 1914. The following data are taken from this article:

The line on the present location is 23.1 miles long, and on the revised location 18.68 miles. The grades for westbound traffic on the present location consist of 16.65 miles, ascending on a maximum grade of 2.2 per cent, 6.45 miles of down grade with the same maximum, and with a total rise of 1,726 ft. and a drop of 692.1 ft. with 1,860 deg. of curvature on the up-hill and 1,288 deg. on the down-hill portion of the line. The revised location consists of 16.77 miles of up-hill grade, with about 5 miles of 2.2 per cent pusher grade, the balance of 1 per cent and a down-hill run of 1.91 miles with a maximum of 2.2 per cent grade; a total rise of 1,178.2 ft. and a drop of 144.3 ft., with 635 deg. of curvature on the up-hill grade and 66 deg. down-hill. The average traffic for the years 1912 and 1913, which is made the basis of calculations, was 1,342½ passenger trains in each direction, and the average weight of the passenger trains, exclusive of locomotives, was 443 tons. Pusher engines were required for 980 of the passenger trains. The weight of the passenger and pusher engines for passenger trains was 175 tons each. There were 1,738½ freight trains in each direction per year; the average weight of the freight trains eastbound, exclusive of locomotives, was 950 tons; and westbound 898 tons. All freight trains had to be pushed in both directions, and the weight of freight locomotives and pushers was 181 tons each. The tonnage eastbound and westbound was as follows:

Eastbound

1,342½	trains @ 443 tons each	594,727.5	tons
2,322	locomotives @ 175 tons each	406,350.0	tons
1,738½	freight trains @ 950 tons each	1,651,575.0	tons
3,477	locomotives @ 181 tons each	629,237.0	tons
	Total	3,281,889.5	tons

Westbound

1,342½	trains @ 443 tons each	594,727.5	tons
2,322	locomotives @ 175 tons each	406,350.0	tons
1,738½	freight trains @ 898 tons each	1,561,173.0	tons
3,477	locomotives @ 181 tons each	629,237.0	tons
	Total	3,191,487.5	tons

Comparison of Comparable Factors Affecting the Cost of Operating Over Rogers Pass, via Present Line and via Tunnel Line, Now Under Construction, Average Traffic for the Years 1912 and 1913

Eastbound tonnage per year, including weight of engines, 3,281,890 tons.

Resistance to overcome, on present line

Actual rise, 692.1 ft.	692.1 ft.	
Curve resistance, 1,288 deg. × .04 ft.	51.5 ft.	
Friction resistance, 6.45 mls. × 15 ft.	96.7 ft.	
Total		840.3 ft.

Resistance to overcome, tunnel line

Actual rise, 144.3 ft.	144.3 ft.	
Curve resistance, 66 deg. × .04 ft.	2.6 fe.	
Friction resistance, 1.91 mls. × 15 ft.	28.6 ft.	
Total		175.5 ft.
Difference		664.8 ft.

3,281,890 tons × 664.8 ft. equals 2,181,800,472 foot tons.

Westbound tonnage per year, including weight of engines, 3,191,488 tons.

Resistance to overcome, present line

Actual rise, 1,726 ft.	1,726.0 ft.	
Curve resistance, 1,860 deg. × .04 ft.	74.4 ft.	
Friction resistance, 16.65 mls. × 15 ft.	249.7 ft.	
Total		2,050.1 ft.

Resistance to overcome, tunnel line

Actual rise, 1,178.2 ft.	1,178.2 ft.	
Curve resistance, 635 deg. × .04 ft.	25.4 ft.	
Friction resistance, 16.77 mls. × 15 ft.	251.5 ft.	
Total		1,455.1 ft.
Difference		595.0 ft.

3,191,488 tons × 595 ft. equals 1,898,935,360 foot tons.

Total work done (extra)	2,181,800,472 foot tons
	1,898,935,360 foot tons
Total	4,080,735,832 foot tons

One thousand foot-tons equals approximately 1 horse-power-hour. Assuming that 5 lb. of coal is consumed in doing 1 horse-power-hour of work and that coal on a locomotive costs $4.60 per ton, the saving in fuel will amount to:

$$\frac{4{,}080{,}736 \times 5 \text{ lb.} \times \$4.60}{2{,}000 \text{ lb.}} = \ldots\ldots \$46{,}928.46$$

Extra wages, train and engine crews.

Present line

6,162 trains for 23.1 miles,	142,342.2 train miles.
5,437 push. engs. for 23.1 miles,	125,594.7 push. eng. miles.

Tunnel Line

6,162 trains for 18.68 miles,	115,106.2 train miles.
5,437 push. engs. for 13 miles,	70,681.0 push. eng. miles.

Amount saved { 27,236.0 train miles. / 54,913.7 pusher engine miles.

27,236 train miles at 22 cents	$ 5,991.92
54,913.7 pusher miles at 25 cents	13,728.40
(25 cents to cover engine crew wages, cost of repairs to pusher locomotives and extra cost of maintenance account of running pushers.)	
Extra cost maintenance of way, 4.42 miles at $200 plus 27,236 train miles at 20 cents	6,331.20
Extra cost of maintenance of way, on account of extra number of degrees of curvature, assuming that 400 deg. of curvature per mile would increase rate at 20 cents per train mile for maintenance by 30 per cent.	
6,162 trains × 2,447 deg. × 1/40 cents	3,769.60
Special maintenance on account of 4½ miles of snow sheds	85,000.00
Extra cost of maintenance of equipment 27,236 train miles at 21 cents	5,719.56
Extra cost of maintenance of equipment, on account of the extra number of degrees of curvature, assuming that 400 deg. of curvature per mile would increase rate of 21 cents per train mile by 40 per cent.	
6,162 trains × 2,447 deg. × 21/1000 cents	3,166.47
Total annual saving in cost of operation	$170,635.61

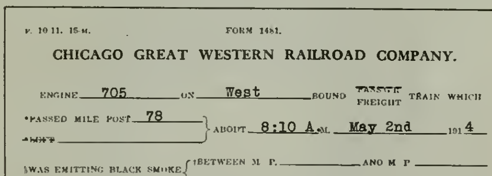
The rate at which traffic has been increasing would indicate that shortly after the work of constructing the tunnel was completed the traffic would have doubled. In this case, if no further economies were made in methods of operating this section of track, the annual saving on account of operating over the tunnel line would be,

$$\$85{,}635.61 \times 2 \text{ plus } \$85{,}000.00 = \$356{,}271.22$$

In arriving at the above figures no account is taken of whether the line was single or double track, and for comparative figures it was assumed that the methods of operation would be the same. As a matter of fact, the present single-track line with double the present traffic would make the business too congested for economical single-track operation. Therefore, it was apparent that it was time to study the question of double-tracking the present line or seeking a new line for double track. It was decided to double track on the five-mile tunnel location. Now to operate successfully a five-mile tunnel we will require the installation of an electric plant and the purchase of electric locomotives. All the details of the proposed electrification have not as yet been worked out, but even if they were, the reader is not interested in the details of cost. He can see at once that the problem was to find out if the cost of operating and maintaining the tunnel line, taking into account the extra cost of operating on account of having a short section of electric operation and extra cost of maintaining tracks in the tunnel, plus the interest on the cost of building the new double-track line, including the cost of electrifying the tunnel, would be less than the cost of operating and maintaining a double-track line on the present location plus the interest on the cost of building the second track. The figures would not have been very decisive one way or the other were it not for the fact that there is now 4½ miles of wooden snow sheds on the present location which will be all eliminated on the new location. The maintenance and costs of renewals of these sheds amounts to between $85,000 and $100,000 per year. To maintain and renew a double-track wooden shed would probably cost at least 50 per cent more than the above, so that with a saving of about $125,000 per year in maintenance and renewals of snow sheds and a calculated saving in operation and maintenance of $171,271.22 on a traffic that surely will be reached in the near future, there was no doubt as to the proper course to pursue.

FUEL ECONOMY ON THE GREAT WESTERN

The Chicago Great Western in effecting economies in fuel has attempted to consider every phase of the subject. The most economical fuel is determined from analyses and the results obtained from actual tests and the prices quoted, all being reduced to show the cost per ton-mile. An analysis once agreed on and made a matter of contract is not permitted to become a dead letter. The coal from each shipper is carefully sampled about twice a month and sent to the railroad company's laboratory for analysis. The aim is to contract for the fuel for each division



F. 10 11. 15-M. FORM 1481.

CHICAGO GREAT WESTERN RAILROAD COMPANY.

ENGINE 705 ON West BOUND ~~PASSENGER~~ FREIGHT TRAIN WHICH

*PASSED MILE POST 78 } ABOUT 8:10 A.M. May 2nd 1914

~~*LEFT~~

†WAS EMITTING BLACK SMOKE { †BETWEEN M. P. ______ AND M. P. ______

~~†WAS POPPING OFF~~ { †AT (STATION) ______

WHEN PASSED BY TRAIN ______ ENGINE ______ AT ______ M

______ 191__

(SIGNED) Jno. Brown, Section Foreman

*FILL OUT ONLY THE LINE WHICH GIVES THE MOST DIRECT INFORMATION.
†DRAW PENCIL THROUGH LINE NOT REFERRED TO.

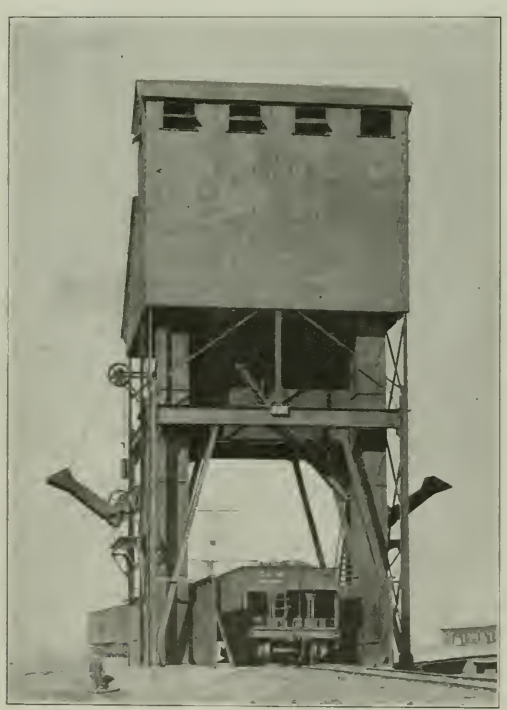
Post Card for Reporting Excessive Smoke and Popping of Locomotives

from one mine in order that the engineers and firemen on that division may become familiar with the fuel and therefore be better able to get the best possible results from it. This is an important feature, and is appreciated by the engine crews.

Each superintendent employs a field inspector who puts in all of his time at the mine, carefully watching the preparation of the coal. After the coal is received at the point of consumption, a certain number of cars are examined each week by the division superintendent himself, or by some of his subordinates, and any items of unsatisfactory preparation are taken up with the shippers

and with the superintendent's own inspector at the mine. Each division is required to check-weigh a certain number of cars each week and report the result to the general manager. The monthly performance of each fuel station is recorded in the general manager's office on the form here reproduced, which shows in detail the results of operation. The type of cars in which the coal is delivered is included in the form so that the general manager may know that the coal is being delivered in the right kind of cars for each particular station. Excessive costs for handling may be readily noted also, and indicate where investigations are necessary.

Within the past five years modern coaling stations have been erected at 12 points of greatest fuel consumption, and by their use the cost of handling has been reduced from an average ranging between 9 and 12 cents per ton to an average ranging from 2 to 4 cents. Illustrations of the coaling stations at Sycamore, Ill., and Carroll, Iowa, are shown. The new coaling stations are all equipped with scales so that the amount of coal delivered to each engine may be determined. These scales have given very satisfactory service; they are tested regularly by the scale inspector and are carefully maintained. An automatic device is used for recording the weights on two coal tickets, one for the



Chicago, Great Western Coaling Station at Sycamore, Ill.

engineman and one for the station attendant. Recognizing that fuel is one of the largest items in the cost of transportation, a systematic programme is being followed out as to equipping engines with superheaters and brick arches to reduce fuel consumption. At the present time the company has 71 engines equipped with superheaters and 224, or over 75 per cent, with arches. Mechanical stokers have not yet been applied, but work has been started to equip some of the heaviest freight engines with them.

A form known as 380, here illustrated, is compiled daily in the train despatcher's office, showing the pounds of coal used by each locomotive for hauling 100 tons one mile. Three separate sheets are used, one for passenger trains, one for through freight trains and one for way freight trains. The form is valuable, not only because it shows the fuel consumption, but also because it shows the percentage of the potential tonnage actually hauled. It records only the performance of individual enginemen and firemen and individual engines while in service. Care is therefore taken not to charge thereon any coal consumed at terminals. When an engine leaves the initial terminal the despatcher is

Coaling Station of the Chicago, Great Western at Carroll, Iowa

immediately informed by the engine house foreman of the amount of coal on the tender. As the train progresses the amount of coal taken on at intermediate stations is wired in promptly. At the destination the first duty of the engine house foreman is to advise the despatcher of the amount of coal remaining in the tender, metal measuring strips being applied to all tenders to enable the men to estimate the coal accurately. The despatcher, having already calculated the ton-miles, is able to compute at once the coal consumed per 100 ton-miles, and an explanation is immediately sought when an undue amount of coal has been consumed.

The engineman and fireman may not be responsible for a poor fuel performance. When a high fuel figure is obtained it is the duty of the master mechanic and his assistants to examine the engine carefully for mechanical defects tending to increase fuel consumption. It may be found that the engine has insufficient draft, worn cylinder packing, defective valve rings, etc., and the defect is remedied before the engine is again sent out. The company's policy is to maintain locomotives in first class condition. An engine not in good condition is a fuel waster, an enemy to good train loading and a producer of overtime.

The company has five classes of locomotives in freight service. The tonnage potential (the assigned rating over ruling grades multiplied by the mileage made) and the fuel potential (the pounds of coal required to move 100 tons one mile) have been determined for each class by mathematical calculations, combined

with actual tests conducted by representatives of both the transportation and mechanical departments. These tonnage potentials are reduced for unfavorable weather conditions to:

92 per cent for temperatures between 45 deg. and 25 deg. or heavy winds;
84 per cent for temperatures between 35 deg. and zero;
75 per cent for temperatures below zero.

The officer analyzing form 380 is, of course, familiar with the runs and makes due allowance for the engines on passenger trains making frequent stops as against through trains, and for time freights as against drag freights, etc. The road foreman of engines devotes special attention to men who regularly turn in worse records than their fellow employees in the same class of service. Superintendents issue bulletins each month showing the rank of individual engineers and firemen. The average fuel performance is calculated from these bulletins for the respective divisions, and the divisions as a whole are given a rank according to the results achieved. This produces a friendly spirit of emulation productive of much good.

To guard against the wasting of fuel as indicated by annoying black smoke and popping off the company distributes to the employees in all departments a postal card on which a memorandum is to be made of such instances observed. This is mailed to the division superintendent, who promptly does what is necessary to bring about improvement. It is well understood that this form is not to be used by employees for the purpose of getting their fellow workmen into difficulties, and, as a matter of fact, it is not used in this spirit.

PERFORMANCE OF FUEL STATIONS ON ______ DIVISION, MONTH OF ______

Station	Type of Station	Number of Cars Received: Gondola	Box to Store	Hopper Bottom	Drop Bottom	Total	Tons Coal Handled	Total Cost on C. G. W. Tracks	Wages of Handlers	*Cost of Coal and Other Fuel	Stores	Repairs	Total Cost of Operating Station	Cost per Ton: Coal on C. G. W.	Handling: Labor (cents)	Fuel (cents)	Stores and Repairs (cents)	Total (cents)	Cost per Ton of Coal and Handling	Differences (in tons) between inventories and sound shortages in black streaks in red
Total this year																				
Total last year																				

*In this column place beside each amount a letter indicating kind of fuel used thus: C for coal, D for distillate, E for electricity, G for gasoline, O for oil.

Form for Reporting Performance of Fuel Stations

FORM 380

SAFETY FIRST — CHICAGO GREAT WESTERN RAILROAD COMPANY — SAFETY ALWAYS

TRAIN DISPATCHERS' DAILY REPORT OF TONNAGE AND COAL CONSUMPTION

Eastern DIVISION First and Second DISTRICTS Through Freights DATE July 27th, 1914.

EAST	Engine No.	Engineer	Fireman	Tonnage Handled: From	To	Train Miles	1000 Ton Miles	Potential 1000 Ton Miles	Engine Rating	% Rating Handled	Eng-Tons Handled	Pounds Coal Consumed	Pounds Coal per 100 Ton Miles	Potential Pounds Coal per 100 Ton Miles	Time in Service: Hrs.	Min.	Weather	Remarks *See Foot Note
74	706	Foster	Jensen	Oelwein	E.Stockton	116.7	1972	1985	1700	.994	1690	27840	14.11	11	7	30	100%	
60	356	C.P.Smith	Murphy	"	"	116.7	1622	1633	1400	.992	1389	24140	14.90	15	6	55	"	
Ex	600	Conrow	Sullivan	"	"	116.7	2741	2334	2000	1.174	2349	35650	13.00	13	10	45	"	
Ex	601	Payton	Bradfield	"	"	116.7	2636	2334	2000	1.129	2259	36120	13.69	13	8	15	"	
72	702	Wells	Ronan	E.Stockton	Chgo Tfr	121.6	3174	3167	2600	1.002	2606	35000	11.02	11	7	30	"	
Ex	339	Lyons	Brown	"	"	121.6	2450	2680	2200	.913	2009	31000	12.65	15	7	10	"	
Ex	709	Tolmage	Hyland	"	"	121.6	2917	3167	2600	.920	2391	32000	10.99	11	7	40	"	
TOTAL						832.2	17512	17298	14500	7.124	14693	221760						
WEST																		
61	703	Hinman	Riplogle	Chgo Tfr	E.Stockton	121.6	2619	2680	2200	.977	2150	30000	11.45	11	6	40	"	
Ex	701	Meehan	Nelson	"	"	121.6	2708	2680	2200	1.010	2224	30000	11.07	11	6	25	"	
Ex	320	Fuller F.	Hyland	"	"	121.6	2445	2192	1800	1.115	2006	28000	11.45	11	6	45	"	
Ex	708	Fuller W.	Davis	"	"	121.6	2747	2680	2200	1.025	2255	27100	9.86	11	7	00	"	
71	704	Conrow	Seitter	E.Stockton	Oelwein	116.7	2274	2205	1890	1.037	1960	24540	10.80	11	6	45	"	
63	602	Ayers	Eeely	"	"	116.7	2850	2800	2400	1.017	2442	34760	12.19	13	12	25	"	
Ex	700	[illegible]	Reynolds	"	"	116.7	2436	2205	1890	1.111	2100	27240	11.18	11	7	10	"	
Ex	606	Johnson	Batzel	"	"	116.7	2617	2800	2400	.935	2243	37880	14.47	13	9	05	"	
TOTAL						956.0	20696	20242	16980	8.227	17382	239520						
GRAND TOTAL						1788.2	38208	37540	31480	15.351	32075	461280						

DISPATCHER ______

*In the remarks column give explanation of known cause when more than normal amount of coal has been consumed.

Despatcher's Report for Showing Tonnage and Fuel Consumption

Western Engineers' and Firemen's Arbitration

Consideration of Railroads Side of the Case, Including Accurate Data as to Increased Cost Due to Demands

D. H. Bremerman, of the Chicago, Burlington & Quincy, was the principal witness for the railroads at last week's hearing before the board of arbitration in Chicago on the engineers' and firemen's demands. Mr. Bremerman testified regarding present schedule provisions in the East, West and Southeast, as compared with the demands made by the western engineers and firemen, to show that, although they already are more highly compensated in the West than in any other part of the country, the western engineers and firemen are demanding changes which virtually pick out the most favorable rules on some individual roads in the territory and ask to have them made of universal application.

In analyzing the men's demands Mr. Bremerman introduced an exhibit comprising 326 pages, 17 in. by 24 in., which compared, first, the present schedule rates and rules for locomotive engineers and firemen on western roads with those on roads in the East and Southeast, and then compared in detail each phase of the 16 articles submitted by the men with the present schedule provisions existing on practically every important railway in the United States.

Eastern passenger and freight engineers, he testified, are practically on a flat basis of pay for all sizes of locomotives, while in the West there is more graduation in rates according to the size of the engine. Passenger engineers in the West receive now from $4.30 a day for engines under 80,000 lb. on drivers to $5 or over on larger engines, against $4.25 on all engines in the East, the western minimum thus being above what is paid for all in the East. Yet the western men demand a new range from $4.50 to $5.60 per day. Freight engineers in the East, he said, receive $4.75 for nearly all sizes of locomotives, whereas western freight engineers now receive from $4.35 for engines under 80,000 lb. to as high as $5.65 on the larger engines, exclusive of Mallets. The men demand from $5 to $6.40. Thus, although already generally on a higher rate than that prevailing in the east, the men demand a new scale in which the minimum would be 25 cents higher, and the maximum from $1.35 to $1.65 higher than is paid in the East under the 1912 award by the eastern arbitration board. Although the men have claimed that they demand nothing which is not granted by some road already, they have simply attempted to show the number of roads that have proposed rules in effect, without reference to their mileage or importance. The railroad exhibit classified the railroads on a mileage basis, and showed that where some of the proposed rules exist they apply often for peculiar reasons of local importance on so small a mileage compared with the total of 140,000 miles of the western roads involved as to be virtually negligible.

Mr. Bremerman occupied the witness stand for three days, Tuesday, Wednesday and Thursday, giving detailed testimony regarding the facts brought out in the exhibit. The 10 per cent differential for way freight service over the through freight rate demanded by the men, he testified, exists only on five per cent of the mileage of the western roads, while time and one-half for overtime in freight and switching service prevails now for no class in transportation service in any section of the United States and would be an entirely new departure. On no railway in any territory is the switching service based on weights on drivers of locomotives as the men demand. The continuous 10-hour day with 30 minutes for lunch under pay was shown to exist on no western road, with the exception of two small terminal companies, all others paying for 10 hours actual work. The 10 per cent differential for way freight service over through freight was shown to exist on only one road, while a 10 per cent differential is generally higher than now exists in any section of the country. The witness also showed the arrangement now made for compensating the increased labor and hazard in mountain service. The men ask for a 10 per cent increase over the proposed valley rate where the grade is 1.8 per cent or over. This now applies on only one road and in limited mountain districts, but the proposal would make it universal. On account of certain local conditions some roads pay differentials as high as 30 per cent for some grades. How cumulative are the men's demands was shown in their demands for narrow-gage service, which would be subject under the proposed articles, not only to a five per cent increase for narrow-gage service, but in some cases also to the 10 per cent increase on account of grades. Only 9 per cent of the western railways now pay for terminal delays in actual minutes as the men demand. Only 8.5 per cent of western roads now pay an arbitrary allowance for preparatory time. Only two roads in the western territory, and none at all in the East or Southeast have the proposed "automatic release" rule, which provides that when a man arrives at a terminal at the end of his run if required to perform any other service a new day automatically begins. The exhibit showed, in fact, a great mass of rules and present schedules which are absolutely contrary to the automatic release principle.

Under the proposed rule dead-heading engine crews would be paid not only the increased rates of pay proposed for the working fireman and engineer of the train, but would receive as well all the extras for incidental services which the men demand be paid to the working crew. Mr. Bremerman showed that only six per cent of the western roads now pay the same rate to dead-heading crews as to the working crews.

Presentation of the facts in the first exhibit was concluded on Thursday and Mr. Bremerman was cross-examined by representatives of the engineers and firemen. Judge Pritchard, chairman of the board of arbitration, asked for an explanation of turn-around service. "If a crew runs out of Chicago 60 miles, turns around and comes back the 60 miles," said J. B. Sheean, counsel for the railroads, "many railways claim that pay for 120 miles is equitable. The men, however, demand pay for 100 miles out and 100 miles back."

W. S. Stone, grand chief engineer of the Brotherhood of Locomotive Engineers, subjected the witness to a severe cross-examination, dwelling upon the scattered portions of mileage in western territory, on which because of local conditions certain rates or rules are in effect, the universal application of which is demanded by the men. "In securing such local variations," asked Mr. Stone, "do the men generally get all they ask for?" "If they don't," rejoined the witness, "I notice they usually come back for more."

What the demands in the way of rates and rules made by the engineers and firemen mean to the railroads in dollars and cents was explained, on January 22, by J. H. Keefe, assistant general manager of the Gulf, Colorado & Santa Fe, who presented figures based on the actual payrolls and the individual time slips of every engineer and fireman on the western roads affected for the month of October, 1913, the month in which the demands were made upon the railways. Each of the railways affected, in order to determine the cost of the men's demands, kept a separate set of accounts for the month. That there might be uniformity in the interpretation placed upon the proposals of the men and to secure the data as to the costs involved in such shape that it could be concentrated into an exhibit for all of the lines, a blank was prepared and sent to the railroads to be used by them in reporting both the expense under the present conditions and what it would have been had the men's proposals been in effect. These forms were introduced as Exhibit 2. Mr. Keefe described in detail the methods used in compiling these figures to show clearly that no arbitrary or radical construction was placed upon the requests of the men. The operating ex-

pense of the roads, he said, would have been increased by $40,888,665 in the fiscal year ending June 30, 1914, had the proposed rates and rules been in effect. For the month of October, 1913, engineers would have received in added compensation $1,759,008 and firemen $1,653,391, while the additional payments for hostlers, motormen and helpers would have brought the total increase for the month up to $3,885,971. This is an increase of 51 per cent. It was admitted that October, 1913, was a period of heavy traffic, but the total increase of $40,000,000 a year was not obtained by multiplying the increase for one month by 12, but by applying the percentages of increase to the actual payments for the year. Of the total increase for the year, Mr. Keefe said, $2,172,110 would have been required to engage additional help to relieve engineers and firemen of work which has always been considered a part of their regular duty, while $38,716,555 would have gone as increased compensation to the men themselves.

Mr. Keefe also presented an exhibit, No. 3, taking up each one of the 16 articles of the men's demands and stating what each would have meant to the roads in money for the month of October, 1913. A synopsis of this exhibit follows:

Article 1.—Changing the basis of a day's pay and overtime would bring about an increase of $75,298 or 458.24 per cent in the cost of passenger service, while in the freight service there would be an increase of $222,574 or 54.18 per cent.

Article 2.—The increased rates of pay alone would bring about an increase in the passenger service payrolls for engineers and firemen of $158,168 or 9.19 per cent, while in all other classes of service, except passenger and switching service, the increase would be $253,552 or 9.23 per cent. The higher rates of pay for Mallet type locomotives in all classes except switching service would be $25,416 or 29.91 per cent. The application of through freight rates to pusher, helper, mine run, work, wreck, belt and transfer service, and all other unclassified service, would increase the expense of operation $91,808, which is 18.58 per cent above the actual amount paid in the test month for these kinds of service.

An increase of $62,391 or 293.72 per cent would be effected by the demand for a 10 per cent increase over the valley rates on divisions having a grade of 1.8 per cent or greater. In the narrow-gage service, the increase in rates of 5 per cent would amount to a new expense of $1,225. Increases demanded in rates of pay for electric or gasolene motor cars would raise passenger service expenses on these cars from $19,931 to $22,410, an increase of $2,479, or 12.44 per cent. The expenses of electric and gasolene motor cars in all other classes of service except passenger and switching would be increased from $1,249 to $1,456 or $206, or 15.55 per cent.

Article 3.—The demands for a greater differential in local or way freight service over the through freight service rates would place upon the railroads affected an additional expense of $46,511. The differential paid for through or irregular freight service because of the requests that engineers and firemen be granted added compensation for performing part of their regular duties would bring about an increase of $78,000 or 319.32 per cent.

Article 4.—The increased rates of pay for switching service demanded would cause an increase of $219,453 or 18.02 per cent. The demand for a differential for night work over day work represents a totally new expenditure of $31,617. Another new expenditure is represented by the demand that 10 continuous hours or less shall constitute a day and that overtime thereafter shall be paid for on a basis of time and one-half. The added cost from this source alone would be $168,943. Another totally new expenditure of $42,380 would be caused by the demand that road rates be paid when road engines are used in switching service regardless of the circumstances.

Article 5.—The demand for a 30-minute arbitrary preparatory time rule would cause an increase in expenditures for this purpose alone from $19,291 to $410,317 or $391,026, which is equivalent to an advance of 2,026.96 per cent.

Article 6.—An increased expenditure of $78,931 or 525.35 per cent would be caused by the proposed requirements for payment for initial terminal delay in passenger service, which represents the added cost to the roads for compensating the engine crews for failure of trains to depart promptly on leaving time. Payment for final terminal delay in passenger service, as proposed, would cause an increase of $54,611 or 410.73 per cent, while in freight service compensation for initial terminal delay would be increased $111,934 or 150.14 per cent, and for final terminal delay in freight service the increase in expenditures would be $75,550 or 198.94 per cent.

Article 7.—The greatest single addition to operating expenses is involved in the demand for an "automatic release and tie up" rule. Under this rule, no matter how short the division, when the crew would arrive at the end of its run, it would be automatically released and if used again at all would be considered as starting a new day. A similar rule would apply to using a crew after it had been tied up under the federal hours of service law. This would represent a totally new item of cost amounting to $621,128. The requirement for payment of continuous time when crews are tied up between terminals would effect an increase in payments for this purpose of $28,858 or 1,324.04 per cent.

Article 8.—Under the requirement that crews held at other than their home terminals after the expiration of 15 hours shall receive continuous time, the railroads would have to increase these payments for this purpose from $1,492 to $151,307; an increase of $149,815, or 10,038.29 per cent.

Article 9.—The proposed new rule as to the basis of pay for dead-heading would mean an increase of $25,722 or 54.75 per cent for this purpose, and for this sum absolutely no productive service would be rendered.

Article 10.—If hostlers are placed as the men demand at points where an average of six or more locomotives are handled within 12 hours, there would be an additional expenditure of $25,374 and the increase in rates of pay for hostlers would increase the payroll by $210,603 or 96.22 per cent. In other words, over $25,000 would represent new labor which must be employed, while almost $211,000 would represent the increase in pay to present employees.

Article 11.—This article provides that the practice of conducting surprise tests in certain ways shall be eliminated, and involves no additional expense.

Article 12.—A totally new expenditure would be involved in complying with the demands that coal be kept where it can be reached by the firemen from the deck of the locomotive where one fireman is employed in freight service, and on all locomotives in passenger service. The new cost would be $59,750.

Article 13.—To place two firemen on coal-burning engines of 185,000 pounds or more on drivers, in freight service, the roads would have to increase their payroll for this purpose from $1,575 to $423,896, or 26,811.18 per cent.

Article 14.—The increase of $18,826 would be involved in relieving engineers and firemen of duties which they are now required to perform incidentally to their regular labor, in the way of setting up wedges, filling grease cups and cleaning headlights. To relieve the engineers and firemen of other duties in the way of placing tools and supplies on locomotives or removing them therefrom, or filling lubricators, flange oilers, headlights, markers or other lamps, would mean an additional increase of $21,613.

Article 15.—This article provides that railroads shall post bulletins showing accurate service weights of locomotives.

Article 16.—To relieve engineers and firemen of the duty of throwing switches or flagging would involve an additional expenditure of $80,381, an entirely new item of cost.

The effect of these increases in the various classes of service, Mr. Keefe said, is shown by a comparison of the classes of service. On passenger trains the engineers' proposal would mean an increase for them of 37.5 per cent in compensation, while the firemen would receive a 42 per cent increase—a total for both classes of 39 per cent. In through freight service, the

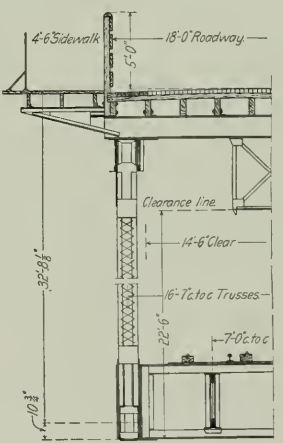
engineers would receive an increase of 41.2 per cent in compensation, while the firemen would receive an 85 per cent increase—a total for both classes of 58.5 per cent.

On locomotives in way freight service the engineers would receive an increase of 56 per cent and the firemen 67 per cent, or a total for both of 60 per cent. In pusher, helper, mine run, gravel, wreck, belt line, transfer and other unclassified service, the engineers' increase in pay would be 31 per cent and that of the fireman 35 per cent, or for both an increase of 33 per cent.

Engineers in switching service would enjoy an increase in compensation of 38 per cent, while the firemen would receive a greater proportion of increase; their advance in wages being 51.5 per cent, or for both classes, 53 per cent. In all classes of service, the increase in pay for engineers would amount to 41 per cent, while the firemen would receive an increase of 61 per cent and hostlers, 108 per cent.

NEW BRIDGE ACROSS THE MISSISSIPPI RIVER AT KEOKUK

The Keokuk & Hamilton Bridge Company has let a contract to the Stroebel Steel Construction Company for the construction of a new bridge to replace its present structure across the Mississippi river at Keokuk, Iowa, at an estimated cost of $325,000. The new structure will consist of a draw span 377 ft.

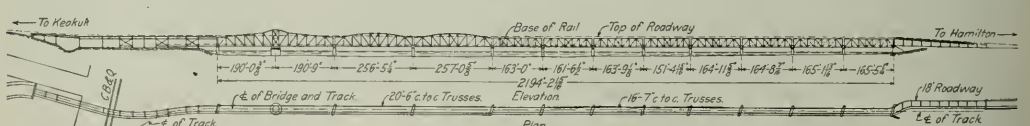


Half Section Showing Relation of Two Decks

1½ in. long, two spans 254 ft. 5¼ in., one 160 ft. 5¼ in., one 159 ft. 4⅛ in., one 161 ft. 4⅝ in., one 148 ft. 11⅞ in., and four spans 162 ft. 8⅜ in. long, the total length of the main structure is 2,194 ft. 3 in. In addition there will be steel approaches for the upper deck at each end.

The old structure, which was built in 1869, carried both railway and highway traffic on the one deck, the Toledo, Peoria & Western and the Wabash reaching Keokuk over this structure. This structure had become too light for the present traffic. In designing the new bridge the highway and railway traffic is separated and the highway placed on an upper deck. The new structure is designed for Cooper's E-50 loading with the highway deck designed to carry a 20-ton motor truck. As shown in the drawing, this structure is designed as a through bridge for the lower tracks and as a deck structure for the highway. The upper level will provide for an 18-ft. roadway, while a 4 ft. 6 in. sidewalk will be carried by cantilever supports on the downstream side. The roadway will be paved with wood blocks carried on 3-in. tongue-and-grooved planks protected from the engine exhaust on the lower level by galvanized iron plates.

This bridge will be built on the site of the old structure with only slight modifications of the piers. It is expected that the work will be completed during this year. This structure has been designed and will be built under the direction of Modjeski & Angier, consulting engineers, Chicago.



Plan and Elevation of New Bridge Across the Mississippi at Keokuk, Iowa

A STANDARD HOME ROUTE CARD FOR FREIGHT CARS

By J. E. Campbell
Freight Agent, Pittsburgh & Lake Erie.

Formerly the duties of the superintendent of transportation or of the officer performing the duties which are usually performed by the person holding that title, were but little more than those of a car accountant. The work was largely of a clerical nature, and had no great bearing on the success and prosperity of his road. Conditions have changed, and now this officer is one of the most important on the modern railroad. The problems with which he is required to deal at different times or under different conditions vary greatly. During prosperous times the great problem is to furnish sufficient and proper equipment to meet the wants of the patrons of the road. In times of depression, however, this problem vanishes and the main question then is how to dispose of surplus equipment and get off the line foreign cars, on which the road is compelled to pay per diem.

During the past year the foreign car question has been one of the most perplexing and troublesome with which the railroads of the United States have had to deal. Under the old system, car hire was paid by mileage. When times of business depression came, cars were side-tracked wherever they might be, and were allowed to remain in storage until such a time as there was a demand for them. This condition was entirely changed under the per diem arrangement, and every line is now anxious to get foreign cars off the road as soon as possible when they are no longer needed, in order to save per diem. They also endeavor to get as many of their own cars on foreign lines as possible, in order that they may earn per diem.

During the past year terminals in all parts of the country have been deluged with empty cars, which were returned empty for movement home. Under normal conditions, the empty car mileage of this country is about 33⅓ per cent of the total movement. This mileage undoubtedly has been 10 or 15 per cent greater during the past year. Some of the more important systems have taken advantage of car service rule 3-B, and have refused to receive their own cars except at the junction at which they were delivered. This has often compelled other lines to haul these cars hundreds of miles and pay per diem on them for some weeks before they could be finally returned to the owners. The spectacle has been witnessed continually during the past few months of empty cars belonging to the southern lines whose terminals are at the Virginia and Ohio river gateways moving north and west toward Cleveland and Chicago, while cars belonging to the western lines have been moving empty to

the eastern seaboard and southeastern gateways. Many of these cars are hauled hundreds of miles in the opposite direction from home in order to be returned home via the routes which they had traveled under load.

At the time the American Railway Association discontinued its car performance bulletins in November, the surplus cars of the country were hovering about the quarter-million mark. If the number of cars which were in transit for home could have been added to this number, the actual surplus probably would have been twice that number. As the surplus increased during the months of November and December, 1914, it is reasonable to believe that about 25 per cent of the entire freight equipment of the country is idle.

The problem of the foreign car is largely one of how to reduce empty mileage and equalize per diem. Per diem adds nothing to the total income of the railroads of the country. A credit in favor of one road is a debit against another road. The road with the most enterprising officials, from superintendent of car service down to yardmasters, and wide-awake employees in all departments, will come out ahead with the balance on the right side of the ledger for car hire. Under present conditions, the road with the more efficient officials in its operating department will have a decided advantage over the road which is weak in that direction.

Various plans have been suggested for handling surplus equipment. It has been proposed to pool a certain proportion of the cars of the various lines and store surplus cars until such time as needed. Per diem then would cease while cars were in storage. This arrangement has been carried out in some instances between connecting lines with special equipment. The plan, however, presents many difficulties in its practical application. The most plausible solution of the problem seems to be a standard home route card which shall be adopted by all of the railroads of the country and a system of short-routing cars home. This, of course, would mean the waiving of car service rule 3-B. Many individual lines have their own systems of home route cards in use, which have been productive of great benefit in times of depression when there was a surplus of cars. These various systems have been neglected in times of prosperity, and much inconvenience is experienced when times again become dull, and it is necessary to dispose of surplus equipment. Last spring, when cars began to accumulate throughout the country, one of the eastern trunk lines had 2,000 foreign cars in one yard which had been sent there from all over the system without any definite information as to how they should be routed home. In order to dispose of these cars it was necessary to haul many of them several hundred miles empty, and it required much clerical labor and a whole month of time to clear up this surplus. Home route cards have usually failed of their purpose through the roads becoming negligent in carrying out instructions governing their use. However, rules governing the use of these cards have been enforced vigorously during the past year, and it is safe to say that every road is in better shape at the present time than for a long time past.

Last August the New York Central Lines adopted a standard home route card, which, if adopted by all roads, and with liberal short-routing rules, would greatly reduce empty mileage and simplify the whole question. The card which has been adopted as a standard by these lines is a yellow card, 3⅞ in. by 10 in. in size. On its face is the proper heading and the name of the road issuing it, underneath which are the spaces for the car number and initials. The rest of the card is ruled off in blank spaces, numbered from 1 to 10 consecutively. On the reverse side are 14 more blank spaces, also numbered consecutively 11 to 24, inclusive. When a foreign car is first received by a road a party to this system, one of these cards is issued and the junction agent stamps in the first space the name of the receiving road, the junction point and the date. Dating stamps are provided for each interchange point for this purpose.

The card is then attached to the waybill, card or revenue, and it accompanies the car on each movement it makes while on the road. When the car passes to a second road, party to the arrangement, that road applies its stamp in the next space, and so on, in case the car should pass to a number of different roads, all parties to the arrangement. If the car is returned via the same route, the agent of the receiving line on its return applies a stamp in the next blank space just as was done when the car was received on its initial movement. This is done until the car finally reaches the junction at which it was first received from a foreign line. When the car finally reaches the interchange point at which the card was issued and is returned to its owners or to the delivering line, the card is taken up and returned to the car accountant of the issuing road. In case the car goes to a road not a party to the arrangement, the card is held by the agent at the junction point for its return. If it is not returned in a reasonable time (60 or 90 days), the car accountant of the delivering line may order disposal of the card if it is deemed best.

When an empty car is received from a foreign or non-participating line for home and the receiving agent has no card on file, he wires his car accountant for the home route and on receipt of the information issues a card showing the road from which the car was reecived and the date. The car can then be forwarded to the road from which it was received, or if placed for loading will be accompanied by a proper home route card when under load. Cars received by any road a party to this system traveling under home route cards belonging to direct connections, can, if desired, be returned to the owners direct and the cards can be taken up. This should always be done if the home junction involves a shorter haul than to the junction at which the car was received by such a road.

The advantages of the system are numerous. Each car carries with it a full record of its movement while on lines participating in the plan and is given more prompt handling. If all lines were to adopt this card or a similar card, every car would carry with it a full record of its movement from the time it left home until its return; agents and yardmasters would be relieved of the necessity of writing for the home route, and delay and much needless switching at interchange points would be prevented. The car accountant would be relieved of the necessity of looking up home routes on hundreds of cars, and there would be a greater likelihood of cars being loaded in the direction of home in accordance with the car service rules.

Its greatest advantage would be in saving empty mileage if all roads would agree to short-route cars home. As an example of what could be accomplished in this way, let us suppose that an Atlantic Coast Line car is delivered to the Norfolk & Western. The car moves to Shenandoah Junction and is delivered to the Baltimore & Ohio; thence to Columbus; then to the Cleveland, Cincinnati, Chicago & St. Louis, and then to Cleveland; to the Erie road to Youngstown; to the Pennsylvania Lines to Pittsburgh. Under the present arrangement, the only way the car could get home would be via the route by which it came. If short routing was permitted, the car would be delivered to the Baltimore & Ohio at Pittsburgh and moved back direct to Shenandoah Junction. The haul via the Pennsylvania Lines to Youngstown, the Erie to Cleveland and the Big Four to Columbus would be avoided. The Baltimore & Ohio would have a shorter haul to Shenandoah Junction. The saving of empty car mileage that would be effected in time of car surplus would be enormous. The wear and tear of equipment, which is often greater under empty than under loaded movement would also be reduced. Under present rules, it may be necessary actually to haul a car across the continent twice empty, in order to get it home. The flood of empty equipment which has deluged terminals and interchange points in the last few months has resulted in much additional clerical expense to secure records and disposition of cars. This would all be saved with a common-sense home route card adopted by all lines. Much empty mileage would also be saved and great expense in handling empty equipment. Often where the movement is light, empty cars are handled in regular or scheduled trains, but where

there is a heavy movement it is frequently necessary to despatch full trains of empties. On some lines which have important terminals and connections at both ends, it frequently happens that trains of empties are moving in opposite directions at the same time; each train representing additional operating expense.

The rules to make such a system effective should be as few and simple as possible. To weigh it down with details would do much toward defeating its efficiency. No car should be permitted to move loaded or empty except on the home road without a home route card. A failure to comply with this rule should be made a subject for discipline.

The adoption of a standard home route card and a short-routing arrangement by the American Railway Association will do much to remove a serious drain upon the revenues of the railroads of this country.

ENFORCING THE LAWS AGAINST TRESPASSING

Stricter laws and stricter enforcement for the prevention of trespassing upon railways are urged upon the state legislatures in "The Deadly Toll of Trespass on Railways," a bulletin of the Railway Business Association.

"There were," the bulletin declares, "33,000 persons under 21 years of age killed or injured while trespassing on railways of the United States from 1901 to 1910, enough to make a mile post for every mile around the world."

Progress toward enactment of laws providing effective penalties and toward conviction and sentences for those who wilfully expose themselves to danger is said to be slowly spreading, while loss of life and damage as affecting railways is increasing. France punishes trespassers by fines up to $579 and jail up to a month; Germany, by fines up to $25; Canada by fines up to $50 and imprisonment up to two months. In the United Kingdom persons other than passengers or employees found on railroad property are fined $10 for each offence.

"In the United States laws are few, and even where penalties are prescribed, magistrates hesitate to impose them, as local authorities dislike to feed and lodge convicted tramps." Trespassers, however, "include little children and wage earners living in the vicinity, whose death or disability often leaves families destitute.

"Elevation of track in Chicago was resorted to at an expense of 70 millions, which is expected to reach 150 millions. Trespassers leap over a city ordinance and climb up on to the elevation in their conscientious devotion to the pursuit of being killed and maimed. In three months 339 arrests were made on the elevated right of way of four systems. Only 67 of the offenders were punished.

LACK OF STATUTES

"Thirty-five states have no laws specifically prohibiting persons walking on railroad right of way. Thirteen states by statute prescribe penalties ranging from $5 fine to 10 days in jail in Maine to $500 fine or one year in jail in New York. These states are New York, Wisconsin, Maine, New Hampshire, New Jersey, Massachusetts, Virginia, Missouri, Rhode Island, Delaware, Georgia, Minnesota and Washington. Missouri has a law which protects the railroad from damage suits, for the purpose of which trespass is a defence for the railroad, but the law in defining the act a trespass for that purpose specifically says "but not otherwise."

Activity on the part of many railroads to lessen the number of fatal accidents on their lines is bearing fruit. The New York Central Lines took the question up with justices of the peace and police court magistrates armed with statistics. Newspapers were urged to give the campaign publicity. Warnings in several languages were posted, while manufacturers and public school teachers were enlisted. The railroad's police department made arrests systematically. During May, June and July, 1914, there were 4,545 arrests and 4,015 convictions. In seven months ended April 30, 1914, there was a reduction in those killed over the corresponding period one year previous from 136 to 98.

"Minors and children, following the example of their elders, flock upon the tracks, engines, cars and turntables and are ground to pieces or crippled for life. Tramps and yeggmen travel around the country in 'side-door Pullmans,' robbing box cars and burning ties, stations, bridges, and timbers, and robbing farmers, country banks, stores and postoffices.

"It would probably cost the states and municipalities less to enforce a law against trespassing, than it does to pick up and bury the dead and care for the cripples."

BUY A MAXIMUM CAR LOAD

O. C. Smith, superintendent of transportation of the Missouri, Kansas & Texas, has issued the following circular letter addressed to "Mr. Shipper and Consignee, Everywhere, U. S. A.": "According to good authority, 1915 will be accompanied by our old friends, 'Confidence,' 'Prosperity' and 'Opportunity,' and it is our intention, with your assistance, to give them a rousing reception. This seems to be an assured fact, as their baggage has preceded them in the shape of improvements in many ways all over the country.

"In the past few months we have heard a lot of talk about 'Buy a Bale of Cotton.' Many bales have been bought and much has been done throughout the South, as well as the North, to relieve the situation. It is a good work. We wish to start the slogan 'Buy a Maximum Car Load,' whether it be coal, lumber or whatever commodity you are dealing in.

"In the eastern rate case it was determined that only 58 per cent of the capacity of cars are used for tonnage that could be handled in the average car. In the West this average, no doubt, is even less.

"From a bulletin sent out by the traffic committee of the Lumber Association, of Chicago, I quote the following: 'The importance of heavier loading is being shown more and more, particularly with the new financial difficulties with which the carriers have to contend. Increasing your loading 25 per cent per car will increase the carriers' revenue the same amount and will not increase the operating expense over 5 per cent. That makes a 20 per cent increase in earning, which is just four times as much as the 5 per cent advance asked for. Bear that in mind whenever possible and load heavily; talk heavy loading to mill men as well as customers, and soon lumber will show a big increase.'

"The railroads have to face (in a bigger way) the same problem that confronts all dealers who have to count on transportation as part of their business. Imagine the fix you would be in, if you should keep on hand during normal and dull times wagons and drivers enough to take care of rush business. How long would your income stay on the right side of the ledger? An increase in the net weight of the car load is just as essential at a time when there is a surplus of cars as when there is a car shortage.

"The Milwaukee Western Fuel Company says, when no cars are to be had, 'You suffer, your customer suffers, we suffer, the railroads suffer.'

"Much is to be gained by all, by shipping and buying a 'Maximum Car Load.'"

Replacing German Goods.—In order to satisfy the demands of the many French inquirers who desire to replace German goods by their British equivalents, the British Chamber of Commerce, Paris, has decided to publish in French a trade index of British manufacturers, merchants, and producers, which will be largely distributed among French firms. After careful consideration, it has been found that this is the most practical method of responding to the demand for British goods in France. The index in question will be confined to firms of undoubted British nationality.

General News Department

A bill to increase the passenger fare in Arkansas from two to three cents a mile was defeated by an almost unanimous vote, after receiving two readings in the Arkansas House of Representatives on January 15.

The Oklahoma railroads have issued a circular letter to the public giving arguments against a number of anti-railroad bills which have been introduced in the legislature, including the full crew law and the car limit law.

The shops of the Canadian Pacific and the Grand Trunk Pacific at Winnipeg, have orders for making shell jackets for the British government, and it is said that between them they will make thirty millions of these jackets.

The Pennsylvania Railroad announces that at the end of this month the sale of liquors will be discontinued in its restaurants at New York and Philadelphia. This means the end of liquor selling throughout the company's lines, both in stations and on trains.

A bill has been introduced in the Utah legislature forbidding all public officers to use railroad passes. Another bill has been introduced prohibiting the issuance of railroad passes to any person included in the list of those prohibited from using them in the other bill.

The bondholders of the Buffalo & Susquehanna are understood to have made arrangements by which they will continue the operation of that road beyond February 1, the date on which, according to an order of the court, trains were to have been discontinued because of insufficient income.

Representative Henry Brady, of Dallas, Ia., has announced his intention of introducing a bill in the Iowa legislature to repeal the long and short haul law, in order to allow railroads to meet competition regardless of their mileage, without being obliged to make corresponding reductions in the intermediate rates.

In the United States District Court at Memphis, Tenn., January 25, the Illinois Central was held blameless for a collision of one of its trains and a street car, September 17 last, in which 11 persons, passengers on the street car, were killed. The jury also awarded damages of $4,000 to the railroad to reimburse it for damage to its equipment as a result of the wreck. Suits aggregating probably $200,000 have grown out of the wreck.

The board of directors of the American Society of Civil Engineers has adopted a resolution and sent it to President Wilson, declaring its opinion that "it would be unfortunate for the present Alaskan Railway Commission to be superseded, and that the interest of the public demands that the present commission be allowed to carry out the construction as well as the location of the proposed line." The commissioners are William C. Edes, Lieutenant Frederick Mears and Thomas Riggs, Jr.

Index to Classification of Operating Expenses

The Interstate Commerce Commission has issued a pamphlet of 297 pages, containing a very full and apparently complete and useful index to the classification of operating expenses of steam roads as issued by the accounting department of the commission. It is printed in large clear type and in the careful and tasteful manner characteristic of the government printing office. A work of this kind has long been needed. If it has any faults, they can be detected only by using the book; but it is safe to say that railroad accounting officers everywhere will welcome the book as a great convenience.

M. K. & T. Officers Asked to Study Public Relations

President C. E. Schaff of the Missouri, Kansas & Texas has issued the following circular to the officers and agents of the system: "It is desired that constant attention should be given to the question of public relations between the Missouri, Kansas & Texas lines and the communities which they serve. Many disagreements which have occurred in the past were caused for the most part by municipal authorities, town councils, business organizations or individual citizens not having a full understanding of the railroads' position in matters of common interests, or by misunderstanding on the part of the railroads' officers who were not in possession of sufficient information to act with intelligence and judgment.

"It is the desire of the Missouri, Kansas & Texas lines to avoid this, and to keep in intimate touch with matters of state and municipal government, as well as the activities of business organizations, in order that its management may work along co-operative lines with the communities upon which it depends for revenue; and all officers, agents and other representatives are urged to closely follow such matters and to be present at meetings of town councils, trade organizations or citizens so that where railroad questions are involved the company may secure a hearing when propitious for it to do so. Agents and others should keep the heads of their departments informed in matters of local interest in their communities affecting the interests of the Missouri, Kansas & Texas directly or indirectly, and also keep themselves informed through the medium of the local press and forward any articles of interest to the proper officer in charge."

New Haven Road 92 Per Cent Block Signaled

Another road whose statement of block signal mileage failed to reach us for inclusion in our annual table was the New York, New Haven & Hartford; which road in 1914 increased by nearly a thousand miles the length of line on which the manual system is in force. The statement (miles of road) follows:

Automotic Block Signals		
Single track	1.6	
Two or more tracks	344.6	
		346.2
Non-Automatic		
Single track	1,033.8	
Two or more tracks	388.2	
		1,422.0
Totol, both kinds		1,764.4
Total passenger lines operated		1,923.6

The apparent discrepancy of 3.8 miles in the final total is on account of two sections of four-track road where 2 tracks are automatic and 2 tracks non-automatic.

Fixed Audible Signals in Place of Hand Motions

In the large freight yard of the Southern Railway at Inman, Ga., near Atlanta, "Klaxon" horns, like those used on automobiles, fixed on posts alongside the track, are used to give signals to the men on long strings of freight cars being pushed over the hump for distribution. In this yard the receiving tracks are about 3,000 ft. long, and to make sure that the signals, to start or to stop or to set back, shall be quickly understood by the engineman and by all of the brakemen, ten Klaxons are distributed at distances of about 300 ft. apart. All of these noise-makers are sounded, simultaneously, by the closing of a circuit in the signal cabin, and the instructions of the man in charge of the switching are thus conveyed in unmistakable terms, simultaneously, to all concerned.

This arrangement is, of course, equally efficient by day or by night and regardless of dense fog or anything which might obscure visual signals.

These signals have been in use since last March, with much satisfaction, and a similar installation is being put in at Finley, the Southern's large new yard near Birmingham, Ala.

Canadian Northern Track Through to Pacific Coast

The Canadian Northern has laid the last rail on its line from Lake Superior to the Pacific coast, the lines from the east and from the west having been connected January 23, at Basque, a village on the North Thompson river, 200 miles east of Vancouver. It will require three months more to ballast the road-

bed, and the official ceremony of driving a golden spike is expected to take place about May 1. This event marks what may be called the final stage of the picturesque struggle of Sir William Mackenzie and Sir Donald Mann, to expand their group of local lines into a coast-to-coast railway. The enterprise had its birth in 1896, when Donald Mann bought the charter of the Lake Manitoba Railway & Canal Company and, with Mackenzie's assistance, built and operated 125 miles of line between Gladstone, Manitoba, and a point beyond Dauphin. By rapid additions of new and old charters and a vigorous construction policy, the promoters, within eighteen years, gridironed the prairie country with Canadian Northern lines, reached the head of the Great Lakes and finally passed across the ridge of Lake Superior and built lines connecting Toronto, Ottawa, Montreal and Quebec. The Canadian Northern lines of today reach practically all of the important traffic-producing centers in the Dominion.

The Engineering Foundation

At a meeting held in the Engineering Societies building, New York, last Wednesday evening, the Engineering Foundation was inaugurated and it was announced that Ambrose Swasey, designer and builder of the Lick, Yerkes and United States Naval Observatory telescopes, and an engineer, scientist and astronomer of distinction, had given $200,000 to promote engineering research.

Mr. Swasey is a member of the firm of Warner & Swasey, Cleveland, machine tool builders and manufacturers of telescopes, in which branch they are among the largest in the world. Mr. Swasey is 69 years old, a past president of the American Society of Mechanical Engineers and of the Cleveland Engineering Society, a member of the Institution of Mechanical Engineers of Great Britain and of the British Astronomical Society. He is a Fellow of the Royal Astronomical Society. In 1900 he received from the French government the decoration of the Legion of Honor for his work on astronomical instruments.

The administration of the fund will be conducted by the Engineering Foundation Board elected by the trustees of the United Engineering Society, and composed of nine members from the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, and the American Society of Electrical Engineers, with two members to be chosen at large.

American Wood Preservers' Association

At the closing session of the American Wood Preservers' Association convention, held at Chicago on Thursday afternoon of last week, officers were elected as follows: President, J. H. Waterman, superintendent timber preservation, Chicago, Burlington & Quincy, Galesburg, Ill.; first vice-president, H. S. Loud, chief engineer, United States Wood Preserving Company, New York; second vice-president, Lowrie Smith, superintendent tie plants, Northern Pacific, Brainerd, Minn.; third vice-president, F. D. Beal, superintendent, St. Helens Creosoting Company, Portland, Ore.; secretary-treasurer, F. J. Angier (re-elected), superintendent timber preservation, Baltimore & Ohio, Baltimore, Md. Members of executive committee are as follows: George E. Rex, superintendent timber preservation, Atchison, Topeka & Santa Fe, Topeka, Kan.; G. M. Davidson, engineer of tests, Chicago & North Western, Chicago; J. B. Card, manager, Chicago Creosoting Company, Chicago; John Foley, forester, Pennsylvania Railroad, Philadelphia; E. A. Sterling, forest and timber engineer, Philadelphia, and C. M. Taylor, superintendent of treating plants, Philadelphia & Reading, Port Reading, N. J.

American Society of Civil Engineers

At the sixty-second annual meeting of the American Society of Civil Engineers, held on January 20, in New York, the following officers were elected: President, Prof. Charles D. Marx; vice-presidents, Daniel Bontecou and Clemens Herschel; treasurer, Lincoln Bush; directors, J. V. Davies, G. A. Harwood, J. E. Greiner, J. F. Coleman, J. B. Hawley and H. S. Crocker. The annual convention is to be held in San Francisco on September 15.

The Traffic Club of New York

At the January meeting of the Traffic Club of New York to be held at the Hotel Astor, on Friday evening, January 29, Martin B. Madden, Congressman from Illinois, will address the club on the subject of the Panama Canal. Woods Hutchinson will also address the club on the same evening.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. Hereafter the full list of meetings and conventions will be published only in the first issue of the Railway Age Gazette for each month.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, March 2-3, San Francisco, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual Meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meetings, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. F. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

The railways west of Chicago are planning to file tariffs with the Interstate Commerce Commission about February 1, advancing interstate passenger fares to a basis of approximately 2½ cents a mile.

The Rocky Mountain National Park, in Colorado, is to be established, by virtue of a law which has just been passed by Congress. This will be the seventh large national park and will have an area of 230,000 acres. The six national parks already established are said to have had in the past year about 250,000 visitors.

The Seaboard Air Line has made an arrangement with the Atlanta, Birmingham & Atlantic by which S. A. L. passenger trains, two each way daily, except Sunday, will be run through between Savannah, Ga., and Brunswick, 87 miles. The junction is at Thalman; from there east to Brunswick by the A. B. & A., the distance is 21 miles.

The Atchison, Topeka & Santa Fe last week lifted its embargo on export grain for shipment through the port of Galveston, Tex., which has been in effect since December 10. When the embargo was lifted there were about 2,500 cars on the tracks near Galveston, which will be rushed into the city as fast as the ships can take the grain.

The Atchison, Topeka & Santa Fe has announced that a new passenger train will be put in service on February 7, between Chicago and Los Angeles and San Francisco, to be known as the "Missionary." On the same date a new train will be put on between New Orleans and California, to be known as the "California Special," running over the Frisco lines from New Orleans to Houston.

The University of Illinois has announced a short course of two weeks on the diseases of plants as related to their keeping quality during transportation and storage, to be given under the personal supervision of Dr. F. L. Stevens, professor of plant pathology, assisted by George L. Peltier, pathologist of the university department of horticulture. The course will begin on February 8, and close February 20.

The committee of representatives of western state railway commissions that is making preparations for opposing the proposed advances in freight rates by the western roads at the hearings to begin at Chicago, on February 15, has announced its intention of asking for an extension of time in which to prepare for the case. It is reported that the committee has estimated its expenses as about $30,000 for the preliminary preparations and about $45,000 more for the completion of the case should the commission grant the extended time.

The Pennsylvania Railroad, in a leaflet issued to inform the public concerning the company's efforts to safeguard the health of passengers, tells of some of the rules prescribed for this purpose. The water coolers in the passenger cars are sterilized with steam once a week. Water from all sources used by the road is analyzed frequently, 600 analyses having been made in one year. Samples of water are taken from every source of supply and examined at least once every thirty days. The men who handle ice for drinking water wear rubber gloves and do not touch the ice with their hands. In cleaning 22,000 passenger cars (the number at New York in one month) the amount of cotton waste used was 1,700 lb.; of liquid soap 300 gal.; linseed oil soap, 1,380 lb., and the list includes a great lot of other things. The company's passenger cars are fitted with ventilating apparatus which supplies each passenger with 1,000 cubic feet of fresh air each hour, with all windows and doors closed. The ventilating apparatus costs $265 per car, which means $795,000 for the 3,000 steel passenger cars owned by the road. Every person having anything to do with the preparation or serving of food has to undergo a physical examination every 30 days. About 1,100 men are employed in the dining cars and the restaurants of the road. Medical examiners inspect every dining car and every restaurant at least once each month.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The St. Louis Coal Operators' Traffic Bureau has filed a complaint with the Interstate Commerce Commission against the rates on coal shipped to St. Louis from the Illinois bituminous fields.

Switching Charges at Milwaukee

Opinion by Commissioner Clark:

The commission finds that the Chicago, Milwaukee & St. Paul has justified proposed changes in the switching charges applicable in the switching district of Milwaukee, Wis., changing the rate on interstate shipments from $2, $2.50 and $4 per car, dependent upon distance to 1 cent per 100 lb., minimum 60,000 lb. for reciprocal switching; and from $5 and $6 per car to 1½ cents per 100 lb., minimum 60,000 lb., for movements between industries. An analysis of the actual cost of switching charges at Milwaukee shows that the proposed charges are not unreasonable. (32 I. C. C., 509.)

Rates on Cotton to St. Louis

St. Louis Cotton Exchange v. Missouri, Kansas & Texas et al. Opinion by Commissioner Harlan:

The commission finds that the rates on cotton from producing points in Oklahoma to St. Louis are not unreasonable or discriminatory. The record indicates that St. Louis is losing ground as a cotton market. The evidence shows, however, that this is due to changes in economic conditions. Shippers find it better to send their cotton through the ports. By far the greater proportion of cotton received at St. Louis is through cotton which if stopped at all in transit is stopped at that point only to be transferred from car to car. Another cause of the decline is that there has been in the last few years a change in the method of handling. Formerly it was consigned to factors at St. Louis and there sold; now the buying is largely done in the field, the cotton being purchased from the farmer or storekeeper direct and the transaction financed by local banks. (32 I. C. C., 501.)

Class and Commodity Rates to Salt Lake City and Other Points

Opinion by the commission:

It is found that the carriers have justified proposed increased class and commodity rates from Missouri river points and Mississippi river points, Chicago, and intermediate territory on the one hand, and Utah common points on the other. The present class rates, in both directions, and some 210 commodity rates, westbound, as also a few eastbound were prescribed by the commission in *Commercial Club, Traffic Bureau of Salt Lake v. A. T. & S. F.*, the so-called Salt Lake case. They became effective November 15, 1911. The class rates are on the scale per 100 lb., first class, of $2.45 from or to Chicago, $2.27 from or to Mississippi river points, and $1.90 from or to Missouri river points. The respondents have revised the class and commodity rates with a general upward trend. The first-class rates to Utah common points will be $2.65 from Chicago, $2.47 from Mississippi river points and $2 from Missouri river points.

The present commodity rates, where not prescribed in the Salt Lake case, are those voluntarily established by the carriers, subject to observance of two alternative clauses, one fixing the Spokane rate as maximum, and the other fixing the Montana common-point rate as maximum. The proposed tariff eliminates these clauses and states the specific rate in each instance. It revises the descriptions and restores differential adjustments from different territories of origin in effect for many years prior to the order in the Salt Lake case, by taking as base the proposed commodity rates from Chicago and adjusting with relation thereto the proposed rates from Mississippi river territory, Peoria, St. Paul, Memphis and Duluth. In this adjustment commodity rates from Chicago to Spokane and Montana common points still operate as maxima to Utah common points,

and rates from Missouri river territory are generally held at 80 per cent of the Chicago rate, following the relation prescribed in the Salt Lake case. (32 I. C. C., 551.)

Hearing on Spotting Charges

A hearing on the tariffs filed by the railways east of Chicago, imposing a charge for spotting service, was begun before an examiner for the commission at Chicago on Tuesday, January 26. The first witness was Eugene Morris, chairman of the Central Freight Association, who testified regarding the provisions of the tariffs, but declined to be drawn into a discussion as to their interpretation or the reasonableness of the charge, saying he would leave that to the witnesses for the individual roads.

Mr. Morris gave the following definition of spotting service as provided in the tariffs:

"Spotting service is the service beyond a reasonable convenient point of interchange between road haul or connecting carrier and industrial track as defined below and includes:

"(a) One placement of a loaded car which the road haul or connecting carrier has transported, or

"(b) The taking of a loaded car from a particular location in the plant for transportation or road haul by connecting carrier.

"The tracks of an industry which are made use of for an intra-mill service which is a part of the operation of a plant will be considered industrial plant tracks.

"The spotting charge on the loaded car includes the handling of the empty car in the reverse direction."

The proposed charge for spotting service is 5½ cents per ton, net or gross, as classified, of 2,000 pounds or fraction thereof, with a minimum charge of $2 per car.

Mr. Morris was followed by a number of operating officers who testified regarding various local conditions to which the charge would apply.

The Tap Line Cases

The commission has issued a third supplemental order in the tap line cases, which provides that the maximum allowances or divisions of the through rates fixed in the commission's order of July 29, 1914, shall apply to the tap lines which were dismissed as parties to this proceeding prior to July 29, 1914. Allowances or divisions in conformity therewith may be paid to such tap lines by their respective trunk line connections on shipments moving between May 1, 1912, and the effective dates of the orders respectively dismissing the tap lines from the effect of orders entered prior thereto. The order also modifies that of July 29, 1914, so as to permit trunk lines to make settlement with tap lines named therein, as well as those previously dismissed as parties, on the basis of allowances therein prescribed as maxima. Trunk lines party to the case are required to file with the commission copies of their tariffs showing divisions with each of their tap line connections. Tap lines are required to file their distance tariffs or tables of distances from all shipping points to the junctions with the connecting carriers.

Hearing on Embargoes

Commissioner Daniels of the Interstate Commerce Commission held a hearing at Chicago on January 20, in a general investigation by the commission of the subject of embargoes. T. M. Bowers appeared as attorney for the commission. Arthur Hale, general agent of the American Railway Association and chairman of the Committee on Relations Between Railroads and of the Arbitration Committee, was the principal witness, and described in a general way the various kinds of embargoes and the necessity for them.

Mr. Hale said that embargoes are necessary because there is no limit to the number of shipments that may be made by anyone anywhere, while the railway facilities are to a certain extent fixed. While it is impossible to improvise delivery sidings the shipper may greatly increase his shipments over night, and an embargo is the best kind of regulation the railroads have been able to work out to prevent congestion. He said the railways do not like embargoes because they cause them to lose revenues, or at least postpone revenues for some time. They are a necessary evil. They represent a measure of self-defense on the part of the railroads against the monopolization of railway facilities by one shipper or class of shippers, and are in the interest of the general public. Some embargoes are precautionary, for the purpose of stopping shipments that cannot be handled, and for the purpose of regulating congestion which the shippers ought to regulate. Mr. Hale said that fully half of the embargoes now in effect are on account of various governmental regulations, such as the embargoes on account of the hoof-and-mouth disease. Some embargoes are caused by floods and accidents; others have been caused on account of the war because certain steamship lines cannot go to certain points. Embargoes also are based on the closing of navigation, but he said the embargoes in which the commission is probably most interested are those on account of accumulations of cars.

Probably from 15 to 20 per cent of the embargoes now in effect are on this account. These occur, he said, when the facilities of the railroads cannot accommodate a sudden increase of traffic, sometimes on account of the disability of connecting railroads or the inadequacy of interchange facilities. Sometimes they are due to the failure of the railroads to make a sufficient charge for the use of their facilities; as, for example, the free storage and demurrage allowed at ports. Facilities that are free are liable to be overtaxed and result in embargoes. Many accumulations of cars arise from the lack of facilities on the part of consignees and because the demurrage rules are imperfect. Mr. Hale said that embargoes are not so frequent as they were prior to 1906, when they were very frequent, but since that time the demurrage rules have been improved and their administration has been improved. It is not unusual, he said, for a big road to put an embargo a week, where it used to be about one every day. "If we could absolutely perfect our demurrage and storage system," he said, "there would be very few embargoes necessary. Many trades that thought they could not regulate their freight found out under the pressure of demurrage rules that they could regulate it better than the railroads could. The railroads used to try to regulate it and often made mistakes."

As to the misuse of embargoes, Mr. Hale said he had known of mistakes being made and had made them himself when he was a superintendent of transportation, but that all roads try to limit embargoes as much as possible. The greatest difficulty is encountered with perishable freight, because one consignee may easily monopolize the facilities and hold refrigerator cars under demurrage for a long time. This, he said, demonstrated that the demurrage rate was too low, so an agreement was reached with the representatives of the perishable fruit trade, providing for an increase in the demurrage rate to $3 for each day after three days, and to $5 for each day after five days. Similar questions arise, he said, in connection with automobile shipments. Cars are sometimes held as long as two months, because it is cheaper to pay $1 a day than to unload and store the freight.

As to giving notice to the Interstate Commerce Commission of embargo notices, Mr. Hale said he saw no reason why roads should not send the commission a copy of every embargo notice, but that it was absolutely impracticable to send prior notice to the commission or to shippers, because it is necessary to act promptly in such cases; and because to notify shipper would result in an immediate overshipment to the points affected, which would vitiate the purpose of the embargo. Moreover, he said, it is impossible to notify everybody. The roads try to notify those most affected.

Mr. Hale's testimony was followed by that of several superintendents of transportation who testified regarding the practices in issuing embargoes on their own roads. It was agreed that there was no objection to filing copies of embargo notices with the Interstate Commerce Commission, but that they would do no good, because in many cases the embargoes would be withdrawn by the time the notice would reach the commission, and that it would be impracticable to give prior notice to the commission or to shippers.

STATE COMMISSIONS

The Public Utility Commissioners of New Jersey have ordered the Pennsylvania Railroad to restore three passenger trains which were taken off in September. These trains ran between Long Branch, Trenton and Camden.

The Public Service Commission of Pennsylvania, by general order No. 12, forbids the practice, said to have been indulged in by certain public service companies, of sending out written or printed notices to patrons attributing to the commission alleged rulings or orders which have never been made, or which if made, are not correctly quoted. By this unauthorized practice a considerable amount of misunderstanding, confusion and inconvenience has been occasioned. Henceforth, no public service company may send out any such utterance of the commission unless it be printed in full from an official copy.

The Public Utilities Commission of Ohio, on complaint of the American Steel & Wire Company, has decided that the Newburgh & South Shore, the freight belt line serving important industries in the southern part of Cleveland, is a common carrier, and has ordered the railroads which connect with the belt line to cease and desist from eliminating the Newburgh & South Shore as a common carrier when they compute demurrage charges against the Steel & Wire Company and other industries. When these other roads deliver cars to the Belt for placement for loading or unloading the demurrage rules of the Newburgh & South Shore, and no other, must be applied.

The Pennsylvania is contesting the recent order of the New Jersey Board of Public Utility Commissioners requiring the road to restore three seashore trains which it had discontinued. The commission's order will be reviewed by the Supreme Court in certiorari proceedings during the February term of that tribunal. The action of the railroad in appealing to the court will operate as a stay of the order of the board, which was to go into effect this week. The trains taken off (last September) were locals running from Long Branch and other shore resorts to Freehold, Jamesburg, Trenton and Jersey City. According to F. L. Sheppard, general superintendent of the New Jersey division, the running of these trains during the five months which the company did not intend to run them would involve an expenditure of $20,400. He stated that in his opinion this would be an entire loss, as it is not probable that the running of the trains would induce any additional travel.

The Virginia State Corporation Commission declares constitutional the statute passed at the last General Assembly in regard to taxes on cars and engines. Under the old law, the rolling stock tax went to the cities in which are situated the principal state offices of the railroad companies, while under the present decision, the counties, towns and cities traversed by the lines will receive a proportionate share of the total money collected. Every steam and electric line in Virginia is subject to the new ruling, and all were joined as defendants in the action, which was brought by the City of Richmond. The enforcement of the new law will cause Richmond a loss of $266,000 annually. The rolling stock act was passed by the General Assembly in 1914, when it amended and re-enacted the then existing law. The act provides for the distribution among the several counties, cities and towns through which the roads pass, the assessment of rolling stock for taxation in the proportion that the assessed value of the right of way, roadbed, track and all other property, except rolling stock, bears to the total assessed value of such property, except rolling stock. The railroads, while named as defendants, took no part in the proceedings, taking the ground that they are not materially affected. As the rates of assessment are not uniform in the various counties, cities and towns, it is believed that there will be considerable saving to the roads.

Demurrage in California

The Railroad Commission of California has issued a decision (No. 1994) in the matter of applications for changes in demurrage rules on intrastate traffic, giving its conclusions on numerous questions presented by E. E. Mote, manager of the Pacific Car Demurrage Bureau, on behalf of the carriers, and by certain shippers' organizations.

Mr. Mote proposed that the Reciprocal Demurrage rule be modified in four particulars, namely:

1. That shippers desiring to avail themselves of the privilege of reciprocal rules shall give written orders for all cars wanted for loading.

2. That such orders, in addition to specifying the character of the freight and its destination, should also specify the routing.

3. That when cars are required at an agency station the notice shall be given to the agent at such station, and if required at a non-agency station notice shall be given to the next agent on either side of such non-agency station.

4. That Section "C" of this rule be so amended that carriers may not hereafter be required to notify every shipper, who does not have on file a reciprocal demurrage bond, when applying for cars, of the provision of the reciprocal demurrage rule to relieve it from liability for reciprocal demurrage.

These modifications were all granted except the third. As to this the commission holds that it is entirely practicable for the carrier to transmit the order for the car or cars to the agent at or near the loading point. Moreover, in actual practice, most orders for cars will undoubtedly be placed with the agents at the point of loading or the nearest agency station.

The commission rejected a number of rules proposed by certain organizations which appeared at the hearing, among which was one to amend the holiday rule so as to include all legal holidays, National, State and Municipal; one to extend the free time allowed to load and furnish billings; to extend free time on cars stopped in transit; one to modify the weather rule, eliminating charge for demurrage on each inclement day until final release of car; one calling for notification by first-class letter, instead of by postal-card, and a credit rule providing for the payment by carrier to shipper or consignee of $1.50 for each car loaded or unloaded within the first 24 hours and $3 in case the same car is unloaded and reloaded within the first 24 hours.

It will be noted that no objection was raised to the three-dollars-a-day demurrage rate prevailing in California.

PERSONNEL OF COMMISSIONS

Joseph B. Eastman has been appointed a member of the Massachusetts Public Service Commission, in place of George W. Anderson, resigned.

Howard N. Ogden, member of the Public Service Commission of West Virginia, died suddenly at his home in Charleston, January 27.

Judge J. A. Guiher of Winterset, Iowa, has been appointed a member of the Board of Railroad Commissioners of Iowa, succeeding N. S. Ketchum, deceased.

Walter Alexander, heretofore district master mechanic of the Chicago, Milwaukee & St. Paul, at Milwaukee, has been appointed a member of the Wisconsin Railroad Commission, succeeding David Harlow.

Henry C. Hall, nominated some time ago to succeed himself as a member of the Interstate Commerce Commission, was confirmed by the Senate, on Tuesday of this week, by a vote of 38 to 13. There was strong opposition to this confirmation, based on criticism of the commission's recent action in authorizing a general increase of freight rates throughout the eastern states.

COURT NEWS

L. D. Puterbaugh, special commissioner for the supreme court of Illinois, in the controversy between the Illinois Central and the state auditor regarding the method of taxation of the Illinois Central, has filed a report in which he finds that the Illinois Central was assessed by $2,100,000 too much in 1913, and that the road was taxed in an arbitrary way. The state auditor, in January, 1914, made a tax levy against the Illinois Central's charter lines in Illinois which the railroad company protested was arbitrary and discriminatory. The special commissioner was appointed to hear the evidence.

Condemnation Proceedings—Speculative Damages Disallowed

In North Carolina a railroad company instituted a proceeding for the condemnation of a right of way through the defendant's mill village, on which was its manufacturing plant and cottages occupied by its workmen. The right of way was at a greater distance from the defendant's principal buildings than a pre-existing line. The defendant claimed that its measure of damages was the difference in the value of its entire plant and premises before the taking and afterwards, and that, in determining the difference, the annoyance to its employees by the maintenance of the railroad close to their homes and the danger to their children should be considered, as well as the fact that

such dangers would tend to drive away the better class of operatives, and necessitate the payment of higher wages. The court held that, as the owner of property condemned for a public use is entitled to compensation only to the actual and direct damages which he may sustain, which consist in the actual value of the property taken and the direct physical injuries to the remaining property, the damages claimed by the defendant were too speculative; there being no evidence that the actual operation of its mills was interfered with by the plaintiff's railroad, or that it suffered damages different from others whose land was near the railroad.—Raleigh C. & S. v. Mecklenburg Manufacturing Company, North Carolina Supreme Court, 82 S. E. 5.

Hours of Service Law—Unavoidable Accident

A railroad company's violation of the federal hours of service law resulted from having to feed the locomotive with impure water from a creek, while the train was being moved over a temporary logging road, causing the injectors, which were in good order, to fail to work properly. In an action for violation of the statute it was held that the delay was the result of an unavoidable accident which could not have been foreseen and prevented by the use of ordinary care, and hence the company was not liable for a penalty.—United States v. Chicago, M. & St. P., 212 Fed. 574.

Employer Sustained in Excluding Union Men

The Supreme Court of the United States, in a decision by Justice Pitney, handed down January 27, declares unconstitutional the statute of Kansas making it unlawful for any individual or corporation to coerce or influence any person to enter into an agreement not to join or remain a member of a labor organization as a condition of such person securing or continuing in the employment of such individual or corporation. The decision is of the first importance in the labor world. It was in the case of T. B. Coppage, a superintendent of the St. Louis & San Francisco at Scott, Kan., convicted of violating the law in threatening A. R. Hedge, a switchman, with discharge if he did not sign an agreement to withdraw from the Switchmen's Union.

"The court intimates nothing inconsistent with the right of individuals to join labor unions," said Justice Pitney. "Nor is the legitimacy of such organizations questioned, so long as they conform to the laws of the land, as others are required to do. But the individual has no inherent right to join the union and still remain in the employ of one who is unwilling to employ a union man, any more than the same individual has a right to join the union without the consent of that organization.

"Just as labor organizations have the inherent and constitutional right to deny membership to any man who will not agree that during such membership he will not accept or retain employment in company with non-union men, and just as a union man has the constitutional right to decline proffered employment unless the employer will agree not to employ any non-union men, so the employer has the constitutional right to insist that the employees shall refrain from affiliation with the union during the term of the employment. There cannot be one rule of liberty for the labor organization or its members and a different and more restrictive rule for employers.

"The employee's liberty of making contracts does not include a liberty to procure employment from any unwilling employer or without a fair understanding. Nor may the employer be foreclosed by legislation from exercising the same freedom of choice that is accorded to the employee. To ask a man to agree in advance to refrain from affiliation with the union while retaining a certain position of employment is not to ask him to give up any part of his constitutional freedom. He is free to decline the employment on those terms, just as the employer may decline to offer employment on any other; for 'it takes two to make a bargain.' And having accepted employment on those terms the man is still free to join the union when the period of employment expires or, if employed at will, then at any time upon simply quitting the employment. And, if bound by his own agreement to refrain from joining the union during a stated period of employment, he is in no different situation from that which is necessarily incident to contracts in general.

"For constitutional freedom of contract does not mean that a party is to be as free after making the contract as before; he is not free to break it without accountability. Freedom of contract, in the very nature of the thing, can be enjoyed only by being exercised; and each particular exercise of it involves making an engagement which, if fulfilled, prevents for the time any inconsistent course of conduct."

Dissenting opinions were filed by Justices Day, Hughes and Holmes. Justice Day said that this question was up for settlement in fourteen states and that the right of contract had been seriously limited in a number of states for public policy, as, for instance, where miners were not permitted to contract to work longer than eight hours a day. "If an employer could refuse to employ a man for the simple reason that he belonged to a labor union, could he not also demand agreements that an employee should not join the National Guard? . . . Could not the state strike down agreements not to join a certain political party?"

Other laws which, according to Justice Day, are invalidated by today's opinion are those of California, Colorado, Connecticut, Indiana, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oklahoma, Oregon, Pennsylvania, Wisconsin and Porto Rico.

Justice Pitney, in announcing the majority's opinion, explained that the court did not consider "actual coercion" as beyond the power of the states to prohibit. He declared the decision was not only based on reason, but was supported by the decision of the court several years ago in the Adair case, in which the Federal act of 1898, prohibiting an interstate railroad from discharging an employee because he belonged to a union, was annulled as unconstitutional.

Decision in Great Northern Hours-of-Service Suit

The United States Circuit Court of Appeals, seventh circuit, in a decision by Judge Baker, concurred in by Judge Seaman and Mack, reversing the district court for the Western district of Wisconsin, in a suit brought by the government against the Great Northern, to recover penalties for violation of the hours-of-service act, holds that the separating of a train into two parts because of a broken coupler or a bursted hose may not be a sufficient excuse for disregarding the rule of the law limiting the working hours of trainmen to sixteen hours, especially if it be shown that there had been a succession of accidents due to those causes.

In this case, the government sought to show that during the three months prior to the accident which caused the delay that led up to the suit, trains had broken in two on the line in question from two to seven times a day, because of the pulling out of draw-bars or the bursting of hose; but the trial court would not admit this testimony. The government claimed that it should not be presumed, in the absence of any proof, that the company's equipment was in good condition; the mere statement that the delay to the train was the result of a pulled out draw-bar should not, by itself, be sufficient excuse for violation of the rule. The lower court refused to accept this view and it is now reversed; and a new trial is ordered.

The report of the decision gives the following details:

"Two train crews of five men each were involved. As the delay in both instances came from substantially identical causes an outline of the story of one train will suffice. This road carries iron ore from Kelly Lake, Minn., to docks at Allouez, near Superior, Wis., a distance of 100 miles. Rails, cars, and engines are of the heaviest types. From mines to docks the grade is slightly downhill. So heavy is the traffic that from 100 to 125 loads are taken in one train, and the trains, following each other less than an hour apart day and night, and progressing at an average speed of little over six miles an hour, usually consume nearly the whole of the 16 permitted hours in making the run.

"On June 18, 1912, the crew of train 1981 began service at 7:45 p. m., and remained on duty for more than 20 consecutive hours. When this train had covered about 70 miles the seventh train ahead of it pulled out some drawbars and broke into five pieces. The cripple and the six intermediate trains were put in on sidings and the crews were relieved. But no siding ahead was available for train 1981. It could not back up, either on account of its weight or obstructing other down trains; it could not cross over to the other main track without blocking the stream of returning empties, and the men in charge were required or permitted to proceed on the main track to destination. Delay in the other instance was caused by the bursting of air hose. . . ."

Railway Officers

Executive, Financial, Legal and Accounting

J. W. Wardlaw has been appointed assistant to president and purchasing agent of the Central Vermont, with office at St. Albans, Vt.

Mrs. Elizabeth T. Bliss has been elected president of the Lake Tahoe Railway & Transportation Company, with headquarters at San Francisco, Cal., succeeding her son, W. D. Bliss, resigned.

B. C. Hightower, chief clerk in the chief accountant's office of the Rock Island Southern at Davenport, Iowa, has been appointed auditor of the Muscatine North & South, with headquarters at Muscatine, Iowa.

I. C. McGee has been appointed assistant treasurer of the Kansas City Southern, with headquarters at Kansas City, Mo., vice C. A. Peabody, assigned to other duties. It was erroneously stated in our issue of January 22 that Mr. McGee was appointed treasurer, succeeding H. Visscher.

The jurisdiction of H. H. Downs, who was chief claim agent of the New York Central & Hudson River, at New York, has been extended to include all of the road in the state of New York, of the consolidated company, the New York Central Railroad, with headquarters at New York.

S. H. Church, assistant secretary of the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis, at Pittsburgh, Pa., has been elected secretary to succeed S. B. Liggett, deceased, and J. W. Orr, assistant controller, has been promoted to controller to succeed J. W. Renner, retired under the pension rules of the company.

O. H. Nance, secretary, treasurer and auditor of the St. Louis, Brownsville & Mexico at Kingsville, Texas, has been elected president of the Maryland & Pennsylvania, with headquarters at Baltimore, Md., succeeding John W. Brown, resigned. Mr. Nance has been elected also general manager of the Maryland & Pennsylvania Railroad, and president and general manager of the Maryland & Pennsylvania Terminal Company, effective February 1.

Ira A. Place, who was vice-president of the legal department of the New York Central & Hudson River, has been appointed vice-president in charge of the law department, and of the land and tax department of the new consolidated company, the New York Central Railroad, with headquarters at New York. Albert H. Harris, whose appointment as vice-president of the New York Central Railroad has already been announced in these columns, has been appointed also general counsel in general charge of legal matters, with headquarters at New York; and Edward T. Glennon, who was assistant vice-president of the Lake Shore & Michigan Southern, has been appointed assistant vice-president of the new consolidated company, the New York Central, with headquarters at Chicago. Mr. Glennon will have charge of such matters as may be referred to him by the vice-president in charge of the law department or by the general counsel.

Traffic

H. V. Dinniene has been appointed acting Pacific Coast agent of the Traders Despatch at San Francisco, Cal., vice H. C. Ewing, who has been appointed general agent of the Lehigh Valley at San Francisco.

F. L. Wemple, acting general freight and passenger agent of the Mexico North Western at Ciudad Juárez, Chih., Mexico, has been appointed general freight and passenger agent, with office at Ciudad Juárez.

G. J. Mitchell, commercial agent of the Carolina, Clinchfield & Ohio, has been transferred from Columbia, S. C., to Charlotte, N. C., succeeding J. I. Sabiston, and J. E. Scott has been appointed commercial agent, at Columbia, succeeding Mr. Mitchell.

L. H. Landis has been appointed traffic manager of the Fresno Interurban Railway, with office at San Francisco, Cal. Mr. Landis is also assistant to president and traffic manager of the Tidewater Southern and president and general manager of the San Jose Terminal Railway.

Operating

Wilbur Oglesby, acting superintendent of the South Georgia, has been appointed superintendent, with office at Quitman, Ga., succeeding Z. W. Oglesby, deceased.

William H. Neff, formerly general superintendent of the St. Louis Southwestern at Tyler, Tex., recently has been appointed general superintendent of the Northwestern Pacific, with headquarters at San Francisco, Cal.

J. W. Roberts, superintendent of car service of the Vandalia Railroad, with office at Terre Haute, Ind., has been promoted to general superintendent of passenger transportation of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, Pa., succeeding Charles Watts, retired under the pension rules of the company.

John M. Daly, whose resignation as general superintendent of transportation of the Illinois Central and the Yazoo & Mississippi Valley, has already been announced in our columns, has been in railway service since 1874. He began railway work as a clerk in the car accountant's office of the Toledo, Peoria & Western, and subsequently was employed consecutively as switchman on that road, clerk for the Wabash, St. Louis & Pacific, the Atchison, Topeka & Santa Fe and the Chicago & North Western, until 1883. He was then for four years car accountant and trainmaster of the Chicago, St. Paul & Kansas City, and from 1887 to 1891, car accountant of the New York, Chicago & St. Louis. Mr. Daly was then with the Illinois Central until May, 1899, successively as car accountant and superintendent of transportation, leaving that road to go to the Delaware, Lackawanna & Western as superintendent of transportation. He was engaged in special work for the Intercolonial Railway of Canada from June, 1901, to December of that year, when he became general manager of the Cape Breton Railway. He returned to the Illinois Central in April, 1902, and was superintendent of transportation until June, 1904; car accountant from the latter date to 1910; superintendent of transportation the next two years, and since 1912, general superintendent of transportation, his jurisdiction also extending over the Yazoo & Mississippi Valley. Mr. Daly now leaves the service of the Illinois Central to engage in other business.

J. M. Daly

OBITUARY

A. W. Montague, superintendent of terminals of the Houston & Texas Central at Fort Worth, Tex., was shot on January 20, while in his office, by a discharged switchman, and died within a short time.

W. D. Scott, general manager of the Spokane, Portland & Seattle, the Oregon Trunk, the Oregon Electric and the United Railways, died at his home in Portland, Ore., on January 21, aged 56 years.

Lorenzo S. Coffin, formerly a member of the Iowa Board of Railroad Commissioners, died at Fort Dodge, Iowa, on January 17, aged 91 years. Mr. Coffin will be remembered by older railroad men, and especially by the older members of the railway brotherhoods, by reason of his activity, in the early nineties, in the propaganda for the federal safety appliance laws. Later he was an apostle of temperance among railroad men and a promoter of the "white button" movement.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Missouri, Kansas & Texas is preparing specifications on a number of locomotives.

CAR BUILDING

The Atchison, Topeka & Santa Fe is in the market for 700 box cars and 500 refrigerator cars.

The Russian Government.—A letter from the Imperial Russian consul to the Seattle Chamber of Commerce contains the following statement: "It gives me pleasure to inform you that an order for 15,000 railway cars has been placed by our government with a Seattle company."

IRON AND STEEL

The Paducah & Illinois ordered 253 tons of steel for several small bridges near Paducah, Ky., from the Kenwood Bridge Company, Chicago.

The Chicago & North Western has ordered 1,050 tons of steel for miscellaneous bridge work for 1915, from the Chicago Bridge & Iron Works.

The Chicago, Milwaukee & St. Paul has ordered 151 tons of steel for its Clinton street subway, at Milwaukee, Wis., from the Milwaukee Bridge Company.

The Chicago, Burlington & Quincy has ordered 15,000 tons of rails from the Illinois Steel Company. This order is in addition to one for 15,000 tons placed some time ago with the Colorado Fuel & Iron Company.

SIGNALING

The Southern Railway has begun the installation of automatic block signals on its line between Pelham, N. C., and Denim, 36 miles, where the line is being double tracked.

Railway Construction in Uruguay.—The Uruguayan government is planning to proceed with the construction of a new short line of railway from Tablada, to connect with the already existing line owned by the Uruguayan Central Railway.

Standardizing Australian Railway Gage.—The conflict in Europe has brought to the front the question of standardizing the gage of the Australian railways, and it is of interest at this time to review some of the points pro and con. In favor of the idea it is said that in case of invasion the present different gages of the various commonwealths would interfere with the speedy transportation of men and supplies and that if retreat should be necessary, it would be almost impossible to move the railway rolling stock to places of safety as was done when the Belgian equipment was sent to the south of France. It is argued, however, that the present would be a bad time to make extensive changes of gage. Great Britain's control of the seas makes invasion of Australia seem unlikely. The service of the Australian railways for the time being, therefore, will be to transport troops to the ports where they will board ships which will carry them to the fields of war. Extensive reconstruction will handicap the service and the carrying of troops and supplies will be done only at great cost and with exasperating delay, and, in addition, even if invasion were possible, reconstruction work would certainly prove a decided disadvantage from the standpoint of the defenders. Opinion is not unanimously in favor of the 4 ft. 8½ in. gage. If that gage were made standard, Australia would perhaps be able to purchase locomotives and cars at short notice, but on the other hand if some other gage were adopted, an enemy attempting to invade Australia possibly at some future time could not use its own equipment without alteration.

Supply Trade News

Berry Brothers, Detroit, Mich., have recently opened a new branch at Savannah, Ga.

The Asbestos Protected Metal Company has removed its head office from Beaver Falls, Pa., to the First National Bank building, Pittsburgh, Pa.

W. P. Mellon has been appointed railway sales manager of the southeastern district of the Flint Varnish Works, with headquarters in New York.

Samuel Higgins, formerly general manager of the New York, New Haven & Hartford, has been elected president of the Standard Heat & Ventilation Company of New York and Chicago.

L. H. Mesker has recently become associated with the sales department of the Kearney & Trecker Company, Milwaukee, Wis., and will represent that company in Ohio after February 1.

Earl F. Scott has been appointed representative of the Terry Steam Turbine Company, Hartford, Conn., for the state of Georgia. He will have offices at 702 Candler building, Atlanta.

William Bayliss & Co., Ltd., 240-241 Dashwood House, London, England, have been appointed exclusive European sales agents for the Chicago Railway Signal & Supply Company, Chicago.

The directors of the United States Steel Corporation at their meeting on Tuesday passed the dividend of 50 cents a share quarterly on the common stock, after having reduced it from $1.25 a share to 50 cents a share three months ago. The regular dividend on the preferred stock was declared.

David A. Wright, who for several years past has been connected with the Yale & Towne Manufacturing Company, New York, as district manager in the west, has opened an office for himself as manufacturers' agent at 140 South Dearborn street, Chicago, Ill. He will specialize on labor saving and pneumatic machinery, cranes, etc.

M. A. Sherritt, for several years associated with Manning, Maxwell & Moore, Inc., New York, as manager of the company's Philadelphia branch, resigned this position on January 25 to become vice-president and general manager of Sherritt & Stoer Company, Inc., dealers in machine tools and railway and machine shop equipment. The company will occupy its new offices in the Finance building, Philadelphia, on February 1.

William Penn Evans, general inspector for the Baldwin Locomotive Works, died at Philadelphia on January 16. Mr. Evans was born in Bridgeport, Pa., and received his technical education in the Polytechnic College at Philadelphia. His first work was with R. S. Newbold & Son, the Eagle Iron Works, Norristown, Pa. In September, 1872, he left the latter company to accept a position in the drafting department of the Baldwin Locomotive Works, and he continued in the service of that company with the exception of a brief interval, until the time of his death. In 1876 he obtained leave of absence to act as assistant superintendent of the Philadelphia & Reading Terminal at the Centennial Exposition, and in 1879 left the locomotive company to become mechanical engineer on the Missouri, Kansas & Texas at Sedalia, Mo. After one year's service he returned to the Baldwin Locomotive Works, being appointed, in 1885, chief draftsman, which position he held until 1903. In 1904 he was placed in charge of the exhibit of the Baldwin Locomotive Works at the Louisiana Purchase Exposition in St. Louis, and upon his return to Philadelphia at the termination of the exposition was made general night superintendent. In 1905 he was given charge of the exhibit of the Baldwin Locomotive Works at the Lewis & Clark Exposition at Portland, Ore., and when this exhibit was closed was appointed northwestern agent, with headquarters at Portland. He occupied this position until 1910, when he returned to Philadelphia and was appointed general inspector, which position he occupied until the time of his death. Mr. Evans was a member of the American Society of Mechanical Engineers, the Franklin Institute, the Engineers' Club of Philadelphia, and the Historical Society of Pennsylvania.

Railway Construction

Athabasca Northern.—The Canadian parliament has been asked to continue this company's corporate existence, and to grant an extension of time in which to build from Edmonton, Alta., to Athabasca Landing. The provisional directors named at the time of incorporation, in 1905, were F. H. Markey, Montreal, Que.; J. K. McKenzie, Selkirk, Man., O. E. Fleming, Windsor, Ont., and M. Burton, Barrie, Ont.

British Columbia Southern.—See Canadian Pacific.

Canadian Pacific.—This company will apply to the Canadian parliament for an extension of time in which to build the following lines: From a point on the Kleinberg-Sudbury branch between Bolton Junction, Ont., and Palgrave, to a point at or near Campbellville and from Asquith, Sask., north and northwesterly about 20 miles. The following subsidiary lines will also ask for an extension of time in which to build new lines: Manitoba & Northwestern, from a point at or near Theodore, Sask., west to a point between Govan and Lanigan, about 100 miles; South Ontario Pacific, from a point at or near Hamilton, Ont., to a point on the Niagara river, at or near Niagara Falls, Ont., and British Columbia Southern, to build from Michel, B. C., to Kananaskis.

Carolina, Atlantic & Western.—This company, which completed track laying last year on an extension from Andrews, S. C., south to Charleston, 57 miles, is planning to build another extension, it is said, from Charleston southwest to Savannah, Ga.

Chicago, Burlington & Quincy.—Work on the extension of the Chicago, Burlington & Quincy from Guernsey, Wyo., to Wendover, will be resumed on February 1. All the outfits that were taken off last fall will be put back, and it is expected that this work will be completed during the coming fall. This line will be 8.5 miles long, including three tunnels, the longest being 3,500 ft., and will be carried across the Platte river on a steel girder bridge. It is estimated that the cost of completing this work will be approximately $1,000,000.

Florida Roads.—Surveys have been made and the right of way is secured, it is said, for a line to be built from Fort Myers, Fla., south along the west coast of Florida via Marco bay and Naples to Everglade, thence east across the southern part of Florida to Miami, on the east coast, about 150 miles. Capitalists of Baltimore, Md., are said to be back of the project.

Florida Roads (Electric).—Construction work has been started on an electric line, it is said, from Jacksonville, Fla., southwest to Middleburg, about 25 miles. A. W. MacKinlay, general manager and chief engineer, Jacksonville.

Hudson Bay, Peace River & Pacific.—The Canadian parliament has been asked for an extension of time in which to build this projected line from Winnipeg, Man., to Hudson Bay, thence west to a point on the Pacific coast. Application has been made also to change the name of the company to Winnipeg & Hudson Bay. Lewis & Smellie are solicitors for the company, Winnipeg, Man.

Jackson & Eastern.—See Meridian & Memphis.

Jellico, Capuchin & Western.—According to press reports from Jellico, Tenn., surveys are being made for a 30-mile line, to be built through the mountain section west of Jellico, Tenn. The new line is to be built to open up coal and timber fields, and grading work will be started soon. The names of the incorporators are not given.

Kankakee & Urbana Traction Company.—An extension of this line from Ludlow, Ill., north is being contemplated. There will be no curves and the maximum grade will be 0.05 per cent. Cuts will amount to about 5,470 cu. yd., and fills to about 43,500 cu. yd. per mile. All grading will be done by company forces. One 70-ft. deck girder will be required. No contracts have been let. T. W. Shelton, Urbana, Ill., is chief engineer.

Kettle Valley.—This company will apply to the Canadian parliament for an extension of time in which to build lines in British Columbia as follows: From Summer creek or One Mile creek to Copper mountain, and to Voiget mining camps; from Vernon to Kelowna via Penticton; extension of branch line to Otter Summit; also to build from a point near Tulameen up the Tulameen river, about 50 miles; from Penticton to Osoyoos lake; from Summer creek to Allison or Princeton, and thence to Granite creek coal sections; from Grand Forks to a point 50 miles up the North Fork of Kettle river; also from Midway to Hedley and from Penticton to Nicola.

Manitoba & Northwestern.—See Canadian Pacific.

Meridian & Memphis.—An officer writes that grading work is now under way on the Jackson & Eastern building an extension of the Meridian & Memphis which operates a 32.6-mile line from Meridian, Miss., northwest to Union, where connection is made with the New Orleans, Mobile & Chicago. The extension is being built from Union, Miss., west to Sebastopol, about 13 miles, and the company expects to develop a traffic in lumber and general merchandise. The line will probably be extended later to Carthage, about 30 miles from Union. S. A. Neville, Meridian, Miss., is in charge of the work, and J. M. T. Hamilton is the chief engineer. (February 13, 1914, p. 345.)

Montana Roads.—E. W. Davis, Bozeman, Mont., is raising a bonus for the building of a railroad from Three Forks district up Madison valley to Yellowstone, Mont.

Norwich, Colchester & Hartford Traction.—Under this name a company is to be organized in Connecticut, it is said, to build an electric line through Norwich, Bozrah, Lebanon, Colchester and East Hartford. F. Cronin, A. Manning and W. Strickland are interested.

Ozarks Railway.—A new railroad extending from Springfield, Mo., through Mountain Home, Ark., up along the Buffalo river, then south to Little Rock, Ark., 210 miles, is proposed by this company. No contracts have been let. T. J. Murray, Mountain Home, Ark., may be addressed.

Palm Beach & Everglades.—We are told that this company plans to build a line from a point near West Palm Beach, Fla., west to a point near Lake Okeechobee, thence skirting the shore of the lake to a point on the west shore near Lake Hicpochee, in Desoto county. Construction work is to be started as soon as the necessary arrangements are completed, and the promoters expect that the line will develop a traffic in vegetables and tropical fruits. Charles H. Baker, New York, president. (January 15, page 116.)

Pennsylvania Roads (Electric).—Residents of Monaca, Pa., will organize a company, it is said, to build an electric line from Monaca south to Coraopolis, about 20 miles. J. W. Reid, D. J. Mitchell, J. J. Allen and H. L. Grimmell, all of Monaca, are said to be interested.

South Ontario Pacific.—See Canadian Pacific.

Southern Railway.—Contracts for grading work in connection with the revision and double tracking of the line from Orange, Va., to Charlottesville, have been let by the Southern Railway, as follows: From Orange to Burnley, 15 miles, to the Morrow Construction Company, Atlanta, and from Burnley to Charlottesville, 13.7 miles; to C. W. Lane & Co., Atlanta. (January 22; page 171.)

Southwestern Traction & Power Company (Electric).—Plans are being made for the construction of an electric railroad from New Iberia, La., to St. Martinville, a distance of 10.5 miles, also from Jeanerette, La., through Franklin, Baldwin and Patterson, to Berwich, a distance of 50 miles. No contracts have been let, but it is expected that work will be completed during the present year. W. S. Henning, New Iberia, La., is chief engineer.

Tennessee & Alabama.—Bids will be asked for building this line about May 1, it is said, from Fayetteville, Tenn., south to Huntsville, Ala., 34 miles. There will be one bridge on the line about 1,000 ft. long. J. E. Hurd, chief engineer, Fayetteville. (December 25, p. 1208.)

Virginia-Blue Ridge.—An officer writes that construction work is now being carried out by company forces on the line from Tye River, Va., northwest, via Lowesville to Massies Mill, 22 miles. There will be a number of trestles and one 500-ft. tunnel on the line. J. W. DeWight, president; A. K. Murrell, chief engineer, Tye River. (January 22, p. 171.)

Warren, Johnsville & Saline River.—Work on the five-mile extension of this line from Johnsville, Ark., to Peter's lake, is 50 per cent completed. Grading will amount to approximately 4,000 cu. yd. a mile. The maximum grade will be 1 per cent, and the maximum curvature, 3 deg. There will also be four short bridges on this line.

West Pennsylvania Traction.—This company will build a seven-mile line, it is said, between Leisenring, Pa., and Uniontown.

West Virginia Roads.—According to press reports the Superior Black Coal Company is developing mines in Lincoln county, W. Va., and has started work on a new railway. The line is to connect the Coal River branch of the Chesapeake & Ohio with the coal lands controlled by the coal company. John Anderson, general manager, Beckley, W. Va.

Winnipeg & Hudson Bay.—See Hudson Bay, Peace River & Pacific.

RAILWAY STRUCTURES

Bridgeport, Okla.—Bids have been asked by the Chicago, Rock Island & Pacific for the construction of two new pneumatic piers and a through truss bridge for single track, over the South Canadian river, near Bridgeport, Okla. The span will be 200 ft. long and will replace the old bridge which was destroyed by a flood last spring. The old approaches will be used, but will be raised to meet the higher new span. Work is to begin early this spring. The total estimated cost of this improvement will be $200,000.

Chicago, Ill.—President Daniel Willard of the Baltimore & Ohio, went to Chicago on Monday and held conferences with the Chicago Railway Terminal Commission and the local industries committee of the city council on the ordinance which the Baltimore & Ohio Chicago Terminal has requested to permit the road to transfer its coach yards to the vicinity of Western avenue and Sixteenth street. The company has made arrangements to sell the land now occupied by its coach yards at Harrison street to the Pennsylvania Company, to be used in connection with the latter's proposed freight terminal. It is expected that as soon as the ordinance is passed preliminary work can begin for the Pennsylvania freight terminal, which must precede the beginning of work on the proposed new Union passenger terminal.

Macon, Ga.—A contract which transfers certain lands and makes other grants to the Central of Georgia in consideration of the latter building a union station at Cherry and Fifth streets, in Macon, has been signed by the railroad company, it is said, and the city officers will at once sign the contract. It is expected that work will be started in the near future on the new station. (August 7, p. 269.)

Memphis, Tenn.—The Arkansas & Memphis Railway Bridge & Terminal Company has just completed the construction of the piers for its new bridge across the Mississippi river at Memphis, Tenn. Financial arrangements have been completed whereby the Pennsylvania Steel Company, which has the contract for the fabrication and erection of this structure, will proceed at once with its erection. The Arkansas & Memphis Railway Bridge & Terminal Company was incorporated by the Chicago, Rock Island & Pacific; the St. Louis, Iron Mountain & Southern, and the St. Louis Southwestern to build a double track bridge across the Mississippi river to provide an independent entrance into Memphis for these three roads.

Milwaukee, Wis.—A small new terminal will be built by the Milwaukee Northern Electric, at Fifth and Wells streets, Milwaukee. The contract for the steel and iron work has been awarded to the Milwaukee Bridge Company, Milwaukee, Wis.

Pine Hill, Ala.—The Gulf, Florida & Alabama has given a contract to the American Bridge Company for building a steel bridge over the Alabama river near Pine Hill. The bridge is to have 12 spans, including a draw span of 292 ft.

Temple, Okla.—The Chicago, Rock Island & Pacific has awarded a contract to George B. Swift, Chicago, for the construction of a small frame depot at Temple, Okla. Work is to begin at once.

Railway Financial News

Boston & Maine.—The trustees of the majority stock have sent a bill to the Massachusetts legislature, which when it becomes a law will permit the stockholders of the Boston & Maine and of the leased lines to reorganize or consolidate their properties, and attached to the bill is an outline of the three plans, one of which will be adopted if the bill is passed and the consent of the stockholders is obtained. Two of these plans provide for reorganization or consolidation without receivership, and the third outlines the plan to be followed if the road is put into the hands of receivers. All three plans provide for the merger of the leased lines with the parent company and the reduction of the drain on the parent company of the guaranteed dividends on the leased lines' stock.

Chicago, Rock Island & Pacific.—A committee has been formed which asks for proxies for the next meeting of stockholders and for the regular annual meeting of stockholders. This committee consists of Edward W. Sheldon, president of the United States Trust Company, New York; William Woodward, president of the Hanover National Bank, New York; Charles G. Dawes, president of the Central Trust Company of Illinois, and J. Horace Harding, of Charles D. Barney & Co., New York.

Cincinnati, Hamilton & Dayton.—The receivers have brought suit to compel the appointment of a separate receiver for the Cincinnati, Indianapolis & Western, which has been operated as a part of the Cincinnati, Hamilton & Dayton, and its operation, it is claimed, has been at a loss.

Delaware, Lackawanna & Western.—The company has sold $5,000,000 Morris & Essex 3½ per cent refunding bonds to Kean, Taylor & Company and Robert Winthrop & Co., both of New York. The bonds were sold by the railroad company, it is understood, at a price which will cost the railroad company interest 4.30 per cent. The proceeds of the bond sale will be used to pay in part the $11,577,000 Morris & Essex 7 per cent consolidated bonds when they fall due, the remainder required to retire these bonds being paid from current funds.

New Jersey & Pennsylvania.—The vice-chancellor in the New Jersey court has ordered the sale of the New Jersey & Pennsylvania, which road has not been in operation for a good part of the last two years during its receivership.

New York Central Railroad.—Wood, Struthers & Company, New York, have made an analysis of the present security for the New York Central refunding and improvement 4½ per cent bonds as affected by the recent consolidation. The analysis is quite comprehensive, including a consideration of the lien, earnings, surplus and income from investment.

Ozark Valley Railroad.—This is the name of a new corporation which has taken over the property of the Williamsville, Greenville & St. Louis, which runs from Williamsville, on the St. Louis, Iron Mountain & Southern, northeast through Wayne county, 35 miles. The new company is incorporated for $350,000.

Pennsylvania Railroad.—Kuhn, Loeb & Company, New York, have bought $49,000,000 consolidated (now first) mortgage 4½ per cent bonds of the Pennsylvania. The bonds are to be offered publicly at a price expected to be about 103, and the bonds sold on the curb when issued at prices from 105 to 105⅞.

Wabash.—The joint protective committee syndicate has bought $1,545,000 receiver's certificates to provide for the payment of maturing equipment notes.

Williamsville, Greenville & St. Louis.—See Ozark Valley Railroad.

Russia Establishes Direct Railway Service with Galicia.—The Russian government has established a direct passenger and freight service connecting all the Russian railways with Lemberg in Galicia, via Radziviloff and Volochisk.

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Contents

*Illustrated.

That the railroads of America have 49 masters—one at Washington and one at each of 48 state capitals—is an observation which, as a vague generality, is very familiar. Mr. Hustis, president of the Boston & Maine, has had occasion to consider the fact in the concrete. Speaking before the Massachusetts Public Service Commission in Boston the other day, which commission has suspended the road's new passenger tariffs raising all fares to 2½ cents a mile, he said that similar tariffs, filed at the same time, had been approved in Maine, New Hampshire, Vermont and New York, and by the Interstate Commerce Commission. There is state sovereignty with a vengeance! That careful observer who said that most of our state commissioners are "conspicuously deficient" in some of the essential qualifications needed in commissionerships may not have been precisely accurate in his statement; but that our system as a whole is conspicuously efficient, in blocking the wheels of business, is quite apparent in many places. The four states mentioned may have many interests which are diverse; but the general fact that most passenger fares are too low is true of all of them. It was only a few months ago that the commissioners of five states met in Massachusetts, with Federal Commissioner Prouty, and a statement was given out endorsing the view that passenger fares generally were too low; but that was only theory; now we have practice. Mr. Prouty is in Washington, five hundred miles away, but the fact that some Massachusetts citizens will have to pay a little more money for fare is right under the commissioners' noses. In Philadelphia, where the people were aroused recently by an advance in fares, one of the most conservative papers, one which supports the general proposition that the railroads need more money, quickly brought up the doctrine that freight traffic may rightfully bear a part of the burden of the passenger service The Interstate Commerce Commission, supporting the doctrine that each branch of the traffic should bear its own burdens, will need to get a louder trumpet, if it is to prevail.

State Commissions' Divergent Views

The Pennsylvania's annual report for 1914 does not come out until March, but the preliminary figures for December and for the calendar year ended December 31 for all the Pennsylvania lines were given out on Monday of this week. It was the Pennsylvania Railroad itself and the Pennsylvania Company (northwest system of the lines west) which were particularly hard hit. Total operating revenues for all Pennsylvania lines, both east and west, amounted to $353,239,000 in the 1914 calendar year, a decrease from the previous year of $37,823,000, or 12 per cent. Total operating expenses amounted to $287,090,000, a decrease of $32,597,000, or 13 per cent. The very heavy cut in expenses prevented a seriously smaller net revenue, the net in 1914 being $66,149,000, or $5,226,000 less than the previous year. The saving in expenses was about equally divided between transportation expenses and maintenance expenses. On the Pennsylvania Railroad a saving of $7,158,000 was made in maintenance and $6,000,000 in transportation; on the southwest system, $5,157,000 in maintenance and $4,258,000 in transportation. The Pan Handle—the Pittsburgh, Cincinnati, Chicago & St. Louis—suffering proportionately with the other lines in loss of revenue, succeeded in making even deeper proportionate cuts in expenses, the saving in maintenance being $4,149,000 and in transportation $2,531,000. Maintenance costs do not decrease in anything like the ratio of loss of freight business. The Pennsylvania's figures, therefore, quite surely show deferred maintenance. This means just that much more material and supplies used in maintenance to be bought as soon as increased earnings warrant it.

The Pennsylvania in 1914

The Railway Business Association recently has issued a bulletin regarding "The Deadly Toll of Trespass on Railways," which has forcibly brought up this subject for public attention again. As its bulletin shows, over 50,000 trespassers on railway property are killed every 10 years in this country, this being more than one-half of all the fatalities on our railways; and this long death roll is due to the fact that the governments will not pass and enforce laws to suppress the evil. The railways have sought such action year after year, but in vain. Why will not the legislatures do something? An address made by J. A. Culp, at the meeting of the Illinois Legislative Board of the Brotherhood of Locomotive Firemen and Enginemen, held at Springfield, Ill., on September 28, 29 and 30, 1914, throws light on this question. We quote

Railway Employees and the Trespass Slaughter

the following from Mr. Culp's remarks, as published by the brotherhood's legislative board:

Trespassing. That was another bill that was a very innocent looking bill. Prevented trespassing of anyone upon the company's property, and provided a heavy fine and imprisonment. If the boys would "walk out" and go down to the roundhouse or on the company's property and one of the fly cops would see you, they could send you to jail from thirty days to six months, and fine you anywhere from $1 up. So that bill didn't look good to us and we killed it, and one of the senators told us, "You boys could come down here and ask to have the rails nickel-plated on the railroads and we would do it for you, but when the railroad company asks for a little bill like that you boys object to it." And why shouldn't we?

Was ever a more cynical and outrageous statement made? Because some of the "boys" might possibly get arrested, while on strike and out of the railway's service, good and vitally-needed legislation must be defeated, and 5,000 men and women must be killed each year. And the same legislative board was daily button-holing members of the legislature for train crew and other similar legislation in the alleged interest of "safety" on railways! "You boys," said the senator quoted by Mr. Culp, "could come down here and ask to have the rails nickel-plated on the railroads, and we would do it for you, but when the railroad companies ask for a little bill like that you boys object to it." And Culp's comment is: "And why shouldn't we?" "The public be d——," one of the Vanderbilts is reported to have said. And likewise the spokesman of the railway brotherhoods say: "Sure! to h—— with the public, and law, and order, and good government, and the safety of human lives, rather than that there should be any possible police interference with us!"

A "PRIVATE" MANAGER FOR GERMAN RAILWAYS

A CABLEGRAM from Berlin announces that Herr Ballin, director-general of the Hamburg-American Steamship Company, has been placed in charge of the operation of all the railways of Germany. This is an extraordinarily interesting and significant piece of news. A large majority of the railway mileage of Germany is owned and managed by the governments of the various states. The state railways of Germany, especially those of Prussia, are recognized by every intelligent student of the subject as the best managed government railways in the world. If it should be assumed that anywhere there could be found a state railway system which had developed officers and an organization that would be able to cope with any situation or emergency, every student of the subject would say that the state railway system of Prussia was that system. And yet, in the crucial test to which the state railways of Prussia and the other German states are being put by the great war, the government passes over the heads of all the men in its civil service, in its army and in its navy, and takes for the manager of the railways during the war the head of a great private company.

The German Hamburg-American Steamship Company, however it may have been subsized and encouraged by the government, is a private enterprise which has been developed and managed on commercial principles by private business men. The Hamburg-American is the greatest and best managed steamship line in the world, and Herr Ballin in its management has demonstrated the possession of those qualities of foresight, initiative, enterprise, resourcefulness and driving power which are the great essentials to success in all practical affairs. It is doubtless because he has demonstrated their possession that he, rather than some man developed in the Prussian civil service, has been selected to manage the railways. Is it possible that these qualities cannot be developed to the highest degree even in a civil service like that of Germany? If so, how can they be expected to be developed in the civil service of any other nation?

One of the many arguments that have been used in favor of government ownership of railways is that of military expediency; yet, in this great crisis it has been found a matter of military expediency and necessity to go outside of the government railways and get a private business man to run them. Highly significant also was the frank acknowledgment made by Colonel Goethals in his address before the Chicago Engineers' Club last week of his indebtedness to the railway engineers, John F. Wallace and John F. Stevens, who preceded him on the Panama canal. Without the organization and construction methods which they had worked out and which he inherited, his labors, Colonel Goethals said, would have been unsuccessful. This statement illustrates the bigness of Colonel Goethals, and it also tends to nullify the arguments in favor of government ownership which have been based on his success in building the canal.

UNEMPLOYMENT ON RAILROADS

NEVER has the problem of unemployment been brought more forcibly to the notice of the people of the United States, or been given greater attention by the more intelligent of them, than during the present winter In every part of the country thousands, and even hundreds of thousands, of men and women have been unable to get work. Some of them are undeserving; but a very large majority are honest and industrious people who are willing and able, and whose failure to get anything to do has not been attributable to any fault of their own. They are victims of industrial and economic conditions which they have had practically no part in producing.

The situation this winter has been especially bad. But the problem presented is not a new or ephemeral one. There is chronically too much unemployment in this country. Its result is an amount of mental and physical suffering and degradation which cannot be contemplated by any intelligent and humane person without the deepest commiseration for the victims, or profound misgivings regarding the future of the nation. Unemployment, aside from the immediate suffering it causes, is an inevitable and prolific breeder of industrial and social unrest. The more intelligent and prosperous classes should co-operate in investigating its causes and remedies, and in applying the latter. If they do not the condition is quite certain to be attributed to wrong causes and to be attacked by people whose intentions are good, but who are ignorant, or by demagogues who are ignorant, but whose intentions are not good, with remedies that will aggravate the disease or engender others.

The course of events in the railway business from season to season and period to period is one of the most prolific of all causes of unemployment in the United States. Because of the desire of the managements to make a good paper showing on roads which are financially in bad shape it is a common thing to postpone needed maintenance work until after the ending of the fiscal year on June 30, and then to plunge into it vigorously to make up for lost time. This causes a wide fluctuation in the demand of the railways for unskilled labor, and furthermore, causes a large increase in their demand just at the time when there is a maximum demand for such labor on farms. The economic disadvantages of this to both labor and employers, as well as to the public in general, are evident. If the railways generally would begin their maintenance work earlier in the year the reduction in the fluctuations in the demand for unskilled labor, and the improvement in respect to seasonal unemployment would be considerable.

Again, in those months of the year when the weather is warmest, the days are longest, and all other conditions are most favorable for railway operation, the freight traffic is comparatively light and there is a reduction in the number of men employed in connection with train operation. On the other hand, when the season of short days and severe weather comes and conditions become most unfavorable for railway operation, coal, lumber, grain and other kinds of bulky freight are poured on the railways in a flood, and there is a large increase in their demand for employees directly concerned in the movement of trains. The only way to reduce the fluctuations in the number of employees produced by this cause is to mitigate the cause by regularizing the movement of traffic. There is no good reason why so much of the coal and lumber, for example, should move in

the fall and winter. The movement of such commodities in the spring and summer could be increased, and the movement of them in the fall and winter reduced, by co-operation between the railways, the shippers, the consignees and the consumers.

Far worse in their effects than the seasonal fluctuations in the demand for labor are the fluctuations in the demand for it from year to year and period to period. How great these are may be illustrated by the following statistics showing the number of men employed on June 30 of the years from 1902 to 1913, inclusive:

1902	1,189,315	1908	1,436,275
1903	1,312,537	1909	1,502,823
1904	1,296,121	1910	1,699,420
1905	1,382,196	1911	1,669,809
1906	1,521,355	1912	1,716,380
1907	1,672,074	1913	1,815,239

It is probable that on June 30, 1914, the number did not exceed 1,650,000, and on December 1, 1914, there may have been 250,000 fewer employees on our railways than there were 18 months before.

While the change between 1913 and 1914 was big, it was not without precedent, for between 1905 and 1906, it will be noted, there was an increase in the number of employees of 140,000, while between 1907 and 1908 there was a reduction of 236,000; and variations upward or downward of 100,000 in a year are not uncommon. In other words, variations between the numbers employed by railways in two successive years amounting to from 6 to 15 per cent have occurred constantly within the last 15 years.

These fluctuations from year to year in the number of employees on railways have been due to correspondingly great fluctuations from year to year in traffic and earnings. But is there any good reason why the number of employees should vary in proportion to earnings and expenses? Improvements can be made more economically in years of bad business than in years of good, and if the policy of making them then were adopted the extent of unemployment in the bad years would be greatly reduced. The reason why most railways make improvements in the good years and do not make them in the bad ones is that they do business on such a narrow margin of profit that it is only in the good years that they have the financial means with which to make improvements. If they were allowed to earn larger surpluses in the good years to carry over to the bad ones they would be able to make more improvements in the latter and the fluctuations in the number of employees could be greatly reduced.

The policy of the labor brotherhoods aggravates the situation. Most of them insist on provisions in the wage schedules requiring the managements to give regular employees a minimum number of days' work in each month. The result is that when it is necessary for the roads to reduce their forces they must give this minimum number of days' work per month to the employees that they retain, which makes it necessary to lay off many employees entirely. If agreements could be made between the railways and the brotherhoods that in such bad times as the present the railways could give a smaller number of days' work to each employee, it would be possible to retain a larger number on the payroll, although each of those kept on the payroll would work a smaller number of days per month, and therefore earn a smaller average in a month than is the case under existing arrangements. Instead of the entire loss and suffering falling on some, it would then be divided among practically all, and the results would be far less bad.

While much attention is now being given to the problem of unemployment, business conditions doubtless will soon improve and the situation will then become less aggravated: It is greatly to be feared that when this turn for the better comes, the problem will again be neglected. But business will become poor again, and if, while it is good, nothing is done to solve the problem, the situation will again recur. It is to be hoped, therefore, that no effort will be spared to bring about co-operation and concerted action by public officials, economists, employers and labor organizations in reference to this most serious matter. As the condition of seasonal and periodical unemployment is met with in such aggravated form in the railway industry, it is to be hoped that special efforts to deal with it will be made by railway managers and the railway brotherhoods. It has been demonstrated that the managements and the employees can co-operate whole-heartedly and effectively in the interests of "safety first." Cannot similar methods and a like spirit be developed to deal with unemployment?

THREE-CYLINDER LOCOMOTIVES

In speaking at the annual meeting of the American Society of Mechanical Engineers in December last, J. B. Ennis, chief mechanical engineer of the American Locomotive Company, dwelt on the possibilities of the use of three cylinders in overcoming some of the difficulties that have developed with the large dimensions which the American locomotive has reached. Mr. Ennis' remarks on this subject were published on page 123 of our issue of January 22, 1915. J. Snowden Bell, in a paper on the three-cylinder locomotive, read at the 1913 convention of the American Railway Master Mechanics' Association, brought out the possibilities of the increase in power to be obtained by the use of this type, as well as the greatly improved balancing conditions. This latter feature is of particular importance, when we consider the high wheel loads in use on modern locomotives and the added effect on the rail pressure caused by the conditions obtaining in counterbalancing.

A great deal of progress has been made within the past two or three years toward reducing the weight of reciprocating parts by means of careful designing and the use of heat-treated and alloy steels. Unquestionably more can still be accomplished along these lines, tending toward improved balancing in the two-cylinder locomotive, but there is a limit to the possibilities of improved counterbalancing when the two-cylinder type is retained. As stated by Mr. Ennis, the power obtained in a two-cylinder engine having cylinders 27 in. in diameter and a maximum piston thrust of 117,000 lb., can be obtained in a three-cylinder engine with cylinders 22 in. in diameter and a maximum piston thrust of 78,000 lb. This is a decrease in piston thrust of 33 per cent and permits a corresponding reduction in the weight of the individual parts of the machinery, but particularly in the reciprocating parts. Neglecting, then, the fact that the three-cylinder arrangement gives an almost ideal balancing condition, it will be seen that considerable improvement is possible because of the reduced weight of the reciprocating parts alone.

The greatest objection raised against the three-cylinder locomotive is the necessity of the employment of a crank axle; and where simplicity of construction and ease of inspection and maintenance are given the prominence that they receive in American railway practice, such an objection is serious. There are crank axles in considerable number in regaular service on American railways, principally on four-cylinder balanced compounds, but all things considered, it cannot be said that they give entire satisfaction. The dangers of failure in an axle of this type are greatly increased over those of the plain axle and the conditions which might develop from such a failure, particularly on a four-cylinder engine where there are two inside connected main rods, need no enlarging upon to bring out the seriousness of the accident that might result. While the same arguments apply to the crank axle for a three-cylinder locomotive, they do not do so to the same extent because of the fact that in this type there is but one main rod inside connected, and the designer has, therefore, much broader limitations to which he can work.

With the increase in the amount of radiating surface with the use of the three-cylinder arrangement there would undoubtedly be an increase in the amount of condensation. Just what effect this would have on the steam consumption is problematical, but it does not seem unreasonable to expect, in a three-cylinder locomotive, some increase in steam consumption over a two-cylinder locomotive of equivalent power. The use of a superheater, however, would probably overcome this. All things

considered, the crank axle seems to offer the main objection to the adaptation of the three-cylinder locomotive to American practice, but the ability and courage characteristic of American designers, which have developed and perfected the Mallet compound, the superheater and the mechanical stoker should also be capable of producing a satisfactory crank axle. The three-cylinder locomotives which have been in service on the Philadelphia & Reading for some years, have, on the whole, done excellent work, and have proved satisfactory in many respects; and the application of this principle to a large Pacific or Mikado type locomotive would make it possible to determine just how valuable this type of locomotive could be made in American railway service and would also be watched with considerable interest.

SOME RECORD-BREAKING CONSTRUCTION PROJECTS

IT is somewhat anomalous that records should be broken in the magnitude of construction projects under conditions causing extreme financial depression, such as those that have prevailed in the transportation industry in recent years, and reached their culmination, it is to be hoped, at the outbreak of the European war. The effects of universal retrenchment, as reflected in reduction in mileage of new lines completed last year, tend to overshadow the record-breaking work now under way or recently completed. It may therefore be of interest to recall a number of such instances.

Doubtless the best known of the projects under way which are establishing precedents is the Quebec bridge, which is to carry the new National Transcontinental Railway over the St. Lawrence river, about seven miles above the city of Quebec. As will be recalled, the length of the main span in this structure, 1,800 ft., is 100 ft. greater than that in the Firth of Forth bridge in Scotland, which now has the distinction of having the longest span in the world.

Second in interest only to the Quebec bridge is the 1,000-ft. steel arch of the New York Connecting Railway over Hell Gate in the East river, New York City. The longest span of this type now in service is the highway bridge crossing the Niagara river, about 1,000 ft. below the falls, which has a length of 840 ft. The contrast between this structure, notable as it is, and the new Hell Gate arch is emphasized when it is remembered that the latter will carry a four-track railroad on a concrete ballasted deck. The magnitude of the entire project of which this crossing forms a part makes it unusual in new railway construction.

In the revision of old lines, which has become increasingly common as the volume of traffic has increased, it is impossible to compare projects as accurately as in the case of bridges, but in respect to cost, character of work and importance of the improvement, it is probable that two of the cut-offs now under construction surpass all previous work of this kind. These are the Baltimore & Ohio Magnolia cut-off between Orleans Road, W. Va., and Little Cacapon, one track of which was placed in service December 6, 1914, and the Delaware, Lackawanna & Western Summit cut-off between Clark's Summit, Pa., and Hallstead, which will be finished next summer. The former is 12 miles long and on the average each mile will cost $500,000, require the handling of nearly 300,000 cu. yd. of material and the placing of 6,000 cu. yd. of concrete. The latter is 40 miles long, its cost is estimated at $300,000 per mile, and the earthwork and concrete yardages are 336,000 and 10,000 per mile, respectively. The Baltimore & Ohio line is double-tracked, while the Lackawanna is for three tracks, with the exception of two short sections. The Lackawanna cut-off includes one six-mile section, costing $4,000,000, in which is located the Tunkhannock viaduct, described elsewhere in this issue. This reinforced concrete structure will have a greater total yardage, length and height than any of similar design, although the 180-ft. spans, while long, are not of record length. The concrete yardage is 167,000, the length 2,375 ft., and the height 300 ft. from bottom of foundation to top of coping.

The above work is all located in the east, but the west is not lacking in projects of nearly, if not quite, equal interest. For instance, the largest freight classification yard in the country, and therefore in the world, is now being completed at Chicago. Clearing yard has a standing capacity of 12,400 cars, a handling capacity of 10,000 cars per day and direct connections to two belt lines, intersecting every one of the 24 trunk line roads entering the city. On the lower Ohio and Mississippi rivers two big bridges are being constructed, one at Metropolis, Ill., by the Chicago, Burlington & Quincy and the Nashville, Chattanooga & St. Louis, and one at Memphis, Tenn., for the Chicago, Rock Island & Pacific, the St. Louis, Iron Mountain & Southern, and the St. Louis Southwestern. While these will not establish new records for size, they are of unusual length. Work on the former is temporarily postponed, and on the latter the substructure has just been completed.

In the far west the Snake river steel viaduct of the Oregon-Washington Railroad & Navigation Company, placed in service late last summer, is notable as to height and length, being second only to the Lethbridge viaduct of the Canadian Pacific in the combination of these dimensions. The length of the new structure is 3,920 ft. and the base of rail is 270 ft. above low water. Records in tunneling have also been broken by a western project, the Canadian Pacific five-mile tunnel at Rogers Pass, B. C. This is 1,400 ft. longer than the longest railway tunnel in America at present, the Hoosac tunnel of the Boston & Maine. The work had not progressed far in driving the heading of the pioneer tunnel from which the main bore is being excavated, when the world's record for progress in driving was broken, and subsequently the contractors bettered their early performance in this respect, completing an average of 27 ft. per day at one face for the last two months.

NEW BOOKS

Drake's Telephone Handbook. By D. P. Moreton. 286 pages, 4¾ in. by 6½ in. Illustrated. Bound in cloth. Published by Frederick J. Drake & Co., Chicago. Price $1.

This book is described on the title page as "a book for the practical man"; and it appears to be very full and satisfactory in the scientific and theoretical field as well. The author is associate professor of electrical engineering in the Armour Institute of Technology, and the work gives evidence not only of his ability as a writer, but of his practical acquaintance with the subjects on which he writes. The circuits of the Bell Telephone Company are described, with drawings. Any telephone maintenance employee, whether indoor or outdoor, will find the details of his work dealt with in great fullness.

Installing Efficiency Methods. By C. E. Knoeppel. 258 pages, 6¾ in. by 10 in. Illustrated. Bound in cloth. Published by the Engineering Magazine, 140 Nassau street, New York. Price $3.

There have been so many books published within recent years dealing with the principles of scientific management, that when a new one is brought out it arouses but little interest. In this book, however, Mr. Knoeppel endeavors to avoid the matter of a mere declaration of principles and tells what the methods are that are known to increase the efficiency of a manufacturing plant and also how they are put into use. The introduction to the book states that the purpose has been to give wholly frank and thoroughly practical working instructions and explanations, covering the entirety of efficiency practice as tested and proved in many important and successful undertakings carried out by the author, and this purpose, it would seem, has been carried out. As originally prepared, the material in the book appeared in a series of articles published in the Engineering Magazine during 1914, but this is expanded and changed to a considerable extent in this volume. The chapter on the efficiency clearing house has been considerably enlarged and chapters added on costs and on auxiliary devices for the planning department. A considerable number of charts, diagrams and illustrations have also been added.

Letters to the Editor

DESPATCHERS' CHANCES OF PROMOTION

New York.

To the Editor of the Railway Age Gazette:

I have been reading the letter in your issue of January 29 signed W. S. Hobbs, taking issue with an earlier correspondent in regard to the question whether or not train despatchers are getting a square deal in the matter of promotion nowadays. It seems to me that neither Mr. Hobbs, nor the Editor, in his note subjoined to the letter, gives a satisfactory answer to the despatcher who complains that he is overlooked when competent men are wanted for higher positions in the operating department. It is true, as you say, that a large number of managing officers now in active service began their careers as telegraphers and worked for considerable periods as train despatchers; but the trouble is that, so far as present day problems are concerned, these facts do not throw much light on the question. These general managers, presidents and other officers who presided at the train sheet did so from twenty to forty years ago. May it not be that quite radical changes have taken place since those days? It is a well-recognized fact that civil engineers are better appreciated by railroad presidents now than they were twenty years ago, and this appreciation leads to their more frequent promotion. The same is in some measure true in regard to mechanical engineers. Quite likely, also, the average traffic officer is a bigger man now than was the average traffic officer of 1890, and if that is the case the traffic officer deserves more consideration in the matter of promotion than he did at that time. An extreme view would be that in former years the despatcher had better chances than he deserved: the college educated men were at that time not adequately appreciated.

However this may be, it is plain that today the fact is, and there is no unfairness about it, that the despatcher, as suggested in your editorial, must take his chances with other men who have done well in their respective departments and who aspire to be all-around railroad experts. The despatcher, being at the superintendent's side, has the first chance, but not the only chance. E. N. H.

RAILWAY CREDIT

Chicago, Ill.

To the Editor of the Railway Age Gazette:

It is to be regretted that the value of John E. Oldham's analysis of the "relation that should obtain between gross earnings and various kinds of outgo for satisfactory (railway) credit," in your issue of January 15, is impaired by the inclusion of other (non-operating) income in his computations. When he says, "As charges and dividends must come from the current yearly earnings of a property, the surplus must also come from this source as surely as must the payments for current operation of the property," he places the problem that confronts the railways on its only safe basis. This makes the inclusion of "other income" in the fund available for fixed charges, dividends and surplus surprising and confusing.

Surely as eminent a banker as Mr. Oldham knows that the "other income" that figures so prominently in railway statistics comes mostly from interest and dividends paid from one railway treasury into another. Thus the dividends of the Lake Shore & Michigan Southern went to swell the fund out of which the New York Central paid its interest and dividends.

Let me illustrate the point I wish to make by presenting Mr. Oldham's figures comparing the relation of the named items, per $100,000 earned, for the period 1900-1909 and 1913 for the 19 dividend-paying roads he names, adding thereto figures for the same roads in 1914 and omitting "other income."

	Ten-year period— 1900-1909	1913	1914
Gross earnings	$100,000	$100,000	$100.000
Cost of service	67,400	74,300	75,200
Available for capital	32,600	25,700	24,800
Other income	4,200	6,600	.....
Total available for capital	36,800	32,300	24,800
Fixed charges	16,300	14,200	11.000
Dividends	10,900	12,000	12,600
Surplus	9,600	6,100	1,200

Here it will be seen that the balance for surplus has dwindled almost to the vanishing point. This would be alarming save for the fact that both fixed charges and dividends are unduly swelled by duplications, mostly through stock ownership. On the other hand, a sum equal to $2,800 per $100,000 of gross earnings should be added to the fixed charges for the capital item of rental for leased lines. This, however, would have necessitated a distribution of a larger sum than was available for capital.

The items as they stand represent a return of 3.82 per cent on the funded debt of the roads represented and 5.98 on capital stock—both figures being more or less fictitious.

The true relation of earnings to outgo of these 19 railways is best revealed by the third line of the table, $32.60 out of every $100 earned available for capital, reserves and surplus, for the 10-year period to 1909; $25.70 in 1913 and $24.80 in 1914. Thirty dollars is the line of safety and security for the average American road.

There are facts behind these figures that have a definite bearing on railway credit. As a result of the disproportionate "cost of service" in 1914 no less than 7 of the 19 railways selected by Mr. Oldham had to draw on surplus to meet their capital demands, and only 4 of them appropriated anything out of current income for additions and betterments.

Mr. Oldham's interesting paper would have been more enlightening as to the railway situation in the United States had it included the ninety-and-nine other roads that hew wood and carry water for the American people and declare no dividends, as well as the favorably situated 19 that do. The problem of railway credit is a vast one which is not to be judged by dividend-paying samples any more than by the unfortunate examples in receivers' hands. Slason Thompson.

THE TRAIN DESPATCHER—WHO HAS NO GRIEVANCE COMMITTEE

Whitefish, Mont.

To the Editor of the Railway Age Gazette:

More consideration should be given to the train despatcher. The methods used by some managements are often discouraging. Occasionally a young despatcher, who has within himself the making of a good man, is curtly dismissed for some error or delay which did not result in hazard, and he loses confidence in himself and is timid about taking hold of another job.

There are more changes in despatchers' forces on western roads than on eastern lines, in proportion to the number of men employed. Some of these vacancies are caused by promotions, but more generally by despatchers resigning to go to another company in the same capacity. But quite often this is a jump from the frying pan into the fire, and then as soon as another situation can be secured there is another change.

To certain offices in the western states the sobriquet of "a boomer job" has become attached. Few of the railroads west of the Mississippi river promote operators to be despatchers, and will hire as despatchers only experienced men. Eastern roads, as a rule, employ the direct opposite of this and "make their own men."

Certain of the western roads have learned at last that it costs much money in the long run to be changing despatchers so frequently, and have, of late, become more disposed to encourage men in the telegraph department to look forward to promotion. That they are having success in this method is shown by the fact that there are less changes in their despatching forces than

formerly. The newly promoted man is working with his might and main to make good. He accepts advice from his superior officers more readily than the average "old head." And, in most cases, these new men do make good.

The trainmen and enginemen have their labor organizations, and when a member of those organizations is disciplined, a grievance committee waits upon the superintendent, whether the man disciplined was in the right or in the wrong. Train despatchers have an organization for the exchange of ideas as to the best methods of train despatching, which enjoys a considerable membership of prominent railroad officers; but if a despatcher is discharged, he has no redress and no grievance committee to take up his case. In some cases the dismissed employee may take the matter up with the general superintendent, the general manager or the vice-president, in the order named, if he thinks he has been unjustly disciplined. In the majority of cases, however, a discharge is final, the higher officers taking it for granted that the discharging officer exercised good judgment. But many despatchers are dismissed from the service on account of some serious delay to trains, and, apparently, division officers receive less criticism from their higher-ups when they advise that "the despatcher responsible for the delay has been dismissed" than if they undertake to explain the delay and keep the man in service.

Trick despatchers often feel that they are being imposed upon, or nagged, through the practices of chief despatchers, in some offices, of taking exception to every trivial delay. Quite often a meet is a "stand-off," and one or the other of the trains must suffer a little delay; or some unforeseen complication arises and breaks up the "combination" and things "go all to pieces," through no fault of the train despatcher. The majority of train despatchers do not object to answering "bullets" or "torpedoes," as we call them, relative to legitimate delays, but when a man finds three or four notes awaiting him every day as he goes on duty, it tends to create a feeling of unrest and dissatisfaction. If the despatcher knows that he did the best that anybody could have done under the circumstances, and that it was not "poor work" upon his part that caused the delays, he has a grievance which it takes a long time to obliterate.

A despatcher, like a switchman, can get as much money in one job as another, and if he feels he is being "nagged" on one job, he begins to look around for another opening. Occasionally an absolutely first-class train despatcher runs into a "bunch of hard luck" for which he is not responsible. Those in position above him should guard against hasty judgment of a man's work in a case of that kind.

A certain general superintendent of a western road, who had several divisions under his supervision (and who has not risen from the ranks), had considerable mileage upon which the telegraph offices were few and far between. There were a couple of fast passenger trains over his district, and the despatchers had strict instructions to avoid "saw-bys" with these particular trains. The trick men would "stake 'em out" (meaning the freight trains), so there would not be two at the same place for either one of those fast trains; but occasionally something would go wrong, and a "saw-by" would ensue which would result in more or less delay to one of those fast trains. This general superintendent, seeing the delay upon his morning reports, would wire the division superintendent: "Fire the despatcher who sawed No. ——." This general superintendent was a very strong-minded man; and the superintendents would rather hire a new man than fight to keep the despatcher whom the general superintendent had held responsible for delay. Despatchers changed so often in the offices in that district that it became hard to get new men to take the places, the despatchers who left advising their friends that they were "boomer jobs," and that nobody stayed in them. A new man would, naturally, hesitate to enter into service under the supervision of that officer. Afterwards, that general superintendent was promoted to a higher capacity, and a division superintendent, who had been a despatcher himself for many years, took his place; and almost from the first day conditions in that district began to improve; and, today, you will find no more loyal bunch of train despatchers anywhere than are working on that district.

No matter how careful the despatcher may be, nor how far ahead he may figure, he will sometimes slip up, and overlook the need of issuing instructions to a train to do certain work; or may put out a "bum" order; but whether the bad results are small or great that man is usually conscious of his error the moment it occurs, and it stings him to the core. His own conscience and judgment sting more than a "butterfly" or a chief despatcher's note, and he profits by his mistake.

Trick despatchers should be under the control of the superintendent, rather than of the trainmaster or chief despatcher, though reporting, of course, to the chief train despatcher. A new despatcher should be approved by the superintendent before being hired, and only the superintendent should finally discharge a train despatcher.

The superintendent should take a personal interest in his despatchers. The opinion is rapidly spreading that the person who issues train orders should be authorized to sign them with his own signature. The superintendents' and the train despatchers' associations will recommend to the American Railway Asso-tion, in their report upon the proposed revision of the Standard Code, that the train despatcher issuing the train-order be authorized to do so over his own initials. Several large railways adopted this practice some time since, and it is found that the despatcher's greater pride in his work and increased sense of responsibility render him more ambitious to excel in the performance of his duties. The orders are the product of his brain, and no other. And, as Mr. Forman points out in his recent letter in the *Railway Age Gazette*, it would save considerable trouble in searching old records to find who authorized a certain order. Further, their names should be printed on the Time Tables, as is done now by certain lines. This tends to make a despatcher feel that he is, in a way, an officer of the company, which he is; and he should be thus recognized.

Where possible, every train despatcher should spend at least two days out on the road, every month, without loss of pay. He should ride the way-freights. Their frequent stops would allow him time to look around and familiarize himself with the location of every station, train-order signal, interlocking plant, sidings, industry tracks, etc.

It is the custom with a few roads to give their despatchers annual passes over the system, and one in favor of wife and children good over the division. Despatchers always appreciate little courtesies like this, and it cements the feeling of loyalty to the management. Some other lines give their despatchers only trip passes, either for personal or company business, and those men feel tied down. . . . Passes in favor of train despatchers and their immediate family should not be restricted to certain trains, unless the excluded trains are excess fare trains. The passes in favor of the despatchers themselves should be also endorsed "Good on Engines and Parlor Cars." I understand one southern road also includes the privilege of employees' rate in dining cars.

In conclusion, I wish to repeat that many a young man who starts out with a highly optimistic outlook as a train despatcher is often discouraged during his earlier years by sharp or sarcastic criticism on the part of those in position above him; whereas, if dealt with kindly and with a little patience, he would reward his superiors by doing high-grade work.

William E. Watts,
Train Despatcher, Great Northern Railway.

Nigerian Railway.—The line was opened to Bukuru on the Bauchi Light Railway section on December 10 for passengers and freight. A through train from Zaria to Bukuru, 140 miles, will be run in connection with the main line boat from Iddo, on which a dining car will also be provided so that passengers need take nothing with them after arrival at Zaria.

Tendencies Toward Inefficiency in Legislation*

Legislatures Neither Refrain from Passing Doubtful Statutes Nor Make Adequate Investigation of Them

By Roberts Walker

Criticism and rejection of eastern views are sure to be voiced by Oklahomans. But do not misunderstand me: there is no fundamental basis for differences of opinion, as between New York and the Southwest. Our points of view are, today, not the same. Yours may be better than ours. It is certainly as much fresher, as ours is older. But in time the two will become not greatly dissimilar. You are making some experiments that we might well copy. From our successful experiments you can borrow and have borrowed much of value. And our failures have taught you what to avoid. For example, New York still has on its statute books a law, whereof the legislative purpose remains an utter mystery, prohibiting billiard tables on steamboats. Oklahoma, being better versed in elementary physics, can be relied on never to reproduce this attempt to make a misdemeanor out of what no sane man would think of doing.

INEFFICACY OF STATUTES

We need not pause to philosophize upon that trait of mankind which reposes so implicit and childlike trust upon legislative enactments. History teems with examples of this unreasoning faith. Yet it is our commonest experience that laws are not self-enforcing; that the courts emasculate many of them; that the legislatures repeal or alter many others; and that the great popular will prevents many another from ever being enforced. Prohibition only partly prohibits; a tax law does well if it collects a tithe; and the oldest profession continues to recruit its excommunicated priestesses in spite of savage statutes seeking its total destruction.

There are, however, certain realms wherein statutes are efficacious, and always enforceable if not too obnoxious. It is a familiar tenet of comparative jurisprudence that it is alike easier to pass and easier to enforce laws dealing with commercial transactions than laws governing domestic relations. Instead of a uniform divorce law—so obvious a need in our 48 states—we remain almost exactly where we began: in South Carolina even the legislature may not sunder whom God hath joined, while in Nevada (at least until recently) divorce was included among the stop-over privileges on your railroad ticket. In sharp contrast is the steady progress made by the standard negotiable instruments law, sales act and bills of lading law through the various legislatures. These and others exemplify the area within which statutory regulation may be at once efficacious and efficient, namely, the area of commerce, including many, if not all, of the functions of production, distribution and consumption.

But the very feasibility of enacting laws to regulate business has resulted in the obscuration of the proper aims and limits of such legislation. Like joy-riders, we forget the safety of passengers and pedestrians and exult only in the speed and the ease of operating the machine. The warning upraised hand of the traffic policeman is needed on the legislative speedway. For the common welfare, conviction of mistakes must be brought home to the voters and their representatives. Once given the evidence, cannot the voters be trusted? Witness the recent crushing defeat by referendum in Missouri of what is charitably described as the full-crew law, and more accurately characterized as the law to compel railroad companies to pay men for riding around doing nothing.

To a few, then, of the current legislative practices that tend toward inefficiency or even disaster, your attention is now directed.

*From an address before the Oklahoma Bar Association, December 28, 1914.

WORKMEN'S COMPENSATION LAWS

Some noveltist once said that while there are two ways to begin a chronicle, neither way relieves you from telling your whole story. One gambit is to start with John Applegreen in 1660, recount his ancestry, surroundings and descendants, and arrive, 200 years later, at the characters of your tale. The other way starts thus: "'Good riddance!' yelled Roger Stone, as he kicked his grandmother out of the third-story window." This latter method catches the attention quicker, but necessitates going back to explain the earlier history of the Stone family and why Roger could feel so gratified at hurting his grandame through space.

Our American legislatures vastly prefer this second method. Time and again has vehement retaliatory legislation been enacted to meet current clamor, only to have its incompleteness become almost instantly apparent, thus requiring the addition of substructure and side-bearings, until the statute became relatively coherent and equitable. The intolerable spoliatory granger legislation had its valuable residuum in the establishment of principles for the control of public service corporations, based, in theory at least, on the mutual and interdependent relations between the public and the utilities.

And hence, is it not pertinent for us to inquire: Are we not now in the earliest or vindictive stage of employer's liability and workmen's compensation legislation? With most of us, I am sure the answer will be "yes." In a land where, thank God! workmen have more initiative and intelligence than anywhere else on earth, and because whereof the defenses of contributory negligence, assumption of risk and fellow service were at first (and in many a trade still would be) abstractly equitable and right, we have at a stroke of the governor's pen stricken down those defenses and have given the employer what in return? Nothing; absolutely nothing! Nay more, we do worse; we abolish the whole question of fault, fix a scale of prices for casualties *per se*, and send the whole bill to the employer. The propriety of charging the product with some portion of the cost of industrial accidents is not here discussed. But it is a most obviously proper question whether it was just or even defensible to free the worker from all the consequences of his own acts and saddle his employer with the whole burden. The instant result is that the employer passes that same burden on to the consumer, if he can, and thus the worker may blunder *ad libitum*, knowing that the consumer foots the bill.

Such legislation is inefficient for at least three reasons: (1) It demoralizes the worker by depriving him of his last reason for being careful; (2) it forces the employer, by physical examination and other tests, to cull out many men otherwise unexceptionable; and (3), it necessitates all the "safety first" methods, which the rich, large employers can install, but which the less fortunate manufacturers and contractors can supply only with difficulty, if at all, thus adding to the oligarchical power of wealth by hampering or even obliterating the small producers. How infinitely fairer it would be to treat this subject in its entirety; to include sick benefits and pensions for old age and incapacitation, to create an insurance fund to carry the load in a given trade so that a run of bad luck would not sink a single employer, and to have not only master but employees pay premiums to sustain this fund, the workmen's share in the premium to be greater for sickness and pensions, the employer's portion to be greater for casualties. This is no imaginary scheme that I am so roughly sketching; Germany has had it in use for over 30 years. Nor are excuses offered because it is socialistic. Granted that it is, what less can be said of the present workmen's compensation acts?

The whole idea of making commerce carry directly, instead of in haphazard man-to-man fashion, the cost of industrial accidents is intrinsically socialistic. My plea is that, being embarked upon this economic adventure, we should master and apply *all* the precepts of such manœuvres.

It is regrettable, also, that the passage of such lop-sided, jug-handled laws of employers' liability and workmen's compensation cannot fail to have a demoralizing effect on the laborer class. They are bound to conclude that their voting power, or the fear of their using it, can get them further largesse from the state. Thus pauperized and morally debilitated, they become a genuine risk. It is for the highest welfare of society that all grades of endeavor be constantly invigorated and incited. Any contrary tendency is a menace. Unless we manage workmen's compensation with more comprehensive wisdom, the present inefficient laws will fester into cancerous growths requiring extensive and painful surgery.

LIMITATIONS OF GOVERNMENT BY COMMISSIONS

For many years I have been on the point of writing an essay to be entitled "Democracy and Taxidermy," to revolve around the one and only inviolable principle recognized by the executive and the judicial branches of our federal government, namely: "We will not skin any skunks for Congress." In our unique three-headed form of government, the temptation to "pass the buck" is all but irresistible. Congress passes a law fixing hours of labor for railroad telegraphers, but giving the Interstate Commerce Commission power to suspend its operation for cause shown. The commission, despite due cause shown, recalls that it knew some laboring men itself once, detects a mephitic aroma in this delegation of congressional power, declines to flay the varmint, and flays the petitioning railroads instead! Again, the Sherman law is enacted by a Republican Congress anxious to glorify competition and denounce monopoly, always provided that the former must not become so energetic as to result in the latter. These benevolent intentions are expressed in nice, plain, inclusive copy-book language. Do the courts whittle down this sweeping import, even though every dictate of horse-sense would justify them in so doing? They do not. Instead, they vie with one another in squeezing situations into the scope of the act, perhaps in the hope of persuading Congress that the "eloquently silent" little animal ought to be skinned, but by Congress itself. Then, as if alarmed at possible results to flow from these interpretations, the Supreme Court devised the "rule of reason," telling us, however, what *doesn't* fall within it, not what *does*. Congress has now enacted another such statute, containing the words "to substantially lessen competition." And do I not detect, in that word "substantially," a pretty kitten-like creature with lovely black fur and a white stripe down its back? 'Pears like I do. At any rate, keep your eye on that word "substantially" for the next few years.

This sailing on the River of Doubt as a faunal naturalist is so entertaining that I am loth to step ashore. But let's discuss some defects in reposing too great reliance upon commissions.

Confronted with a problem of regulation of a complicated subject, there are only two practical courses for a legislature to pursue: either to refrain from passing a statute, or to have the subject exhaustively investigated by a committee and to pass a statute based on its findings. Legislatures are too prone to do neither, but to borrow or adapt a statute from some other state or nation and create a commission to carry it into effect. Whereupon some three or five or seven men, perhaps without experience in or peculiar qualifications for the subject matter, are plunged into a maze of detail under an ill-digested statute and left to work out their own salvation and the public's. The inevitable results are delay, confusion, mistakes, abuse of power—in a word, inefficiency. I know one state commission which requires papers on security issues to be filed with it at least three weeks before it acts. The papers are a rehash of the corporation's own periodical figures; the commission's decision is a simple yes or no. Any experienced banker's clerk could reach a decision over night, deciding moreover what the commission does not decide, to wit, the *price* the securities should bring.

With the abstruse and diversified problems of gas, trolley, electric light and power, steam railroad and other utilities and their rates, services and stock and bond issues, the commission soon finds itself unequal to its task and cries for a larger appropriation. Because this is a democracy, wherein lots of jobs are preferred to real expertism, a larger appropriation means only more clerks, most of them unskilled, few of them capable of becoming experts, all of the developed experts subject to hire at better pay by private enterprises as soon as their qualifications become manifest. Then ensues administration by clerks. Even that would not be completely bad, if the other fellow ran his business by clerks; but he doesn't. He hires the best men he can afford and plenty of them. Not alone the utilities employ wide-awake experts, but so do the large shippers, the chambers of commerce, the boosters' clubs and all the other agencies that propound or incite cases for the commissions to decide. With the great number of these utilities, the ramifications of their services and the questions agitated by all these ingenious intellects, the commissions and their clerks are utterly unable to keep abreast.

In the nature of things, the Interstate Commerce Commission is so great an offender that the state commission seems almost blameless by sheer force of contrast. The commissioners themselves, most of whom I hold in high and affectionate regard, are not to be held wholly responsible; much of their difficulty arises from the magnitude of their task and from the failure of Congress to insist upon and provide funds for a competent staff of experts.

Clerks sift evidence and compose many rulings. And the worst of the matter is that the commission is nowhere near caught up with its work. The country has recently had proof of the time consumed upon a transcendently important subject. What the public does *not* know is how other matters, fully as important to the participants, drag their weary way along. And, let me repeat, such faults are not entirely the commissions'. In the last analysis, the responsibility is upon the legislature or Congress for improvidently overloading a small group of ill-paid men with duties that they could not humanly perform, even if provided, which is not the case with an adequate staff and ample funds. Indeed, we ought not to admit that a commission may further delegate its powers. The maxim *delegatus non potest delegare* is as stern upon the legislative as upon the judicial side. The summary of the whole subject must be that the legislature should never endow a commission with authorities impossible of vigorous and effective exercise.

DISREGARDING GROSS INCOME

On December 19 the newspapers state that Secretaries McAdoo and Redfield are to investigate the rise of ocean freights since the European war broke out. From personal knowledge I foretell that they will report increases all the way from 50 per cent to 200 per cent. And the reason is plain. These rates have merely responded to the inexorable compulsion of the law of supply and demand.

Now contrast shipping with railroads. Here was a huge, instant emergency. It arose July 30. Not till December 16 was any measure of relief even promised, and then only to a small extent and with patent hesitation.

All the statutes affecting public utilities must be held up to the light. Scarce one of them will stand the test of reciprocal justice to the securityholders, as well as to the shippers. Our entire fabric of regulative law (excepting possibly the laws governing banks) proceeds on the theorem that expenses may be piled up indefinitely to meet the needs or policies of the times, but that revenues must not increase unless a narrow, difficult, tedious and technical demonstration shall first have been made. The alternative, on the revenue side, is to leave the matter to free and unrestricted competition, of the sort those stalwart Republicans fit, bled and drew their salaries for on July 2, 1890.

Neither method can succeed when used conjointly with regulation—meaning thereby *increase*—of operating costs.

In railroads, our process has been the same as in coal mining. I need not bore you with a list, as long as Homer's list of the ships, of statutes that have added to the cost of railroad operation. Yet the Interstate Commerce Commission asks Congress for more. Its annual report (December 10, 1914) begs for these laws:

> Compulsory use of steel passenger train cars;
> Penalties for violating hours-of-service act;
> Control of railway capitalization;

but contains never a word of request for power to stop railroad losses, to put its fingers on leaks, such as, for instance, the regulation of wages as fully as rates are regulated, nor for power to initiate rate schedules. The result of heaping up costs and not controlling wage expenditures, nor protecting adequate gross revenue, is eloquently proclaimed by these Rock Island figures. Of every dollar paid by passengers and shippers, there was disbursed upon payrolls†

> in 1900 34 cents,
> in 1907 40 cents and
> in 1914 43.9 cents;

while out of the same dollar there was paid for interest and dividends

> in 1900 21.3 cents,
> in 1907 20.1 cents and
> in 1914 19.6 cents.

Labor, that is to say, gathered unto itself 29 per cent more during the 14-year period, while capital had to be content with 8 per cent less.

While under ideal conditions, wage increases would be zealously scrutinized, no one would grudge the railroad employees their steady gain in pay if the gross resources were steadily growing to match. But they are not. On the contrary, the railroads are where a crippled $1,000 annuitant would find himself if his living expenses were increasing $100 per year, or where the farmer would be if he had to pay today's wages out of 40-cent wheat. If the various commissions are to continue holding down rates, they should also hold down taxes, the cost of supplies, wages and the money market. But if they are to meet actual conditions, the gross incomes need solicitous attention, that they may readily respond to growing demands. Wise legislation must include both sides of the income account, or neither.

REGULATION OF SECURITY ISSUES

Here, to my mind, is one of our finest illustrations of misdirected energy. About all it amounts to is the entering of records that nobody ever consults. The state assumes no responsibility as guarantor. Its investigations, prescribed and circumcribed by wooden statutes, are such as to make a skilled bond-broker weep at their pathos. So the investor gets nothing out of the red tape; from his viewpoint, the securities might as well be sniffed over by an experienced hound-dog. "But," say the champions of these statutes, "the public has to pay fares and tolls to provide interest and dividends, and this regulation prevents watering and minimizes the burden the public has to carry." There is one slight defect in this claim, namely: it is not true. Did you ever hear of a commission—even in Texas, where this legislation was born and raised—asking about a carrier's securities when engaged in fixing rates, heating waiting-rooms or running stub-trains? Did you ever know of a railroad charging higher rates because it had more fixed charges to pay? You never did; and in the old rate-cutting days it was always the water-logged railroad that did the rate-cutting. Did you ever hear of a commission ordering the Burlington, capitalized at $35,000 per mile, to charge lower rates than the Alton, capitalized at $128,000 per mile? Don't you know that any such fool order would route all the business over the road that needed it least? Is the public overtaxed when roads, such as Frisco or Pere Marquette, are neither earning nor paying fixed charges, as at present? especially when you consider that their more successful neighbors are both earning and paying larger amounts of interest and dividends? Are you not aware that, for weal or woe, the respective capitalizations of the various carriers have been pretty permanently established for some decades, so that the sound and prosperous roads sell fewer securities at or above par, while the staggering ones must suffer huge discounts and pile up their funded debts; and hence that any attempts to protect the public, at this late date, by holding down fixed charges is a futile waste of the taxpayers' money?

There is a fallacy beneath the regulation of securities. It is the notion that the public is benefited by paying the lowest possible rates today, while the carrier borrows, for collection in the future from the descendants of the present shippers, huge sums of money represented mainly by bonds and to a small extent by stocks. Even tomorrow's shippers are paying interest on these borrowings. How much better to follow the example of the far-sighted farmer or manufacturer, and build improvements, buy equipment and even construct new mileage, out of surplus earnings. Such expenditures involve no awful debt to be paid in the future and no millstone of interest payments on the carrier's neck.

Pudd'n'head Wilson—I refer to the character in fiction—says: "Put all your eggs in one basket *and watch that basket!*" I think we make a sad mistake in all our regulation. There is just one basket to watch: the surplus. Rates should be high enough to produce a surplus. The better the surplus, the better new securities will sell and the less the public will be "burdened" —if you like the word—with fixed charges. The emission of securities should be a matter of free bargaining; the money rates and the carrier's financial condition will fix the nature and price of the bonds or stock. Let the state, through its commission, step in only when the surplus is being wasted in too high dividends or otherwise. Let the state insist that surplus earnings, above a suitable maximum, be used in new work or in reduction of debts previously incurred for new mileage or improvements. Keep the carriers frugal and provident. Turn them into self-respecting men of business who run their plants with moderate incomes for themselves and with the least possible cost to present-day shippers and to posterity—the latter being no less important than the former.

A BETTER LEGISLATIVE VIEWPOINT

Such results as I have cited flow from being so zealous for the rights of man as to forget the due protection of property rights; yet the best safeguard to human life and liberty is the enforcement of respect for man's possessions.

If the legislative trend is to be improved, the first essential is the stoppage of class antagonism, the abatement of those feelings which cause legislation to be conceived in a destructive and bitter spirit. Never was a better time to pause and take our bearings. On the continent of Europe, the nations are locked in a titanic struggle, arising out of what? Largely out of the desire of each of the two chiefest nations for the commercial hegemony of the world, to wit, the advancement of its property interests. To gain this pre-eminence, each of them is destroying its property and treasure at the rate of millions per day. No matter what the outcome, they will emerge from the war impoverished, and the winner will have to take years to earn enough to purchase the hegemony that the victory entitles him to. Is commercial supremacy, at such a price, worth having?

The classic philosophical division of property is between property for *use* and property for *power*. This terrible war is the madness of property employed for power. It ought to fix us neutrals in the conviction that our sedulous end and effort must be to enhance property "for use" and the uses of property, thus inspiring real conservation and stimulating the acquisition of private possessions by every citizen in the state.

Observations of a Traveling Editor.—A prize which might safely be offered in any amount would be a reward for the discovery of a man who looks happy while he is trying to hog two seats in a crowded railway train.—*The Continent.*

†Exclusive of general officers' salaries.

STANDARD TESTS FOR COLOR BLINDNESS

In a report presented at the last annual meeting of the American Medical Association, Section on Ophthalmology, three prominent railroad physicians, acting as a committee of the association, have given the results of their studies in the latest practices, throughout Europe and America, in the examination of railroad employees and others for color vision and in the most advanced requirements in this matter. The report is to be found in a pamphlet printed by the American Medical Association, 535 North Dearborn street, Chicago. It is by Doctors Charles H. Williams, of Boston; Nelson M. Black, of Milwaukee, and J. Ellis Jennings, of St. Louis. The report contains descriptions of the latest model of Williams' lantern, of the anomaloscope (recently noticed in the *Railway Age Gazette*) and other apparatus used in tests.

To obviate some of the objections found in using Holmgren's worsted test, Dr. Jennings has devised a scheme for testing with yarns without handling them, and the colors are arranged in a box or frame in such a way that a person who is tested makes a permanent record of his color sense. This arrangement consists of a square box divided into an upper and a lower half, each half having a lid—virtually two shallow boxes with bottoms joined together. The upper side of the box is marked "Test No. 1 Green," and contains a color-board made up of all the different colors, shades and tints likely to be mistaken by the color-blind for green. The lower side of the box is marked "Test No. II Rose," and contains a color-board made up of all the different colors likely to be mistaken by the color-blind for rose. The color-boards, like the box, are absolutely square and each contains 64 patches of worsteds ¼ and ½ in. in size, of various colors and shades, making a total of 128 colors used in the test.

In close proximity to each patch of colored worsted is a circular opening in the color-board which is for the purpose of registering the particular patch of color chosen by the candidate. This he does by inserting a pointed pencil of wood or metal through the opening and punching a hole in the record sheet which had previously been placed beneath the color-board. The position of the patches of color and the circular openings have been arranged in an absolutely symmetrical design, so that when the box is turned in any one of four positions the same appearance is presented and it is impossible to say which is top or which is bottom. The openings in the boards are so arranged that the records of both the green and rose tests are made on a single sheet.

Method of Testing.—The cover marked No. 1 is removed, the color-board lifted out, a record blank inserted and the color-board replaced. Care must be taken to see that the mark "TOP" in the box, "TOP" on the back of the color-board and the top of the record blank all correspond. The box is now turned around several times until all sense of direction is lost.

The green test skein fastened to the inside of the box cover is placed at a distance of 2 ft. and the candidate is given the pointed pencil and requested to look along each row of colored patches and when he sees the test color or one of its lighter or darker shades, he is to place the point of the pencil in the opening opposite and punch a hole in the paper beneath. Having completed Test No. I, the cover is replaced and the box turned over, exposing Test No. II, the Rose. The corresponding record blank having been inserted and the Rose skein displayed, the test proceeds as before.

It will be seen that the subject is obliged to decide by color alone. There are no odd and even numbers to give a clue. The patches of color are small enough so that cases of color scotoma may be discovered.

RECOMMENDATIONS

The results of the studies of this committee are summarized in the recommendations which they present at the end of the report, which are as follows:

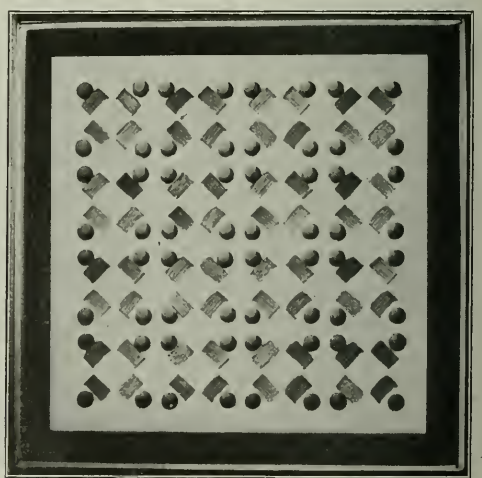
1. In every case the color-sense should be examined by the Holmgren worsteds exactly according to the directions given. As some cases of defective color-sense may occasionally pass the Holmgren test it is necessary that another test with a lantern should be used in every case to determine the color-sense of the macula region where the colors of signal-lights must be quickly recognized.

2. (*a*) Those who pass the test with the worsteds and with the lantern, without making a mistake, should be classed for signal purposes, as normal.

(*b*) Those who make the characteristic mistakes in selecting colors which look like the green, or the rose test skein, of the Holmgren worsteds, or, who make mistakes in naming the colors of the lantern, should be classed as abnormal.

(*c*) Of the abnormal cases: Those who select with the green test skein some greens and also some grays, browns, rarely a red, or, who select with the rose test skein some rose or red colors, and also blues, purples, grays or greens, or with the lantern test call a red light green or white, a green light red or white, or a white light red or green, should be classed as dangerously defective in their color-sense.

Those who make other mistakes than the foregoing, or who are very hesitating in their selection or naming of colors, should be classed as having a weak color-sense. If these



Jennings' Self-Recording Worsted Test

persons wish to work where they will use colored signals, they should be re-examined under medical supervision by repeating the tests with the Holmgren worsteds, and the lantern; and in addition with Stilling's plates (Fourteenth edition, 1913), and also with some form of spectroscope test to determine the extent of the visible red end of the spectrum, and, if possible, with Jennings' self-recording worsted test, and with the Nagel anomaloscope.

3. Cases of appeal from the original examination should be re-examined as provided in the foregoing paragraph.

4. Some plan should be adopted to ensure a proper and uniform standard in the colors of the worsteds, especially the green and the rose test skeins, and in the colors of the lantern.

5. On large railway systems, and in the marine service, there should be some central point where a complete equipment can be maintained in charge of a competent medical examiner, for the re-examination of doubtful or appealed cases. There should also be a periodic examination by such examiner of all the equipment used in these tests over the whole system, to be sure that it is kept in proper condition and renewed when necessary.

6. Reports of the examinations should be kept on file at some central point and should be supervised by some competent medical authority to see that the tests are made according to the instructions.

7. The Section on Ophthalmology should adopt some standard form of instruction and record blanks which may serve as a guide for those who make the tests.

It will be noted that in the foregoing recommendations no mention is made of red-blind, or green-blind, or blue-blind. The border-lines between the various forms of defective color-sense are not sharply marked, and with the means at the disposal of the examiner in making the routine tests of large numbers of men, it is not possible for him to determine with certainty the exact quality of the defective color-sense, nor is it essential. It is sufficient if he can pick out those who are dangerously defective in their color-vision, or who need a further special examination, and the committee believes that a careful study of its report, and a strict compliance with the methods and standards there explained, will enable the examiner to make these tests for color-vision fairly and accurately.

THE WAR AND PENDING RAILWAY FINANCE

By George A. Clark

The railroads of the United States, Canada and Mexico have approximately three-quarters of a billion dollars of bonds and notes now outstanding, which mature during the next five years, 1915 to 1919, inclusive. Approximately $450,000,000 will fall due during 1915. In these totals no account is taken of equipment trust obligations, of the new capital which must be raised to perfect pending reorganizations of a large amount of mileage now in receivers' hands, nor of the new capital expenditures which are absolutely necessary during this period. A most conservative estimate would place the requirements for these purposes at not less than $250,000,000.

The task of raising a billion dollars even in normal times for an industry which has largely passed the period when the inducement of large profits may be held out to investors, is a fairly sizable one. The fact that a large part of the total amount required during the period is already invested, and that in the process of refunding the actual amount of new capital brought into the industry is relatively small, does not lessen the seriousness of the situation. Because of the abnormal conditions prevailing as a result of the war a considerable part of the money represented by the maturing obligations will be diverted to other classes of security. The wide extent of the war and the consequent enormous waste of capital with resultant influence on interest rates has brought about a situation more serious than the railroad industry has ever faced before.

Those companies which are under the necessity of refunding maturing obligations in 1915 and to a slightly less extent during the subsequent three or four years are confronted with a situation more pressing than the problems which they have been struggling with during the past few years. For the time being the necessity of raising new capital upon such terms as will permit a continuance of the corporate existence of the companies involved overshadows problems of increased operating efficiency, higher rates and combatting labor demands. The money to refund these obligations must be raised or the inevitable receivership faced. Fortunately, the obligations maturing in 1916, 1917, 1918 and 1919 are relatively small in amount, both for the individual companies and in the aggregate, for the several years.

The statement in the accompanying table sets forth the principal obligations matured and maturing during 1915, including equipment trust obligations, arranged in order of maturity.

It is generally conceded that, as a result of the war, higher interest rates will be the general rule for some time to come. It is possible that long-term money will cost more than it has at any time since the Civil War. During the progress of the war, not only have the processes of production been stopped, but an enormous sum is being consumed by the operation of the hostile armies and navies. Modern warfare is so costly that the European conflict may deplete the world's surplus of capital almost to the point of exhaustion. Possibly during the progress of the war, and certainly following its conclusion, the principal governments involved will endeavor to float loans. It is conceivable that the necessity for money will be so pressing on the part of the combatants that interest rates unknown in modern times will prevail. Such a development could have but one result upon the market for railroad securities. The income return of-

Company	Obligation	Interest Rate	Due, Date	Amount
Ashley River	1st currency	6s	Jan. 1	$33,500
N. Y. C. & H. R.	1 yr. Notes	5s	Jan. 1	30,000,000
St. Louis & San Francisco	Rec. Cer.	6s	Jan. 2	3,000,000
N. Y. C. & H. R.	S. P. & O. 1st	6s	Feb. 1	175,000
Chicago & North Western	Cons. currency	7s	Feb. 1	12,832,000
A. T. & S. F.	Chic. & St. Louis 1st	6s	Mar. 1	1,500,000
Boston & Lowell R. R. Corp.	Plain	4s	Mar. 1	500,000
Michigan Central	Notes	4½s	Mar. 1	6,000,000
Boston & Maine	1 yr. Notes Ext.	6s	Mar. 2	27,000,000
Erie Railroad	Coll. Trust Notes	5s	Apr. 1	10,000,000
A. C. L.	Richmond & Petersburg	6s 7s	May 1	340,500
Missouri, K. & T.	2 yr. Notes	5s	May 1	19,000,000
N. Y. C. & H. R.	3 yr. Notes	4½s	May 1	20,000,000
N. Y. C. & H. R.	Oswego & Rome 1st & 2d	5s & 7s	May 1	750,000
N. Y. N. H. & H.	Harlem Rv. & Port Chester	5s	May 1	10,000,000
N. Y. N. H. & H.	Notes	5s	May 1	20,000,000
Missouri & No. Arkansas	Rec.	5s	May 1	1,250,000
Lake Shore & Michigan Central	1 yr. Notes Discounted May 15	..	.....	20,000,000
Baltimore & Ohio	Notes	4½s	June 1	35,000,000
D. L. & W.	Morris & Essex Cons.	7s	June 1	11,677,000
Missouri Pacific	Extended	6s	June 1	24,942,000
Nat'l Rys. of Mexico	2 yr. Notes	6s	June 1	26,730,000
Pere Marquette	Rec.	5s	June 1	1,892,000
Cumberland Corporation	Conv.	5s	June 1	5,000,000
Canadian Northern	Notes	6s	July 1	3,500,000
Canadian Pacific	1st	5s	July 1	13,147,633
Western Maryland	Coll. Notes	5s	July 1	10,000,000
Western Maryland	Coll. Notes	6s	July 1	3,000,000
Hampden R. R. Corp.	Notes	6s	July 1	2,000,000
Chicago & Eastern Illinois	Re. Cert.	6s	July 6	6,000,000
Pittsburgh, Shawmut & Northern	Rec.	5s	Aug. 1	1,500,000
Wabash R. R. Co.	Re. Cert. Ex.	6s	Aug. 1	16,000,000
Chicago & Western Indiana	Notes	5s	Sept. 1	10,000,000
C. & O.	Kineon Coal 1st	5s	Oct. 1	200,000
Penn. R. R.	Conv.	3½s	Oct. 1	86,827,000
Vicksburg, Shreveport & Pac.	Prior Lien	6s	Nov. 1	1,323,000
C. St. P. M. & O.	S. Ste. M. & S. W. 1st Cur.	5s	Nov. 1	350,000
Erie Railroad	Tioga 1st Ext.	5s	Nov. 1	239,000
New Orleans & North Eastern	Prior Lien	6s	Nov. 1	1,320,000
Total				$443,028,633

fered and the safety of the investment must be comparable with the investment features offered in the obligations of foreign governments.

Although the aggregate amount of capital which must be raised for refunding purposes bulks large in a situation like the present, there is cause for congratulation that such a large amount of permanent financing was successfully completed during the first half of 1914. During this period a number of the leading companies have been successful in substituting on a favorable basis long-term obligations for short-term notes. In addition the capital requirements of these companies were anticipated sufficiently to provide for pressing immediate needs. The Southern Pacific, the Northern Pacific, the Chicago, Milwaukee & St. Paul and the New York Central & Hudson River Railroad raised $165,000,000 for this purpose. A number of companies, including the Southern Railway, the Maine Central and the Chesapeake & Ohio, raised large sums by means of three and five year note issues. Two important companies, the Erie and the Baltimore & Ohio, both of which, according to reports, have been working on a general and refunding mortgage, refunded their maturing obligations through the sale of one year notes. The latter company has $35,000,000 maturing June 1, 1915.

Generally speaking, the situation is as sound, if not better, than at any time since 1907. Many extensive programs of improvements have been largely completed. A part of the

expenditure represented by these improvements has already been permanently financed. This is particularly true of the Chicago, Milwaukee & St. Paul and the New York Central & Hudson River.

It is particularly fortunate in view of the probable investment conditions that more than half of the obligations which mature are those of companies enjoying the very strongest credit and whose securities are held in high regard by the investing public. The Pennsylvania Railroad Company with $86,827,000 3½s, the largest single maturity, maturing in October, has long been considered the premier American railroad in investment stability and this company has just sold $49,000,000 consolidated mortgage bonds at a very good price.

In spite of these encouraging features, and there are many, there still remains for a number of important companies the difficult task of refunding maturing obligations in such a manner as to avoid excessive charges for the capital required without incurring undue risks in further refunding at some future date.

The uncertainty among investors as to the probable trend of investment conditions will make it difficult to sell long-term obligations on a satisfactory income basis. In such a time it is not feasible to raise any large sum through the sale of capital stock. Of necessity most of the companies will be forced to fall back upon short-term notes.

In again resorting to this type of finance on a general scale the fiscal representatives of the companies will have the benefit of the experience of the past six or seven years in this form of financing. If nothing else, this experience has demonstrated the danger of too short maturities, particularly when the issue is a large one. Short-time notes in large amounts maturing in less than two years should only be issued by companies enjoying the very best credit. For companies not so favored as to credit, it would seem as though the adoption of the principle used in refunding equipment trust notes might be used to advantage. The Minneapolis & St. Louis affords an interesting illustration of the possibilities in retiring a part of an issue at a time. Short-time notes maturing serially might be used to good advantage at this time.

A short-time note is essentially nothing less than the promise of the issuing railroad company to pay the amount named in the course of a few years. In the past a number of companies have attempted to improve the investment standing of their issues by securing them with collateral which has frequently consisted of mortgage obligations of the same company. Investors have not found in practice that the presence of the collateral has more than a sentimental value. If a company reaches a position where payments of either interest or principal upon a short-time obligation must be defaulted, the general refunding obligations of the same company when secured by third, fourth or fifth mortgages are at best of doubtful value.

If the assumption is correct that following the war capital will be difficult to secure, this condition has come about at a most fortunate time in the history of the railroad industry in this country. The process of construction, of system building and intensive development has been about completed. True, large amounts of capital will be required in the future for the further enlargement and improvement of existing facilities. For the time many of these betterments can be postponed without irreparable injury. An expenditure which will pay its way in increasing operating efficiency is always to be desired, but when the capital for such an improvement must be secured upon terms which involve a serious risk as to the ability of the company to refund the obligation at maturity, it should be deferred to a more favorable time. Rigid economy, a high degree of personal efficiency and a conservative refunding policy as to additional financing would appear to be the most logical program for the present.

ANNUAL REPORT OF MASSACHUSETTS COMMISSION

The Public Service Commission of Massachusetts has sent to the legislature its second annual report. It is made up largely of statistics; and these go back ten years or more, including the records of the former railroad commission, which was superseded by the Public Service Commission in 1913.

With the enlargement of the functions of the commission under its new organization several new departments have been established. The rate and tariff bureau is one of these; this bureau received up to the end of the year 5,176 tariffs, which have been filed and indexed. The commission has aimed to keep down the expense of this work and the report says that the system adopted is much simpler than that used for similar work in other offices. In complying with this new law, and filing all tariffs with the commission, the railroads found many questionable and improper rates in force, and these have been cancelled.

The report recounts the action of the railroads during the past year in making advances in passenger and freight rates, and contains a full copy of the standard mileage schedule of class rates for freight on which were based the new freight tariffs of the Boston & Maine. The other two principal roads, the Boston & Albany and the New York, New Haven & Hartford, have adopted a similar basis; and this uniformity throughout the state is looked upon by the commission as a great public benefit.

The chief of the inspection department is George W. Bishop, who assumed the duties of that office August 1 last. The report gives a summary of the work of this kind done during the year ending June 30 last, some of the items of which are:

	Examinations	Reported Faulty
Frog and switch blocking	.....	918
Bridge guards	.....	401
Passenger stations (971)	5,222	112
Locomotives (2,625)	3,929	492
Spark arresters and ash-pans (additional to above)	655	...
Passenger cars	13,004	1,446
Passenger cars (street railways)	3,257	786

During the year 16 collisions, 40 derailments and 429 fatal accidents to individuals were investigated. The inspectors of the commission attended 362 inquests. Of the ten passengers killed during the year all were reported as having been the victims of their own imprudence or negligence.

The engineering department is in charge of Henry W. Hayes; L. E. Moore is engineer of bridges and signals and W. J. Keefe assistant engineer of signals. This department has made a large number of examinations of properties, both steam railroads and electric lines, in connection with improvements to the property and applications for authority to issue new stock or bonds. The report includes a detailed statement of railroad signals, like that issued by the Interstate Commerce Commission; and also a list, made up in somewhat the same way, showing signals on electric lines. In this list of electric lines there are 39 companies. The automatic signals on these electric lines are classified as "counting" and "non-counting," the mileage of road entered under the head of counting being 72.15.

The telephone and telegraph department of the commission is in charge of W. H. O'Brien. The report names 15 features in which the commission has brought about improvements in telephone service.

The general discussion at the close of the report is very brief, and it is stated that certain important matters, which are now pending, will be made the subject of special reports to the legislature.

Hospital Train for Egypt.—A hospital train has been placed at the disposal of the military authorities in Egypt through the generosity of the Egyptian Red Crescent Society, which has contributed the sum of $8,000 for this work. The train was equipped in the Egyptian state railways work shops, and will accommodate 12 officers and 96 wounded men.

Recent Additions to Union Pacific Freight Equipment

Steel Automobile Car, and Box Car With Underframe, Roof and Ends of Steel; Both of 100,000 lb. Capacity

There were placed in service a short time ago by the Union Pacific 4,000 steel underframe box cars, 2,000 of which were built by the American Car & Foundry Company, and 2,000 by the Western Steel Car & Foundry Company, and 600 all-steel automobile cars built by the Western Steel Car & Foundry Company.

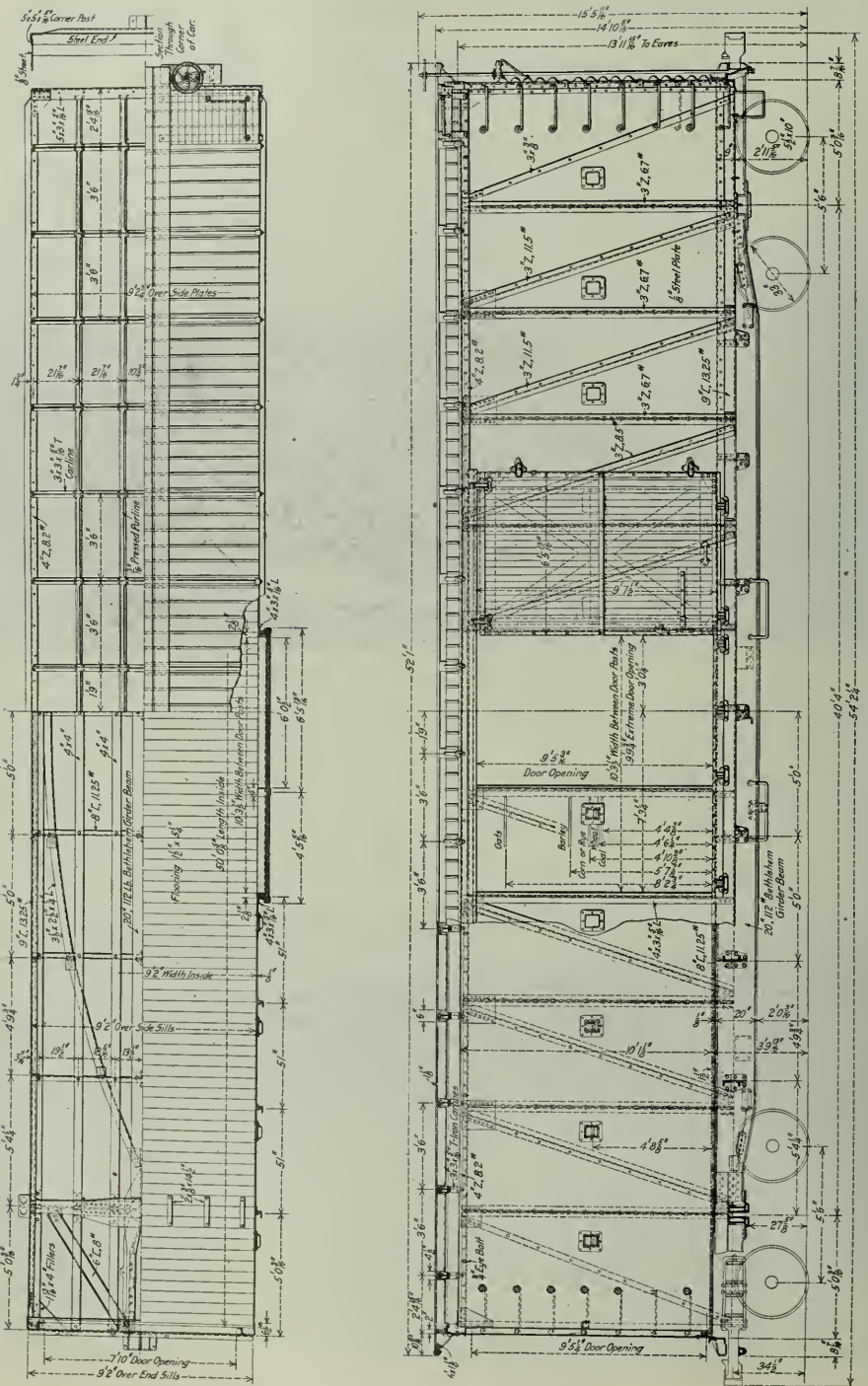
Union Pacific Steel Car for Automobile Traffic

AUTOMOBILE CARS

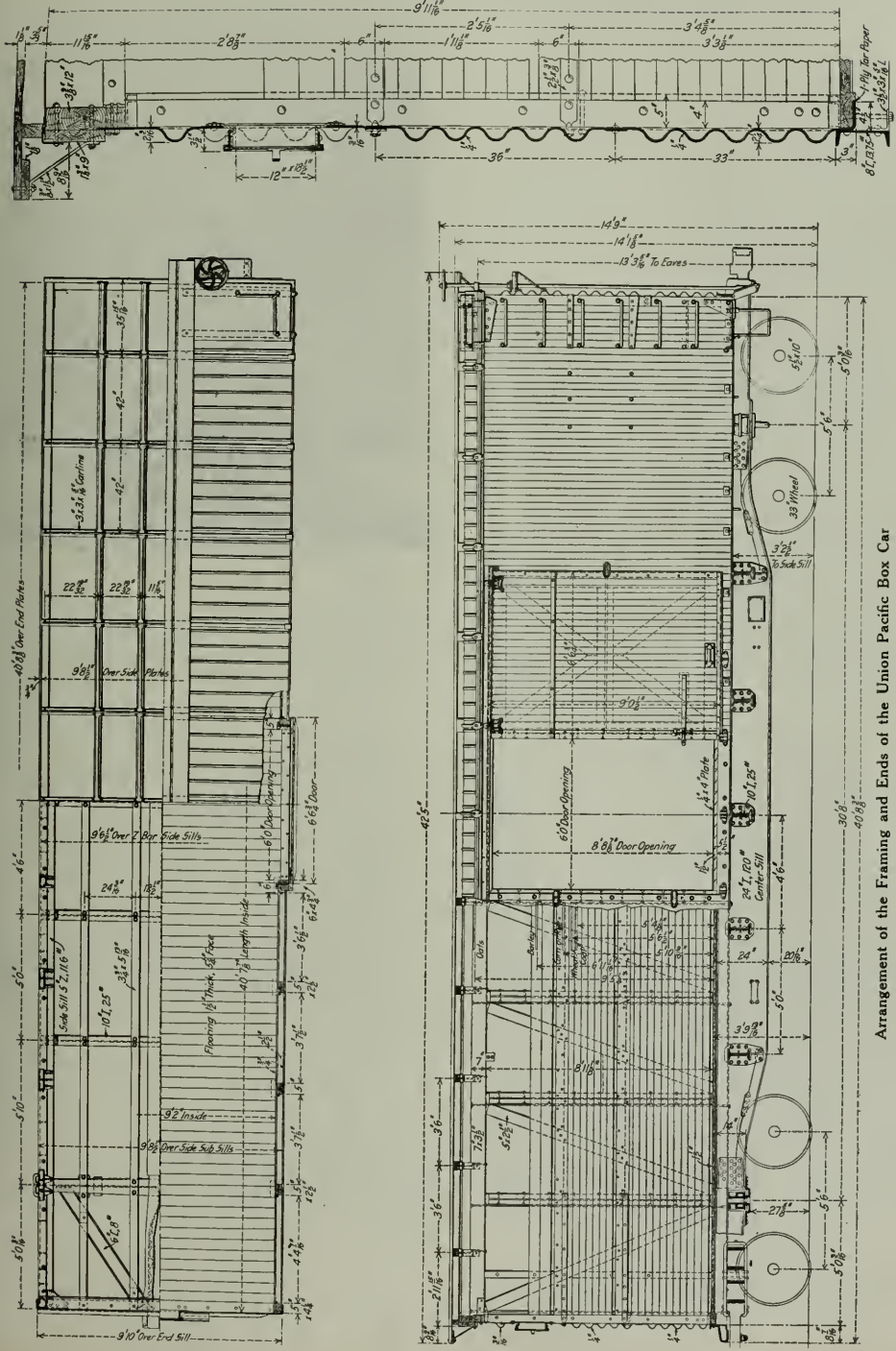
The automobile cars are of 100,000 lb. capacity and weigh 51,900 lb. They are 50 ft. 6¾ in. long over end sills and are 50 ft. long inside. The height from the top of the floor to the bottom of the carlines is 10 ft. 1⅛ in., and the cubical capacity is 4,630 cu. ft.

The underframe is of the Bettendorf type, the center sills consisting of a 20 in., 112 lb. I-section girder, while a cast steel body bolster is used. The end sills are 8 in., 13.75 lb. channels and 6 in., 8 lb. channels are used as diagonal braces between the end sills at the center sill and the body bolster near the side sill. The side sills are 9 in., 13.25 lb. channels and the crossties which extend between the center sill and the side sill are 8 in., 11.25 lb. channels. A 3½ in. by 2½ in. by ¼ in. angle extends in the form of a bow between points on the center sill just back of the draft arms, the top of this arch being at the side sill on either side of the car. There are 4 in. by 4 in. wooden stringers used for supporting the floor and these are carried on the 8 in. channel crossties. The trucks are spaced 40 ft. 4 in. between centers and have cast steel side frames of the Vulcan type. One end

Steel Underframe Box Car for the Union Pacific



Arrangement of the Framing of the Steel Automobile Car

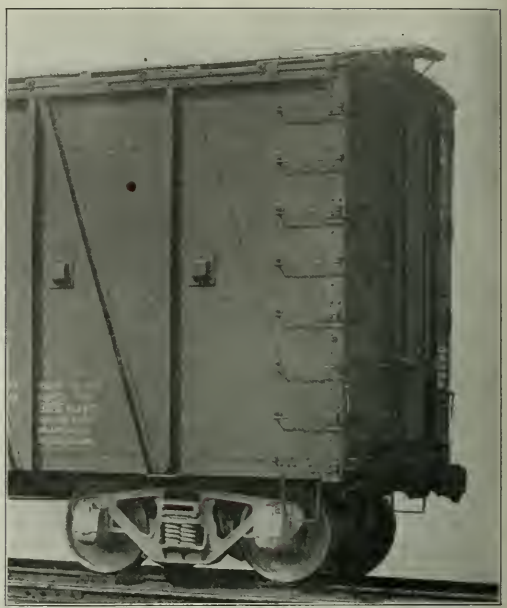


Arrangement of the Framing and Ends of the Union Pacific Box Car

of the car is fitted with steel doors swinging to either side, while double side doors of wooden construction are used. These side doors give an extreme door opening of 9 ft. 9¾ in., the width between the door posts being 10 ft. 3½ in.

The steel body framing is made up of 3 in., 6.7 lb. Z-bar side posts and 3 in., 11.5 lb. Z-bar braces, the framing being outside the ⅛ in. steel plate sheathing. The side plates are 4 in., 8.2 lb. Z-bars and the end plates are 5 in. by 3 in. by 5/16 in. angles. The sides of the car are fitted with stringer pockets as shown in one of the illustrations. These pockets are used to carry the ends of transverse stringers for supporting an upper deck in the car when this is required, and it will also be readily seen that they can be of material assistance in securing miscellaneous lading in place. The Murphy corrugated steel end is used as well as the Murphy radial type of roof, the strength of the end construction being made to meet the Master Car Builders' Association recommendations. This end is made in three sections, the two lower being of ¼ in. plate, while 3/16 in. plate is used in the upper section. The carlines are 3 in. by 3 in. by 5/16 in. tees, while there are two 3/16 in. U-section pressed steel purlines on either side of the car, spaced 27 7/16 in. between centers, the inner one being 10¾ in. from the center line of the car.

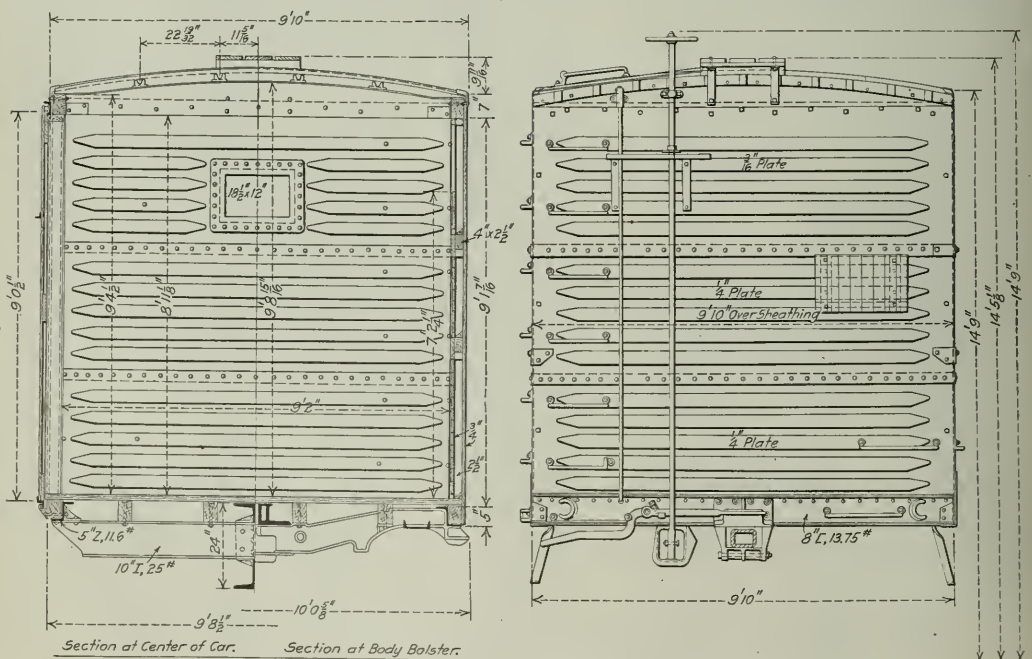
The special equipment includes New York air brakes, Western angle cock holders, Acme automatic brake adjusters, Scullin-Gallagher body bolsters, Creco brake beams, Climax couplers, Carmer coupler relief rigging, Camel door fasteners, Miner draft rigging, National malleable journal boxes, Buckeye cast steel truck bolsters, Miner gravity truck side bearings and Barber truck roller device.



End of the Automobile Car Showing the Steel Doors

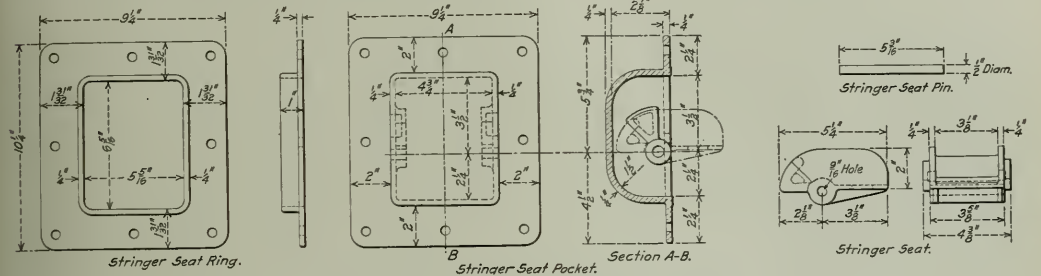
BOX CARS

The box cars are of 100,000 lb. capacity and are also equipped with the Bettendorf steel underframe. Cars of this type having a steel underframe, steel end construction and a steel roof have met with distinct favor in some quarters. In point of strength it would seem that they should give almost as good results as the steel frame inside sheathed car while retaining the advantages of the vertical sheathing. These cars are 41 ft. long over ends and 40 ft. 8 in. long inside, the cubic capacity being 3,500 cu. ft., and the height from the top of the floor to the bottom of the carlines 9 ft. 4½ in.; the weight of the car is 42,900 lb.



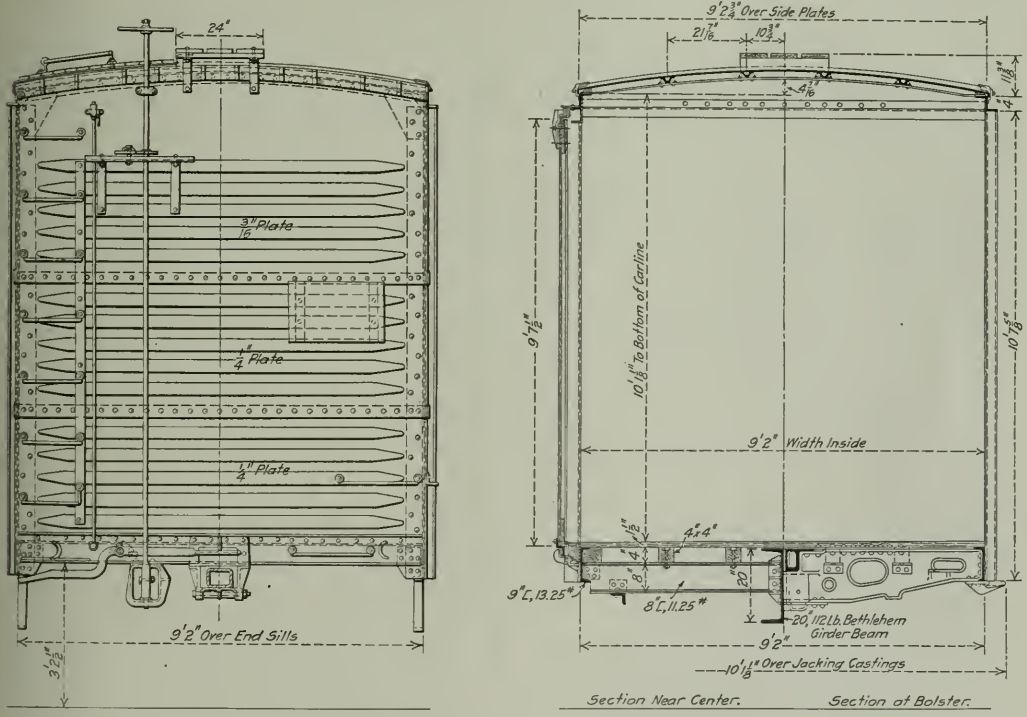
End Elevation and Cross Sections of Union Pacific Steel Underframe Box Car

The center sill consists of a 24 in., 120 lb. I-section girder while the body bolsters are of cast steel. It will be noticed that this center sill is heavier in the box car than in the automobile car, the reason for this being that the center sill in the box car was designed to carry the greater proportion of the lading, while in the automobile car it was the intention of the designer that a considerable portion of the weight of the lading should be carried by the side frames of the car. The end sills are 8 in., 13.75 lb. channels and the side sills are 5 in., 11.6 lb. Z-bars. There are 6 in., 8 lb. channel diagonal braces between the ends sills at the center and the body bolsters at the side sill; the crossties are 10 in., 25 lb. I-beams. The superstructure of the car is of wood, but the ends are of the Murphy corrugated steel type, there being an 18½ in. by 12 in. door opening in one end. The roof is of the Murphy radial steel type with pressed steel U-section purlines and 3 in. by 3 in. by 5/16 in., T-section carlines, each 42 in. between centers. There are two purlines on either side of the car, spaced 22 19/32 in. between centers.



Upper Deck Stringer Pocket Used on the Automobile Car

The special equipment on the box cars includes Climax couplers, Barber truck roller device, New York air brakes, Creco brake beams, Carmer coupler release rigging, Vulcan cast steel truck side frames, Camel door fixtures, Miner draft rigging, National malleable journal boxes, Buckeye cast steel truck bolsters and Miner gravity truck side bearings.



End Elevation and Cross Sections of the Automobile Car

RAILWAY CONSTRUCTION IN THE NETHERLANDS.—It is reported that the Netherlands Minister of Waterways, Railways, etc., has granted to the Geldersche Stroomtramweg-Maatschappij a concession for a railway from Dieren to the Prussian frontier in the direction of Isselburg.

RIVERS AND RAILROADS IN THE UNITED STATES*

By William W. Harts

In most of the progressive countries of the world, especially in those where population is dense and production large, the improvement of the waterways by the government, for better communication in the interior, and the protection and deepening of harbors, have gone on at a rate which, as a general rule, has kept pace with the increase in population and production. Of late years, however, this progress has been strongly affected, both in America and in Europe, by the development of railways—sometimes favorably and sometimes otherwise.

In the United States the improvement of rivers by federal appropriations extends far back into the early history of the nation, long before the era of railways.

With the coming of the steamboat, the government's interest in canal and highway work was soon expanded to include the improvement of rivers and the deepening and protection of harbors as the necessity therefor grew, so that, by a natural process of development, the duty of designing and constructing the enormous waterway projects which have since come into existence was the logical inheritance of the army engineer.

The very early records of public money expended are so incomplete that they can scarcely be used to illustrate the enormous growth of these works, but between 1875, a comparatively recent date, and 1914, the annual appropriations increased from $5,218,000, in round numbers, in 1875, to $53,000,000 in the proposed act of 1914, or more than eightfold in about 40 years. These large sums are appropriated and expended in accordance with projects prepared by the army engineers and approved by Congress. The responsibility, therefore, must be shared between these two in some proportion, however unequal.

Very few people realize the amount of river and harbor improvement already adopted or under construction. Projects which have already received the sanction of Congress and are under process of construction now amount to more than $200,000,000. About $86,500,000 in new work has been reported favorably by the engineer department, but has not yet been adopted by Congress. In addition, there are projects amounting to more than $2,500,000, which have been favorably considered, but not yet accepted by the engineer department. Thus, there is a total of work costing more than $289,000,000, which is either in progress, or approved by Congress, or soon to be brought before the country.

It has been officially reported that in the 100 years, from 1802 up to December, 1902, there had been spent by the United States Government $221,869,759 for rivers, $147,448,903 for harbors, and $33,237,857 for canals, or a total of more than $400,000,000. From 1814 to 1900, France spent $449,000,000 on new works and in the maintenance of those already built. Similarly, Belgium spent $101,000,000 between 1831 and 1903. Between 1813 and 1906, Prussia spent $129,000,000 for new construction alone, and her maintenance charge in the single year, 1905, was $4,000,000. The United States is about 18 times as large in area as either France or Germany, and has about four times the length of navigable streams. Although the density of population in the United States is much less, being only about one-half that of all Europe, and about one-twelfth that of Germany, it can be seen that the United States has more than kept pace with other progressive nations, when density of population is considered.

The first question that will be asked the river engineer is, to what extent are these facilities used, and do they pay in public service for the enormous cost of construction and maintenance? When we begin to study the economic features connected with works of this character, we are struck with surprises. The advent of the light-draft, inexpensive steamboat made our rivers and waterways of great value as commercial carriers at a very early date. Too much praise cannot be given to this simple means of developing a great region. The hazards of this sort of transportation, however, were very great, and the steam railroad was beginning to be a fierce competitor after the Civil War. Railroads found a fertile field in those areas where the rivers had already induced a new prosperity. As these railroads were developed throughout the country into that intricate network which is the pride of the nation today, little by little the freight formerly handled by river was taken over by the railway lines, until now it is found that practically all the rivers of the great Mississippi Valley are dwindling in commerce in spite of the large expenditures for better channels that have been and are still being made. This falling off in usefulness is in the face of an enormous expansion in production of all kinds and a development of commerce that is unsurpassed in our history.

The Mississippi valley is one of the richest and most productive areas in the world. The volume of commerce originating there is enormous, and has been rapidly increasing during the past 15 or 20 years, but, notwithstanding this growth, less and less is being carried by the rivers, and only those few streams which are not paralleled by railroads are still managing, with many a struggle, to maintain their former value to the public. Nowhere are the products of the farm more valuable; nowhere are the mines more productive, and nowhere are the energy and capacity of its people excelled in all those various pursuits of wealth which are so numerous in this great area. If, therefore, the rivers anywhere might be expected to show increased usefulness as the country develops, it would certainly be in this region. It is, therefore, with keen disappointment that the opposite tendency is found to be growing more than ever apparent. Rivers in this valley were teeming with steamboats and barges within the memory of men still living. The arrival and departure of the large packets were events of much interest in the various towns where steamboat landings were scheduled, and boating was a well recognized industry, employing many men. Today, however, the passenger traffic by river boat has almost disappeared, and bulky and slow freight forms the main part of what is left of a once flourishing business.

The explanation of this is not far to seek. The railway of today is well able to compete with the waterways at every turn. Combinations of many small and weak lines into through routes, and the extension of rail lines into every region where it seemed reasonable to expect a financial return, have developed what was a disconnected and feeble collection of roads into a systematized network of enormous value. The unfeeling and unrelenting competition which commenced first between river and rail lines and then continued among the various rail lines themselves, has forced an economy of operation and administration which has made the rail lines a giant in power and a miracle of usefulness. Within little more than a generation, the average cost of moving a ton of freight a mile in the United States has diminished from 7½ cents to about 7½ mills, a reduction of 9/10ths, and some of the coal roads having easy grades and flat curves boast that their tonnage cost has been cut to 2.3 mills per ton-mile. This is the harsh competition that rivers must meet. Railroads can be changed in location, and terminals can be placed wherever needed; cars can be switched from one line to another; spurs can lead to the point of destination without transshipment or breaking bulk, and distribution is simplified. On the other hand, waterways are fixed in location, require numerous expensive terminals, need constant improvement, and require steamboats and other craft of considerable cost. River lines have the advantage that their roadbed is provided by the government. Railroads require large sums for general administration; for employees in yards and at stations; for maintenance of way and equipment; for interest on their capital invested, and taxes. As the steamboat has no maintenance-of-way expense, it has a great advantage over the railroad in regard to fixed charges. Its interest on its cost has been estimated at 5 per cent, insurance 8½ per cent, and maintenance at 7½ per cent, whereas the railroads must pay interest on the cost of the entire road, estimated at 5 per cent.

*From a paper presented before the American Society of Civil Engineers, February 3, 1915.

maintenance estimated at 2 per cent, interest on the cost of equipment 5 per cent, maintenance of equipment 10 per cent, and insurance 3 per cent. Notwithstanding this unequal burden, railroads have out-distanced the river in economy of administration, and on most roads the fixed charges for interest on capital and maintenance are much less per ton-mile than those on a river packet. This indicates clearly the reason for the decline of the river commerce of St. Louis in 30 years from 2,120,825 tons in 1880 to 191,965 tons in 1910, a loss of about 9/10ths. During the 17-year period, from 1890 to 1906, the river commerce of that city dwindled from about 1,260,000 tons to about 317,000 tons, but in the same period the rail business increased from 15,000,000 to about 45,000,000 tons, or about 200 per cent, according to the reports of the St. Louis Merchants' Exchange. As a competitor, the Mississippi river has fallen from a position of pre-eminence to almost a negligible quantity.

Furthermore, of late years, a great decrease in the cost of handling freight on railroads has taken place, notwithstanding increases in cost of materials, labor and taxes. On the other hand, an increase of at least 50 per cent in steamboat operation costs has taken place, due to these same advances, but this has not been offset by reduced operating expenses. The river steamboat has not changed much in late years, and river terminals have nowhere been improved to a marked degree; certainly these improvements have not kept pace with the improvement of the channels by the government. It has been stated that the stock in the largest company plying between Louisville and Cincinnati has fallen from a high premium to less than par within the last 25 years, a loss of more than 80 per cent.

The realization of the one-sidedness of this unequal struggle has of late years brought with it to river engineers a feeling that we are now far ahead of the demands of the present in many of our inland streams, and henceforth expenditures should be restricted to the barest necessities until the commercial development of the neighboring regions brings with it new demands. It seems not too strong a general statement to make that the navigational facilities on every stream on which commerce is now diminishing is far in advance of the present necessities, and that additional improvement at public expense should be withheld until such time as the economic pressure for additional transportation facilities becomes plainly manifest.

It seems reasonable to suppose that these tendencies toward diminution of river commerce are not necessarily permanent everywhere, for the commercial development of the areas contiguous to transportation lines is nearly always conspicuous, and frequently brings a need for additional facilities. New railroads are not being built so rapidly as a few years ago, and some day some of the interior streams may be expected to handle an increasing commerce in bulky freight where time of transit is not of great importance. This need for meeting the demands of expanding production may bring back some rivers to a new usefulness that cannot now be safely predicted.

Nor must we conclude that all our rivers are losing their value as commerce carriers, or that all are even diminishing in usefulness. Many streams outside the great central valley of the country, particularly those that empty in the harbors along the coast, and allow ocean-going vessels or coastwise ships to reach interior points, are showing very encouraging results. Some of those entering New York harbor, for example, in the regions where population is dense, are very valuable and carry large quantities of commerce. In 1905 Arthur Kill had a commerce of 11,700,000 tons, valued at $265,000,000; and in 1911 it had a commerce of 30,500,000 tons, valued at $515,400,000.

In looking over the history of some of our rivers, it appears that they pass through several more or less indistinct stages of usefulness. First, while the country is comparatively undeveloped, and before the construction of railways has been begun, the rivers are found to be the best and cheapest lines of commerce. At such times the steamboat enterprise thrives and river commerce multiplies. In some cases new land is opened to profitable cultivation, or new industries are encouraged. Later, towns spring up, and a whole region often receives a new impetus from its greater accessibility. Next comes the period when the results of this enterprise have brought about such a prosperous condition that the extension of railways is induced in the same territory. They, with their many advantages, then absorb most of the river transportation business. River commerce dwindles during this period, even though increase in production is noticeable on every hand. At such time discouragement may be felt by river advocates, because it seems that the rivers are not performing their wonted part in the upbuilding of the country through which they pass, for the part played by the streams is lost sight of in the economic progress of the neighborhood.

This discouragement might be justified but for the third stage, which seems to be within the range of safe prediction for some of our internal waterways, especially if one judges by the rivers emptying into New York harbor and those rivers like the Rhine flowing in congested communities. This third stage comes when the population and production have increased to such an extent that all lines of traffic are insured a large part in the transportation business of the locality. At such times the rivers again become useful and efficient. If we have proceeded too rapidly in the improvement of our interior rivers, there is still this hope of ultimate usefulness after the second stage has passed.

On the other hand, however, our harbors have had no such vicissitudes. Economy of ocean transportation has gradually forced ship-owners to adopt deeper draft for their vessels. With the advent of steam, the depth of hull has steadily increased until now the largest ships are limited to few ports. The expansion of the railways throughout the interior, in many cases, has led directly to the greater development of the seaports.

The harbor, by its very nature, is a sort of terminal where products are exchanged between rail and water. Thus the railway, which is now having such an adverse effect on some of our interior rivers, has at the same time brought about a corresponding necessity for improvement in many of our harbors, and has contributed enormously to their value.

For example, in 1892, in New York harbor, the exports and imports of foreign trade alone amounted to about 5,000,000 tons. In 1912, it totaled more than 14,000,000 tons, an increase of nearly 200 per cent. The total commerce by water was estimated in the 1906 census report at 114,000,000 tons. The harbor at Norfolk in 1892 had a commerce of 3,427,000 tons, whereas in 1912 it was more than 22,000,000 tons, an increase of nearly sixfold. Savannah in 1892 had about 2,000,000 tons of commerce, and in 1912 more than 3,120,000 tons, an increase of more than 50 per cent. Galveston in 1892 had a tonnage of 1,134,326 tons, and in 1912 a total of 3,224,367 tons. These cases are probably the more conspicuous ones, but it may be accepted as a general rule that all the larger harbors have amply justified the expenditures made in providing better channels.

On the whole, our expenditures for waterways have been of immeasurable benefit to the country at large. Never in our history has the volume of domestic and foreign commerce been so great, and never has the outlook for future increases been brighter. Our over-sea exports and imports are now growing enormously, and the prosperity of the land requires that there should be no restriction anywhere on account of inadequate channels. A practical test, almost infallible in its application, that will show whether a waterway project can be economically considered for further improvement, is a progressively increasing commerce, and the measure of saving in cost of transportation will always be a guide as to the extent of work that is justified.

Thoughtful observers of our system of channel development have been impressed with the tendency of the government to overliberality in many instances, but the signs are multiplying that, in the near future, the public will demand a more rigid adherence to economic laws in the adoption of new projects.

Germans and the Belgian Railways.—It is reported that the entire Belgian railway system was put into operation on January 1, about 8,000 employees of German railway administrations, including 1,100 railway employees from Bavaria, having left for Belgium recently.

Western Engineers' and Firemen's Arbitration

Continuation of Railroads' Statistical Evidence. Payrolls Showing Actual Earnings of 64,000 Men Presented

J. H. Keefe, assistant general manager of the Gulf, Colorado & Santa Fe, occupied the witness stand throughout all of last week in the hearing at Chicago before the board of arbitration on the western engineers' and firemen's demands, continuing his testimony on statistical exhibits introduced in behalf of the railways. On Monday, January 25, Mr. Keefe presented testimony to show what would be the effects of the proposed automatic release rule as applied to "turn-around" runs, as in suburban service. The rule provides that when a crew reaches the end of its run or a terminal and is then required to perform any other service, a new day shall begin. "An engineer in actual service on one of our mixed trains," said Mr. Keefe, "now earns $202.74 per month for working 8½ hours per day on one of these 'turn-around' runs. With the demanded rules in effect this man would have earned actually in October, 1913, $1,435.75. His increase in pay would equal 608 per cent. The fireman on this run actually earned $119.04, and it was on an oil-burning engine on which no coal was shoveled at all. This fireman would have been paid $937.79 for his month's work under these rules. His increase would be 688 per cent."

In the cross-examination of Mr. Keefe, Warren S. Stone, grand chief of the engineers, tried to show that it was not fair to compute the cost of overtime on the basis of the present amount of overtime, because, he said, the rule of time and one-half was intended as a penalty and that the roads would manage to reduce the overtime. The same argument he applied to the automatic release and tie-up rules, saying that the effects of the rules would be avoided by a rearrangement of operating methods or terminals, and that the figures compiled to show their cost were "purely imaginary."

At the conclusion of Mr. Keefe's testimony as to the cost to the railroads complying with the demands, which was summarized in last week's issue, Mr. Stone insisted that the railroads furnish the basic information from which the exhibit was made consisting of time cards, train sheets, delay reports and the time slips of the engineers and firemen on all the roads for the month of October, 1913. He said he was satisfied that there was "something wrong" with the figures and that he had no other way of checking them. Mr. Sheean said that the roads would furnish anything the board desired, but he pointed out that they had already presented the detail reports furnished by the individual roads on the forms submitted to them for that purpose, and certified to by the proper officers, with the understanding that each company should be fully prepared to defend any figures reported regarding which any controversy might arise. Mr. Park asked Mr. Keefe how many trainloads of train sheets it would be necessary to bring to Chicago. Mr. Keefe said it would take 30 train sheets for each of the 544 districts, making 16,320 train sheets; also the individual time slips for 64,000 men for 30 days, or 1,820,000 time slips, in addition to delay reports and roundhouse records.

After consideration Chairman Pritchard announced that the board had decided to grant the request, feeling that the law required it to do so, but he suggested a conference with the hope that some plan might be adopted by which time and labor might be saved. An agreement was finally reached that these records would be furnished for only five roads.

Mr. Keefe presented as Exhibit 4 a statement of the revenues and expenditures of the roads parties to the arbitration for the fiscal year 1914, as compared with 1913 and 1910. This showed that the total operating revenues increased from 1910 to 1914 by $106,430,973, while the operated mileage increased 8,500 miles, and the operating income decreased $15,652,533. The decrease in operating income from 1913 to 1914 was $39,128,875. The decrease per mile from 1910 to 1913 was $312, and from 1913 to 1914 was $335. Taxes increased from 1910 to 1914 by $18,687,060, and from 1913 to 1914 by $8,219,000. The increase per mile in 1914 over 1910 was $119, while in 1914 as compared with 1913 it was $58 per mile. The expenditures per mile for maintenance of way and structures were $1,409 in 1910, $1,387 in 1913, and $1,367 in 1914. For maintenance of equipment the expenditures per mile in 1910 were $1,333; in 1913, $1,525, and in 1914, $1,529. The cost of conducting transportation per mile in 1910 was $3,246; in 1913, $3,538, and in 1914, $3,417.

In Exhibit No. 5 Mr. Keefe presented the income accounts of the roads involved for 1910, 1913 and 1914. This showed that the interest payments on funded debt in 1910 amounted to $166,873,921; in 1913, to $194,070,135, and in 1914, to $193,731,080. The dividends declared out of income amounted in 1910 to $168,150,945, in 1913 to $154,341,750, and in 1914 to $146,155,706. Appropriations from income for additions and betterments in 1910 amounted to $10,633,797, in 1913 to $19,757,874, and in 1914 to $11,648,314. The amount carried to surplus amounted in 1910 to $57,826,381, in 1913 to $45,955,296, and in 1914 to $33,355,906.

Exhibit No. 6 showed that during the three-year period ending June 30, 1913, the roads had expended $1,058,386,502.81 for additions, extensions, betterments and improvements to property. From this was deducted a total of $391,855,197, as the cost of road purchased, to avoid the possibility of duplication, leaving a balance of over $660,000,000.

Exhibit No. 7 showed that substantially one-third of this expenditure, or over $221,000,000, was devoted to increasing efficiency and safety and to expedite train movements, the various classes of expenditures being grouped under 15 heads. For instance, it was shown that $21,920,345 was expended for grade reduction and the elimination of curves; $15,000,000 for yard improvements; $6,500,000 for block signals, and $17,971,000 for heavier rails.

Exhibit No. 8, introduced by Mr. Keefe, showed that 3,251 orders of state railway commissions in the territory involved have been issued since July 1, 1910, and 1,115 bills have been introduced and 208 laws enacted in state legislatures, relating to railway operation, during the sessions of 1911, 1912, 1913 and 1914. Mr. Sheean said that the exhibit was introduced to show the general tendency of increasing burdens placed by commissions and legislatures upon the funds of the railroad companies, and that as to the bills introduced it was proposed to show that the same organizations which base their claims on the theory of increased productive efficiency are seeking to have passed laws which make impossible the carrying out of the efficiency and economies that would result from the purchase of heavier power and the elimination of grades. He said that no attempt had been made to compile the cost of the various laws and orders, because it would be difficult to do so accurately.

Mr. Park remarked: "On the proposition that you can only run half a train it would be almost impossible, under certain conditions, to estimate the loss." Chairman Pritchard asked if there is a law of that character. Mr. Keefe said that train limit bills have been, or will shortly be, introduced in the legislature of Arkansas, California, Illinois, Kansas, Missouri, Montana, South Dakota, Utah, Washington, Colorado, Idaho, Ohio, Minnesota, Nebraska, Nevada, Oklahoma, Oregon, Wyoming and Texas, or 19 out of the 24 states embraced in this movement, and that there is a law in Arizona, passed in 1912, limiting the length of freight trains to 75 and of passenger trains to 14 cars. The proposed limit to the number of cars in a train ranges from 35 to 50 freight cars, and from 9 to 12

passenger cars. Mr. Sheean showed that on the Virginian Railway, where 100 cars of coal may be hauled on the level or down grades from the coal fields to tidewater, with one engine crew and one train crew, the effect of such a law would be to necessitate two engines, two engine crews, and two train crews to move the same traffic. Chairman Pritchard asked if helpers were not now employed on grades. Mr. Sheean replied in the affirmative, but said that whereas a helper crew may help all trains over a certain grade, which may be loaded to the tonnage rating on other parts of the line, the proposed law would increase the number of trains throughout the entire line.

Mr. Stone said it had not yet been decided whether to support the train limit bill in Congress, but when asked if all four railroad organizations are not supporting the bill in the states he said he did not think there was concerted action, except in some states, and that the engineers and firemen were not making an aggressive campaign, but that they would not oppose the bill if the other organizations wanted it. Mr. Sheean said the exhibit showing the number of laws and orders against railroads was not introduced in a spirit of criticism, but simply to advise the board of the situation, "that after the productive efficiency of labor and capital has produced some money, the public, through the legislature, reaches out immediately for a part of that money before there is either right or power to distribute it as between labor and capital."

Exhibit No. 9 was a comparison of freight and passenger traffic density. In 1910 the freight density was 735,828 ton-miles per mile of line, and in 1913 it was 820,851. In 1910 the passenger traffic density was 116,463 passenger miles per mile of line, as compared with 111,214 for 1913.

Exhibit No. 10, which was introduced in answer to the claim of the men that longer trains required them to put in longer hours in getting a train over the road, showed that in October, 1910, 77.24 per cent of the train-miles in through freight service were paid for on the mileage basis, that is, they were operated at a speed greater than 10 miles an hour, while in October, 1913, the percentage was 78.3. In the local freight service in October, 1910, 31.42 per cent of the train-miles were on a mileage basis, while in October, 1913, 30.62 per cent were on a mileage basis. Similar figures for other classes of service showed that in general the speed of the trains was greater in October, 1913, than in October, 1910. Therefore, Mr. Keefe said, if the men are handling heavier traffic and are operating larger engines which take a higher rate of pay than the smaller engines, they are receiving a larger sum of money for a slightly decreased number of hours than in 1910.

Exhibit No. 11 showed the reduction in time on the road.

Exhibit No. 12 showed that for the calendar year 1913, of the 2,277,749 passenger trains run, 910, or .04 per cent, were on the road for more than 16 hours. The "other trains" run during the year numbered 3,671,886, and of these 33,978, or .93 per cent, were on the road for more than 16 hours. Of the total of 33,978 "other trains" that exceeded the 16-hour limit, 19,910 were on the two Canadian roads, which are not affected by the 16-hour law and on which there is no limitation other than the desire of the men as to when they shall tie up. For all roads 540 passenger trains were tied up on account of the 16-hour law and 34,951 other trains.

Exhibit No. 13 showed the extent to which the railways are now making payment to engineers and firemen for which no actual service, either in miles or hours, is given by the men, because neither the hours nor the miles called for by the schedule can be required of the men in practical operation, as where an engineer runs 80 miles in 7 hours, and is allowed 100 miles as a minimum. In 1913, $269,303 was so paid in passenger service, $1,084,373 in freight service, and $49,362 in work train service, making a total of $1,403,038 paid to engineers and firemen for no equivalent in miles or hours.

Exhibit No. 14 showed the number of locomotives of various weights on drivers in service in 1910 and in 1913. This showed a decrease in percentage of the smaller class of engines, also a decrease in engines between 80,000 and 100,000 lb. on drivers, a slight decrease in engines between 100,000 and 140,000 lb., and a general tendency to increase the size of locomotives only in the intermediate classes between 140,000 and 225,000 lb. This exhibit also showed that in 1913 there were 2,908 more locomotives than in 1910, an increase of approximately 12 per cent, and an increase in the number of oil-burning locomotives from 3,048 to 4,148, or 36 per cent, and that in 1913 the percentage of oil-burning locomotives to the total was over 15 per cent. The exhibit showed that about 15 per cent of the engines would require two firemen under the request. In 1910 there were 456 locomotives, weighing from 200,000 to 225,000 lb. on drivers, and in 1913 there were 1,577. In 1910 there were 167 locomotives, weighing from 225,000 to 250,000 lb., and in 1913 there were 423. In 1910 there were 82 locomotives, weighing from 250,000 to 300,000 lb., and in 1913 there were 89. In 1910 there were 163 locomotives, weighing from 300,000 to 400,000 lb., while in 1913 there were 304. In 1910 there were 7 locomotives, weighing 400,000 lb. on the drivers, and in 1913 there were 67. Mr. Stone asked that figures be presented showing locomotives ordered or received during the past year, saying he thought they would show a larger increase in the heavier engines.

Exhibit No. 15 showed that of a total of 27,221 locomotives, on November 1, 1914, 4,272 were oil-burners, 4,852 were equipped with superheaters, 9,512 with brick arches, 1,033 with power coal pushers, 4,098 with hopper bottom tenders, 50 with power stokers, 3,597 with automatic door openers, 192 with power grate shakers, 1,613 with power reverse gears, and 22,941 with improved ash pans. Mr. Keefe said that the exhibit showed that the larger locomotives are the ones on which the labor-saving devices are more generally being applied.

Exhibit No. 16 was presented to show that the density of population per mile of railway is less in the Western district than in the East, and that the density is increasing faster in the East than in the West and Southeast.

Exhibit No. 17 showed the proportion of single track, main track, and sidings to the area of the country served, for the roads involved.

Exhibit No. 18 showed the proportion of branch line mileage, ranging from 7.6 per cent to 59.95 per cent. The total was 43.65 per cent of branch line mileage, with 19.34 per cent of the total train-miles operated over branches, and 7.7 per cent of freight ton-mileage operated over branches.

Exhibit No. 19 showed that in 1910 the average freight train-load in the Western district was 325.9 tons, while in the Eastern district it was 459.8 tons, and in the Southern district it was 324.2 tons. In 1913, taking the trainload in the Western district as 100 per cent, the East was 140 per cent and the South 102 per cent.

Exhibit No. 20 compared the tractive power of locomotives.

Exhibit No. 21 was a comparison of the wages of engineers and firemen with those of employees in the marine service of the railroads and of steamship lines. Mr. Stone asked a number of questions regarding the conditions of employment for men in marine service. He said he had noticed that the captain of a boat usually sat at the head of the table, and that the most beautiful woman passenger had the seat of honor on his right. He asked the witness: "Do you know of any of the beautiful women passengers on these Overland Limited passenger trains that are riding in the cab with the engineer?"

Exhibit No. 22 presented a comparison of the wages paid engineers and firemen with those of other employees in transportation service. This was prepared during the hearing in response to a request by Mr. Nagel, who said that "in considering what should properly be paid to engineers and firemen we must have regard for what ought to be paid to other employees." Mr. Nagel expressed great interest in the figures for telegraphers.

Exhibit No. 23 presented similar comparisons for shop employees.

Passenger engineers for the month of October, 1913, were shown to have earned an average of $7.80 per day of seven hours, or $1.12 per hour. Engineers in through or irregular freight service averaged $7.54 per day and $170.02 per month, while engineers in local or way freight service earned $7.16 per day and $172.40 per month. Firemen in passenger service averaged $4.96 per day and $115.53 per month, while those in through or irregular freight service averaged $4.99 per day and $110.25 per month, and those in local or way freight service averaged $4.80 per day and $105.59 per month. One engineer in this month earned $341.60 in passenger service, while another in freight service earned $358.70. One fireman in passenger service earned $209.89, while in freight service one fireman earned $221.05. Mr. Keefe said that there were a number of engineers and firemen, as well as hostlers, who could have earned even more had they availed themselves of the opportunity presented by the companies for earning wages. He said he had not undertaken to show whether or not the men were actually available for duty the entire day. Of all the engineers in passenger service in the month of October, 1913, the summary showed that 4,478 earned $170 or over per month, and of these 2,842 earned $200 or over. Of all engineers in through or irregular freight service 5,560 earned $150 or over, while of this number 1,430 earned $200 or over per month. Of all engineers in all services 18,197 earned $150 or more, of which 4,019 earned $200 or more. Three engineers were shown who earned from $358 to $366.65 in a single month. In comparison with these figures Mr. Keefe showed that captains of steamers in the trans-Atlantic or trans-Pacific service are paid a maximum of $275 a month, and a minimum of $140. The chief engineers of these steamers, he said, averaged about $150.

Mr. Stone objected to average figures, although his witnesses had done a good deal of "averaging." "Averages do not mean anything," he said. "If one man can eat five meals a day, the second four meals and the third three meals the fourth man cannot be made to believe he has had three meals because that is the average eaten by four men."

A controversy regarding the employment of negro firemen on the Yazoo & Mississippi Valley was interjected into the hearing by W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen. The railroads, in Exhibit No. 3, had presented no figures regarding wages of firemen on the Yazoo & Mississippi Valley, saying that most of the firemen on that road were negroes and were not members of the brotherhood or parties to the arbitration proceedings. Mr. Carter made a heated speech, demanding that any arbitration award be applicable to the Yazoo & Mississippi Valley, and presented a petition signed by 132 firemen of that road, most of whom were negroes, asking the brotherhood to represent them. He said the roads were seeking to evade the application of any award that might be made to that road. Mr. Sheean said that this was an effort on the part of the brotherhood to "root the negro fireman out of his job" by forcing the same wages for negroes as for white men. Mr. Carter admitted that the probable result of any application of the award to the road would be to replace the negro firemen with white men, but insisted that that would be the fault of the road and not of the organization, "because they only hire negroes because they are cheaper."

"Then how did you induce the negroes to sign this petition?" asked Mr. Nagel. "What actuated the negro to sign this petition when he knows that will deprive him of his job?" "I do not think he knows it," replied Mr. Carter. C. V. McLaughlin, vice-president of the brotherhood, later testified that he had secured the negroes' signatures to the petition without explaining that they might thereby lose their jobs. Mr. Carter offered, however, to join in a petition to the officers of the Yazoo & Mississippi Valley not to discharge the firemen. "If the railways raise the question of the right of the brotherhoods to represent all, whether or not members of the organization," said Mr. Carter, "we shall be forced to demand a closed shop."

In response to a request from the engineers' and firemen's organizations, the railways produced W. W. Thompson, formerly an engineer on the Chicago, Rock Island & Pacific in Oklahoma, who denied on oath any recollection of having ever jumped from his locomotive under a surprise test and breaking his collar bone. Fireman Modenbach, working on the Rock Island in Oklahoma, testified several weeks ago that one of these tests resulted in his engineer, W. W. Thompson, and himself jumping from the engine, the engineer breaking his collar bone and being laid up for several weeks. After a long search the roads finally located Thompson, and, as requested by the two organizations, brought him to Chicago to testify. Mr. Sheean read the Modenbach testimony and asked the witness if he had any recollection of the things described, which the witness swore he had not.

On Friday, January 29, the railroads introduced in evidence an exhibit consisting of 18 sets of 3 volumes each, resembling enlarged editions of the unabridged dictionary, containing a duplication of the payrolls of the 64,000 engineers, firemen and hostlers on 98 Western railways involved in the arbitration for the month of October, 1913, and giving information as to the kind of service in which each man was employed, the terminals between which he ran, the number of days he worked, the number of trips he made, the miles he covered and the hours he spent on duty, with the exact amount of wages he received. It was shown that engineers in regular passenger service earn from an average of $185 to a maximum of $341.60 per month; in freight service from an average of $170 to a maximum of $358 per month. Firemen in regular passenger service earn from an average of $115 to a maximum of $209.89 per month, and in freight service from an average of $110 to a maximum of $221 per month, while other firemen in combination freight and passenger service earn even higher than this. The volume contained the records of 28,446 engineers, and page after page of the exhibit was shown on which the majority of engineers were reported as earning in excess of $200 a month. Records were also presented of 32,321 firemen and 2,688 motormen, helpers and hostlers.

PULLMAN UPPER BERTHS

[From the Rock Island Employes' Magazine]

Many travelers are prejudiced against upper berths in Pullman sleepers, and many of our ticket agents thoughtlessly assist in keeping alive this prejudice. This is done, to some extent, by stating to travelers to whom a lower cannot be assigned, "There is nothing left but an upper," or "I can only give you an upper," leaving an impression in the traveler's mind that an upper berth is inferior or undesirable.

Would it not leave a better impression, in case the passenger's wish for a lower berth cannot be complied with, to say, "The lowers are all taken, but I can assign you a choice upper berth. The rate is 20 per cent cheaper than the lower." The traveler may at once see that, considering the differences in the rate, an upper berth has perhaps an advantage over the lower. Then a few words of explanation as to other advantages of the upper berth may decide the matter favorably with the prospective passenger.

In the more recently constructed Pullman sleepers, upper berths are now furnished with protection guards, precluding the possibility of falling out of the berth. Reading lamps are also provided in uppers, as well as lowers, and the aisle lamps are under individual control, doing away with the annoyance of unnecessary light. The ventilation in upper berths is also of the best, and for that reason alone many travelers prefer them.

As only a limited number of passengers can be accommodated in Pullman sleepers, every effort should be made to dispose of the uppers, as well as the lowers.

Progress on Summit Cut-Off of the Lackawanna

A Description of the Present Stage of Construction of World's Largest Concrete Bridge and a 3,630-ft. Tunnel

It is expected that the new three-track line of the Delaware, Lackawanna & Western between Clark's Summit, Pa., and Hallstead, on which some unusually heavy work has been under way for the last three seasons, will be ready for operation by December 1 of this year. This cut-off of 39.6 miles is being built at a cost of about $12,000,000 to reduce the distance 3.6 miles, the maximum grade eastbound from 1.23 per cent uncompensated to 0.68 per cent compensated and westbound from 0.52 per cent uncompensated to 0.237 per cent compensated; and the maximum degree of curvature from 6 deg. 22 min. to 3 deg., to eliminate 327 ft. of rise and fall and 2,440 deg. of central angle,

A General View of Martin's Creek Viaduct Which Is Now Completed

to add a third track and to abolish all grade crossings. As the maximum train loading is fixed by the grades on the remainder of the engine district, no increased tonnage will be made possible by the improvement, but an important saving in mileage of helper engines and in running time over this portion of the line will be effected. The reasons for this work were fully covered in the *Railway Age Gazette* of April 25, 1913, and November 14, 1913.

GENERAL

The construction of this line required the excavation of 13,318,000 cu. yd. of material. The interesting methods of handling this heavy grading work were described in the second article referred to above. The grading is now about 85 per cent completed and about 25 per cent of the track has been laid.

The small bridge work is practically completed, and the last concrete in the Martin's creek viaduct, one of the two large structures, was poured on November 14. The 12-span concrete arch bridge over Tunkhannock creek, which is the largest structure on the line, will probably be the last work completed. This double track viaduct consists of ten 180-ft. and two 100-ft. arches with a total length of 2,375 ft., and a height of 242 ft. from stream bed to top of coping. These dimensions with the concrete yardage of 167,000 make it the largest structure of its type in the world.

The method of sinking the piers to rock at a depth of 10 ft. to 95 ft. below the ground line and the construction of these piers above the ground to the top of the umbrella section 37 ft. above the springing line were described in the *Railway Age Gazette* of December 5, 1913. At present all of the substructure has been finished except pier 5, which has been delayed by serious difficulty with quicksand. A comparatively slight delay was caused by a pocket of quicksand at one corner of pier 4, but as the material at the other end was solid, it was possible to divide the area, finish one end and then brace against the concrete to hold back the pressure of the soft material.

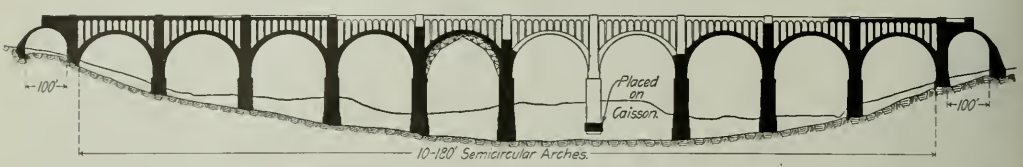
In pier 5, a stratum of quicksand extending over the whole area of the cofferdam was encountered about 75 ft. below the surface and 20 ft. above the rock. An attempt was made to drive sheeting inside the caisson to divide the area into 24 parts, each of which could be finished separately, but this sheeting was bent and displaced by boulders overlying the rock, making this method impracticable. It then became necessary to use a pneumatic caisson which was built in two chambers with two locks in each. The caisson was constructed with the cutting edge 27 ft. above rock; air was turned on December 13, and the caisson had been sunk 10 ft. on December 21.

A General View of the Tunkhannock Creek Viaduct Under Construction

DESIGN OF CONCRETE ARCH VIADUCTS

As stated in the previous article, the substructure in reality includes the piers and the umbrella tops forming the skew-

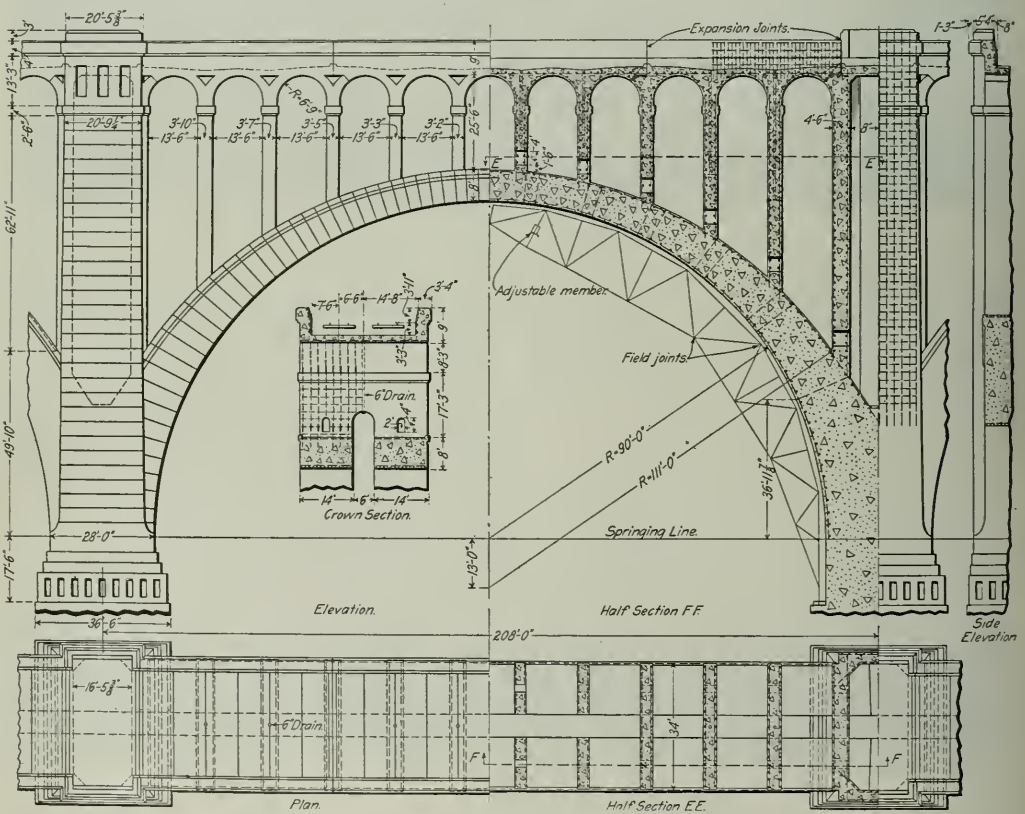
backs for the arch rings. The superstructure differs somewhat in the 100-ft. and the 180-ft. arches. The former are located at the ends of the structure and are termed abutment spans, as they are completely buried by the approach fill. In these spans the two arch ribs are 5 ft. 6 in. thick at the crown and 12 ft. wide. They are spaced 22 ft. center to center leaving a 10-ft. opening between the ribs and are tied together by four reinforced concrete struts. The ribs support reinforced transverse walls on which is carried a floor slab from 1 ft. 9 in. to 2 ft. 6 in. thick. An 18-in. curtain wall along each outside face closes the opening between the arch ring and the floor slab.



Outline Elevation of Tunkhannock Creek Viaduct Showing Progress up to January 1, 1915

In the 180-ft. spans the arch ribs are 8 ft. thick at the crown and 14 ft. wide, the intrados being semi-circular; the extrados is segmental with a radius of 111 ft. The arch ribs are spaced 20 ft. center to center, leaving a 6 ft. opening between them. They support transverse walls varying in thickness from 3 ft. 2 in. to 4 ft. 6 in., which span the center opening. These walls are connected at the top by spandrel arches of 6 ft. 9 in. radius with a crown thickness of 1 ft. 9 in. Belt courses on the walls 1 ft. 6 in. below the springing line of the spandrel arches provide seats for the centers used in building these arches. The two walls over each pier are connected at the ends by pilasters 3 ft. thick, which stiffen the spandrel system and give the appearance of a solid pier.

The floor is pitched 6 in. to the center of the transverse walls, the drainage being carried down through 6-in. pipes in these walls and discharged in the space between the arch ribs. The minimum depth of ballast is 12 in. over the expansion joints of which there are four on each span, two at the piers and one over the third transverse wall from each pier. These joints consist of a ¼-in. open space covered by a copper plate bent to project down into the joint slightly and with its edges turned down into grooves parallel with the joint, where it is held in



The General Elevation and Cross Section of the Tunkhannock Creek Viaduct

place by a mastic filling. The waterproofing is carried continuously over this plate. A parapet wall with an overall width of 3 ft. 4 in. extends 7 ft. 3 in. above the floor at the crown of the spandrel arches and the pilasters extend 3 ft. above the top of the parapet.

The general design of the Martin's creek viaduct is similar to the Tunkhannock creek bridge, except that it will carry three tracks and that seven of the eleven are 150 ft., three-centered arches, consisting of two ribs 17 ft. 6 in. wide with an open space of 12 ft. between ribs. The spandrel arches are flattened to conform with the appearance of the main arches. The total length of this structure is 1,600 ft., the base of rail is 150 ft. above the stream and 78,000 cu. yd. of concrete were required in its construction.

CONSTRUCTION OF CONCRETE ARCH VIADUCTS

The contractor's methods adopted in building the superstructures of the two large viaducts were practically the same, so that a description of the work on the Tunkhannock bridge will apply in general to the Martin's creek structure as well. As mentioned in the article on the substructures referred to above, all form material and concrete at Martin's creek were handled by derricks, while at Tunkhannock a combination of

The Abutment Span Before Completion and the Two Short End Spans of the Martin's Creek Bridge

derricks and a double cableway is being used. The center tower of this cableway was 260 ft. high for the early stages of the work and was later raised by a 40-ft. addition in accordance with its design. Two duplicate concrete mixing plants at Tunkhannock and one at Martin's creek, each with a capacity of about 40 cu. yd. per hour, were provided.

With the exception of the abutment spans in both structures, for which wooden centers supported on wooden towers were used, the arch rings were built on self-supporting steel arch centers. These were seated on benches on the sides of the piers, which in the Tunkhannock bridge are 4 ft. 3 in. wide and 17 ft. 6 in. below the springing line. The spandrel arch centers and all forms are of wood. Five sets of arch centers are used, each of which supports a single main arch rib. After the construction of one rib in a span the centers are moved over under the other rib in the same span and used again without dismantling. In order to utilize both material cables at the same time, the centers are erected on alternate sides in adjacent spans.

Each set of steel centers consists of four three-hinged arches spaced 3 ft. 10 in. center to center and thoroughly braced. The assumed loading on these centers, including the weight of the trusses, lagging and forms, is 1,370,000 lb., which produces a maximum horizontal reaction at the lower skew back pins of 261,100 lb. During the lateral movement of the centers the thrust resulting from the weight of the trusses and lagging is taken by two 1 in. rods connecting these pins. The wind load on the forms is taken by four 1¾-in. anchor bolts extending into the concrete bench on each side of the pedestals. As an added precaution, the contractor used two ¾-in. steel cable guy lines from the crown of the centers.

The four arch trusses in each set are supported by a pedestal 16 ft. 7 in. long. In order to provide for the side movement from one arch rib to the other, the base plate under this pedestal is provided with a guide rib ½ in. by 2½ in. which engages the shoulders of 6-in. rollers running on a bottom grillage. This grillage is 35 ft. 6 in. long, consisting of four 8-in. I-beams with top and bottom cover plates, the former having a guide plate to engage the rollers similar to the one on the pedestal.

The 3½-in. lagging is carried on planks set on edge over each rib with their outer edges curved to conform to the intradosal line. As the top pin is 6 ft. below the crowd of the arch, the lagging for one panel length on each side of the crown is carried on a rigid triangular frame above the top chord sections. The adjacent members of these frames over the pin are about 2 ft. apart at the crown, an oak block being supported in this space by bracket angles to carry the lagging over the joint.

The adjustment of the height of the centers necessary to strike them before removal is accomplished by changing the length of the diagonal members of the two panels adjacent to the crown. Pin connections are used in these panels to make this possible and the diagonals are each made in two pieces connected by bolts with left and right handed threads.

The centers, which have a total weight of about 200 tons, are erected by the cableway, each rib being handled in four pieces. The lower half of each semi-truss is erected first and held in position on the skewback pins by two temporary bolts through gas pipe sleeves in the concrete of the umbrella tops which bear on washer plates at the upper ends of the pipes and support a short I-beam yoke under the upper chords of the trusses. The upper halves are then erected and bolted to the lower sections, the entire semi-trusses being supported as cantilevers from the piers until the crown connections are made, converting them into three-hinged arches.

After the completion of the first rib, the centers are struck and are then jacked over on the grillage, a distance of 20 ft., to bring them under the second rib. After this rib is concreted and set, the centers are again struck and rolled into the space

between ribs where the segments can be removed one at a time by the cableway for erection in another span.

Each arch rib consists of 11 vouissoirs and the necessary connecting key sections. The corresponding vouissoirs on opposite sides of the arch are concreted simultaneously, and after the last one is placed a set of seven days is allowed before the keys are put in. Separate forms are provided for the vouissoir blocks and the key sections allowing the former to be removed for use on another span while the keys are being placed.

The End Span of the Tunkhannock Viaduct Showing the Pilasters at the Piers and the Spandrel Arches Partially Completed

All the concrete is handled in bottom dump buckets by the cableway from cars pulled by dinkey engines from the mixing plant. In most cases these buckets are dumped directly into the forms, but in the case of the spandrel walls for example, where the width of forms is not great enough to permit this, dumping platforms are used. A stiff-leg derrick was erected on the finished floor as soon as one section was completed and is moved out as the work progresses to handle the spandrel

Erection of the Steel Centers for One Span at Martin's Creek in Progress Showing Details of Crown Connection and Adjustable Members in the Top Panel of Each Semi-Truss

arch forms from under the completed floor at the sides of the bridge, thus obviating the necessity for using the cableway for eccentric loads. In hot weather each floor section is kept flooded until it has set, and in cold weather a tarpaulin cover is provided and a steam pipe run in to heat the surface. The lower section of the parapet walls up to the first offset on the

A Construction View at Tunkhannock Creek Showing Forms in Place for Spandrel Walls, Arches and Pilaster

outer surface is cast with the floor in order to avoid the appearance of a construction joint.

THE NICHOLSON TUNNEL

The excavation in the double track tunnel 3,630 ft. long near Nicholson, amounting to 146,000 cu. yd. was completed about the first of November, and work is now in progress on the lining of this bore, 1,600 lineal ft. of lining having been

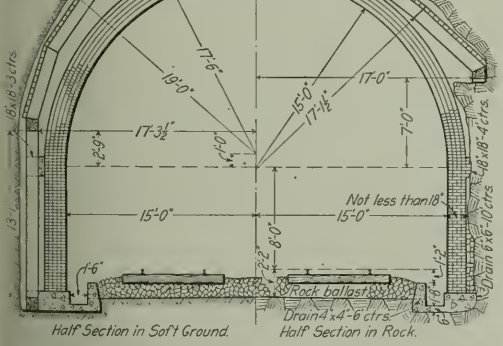
Two Spans of the Tunkhannock Viaduct in Each of Which One Rib Has Been Finished and the Centers Are Now in Place Under the Second Rib

completed. As mentioned in one of the previous articles, two shafts were driven at the third points in order to advance the work before the completion of the portal cuts, which are about 100 ft. deep, and one of which contains over 1,000,000 cu. yd. of material.

Center top headings 9 ft. by 12 ft. were driven in both directions from each shaft and also in from the west portal as soon as the cut at that end had progressed far enough to

make this possible. These headings were later widened to allow the placing of the wall plates and the 12 in. by 12 in. roof timbers, which were spaced 4 ft. center to center. The remainder of the section was excavated by a single pass of a 40-ton Marion shovel operated by compressed air. The material was shot down ahead of the shovel in two benches, the upper having a face of about 6 ft. and the lower about 12 ft. The shovel loaded the material into 6-yd. cars operated in trains of 10 by dinkey engines burning hard coal.

Two tracks were provided in the tunnel for this narrow gage equipment with a switch about 200 to 300 ft. from the working face. A train of empty cars would be pushed up to this switch on one of the tracks and the loaded cars collected by another engine on the other track. The first engine would push in two empty cars to the shovel, run back of the switch, the second engine would come up and pull out the two cars as soon as loaded, and the first engine would then set in two more. By the time the loaded train was ready to leave, another train of empty cars would arrive and the process be continued, always having two engines at the shovel to switch the cars. The haul varied from ½ mile to one mile from the portal. The shovel completed the excavation in 350 days elapsed time,



Typical Cross Section in Earth and Rock of the Nicholson Double Track Tunnel

making a progress of about 12 ft. per day of actual working time.

Three compressors located in a plant at the west end supplied air for the shovel and drills, the 10-in. air main being carried for a maximum distance of about one mile. A generator located in the compressor plant furnished electricity for lighting the tunnel during the placing of the lining, although large carbide torches and individual gasolene lights were used until the completion of the excavation.

The tunnel is being lined with vitrified brick which has been shown in extensive tests to have a high compressive strength and resistance to corrosion. The estimates showed that a concrete lining could be placed for about 60 per cent less per cubic yard than the brick, but the yardage is decreased by using the brick so that the comparison of the total costs does not show as great a difference. The proximity of unusually good supplies of brick was a factor considered in this case. The side bricks are obtained in Corning, N. Y., and the arch bricks, in Scranton, Pa. The bricks are of two sizes, those in the side walls being 2¼ in. by 4 in. by 8¾ in., and those in the arch 2¾ in. by 4 in. by 8 in. The lining is four courses thick, except in the short section of earth near the east end, where a fifth course is added.

The brick lining is carried on a concrete footing which is extended toward the tracks to form an open drain 18 in. wide and 12 in. deep. The thrust of the arch is taken by 18 in. square thrust blocks of brick at the springing line, spaced 4 ft. center to center. The space above the ring and behind the side walls is back-filled with selected rock, and 6 in. by 6 in. drains through the concrete footings at intervals of 10 ft. afford an outlet for any water collecting behind the lining. In the east approach cut where the grade is descending toward the tunnel, a vitrified pipe line for drainage will be laid with a grade sloping away from the tunnel. So far no difficulty has been encountered with water, and none is anticipated.

The concrete footings are built in 15-ft. form sections, the concrete being mixed at the top of one of the shafts and lowered by a derrick. A crusher was installed here to supply crushed stone for this concrete, using the rock removed from the tunnel. The output of the crusher was also used for the concrete in a small culvert near by.

The brick arch is being built on four 32-ft. sections of centering which are moved forward on wheels. Bricks are laid in 1:2 cement mortar mixed by an electrically operated Ransome mixer in the tunnel. A motor-driven conveyor is also used to elevate the bricks and the mortar to the working platform of the centering. The mason gang employed at present on this work can average 1,500 to 2,000 bricks per man in an eight-hour day.

The plans for this cut-off line and the construction work have been handled under the supervision of G. J. Ray, chief engineer. The designs for the large concrete arch viaducts were made by A. B. Cohen, concrete engineer. All field construction work is directed by F. L. Wheaton, engineer of construction, the residency including the Tunkhannock viaduct, the Nicholson tunnel being in charge of C. W. Simpson, resident engineer.

LAFAYETTE YOUNG ON GOVERNMENT OWNERSHIP

[From the Des Moines Capital]

The railroads are out of politics. In a political sense they are boycotted. Prove that a man is subservient to railroad influence and his defeat is certain. The conditions are much better because these achievements have been had.

Therefore, we cannot agree with Dr. Frank Crane in his desire to put all the corporations into politics. He wants the railroads, tramways, telephone and telegraph lines, and all other systems of transportation; all water-ways, all electricity, gas and the like put under the ownership of the government.

The editor of The Capital has been in nearly every country in the world, and we can say truthfully that the telegraph and telephone lines, also the railway lines, are better managed in the United States, and give better service than in any country in the world where government ownership prevails. The charges in the United States are not excessive.

In a republic where the majority rules, and the majority are in the government employ, what are the other people going to do? We very much fear that under universal government ownership American politics would become so corrupt that the government itself would go down under the weight.

Government ownership is justifiable only when private ownership everlastingly fails. Some arguments could be put up for government slaughter and packing houses; even for flouring mills. But when the transportation business is well managed, why put millions into it?

We venture the statement that very few businesses in America have been destroyed by transportation charges.

Dr. Crane points to higher conditions morally, and anticipates an appreciation of responsibility upon the part of everybody, which is not at present warranted by the facts.

The Practical Problems of Terminal Operation*

Some Seemingly Unimportant But Nevertheless Vital Considerations in Successful Yard Management

THE PROBLEM OF THE OLD YARD

By G. G. Butler
Southern Railway, Washington, D. C.

Success in yard operation cannot be secured in a day, neither does it come overnight, but rather it is the reward of concentrated thought and study of all the multifarious conditions which exist and arise between the two yellow boards which mark its geographic limits. While it has been the tendency in later years to spend much time and thought in planning the layout of new yards, into which many mechanical innovations and new ideas have been introduced, the vast majority of yards throughout the country still retain their original characteristics with new tracks and facilities added from time to time. It is in these yards of meager and inadequate facilities that the greatest personal effort is required and most generally the least credit or glory to the yard organization is given, for it seems to be the rule that as viewed from the chief despatcher's table or the chief clerk's desk, the yard that handles the greatest bulk of traffic and does not become actually blocked in so doing, regardless of the disparity in its facilities, is the better conducted yard. Yet a careful study of conditions and a fair comparison of merits and values might cause a reversal of opinion.

However, the essential qualifications of the yardmaster in either yard are measured by the same rule. Each must serve his employer, the public. The public employs the company and the company employs the yardmaster, and so the latter has a dual responsibility in all that he does. The yardmaster is one of the closest mediums of contact between the company and the public and he therefore has it in his power to do much for or much against either one, or both. When he fails or neglects his service to the patron he may expect a complaint, which usually means his appearance on the "carpet," and of course, an excessive number of attacks of that malady are not conducive to his continued signing of the payroll.

The man who has never come in close contact with the whines and complaints that can and do arise in a busy industrial yard has missed an education in itself. It therefore behooves the yardmaster to make the personal acquaintance of every patron enjoying private siding facilities and of his underlings who have any control over that part of the business. The yardmaster will therein find much to his advantage and the patron will benefit likewise. But the essential qualification of a man in charge of any yard is that he know his business and that he have the moral courage to insist upon that which is right. He then commands the respect of all with whom he deals, from the most exacting patron to the junior call boy. He must have substantial authority over his men and be a firm but just disciplinarian. He must co-operate closely with the other departments, especially the mechanical and the despatching. Much is to be accomplished by a pleasant working relationship between these two. I have found that when the yard men make an honest effort toward co-operation they are usually met half way, but when they fail to switch the store house cinder pit, sand house or coal pocket, it is not to be marvelled that a regular engine is shopped and an old "scrap heap" is furnished to worry through a day's work. Too much cannot be said of co-operation with the despatcher, for the two departments are more frequently at odds than working harmoniously, the yardmaster striving to get trains out and the despatcher trying to get trains in.

Of primary importance is the watching of yard expense. With a heavy and favorable run of business it is of course less difficult to make a "showing" than under conditions of the reverse nature. The fixed expense of the yard, including the yardmaster, his assistants, clerks, etc., will generally remain the same and superior officials are less inclined to ask a reduction in this expense then they are to want an engine discontinued. While regular switch engine schedules, with regular crews, are conducive to the best general economic results, there are times when the yardmaster would be extremely derelict were he to allow them all to work. He should closely watch the prospective movement and arrange his forces in such a way as experience has taught him will cover all requirements and at the same time permit of no waste of power. Whether he has done this conscientiously or not can be detected quickly by the superintendent in an examination of the "cost per car handled" and "cars handled per engine." In scheduling yard engines, it is well, if compatible with traffic requirements so to arrange their departing time from the engine house that at least one engine will be on duty at all times. I have never seen the yard so up-to-date but that it could not find something to keep the locomotive employed and there is thus always an engine ready to protect any emergency.

OPERATING EXISTING YARDS A PRACTICAL NECESSITY

By M. A. Mulligan
Trainmaster, Lehigh Valley, Jersey City, N. J.

As a general rule railroads have been compelled to utilize the same yards and terminals to take care of the increased business, although the rolling stock and equipment have been greatly increased and improved, and operating methods have been revolutionized to meet the intense tonnage and time requirements. The fact is, the relocation or radical reconstruction of yards and terminals involves too great an expenditure to be considered by the already overburdened railroads. Therefore, we must disregard the theorist, with his ever-ready suggestions for ideal yard and terminal layouts, and turn to the practical railroad man for a solution of the difficulties which beset the operation of our existing yards. The importance of the part played by yard and terminal facilities cannot be overestimated, as they are not only the distributing points for a railroad's equipment, but also a controlling factor in the prompt movement of its tonnage. Present conditions demand that these facilities produce the maximum efficiency at a minimum cost.

The keystone of efficiency is organization. Therefore, careful consideration must be given to the selection of the officer charged with the duty of securing proper organization and infusing the proper *esprit de corps*. Unquestionably, he must be an experienced and practical man, familiar with railroad methods, and with a faculty of applying them to the best advantage. He must be able not only to plan a detailed organization that will fit all local requirements but must be qualified to instruct each man in his duties and to know when every man is doing his duty. He must also be a strict, but just disciplinarian. He should be qualified to go into a terminal and quickly grasp the details of its classifications and methods of working, discover any weak points in its organization and be capable of either educating or reorganizing the force, making such changes in rules and methods as may be necessary to insure a smooth-running machine, not only performing its own work promptly and economically, but operating efficiently and smoothly with connecting points.

A yard, and particularly an intermediate yard, is a necessary evil on a railroad, inasmuch as it produces no revenue. To reduce the item of yard expense to a minimum, for it cannot be eliminated, it is essential to keep cars moving, avoid unnecessary switching to enable all possible reductions in engine service

*Abstracts of several of the papers received in the Contest on the Operation of Terminal Yards.

and overtime, and facilitate the movements of inbound and outbound trains to prevent congestion.

A yardmaster should keep himself familiar at all times with the trains in transit, as a guide for ordering power to handle the following day's business. All yards should classify their outbound freight, to avoid unnecessary switching and delays at other yards. If this is done it will only be necessary to switch and classify the cars originating at the intermediate yard, cars requiring shop attention and those brought in by pick-up trains. These can be assembled in one section of the yard and made up in properly classified trains, without delay. This will not only avoid delay to local cars, but will also keep foreign cars moving and thereby reduce per diem charges. Sufficient road power must always be furnished to take away the cars promptly and keep the yards open properly to do their work. Similarly, yards should not be compelled to receive trains from one division in close succession and then be forced to wait for power to arrive from the connecting division.

Yardmasters should make arrangements with the roundhouse foremen to have engines furnished with proper supplies during the meal hour. In the case of double-crewed engines this can also be done at the meal hour, but the time of boarding should be arranged so that crews are spaced one hour apart night and morning, dividing them to conform with the roundhouse organization. This will avoid paying a crew while the engine is being supplied. An emergency yard engine should always be kept available at a convenient point in the engine yard, to take the place of any regular engine that may have an accident or be disabled.

THE CAREFUL CARDING OF CARS

By James M. Fox

Yardmaster, Southern Railway, Winston-Salem, N. C.

The first step toward the successful operation of a yard consists in maintaining complete and accurate records in the office. A record of all waybills covering carload shipments of freight received should be made before the waybills are passed into the agent's office. A record of all home route cards should also be kept, and the cards filed. This record will eliminate delay in preparing a duplicate card should one become lost. Cards showing initial and number, contents, consignee and date of arrival should be placed upon all cars as soon as received, and weigh-cards upon such cars as require scaling.

Loads on which the freight is not prepaid, also those billed "shipper's order," should be carded "hold" and placed on a track set aside for that purpose. The agent's office should notify the yard office when any of these cars are ready to be placed for unloading and a clerk can then apply the proper carding. The "hold track" should be switched as often as business demands, but not less than once a day.

When billing for outbound loads is delivered to the yard office, a list (or lists) should be made, showing the initial and number of each car with the contents, location and destination, and such lists should be furnished to the foremen working in the territory where the cars are located. Cards showing the same information should be placed on each car, and where weights are necessary, cards indicating this also should be applied.

Loaded cars bearing bad-order tags should never be placed on a repair track, if in the opinion of the yard foreman, the defect is such that it will not interfere with the movement of the car to the industry to which it is consigned. This is particularly true of shipments of livestock, merchandise and perishable freight. However, in a case of this kind, all parties should be instructed not to reload the car. Preferred handling in the placing of this high class freight should never be deviated from; other freight should be placed as promptly as possible.

All cars consigned to the same industry should be kept together, and the oldest loads placed first, unless other instructions are issued. This is an easy matter where a perfect carding system is in vogue, and the foremen observe it. In the placing of cars on team or industry tracks, care should be used to push them in as far as possible in order that any available space remaining will be adjacent to the main line. This will prevent disturbing any loading or unloading of cars on this track in case another delivery has to be made during the day.

A great saving is effected by keeping a close check on the number of crews necessary to properly handle current work. Forces should never be reduced so that industries will suffer for want of attention, but on holidays and days when the industries are idle, the number of crews may often be reduced. The matter of overtime should also come in for close attention and be reduced to a minimum.

All concerned should understand that the public is entitled to courteous treatment, and should act accordingly. The yardmaster should make it a point to visit each industry as often as possible, keeping in close touch with those in charge, and seeing that their wants are being satisfactorily attended to. An exhibition of such interest goes a great way towards keeping down complaints which otherwise arise, and gives the yardmaster the opportunity to keep in close touch with every angle of his work.

FREIGHT SOLICITORS A FACTOR IN YARD OPERATION

By O. C. Hill

Assistant Superintendent, Chicago, Burlington & Quincy, Kansas City, Mo.

Freight solicitors should be selected with care and should be thoroughly familiar with all the operations of the terminal in which they are located. They are securing business on the basis of service performed, and to be performed. They work so closely with the operating department that it is hard to tell where the traffic department ends and the operating department begins, as all operating men are virtually traffic men. The general agent should receive a consist of all freight destined for his terminal from the preceding terminal. This should be given to his different solicitors, so that they in turn can take up with the consignee and obtain a prompt release on all shipments so that the cars can be carded direct from the train to the road or switching line that is to handle them to destination. By this means the handling will be direct and the cars will be kept in a regular channel.

The yardmaster must work closely with the roadmaster or general track foreman and must see that his assistants give the roadmaster and his foremen an opportunity to keep up the physical condition of the terminal to a high standard, as the length of time and the amount of work that can be turned out depends upon the condition of the tracks.

The secret of a successful yardmaster is having all of regular work well in hand at all times and then, when the necessity arises, he can deliver as the needs demand without affecting the movement of the regular business.

THE PUBLIC AND THE TERMINAL

By G. B. Schrand

Trainmaster, Chicago & North Western, Chicago, Ill.

Being public utilities, the railroads must be operated to the mutual advantage of the shippers and the owners. The public is continually demanding new concessions and greater rapidity in the handling of its business and naturally a freight terminal must conform to those demands and must adapt itself to their fulfillment. To accomplish the desired results, and to satisfy the public, we must have suitable facilities, able supervision and a balanced, experienced and loyal organization.

Granted that facilities are adequate, supervision and organization are next in importance. Supervision should be properly taken care of first and then we must work for a proper organization. In this organization we must not lose sight of economy and the proper distribution of forces, manual and clerical.

To facilitate car movements our company has adopted and is now carrying out successfully an embargo system which is controlled by an embargo bureau located in and operated in harmony with its Chicago freight terminal. The establishment of this bureau solved a big problem for our company.

General News Department

The receiver of the Buffalo & Susquehanna has been authorized by the court to continue the operation of the road until March 1.

A press despatch from Vera Cruz, Mexico, February 2, announced the re-opening of the railroad between that place and Mexico City, with a passenger train running through for the first time since November 19.

A petition was presented last week to the Kansas legislature, signed by several hundred persons in Labette, Coffey, Woodson and Sedgwick counties, asking that the legislature, during the present session, be lenient in the matter of anti-railroad legislation. "Drastic legislation will work no benefit to the traveling public," the petition stated, "and bills of this nature should be defeated."

Foley Brothers and the Northern Construction Company have begun suits at Toronto, in mechanics' lien proceedings against Mackenzie, Mann & Company to recover $4,276,667 balance alleged due on a $17,578,637 contract for the building of the Port Arthur-Sudbury section of the Canadian Northern Railway. Foley Brothers are incorporated under the laws of Minnesota.

The general offices of the National Railways of Mexico were recently moved from the City of Mexico to Torreon. All of the records of the company were moved, and the new offices are occupied by the full working force of clerks. There is some talk that the change may be made permanent, irrespective of the outcome of the revolutionary troubles, as Torreon is considered the logical operating center of the government-owned system.

The Secretary of the Interior has recommended to Congress an appropriation of $2,000,000 for the use of his department in the work of building the proposed government railroad in Alaska. An appropriation of $1,000,000 was made at the last session of Congress. The secretary has not yet reached any decision as to the purchase of the Copper River & North Western or the Alaska Northern, both of which roads may be included in the proposed government system.

Representatives of engineers', firemen's, conductors and trainmen's brotherhoods have been holding conferences with the management of the San Antonio, Uvalde & Gulf, protesting against a proposed reduction in the wage rates of employees on the road, which the road had announced would become effective February 1. The road proposed to reintroduce the scale which was in effect about a year ago. Since that time most of the employees have received advances which the road now says it is unable to pay on account of decreased revenues.

The American Museum of Safety, William H. Tolman, director, will make its annual award of medals next Wednesday evening, February 10, at 8:30 o'clock, at the United Engineering Societies Building, 29 West Thirty-ninth street, New York City. The E. H. Harriman Memorial medal for the American steam railroad, which during one year has been the most successful in protecting the lives and health of its employees and of the public, goes this year to the New York Central. The Anthony N. Brady medal, for a similar purpose, awarded to an electric railway, goes to the Boston Elevated.

The Baltimore & Ohio, the Erie and the Pennsylvania, and presumably all of the other principal eastern roads have put in effect the revised tariff of demurrage charges on refrigerator cars containing perishable freight, which has been under consideration for several months. The usual free time is allowed, two days; for the next three days the regular rate, one dollar a day; for the next three days $3 a day, and thereafter $5 a day. The new charge has received the endorsement of the National Industrial Traffic League, the National Poultry, Butter and Egg Association, Western Fruit Jobbers' Association, International Apple Shippers' Association, North Pacific Fruit Distributors and New York State Cold Storage Association.

Thomas W. Hulme, general secretary of the Presidents' Conference Committee for the Federal Valuation of Railroads, has issued a statement showing the manner in which the information required by the government regarding the acquisition of lands has been prepared in three separate instances in conformity with those requirements, as an example of the manner in which such information should be prepared. The three instances, all of which are on the Northern Pacific, include a 68-mile extension of a branch line in western North Dakota, where land was cheap and the road was desired by the residents; the acquisition of terminal property for a passenger coach yard in St. Paul, where about half of the land was secured before the identity of the purchaser became known; and an extension into a community in eastern Montana, which was already served by railway facilities and where the road was not desired by the farmers.

Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York City, and also of the New York Railways Company, operating surface street railways in New York, has issued a pamphlet showing the unfavorable aspects of motor bus traffic in large cities; the purpose being to induce the authorities of New York to refuse franchises to operate motor omnibuses in the street. About two years ago applications were made for such franchises, and at once Mr. Shonts sent two of his men to London and Paris to study the transportation facilities of those cities, with particular reference to omnibuses and their effect on the fortunes of the city. This report is the result of the investigations thus made. The investigators declare that unlimited motor-bus competition in New York would seriously impair the traffic and income both of the subways and the street railways, while at the same time it would mean greater congestion in the streets, more street accidents and serious financial losses to the city, which owns the subway; and without commensurate benefit to the people.

Illinois Roads Begin Campaign for Increased Passenger Fares

The railroads of Illinois are going to try their case for an increase in passenger fares in the state in the court of public opinion, with "a campaign of candor." As a first step in the campaign, a committee of railway presidents called on Governor Dunne at Springfield on Wednesday to submit to the governor the intention of the roads to ask the people and their representatives for an amendment to the law of 1907, which reduced the maximum passenger fare from three cents to two cents a mile, so that the maximum rate may be restored to 2½ cents.

President Markham of the Illinois Central issued the following statement as to what the railroads want and how they propose to go frankly to the public to get it from the legislature:

"Everybody knows there has been an increase in the cost of railway operation, without a corresponding revenue increase to offset it. President Wilson has indorsed the interest of the whole public in the proper maintenance and complete efficiency of the railroads.

"The Interstate Commerce Commission, after searching investigation, has found that a serious defect in the railroad situation and a drag upon proper maintenance and complete efficiency is the inability of the railroads to get a sufficient return from their passenger service. Citing the advance in passenger fares in New England, the commission has also expressed a belief that the public will acquiesce in similar action wherever it is shown to be necessary; that the people are willing to pay for the improved service they demand; and that an effort should be made, where two-cent laws are in effect, to secure an advance. As evidence of its own attitude toward passenger fares, the commission has recently accepted interstate passenger tariffs based on a rate of 2½ cents a mile in Illinois.

"The relief suggested by the commission can be had in Illinois only by consent of the people through their representatives in the state legislature, with approval by the governor.

"In consequence of this situation and of the commission's find-

ings, the railroads of Illinois have decided to present their case directly to the people. As the first step the presidents of Illinois railroads will call upon Governor Dunne, who has kindly consented to give them a hearing. Later, the railroads will try to get all the facts of this passenger fare question before all the people. Railway officials will appear before commercial, industrial, labor and civic organizations and public meetings throughout the state, wherever such meetings can be arranged, to make clear to the public just what the railroads need and why they should have it, and to answer fully and frankly all questions asked.

"In due time a bill will be presented in the legislature for restoration to the railroads of half of what was taken away from them in 1907 by legislative action, or for a maximum rate of 2½ cents per mile. The railroads believe the people will endorse this bill after they have learned all the facts in the case, and the purpose of the railroads is to give the people 'the truth, the whole truth and nothing but the truth.' Already arrangements have been made for meetings beginning next week at Galena, Rockford, Freeport, Joliet, Ottawa, Polo, Mendota, Sterling, Dixon, DeKalb, Belvedere, La Salle, Peru, Peoria, Monmouth, Galva and Galesburg.

Chicago Railway Equipment Company Annual Dinner

At the annual dinner of the Chicago Railway Equipment Company, held at the Union League Club, in Chicago, on Tuesday evening, February 2, the subject for discussion was "The Business Man and the Future, His Duties and Opportunities."

Papers on various phases of the subject were read by E. B. Leigh, president of the Chicago Railway Equipment Company; Samuel O. Dunn, editor of the *Railway Age Gazette;* J. R. Chapman, vice-president of the Continental & Commercial National Bank; C. S. Gleed, chairman of the Missouri & Kansas Telephone Company; A. H. Mulliken, president of the Pettibone & Mulliken Company, and W. A. Smith, editor of the Railway Review. The meeting was attended by the officers and directors of the Chicago Railway Equipment Company and by numerous persons connected with other large interests, and after discussion resolutions were adopted setting forth several reasons for the need of concerted action by the business interests of the country regarding legislation and expressing the view that the Chamber of Commerce of the United States seemed to be the only great business organization from which could issue a movement for organizing the business men of the country. A telegram to this effect was therefore sent to the Chamber of Commerce of the United States in session at Washington urgently requesting it to give careful consideration at its meeting to this suggestion and to appoint a committee to devise ways and means for mobilizing the entire business forces of the country to the end that business may speak and act as an intelligent and forceful unit on the many questions which so vitally effect it.

Proposed Railway Legislation

A bill has been introduced in the Alabama legislature to require all locomotives in the state to be equipped with electric headlights.

* * *

The Iowa railroads have announced that they have appointed a committee to petition the legislature to repeal the state two-cent fare law and substitute for it a law allowing a fare of 2½ cents a mile.

* * *

The Minnesota railroads have asked the legislature to amend the state passenger fare law to empower the state railroad and warehouse commission to authorize increases in passenger rates, if, after an investigation, it finds that increased rates would be reasonable.

* * *

A bill has been introduced in the Oklahoma legislature to require each railroad company operating in the state to maintain a hospital for employees within the state. Other bills before the legislature are the full crew bill and the car limit bill. Petitions have been received by the legislature from the commercial clubs of several towns protesting against the enactment of any anti-railroad legislation.

Representative Clark of Florida has introduced in Congress a bill to require the provision of separate cars for negroes by all transportation companies in the district of Columbia. The bill has been reported favorably by the committee on the District of Columbia, but there seems little chance that it will be acted on seriously at the present session of Congress.

* * *

A bill has been introduced in the Arizona legislature for the purpose of encouraging the construction of railroads. The law exempts from taxation for a period of 10 years all the property of any company which shall, during 1915, after having filed notice with the secretary of state of its intention to do so, begin the construction of a line of railroad or street railroad in the state, provided work shall be started within six months after such notice and that not less than 2 miles of track shall be laid during each 30 days.

* * *

A bill has been introduced in the Senate of Virginia which, if adopted, will more than double the taxes now paid by the steam railroads in Virginia. The purpose of the measure is to make uniform assessments and taxation and to abolish the state franchise tax. The franchise tax is repealed outright and all property of the roads, of all kinds and descriptions, is subjected to state, city, county and district taxes. The supporters of the measure allege that the value of the railroad property in Virginia was reduced from $304,327,509 to $121,530,081, because the State Corporation Commission, in ascertaining and assessing the value of property, reduced the value by capitalizing the franchise tax on the basis of 35 cents on $100, and then deducting this sum from the actual valuation. This is claimed to be an injustice to the other taxpayers of Virginia.

Locomotive Spark Arresters

The Railway Commission of Canada proposes to prescribe the use of special spark arresters for locomotives burning non-coking coals, and has issued a circular (No. 141) calling for suggestions. The circular says that during the past two years, numerous complaints have been received as to fire danger resulting from the use as locomotive fuel of certain classes of western coals. It appears from analyses that the coals in question are not lignites, but that in each case where such trouble has occurred the coal has poor coking properties, or is non-coking. It is considered essential that some steps be taken to reduce to normal proportions the fire hazard resulting from the use of such coals, and to meet this situation, the board has under consideration the advisibility of amending Regulation 2 of General Order 107 by adding the following:

(c) There shall be such special spark-arresting device, other than the above, as may be approved by the board, on every engine burning coal which has poor coking properties or is non-coking, the use of which, as locomotive fuel, is not prohibited by Regulation 7 of this order.

All parties interested are requested to submit their comments to the board, in writing, not later than February 20.

Railway Business Association

The general executive committee of the Railway Business Association for 1915 is announced as follows, being made up of the elected president, treasurer and vice-presidents and the appointed executive members:

President, George A. Post; treasurer, M. S. Clayton; vice-presidents, S. P. Bush, Alba B. Johnson, H. G. Prout, W. G. Pearce, W. H. Cottingham, W. B. Leach, E. B. Leigh; executive members, J. C. Bradley, W. E. Clow, J. S. Coffin, O. H. Cutler, Henry Elliot, Irving T. Hartz, F. T. Heffelfinger, H. H. Hewitt, J. M. Hopkins, A. M. Kittredge, Robert P. Lamont, F. J. Lanahan, W. H. Marshall, Stephen C. Mason, A. H. Mulliken, Rudolph Ortmann, S. F. Pryor, W. W. Salmon, Justus H. Schwacke, G. W. Simmons, Geo. T. Smith, James S. Stevenson, H. H. Westinghouse, W. W. Willits.

National Association of Scale Experts

The eleventh semi-annual meeting of the National Association of Scale Experts was held in the Fort Dearborn hotel, Chicago, February 1, 2 and 3. Five business sessions were held, at which papers were presented on various phases relating to design, installation and maintenance of scales. Among the pa-

pers of interest to railway men were the following: "Installation, Maintenance and Care of Track Scales," by A. Malmstrom, chief scale inspector, Santa Fe System; "Test of Railroad Track Scales," by D. J. McGrath, scale expert of the state of Minnesota; "Weighing and Recording of Weights," by L. M. Allen, district superintendent, Western Weighing & Inspection Bureau, Omaha, Neb., and "Recording Weights," by F. C. Maegly, assistant general freight agent, Santa Fe System, Chicago.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, April, 1915, Richmond, Va.

American Association of Dining Car Superintendents.—H. C. Boardman, D., L. & W., Hoboken, N. J. Next meeting, October, 1915.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 21-24, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, March 2-3, San Francisco, Cal.

American Association of Railroad Superintendents.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

American Electric Railway Association.—E. B. Burritt, 20 W. 39th St., New York. Annual convention, October, 1915, San Francisco, Cal.

American Electric Railway Manufacturers' Association.—H. C. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

American Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, Chicago.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, Atlantic City, N. J.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Railway Safety Association.—L. F. Shedd, C. R. I. & P., Chicago.

American Railway Tool Foremen's Association.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July, 1915.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Manufacturers of Chilled Car Wheels.—George W. Lyndon, 1214 McCormick Bldg., Chicago.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Next meeting, June 23-25, Niagara Falls, N. Y.

Bridge and Building Supply Men's Association.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

International Railway General Foremen's Association.—Wm. Hall, 829 W. Broadway, Winona, Minn. Next convention, July 14-17, 1915, Sherman House, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

Maintenance of Way and Master Painters' Association of the United States and Canada.—T. J. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 26 to 28, 1915, Chicago, Ill.

Master Car and Locomotive Painters' Association of the United States and Canada.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-17, 1915, Detroit, Mich.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

Railway Business Association.—Frank W. Noxon, 30 Church St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Fire Protection Association.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Society of Railway Financial Officers.—Carl Nyquist, C. R. I. & P., La Salle St. Sta., Chicago. Annual meeting, September, 1915.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next regular meeting, January 21, 1915, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimontbly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Despatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, September, 1915, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

The formal opening of the Panama Canal has been postponed from March to July.

The Chicago Transportation Association will hold its eighth annual dinner on Thursday, February 11, at the Hotel Sherman, Chicago. Luther M. Walter will be the principal speaker.

Examiner Brown of the Interstate Commerce Commission began a hearing in Cbicago on Tuesday, on the discontinuance of the absorption of tunnel and lighterage charges by the trunk line railroads.

An embargo on transportation of livestock was again imposed at Chicago last week, a case of foot-and-mouth disease having been discovered. It was expected that the interruption to business would be of short duration.

The Louisville & Nashville Railroad has withdrawn its request lately presented to the Alabama Railroad Commission to allow an increase in the passenger rate from 2½ cents to 3 cents a mile, on all branch lines. Action has been postponed by the commission indefinitely.

The New York Central reports having taken a whole train load of Argentine Republic exhibits from New York destined to the Panama Pacific Exposition, San Francisco. This is one of the largest exhibits from any foreign country. The Central reports also that the inquiries for information as to fares, routes, etc., are now of record breaking proportions. The passenger department estimates that if a tenth of the people who make such inquiries go to the Exposition the travel will far eclipse anything that was expected two months ago.

J. B. Ford, assistant general freight agent of the Cincinnati, New Orleans & Texas Pacific, has issued a circular to local agents and to interested shippers telling in detail of a large number of opportunities for foreign trade, the information being set forth after the fashion which is followed in the circulars of the Department of Commerce at Washington. Mr. Ford's circular dated January 26 fills five pages, and gives names and addresses, with details, more fully than does the government. A whole page is taken up with descriptions, including dimensions, etc., of cotton mill machinery wanted by Ramon Sosa, of Asuncion, Paraguay.

The railroads in the Western Passenger Association, operating through the territory west of Chicago and St. Louis to the Rocky mountains, have filed tariffs with the Interstate Commerce Commission to become effective on March 1, increasing their interstate passenger fares from a basis of approximately 2 cents to a basis of approximately 2½ cents a mile. These tariffs are similar to those filed by the eastern railroads, which became effective in December without suspension by the Interstate Commerce Commission. The following table shows the increases from Chicago to various important cities:

	Present rate	Proposed rate
St. Paul	$8.05	$10.00
Omaha	10.15	12.25
Kansas City	10.15	12.50
Duluth	9.29	11.43
Sioux City	10.30	12.75
Des Moines	7.17	9.00

Meanwhile the western roads, as well as those in Ohio, Indiana and Michigan, are preparing to push actively their campaigns to secure a repeal of the 2-cent fare laws and the substitution of laws allowing 2½ cents a mile in the several states.

Like Old Times

The Baltimore & Ohio and other railroads in trunk line territory have been authorized by the Interstate Commerce Commission to establish immigrant rates from New York, Philadelphia, Baltimore, Boston, Providence and New Bedford, to points in Canada west of and including Winnipeg, on the Grand Trunk Pacific, lower than the fares to intermediate points in Minnesota and South Dakota. Authorization was given also to roads in the same territory to make rates of the same kind to points in British Columbia on the Great Northern lower than to intermediate points in the United States.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

New York Dock Railway Refused Joint Rates

New York Dock Railway v. Baltimore & Ohio et al. Opinion by Commissioner Clark:

The commission finds that the trunk lines need not establish through routes and joint rates with the New York Dock Railway on traffic between complainant's stations on the Brooklyn (N. Y.) water front and points on defendants' lines in and west of trunk-line territory. The New York Dock Railway at the present time receives for its services to defendants 4½ cents per 100 lb. on all freight, except grain in bulk for track delivery, originating at or destined to points west of the western termini of the trunk lines; three cents per 100 lb. on all freight originating at or destined to points on and east of the western termini, and three cents per 100 lb. on all grain in bulk for track delivery.

The railway has trackage at the Fulton, Baltic and Atlantic terminals of the New York Dock Company. It has been operated separately as a railway since October 1, 1912. Its capitalization is $500,000, $450,000 preferred stock, and $50,000 common stock, but the only stock that has been issued is $3,000 preferred stock, all of which is owned by the dock company. Only the common stock, none of which has been issued, has voting power. Most of the directors of the railway are officers of the dock company, and the principal officers of the two organizations are the same.

The property of the New York Dock Railway is adjacent to the Jay Street Terminal, the Brooklyn Eastern District Terminal and to freight stations of the Lackawanna and the Pennsylvania railroads, and there seems to be no public demand for the joint rates requested. The commission feels that where the general public involved is adequately served, where there is no apparent necessity or demand on the part of shippers for the establishment of joint rates, and where there are no absolutely unreasonable rates, practices or discriminations, the commission cannot view with favor an effort to require the establishment of such routes and rates merely to enable a carrier to wrest from its connections or an agent to wrest from its principal greater compensation. (32 I. C. C., 558.)

Hearing on Spotting Charges

A hearing at Chicago before Examiner Pattison on the tariffs filed by the eastern railways imposing charges for spotting cars was concluded in Chicago last week, and it was announced that further hearings had been arranged to be held at Cincinnati on Monday, at Cleveland on Saturday of this week, at Pittsburgh on February 11, at Boston on February 19, and at New York on February 25. The Chicago hearing was confined to tariffs applying to industrial plants in Indiana, Michigan and Illinois. It was announced by the carriers that they would not at the Chicago hearing introduce any testimony as to the fairness or reasonableness of the charge, but that such testimony would be offered later. Eugene Morris, chairman of the Central Freight Association, in addition to his testimony as reported last week, told of a meeting of the Central Freight Association at which the Interstate Commerce Commission's decision in the industrial railway case was discussed, and said that as a result of that opinion the spotting tariffs had been filed. Mr. Morris explained that, as provided in the tariffs, the charge for spotting would apply in the following typical cases:

"1. Upon tracks of industries where plant service has been performed by the industrial or plant facility having its own power and an allowance has heretofore been made therefor but canceled, and the connecting or road-haul carrier may hereafter be called upon to perform such plant service, and it is practicable to do so.

"2. Upon tracks of industries upon which the engines of the road-haul or connecting carrier and power of the plant have heretofore performed the service and divided the cost as between the plant and the carriers.

"3. Upon plant tracks in cases where two or more carriers

reach the industry, and for operating reasons each carrier contributes a certain number of engines and prorates the actual cost.

"4. Industrial plant tracks upon which the engines of the road-haul or connecting carrier have performed the service at their expense, or when one carrier has performed the service and divided the expense among two or more carriers reaching the tracks of the plant."

The other witnesses were operating officers who described in detail the physical conditions at the various plants. They were cross-examined by John S. Burchmore, attorney for the National Industrial Traffic League, and by other attorneys representing the shippers.

STATE COMMISSIONS

The Massachusetts Public Service Commission has again suspended, until March 1, or until further orders, the proposed advances in passenger fares filed with the commission by the principal railroads of the state several weeks ago.

The Railroad Commission of Louisiana has issued an order, No. 1,856, forbidding the railroads to charge "car rental" on cars containing freight "transported from one point to another within prescribed switching limits at published switching rates, or elsewhere in the state of Louisiana." Apparently the car rental charge is something that has been collected by railroads in addition to the usual demurrage charge.

The Public Service Commission of Pennsylvania on complaint of residents of East Berlin holds that the East Berlin Railroad Company must before February 1 resume the running of freight and passenger trains; and this notwithstanding the fact that the company has become virtually bankrupt because of the small volume of traffic. It is held that the charter of the road is a contract between the state and the company, and until the charter has been surrendered or the state has declared it forfeited the contract must be carried out. The line of the road is seven miles long from East Berlin to a connection with the Western Maryland.

The New York Public Service Commission, Second district, has suspended new regulations, proposed by the principal railroads, by which they would make shippers of bulk freight pay for the bulkheads or temporary doors needed in shipping bulk commodities, such as fruit, vegetables and salt. It has hitherto been the custom of the railroads to supply these doors, or, where the shippers supplied them, to make an allowance of fifty cents each, not exceeding two dollars a car. The commission will shortly set a date for a hearing. The railroads had furnished this service to shippers under an order of the commission made in 1909 on the complaint of the New York State Shippers' Association, which order expired this month.

COURT NEWS

The Supreme Court of the United States has declared void, as an interference with interstate commerce, an order of the Louisiana Railroad Commission, requiring the railroads of that state to establish switching tariffs, to apply on both interstate and intrastate freight.

The Supreme Court of Appeals of West Virginia has held a consignor responsible for charges on freight refused by the consignee. It was in the suit of the Baltimore & Ohio against the Luella Coal & Coke Company. The court says that in the absence of a special contract, a shipper of coal in carload lots to a consignee who declines to receive it is liable to the carrier for the freight charges and also for demurrage accruing after he had notice of the consignee's refusal.

The Supreme Court has this week held that local commerce between the mainland of a state and an island belonging to it is subject to state regulation. The decision was announced in a suit brought by the Wilmington Transportation Company to enjoin the California Railroad Commission from regulating rates between San Pedro, on the mainland, and Avalon, on Santa Catalina Islands, 27 miles away. The transportation company claimed the commerce was carried on the high seas and thus was subject only to federal regulation.

The Supreme Court of the United States has declined to review the decision of the Fifth Circuit Court of Appeals in a test case involving claims for damages against the Louisville & Nashville on alleged forged bills of lading issued to Knight, Yancey & Company, Alabama cotton brokers, who failed. The lower court held the railroad not liable. The claims against carriers which were presented for losses in connection with fraudulent bills of lading, issued by connivance or negligence on the part of the station agents, at or about the time of the Knight-Yancey failure, amounted to more than $2,500,000.

The supreme court of Arkansas has rendered a decision under the full crew law of that state, deciding in favor of the state in a case which had been appealed by the St. Louis & San Francisco, which had been fined for violation of the law. The railroad appealed on the ground that the act, which applies to railroads operating lines more than 50 miles long, does not apply to it because it does not have 50 miles of continuous mileage in Arkansas. The court held that the act applies to all railroads of more than 50 miles that enter Arkansas, no matter what portion of the tracks may lie in the state. Attorneys for the railroad announced that the decision would be appealed to the United States Supreme Court.

The New York State Court of Appeals, in the case of the Public Service Commission against W. H. Mendel, proprietor of the parcel checking room at the Grand Central terminal in New York City, has decided against the commission. This proceeding was begun some time ago on a complaint charging that the fees collected (ten cents) were exorbitant. Mr. Mendel before the commission, refused to give certain testimony, whereupon the commission carried the case to the courts. The courts decline to compel Mr. Mendel to testify as to the financial condition of his business; they hold that it is a private business and that the accident of location does not put him under the jurisdiction of the commission. The Mendel family has had this "concession" at the Grand Central for more than 40 years.

Fencing Statute Applies to Live Stock Only

The Supreme Court of Montana holds that the statute, Rev. Codes, §4,308, requiring railroads to fence their tracks and maintain cattle guards, and making them liable for killing stock on their roads in case they do not maintain fences and guards, protects live stock only. Failure to maintain a fence does not render a road liable for the death of a child who had entered on the unfenced tracks and was run over. (Nixon v. Montana, W. & S., 145, Par. 8.)

Federal Employers' Liability Act

In an action under the Federal Employers' Liability Act for the death of a switchman, it appeared that the deceased was employed by the defendant in its yards at Oelwein, Iowa, making up a train destined for Minnesota, some of the cars to be set out at stations in Iowa, and some carrying local freight to be unloaded on the way. Some of the cars, destined for points in Iowa, originated in Iowa, and some came from points in Illinois. These cars, some intrastate and some interstate, were being made into the Minnesota train. The deceased was run over by an intrastate car and the negligence found was in respect of the brake-step of an intrastate car. It was held that the defendant was at the time engaged as a common carrier in interstate commerce and that the deceased was employed by it in such commerce, and that the Federal Employers' Liability Act applied. (Crandall v. C. G. W., Minnesota Supreme Court, 150, N. W., 165.)

Construction of Statute Fixing Passenger Fares

By Minnesota laws 1913, C. 536 (Gen. St., 1913, §§4,286, 4,287), no railroad company shall charge for transporting any passenger any sum in excess of the following prices, viz.: For a distance not exceeding five miles, three cents a mile; for all other distances, two cents a mile. Construing this act, the Minnesota Supreme Court holds that the language of the act is ambiguous. It is uncertain whether the legislature intended to authorize a railroad company, when the distance exceeds five miles, to charge three cents a mile for the first five miles, and two cents a mile for the additional distance, or only to charge the lower rate for the entire distance. The act is therefore open to construction.

Considering the probable object of the legislature in granting the three cent rate, and the absurd result of the last-named construction, which would allow the carrier to charge 15 cents for five miles, and only 12 cents for six miles, and 14 cents

for seven miles, and that this would be in direct violation of the state statutes prohibiting unequal or unreasonable transportation charges, the act is construed to mean three cents a mile for the first five miles and two cents a mile for the additional distance. (State v. Chicago, M. & S. P., 150 N. W., 172.)

Eminent Domain—Extent of Interest Acquired

The Supreme Court of North Carolina holds that in condemning a right of way, under ordinary proceedings, a railway acquires an easement in the property, to be held and used as the necessities and well-ordered management of the road may require; and the officers of the company are made the judges of the extent and necessities of this use.

To the extent that the land covered by the right of way is not presently required for the purpose of the road, the owner may continue to occupy and use it in a manner not inconsistent with the full and proper enjoyment of the easement. It is very generally held that, while a railroad company may not use or license the use of its right of way or station grounds for purposes strictly individual or private, it may erect thereon any and all buildings reasonably required for the convenience of the company as a corporation and a promotion and furtherance of its corporate business, and what it may do for itself and for like purposes it may permit or license to its patrons to the extent that it does not hinder or interfere with the proper performance of its duties to the public. It was held that a railroad company could lease a part of the land condemned for its station grounds to a party who erected thereon a warehouse used for receiving and shipping freight in his wholesale business and who covenanted to make the railroad company his preferred line for the transportation of merchandise to and from such warehouse. Coit v. Owenby, Wofford Co., North Carolina Supreme Court, 81 S. E., 1,067.

Construction and Maintenance of Private Side Tracks; Powers of Legislature and Railroad Commission

The Michigan Railroad Commission, in a recent decision, held that railroad companies agreeing to construct and maintain private side tracks should not insert in their contracts requirements providing (a) that the railroad company shall have priority of right to the use of the side track when constructed upon the shipper's premises and at his expense, or when, after construction by the railroad company, it has been paid for by such shipper; (b) that during the time such side track remains the property of the shipper the railroad company may extend the track through the shipper's premises without his permission; (c) that the railroad company may, at its option, if the shipper fails to comply with the contract, discontinue the service and remove the track; (d) that the shipper on whose premises and at whose sole expense the side track was constructed must route his freight over the operating line; (e) that the shipper must assume risk of fire and release the railroad from all liability for loss or injury by fire; (f) that the shipper maintain a clearance as to said side tracks to exceed 22 ft. overhead and 6 ft. from the rail on either side thereof. The Supreme Court of the state holds that this decision is invalid, because, though the duty to maintain and operate side tracks is absolute, no universal rule governing the conditions under which the duty shall be performed can be made. The reasonableness of an order requiring performance of the duty depends upon the peculiar circumstances of each case; the decision is a practical denial of a hearing in each case where one is desired, and a prejudgment of the rights of railroad companies.

What the commission did, the court said, was, not to administer, but enact, a law. The legislature alone can impose upon railroads the duty to construct private side tracks. When the complaint was made, it had imposed no such duty. Having the right to construct or refuse to construct or maintain a particular track, the complainant had the right to impose the terms upon which it would construct and maintain it. After the complaint was made, and before the decision of the commission was handed down, the legislature imposed upon railroads the duty to build spur tracks to and upon the grounds of shippers on certain terms and subject to certain contingencies. (Michigan Public Acts, 1909, Act No. 300, §6, subd. "b.") Even if that legislation should be held invalid, it was nevertheless an expression of legislative opinion that the commission had no such powers as it had assumed in the matter. (Grand Rapids & Indiana v. Railroad Commission, 150 N. W., 154.)

Railway Officers

Executive, Financial, Legal and Accounting

W. A. Webb, general manager of the Missouri, Kansas & Texas, has been appointed vice-president, with headquarters at Dallas, Tex.

Colonel J. J. Slocum has been elected president of the Tennessee, Alabama & Georgia, and E. C. Osborn has been elected treasurer, both with headquarters at New York.

B. B. Young, chief clerk to the first vice-president of the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis at Pittsburgh, Pa., has been promoted to assistant secretary.

L. J. Brinkman has been appointed freight claim agent of the Michigan Central, the Chicago, Kalamazoo & Saginaw, the Detroit & Charlevoix, and the Detroit Terminal, with office at Detroit, Mich., to succeed J. M. Eedson, resigned.

D. D. Curran, president and general manager of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with office at New Orleans, La., has been elected chairman of the board of directors. Larz A. Jones, vice-president and controller at New Orleans, has been elected president and general manager, succeeding Mr. Curran, and T. F. Steele, freight traffic manager at New Orleans, has been elected vice-president and traffic manager.

G. S. Waid, whose appointment as general manager of the Sunset-Central Lines, with headquarters at Houston, Tex., has already been announced in these columns, was elected vice-president and general manager of the Galveston, Harrisburg & San Antonio, effective December 1, 1914; also of the Houston & Texas Central, the Houston East & West Texas, and the Texas & New Orleans, effective January 12, 1915, and of the Houston & Shreveport, effective January 13. Prior to December 1, 1914, Mr. Waid was assistant general manager of the companies named and on that date was appointed general manager succeeding W. G. Van Vleck, deceased, who was vice-president and general manager, the vice-presidency in each case remaining vacant from the date of Mr. Van Vleck's death on November 10, 1914, until the election by the several boards of directors of Mr. Waid as his successor, as above noted.

Albert H. Harris, general counsel of the New York Central, announces the appointment of the following seven officers in the legal department with assigned territories as indicated, with slight exceptions: Alexander S. Lyman, general attorney, New York (states of New York, Pennsylvania and New Jersey); Frank J. Jerome, general counsel, Cleveland (Ohio and portions of New York and Pennsylvania); Robert J. Cary and Bertrand Walker, general counsel, Chicago (Illinois, Indiana and Michigan); Samuel H. West, general attorney, Cleveland (Ohio and portions of New York and Pennsylvania); Charles C. Paulding, solicitor, New York (in charge of legislative matters in New York and New Jersey); Frank V. Whiting, general claims attorney, New York, in charge of claims for injury to persons and for loss and damage to property, except such as are subject to the jurisdiction of the traffic or accounting departments.

Operating

W. E. Williams, general superintendent of the Missouri, Kansas & Texas, has been appointed general manager, with headquarters at Parsons, Kan.

A. E. Pistole, trainmaster of the Texas & Pacific at Marshall, Tex., has been appointed superintendent of terminals at Fort Worth, Tex., succeeding A. W. Montague, deceased.

H. McCall, division superintendent of the Grand Trunk Pacific at Edson, Alberta, has been transferred to Melville, Sask., in a similar capacity, succeeding G. S. Cooke, resigned. A. Kilpatrick succeeds Mr. McCall.

W. R. Dawson, assistant superintendent of the Pocahontas division of the Norfolk & Western, at Bluefield, W. Va., has been appointed assistant to the general manager, with office at Roanoke,

Va., succeeding G. W. Merrell, deceased. L. C. Ayers, assistant superintendent of the Scioto division, at Portsmouth, Ohio, succeeds Mr. Dawson, and H. T. Reinicker, roadmaster at Shenandoah, Va., succeeds Mr. Ayers.

C. O. Jenks, superintendent of the Lake district of the Great Northern, with office at Superior, Wis., has been appointed general manager of the Spokane, Portland & Seattle, with headquarters at Portland, Ore., succeeding W. D. Scott, deceased.

Amos G. Manahan, special agent of the operating department of the New York, Philadelphia & Norfolk, at Cape Charles, Va., was retired on January 1, under the pension rules of the company, after a service of 57 years and 9 months on the Pennsylvania system.

C. E. Crosby, transportation superintendent of the Carolina & North Western at Chester, S. C., has been appointed superintendent in charge of transportation, maintenance of roadway and equipment, with headquarters at Chester, and his former position has been abolished.

R. C. Andrews, superintendent of the Eastern division of the Texas & Pacific, with headquarters at Marshall, Tex., has been appointed assistant general superintendent, with office at Dallas, Tex. William Lynch, superintendent of the New Orleans division, at New Orleans, La., succeeds Mr. Andrews, and J. H. Elliott succeeds Mr. Lynch. H. F. Bickell has been appointed inspector of transportation, with headquarters at Dallas, Tex.

A. M. Marion, chief clerk to the general superintendent of freight transportation of the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis at Pittsburgh, Pa., has been promoted to the newly created position of assistant to the general superintendent of freight transportation, and S. M. Rankin, chief clerk to the general superintendent of passenger transportation at Pittsburgh, has been promoted to the newly created position of assistant to the general superintendent of passenger transportation.

Lewis Warrington Baldwin, whose appointment as general superintendent of the Illinois Central and Yazoo & Mississippi lines south of the Ohio river, with headquarters at New Orleans, La., has already been announced in these columns, was born on February 26, 1875, at Waterbury, Md. He was graduated from Lehigh University in 1896, and began railway work in July of that year with the Illinois Central, with which road he has remained ever since. He was consecutively chainman, rodman and assistant engineer until June, 1898; the following three months assistant engineer on maintenance work, and from September, 1898, to January, 1900, assistant engineer on location and construction. He was then for one year supervisor of track; from February, 1901, to September, 1904, roadmaster, and from the latter date to April, 1906, trainmaster. The succeeding four years Mr. Baldwin was superintendent, being appointed engineer maintenance of way at Chicago in May, 1910. In April, 1913, he became superintendent of the Kentucky division, which position he held at the time of his recent promotion to general superintendent of the lines south of the Ohio river, as above noted.

L. W. Baldwin

Traffic

The office of H. E. Arnold, commercial agent of the New York Central, at Lowell, Mass., has been removed to Boston.

E. S. White has been appointed general freight and passenger agent of the Illinois Southern, with office at St. Louis, Mo., succeeding W. H. Ogborn, resigned.

M. B. Wilburn, traveling freight agent of the Gulf, Colorado & Santa Fe at Houston, Tex., has been appointed commercial agent at that place, succeeding Drew Head, promoted.

Ted W. Krein, assistant general freight and passenger agent of the Fort Dodge, Des Moines & Southern, has been appointed traffic manager of the Muscatine North & South Railway, at Muscatine, Iowa, in place of H. B. Holbert, resigned.

K. B. Hannigan, commercial agent of the Southern Railway, at St. Louis, Mo., has been appointed assistant general freight agent, with headquarters at St. Louis, and C. F. Lauer, freight soliciting agent, at St. Louis, succeeds Mr. Hannigan.

F. M. Steele, commercial agent of the Fort Dodge, Des Moines & Southern at Des Moines, Iowa, has been appointed assistant general freight and passenger agent, with headquarters at Chicago, succeeding Ted W. Krein, resigned. Charles W. Welch succeeds Mr. Steele.

R. B. Robertson, general agent of the Chicago, Indianapolis & Louisville at Chicago, has been appointed division freight agent with headquarters in that city, and the former position is abolished. Henry Warner, assistant general agent at Chicago, has been appointed commercial agent at that point, and the former position is abolished.

Engineering and Rolling Stock

D. M. Neer has been appointed roadmaster of the Missouri, Kansas & Texas at Smithville, Tex., succeeding A. B. Crook, resigned.

D. E. Barton has been appointed acting master mechanic of the Atchison, Topeka & Santa Fe, with headquarters at Argentine, Kan., in place of E. E. Machovec.

H. Selfridge, general foreman of the Oregon Short Line, at Salt Lake City, Utah, has been appointed master mechanic of the Nevada Northern, with headquarters at East Ely, Nev.

J. H. Cooper, assistant supervisor of the Pennsylvania Railroad, at Tyrone, Pa., has been appointed assistant supervisor of division No. 2 Philadelphia division, with office at Paoli, succeeding F. H. Bentley, promoted.

W. C. Burel, district foreman of the Oregon Short Line, at Montpelier, Idaho, has been appointed general foreman of the Utah district, Utah-Montana division, with headquarters at Salt Lake City, Utah, succeeding H. Selfridge.

T. W. Fatherson, assistant engineer of the Rock Island Lines at El Reno, Okla., has been appointed engineer maintenance of way of the Chicago Great Western, with headquarters at Des Moines, Iowa, succeeding C. Millard, resigned.

J. W. Fletcher, roadway superintendent of the Carolina & North Western, at Chester, S. C., has been appointed engineer in charge of valuation, construction, betterment, inspection, tests and standards, with headquarters at Chester, and his former position has been abolished.

H. G. Sparks, division engineer of the Chicago & Eastern Illinois at Evansville, Ind., has been appointed division engineer at Salem, Ill., succeeding J. W. Hunter, who has been transferred to Danville, Ill., as division engineer in place of W. A. Van Frank, resigned. C. Brannon, assistant division engineer at Chicago, succeeds Mr. Sparks at Evansville.

The following officers of the Lake Shore & Michigan Southern, which is now consolidated with the New York Central Railroad, have had their jurisdiction extended over the Illinois division of the New York Central, formerly the Chicago, Indiana & Southern: Robert O. Rote, assistant chief engineer, Cleveland, Ohio; H. B. Reinsagen, principal assistant engineer, Cleveland; B. R. Leffler, bridge engineer, Cleveland, and F. B. Wiegand, signal engineer, Cleveland.

OBITUARY

John B. Gillett, formerly general freight agent of the Boston & Maine, until about 1871, died on February 2, at his home at Malden, Mass., at the age of 85.

Ellery S. Allen, formerly for many years general agent of the Cromwell Steamship Company, at New York, died of pneumonia on January 31, at his home in New York, at the age of 78. Mr. Allen retired from active work in 1907.

Equipment and Supplies

LOCOMOTIVE BUILDING

The French Government has ordered 7 locomotives from the Baldwin Locomotive Works.

The Grand Rapids & Indiana has ordered three Mikado type locomotives from the Lima Locomotive Corporation.

The Chicago, Burlington & Quincy is in the market for from 30 to 35 freight locomotives and 15 passenger locomotives.

The Louisiana Railway & Navigation Company has ordered 3 ten-wheel locomotives from the Baldwin Locomotive Works.

The Illinois Central has ordered 25 Mikado type locomotives from the Lima Locomotive Corporation in addition to the 25 similar locomotives ordered of the same company, reported in the *Railway Age Gazette*, January 8, and 25 switching locomotives ordered of the American Locomotive Company and reported in the issue of January 1.

CAR BUILDING

The Chicago, Burlington & Quincy is in the market for 1,200 box cars, 300 stock cars and 200 gondola cars.

The Baldwin Locomotive Works is figuring on several inquiries for a large number of trucks for export.

The Illinois Central has ordered 900 40-ft. 40-ton capacity refrigerator cars from the American Car & Foundry Company.

The Grand Trunk is building five freight cars in its shops at Chicago. These cars will replace some that were recently destroyed.

The Richmond, Fredericksburg & Potomac is reported to be preparing specifications for six all steel passenger cars. This item has not been confirmed.

The Pennsylvania Tank Car Company has received an order for 50 10,000 gal. capacity and 50 8,000 gal. capacity tank cars for an Oklahoma oil producer.

The Siamese Royal Railway Department invites bids for 40 bogies (trucks) and frames and fittings for 20 railway carriages, and for one steel bridge, 5 by 40 M.; separate specifications and drawings may be had from the Siamese Legation, Washington, D. C., upon payment of fees of $4 or $2 respectively.

IRON AND STEEL

The Siamese Royal Railway Department.—See item above under Car Building.

The Chicago & North Western has ordered 27,000 tons of steel rails from the United States Steel Corporation.

The Southern Pacific is said to have ordered 30,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Erie has ordered 22,000 tons of steel rails from the Carnegie Steel Company, 6,000 tons from the Illinois Steel Company, and 2,000 tons from another manufacturer.

The Denver Union Terminal Railway Company has ordered 152 tons of steel for its approach to the Twentieth street viaduct, Denver, Colo., from the Patterson Burkhardt Company.

The Seattle Terminal Company has ordered 292 tons of steel for its building at Seattle, Wash. The order was divided between the National Steel Construction Company, the Vulcan Iron Works and the N. & S. Foundry Company, all of Seattle.

SIGNALING

The Federal Signal Company has taken an order for the material for a mechanical interlocking plant on the Wilkes Barre Connecting Railroad, at Wilkes Barre, Pa.; 29 working levers and 3 spare spaces.

Supply Trade News

Leonard W. Kent, formerly eastern sales agent of The P. & M. Company, with offices in New York, died suddenly at his home in Westwood, N. J., on January 24.

The Hewitt Company, Chicago, Ill., has succeeded to the business and assumed the contract obligations of the Hewitt Supply Company, effective January 1, 1915. C. M. Hewitt is president.

C. B. McElhany, assistant general manager of sales of the Cambria Steel Company, has been appointed general manager of sales, succeeding J. Leonard Replogle, who has resigned to enter the service of the American Vanadium Company.

Effective February 15, the Cleveland office of the Ayer & Lord Tie Company, Chicago, Ill., at 801 Swetland building, will be placed in charge of B. S. McConnell, who will succeed F. A. Weaver, resigned. R. W. Slaney will succeed Mr. McConnell in Chicago territory.

James S. Llewellyn has been elected secretary, and Paul Llewellyn treasurer of the Chicago Malleable Castings Company. James S. Llewellyn will continue to hold the office of works manager at the West Pullman works.

J. Leonard Replogle, vice-president and general manager of sales of the Cambria Steel Company, since September, 1912, has resigned, effective March 1, to accept the position of vice-president and general manager of sales of the American Vanadium Company. Mr. Replogle has been in the service of the Cambria Steel Company for approximately 26 years. He was born in Bedford County, Pa., on May 6, 1876, and was educated in the public schools of Johnstown. He entered the employ of the Cambria Steel Company as an office boy when he was but 13 years of age and served successively as clerk, shipper, assistant superintendent of the axle department, superintendent of the forge, axle and bolt departments, assistant to the assistant general manager, superintendent of the order department, assistant general manager, assistant to president, and vice-president and general manager of sales. In his new position Mr. Replogle will have offices at New York and Pittsburgh.

J. L. Replogle

H. Bortin, formerly engineer in charge of the valuation department of the Union Pacific and a member of its valuation committee for four years, and lately assistant to the general secretary of the Presidents' Conference Committee on Federal Valuation of the Railroads, has opened an office as consulting valuation engineer, at 149 Broadway, New York City.

Charles E. Poyer has been appointed assistant general sales manager of the Edison Storage Battery Company, Orange, N. J. Mr. Poyer has been with the Edison interests for about four years, having served first on the personal engineering staff of Mr. Edison in the development of special applications of the alkaline battery, and later as assistant advertising manager. For the past two years he has been manager of the house lighting department.

The corporate name of the W. W. Herron Lumber Company, Mobile, Ala., has been changed to the Walker-Johnstone Lumber

Company, Inc., effective February 1. The officers of the company will be R. D. Walker, president; C. A. L. Johnstone, vice-president and treasurer, and D. R. Forman, secretary. This company has specialized since 1902 in furnishing yellow pine railroad tie and car material to the railroads and car companies. There will be no change whatever in its policy.

Lyndon F. Wilson, vice-president of the Railway List Company, Chicago, has resigned to become vice-president of the Bird-Archer Company, New York, effective April 1, 1915. Mr. Wilson was born at Rush Lake, Wis., November 4, 1883. He was educated at Ripon College, Lawrence University, and the University of Wisconsin. Before entering college, however, he was an operator in the office of his father on the Chicago, Milwaukee & St. Paul. Later, after having had considerable machine shop and power plant experience, he became an engineer in the Department of the Interior of the United States government, after having passed examinations in steam, electricity and heating and ventilating. After one year in this service, he joined the engineering department of the Western Electric Company, and remained with the latter until the fall of 1908, when he became mechanical department editor of the Railway Review. In the spring of 1909 he became editor of the Railway Master Mechanic, and was subsequently given editorial charge of Railway Engineering, both being published by The Railway List Company, Chicago. He was promoted to the vice-presidency of this company in the summer of 1913. After April 1, Mr. Wilson will be located in the Chicago office of the Bird-Archer Company.

L. F. Wilson

J. A. McFarland has been appointed southwestern district manager of the Bird-Archer Company, Chicago, with headquarters in the Frisco building, St. Louis, Mo. Mr. McFarland was born on October 23, 1880, at Mendota, Ill. After finishing his common school education he entered the University of Illinois, from which he graduated in 1903, having specialized in chemistry. He began railway work in May of the same year in the chemical department of the Atchison, Topeka & Santa Fe, at Topeka, Kan. On January 1, 1904, he became assistant in the testing department of the Chicago & North Western. In February, 1905, he became chief chemist of the Missouri Pacific, in which position he remained until May, 1909, when he took charge of the St. Louis office of the Dearborn Chemical Company, Chicago, looking after the latter's railroad business in that territory. In July, 1911, he left that company to become chemist and engineer of tests of the Frisco System, and was later connected with the Standard Railway Equipment Company, New Kensington, Pa., until his recent appointment to the position of southwestern district manager of the Bird-Archer Company, as above noted.

J. A. McFarland

The Canadian Car & Foundry Company, Ltd.

Although the declaration of war did not have a relatively great effect on the operation of the Canadian Car & Foundry Company, Ltd., for the fiscal year ended September 30, 1914, the combined output of this company and its associated companies, the Canadian Steel Foundries, Ltd., the Pratt & Letchworth Company, Ltd., and the Rhodes, Curry Company, Ltd., was approximately $11,000,000 in value as compared with $27,000,000 for the previous fiscal year, a reduction of no less than 59 per cent.

The combined profit, after charging all expenditures for the maintenance and renewal of plant and equipment was $673,036. From this there was deducted provisions for depreciation and bond sinking funds of $278,077, leaving a total of $394,959. Interest on bonds was $556,205, and there was deducted from the latter amount $95,437 charged to property account and representing interest on the cost of construction of the new Fort William plant, thus leaving a total of $460,768. There was, therefore, a deficit for the year, after the payment of bond interest, of $65,809. The combined surplus of the associated companies on September 30, 1913, was $2,224,579, thus leaving a surplus available for dividends of $2,158,770. Dividends of $526,500 were paid, so that the surplus on September 30, 1914, was $1,632,270.

The associated companies now have capital assets, including real estate, buildings, machinery, patents and good will of $19,297,122; $1,012,859 having been added during the year chiefly by the expenditure on the Fort William works. The current assets amounted on September 30 to $5,920,748, of which $3,245,710 was inventory of manufactured and partly manufactured products, materials and supplies, and $163,855 cash. The company's capital stock is now $10,975,000, and there are bonds outstanding of $9,303,429. The current liabilities on September 30 amounted to $1,595,187, of which $706,593 was accounts and bills payable.

The annual report is published in an unusually attractive manner and contains several views of freight and passenger cars turned out at the various works.

TRADE PUBLICATIONS

Chicago, Rock Island & Pacific.—The passenger department has issued a 48-page folder containing numerous illustrations showing points of interest at both San Francisco and San Diego, in connection with the Panama expositions. It describes these places as well as telling how to reach them.

Portable Machine Tools.—The Pedrick Tool & Machine Company, Philadelphia, Pa., is now distributing its 1915 catalog of portable machine tools. The catalog contains views and illustrations of portable cylinder boring bars, portable turning machines, milling machines, pipe bending machines, etc.

Tools.—The Verona Tool Works, Pittsburgh, Pa., has issued catalog No. 11, a 64-page book, devoted to the description and illustration of its various forms of track tools. It also shows a view of the laboratory where each lot of steel is analyzed. The illustrations clearly show the detail of construction of the tools.

Telephones.—The Western Electric Company, New York, has issued a folder containing an article entitled "The Transcontinental Voice Highway" describing the opening of the direct connection by long-distance telephone between New York and San Francisco on January 25, together with a brief history of the development of long-distance telephone operation in this country.

Curtain Fixtures.—Bulletin No. 182, issued by the Dayton Manufacturing Company, Dayton, Ohio, describes and illustrates the Dayton curtain for railway car windows. This curtain is fitted with friction shoes bearing in grooves which hold the curtain in position and retaining strips prevent accidental displacement. A guide for convenience in ordering is given on the last page.

Hoists and Derricks.—The Minneapolis Steel & Machinery Company, Minneapolis, Minn., has issued a 110-page catalog which illustrates and describes fully the design and construction of the various types of Twin City hoists and the machinery necessary for their operation. The book also describes the construction and action of various kinds of coal hoisting and dredging buckets, pile drivers, grab hooks, etc.

Railway Construction

Carolina & Yadkin River.—Surveys are to be started soon, it is said, for an extension to be built from Denton, N. C., southwest to Troy, about 25 miles.

Grasse River.—This company has track laying finished on a line from Childwold, which is on the New York Central, in St. Lawrence county, N. Y., west via Conifer to Cranberry Lake, about 15 miles. The maximum grade is 2.3 per cent, and maximum curvature 14 deg. The company expects to develop a traffic in lumber, wood products and general merchandise on the new line. The organization of the company has not yet been completed. William T. Turner, Utica, N. Y., is interested.

Jellico Coal & Railroad.—Surveys are being made, it is said, for the line projected last year from a point near Pine Knot, Tenn., on the Queen & Crescent Route, to Jellico, about 20 miles. There are to be two tunnels and three small bridges on the line. W. E. Wheelock, superintendent of terminals of the Cincinnati, New Orleans & Texas Pacific at Chattanooga, Tenn., is president of the new company, and D. C. Barker, chief engineer, Jellico. (September 18, p. 549.)

Mexican Roads.—Plans have been made by a syndicate of Americans to build a railroad in the state of Puebla to provide an outlet for coal that was recently discovered in the southern part of the state. The syndicate has bought the coal deposits, and it is said will spend about $4,000,000 gold in developing the property and constructing the proposed railroad. The line is to be built from Zautla to a connection with the Teziutlan branch of the Interoceanic Railroad.

Official announcement is made at the City of Mexico of the cancellation by the Conventionist government of Mexico of the concession granted to a Belgian syndicate for the construction of an extensive system of railways to cost about $40,000,000. Considerable preliminary work had already been carried out and some of the routes had been surveyed. The cancellation of the concession was made upon the application of the syndicate, it is said, as present conditions in Belgium make it impossible for the contract to be fulfilled.

Ocilla Southern.—Work is to be started soon, it is said, on the extension which was projected over a year ago from the present northern terminus of the road at Rochelle, Ga., north to Macon, about 80 miles. The company has secured an amendment to its charter, and the stockholders have acted favorably upon a proposed increase in capital stock of from $1,000,000 to $3,000,000.

Ottawa & St. Lawrence Electric.—This company was organized in 1912, to build 275 miles of electric railway in eastern Ontario out of Ottawa. Contracts for some of the work have been let, it is said, and work will be started next spring on the section between Perth and Smith's Falls, about 15 miles. H. W. Pearson, Confederation Life building, Toronto, is secretary. (December 18, p. 1166.)

South Carolina Roads.—Under the name of the North Charleston Corporation, plans are being made, it is said, to build a belt line to connect North Charleston industrial plants with the yards of the Southern Railway, the Atlantic Coast Line and the Seaboard Air Line. R. G. Rhett, president, Charleston.

Right of way has been secured, it is said, to build a line from timber lands on the Congaree river to a point near Columbia, S. C., 12 miles. J. C. Brewerton, Fayetteville, N. C., is back of the project.

Waushara County.—An officer writes that work on the construction of the proposed line between Red Granite, Wis., and Poysippi will be begun as soon as the frost leaves the ground.

RAILWAY STRUCTURES

Dallas, Tex.—The Stone & Webster Engineering Corporation is preparing plans for the construction of extensive terminal facilities for its interurban railway system.

Macon, Ga.—An officer of the Central of Georgia writes that the contract entered into with the city officers of Macon, for the construction of the union station at Macon is only a preliminary step. No detail plans for the station or for other improvements have as yet been made. The company has not yet decided when bids for this work will be asked for, or when construction work will be started. (January 29, p. 212.)

New Orleans, La.—The Louisiana Railway & Navigation Company has negotiations under way for the building of a large grain elevator on the river front.

Paterson, N. J.—An officer of the Erie writes that nothing definite has been determined upon to carry out the removal of 15 grade crossings on the Erie in Paterson. The Board of Public Utilities Commissioners recently acted favorably on the application of the city officers of Paterson for the elimination of these grade crossings.

Pen Argyl, Pa.—An officer of the Lehigh & New England writes that contract for a new shop and storehouse to be built at Pen Argyl has been let to F. D. Hyde, New York City. The shop will be a one story structure 164 ft. 9¼ in. by 264 ft. outside dimensions, and the machinery will be operated by electricity. The shop will have steel columns, roof trusses and purlins, reinforced cinder concrete roof slabs, waterproof roof covering, steel sash, concrete foundations and Natco hollow tile walls with stucco covering; the storehouse will be 40 ft. by 150 ft., and there will be a boiler house 34 ft. by 40 ft., and an oil house 20 ft. by 21 ft. The contract also includes a foundation 40 ft. 7 in. by 310 ft. for a transfer table. The work will probably be started early in February, and will cost about $95,000.

Pittsburgh, Pa.—An officer of the Baltimore & Ohio writes that bids have been asked for building a steel viaduct 1,900 ft. long, which will be 35 ft. at its greatest height, to cost about $700,000. The improvement is being carried out to eliminate the grade crossing at Liberty avenue and Thirty-third street, Pittsburgh.

Salt Lake City, Utah.—The San Pedro, Los Angeles & Salt Lake has submitted plans to the city council for a proposed new passenger station to be built on Seventh street. The building is to be 90 ft. by 162 ft., and two stories high, and is to be of reinforced concrete construction. The company will file formal application for permits and privileges at once, and states that the building will be completed in six months. The estimated cost is $260,000.

Guatemala and Southern Mexico.—It is reported that the Guatemala Central has been extended westward to Mariscal on the Pan-American, on the border line between Guatemala and Mexico; but it is expected that several months must elapse before through traffic can be established between the two countries, because of the disturbances caused by the revolutionists. Depredating bands have recently destroyed bridges along the line of the Pan-American and have torn up long stretches of track. The line between the Tehuantepec Railroad and Vera Cruz is also in bad shape and no regular through trains are being run.

The Needs of the Railways of New Zealand.—The new general manager of the New Zealand State Railways has recently made a report on the organization and equipment of the system, in which there are proposed a large number of important changes. The erection of new locomotive construction works is contemplated at Newmarket, and the standardization of engine types and the abolition of the small type of engine hitherto extensively used on the New Zealand railways is engaging attention. Among other contemplated changes and extensions the following may be briefly indicated: rail motor service for suburban traffic in the larger cities; substitution of electric lighting for gas on main through trains; reorganization of the present system of car cleaning; extension and re-modeling of existing building and repair shops, and the erection of new stations. The various improvements entail a total estimated expenditure of $16,250,000 spread over a period of five years and comprise: terminals, $7,850,000; double tracking, $2,425,000; grade elimination, $1,250,000; new engine house and approach lines at Auckland, $700,000; additions to shops, $300,000; new lines, $1,875,000; signaling and interlocking, $1,250,000; warning signals for grade crossings, $100,000; bridge strengthening, $250,000, and 10 new locomotives, $250,000.

Railway Financial News

Chicago, Rock Island & Pacific.—A suit has been filed in the New York Supreme Court by the First National Bank of Ridgefield, N. J., the People's National Bank of Hackensack, N. J., N. L. Amster, of Boston, and nine other stockholders of the Chicago, Rock Island & Pacific Railway Company to recover from the directors of the company of December, 1909, $7,500,000 alleged to have been unlawfully paid out by the Railway company. The specific grounds for the suit are the allegations that in December, 1909, the Railroad company—the Iowa holding company—sold $28,940,300 stock of the St. Louis & San Francisco, held as collateral under $17,364,180 bonds of the Railroad company, for 37.50 per cent of par, an aggregate of $10,852,612, and that in order to release the collateral it was necessary for the Railroad company to raise $7,500,000 in cash in addition to the proceeds of the sale of the collateral. The individual defendants being in control of the Railroad company, the complainant alleges, and being heavily interested in the stock of the New Jersey company, caused the Railway company to borrow $7,314,661 and to pay $185,339 as expenses of raising the money and to turn over the $7,314,661 to the Railroad company in exchange for $7,500,000 5 per cent unsecured debenture bonds, and that this purchase by the Railway company was fraudulently and unlawfully accomplished. The individual directors named are D. G. Reid, Richard A. Jackson, H. S. Cable, F. L. Hine, Ogden Mills, G. G. McMurtry, W. T. Graham, W. H. Moore, G. T. Boggs, E. S. Moore, J. J. Mitchell, J. H. Moore and H. U. Mudge.

Another suit has been filed against individual directors by Sadie E. Hiddon in behalf of herself "and other bondholders" to recover sums claimed to have been paid as campaign contributions and in excessive salaries.

D. G. Reid has resigned as a director of both the Railway company and the holding company, and E. S. Moore, Roberts, Walker and John J. Mitchell, whose terms expire this year, have announced that they do not seek re-election.

Erie.—This company has notified the New York Public Service Commission that an offer had been received from J. P. Morgan & Co., to purchase $13,000,000 bonds of the Erie & Jersey and the Genesee River Railroads, roads owned by the Erie, at 98½ per cent and 97½ per cent, provided an increase on the interest of the bonds from 4 to 6 per cent is approved by the commission. These 4 per cent bonds are now pledged as security for the Erie's short term notes, which it sold in 1905, when the two railroads were incorporated and the lines constructed to reduce grades of 1 per cent to grades of ½ per cent, so that the Erie might compete with other trunk lines. The offered price, is net and without commission.

Evansville & Indianapolis.—The protective committeee representing the first mortgage 6 per cent bonds of 1924 and the first consolidated mortgage 6 per cent bonds of 1926, of which Frederick H. Shipman, treasurer of the New York Life Insurance Company, is chairman, has fixed February 15 as the last day on which bonds can be deposited with the Farmers' Loan & Trust Company as depository for the committee.

Illinois Central.—The company has sold to Kuhn, Loeb & Company, New York, $10,000,000 Illinois Central and Chicago, St. Louis & New Orleans division joint first refunding 5 per cent bonds.

New York Central Railroad.—Judge Hough, in the United States district court, has upheld the complaint of John Scott Boyd, Jr., representing certain minority stockholders of the New York & Harlem, preventing the merger of the New York & Harlem with the New York Central & Hudson River. The following is a brief abstract of the decision:

(1) That the New York Central desires and intends to consolidate with the New York & Harlem.

(2) That this consolidation would be a violation of the contract rights of the minority stockholders of the Harlem Company, and that such stockholders are entitled to an injunction restraining consolidation during the term of the lease of 1873, namely, until the year 2274.

(3) That no testimony is necessary to establish the right of the minority stockholders to such an injunction, but that they are entitled now to an injunction during the pendency of the action and will become entitled to a permanent injunction at the trial, or by waiving the additional claims made in the complaint, the minority stockholders will become entitled now to a permanent injunction restraining the consolidation.

(4) The allegations of the plaintiffs to the effect that the control of the Harlem road by the Central is a violation of the Sherman act sets forth a good cause of action which, if proven, may entitle the plaintiffs to additional relief in order to maintain the present status and prevent any increase of the existing illegal control until such time as the attorney-general chooses to act.

Justice Keogh has denied the Continental Securities Company an injunction to restrain the merger of the Lake Shore and the New York Central on the ground of the issue of 4 per cent bonds in place of 3½ per cent bonds. Justice Keogh holds that this does not violate the New York Public Service Commission law.

New York, New Haven & Hartford.—A bill is to be introduced into the Rhode Island legislature providing that the New York, New Haven & Hartford be permitted to issue preferred stock, and it is said that a similar bill will be introduced in the Connecticut general assembly. President Elliott is quoted in the Providence Journal as saying:

"One very desirable method of raising the money needed [to refund maturing short term indebtedness] would be for the stockholders to buy new issues of common or preferred stock. . . . The showing made by the property and the complications surrounding it during the past two years are such that an increase of common stock at this time is out of the question.

"The issue of preferred stock is a desirable method when practicable, but it is not clear that the right exists under the present law. . . . It is now important, therefore, to have the laws made clear so that steam railroad companies can issue preferred stock as a means of raising money if market conditions justify.

"Although there are no mortgage bonds outstanding on the main line of the railroad from New York to Providence, and from New Haven to Springfield, except $750,000 between New London and Providence, nevertheless the company cannot pay its obligations by an issue of bonds secured by a mortgage because of limitations and conflicts in the laws of the states of Massachusetts, Rhode Island and Connecticut. Massachusetts permits the issue of a mortgage to twice the amount of capital stock and premiums actually paid in, while Connecticut limits the amount of mortgage to one-half the amount actually expended on the railroad. Under this limitation no mortgage could be issued which would take care of the outstanding obligations necessary to be included, to say nothing of the floating debt and additional necessities of the railroad. As the general laws of Rhode Island do not specifically authorize railroad mortgages, there is some doubt of the New Haven's right to mortgage property in that state.

"Under existing Massachusetts laws any mortgage made by the New Haven company must secure the bonds of other railroad companies now a part of the New Haven system, which are already amply secured by first mortgages on the property of those roads and manifestly should not have the additional security of any mortgage on the now unmortgaged main line of the New Haven.

"Doubt exists as to the actual amount of outstanding capital stock recognized by the state of Massachusetts, owing to the fact that when the New Haven securities were validated by the report of the validation commission in 1911, a stock issue was authorized and subscribed for, but only paid in part, and only the amount then paid in was validated. Legislation to validate the total amount paid in is obviously necessary."

Pennsylvania Railroad.—The offering price to the public of the $49,000,000 consolidated (now first) mortgage bonds which Kuhn, Loeb & Company, New York, bought from the Pennsylvania was 103¾, yielding approximately 4.31 per cent on the investment. The issue was subscribed for five times over.

The Pennsylvania has asked the New Jersey Board of Public Utility Commissioners for permission to take over the Philadelphia & Long Branch, the Pemberton & Hightstown and the Kinkora & New Lisbon. These are branch lines which the Pennsylvania owns and has been operating.

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Contents

*Illustrated.

New York Central New Bond Issue

After the approval of the stockholders and public service commissions concerned has been obtained, stockholders of the New York Central Railroad Company, the new consolidated company, are to be offered the privilege of subscribing for an issue of $100,000,000 6 per cent 20-year debenture bonds at par. The bonds are convertible into stock after 1917 and up to May 1, 1925, at 105. J. P. Morgan & Co. are to form a syndicate to underwrite the issue. The arrangements for the sale of these bonds marks the end for the New York Central and the Lake Shore of a long period of financing by short term notes. The New York Central has $20,000,000 notes falling due in 1915, and at the end of 1913 $44,868,000 loans and bills payable, and the Lake Shore at the end of 1913 had $23,768,000 one-year notes falling due in 1914, which have been temporarily extended. The proceeds of the debenture bonds sale will, therefore, just about pay off all of the maturing short term notes. By selling 6 per cent debentures to its stockholders at par the New York Central, in effect, gives its stockholders rights, which apparently are worth from $3 to $6 a share; by issuing debentures for refunding purposes instead of mortgage bonds secured by the new improvement and refunding mortgage it would appear to strengthen the position of the bonds which have already been issued under this mortgage, and by making the debentures convertible into stock it indirectly increases the total amount of bonds which can be issued under the improvement and refunding mortgage by $300,000,000, the limitation in the improvement and refunding mortgage as to the amount of bonds which can be issued under it being contingent on the amount of stock issued. The high rate of interest on the debentures is probably thought by the directors to be fully justified by the gain which is made in strengthening the improvement and refunding mortgage bonds which may later be issued either for refunding underlying obligations or for additions and improvements.

Blocking Development at St. Louis

The Terminal Railroad Association of St. Louis is again seeking authority to enlarge its terminal facilities in that city. Seven years ago it acquired a tract of 26 acres in the heart of the railway district to supply greatly needed storage tracks, but the city authorities refused to let it cross some streets and alleys which really had never been opened, and it has been denied the use of its property to the present time. In consequence, it has become crowded so badly in the yards adjacent to the Union Station that local freight facilities have had to be taken over for the storage of passenger equipment. St. Louis has a new city charter, which confers upon its local public service board the exclusive right to permit railroad tracks to cross or occupy public streets and alleys. A month ago the Terminal Association asked permission of this board to cross some unused streets to make use of part of its tract in order to prevent a serious congestion in its main yards which was threatened. The board promptly filed its application, and then apparently forgot about it. Now the shippers are taking a hand in the matter and are demanding some action without further delay. The Business Men's League and the various railroads serving St. Louis all maintain industrial organizations that work to bring new factories to the city; and to make any headway in this sort of endeavor it is essential that the prospective newcomers be guaranteed switch tracks to their factories. One of the arguments in favor of the new charter was that the transfer of the switch-giving power from the aldermen to the public service board would insure quicker action and thereby aid in the campaign to get more industries for St. Louis. One of the first applications under the new code was that of the Terminal. The shippers who have come to its support are the biggest in St. Louis, and some interesting sessions between their committee and the service board are expected. If the board is going to sidetrack switch applications in this way the city will hardly be able to compete for new industries with other cities where switch tracks are allowed to be built almost as a matter of course.

The Price of Rails

For the first time since 1901 steel rails are now being quoted openly at less than $28 per ton. This basic price was established for Bessemer rails at the time of the formation of the United States Steel Corporation and has been maintained by the corporation and independent mills alike since that date. Very recently the Algoma Steel Company, a Canadian corporation, has entered the market in this country, quoting open hearth rails at $25 per ton on board cars at the mills, or $27.60 on board cars at Chicago, as compared with $30 at the mills quoted by the manu-

facturers in the United States. This creates a very interesting situation in the steel market, and at least three roads, the Pere Marquette, the Big Four and the Toledo & Ohio Central, have given this company rail orders at these prices. The reasons why the Algoma Steel Company is able to quote this price on rails are evident. The European war has created a business depression in Canada much more acute than in the United States, with the result that the rail requirements of the Canadian railways are materially reduced. The steel company is therefore seeking new business at a reduced price to prevent the closing down of the mill. The fact that there is no tariff on ore moving from the United States into Canada, and the recent removal of the tariff on steel products into the United States now enables that company to direct its attention effectively to this country. Situated as it is on Lake Superior, it is in a position to deliver rails by water at any of the lake ports, and it may therefore become a serious competitor of the mills in this country. While as a business matter it may be expedient to reduce the price on the rails delivered in this country to maintain the output, it will be interesting to note whether the Canadian roads do not demand a similar reduction. It will also be interesting to observe the attitude that the steel companies in this country will assume toward this new competition and the extent to which the roads in this country will avail themselves of this reduction in price, and the effect, if any, on prices in this country.

THE LAW, AND THE RAILWAYS AND THEIR PATRONS

WE referred in a recent issue (*Railway Age Gazette*, January 22, page 117) to statistics showing that in 1913 the Interstate Commerce Commission secured more indictments and caused more prosecutions of patrons of the railways than of the railways themselves for violating the Interstate Commerce law and the Elkins act. The complete figures for 1914 show that the same thing was true in that year. The number of indictments of railways secured in 1914 was 21, while the number secured against other persons and concerns was 37. The number of prosecutions under these laws carried to success in 1914 against railways was 23, while the number against other persons and concerns carried to success was 45.

Combining the figures for 1913 and 1914 we get the following results:

Total number of indictments, 119.

Number against railroads, 48, or 41 per cent.

Number against other persons and concerns, 71, or 59 per cent.

Total number of successful prosecutions, 119.

Number of successful prosecutions of railways, 42, or 35 per cent.

Number of successful prosecutions of other persons and concerns, 77, or 65 per cent.

The laws under which these indictments were secured and these prosecutions were conducted were passed primarily to regulate railways. If these figures have any significance it is that the railways are now obeying the laws much better than the people who travel and ship goods over their lines. The *Railway Age Gazette* repeatedly has contended that the standard of morality in the railway business is higher than in other lines of commercial and industrial enterprise in the United States, and the statistics cited support this contention.

The offenses committed by the patrons of the railways are of various kinds, and include misdescription of contents of packages; false billing; making fraudulent claims against carriers; soliciting unlawful discriminations; making unlawful use of free passes; using false weights; conspiring to violate the Hepburn act in connection with the transportation of theatrical goods; obtaining unlawful concessions on shipments; inducing agents of the railways to discriminate by issuing bills of lading prior to the receipt of shipments; accepting rebates outright; soliciting and receiving information concerning shipments consigned to other parties, and so on. The variety of the offenses committed is great, and it will be noted that in a majority of cases they not only violate the law but rob the railway.

Regulation of railways, especially that which has been done by the Interstate Commerce Commission, has tended powerfully to raise and maintain the standard of morals in the railway business. This effect was expected. The influence which it is exerting in raising the standard of morals in other lines of business by compelling concerns in other lines of business to quit trying to defraud the railways is unexpected, but is none the less beneficent on that account.

It is hard to resist the temptation to suggest, in conclusion, that as the evidence shows, men in many lines of business who have devoted a large part of their energies to denouncing the evils in railway management might have been more usefully employed in denouncing the evils in their own lines of business, and perhaps in even correcting forms of crookedness prevailing in their own concerns. As long as 65 per cent of the successful prosecutions under the Interstate Commerce act and the Elkins act are directed against shippers and other patrons of the railways we shall hope to hear less than in the past from representatives of business concerns regarding the failure of the railways to clean their houses.

BUSINESS INTERESTS AND THE GOVERNMENT

AT the recent annual dinner of the Chicago Railway Equipment Company, which was attended by a number of prominent business men, a resolution was adopted on the motion of E. B. Leigh, president of this company, expressing it as the sense of those present that the Chamber of Commerce of the United States should appoint a committee to devise ways and means for mobilizing the entire business forces of the country to the end that business may speak and act as an intelligent and forceful unit on the many public questions which so vitally affect it.

This resolution expresses one of the great needs of the present day in the United States. For ten years the business interests of the country have been constantly under fire. The fire has come from the professors of economics in the universities, from advocates of socialism, from leaders of organized labor, and from public men. It has also come from business men themselves, some classes of them attacking others. It has consisted not only of agitation and denunciation, but of an enormous amount of municipal, state and national legislation. At first the attacks affected only insurance companies, railway companies and large combinations. They now directly or indirectly affect all business men and businesses, big and little.

Practically every provision, state and national, which has been enacted during this period for the regulation of business has been a piece of class legislation. The general purpose has been to promote a different, and what it has conceived would be a more equitable, distribution of wealth. None of the legislation passed has been intended or adapted to increase efficiency in production. But it is very difficult to frame legislation so that it will affect the distribution of wealth without so framing it that it will affect the production. And the legislation intended to influence distribution has influenced production. Whatever other effects it has had on distribution, one effect it clearly has had. It has reduced production and thereby curtailed the amount available for distribution. Whether distribution is or is not more equitable than ten years ago, the absolute amount being distributed to all classes—to the working class, the middle class and the more wealthy class—has been substantially reduced.

Organized labor has had a potent part in shaping the legislation for the regulation of business. The American Federation of Labor, the various state federations of labor, the railway brotherhoods, with their large voting strength through their legislative agents at the state capitals and at Washington, have largely determined the tone and the speci

provisions of many of the laws which have been passed. On the other hand, as a class, business men have exerted but little influence on legislation. As classes, rather than as a single class, they have influenced it. The shippers have got a large part of the legislation which has been applied to railways. The direct effect has been to curtail the earnings and hamper the development of the railroads, and its indirect effect has been to stimulate a tendency to apply to industrial and commercial concerns the same kind of regulation which has been applied to railways. The bankers exerted an influence on the federal reserve legislation, but they received little support, from other classes of business men. And so it has been all along the line. While labor has acted unitedly the business men have split up into a dozen camps and spent more time trying to get legislation that would profit one part of them at the expense of another than in trying to prevent legislation which would hurt all of them.

The shrewdness and skill which organized labor has shown in carrying on its campaign for regulation which it has conceived would benefit it has been equaled only by the short-sighted selfishness and stupidity which the business interests have shown in dealing with questions vitally affecting them. Where is the business organization which corresponds to the American Federation of Labor? Where is the business organization in any state which corresponds to the various state federations of labor? Where are the legislative representatives of business at Washington and at the various state capitals who correspond to the legislative representatives that labor has in those places? When a state legislature or Congress meets there usually are lobbies on hand representing business interests, but they are usually not there lobbying to protect the interests of business as a whole, but to enable some classes of business interests to get advantages, fair or unfair, over other classes of business interests.

The consequence is that organized labor, representing, it is understood, about seven per cent. of the people, is dictating legislation and regulation in every state and in the nation, while the business interests, instead of securing fair treatment from the government and its co-operation and support in developing commerce and industry, are securing almost no legislation favorable to them and are being constantly victimized by legislation which injures them and the entire nation.

When are business men going to awaken to their true interests? When are they going to recognize the fact that every time one class of business interests gets legislation for the regulation of some other class of business interests it establishes a precedent for the application of some form of government interference to its own business? When are they going to recognize the fact that by splitting into factions, as they do now, they play into the hands of the leaders of organized labor, and the agitators for state socialism.

We have a Chamber of Commerce of the United States, and it ought to be loyally supported by the business interests of the country and so organized and constituted that it may become a potent representative and spokesman of business interests as a whole at Washington. But ought there not to be a similar organization of business interests in every state, an organization including all classes, which would regularly be represented at the legislatures by spokesmen competent to fight effectively for good legislation and to fight effectively against bad legislation? Business men are constantly crying out about the way the national government is dealing with business. But the state governments are, in many cases, doing business far more harm than the national government. In the case of railroad regulation the work of the Interstate Commerce Commission and of Congress, about which so many business men complain, is perfection compared with the work of many state legislatures and state commissions. Ought there not to be not only a Chamber of Commerce of the United States, but also a chamber of commerce of New York state, a chamber of commerce of Pennsylvania, a chamber of commerce of Illinois and a chamber of commerce of every other state through which the manufacturing, the railway, the commercial, the mercantile, the agricultural and all other business interests might act and speak as a unit at their respective state capitals? Business needs to sit at the feet of organized labor and learn from it.

THE CAMPAIGN FOR ADVANCES IN PASSENGER RATES

EIGHT years ago an agitation for the reduction of the railway maximum passenger fare from three cents to two cent a mile swept over the United States. How it was started would be difficult to say. It was merely a part of the general movement for a reduction of railway rates. The railways resisted it, but unsuccessfully. Two-cent fare laws were passed in most of the states and the relationship between state and interstate rates compelled the reduction of interstate rates to the same basis.

It was inevitable that sooner or later there should be vigorous efforts made by the railways to get advances in the rates fixed at that time. There was no evidence that a maximum fare of two cents a mile was reasonable. The Wisconsin Railroad Commission, which made the most thorough investigation of the subject, held that even on the Chicago, Milwaukee & St. Paul and the Chicago & North Western, which had the densest traffic in the state, a rate of less than 2½ cents would be unreasonably low. Nevertheless, the railways let the two-cent fare laws go into effect in many states in order to avoid the heavy penalties prescribed for their violation, and to satisfy the public demand that they should be given a trial.

Even the advocates of the two-cent fares practically conceded that on the basis of the traffic existing at that time they would be unremunerative, but they argued that the reduction in fares would so greatly stimulate the growth of the traffic that the railways would make more money on the lower fares than they had on the higher. Experience has conclusively answered this argument. The growth of passenger traffic has been lower since the two-cent fare laws were passed than it was before. The Illinois lines have shown that in that state in the four years prior to July 1, 1907, on which date the two-cent fare law went into effect, the number of passengers carried one mile increased 22.31 per cent, while in the four years ending June 30, 1913, the increase was only 17.43 per cent. The reduction in fares did not retard the growth of traffic, but it did not increase it. Whether a reduction in rates will cause an increase in traffic depends entirely on the nature of the traffic to which, and the conditions under which, the rates apply.

Not only was the two-cent fare unreasonable when the legislation prescribing it was passed, but it has steadily become more unreasonable ever since. There have been enormous increases in railway expenses and taxes since the years 1906 to 1908, in which the most of this legislation was passed. It has been possible largely to offset, in the freight service, this increase in expenses by the introduction of economies, but passenger traffic does not lend itself to this kind of treatment to the same degree as freight traffic. The greatest economies in the handling of freight are effected by increasing the tons hauled per car per train. Proportionate increase in the number of passengers hauled per car and per train cannot be made for perfectly obvious reasons. Therefore the increase in the ratio of passenger service expenses to passenger earnings has been much greater than the increase in the ratio of freight service expenses to freight earnings. Louis D. Brandeis, special counsel for the Interstate Commerce Commission, brought this point out very clearly in his argument in the original five per cent rate case. For example, as he showed, between the fiscal year 1911 and the fiscal year 1913, the ratio of freight expenses to freight earnings on the Baltimore & Ohio was actually reduced from 68.16 per cent to 66.44 per cent, while the ratio of passenger expenses to passenger earnings increased from 82.39 per cent to 106.23

per cent. The experience of the Baltimore & Ohio was similar to that of almost every other road in eastern territory, and convinced not only Mr. Brandeis, but the Interstate Commerce Commission that even on the eastern roads, with their relatively dense passenger traffic, the two-cent fare was entirely unremunerative. If it is unremunerative in the eastern states, it must be very much more unremunerative in other states, such as Ohio, Indiana and Illinois, and especially Iowa, Missouri, Kansas, Nebraska, Arkansas and Oklahoma.

The evidence as to the unremunerativeness of the two-cent fare is ample to convince any reasonable man. It is sometimes pointed out that the average passenger fare in other countries is lower than in the United States. But in the first place the passenger fare in the United States is lower than in any other country in the world for similar service, the low average fares in such countries as Germany and France resulting from the charging of low rates for third- and fourth-class services so poor that no class of people in America would use them. In the second place, in the countries where these low average passenger fares obtain the wages paid to railway labor are only one-half as high as the wages paid in the United States. Finally, the passenger traffic on the railways of the leading countries of Europe are from three to five and one-half times as dense as it is on the railways of this country. Therefore, to compare the average passenger rates of Germany and France, for example, with the average passenger rate in this country is to compare things that are not comparable.

The difficulty is not in producing evidence that the two-cent fare is unreasonably low, but in getting it before those who will finally determine what the maximum fare should be. Public opinion demanded the two-cent fare legislation of seven to ten years ago. Public opinion will also determine whether one-half of what was then taken away from the railways shall now be given back to them. Therefore, through public addresses, pamphlets, newspaper articles and advertisements, the railways of Illinois and other states are taking their case for higher passenger rates directly to the public. In Illinois, for example, a committee of presidents first got a hearing with the governor, and now officers of the roads are conducting a state wide campaign of public education. Later, they will go before the legislature.

By following this procedure the railway managements are showing great good sense. Regulation has been unfair to the railways in the past because the public has been misinformed, and, being misinformed, has been prejudiced. The public will give the railways a square deal if they will give it a chance. That it has not given them a square deal in the past has been largely due to the fact that the railways have not made enough efforts to get the facts regarding their business before it.

THE WAR AND RAILWAY NATIONALIZATION

THE Railway Gazette of London observes that many of those who favor the nationalization of British railways are so eager that any argument is seized upon to support their case, and that they have taken the success of the government control of the British railways during the war, for the purpose of securing closer co-operation of the railways and the military authorities, as a proof of the success which would attend actual government ownership and operation. But, as our English contemporary shows, any such argument ignores the most vital facts in the case. The government, while practically managing the railways to the extent that they are used for military purposes and that all other considerations are made subordinate to the military requirements, is exercising that control through a committee of twelve of the general managers of the railways themselves, appointed long before the war, who work in conjunction with the War Office and the Admiralty. Moreover, the efficiency with which this committee has done its work, and the fact that it is practically the only department concerned with the military preparations which has done its part almost entirely without criticism, is pointed to as the best possible proof of the superiority of private over government management. The work of the War Office, the Home Office, the Foreign Office and the Admiralty has received a large amount of public criticism, whereas the railways, which in ordinary times are constantly condemned, have received nothing but praise since the war began.

One of the reasons given as to why government operation of the roads would be less successful than private management is that the government would not pay sufficiently large salaries to retain the services of the kind of men that now comprise the committee. Instead of the operation of the railways during the war serving as an argument for British railway nationalization it is quite likely that the war will give a quietus to the discussion of the question for many years, because the British government for some time after the war is over will have its hands full of work which is more properly the function of a government than railway operation, and will hardly be in a position to add to the financial obligations caused by the war, the burden of investment in the railway system.

WABASH

THE details of the reorganization of the Wabash when the property is taken out of the receivership will be the result, as in all railroad reorganizations of a compromise between the various conflicting interests of the security holders and creditors of the company. The basis for any reorganization, however, must be the earning power of the plant, and the results of operation of the Wabash in the fiscal year ended June 30, 1914, while not utterly hopeless, appear to show something vitally wrong either with the rates received or with the cost of operation.

The Wabash operates 2,515 miles of road, of which 507 miles has second track, and of the total mileage operated 2,035 miles is owned, the remainder being almost entirely joint trackage rights. After the payment of expenses and maintenance and of hire of equipment and joint facility rents, the receivers had a balance of $2,609,000. This is at the rate of about $1,280 per mile of road owned and at 5 per cent would pay the interest on a capitalization of approximately $25,600 per mile of road. The old Wabash company had a funded debt alone of over $53,600 per mile of road, and there are outstanding in addition to the bonds of the old company $15,000,000 receiver's certificates, not to mention the $92,400,000 of Wabash stock. A reorganization which would scale down mortgage indebtedness from $124,000,000 to $50,000,000 is inconceivable and would be, of course, wholly unjust. The Wabash by no stretch of imagination could be valued as low as at $25,000 a mile. Either, therefore, rates are so low as to result in confiscation, or there is something the matter with the plant itself or the way in which it is operated which makes its operating cost entirely too high, or there is a combination of these two things.

There is no road so situated as to be wholly fairly comparable to the Wabash. The Cleveland, Cincinnati, Chicago & St. Louis has some points, both from a traffic situation and physical location, in common with the Wabash, as has also the Chicago & Alton and the Chicago Great Western. Since these four roads compete one with another on various classes of traffic and therefore must charge the same rates on the competitive traffic, if the other three roads were blooming with prosperity, to paraphrase Mr. Brandeis' diagnosis of general business conditions, it would be pretty good evidence that the trouble was not with the rates received by the Wabash, but with its cost of operation. But no one of the other three roads is in a state even of moderately healthy prosperity. The Big Four had a deficit, after the payment of fixed charges, in the calendar year 1913 of $2,698,000; the

Alton, a deficit in the fiscal year ended June 30, 1914, of $2,762,000, and the Great Western—for all it only recently went through receivership and was reorganized—had a surplus of only $896,000 after interest charges. While this is not, of course, conclusive evidence that rates obtained by the Wabash are too low, it is certainly strongly corroborative of this assumption.

The Wabash got an average rate per ton per mile before the Interstate Commerce Commission 5 per cent rate advance order was made of 6.081 mills; the Big Four, 5.47 mills; the Alton, 6.06 mills, and the Great Western, 7.29 mills. The Wabash received 1.888 cents per passenger per mile; the Big Four, 1.893 cents; the Alton, 1.889 cents, and the Great Western, 2,001 cents. If the character of traffic was such as to permit of very low cost of handling, and the nature of the grades, other facilities and of weather conditions were also such as to facilitate very low operating costs, a 2,000 mile railroad might operate profitably with a six mills per ton mile rate for freight and a two-cent per mile rate for passengers. The less than two-cent per mile rate on the Wabash is undoubtedly unremunerative and lower than American railroad conditions anywhere warrant.

Nature of traffic and characteristics of plant on the Wabash do not permit of very low operating costs per unit of freight and passengers handled. Of the total tonnage of freight, which in 1914 amounted to 14,261,000 tons, 35.65 per cent was furnished by products of mines, 22.24 per cent by manufactures, 18.25 per cent by products of agriculture, 7.40 per cent by products of forests and 6.72 per cent by products of animals. With only 36 per cent of its total tonnage coal and ore, and with 22 per cent of its tonnage manufactures, and, furthermore, with just a third of the tonnage of manufactures l. c. l. freight, an average ton-mile rate of a little over six mills makes a return on anything like a fair valuation of the Wabash an impossibility.

Even with a rate adjustment, however, something will probably have to be done to lower the unit cost of operation of the property to insure future solvency, even if a drastic reorganization is carried through.

The following table shows the percentage of each class of expenses to total operating *expenses:*

	1914	1913
Maintenance of way and structures	16.51	17.54
Maintenance of equipment	23.11	21.59
Traffic expenses	4.23	4.15
Transportation expenses	52.72	53.51
General expenses	3.43	3.21

Transportation expenses are obviously out of line with maintenance expenses, and while maintenance expenses are apparently fairly ample, they are by no means large, with the exception of maintenance of equipment. Maintenance of way in 1914 cost $1,611 per mile of road, and in 1913, $1,722. Repairs of equipment per unit of equipment were as follows:

	1914	1913
Locomotives	$3,589	$3,520
Passenger cars	910	926
Freight cars	72	72

Another serious problem with the Wabash is the very high debit balance which it has to pay for hire of equipment—$1,114,000 in 1914 and $1,083,000 in 1913. In addition the company had to pay $1,576,000 for joint facility rents in 1914 and $1,522,000 in 1913.

The Wabash has a particularly hard problem in regard to its debit balance for equipment. In 1914 there were on an average 14,714 foreign freight cars on the Wabash per day. This compares with 18,593 in 1913 and compares with a total number of freight cars owned by the Wabash of 23,114.

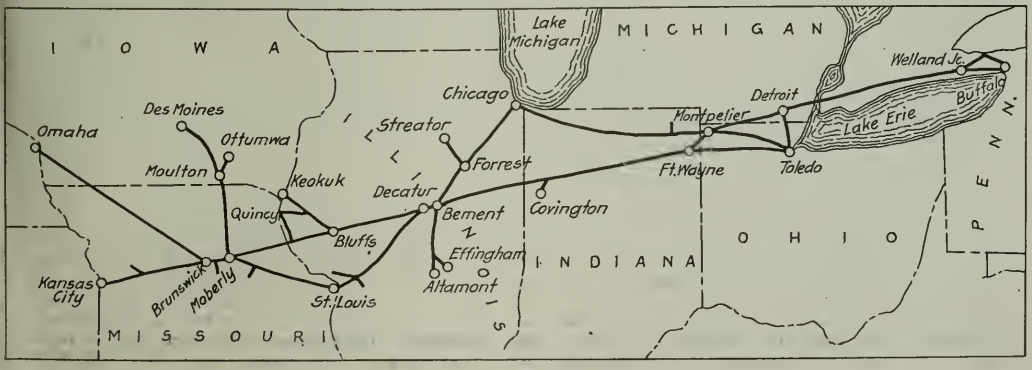
The average revenue trainload on the Wabash in 1914 was 394 tons, and in 1913, 395 tons. There is quite a heavy tonnage of company freight, so that the total tonnage per train mile was 429 tons in 1914 and 435 tons in 1913. The freight density on the Wabash was 1,041,000 tons one mile per mile of road. This is a fairly heavy density for a road with the comparatively small proportion of second track which the Wabash has and with a comparatively high percentage of manufactures and merchandise.

The Big Four has 426 miles of second track as against the Wabash's 507 miles of second track, with about the same mileage of first track operated, and the Big Four has a freight density of 2,178,000 tons one mile per mile of road; but of the Big Four's total tonnage approximately 50 per cent is products of mines, as against 35 per cent for the Wabash. The Big Four's average total trainload in 1913 was 515 tons. The Wabash averaged 21 loaded cars per train and 11 empty cars; the Big Four, 24 loaded cars and 10 empty cars. This matter of empty car mileage is one largely beyond the control of the operating department.

The following table shows the principal figures for operation on the Wabash in 1914 as compared with 1913:

	1914	1913
Average mileage operated	2,515	2,515
Freight revenue	$20,212,828	$21,777,896
Passenger revenue	7,202,169	7,269,914
Total operating revenues	30,035,750	31,685,584
Maint. of way and structures	4,021,782	4,298,862
Maint. of equipment	5,637,985	5,317,665
Traffic expenses	1,028,463	1,002,685
Transportation expenses	12,799,619	13,079,378
General expenses	834,846	780,767
Total operating expenses	24,322,695	24,479,357
Taxes	1,044,309	907,457
Operating income	4,612,966	6,244,087
Gross income	5,383,236	7,005,371
Rentals and hire of equipment	2,774,261	2,688,536
Interest accrued*	4,002,136	3,888,532
Deficit	1,393,161	428,302†

*Including interest on underlying bonds and on receiver's certificates and obligations.
†Surplus in 1913.



The Wabash

Letters to the Editor

"STATISTICS"

Chicago, Ill.

To the Editor of the Railway Age Gazette:

The superintendent of the Uppannattit division arose leisurely at 9 a. m. After an invigorating cold shower he donned an immaculate morning suit carefully laid out by his valet, and engulfed a hearty breakfast of ham and eggs. Strolling down to the office he cheerfully greeted the force of industrious clerks who had been absorbed in their duties since early dawn.

Upon his rosewood desk he found, among the many business and social communications, a set of large and costly prints covered with minute figures purporting to show the result of his mental and physical efforts at some previous period. For the superintendent of the Uppannittit division was in direct charge of 500 miles of railroad valued for taxation purposes at $100,000 per mile and for political pyrotechnics at but $1,000 per mile, and his responsibilities were, indeed, great.

Deftly flicking the ashes from his imported cheroot he reached for his magnifiers and glanced complacently up and down and hither and thither on and across the aforesaid sheets. Then with an exclamation of impatience he drew from a drawer a miniature transit and taking his bearings on line 102 sighted across in an easterly direction to a point. Registering great surprise and perturbation he pushed a button and his chief scribe instantly stood trembling at his side.

"What, ho, varlet!" cried the superintendent of the Uppannattit division, "didst thou not tell me and seek to prove by figures cunningly devised that the operation of my division for the month shown hereon was the best ever?"

"Even so, my lord."

"What then meaneth this item which indicateth a decrease in the trainload and eke in the loading of cars?"

"Thou hast thy finger upon the wrong line, sire. Owing to an eccentricity of the apparatus used in preparing these great and good statements, one must needs look closely to observe that the figures upon this sheet have in places crept up a notch; but nevertheless it is as thou sayest: the Uppannattit division is in disgrace."

"Off with thy head, as thou explain it not!"

"It may not be done to thy satisfaction, sire, as the ways of those who prepare these prints in a far off city are devious and past understanding. But thus it seemeth to me: Business, as thou art aware, was good in this month of March—but, as thou wilt recall, in the month preceding was it simply rotten."

Here the door of the sanctum was cautiously opened and a menial tiptoed in with a message reading:

Jonathan Jones,
Superintendent, Uppannattit division.

It falleth to my lot to inform thee that the general manager is sorely grieved because of the defection on thy division in the month of March, and hath been taken to task by the vice-president, and the president hath been desired by the chairman to forward due explanation instanter to the stockholders. Let me have thy strong reasons in detail.

Jasper Jenks, General Superintendent.

The menial and the c. s. lifted the superintendent from the floor, dusted his Prince Albrecht trousers and reseated him in the Henry VIII chair. Holding his throbbing brow he murmured "Go on; proceed."

"Yea," continued the c. s., "verily the month of February was rotten, especially the last portion thereof, and (behold the cunning of the distributors of accounts), they have, I am credibly informed, taken away the tonnage for the last part of March, which was great, and substituted therefor the last part of February, which was poor, but the train mileage and all other things incident to the heavy business left they unchanged. Ergo, the many train miles and car miles into the few ton miles maketh thy showing bum and to appear exactly as it was not."

"Give me my bonnet!" bellowed the superintendent of the Uppannattit division, "and I will away to the distant city and put a head upon those who do thus play fast and loose with my reputation."

"Mayhap they do need such an appendage, most noble chief, but I beg thee stay thy hand, and it may perchance be that if thou canst retain thy proud position yet another moon, fate will turn the tide in thy favor."

And it was even so.

A month later the superintendent of the Uppannattit division approached his desk in fear and trembling, in sackcloth and ashes, for the report covering the gentle month of April (now far gone) was due, and he felt that his efforts had been without avail.

Feverishly he inspected the figures, and a glow of pride overspread his countenance. Summoning his c. s. he spake:

"Hie thee instantly to the nearest apothecary and bring hither a magnum of his choicest vintage, for verily I have excelled myself and have administered the affairs of this great corporation passing well!"

But the c. s. replied, "Say not so—for thou wast asleep at the switch in the April month. Tonnage slumped and thou didst not get on the job with sufficient promptitude in cutting down thy train miles, and also there were many cost items that thou mightest have reduced."

"How then can it be, base churl, that my trainload has increased over last year, and my expenses per hundred ton miles are much less?"

"Hast thou forgotten, O Chief, the lesson of the last month? Behold the heavy tonnage omitted from that statement is included in this month, and hath offset the train mile fault, and hath also helped diminish the ton-mile cost. But didst thou note the item of casualties, for which Providence and not thou art responsible? Last year it was ten thousands of dollars greater than this for the same month."

"Methinks thy words have weight, but seest thou this item of rails for which I spent but 10 cents this April against $8,000 a year ago, which is creditable surely, and for ties, which last year cost me $17,000.01 there showeth this year a credit of $3,247. Can one do better than expend $3,247 less than nothing for ties in one month?"

"It is even the opposite of what thou supposeth, sire. More ties and rails were used this year than last, but those entrusted with thy good name have discovered various credits to place in these accounts which worketh in thy favor now but next year will go grievously against thee. Also there have occurred in previous months divers errors which it hath been essayed to 'correct' by likewise distorting the figure of another month."

Thus argued the superintendent of the Uppannattit Division and his c. s. long and steadfastly, and at the end thereof the superintendent wept bitterly and wailed:

"How, then, is it possible for one to make a fair showing? Verily I perceive it resteth not with me but with those afar off who know me not nor my travailings. Might not these sheets be prepared in such wise that those to whom they should be most useful might find benefit therefrom and avoid the grievous embarrassment of criticism and needless explanation?"

"All things are possible, O Chief, but 'there are three things which are too wonderful for me, Yea, four which I know not: The way of an eagle in the air; the way of a serpent upon a rock; the way of a ship in the midst of the sea,' and the way of an accountant with operating statistics."

And the superintendent of the Uppannattit Division moralized:

"Lo, it seemeth to me that a tender infant spanked when innocent of wrong doing feeleth the hurt as greatly as doth his justly chastised brother; and the pink tinge endureth as long. It mattereth not that the punisher later realize his injustice, because, forsooth, the memory of punishment inflicted and received remaineth long after the merit thereof hath been forgotten."

C. C.

The "Campaign of Candor" for Higher Passenger Fares

Railroads in Illinois and Other States Appeal Direct to People for Restoration of Half of Reduction

As has been briefly noted in previous issues, the railroads have recently undertaken a campaign, by means of a direct appeal to the people, for increased passenger fares in the states of Ohio, Indiana, Michigan, Illinois and Iowa, and in Nebraska and Missouri efforts are being made to get an increase in fares through the state railroad commissions.

The campaign in Illinois was inaugurated on Wednesday, February 3, when a committee of railroad presidents, with C. H. Markham, of the Illinois Central, as chairman, held a conference with Governor Dunne at Springfield, and asked his co-operation. The plan was outlined to the governor in a statement signed by Mr. Markham, H. U. Mudge, of the Chicago, Rock Island & Pacific; W. J. Jackson, receiver of the Chicago & Eastern Illinois; W. G. Bierd, of the Chicago & Alton; E. P. Ripley, of the Atchison, Topeka & Santa Fe; H. R. Kurrie, of the Chicago, Indianapolis & Louisville; S. M. Felton, of the Chicago Great Western; Hale Holden, of the Chicago, Burlington & Quincy; A. M. Schoyer, vice-president, Pennsylvania Lines; W. A. Gardner, of the Chicago & North Western; A. J. Earling, of the Chicago, Milwaukee & St. Paul, and E. B. Pryor, receiver of the Wabash. The statement to the governor was in part as follows:

For some years the railroads have been facing a condition of stationary or declining rates for their service, and of steadily increasing cost of operation, due to advances in wages, material and supplies, to regulatory legislation, to installation of safety devices, and to heavier and more expensive equipment necessitated by public demand for better service and accommodation. It is unnecessary to discuss this situation in detail. The whole country knows of it. Disaster has overtaken some roads on account of it; others have suffered heavily, and all have been affected.

An important factor in these results has been a 33⅓ per cent reduction in maximum passenger fares made by the passage of the two-cents-a-mile law in Illinois and in several other states.

Application to the Interstate Commerce Commission for acceptance of rate amendments to relieve the situation resulted in the most searching inquiry into the subject of railroad operation and revenues ever undertaken in this country. In this inquiry the generally unprofitable character of railroad passenger service was emphasized to a degree that impelled the commission to give it special consideration, although the question of passenger fares was not specifically or officially before that body. The findings of the commission in respect to passenger fares, together with comments by Louis D. Brandeis, its counsel, and by Commissioner Daniels, are attached hereto.

Therefore it is at the direct suggestion of the Interstate Commerce Commission that we are now presenting the facts in this situation to the people of Illinois and requesting action by their elected representatives with a view to securing the relief recognized and virtually recommended by the commission.

When the two-cents-a-mile law went into effect in 1907, the railroads of Illinois accepted it and made a sincere attempt to live under it without impairment of passenger service. The law has not worked out as some of its advocates expected. The contention that reduction in fares would stimulate travel, and thereby make up the revenue lost, has not been borne out by experience.

From June 30, 1903, to June 30, 1907, being the four-year period preceding the passage of the two-cents-a-mile law, the number of passengers carried one mile in Illinois increased 22.33 per cent; while for the year ending June 30, 1913, compared with the year ending June 30, 1909, which is the latest four-year period for which statistics have been published, the increase in the number of passengers carried one mile was only 17.43 per cent.

The passenger revenues in the year ended June 30, 1913, increased 62.47 per cent over the year ended June 30, 1903. Total revenues in Illinois increased 81.66 per cent for the year ended June 30, 1913, over the year ended June 30, 1903; while operating expenses and taxes increased 98.58 per cent.

The result of this was that, notwithstanding the large investment of railroads in new lines, improvements to existing lines and investments in additional and improved equipment, the net railroad revenue in Illinois increased only 42.25 per cent.

The average distance traveled per passenger in the state of Illinois for the year ended June 30, 1907, before the two-cents-a-mile law went into effect, was 28.10 miles, and the average fare paid was 54 cents. The average distance traveled per passenger for the year ended June 30, 1913 under the two-cents-a-mile law, was only 25.16 miles, and the average fare paid was only 44 cents.

The number of employees of railroads in Illinois in 1903 was 103,385 and in 1913 167,886, an increase of 62.39 per cent. To these Illinois employees the railroads paid $63,674,627 in 1903 and $122,158,824 in 1913, an increase of 91.85 per cent.

These figures are from the reports made by the Railroad and Warehouse Commission of the state of Illinois, the figures for the year ended June 30, 1913, being the latest official figures which are available.

Railroads operating in Illinois, as well as other states where the maximum rate of fare is fixed at two cents a mile, are at a disadvantage in comparison with many states where passenger revenue opportunities are greater. And this, too, has a bearing on the contention that the reduction of fares in Illinois would stimulate travel and make up the loss. Density of population makes volume of railroad travel. The greater the volume the lower the cost of handling. This is a law of trade. Passenger fares, therefore, ought to be lowest in the more densely populated states. But they are not. In the eastern states of Pennsylvania, New York, Massachusetts, Rhode Island, Connecticut, New Jersey and Maryland, density of population is considerably greater than in Illinois, yet maximum fares are higher in all of those states than in Illinois, and not through public indifference to the question. Within a recent period, and since the beginning of the general inquiry undertaken by the Interstate Commerce Commission, this subject has had careful consideration in the New England states, where population is more dense and travel greater than in any other part of the country, and in consequence maximum legal rates have been restored to 2½ and 3 cents a mile.

In presenting this situation to the people of Illinois, the railroads operating in the state are acting in direct response to the suggestion of the Interstate Commerce Commission (which has already approved tariffs providing for increase of interstate rates to a 2½-cent basis), and in accordance with the commission's expressed belief that the people of this state will cheerfuly acquiesce, as the people of New England have done, in reasonable increases, and that the necessary legislative authority will be promptly given.

We propose to present our case to the people of the state frankly and without reservation. Representatives of the railroads are prepared to go before commercial and civic organizations of every kind, and before public meetings, to discuss every phase of the question that can be raised.

In due course a bill for an amendment to the existing passenger fare statute will be presented to the general assembly for consideration and action. We look forward to making the equity and justice of our request so clear to the people of Illinois that the general assembly will not hesitate to enact the proposed amendment, and that it will receive your favorable consideration.

On the following day Governor Dunne replied to the committee of presidents by letter, as follows:

In answer to your communication of this date, presented in person, I would respectfully state that I favor a full and fair hearing upon your application to increase passenger rates from 2 cents to 2½ cents per mile, and I have no doubt the legislature will give you such a hearing.

Whether the prayer of the petition should be granted is dependent upon many facts which can only be developed by a painstaking investigation. I do not believe there is any disposition on the part of the people of the state of Illinois to insist upon confiscatory rates or rates unfair to railroads.

The present 2-cent rate, however, has been in force in this state, without any vigorous protest on the part of the railroads, for nearly eight years, and if the rate is to be increased you must be prepared to satisfy the representatives of the people that the present 2-cent rate is clearly unfair and unremunerative. You should be given ample opportunity to be heard fairly and fully upon the question, and I shall keep myself fully advised of all the facts brought out in such hearing. Should the matter reach me for official consideration I shall endeavor to act fairly and justly to both the people and the railroads of this state, without favoring either unremunerative or extortionate charges.

The Illinois campaign is in charge of a committee of which S. G. Hatch, passenger traffic manager of the Illinois Central, is chairman, and E. E. MacLeod, chairman of the Western Passenger Association, is secretary. This committee has made elaborate preparations for the campaign and has collected statistics and arguments to be presented at the various proposed meetings with commercial clubs and to be given to the press.

This committee made arrangements for meetings with commercial organizations on Tuesday of this week at Galena, Freeport, Rockford and Joliet; on Wednesday at Polo, Dixon,

Mendota, Belvidere, DeKalb and Sterling; on Thursday at Peru, La Salle and Peoria, and on Friday at Monmouth, Galva and Galesburg. Other meeting are arranged for next week. One of the lines at each point where meetings will be held was appointed chairman of a sub-committee on arrangements, consisting of the representatives of the initial lines at those points. Officers, both of the passenger department and of the operating department, were present at each of these meetings, and various individual lines have arranged for other meetings to be held at local points on their lines, at which officers of the roads will present the case of the railroads for the increased fare.

The railroads have not yet taken up the question with the legislature and propose first to conduct a popular campaign. Newspapers have been furnished with statements by railroad men outlining the reasons for seeking a restoration of half of the reduction made by the legislature in 1907, and with copies of the address to the governor and his reply, and beginning on February 5, a series of large display advertisements were published in a large number of newspapers throughout the state. Other somewhat similar advertisements will be published later.

A petition to the Illinois legislature has also been prepared and sent out by the chief executive of each line to its agents and representatives, for the purpose of obtaining the signatures of as many of the local citizens as may be interested in the matter, and believe the railroads entitled to increased revenues to meet increased expenses. The petition circulated quotes from the Interstate commission's remarks on passenger fares in the five per cent case, including the following statement: "The traveling public is giving expression to its demands for better service, better accommodations and for the adoption by carriers of all the devices that make for safety. A public that demands such service cannot reasonably object to the payment of a reasonable compensation therefor." The petition itself is as follows:

Believing it to be to the interest of the public as a whole that the transportation industry, second in importance only to agriculture, should receive a reasonable compensation for its services, we hereby petition the legislature of the state of Illinois to so amend the laws as to fix the maximum rates of fare for passengers traveling in Illinois at two and one-half cents per mile, thus restoring to the railways one-half of the reduction which was made in their passenger fares when the present law, effective July 1, 1907, was enacted, reducing such fares from three to two cents per mile.

A pamphlet containing arguments on the question of passenger fares in Illinois has also been prepared to be distributed to agents and representatives along the line of every railroad in the state. Supplies are to be kept on ticket counters at the more important towns to be handed out to the public, and copies will be furnished to the newspapers. This pamphlet is headed "Why the Illinois Railroads Are Asking for 2½-Cent Passenger Fares" and besides including some of the statements already referred to in the address to the governor, and various other arguments, also includes the previously mentioned quotations from the Interstate Commerce Commission, Mr. Brandeis and statements by Commissioners Daniels and Clark. The pamphlet concludes as follows:

The Illinois railroads are frankly stating the case to the public. Every citizen is urged to give it careful thought and to ask of his legislature favorable consideration.

A similar pamphlet has been circulated in Ohio and Indiana.

The campaign which has just been started in Illinois is in many ways similar to those which had previously been started in some of the other states, especially in Ohio and Indiana. In Indiana a committee of passenger officials first called on Governor Ralston and members of the Indiana Railroad Commission and presented their case, following which a large number of meetings were arranged and held with commercial organizations in the principal towns throughout the state. The same procedure was followed in Ohio, and many commercial organizations have adopted resolutions favoring the position of the railways, while others have taken the stand that the railroads ought to present more conclusive figures to show the exact cost of performing passenger service in relation to the revenues.

In Michigan the roads have announced their intention to ask for an increase in fares and railroad officers have addressed various meetings. The receivers of the Pere Marquette first submitted a petition to the legislature, asking for an increase of fares to 2½ cents, and it was reported in the newspapers that the petition was regarded with some favor by many of the legislators. Later a bill was introduced providing for an increase in fares on all roads, and it was reported that the legislature was less inclined to grant an increase for all roads than to the Pere Marquette alone. One member has introduced a bill providing that fares on railroads whose passenger earnings were less than $3,000 a mile in 1914, shall be 3 cents a mile, and on roads that earned over $3,000 a mile in 1914, the fare shall be 2½ cents a mile. It is reported that the governor has suggested that a special committee be appointed to make investigations to present facts and figures to the legislature before that body takes any action.

In Nebraska the Missouri Pacific asked the Nebraska commission to allow an increase in passenger fares from 2 to 3 cents per mile. The commission said that it had no jurisdiction to do so, and the case is now pending before the supreme court of the state in which the Missouri Pacific is arguing that the constitutional provision giving the commission power to fix just and reasonable rates takes precedence over the specific statute authorizing the 2-cent fare. A bill has been introduced in the Nebraska legislature providing for an increase in the legal state fare from 2 to 2½ cents a mile.

LABORATORY TESTS OF STEEL

At the November meeting of the Canadian Railway Club the characteristics of the materials used in railway service were considered. While the paper and the discussion were more or less elementary some important points were brought out in connection with laboratory tests on metals. Attention was called by Professor Keay of McGill University, to what he termed the most abused expressions in engineering, namely, the elastic limit and the yield point. The yield point is commonly considered as being approximately one-half of the tensile strength, but in experiments with the Martens or mirror type of extensometer it has been found with ¾ in. flange steel that the true elastic limit is in general about two-thirds of the yield point. For this reason it is believed that greater care should be exercised in the use of these two terms.

M. D. Hayes of the Midvale Steel Company also called attention to the difference in the value of the elastic limit of a material when the extensometer was used and when the reading was taken at the drop of the beam. In one case the extensometer showed the elastic limit to be 49,000 lb., while the "drop of the beam" method showed an elastic limit of 61,000 lb. Unless the method of test is included in the specifications the manufacturer will have an excessive amount of leeway. Another point also brought out by Mr. Hayes was the importance of a microscopic examination of the structure of steel in addition to a test of its physical and chemical characteristics. By making this examination a much better idea of the way in which the steel is made is obtained, and while the chemical analysis of two pieces may be the same, the microscopic examination will insure that they are of a correct structure.

Railway Construction in Salvador.—In the Republic of El Salvador some successful surveys have been made for a new railway from Metapan to Ahuachapan. This line, when completed, should open up a valuable and particularly rich tract of country which until now has been very much neglected and held back for lack of transportation facilities.

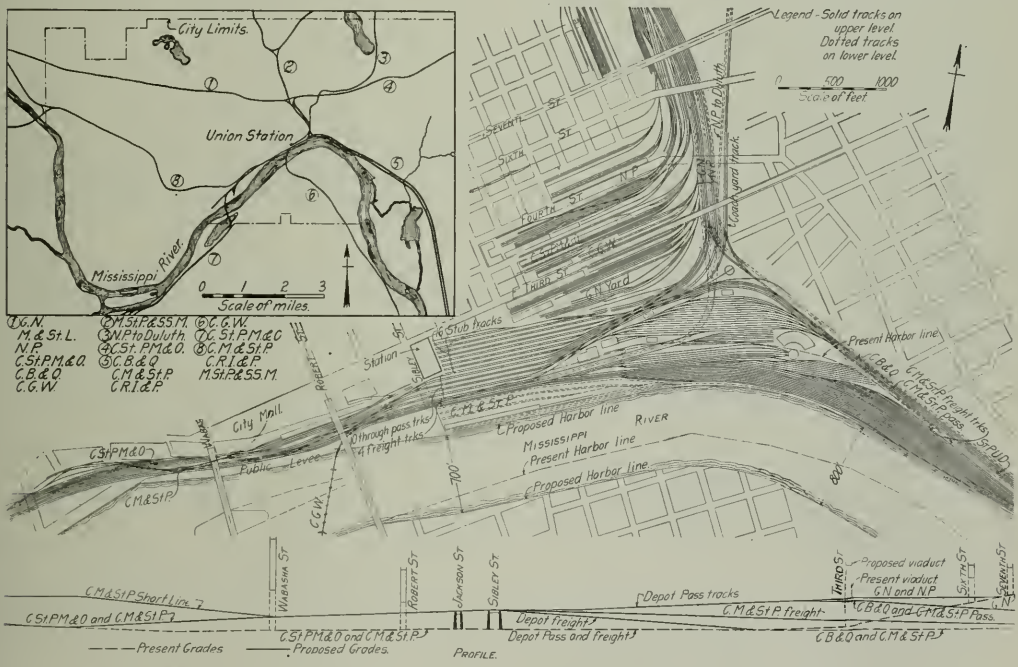
Plans for the New Union Station at St. Paul, Minn.

A $15,000,000 Passenger Terminal Development Is Proposed to Serve the Nine Roads Entering the City

The general plans for a new union station have been completed by the St. Paul Union Depot Company, and were recently submitted to the city council in asking for the ordinances which are necessary before the work can be undertaken. While the need for more adequate passenger terminal facilities at this point has been realized for some time, action was made imperative when the old station was destroyed by fire on October 3, 1913. The location of the terminal property between the Mississippi river and a well-developed commercial section of the city has made the problem of locating an enlarged terminal very difficult, and the necessity for considering the numerous and somewhat conflicting interests of the various roads has also prevented an earlier completion of the plans.

This terminal is used by all of the nine roads entering the St. Paul, Minneapolis & Omaha's Chicago and Duluth trains make a reverse movement in the station, entering from and leaving for the northeast. The Chicago, Burlington & Quincy trains also reverse, entering from the southeast and leaving for the northeast or vice versa. The Chicago, Milwaukee & St. Paul and the Chicago, Rock Island & Pacific trains make a through movement between the west and the southeast approaches. The Chicago Great Western, the Minneapolis, St. Paul & Sault Ste. Marie trains to and from the east and the Chicago, St. Paul, Minneapolis & Omaha's Kansas City trains make a through movement between the west and the northeast approaches.

These operating requirements are met in the proposed plan by a combination stub and through terminal with flexible track



Map of St. Paul Showing Entrance of the Nine Railways and Location Plan Showing Proposed Union Station

city, the Northern Pacific, the Great Northern, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, the Chicago, Rock Island & Pacific, the Chicago, St. Paul, Minneapolis & Omaha, the Chicago Great Western, the Minneapolis, St. Paul & Sault Ste. Marie, and the Minneapolis & St. Louis. There are three main approaches to the station, from the west, the northeast and the southeast. The operation of the trains of the various roads can be divided into seven classes. The Great Northern, the Minneapolis & St. Louis, and the Northern Pacific main line trains terminate their runs at St. Paul, entering the station from the northeast. A few Chicago, Burlington & Quincy suburban trains terminate there, entering from the southeast, and the trains of the Minneapolis, St. Paul & Sault Ste. Marie from the northwest enter from the west. The Northern Pacific's Duluth trains and the Chicago, connections to the three main approaches, and a 218-car coach yard conveniently placed for the rapid switching of equipment in remaking the numerous through trains which break up at this point. A further improvement is effected in the new plan by the separation of grades at street crossings and between freight and passenger tracks in-so-far as this is possible. All passenger tracks in the terminal will be elevated, the through station tracks being carried past the station building on a viaduct. In general the freight tracks will remain as at present on the lower level.

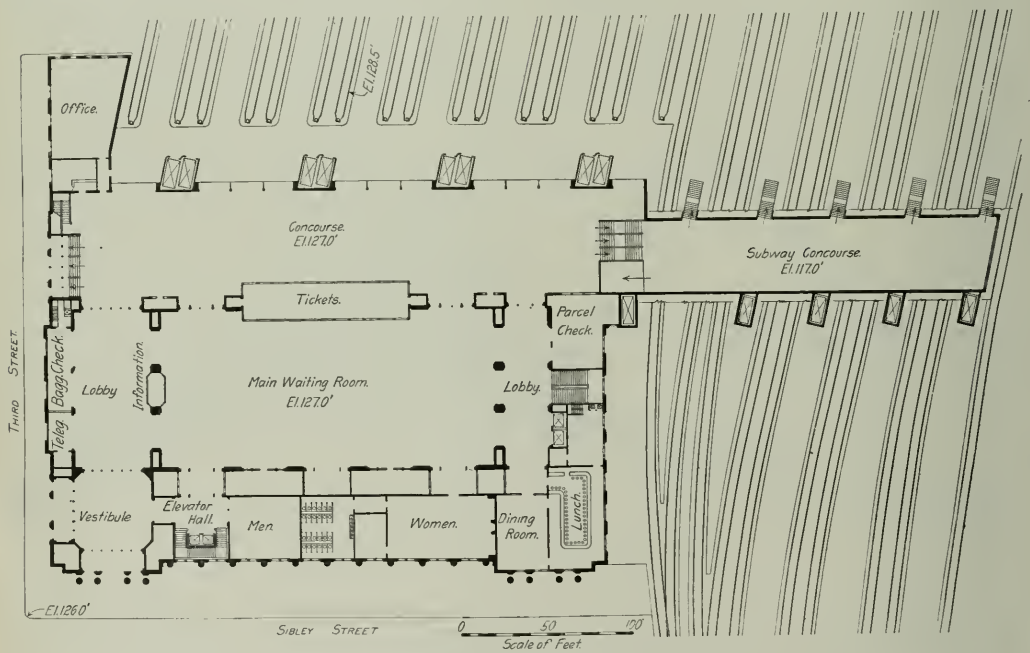
In order to secure the needed property for the enlargement outlined in this plan, it is proposed to move the channel of the Mississippi river towards the south a maximum distance of about 400 ft. As the property adjoining the river on the south which will be destroyed by this move is relatively cheap, this plan was

considered preferable to an expansion to the north involving highly developed property. Under the proposed plan the area of terminal property will be increased from 17.2 acres to 54.2 acres, the mileage of tracks from 9.2 to 24.9, the number of passenger tracks from 14 to 26, the number of freight tracks from 2 to 4, and the capacity of the coach yard from 100 to 218 cars.

The new station building will be located on the same site as the old one with a 315-ft. front on the east side of Sibley street and 220 ft. on the south side of Third street. The station will have three main levels. The middle one, at the track level, will contain the main waiting room, concourses, etc., and will connect at grade with the streets at their intersection. Sibley street is to be carried down toward the river, passing under the through passenger and freight tracks to reach the Milwaukee's freight house and the public levee. The carriage concourse will be entered directly from this street near the southwest corner of the building. Third street will descend toward the east so that an entrance for baggage, mail and express wagons can be provided Sibley street side of this main waiting room will be located additional telegraph and telephone booths, news-stands, etc., and opening directly from it will be a room for women, 35 ft. by 60 ft., and one for men with the barber shop, bath and toilet rooms directly below.

The main waiting room will be joined on the south by a wide corridor with stairs and elevators connecting it with the carriage entrance below and the rest and emergency rooms above. Adjacent to this stairway will be a parcel check room 30 ft. by 40 ft. providing checking facilities both on the main floor and at the basement level. The ticket office, 200 ft. by 100 ft., will be located between the waiting room and the train concourse, with windows opening on both, and will be surmounted by a gallery from which trains will be announced.

The train concourse, which is to be 60 ft. wide by 350 ft. long will be entered from Third street at the north end, or from the main waiting room and lobbies on the west, the aggregate door openings on this side amounting to 130 ft. in width. The 16 stub tracks will be reached directly from the concourse, through



Main Floor Plan of Proposed Union Station at St. Paul, Minn.

on the basement level opposite Wacouta street. The base course of the new building will be of rough pointed Minnesota granite, the exposed portions of the walls of Bedford or similar stone, and the waiting room, which is exposed to view, of brownish-red tile.

The majority of the passengers will enter the station from the main entrance on Third and Sibley streets, which will open into a vestibule 45 ft. by 45 ft. This entrance will connect on one side with a stair and elevator hall, and on the other with a lobby 45 ft. by 90 ft. leading directly to the main waiting room and to the train concourse. The information bureau, baggage checking room and telephone and telegraph offices are to be located around this lobby. The main waiting room will be 90 ft. by 200 ft., occupying the central portion of the building. It will have a penetrated, vaulted ceiling furnishing ample direct lighting and will be finished with marble floors and wainscoting and sufficient architectural decoration to harmonize with its dimensions. On the gates equipped with train indicators. At the south end of the concourse a wide staircase will lead down to a subway concourse 40 ft. wide and 200 ft. long under the 10 through tracks, from which stairways will give access to the station platforms serving these tracks. It is estimated that a person entering the station, purchasing a ticket and checking baggage will walk 450 ft. from the main entrance to the average train location.

The baggage will all be handled in one baggage room on the basement floor adjacent to Third street, with an area of 20,000 sq. ft., this relatively large area being needed on account of the unusual amount of transfer business which will be handled. The baggage will be trucked to trains through a subway extending to the extreme ends of the train platforms, where it can be raised to any of the platforms by one of the 25 elevators. Mail and express matter will be handled in a similar manner from the rooms under the north side of the train shed. The area provided for mail and express matter will aggregate 46,000 sq. ft.

In addition to the baggage, mail and express quarters, and the carriage entrance mentioned above, the basement floor will contain the immigrant quarters and various mechanical equipment. The upper story of the building will contain offices, meeting rooms, kitchen, emergency room and women's room.

All of the large rooms in the station will be lighted indirectly by electricity, and will be equipped with the indirect heating and ventilating system. The power for lighting, heating and ventilating the station will be supplied from a power house located in the terminal yard.

The plans for the new station have been prepared by an engineering committee composed of Ralph Budd, assistant to the president, Great Northern, chairman; C. W. Johnson, consulting engineer, Chicago, St. Paul, Minneapolis & Omaha, and C. F. Loweth, chief engineer, Chicago, Milwaukee & St. Paul. It is estimated that the new terminal will cost between $15,000,000 and $20,000,000, that the work of changing the river channel will require about 15 months, and that the entire project will consume approximately four years.

RATE ADJUSTMENTS IN SOUTHEASTERN TERRITORY

The carriers in southeastern territory are now engaged in making extensive adjustments in their freight rates to make them conform with the findings in the case entitled Fourth Section Violations in the Southeast (30 I. C. C., 153).* In connection with this work they have recently issued a statement bearing the date January 29, 1915, addressed "To the People Served by the Railroads of the South," and signed by presidents J. R. Kenly of the Atlantic Coast Line, W. A. Winburn of the Central of Georgia, M. H. Smith of the Louisville & Nashville, W. J. Harahan of the Seaboard Air Line, and Fairfax Harrison of the Southern.

The statement follows:

An order of the Interstate Commerce Commission, pursuant to requirements of federal law, compels a general revision of southern freight rates. It is proper that the people of the south should be informed as to the reasons for this revision and the principles upon which it is being made.

Excepting the Norfolk & Western, Chesapeake & Ohio and Virginian Railways, which lie in official classification territory, the railroads of the southeast receive virtually no part of the 5 per cent increase in rates recently acquiesced in by the Interstate Commerce Commission. While the need of the carriers of the south for increased revenue is certainly no less than is that of the northern and eastern roads, that need is in no way related to the revision of rates now in progress which arises solely from the necessity of more nearly conforming to the so-called "long and short haul clause" of the law as amended in 1910, and as now construed by the Interstate Commerce Commission.

The original Act to Regulate Commerce forbade the making of lower rates for a longer than for a shorter distance within the same line or route under substantially the same circumstances and conditions. The carriers were free to meet competition as they found it and were required to answer only upon complaint as to the reasonableness of their acts.

The amendment of 1910 deprived the carriers of the right to initiate departures from the long and short haul requirement, and they may no longer meet competition as they find it if the long and short haul requirement of the law is involved, unless they can first obtain the approval of the Interstate Commerce Commission.

They were furthermore required, by this change in the law, to apply to the commission for authority to continue in force rates existing at the time of its passage which contravened the long and short haul principle.

The existing rate structure of the south is not the creation of traffic managers of this generation. It is an inheritance from those who built the roads, and finds its explanation largely in the geography of the south, and in a public policy which encouraged its creation. The changes now in progress are not of the carriers' choice.

Water competition, the most important factor in bringing about departure from the long and short haul principle of the law, has been peculiarly influential on the rate adjustments of the south, surrounded as it is on three sides by navigable water and penetrated by navigable streams. Termini of the first roads were on navigable waters and rates between those termini were from the beginning depressed because of this water competition. When, subsequently, railways were extended to the interior, distributing points were thereby created, where there arose competition of two or more markets, or of two or more carriers, resulting in depressions in rates, even when there was no direct water competition.

These conditions undoubtedly contributed to the commercial and industrial development of the interior south, and, while they resulted in more frequent departures from the long and short haul principle of the law, the carriers had every reason to believe that their practice had the approval of the public, even when it was not directly the result of public demand.

Now, the Interstate Commerce Commission, pursuant to the requirements of an amended law, has concluded an enquiry into rates from the eastern seaboard, including the Virginia cities, from south Atlantic and Gulf ports, and from Ohio and Mississippi river crossings, into the southeast and Mississippi valley territory. As a result the commission has in large measure condemned existing departures from the long and short haul requirement, except where justified by competition beyond the control of the rail carriers, a phrase which came to be restricted to mean direct or indirect water competition.

Obviously, the removal of inequalities condemned by the commission, by reductions only, would result in disaster to the carriers. This fact is recognized by the commission, which, in its review of the situation, stated:

> It is entirely clear that the revenues of a large percentage of the lines in the southeastern territory would be so impaired by such a procedure as to make it impossible for them to meet their operating expenses, taxes and fixed charges and leave their stockholders even a moderate return.

It is equally obvious that it would be unfair to punish the carriers, in conforming to a changed public policy, for acts which at the time of commission were approved by public opinion.

Hence in working out the order of the commission such elevation of rates to the depressed points must accompany reductions to the much larger number of intermediate points as will at least preserve the revenues of the carriers.

The task of revision is no easy one. It has been undertaken in loyal effort to conform to the law, as now interpreted, and to be fair to all.

Departures from the long and short haul principle in the south are not confined to interstate traffic. There are in the south a great many intrastate rates that do not conform to the principle. If undue discriminations are to be avoided, these intrastate rates must be brought into harmony with the revised interstate adjustment being made under the direction of the Interstate Commerce Commission. It is the purpose of the railways of the south to take up each intrastate revision with the several state railroad commissions.

British Railwaymen and the War.—In a review of the labor conditions in the United Kingdom during December, which has been issued by the British Board of Trade, it is stated that as regards railways, the companies have been compelled to apply to the war office for permission to put pressure on their employees not to enlist, and the number who have joined the forces has therefore only risen slightly since the last report, and is now about 60,000 out of some 600,000 employed. In view of the abnormal pressure of Christmas and the demands of the government for transport, the companies have been compelled temporarily to fill places to some extent.

*An abstract of the decision was given in the *Railway Age Gazette* of May 15, 1914, page 1067.

Arbitration of Engineers' and Firemen's Demands

Testimony on Actual Earnings of Enginemen; Mechanical Improvements; Stop-Watch Check on 2,000 Firemen

The statistical testimony concerning the actual wages received and work performed by engineers and firemen on the western railways, which was presented in connection with elaborate exhibits introduced by J. H. Keefe, assistant general manager of the Gulf, Colorado & Santa Fe, at the hearing in Chicago before the board of arbitration on the demands of the western engineers and firemen, was concluded on February 3, and Mr. Keefe was followed by W. J. Tollerton, general mechanical superintendent of the Rock Island Lines, who testified regarding the decrease in work required on account of the introduction of improvements and labor-saving devices on modern locomotives.

EARNINGS LOST BY LAY-OFFS

In Mr. Keefe's testimony engineers and firemen were held responsible themselves for a loss of one-third to one-tenth of their possible earnings through voluntarily laying off a great part of the time. To show what the engineers and firemen could have earned if they had not laid off a large part of the month, Exhibit 30 placed before the board the number of assigned men, the total miles they ran, their hours on duty, their total earnings, their average earnings, and the name of the engineer who received the highest wages in each assignment as well as the amount and name of the engineer who received the lowest wages paid to one man who worked the full month during the month. Coupled with this was a showing of the actual time in which each man's assigned service was performed by someone else showing that he had laid off.

"About three-quarters of the railway service," said Mr. Keefe, "is what is termed 'assigned service.' This means an engine run is assigned to one crew or several crews, and the definite earnings are there for them to take, or to leave for someone else as they choose. Every passenger engineer in assigned service could have earned an average of $197.79 for a month of 184 hours—an average of only six hours a day if he had earned all that the company offered. The only reason they did not earn this was because they had laid off a considerable portion of the time."

Out of 5,412 passenger engineers, the exhibit shows that only 2,876 worked the full month. Of their total assigned mileage of 22,849,739 miles, they left for someone else to perform 2,410,000 miles, thus losing about 10 per cent of their possible earnings. Similar information given for engineers in local or way freight service showed that these men laid off and lost their pay for 20 per cent of their possible service; engineers in mixed train service for this reason lost 15 per cent of their possible wages; engineers in helper or pusher service lost 25 per cent of their possible earnings; those in yard service, 20 per cent, and those in through or irregular freight service 22 per cent.

Turning to the firemen, it was shown that those in assigned passenger service laid off and lost their pay for 17 per cent of the work offered to them; those in way freight service 22 per cent; those in mixed train service, 27 per cent; those in helper and pusher service, 25 per cent; those in yard service, 25 per cent, and those in through or irregular freight service, 30 per cent.

Lay-offs were shown to range from one day to several months' time in the year, with yearly earnings ranging from $1,900 to over $3,000. One engineer laid off 106 days in the year and earned $3,239. Another, off four months in the year, earned $2,000. Another who laid off 38 days earned $3,088 for the year. The average time on duty of engineers in the service covered by these men was about seven hours per day.

These figures include simply the days provided in the assignment, which might be 21, 25, 27 or 31 days, on which the men did not work, and the lay-offs do not include days off which might be provided for in the assignment, such as Sundays.

As a striking example of the high wages now earned by firemen on oil-burning engines, the case of Fireman A. Richardson on the Gulf, Colorado & Santa Fe was cited. He received $209.89 in the month of October, 1913, for firing an oil-burning locomotive. "The rate now paid of $3.75 per day is unreasonable, " said Mr. Keefe, "when applied to oil-burning locomotives in the passenger service having cylinders of 24 inches or over. This rate was the result of an arbitration so unfair that most of the railways took it out after a year's time limit had expired. Some roads still have the rate, but intended to bring this excessive rate up as one of the wrongs to be remedied in the present arbitration proceedings. They are prevented, however, by the fact that the roads are excluded in this arbitration from bringing forth any of the injustices under which they are working, leaving open for arbitration only the demands of the men. This fireman's earnings of $3.75 compare with $4.40 for the engineer, although his position compared with the coal fireman's is a 'snap.' The oil fuel is fed through pipes and regulated by a valve in the cab, the fireman not being required even to leave his seat, except three or four times in an entire 100-mile run, and then only to pour a scoop of sand through the door of the firebox to clean out the flues, which is done by suction."

Charges made by Grand Chief Stone of the engineers' brotherhood that some of the high earnings shown in the exhibit for individual engineers were the result of excessive hours on duty were promptly met by the railways. An investigation of some of the cases pointed out by Mr. Stone was made immediately by telegrams sent to the divisions on which the men worked. One engineer on the Canadian Pacific for whom the exhibit showed an average of 23 hours per day for 19 days to earn $211 in a month was found to have worked actually 15 hours a day, but to have been paid for 23 hours. Another engineer on the Chicago, Milwaukee & St. Paul who was shown as running 5,090 miles in one month, which Mr. Stone thought excessive, was found to be working on a run of 36.6 miles, for each of which runs he was paid for 100 miles under the minimum day rule. The actual mileage run was only 1,537, consuming 5 hours a day, for which the engineer was paid $329.65 in one month.

W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen, remarked that there were many more firemen shown than engineers. This, Mr. Keefe, said, was partly because firemen laid off more than engineers and were more inclined to leave the service for some other occupation. "Is it not a fact," asked Mr. Carter, "that the work of the fireman is so hard that he gets so tired that he has to lay off frequently?" "I should think not," said Mr. Keefe, "in view of the fact that the figures for firemen on oil-burning locomotives show the same proportion of lay-offs." Charles Nagel, one of the arbitrators, asked if the fact that the fireman is usually a younger man than the engineer and is not so likely to have "settled down" might not have something to do with the number of lay-offs.

Exhibit 30-a introduced by Mr. Keefe showed that the high earnings of engineers and firemen in October, 1913, were exceeded frequently in other months of the fiscal year ended June 30, 1914. Representatives of the brotherhood had claimed that the October figures were abnormal because they applied to a busy month. When the new exhibit was introduced W. L. Park, vice-president of the Illinois Central and one of the arbitrators, remarked that figures for some of the men showed even higher wages than for October, 1913.

WEIGHTS OF LOCOMOTIVES

In connection with the discussion of engineers' and firemen's wages Mr. Stone told the board that some time after the last award to the firemen, providing for a rate of $3.75 a day for

firemen on certain classes of engines with cylinders over 24 in., on some of the Santa Fe lines a sleeve or bushing was put in some 25-in. cylinders to make them 23½ in., and the engines were superheated, for the purpose of avoiding the higher rate. He also said that after the award to the engineers, which included an additional payment of 25 cents a day for locomotives weighing over 215,000 lb. on drivers, some roads that had engines stencilled for 217,000 or 218,000 lb. on drivers had them restencilled to show 214,000 lb. For this reason, he said, the demands included a provision for bulletining the exact weights of locomotives. In reply to questions by Mr. Sheean he admitted that he had no direct knowledge as to which of the weights was correct.

Exhibit 31 was a reprint of an exhibit filed by the firemen, to show the earnings of firemen who had just been promoted to engineers, and had been demoted on account of a falling off in traffic, with additional figures inserted to show the earnings of these men while acting as engineers. The original exhibit took no account of earnings of the same men while working as engineers for part of the month, and whereas the brotherhood had stated the average in February, 1913, as $82.62 for each man, the actual average earnings were $108.21. This exhibit aroused a heated controversy in which Mr. Carter insisted that he had been furnished the figures by the Conference Committee of Managers. Mr. Keefe replied that the managers had furished exactly the information asked for and had not known for what purpose it was to be used.

Exhibit 32 showed the length of time pool freight, unassigned or "chain-gang" engine crews were held away from their home terminals during the month of October, 1913, and June, 1914, on each road, including the legal rest period. Mr. Sheean said that this exhibit showed in some cases an extreme length of time which ought to be paid for. The exhibit showed that there were 49,194 crews in June, 1914, whereas there had been 72,000 in October, 1913. In October, 8,085 crews were held away from their home terminals nine hours, and in June, 5,192 crews had been held away for nine hours. One road showed one man away from his home terminal for 100 hours, one man for 84 hours and another for 80 hours.

Exhibit 33 showed the age limit beyond which many of the roads will not employ engineers and firemen. This showed that in most cases roads will not hire an experienced man over 45 years of age, nor an inexperienced man over 35 years of age. "If a man is dismissed from service for some trivial fault after he is 45 years of age he can go and eat snowballs," said Mr. Stone. Mr. Keefe said he could go to some of the roads that do not have an age limit.

SOME EXAMPLES OF HIGH EARNINGS

Exhibit No. 34 gave a comparison of the total payroll for the various months of the fiscal year 1914, to show their relation to the figures for the month of October, 1913, for which the detail figures were given for 64,000 men. This exhibit also showed the total earnings for the entire year of those men who were shown in Exhibit 30 to have earned the highest wages in assigned service for the month of October, 1913. Mr. Keefe explained that this was not necessarily the maximum paid during the year, but that no check had been made for the other months. This exhibit showed one engineer who ran a local freight train between Helper and Green River on the Denver & Rio Grande for 27 days in one month and earned $246.86 for this service, and also made one round trip of 354 miles in passenger service one day and earned $16.10 additional. Another engineer on the Great Northern, working 27 days, made a round trip mileage of 2,444 miles in 353 hours, or 13.1 hours per day, 6.8 hours per trip, and earned $291. An engineer on the Atchison, Topeka & Santa Fe whose average earnings per month throughout the year were $239.65, in one month earned $264, and for the year earned $2,875.77, although he laid off for 25 days of his assignment during the year. During his "high month" he made a round trip mileage of 4,320 miles in 6.3 hours per day, 3.1 hours per trip. Mr. Stone said that this man leaves Topeka at 7:30 a. m. and gets back to Topeka at 10:10 p. m., and that he is not compensated for the large amount of time he is idle at St. Joseph between trips, "although he has sold the company all that he has to sell—his time." Mr. Stone and Mr. Carter tried to show that in order to earn the wages mentioned the men had to work overtime, and that most of the layoffs were on account of sickness or exhaustion, also that the mileage run would depend on the amount of traffic, and that a man would not have the opportunity to work his full assignment in a period of traffic depression. Mr. Stone also objected to figures showing what a man would have earned if he had worked full time, saying that was treating a man as a machine.

FIREMEN WORK 31 PER CENT OF TIME ON DUTY

A feature of the testimony of W. J. Tollerton, general mechanical superintendent of the Rock Island Lines, was an exhibit compiling the results of over 2,000 actual stop watch tests, showing the exact amount of time spent by the fireman in performing his various kinds of work. This showed that more than two-thirds of the time was left available for viewing the scenery along the right of way.

"These stop watch tests," said Mr. Tollerton, "were made on 20 representative western roads by traveling engineers who remained in the cab of the locomotive and recorded every move of the fireman. If he was engaged in any duty at all, either shoveling coal into the firebox, shoveling down coal, sweeping the deck, shaking the grates, or doing anything other than sitting still on the seat box or standing in the gangway idle, he was credited with the performance, which was classified and timed by the stop watch. The average of these 1,556 trips on locomotives of all kinds shows that the fireman was engaged in supplying coal to the firebox 1 hour and 40 minutes, less than one-fifth of the time he was paid for. For 12 per cent more of the time he was either sweeping the deck, shoveling down coal, shaking the grates, hooking the fire or operating the injector. In all he was occupied at some work just 31 per cent of the time, while for 6 hours and 5 minutes, or 69 per cent of the time, he had absolutely nothing to do but look at the scenery.

"On engines of 185,000 lb. or over on which two firemen are demanded, 474 tests were made on 16 roads. On these locomotives the fireman spent 23 per cent of his time shoveling coal into the fire and 10.5 per cent more at other duties, while he had nothing whatsoever to do for 66.5 per cent of the time.

"An accurate count was kept of the number of scoops of coal thrown into the fire. By this means it was determined that in the 1,556 tests made only 1,975 pounds of coal, less than one ton, was thrown into the fire each hour."

"Is this within the capacity of a single fireman?" asked James M. Sheean, counsel for the railroads. "Yes," replied Mr. Tollerton, who had testified to having been a fireman himself for a short time; "4,000 or 5,000 lb. is well within the capacity of one man. On all of these tests the fireman used only about one-half of his capacity to handle coal. On over 2,000 observations the fireman spent less than one per cent of his time shaking the grates and less than one per cent more in breaking coal. This indicates there is really no serious room for complaint, and if complaints do exist, they should be handled locally. The railroads have improved conditions in a number of ways."

Mr. Tollerton stated that the test trains were 10 per cent heavier than the average trains in the busiest months and were one per cent longer on the road than the average in the 30 days of heaviest traffic.

"From these observations do you consider two firemen necessary?" asked Mr. Sheean, attorney for the roads. "Absolutely no," replied Mr. Tollerton.

IMPROVEMENTS IN LOCOMOTIVE DESIGN

Improvements in locomotive design which have cut one-third from the physical labor formerly required of firemen were described by Mr. Tollerton. "Two new inventions alone, the

superheater and the brick arch," he said, "have effected a saving of 30 per cent in the amount of coal shoveled. These improvements," said he, "render it possible to get the same results with a great deal less coal, correspondingly relieving the fireman. Conservatively speaking, the superheater saves 20 per cent of the fuel."

"Do I understand that with two engines, one equipped and the other not equipped with superheater and performing the same work, the amount of coal shoveled by the fireman on the former will be 20 per cent less?" asked Mr. Sheean.

"Yes, sir," replied Mr. Tollerton, "this has been determined by actual tests and is conservative. There is not only a great saving in fuel but also in water, so that the fireman is bound to save some of his physical effort. Addition of the brick arch effects another saving of 10 per cent in the fuel consumption, so that with these two appliances alone 30 per cent of the fireman's labor is eliminated."

To apply these two devices, it was pointed out, costs over $3,000 per locomotive. Yet, because 4,000 pounds are thereby added to the engine's weight, the roads would have to pay a higher wage to the fireman under the new demands, although relieved of one-third his shoveling.

Another exhibit introduced by Mr. Tollerton consisted of a reprint of Exhibit No. 51 introduced by the engineers and firemen, containing a number of articles and statements made by prominent railway authorities and various railway and other technical publications, with additions printed in red to show parts of sentences or paragraphs left out in the original exhibit which greatly qualified, and in many cases absolutely contradicted the effect of the parts left in the employees' exhibit.

"These statements," said Mr. Tollerton, "were comments on the great fuel economies and other labor-saving developments which have taken place in spite of the growth in power, but in every instance all reference to the increased fuel economy of the larger locomotives and their savings in labor for engineer and fireman was cut out and only the partial statements presented to the board of arbitration."

Mr. Stone took up cross-examination of Mr. Tollerton on his testimony as to labor-saving devices on modern locomotives. He attacked Mr. Tollerton's defense of the present cylinder basis of compensating engine crews.

"In the eastern arbitration you were satisfied with the cylinder basis, were you not?" Vice-President H. E. Byram of the Burlington, one of the arbitrators, asked Mr. Stone.

"Yes," replied Mr. Stone, "but that water has gone over the dam."

Turning to the labor-saving devices Mr. Stone asked if they had been introduced out of consideration for the engineers and firemen.

"They are the natural results of improvement in railway work, from which both the men and the railways derive benefits," replied Mr. Tollerton.

"Did you not testify," asked Mr. Stone, "that the engineer has been relieved of everything except opening and closing the throttle?"

"That is still one of his duties," replied Mr. Tollerton, "of which I hope we won't have to relieve him. I claim that the evolution of engines has steadily relieved the engineer and fireman of many duties. The large engines have brought increased pay to their crews, but we have never been able to use them to above 75 per cent of their capacity."

"Whose fault is that?" asked Mr. Stone.

"It is the fault of western conditions," said Mr. Tollerton. "The traffic is so light the tonnage is not there except in a few months of the year, and then generally in one direction."

President Carter then took up cross-examination on the stop watch tests, which showed for over 2,000 observations that only 31 per cent of the fireman's time is occupied.

"On your figures," said Mr. Carter, "I compute that the fireman would shovel about 170 pounds of coal one minute and then rest four minutes. Wouldn't he need a rest?"

"Your own figures show him to be resting 80 per cent of his time," said Mr. Tollerton.

THE DEMANDS APPLIED TO ELECTRIC SERVICE

How the granting of the same wages and rules to motormen and helpers in electric service as to engineers and firemen in steam service would hit the Southern Pacific on its electrified terminal and suburban lines in Oakland, Cal., was placed before the board by R. E. Hewitt, master mechanic of the Southern Pacific electric lines at Oakland, who qualified the engineers and firemen for electric service when the New York Central electrified its terminal in New York.

"These men are now paid $5 for an 8-hour average day, the minimum for engineers," said Mr. Hewitt. "It makes no difference to the motorman whether he has one or three motors working, as they are all operated from the master control, and there is no more labor in running a 10-car train than a single car. On the tractive power basis every motor car in the train would mean so much more tractive power. If the train of cars had three motors in it, as is common, the tractive power would be multiplied by three and the necessary wages would be greatly increased with absolutely no more labor."

Mr. Hewitt testified that the only labor asked of the motorman aside from running the train was to carry a small kit of tools to his car. All oiling, lubricating and repairing are done at the shops.

"Do you know of any place in the country where two men are used to run a multiple unit train?" asked James M. Sheean, counsel for the roads.

"I have never heard or read of such a thing," replied Mr. Hewitt. "Even a trolley tender is unnecessary, as the 'pantagraph' trolley takes care of itself. If the motorman became suddenly sick, fainted or otherwise became incapacitated, the controller mechanism would automatically shut off the power and set the brakes."

The difficulties of running a roundhouse with hostlers who would refuse to perform the ordinary roundhouse duties were described by H. Clewer, supervisor of locomotive operation of the Rock Island Lines. "If the hostlers are recruited from the enginemen, as demanded," said Mr. Clewer, "the result would be decreased efficiency, increased compensation and increased expense to the companies in providing additional men at the terminals to perform the labor now performed by the present hostlers. These hostlers are now recruited from roundhouse forces and occasionally from engineers and firemen incapacitated for road service. At the present time the hostlers can be used as general utility men and it is necessary that they be so. If these positions are given to firemen or engineers protected by all the provisions of their schedules, they would refuse absolutely to do anything but handle the locomotive, and for this would receive a higher wage. Due to the seniority rules there would also be a constant change in personnel, resulting in our having men inexperienced at the terminal, which would be disastrous at busy points."

Mr. Carter stated that hostlers' wages should be paid to every man doing any hostler work whatever.

"If the hostler handles an engine 10 minutes and for the rest of the day does odd jobs about the roundhouse, would he have to receive hostler pay for the entire day?" asked Mr. Sheean.

"Yes," replied Mr. Carter.

"At Bureau, Ill.," the witness then testified, "there is a man who moves the engine daily 150 feet. The rest of the day he shovels cinders or does any other work at hand. Yet because of handling the engine 150 feet, he would have to be paid hostler's wages for the day."

Russian Railway Projects.—It is reported that the opening of the Amur Railway throughout its whole length is expected to take place in the year 1916. In addition, during the five years 1915-19 the Ministry of Ways of Communication has in view the construction of a considerable number of important new railways, totaling approximately 21,000 miles.

The Possibility of Fire from Locomotive Sparks

Data Obtained from Tests on the Chicago, Indianapolis & Louisville; Greatest Danger Within 50 ft. of Track

At the December meeting of the Western Railway Club Prof. Lawrence W. Wallace, of Purdue University, presented a paper on the possibility of fire from locomotive sparks. In the summer of 1913 he and Professor Young, also of Purdue, conducted some spark tests on the Chicago, Indianapolis & Louisville, just north of Lafayette, Ind., where there is a 0.77 per cent grade. In preparation for the tests a plot of ground was marked on each side of the track. Five rows of stakes 20 ft. apart, were set at right angles to the track. The stakes in each row were spaced 20 ft. apart, starting from 25 ft. from the center of the track and extending to 125 ft. Beyond this distance the stakes were located 150 ft., 200 ft., 250 ft., 300 ft. and 350 ft. from the center of the track. Pans 12 in. square by ¾ in. deep were placed at each stake. The pans in three or four rows contained paraffine, while

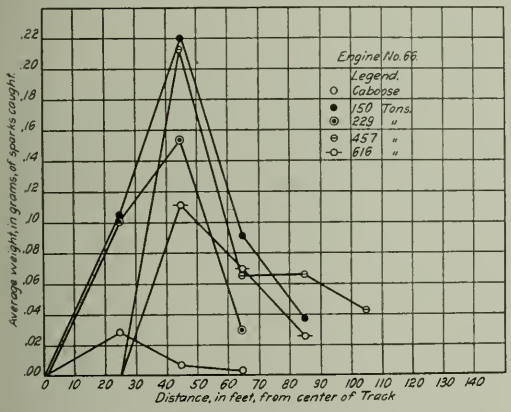


Fig. 1—Average Weight of Sparks Caught from the American Type Locomotive

those in the remaining rows contained cotton fleece. An American type locomotive (No. 66) and a 6-wheel switching locomotive (No. 9) were used in the tests, the former having 18-in. by 24-in. cylinders, 67-in. drivers, a total weight of 100,000 lb., and a tractive effort of 15,800 lb. The switching locomotive had 18-in. by 22-in. cylinders, 45-in. drivers, a total weight of 88,000 lb., and a tractive effort of 20,100 lb. An anemometer was used for obtaining the velocity of the wind.

In conducting the tests the locomotives were run by the field containing the pans at four different speeds varying from a low speed to the maximum that could be obtained under each load hauled. Tests were made with the engine and caboose alone, and tests were then made for each increase in tonnage until the full tonnage was obtained. For each test the direction of the wind and its velocity, the temperature, the condition of the weather, the number of cars, the weight and speed of the train, the position of the reverse and throttle levers, the draft and the character of the smoke were taken.

Fifteen tests were made with the American type engine, a summary of the results being shown in Fig. 1, the chart showing the average weight of sparks caught in each pan for the tests made with the different tonnages. From this it will be seen that the greatest number of sparks fell within 50 ft. from the center of the track. No sparks were caught beyond 150 ft., and in only one test were there sufficient sparks caught at 150 ft. to weigh. It was also found that the quantity of sparks ejected was not materially affected by an increase of tonnage. It was evident, however, that as the tonnage increased the range over which the sparks were spread increased. Of the total weight of sparks caught, 71 per cent was within 45 ft. of the center of the track and 85 per cent within 55 ft.

The tests with the switching locomotive were made in the same manner as those with the American type. Fig. 2 shows similarly the results obtained. These curves have the general characteristics of those illustrating the other tests. No sparks were caught further than 65 ft. from the track when the caboose alone was attached. With a full loading of 630 tons a comparatively large amount were caught at 150 ft., but at the next station beyond there was no trace found. Sixty-two per cent by weight of all the sparks caught from this locomotive was within 50 ft. of the center of the track, and 81 per cent was caught within 65 ft.

There were 613 sparks from both locomotives in all tests caught in the paraffine pans, that were warm enough to stick or to melt into the paraffine. Of these, 83 per cent were caught within 45 ft. of the center of the track, and 96 per cent within 65 ft. In Fig. 3 the total number of sparks that stuck in the paraffine for each locomotive is shown plotted against the distance from the center of the track.

One of the purposes of the test was to determine, if possible, to what extent the possibility of fire from locomotive sparks was influenced by the velocity of the wind, but as the wind velocity during these tests did not exceed nine miles an hour definite results were not obtained. It is intended, however, to continue the tests some time in the spring when the wind is much stronger.

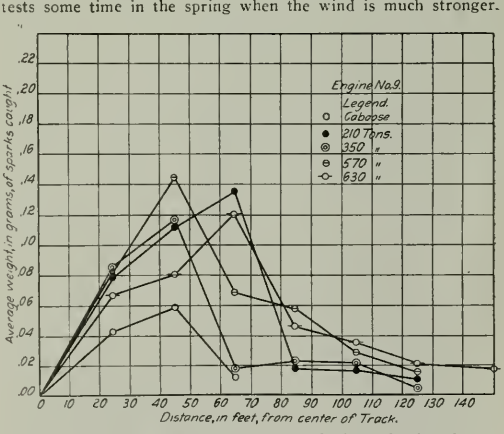


Fig. 2—Average Weight of Sparks Caught from the Switching Locomotive

From a study of the information obtained under these conditions no fixed law was found as to the influence of the wind on the sparks.

Paraffine and cotton fleece were used in the pans in order to determine as far as possible the temperature of the sparks when they reached the ground. The sparks sticking to the paraffine were closely studied and compared with similar sparks at known temperatures placed in paraffine in the laboratory, and in this way the sparks caught in the tests were assigned temperatures. Laboratory tests were made for the purpose of determining the temperature at which locomotive sparks of different sizes would set fire to various combustible materials and to obtain data whereby the temperature of the sparks falling in the paraffine pans in the

tests might be gaged. In preparation for this several hundred pounds of sparks were sifted. The sieves used were carefully made and were of 5/8-in., 1/2 in., 7/16 in., 3/8 in., 1/4-in. and 3/16-in. mesh, the sparks being passed through the sieves in the order named. One or more of each of the several sizes of sparks was placed in a small crucible and heated in a furnace until a temperature of 100 deg. F. was reached, and for a few minutes thereafter to insure that the sparks were of an equal temperature. Then one spark of each size was dropped on each of the combustible substances prepared, namely, cotton fleece, dry grass, excelsior and paraffine, and was closely observed in order to discern what took place. These tests were repeated for all sizes of sparks and for all temperatures up to and including 1,800 deg. F., the increment of increase of temperature being 100 deg. F.

The conclusions drawn from these laboratory tests are: First, that it requires a spark larger than 1/4 in. at a temperature greater than 1,000 deg. F. to ignite so inflammable a material as cotton; second, it requires a spark larger than 3/8 in. at a temperature greater than 1,400 deg. F. to burn either excelsior or dry grass, and for the latter even higher temperatures may be required. From the information obtained in the laboratory tests with the paraffine pans, the 613 sparks that were hot enough to stick to the paraffine in the field were studied and only one gave evidence of having been at a temperature of 1,200 deg. F.; this spark was caught 25 ft. from the center of the track. Only three sparks were graded as having been 1,000 deg. F., and of all the sparks

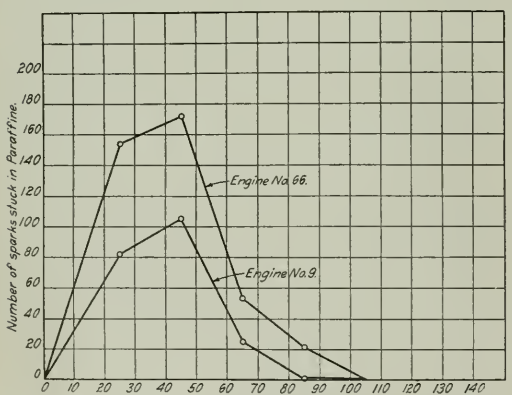


Fig. 3—Total Number of Sparks That Stuck in the Paraffine, for Both Locomotives

that were 800 deg. or more, there was only one that was caught in the pans as far away from the track as 85 ft. Of all the sparks graded as being 200 deg. F., and there were a large number, only two were found as far as 105 ft. from the center of the track. Out of the 32 tests with the two different locomotives worked at their greatest capacity and with the wind velocity as high as 8.7 miles per hour, only four sparks having a temperature of 1,000 deg. F. or over, were caught, and they fell within 65 ft. of the track. Even then it was shown by the laboratory tests that a spark must be hotter than 1,000 deg. F. to set fire to so combustible a material as cotton.

From these tests it was found that the greatest danger of fire from locomotive sparks is within 50 ft. from the center of the track; and that it is unlikely that any sparks over 1,200 or 1,300 deg. F. will reach the ground from a locomotive stack. For a locomotive spark 3/8 in. or less to set fire to so inflammable a material as cotton fleece it must reach the ground at a temperature of 1,300 deg. F. For excelsior the temperature must be 1,600 or 1,700 deg. F., and to set fire to dry grass it must be 1,700 to 1,800 deg. F. The largest sparks caught during the road tests were less than 3/16 in. Professor Wallace stated that the subject had not been fully covered, and the influences of wind of higher velocity and of heavier working conditions are yet to be determined.

LIMITING LENGTH OF TRAINS BY LAW*

By M. W. Potter

President of the Carolina, Clinchfield & Ohio

A bill before the South Carolina legislature makes it a misdemeanor to run trains containing more than fifty cars, whether loaded or empty. The Clinchfield Railway never could have been justified as a sound business proposition and never would have been built, as a fifty-car railroad. More than $15,000,000 was expended to increase its capacity to upwards of 100-car trains. The application of a fifty-car limit would double operating costs and actually destroy at least $15,000,000 of our investment. If adopted in South Carolina the bill would prevent construction of new high-class roads and the revision of present lines. The measure would be an impregnable barrier against the progressive development of the state and permanently prevent the lowering of rates. . . .

With the completion of the Clinchfield extension to Elkhorn City, Ky., shortly to be put into operation, our line, in connection with the lines north, will constitute a practically level railroad from an operating point of view. All that will then remain to give South Atlantic ports a line to the Middle West equal to or better than the lines from the northern ports will be new construction from the Clinchfield to Charleston, or a revision and improvement of the present lines. This subject is now receiving the consideration of the lines interested.

The enactment of the proposed measure by South Carolina would build up and strengthen the railways of other states at the expense of your own.

"While such measures are prompted by a desire to create more jobs, the promotion of safety is given as a pretext. The statistics of the lines handling long trains conclusively prove that operation with long trains is safer than with short. A given tonnage can be handled over a line in a given time with a few long trains with much less danger than with a greater number of short trains. The reason is obvious. . . . By handling a given tonnage in fifty-car trains, instead of 100-car trains, there is four times the danger of erroneous train orders and signals; four times the danger of switches being left open; four times the sudden jars and wear and tear; four times the danger of the flagman not properly warning approaching trains; four times the danger of congestion and collision, and four times the general complexity of operation.

Upon a hearing before the committee of the Virginia legislature, which last winter rejected a similar measure, statistics were furnished by the Norfolk & Western showing that the longer trains were the safer; and similar statements were presented by the Chesapeake & Ohio. It appeared that in the case of both these railroads the mere length of the train was negligible as a cause of accidents. The figures given as the actual experience on those railways harmonize with the universal experience of all railroads. The Clinchfield, which has been operating trains of from 60 to 135 cars in South Carolina for more than five years, has never seriously injured an operative in such service. We handle from 60 to 100 loads into Spartanburg and from 100 to 135 empties out.

Sound state policy would be to encourage development to the highest point of efficiency and the best possible service, with proper regulation of the compensation to be received for such service. The citizens of South Carolina should take this matter up as an important public question, which in its bearing upon the future of your state may, I believe, become as far reaching as any problem you have ever had.

*From a letter printed in the Spartanburg (S. C.) Herald.

National Association of Scale Experts' Convention

Abstract of Papers Presented at the Eleventh Semi-Annual Meeting Held February 1-3, at Chicago, Ill.

The National Association of Scale Experts held its eleventh semi-annual meeting at the Fort Dearborn hotel, Chicago, Ill., on February 1-2-3, at which papers of interest to railroad men were read and discussed on the subjects of: Automatic Scales and Their Mechanical Construction, by F. E. Kaeppel, sales agent, Fairbanks, Morse & Company; Test of Railroad Track Scales, by D. J. McGrath, scale expert of the state of Minnesota; Board of Trade Weighing, by J. A. Schmitz, editor, Scale Journal, and Weighing and Recording of Weights, by L. M. Allen, district superintendent, Western Weighing & Inspection Bureau, Omaha, Neb.

On Tuesday morning the delegates visited the Fairbanks, Morse & Company shops, where the fitting and sealing of levers was demonstrated, returning in time for the association dinner at the Fort Dearborn hotel at 1 o'clock.

FOUNDATION, CONSTRUCTION AND CARE OF TRACK SCALES

By A. Malmstrom
Chief Scale Inspector, Atchison, Topeka & Santa Fe.

There is an crroneous conception in regard to a track scale foundation. We usually call the square concrete box made to receive scale metals, structural steel or timbers, the foundation, whereas the real foundation is the underlying strata on which this concrete box is placed. In deciding upon the location of a scale, if rock is accessible within a reasonable depth a little additional expense and material or labor should not be spared to reach it. If rock, dry sand or gravel cannot be reached conveniently, artificial support must be secured by driving piling. It is impossible to issue any general rules in regard to the location or construction of foundations for track scales, for this must be left to the judgment of the engineering department and the scale experts to use.

For example, on the Santa Fe, nearly every kind of earth formation is found, including the damp and swampy condition on the gulf and Pacific coasts, the sandy and volcanic formation on the desert of Arizona, the black soil, clay and gumbo in the East, and the rocky formation in the mountains. In nearly every instance different treatment has to be resorted to.

In placing a track scale at San Francisco, where the foundation consisted of filled ground on sloping rock, 36 piling were driven to a depth of 60 ft. to reach the rock. Then a footing of concrete 3 ft. thick was built, in which was imbedded 1,625 lineal feet of light rails placed longitudinally and crosswise. The concrete box was then placed on this footing. Until about two years ago the scale had moved 4 in., but had maintained its compactness. In September, 1913, a slight quake jarred it out of level 2½ in., which condition was temporarily remedied by shimming, and later it was permanently remedied. In spite of all these difficulties the concrete box remained absolutely intact.

Another peculiar problem in the construction of a scale foundation was encountered at Galveston, where the bottom of the pit extended down 3 to 4 ft. below the level of the Gulf of Mexico. On one foundation 49 20-ft. piling were driven. A cement footing 10 in. thick was then placed on it, on which the outside form was built. During all this performance the water was seeping in as fast as a No. 8 Knowles steam pump could carry it away. To be able to work it was necessary to extend the excavation 2 ft. in every direction, forming a ditch from which the water could be pumped out. Five layers of tarred roofing paper were placed on top of the 10 in. footing and on the inside of the outside form each layer and its seams being glued with pitch tar. Then 10 in. more concrete was put in, after which the inside form was built. The concrete was then carefully poured against the paper, so as not to penetrate it. After the inside form was removed a heavy coat of ironite and two ½ in. layers of water-proof plaster were applied. This plaster consisted of a mixture of 4 lb. of soft soap and 4 lb. of powdered lime to 50 gal. of water, to which was added enough clear sand and cement, in equal parts, to make it of proper consistency. The pit was then filled with water to prevent the plaster from setting too quickly and cracking. This foundation has proved very tight.

In selecting the location of a track scale the following conditions should receive careful consideration: A scale should be located where cars can be handled the cheapest, usually ahead of the lead on a separate track, it should be convenient to the building in which the weighmaster is located, and, if possible, it should be located where a good gravity drain can be placed. In the actual construction of the scale proper after the foundation is completed there are three principles that should be kept in mind—plumb, level and square. All connections must be plumb; frames, levers, beam and beam shelf must be level; and the coping, structural steel and frames must be square. The levers must also be square with each other.

After the scale is in operation frequent tests and inspections should be made. With proper management the scale men can be greatly assisted by the agent at track scale points. On the Santa Fe each general manager issues a rule to agents at such points, to make an end-to-end test once a week, and make reports thereof to the district scale inspector. By this arrangement the inspector can immediately tell if there is anything wrong with the scale on receiving the report of such tests.

In examining or testing a scale the bearings should not be disturbed unnecessarily by jacking up the scale girders, because in the wear of a scale each bearing seeks its own location, and if this natural position of the bearing is disturbed the scale will show a bad test immediately after such examination is made, while in a short time it will again seek its natural bearings. Of course in case of a breakdown or displacement of levers or bearings the jacking up of the weighing bridge cannot be avoided.

If grease is applied to the bearings it should not be disturbed and air should not be admitted to the steel after it is once covered. After the bearings are badly worn it will be shown by the application of the test car, which is run onto the scale from opposite directions. If there are unreasonable variations, and if each application shows different results and the scale does not readily respond to adjustment, then it is time that levers should be renewed or their metals repaired.

Cleanliness is the most essential detail in the care of the track scale and should be insisted upon at all times. The most effective scheme that we have yet found to prevent corrosion, and to lubricate and keep the bearings clean is to fill all loops and bearings with a grease that will maintain its body at all temperatures. The loops should be filled flush on both sides, covering the pivots completely without touching the body castings of the levers. Applied in this manner it will not impede the movement of the scale in the least, but will exclude all dampness, dirt, dust, corrosion or paint, besides acting as a lubricant. This method also eliminates the frequent scraping and repainting of metal pipes. The best preparation that we have found is No. 4 Mephisto brand Arctic cup grease. No grease should be applied to the bearings above the platform, because in the higher multiplication levers the grease will have some effect. On the shelf lever and beam pivots a very thin covering of "Vaturdrip," or some other good rust preventive, should be applied.

RECORDING WEIGHTS—CALLING EVERY WEIGHT BY ITS RIGHT NAME

By F. C. Maegley
Assistant General Freight Agent, Atchison, Topeka & Santa Fe, Chicago, Ill.

One of the cardinal factors of commercial integrity is accuracy, and with respect to many commodities the scale and the recorded weight is the medium by which the prevailing measure of accuracy is determined. There are innumerable methods of recording weights, ranging from the sublime to the ridiculous. If any one underestimates the value of accurate means of recording weights, let him try to carry the information around in his mind for a time before recording it, and then by any practical method of testing his accuracy, see how many mistakes will result. One of the primary causes of weight discrepancies is the failure of the weigher to have or to utilize a reliable recording device. Many of the checking and recording systems have valuable safeguards against mental errors, or transposition of figures. Constant attention should be given to these features.

The record of first entry of weights recorded should be held sacred and permanent, and under no circumstances, should the weigher or other person destroy this record, however crude it may be, and substitute therefor copied scale tickets or copied weight records. The weigher should make suitable and complete notations on the original record, thereby establishing positive evidence of its integrity and completeness. In recording weights the record should show all circumstances which are essential to the full knowledge of the conditions and manner in which the weights were determined. This record should be so complete as to leave no room for doubt, and it should identify each weight with the particular transaction, car or vehicle to which it belongs. For example, at a recent annual convention of an extensive trade shipping organization a member took the floor and lamented the fact that public weighers' weights so frequently were unreliable because the weighers who were called upon to furnish affidavits of their weights could not say from their own knowledge whether the weights certified by them had reached the particular car or vehicle intended in every instance.

Every local agent should be made to become interested so that each in turn may labor with the customers of the railroad for weighing betterments. The strict attention to the detail of recording weights is one of the main reasons why the Chicago Board of Trade weighing department has obtained such high standing for the prevailing accuracy of its weights.

Simultaneously with the campaign for improved accuracy in the recording and transmission, and the application of weights there should be started another campaign entitled, "Calling Every Weight by Its Right Names." Whenever a weight is not called by its right name there is some underlying cause for hiding the identity of the weight, this cause being deception. If Bill Jones, the individual, weighs a commodity for purchase, sale or transportation, that weight should be known and designated as Bill Jones' weight. If Bill Jones, the employee of a firm or industry, performs a like weighing service such weight should be known as that firm's industry weight, per Bill Jones. If Bill Jones is hired as the accredited weigher of goods, sold, purchased or transported for individual firms or corporations, let that weight be designated as the weight of the institution for which Bill Jones is the bona fide employee. Or, if Bill Jones is employed by an impartial tally check weighing department, let such weight be known and designated as that impartial tally check weighing institution's weight, per Bill Jones, tally check-weighman; so that others at a distance interested in the particular transaction may be in a position to judge as to the character and quality of the weight recorded and transmitted.

Why should the weight of a shipper or receiver of freight by rail be designated as a railroad weighing association weight or as a board of trade weight, if in fact it is the weight of the shipper or receiver? Also, the record of first entry, and likewise any record that is transmitted or reported should show the original true and real author thereof and responsibility therefor, and every weight should stand squarely upon its own bottom and not be allowed to sail under false colors.

In practically every commercial transaction there is an agreed controlling basis as between buyer and seller of commodities sold by weight. Either the seller's weight, the buyer's weight, or the weight of some weighing department is the one upon which the commodity is bought and sold. Where the seller parts with his commodity on the basis of the buyer's weight or the weight of others, he naturally is anxious to have the controlling weight basis protected by every reasonable safeguard. Where the transaction involves the commodity thus shipped the buyers and sellers are usually situated at considerable distances from one another so that they must, in a measure, depend upon such cooperation as may be reasonably employed to insure the accuracy and integrity of the service performed. Certain shipping organizations are now conducting a campaign calling upon their membership for closer attention to the scales used and a prompt written declaration or certificate of weights at the time cars are loaded, so that the same may be used by the destination agent when delivery is made and the controlling weight reported by the consignee. The importance of calling every weight by its right name cannot be too strongly emphasized.

LOCOMOTIVE FEED WATER HEATING

In discussing the report on "Steam Locomotives of Today" at the recent meeting of the American Society of Mechanical Engineers, several references were made to feed water heating. An abstract of this part of the discussion follows:

DISCUSSION BY H. H. VAUGHAN

H. H. Vaughan, assistant to vice-president, Canadian Pacific, stated that considerable has already been heard as to the experiments made on feed water heating by Mr. Trevithic on the Egyptian railways, in which he used not only exhaust steam heaters, but waste-gas heaters in the front end. With the latter he has been able to put the water into the boiler at 230 deg. and obtain 22 per cent economy. In this country the Central Railroad of Georgia has done a little feed water heaters, as well as the New York Central, the Canadian Pacific, and the Central Railroad of New Jersey.

"On the Canadian Pacific we have been experimenting with feed water heating for six years. We have tried open heaters in a tank with fairly good satisfaction. We also applied exhaust steam injectors, and got fair results. We have since been advised by the manufacturers that our troubles were because of our having applied too large size an injector for ordinary work on the engine. However, I am of the opinion that while the exhaust steam injectors would work fairly well under certain conditions, yet there would be some difficulties where the amount of water consumed is large. We found on experiments with an open heater that the temperature obtained was due to the exhaust steam from the feed pump, so, assuming a temperature of 200 deg. in the feed water, it would really be the equivalent of 160 deg. when the water was put into the boiler by an injector with 100 per cent efficiency. By heating the water at the injector suction to 120 deg., we got 6 per cent economy, and used injectors as against 10 or 12 per cent economy with the feed water heater, and using a pump. We thought 6 or 7 per cent with the injector was preferable to 10 or 12 per cent with the pump, and we have been experimenting on that in recent years with reasonable results. Lately we have experimented with an ordinary closed feed water heater, and it is giving fair results.

"This is a subject which American railroad people have largely neglected. It has the advantage of not only saving in coal, but increasing the capacity of the boiler. In careful experiments we found an economy of 12 per cent in the use of the heater, and we feel that that jutsifies our going into the device more thoroughly. I feel that we will see feed water heating coming into larger use, not only with exhaust steam, but with waste gas."

DISCUSSION BY F. F. GAINES

F. F. Gaines, superintendent of motive power, Central of Georgia, stated in part: Feed water heating in this country is confined to a limited number of cases, and cannot be said to be generally recognized as a factor in fuel economy. Experiments made on several engines by the author show that about 10 per cent economy can be expected; there have been, however, offsetting difficulties in maintenance.

The feed water heater in question was made up of two elements. The first consisted of a pair of condensers in the form of long drums applied underneath the running boards. The steam from air pumps, boiler feed pumps, and some of the main exhaust was condensed in them and the heat taken up by the feed water. The second element consisted essentially of a double nest of tubes in the smokebox, similar to a Baldwin type superheater. The feed water from the tank was forced through the condensers and smokebox heater, and from the heater through the regular boiler checks to the boiler itself.

Some trouble was experienced with operation of the pump, and it was also found that the type of pump used was not altogether suitable for the purpose, wearing very rapidly and having considerable slippage. The smokebox heater tubes were objectionable from the standpoint of obstructing draft and filling up with soot and cinders between the tubes, also cutting out very rapidly by the action of the exhaust. There was a further objection due to the fact that the condensed steam from the air pumps and boiler pump exhaust was still at a temperature that, in cold weather, would give off considerable clouds of steam, and as this water had to be wasted, the result was a cloud of steam around the engine, which was objectionable because of obscuring the view of the engineman in looking back over the train.

These heaters were used some two or three years, however, and tests were made which showed them to have a fuel economy somewhere in the neighborhood of 10 per cent. On account of the mechanical difficulties mentioned they were finally abandoned, more especially in view of the fact that very much greater economy can be obtained by using the smokebox for superheating steam, and if this is done, this form of feed water heater, of course, must be abandoned. That eventually, however, we will succeed in developing a satisfactory type of feed water heater seems to me almost a certainty.

It would appear that the most feasible plan for such ultimate development would be a type of open feed water heater which would be located between the frames of the engine and underneath the boiler, which space is now available on account of the elimination of inside valve gear, using as before, the exhaust from the air pumps, boiler feed pumps and part of the main exhaust. In doing this, however, it is thought that ultimately, instead of using the present form of exhaust draft to effect combustion, with its consequent back pressure due to restriction of the nozzle, a form of forced draft of the blower type will be used. Under these conditions the exhaust openings from the cylinder to the atmosphere can be made without any restriction whatever and in this manner greatly reduce the back pressure, so much so that the steam required for operating the auxiliary and forced draft would use but a small proportion of the horsepower gained in so doing. Previous experiments would also indicate that a type of centrifugal pump would be much more effective and positive for boiler feeding than one of the reciprocating type used heretofore.

While American railroad practice is averse to adding any complicated apparatus to the locomotive, it seems that the demand for the utmost economy will eventually bring about a satisfactory method of feed water heating so that in connection with superheating, liberal firebox heating surface and possibly compounding we can obtain the maximum possible economy from the fuel used.

NEW YORK CENTRAL AWARDED HARRIMAN SAFETY MEDAL

The American Museum of Safety held its annual exercises and award the museum's medals on Wednesday evening, February 10, at the United Engineering Societies building in New York City. On this occasion the E. H. Harriman memorial gold medal awarded annually to the American steam railroad which during the year has been the most successful in protecting the lives and health of its employees and of the public, was awarded to the New York Central for the record made during the fiscal year 1914 by the New York Central & Hudson River. This is the second annual award of the medal given by Mrs. E. H. Harriman, which was awarded last year to the Southern Pacific.

The medal was awarded on the decision of the committee on award, composed of Arthur Williams, president of the American Museum of Safety, chairman; E. E. Clark, member of the Interstate Commerce Commission; Charles P. Neill, formerly United States Commissioner of Labor; Dr. Alexander C. Humphreys, president of Stevens Institute of Technology, and Samuel O. Dunn, editor of the *Railway Age Gazette*.

The medal was received by A. H. Smith, president of the New York Central. The silver replica of the medal goes, not to an individual officer, but to a department, the operating department. The bronze copy of the gold medal goes to Dennis J. Cassin, a locomotive engineman, who was retired last September on a pension, after 53 years' service for the company. Mr. Cassin had been an engineman since 1867, and had run the most important trains. The management recommended him for this honor because of his excellent record, and of the intelligence and spirit with which for many years he has sought "safety first."

Nineteen railroads competed for the medal by sending to the committee their accident statistics for the fiscal year 1914. In making the award consideration was given to various factors, including the relation between the number of locomotive miles run and the number of accidents, the improvement in safety made during the year, the conditions under which traffic is handled, and any especial effort made to bring about improvements in safety, including physical improvements, such as block signals and the attention given to a "safety first" campaign. The greatest consideration was given to the relation between the number of locomotive miles run and the number of persons of all classes killed and injured, which were considered on the basis of a weighted scale, the greatest weight being given to passengers, and the least to trespassers. Great consideration was also given to the reduction shown during the year as compared with the previous year in the number of killed and injured, having in mind the relation between the reduction in the number of casualties and in the volume of traffic handled.

The New York Central & Hudson River, it was considered by the committee, made a most remarkable record, not only considered by itself, but especially in comparison with the results of the previous year. While there was an increase in the number of passengers carried one mile, and a reduction of only 5½ per cent in the total number of locomotive miles, the total reduction in fatalities from all causes was 68 per cent. The reduction in locomotive miles was attributable to the decrease in freight traffic. This road in the fiscal year 1914 carried a total of 1,983,885,428 passengers one mile, without a fatality to a passenger in a train accident. There were 12 fatalities to passengers in other than train accidents. In 1913 524 people were killed and 15,569 were injured, while in 1914 the number killed was reduced to 212 and the number of injured to 7,317. Moreover, there was a reduction both in fatalities and in casualties in every class of persons, passengers, employees, etc.

In making the award to the New York Central the various conditions under which its traffic is handled and the operating difficulties experienced by a road such as this, one of the greatest passenger carrying roads in the country, were taken into con-

sideration. The road has shown a steady decrease in casualties since the beginning of the safety first campaign in 1910. For the past four years there has been a continual reduction in fatal accidents to employees on duty, excluding industrial accidents. In 1911 the number was 165, in 1912, 154, in 1913, 140 and in 1914, 99. In 1914 no road trainman was killed in a train accident, whereas during the previous year 12 were killed in such accidents.

The list of roads which competed for the award is as follows: Arizona Eastern; Chesapeake & Ohio, including the Chesapeake & Ohio of Indiana; Corvallis & Eastern; Illinois Central; Long Island; New York Central & Hudson River; New York, Chicago & St. Louis; Queen & Crescent; Rock Island Lines; St. Louis Southwestern; St. Louis Southwestern of Texas; Southern Pacific Company; Sunset-Central Lines; Toledo, St. Louis & Western; Union Pacific System; Vandalia; Western Maryland; Oregon-Washington Railroad & Navigation Company; Oregon Short Line. An excellent showing was made by all of them. Of the 19 roads there were 16 that during the year did not kill a passenger in a train accident.

Other medal awards made at this time include the Scientific American medal for the most efficient safety device presented within a certain number of years and exhibited at the American Museum of Safety, awarded to the Shurloc Elevator Safety Company, Inc., New York; the Travelers' Insurance Company medal, awarded to the American employer that has achieved greatly in protecting the lives and limbs of workmen, awarded to the Commonwealth Edison Company of Chicago; the Louis Livingston Seaman medal, awarded for progress and achievement in the promotion of hygiene and the mitigation of occupational disease, awarded to Surgeon-General William C. Gorgas of the United States Army; and the Anthony N. Brady memorial medal, awarded to the American Electric Railway Company, which for the year of the award shall have done most to conserve the safety and health of the public and of its employees, awarded to the Boston Elevated Railway Company.

"NATIONAL" TRAIN INDICATORS AT KANSAS CITY

Two of the train indicators in the new union station at Kansas City, a description of which was published in the *Railway Age Gazette*, October 30 last, page 799, are shown in Fig. 1. These two indicators show the next two trains that are to leave from track No. 6 and are placed, as shown, at the left and the right of the door leading from the main waiting room to the stairway by which passengers go down to platform No. 6.

These indicators were described in the *Railway Age Gazette*, February 14, 1913, page 296, in connection with the installation of three different designs of indicators in the Grand Central Terminal and the Pennsylvania stations in New York City. To the passenger these indicators are notable for the simplicity and good taste of their design and arrangement; and they commend themselves to the station man by reason of simplicity and ease of operation.

In the Kansas City station, where the architect has designed surroundings which afford a very effective setting to the indicators, the arrangement is different from that with the same style of indicator in New York, in that all of the operations of the attendant are performed on the back side, out of sight. At New York, the putting in of one train-notice in the place of another is done in full view of the passengers.

These indicators are made of steel and iron, copperplated. Those here shown are 32 in. wide and 6 ft. high. The lettering is painted on a curtain made of strong "leather-cloth" painted a flat black. This cloth is attached to a roller like that of a common window shade. The roller is inserted at the bottom of the indicator space, and, by means of chains and guides at the sides, the upper end of the curtain is pulled upward and fastened at the top, the whole change being made in less than half a minute. With the flat color and the neat arrangement of all parts of the frame-work and apparatus, the lettering appears to the observer to have been painted on the solid wall. A curtain

Fig. 1—Train Indicators in Kansas City Union Station

is prepared for each train and, when rolled up on its roller, is kept in a convenient drawer and, the sizes being uniform, a curtain can be displayed at any doorway in the station.

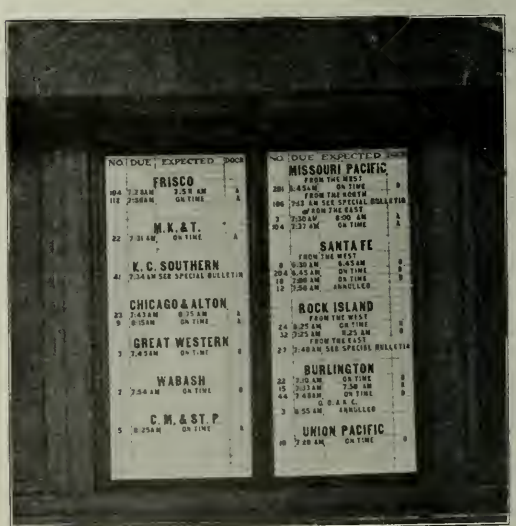


Fig. 2—Bulletin of Arriving Trains, Kansas City Union Station

In connection with these indicators for departing trains, the reader will be interested in the bulletin which is provided in the Kansas City station for arriving trains, shown in Fig. 2. This

bulletin is posted above one of the doors at the side of the grand lobby, and is hung on hinges so that it can be swung around into the station master's office, where the changes in announcements are made. Each half of the bulletin is 27 in. wide and 65 in. high.

This bulletin is made up of slats about 1¼ in. wide covered with white enamel metal. These are fastened into wooden frames. The information shown on the bulletin is made up of separate letters and characters, printed in black on the same white enamel metal; the tops of the characters being bent in the form of a hook to enable them to be hung on the slats. Certain phrases, such as "ON TIME," "ANNULLED," etc., are made in one piece. Thus any changes desired can be made on any slat, and any character can be used.

It has been found that with the large number of trains and the number of changes consequently required, the use of separate characters takes up a good deal of time, and logotypes will probably be made, showing train number and arriving time on one piece of metal. The names of the roads as shown in the picture are made in logotype style. Each of these covers two

Fig. 3—Train Indicators in Memphis Union Station

slats. Its position on the board can be changed readily in case more room is needed for that particular road.

This device is patented and was furnished by the Commercial Sign Company of Ashtabula, Ohio.

Fig. 3 shows the arrangement of "National" indicators in the Union station at Memphis, Tenn., which differs from those at both New York and at Kansas City, in that the indicators for six different trains are grouped in one place; that is, on a balcony above the main doorway leading from the main waiting room to the train-concourse. The clock placed above the indicators serves to draw attention to this side of the room, and a passenger anywhere in the waiting room can thus at a glance secure all of the principal items of information about his train in this one place; and also inform himself concerning all of the trains scheduled to depart within the next hour or two. Each of the six indicators can be used in connection with any one of the platform tracks, the numbers at the top being changeable. These Memphis indicators are narrower than those at Kansas City, being 24 in. wide. They are operated from the rear, the same as those before described.

The indicators are made by the National Indicator Company, Long Island, N. Y. The same company has installed indicators in the Camden station, Baltimore; Windsor street (Canadian Pacific), Montreal; Minneapolis (Great Northern); Detroit Union station; Central of New Jersey terminal, Jersey City, and Long Island Railroad, Brooklyn, N. Y.

LOCOMOTIVE FRONT ENDS AND DRAFT APPLIANCES

The following extracts are taken from the discussion of the report of the railroad committee of the American Society of Mechanical Engineers, presented at the annual meeting in New York, December 2, 1914:

DISCUSSION BY C. D. YOUNG

C. D. Young, engineer of tests, Pennsylvania Railroad, said in part:

Front End Design.—The general use of the Schmidt type of superheater has had an influence in effecting a certain uniformity in the arrangement of the smokebox. The one-piece lift pipe connected directly to the outside stack forms a very desirable and simple arrangement and requires a short exhaust column so that the advantage of a long stack may be obtained. The use of the petticoat pipe, with its adjustable features, is not so desirable as the internal single lift pipe, as the adjustable features are a source of annoyance in that people not properly qualified to make the adjustments are continually tampering with the arrangement, which results in an improper draft in the front end. It is most desirable that the gases have a free passage through the smokebox, and all points of possible restriction between the tube sheet and stack should be carefully investigated as to their areas. Care should be taken to provide a passage through the superheater damper which is equal, at least, to the area of the boiler and superheater tube outlets above the damper.

The use of a damper in connection with the superheater should be optional. On railroads where there is little or no drifting, there would seem to be no necessity for a damper. However, where a moderate amount of drifting is done, or where the locomotives are interchanged between divisions with low and moderate grades and others with heavy grades requiring a large amount of drifting, the automatic damper is a most essential feature for the protection of the superheater unit elements.

There has been a tendency of late to use exhaust nozzles having other than circular openings. The plain circular nozzle forms a steam jet which is too nearly cylindrical, or the shape of the stack, and the use of such a shape as the rectangular appears to break up the continuity or the form of the jet and cause it to draw out a larger volume of gases. Both rectangular nozzles and nozzles of the dumb-bell shape have been used with success, and with an increase in evaporation over that with the circular form. There has recently been developed on our locomotive testing plant a nozzle having four internal projections which appears to be more satisfactory than some of the irregularly formed nozzles. With these nozzles, having other than a circular outlet, an increase in the evaporative capacity of the boiler or from 15 to 25 per cent has been obtained and in recent tests on a large Pacific type locomotive a nozzle with four internal projections has given a maximum capacity in equivalent evaporation from and at 212 deg. of 87,414 lb. per hour. In the locomotive in question, this is an evaporation of 18.0 lb. of water per square foot of heating surface per hour and with this quantity of steam an indicated horsepower of 3,184 was obtained; whereas, the circular nozzle on this same locomotive developed a maximum equivalent evaporation of but 62,719 lb. of water per hour, resulting in an indicated horsepower of 2,501. It should be understood that no change was made in the locomotive other than in the exhaust tip.

Ashpan Air Inlets.—It has been the practice on the Pennsylvania to require that the air openings into the ashpan be at least 15 per cent of the area of the grate, and when the openings are of this size, the ashpan vacuum will be considerably less than one inch of water at the maximum evaporative rates. We have found, however, in the case of some switching locomotives, that this area of 15 per cent of the grate

area has been too large for the requirements of their service and to provide for this condition upon shifting locomotives, ashpan dampers have been installed along the air inlets at the mud ring. This arrangement very nicely takes care of these locomotives, which stand a great deal of the time, and if the air inlets in the ashpan were not reduced, it would be difficult for the firemen to prevent a large amount of steam from escaping from the safety valves.

DISCUSSION BY C. E. CHAMBERS

C. E. Chambers, superintendent of motive power, Central Railroad of New Jersey, said in part:

Locomotive Front Ends.—I presume there is no part of a locomotive that has had as much experimenting done on it as the front-end. We have had long and short stacks, rectangular and oblique, and single and double nozzles. Personally I think the single type exhaust nozzle will give satisfaction if other things are right. The height of the exhaust pipe should be not more than one-quarter to one-third of the diameter of the smokebox.

The netting arrangement does not make much difference. The arrangement of the diaphragm in the front end has a lot to do with the cleaning of the front end. It should be kept 6 to 9 in. away from the sheet to give a clearance.

Two or three years ago we had a new type of locomotive which gave us some trouble. After a number of trials of various expedients it occurred to me that the stack might be too small, so I took up with the locomotive builders the question of the relation of the diameter of the stack to the diameter of the cylinder, and it was admitted by them that the stack was smaller than it should be. We increased the diameter from 15 in. to 18 in. at the choke. We had perhaps one hundred or more engines with the same size stack, and about the same cylinder volume, but not in the same kind of service, so that they did not give us much trouble. But after making these changes on this particular type we made the change on the other engines and found a great difference, including a decreased consumption of coal.

One small improvement we have made in smokebox fronts where there is trouble from overheating is the placing of a liner about 4 or 5 in. away from the smokebox door, and filling the space with asbestos. This did away entirely with the difficulties from overheating.

ANTI-FULL-CREW LAW CAMPAIGN

The Pennsylvania, the Philadelphia & Reading, the Baltimore & Ohio, and ten other railroads in Pennsylvania and New Jersey have appointed a committee to make a comprehensive appeal to the public, to repeal the "full crew" laws. This is a problem in the solution of which the public is vitally interested, and it is proposed frankly to present all the facts, coupled with plain statements as to exactly what the railroads feel to be right, and the reasons therefor. The railroads recognize the fact that the interests of the public stand superior to those of either the corporations or their employees, and they feel that the public, by its greater interest, may be trusted to exert its dominating influence for what is best.

Statements are being prepared and will soon be given wide publicity. Space will be taken in daily and weekly newspapers in Pennsylvania and New Jersey, and the whole proposition will be put squarely before the people. The preliminary statement says:

"In no sense do the railroads war upon their trainmen. This law forces waste—not less than $1,500,000 a year in Pennsylvania alone. It means in all such cases employment without service. That is a defiance of economic law. It makes a proposition which organized labor hurts itself in upholding. It throws an improper cost upon the railroads. This ultimately rests upon the public as a burden and makes a charge which transportation service should not be called upon to bear, because it is productive of nothing good, neither in improved service nor increased operating safety. On the contrary, it makes it impossible for the railroads to do many things for the public which the money now so wasted could be expended for.

"If there shall be evidence that without such laws the railroads would under-man trains, to the hardship of employees or the detriment of the public; or that the present public service acts do not give to the commissions ample powers to determine what crews are necessary on different trains and to compel the railroads to man trains as ordered, we will support such amendments to the present acts as may be necessary to give such assurance."

This is signed by Samuel Rea, president of the Pennsylvania; Theodore Voorhees, president of the Philadelphia & Reading, and Daniel Willard, president of the Baltimore & Ohio, as a committee for the thirteen roads.

A committee of subordinate officers has been appointed to take charge of the work, of which R. L. O'Donnel, general superintendent of the Pennsylvania, is chairman. The other members are: C. H. Ewing, general superintendent, Philadelphia & Reading; F. Hartenstein, assistant to general manager, Lehigh Valley; Robert Finney, general agent, Baltimore & Ohio, and J. S. Fisher, solicitor, New York Central. Other roads represented are the Erie, the Lackawanna, the Delaware & Hudson, the Buffalo, Rochester & Pittsburgh, the Pittsburgh, Summerville & Clarion, and the Cumberland Valley.

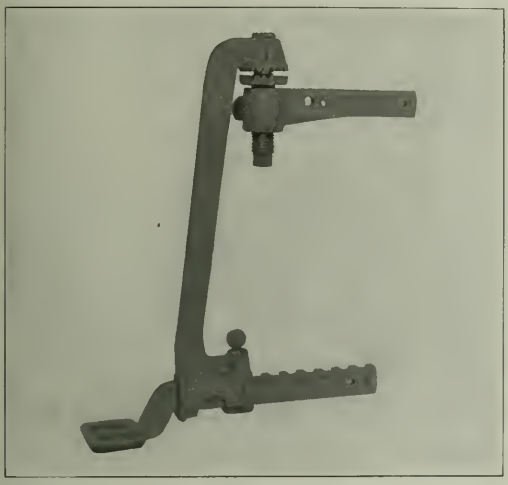
ADJUSTABLE PNEUMATIC FIRE DOOR PEDAL

An adjustable operating pedal for use in connection with pneumatic fire doors, which has recently been developed by the Franklin Railway Supply Company, 30 Church street, New York, is shown in the illustrations. The tread is mounted in a hanger

Adjustable Pedal Attached to the Franklin Butterfly Door

in which it has a sliding adjustment that permits it to be located at a distance from the boiler head suitable for either a tall or a short fireman. The adjustment may also be changed to suit the

position of the fireman as the coal is used back from the coal gates. A lock is provided which holds it in any position. The hanger is mounted on a rigid hanger bolt about which it may be swung in either direction by raising it to clear the teeth in the face of a shoulder on the bolt. When swung to the desired position it is secured by dropping it into place, the teeth in the hanger engaging those in the shoulder. The hanger may be adjusted vertically so that in case of a warped deck the treads may be raised to provide the proper clearance without the necessity of taking the hanger to the blacksmith shop. This adjustment is made by turning the rigid hanger bolt, which is threaded in the fulcrum. One side of the fulcrum is slotted and when the proper adjustment has been made it may be locked in place by means of a bolt provided for that purpose.



Adjustable Pedal Removed from the Fire Door

AN INTERVIEW WITH DANIEL WILLARD

[New York Times]

"What is the problem that this company has to face? What is your chief apprehension as to the future?" Daniel Willard was asked.

"As I view the matter," replied Mr. Willard, "the most serious problem now confronting the railroads is the demand —present and prospective—of labor. The two decisions of the Interstate Commerce Commission in the eastern rate case may be said, when taken as a whole, to comprise a bill of rights for the railroads in so far as the relations between the railroad and the public are concerned, and I for one believe that if the principles recognized and outlined in the decisions above referred to are fairly carried out the future of the railroads from that point of view is more encouraging than it has been in many years past.

"Unfortunately, the same cannot be said with reference to the labor question. The arbitrators who in 1912 passed upon the demands of the locomotive engineers employed by the eastern railroads said that owing to the fact that a railroad was a semi-public institution the employees become by virtue of that fact semi-public servants, and as such it was the duty of the public to see, first of all, that they were fairly paid and properly treated; but also by virtue of that same fact railway employees were under certain obligations to the public which must be recognized; that their service was affected by a public use.

"Unfortunately, railway employees, while willing to avail themselves of the privileges that they are rightfully entitled to as semi-public servants, have seemed to forget at times the obligations which they owe to the same public, because when strikes have been threatened or actually brought about the public is always the chief sufferer. In the past the public generally, not recognizing the relationship which must exist between railroad rates and railroad expenditures, has to a large extent occupied the position of an indifferent observer when wage controversies between railroads and their employees were going on.

"Now that it is more clearly recognized that in the end the public, by means of freight charges and passenger rates, must pay all the costs of railroad operation, including wages, it is to be hoped that the same public will take a keener and more intelligent interest in this matter, because in the end such questions under the existing order of things will usually be settled by arbitration, and arbitration generally reflects to a very large extent the existing public opinion. I repeat, this question of the demands of organized labor is the thing that gives ground for most apprehension as to the future."

CO-OPERATION WITH THE TRAFFIC DEPARTMENT

J. W. Roberts, recently superintendent of car service of the Vandalia, but now general superintendent of passenger transportation of the Pennsylvania Lines West of Pittsburgh, has for some time been practicing a plan for securing the full co-operation of employees in his department with the traffic department of the road. First he called a meeting of the employees of his department for the purpose of discussing the subject, "How can the Individual Employees of This Office Assist the Soliciting Forces of the Freight and Passenger Traffic Department in Increasing Freight and Passenger Revenues of the Vandalia Railroad?" at which he urged the importance of the cultivation by individual employees of the faculty of being constantly on the alert for information which may be utilized profitably for the company, the cultivation of loyalty or a desire on the part of employees to offer a word of recommendation in favor of the railroad when conditions seem to justify that act, and cultivation of interest on the part of members of the families, other relatives and friends of the employees and the employer.

Following the meeting a circular letter was addressed to the heads of sub-departments calling attention to the fact that through association with relatives, friends and acquaintances who are not connected with the railroad company, employees of the department frequently receive information relative to prospective vacation and business trips to points on or reached by the Vandalia Railroad and the Pennsylvania lines, and with reference to prospective shipments of freight inbound or outbound.

Each man addressed was urged to discuss this matter with the men in his respective sub-department, and to urge them to communicate any information of this character to the proper representative of the department directly concerned. In another circular letter Mr. Roberts said that the results of the activity of employees along the line of the suggestions made had been made apparent from time to time, indicating a gratifying interest in the welfare of the company, and while thanking the men for their efforts he urged them to continue to look out for any opportunities for co-operation with the traffic department. "Thirty employees," he said, "with an average family of three persons, and a relationship or close friendship extending to eight to ten additional persons, constitutes quite an important adjunct to a traffic soliciting organization. I am sure that all will join heartily in contributing in the manner outlined their effort toward increasing both passenger and freight revenues."

General News Department

E. B. Roberts, smoke inspector of the city of Cleveland, has submitted a report showing that the density of locomotive smoke during the second half of 1914 decreased 79 per cent, as compared with the second half of 1912.

The railroads entering the Union station at Cincinnati were forced to abandon the station and seek temporary locations on higher ground on Saturday, February 6, because of high water in the Ohio river which flooded the tracks in the station. The flood reached the stage of 55.4 ft. on that day.

The eleventh annual convention of the American Concrete Institute was held at the Auditorium hotel, Chicago, this week, beginning on Tuesday, in connection with the eighth annual Chicago Cement Show, held at the Coliseum, beginning on Wednesday, which will continue until Wednesday of next week.

The Chicago & Alton has reached an agreement with a committee representing its trainmen, providing for increases in pay for flagmen and train baggagemen, and a number of changes in working conditions, including payment for terminal overtime, and extra payments for incidental work outside of the regular routine.

The Southern Railway has sent a statement of its receipts and expenses for the last half year not only to the railroad and financial papers, but also to daily papers throughout the southern states, and expresses the intention of sending such statements to the press generally hereafter. As railway earnings are a good barometer of business conditions, it is believed that the figures will be of interest to the people generally.

The lower house of the New Mexico legislature on February 4 passed, by a vote of 37 to 8, a bill limiting passenger fares throughout the state to three cents a mile. The leader of the Republican side of the house declared that the bill had been rushed through without a hearing and without investigation, and in the face of the fact that a day had been set, in the near future, for the discussion of another bill on the same subject. The present rate is four cents a mile generally throughout the state.

In the federal court at Pittsburgh, Pa., fines for violation of the hours-of-service law aggregating $9,300 have been imposed by Judge Charles P. Orr on the Pennsylvania Railroad and the Pennsylvania Lines West of Pittsburgh. Three employees of the Pennsylvania Railroad, at Oil City, were fined $200 each on charges of having falsified the record of the time certain trainmen had worked. The excuse offered in certain cases by the railroad companies for slow time, that the engines did not make steam, was controverted by the statement that the engines had been in poor condition for some time previous to the violation.

Mr. Foley, superintendent of telegraph of the Delaware, Lackawanna & Western, reports that his wireless telephone apparatus, which has been in experimental use on an express train of that road for several months past, has been so far perfected that conversation was carried on, this week, between a man on the moving train and the operator at a station, 26 miles distant. The sending of dots and dashes by the wireless apparatus is now carried on between this train and four stations; namely, Hoboken, Scranton, Binghamton and Buffalo.

A press despatch from San Francisco, February 10, reports that a wireless telephone invented by H. P. Dwyer, has carried the human voice a distance of 721 miles; it was from the United States government radio station at Mare Island, Cal., to the government radio station at Tatoosh, Cape Flattery, on the coast of Washington. The voice was also heard at Bremerton, a distance of 560 miles, at Point Arguello, at Burcka, and by the government radio operator at San Diego, Cal.

Mass-meetings of the employees of the St. Louis & San Francisco were held on Saturday and Sunday, February 6 and 7, at Springfield, Mo., attended by more than 3,000 employees living at Springfield, and between 5,000 and 6,000 employees from other points on the line in Missouri, for the purpose of enlisting the efforts of the employees in a campaign to impress upon the legislature of Missouri the need of a three-cent passenger fare and higher freight rates in the state which will represent in part a restoration of rates which were reduced by the action of the state legislature a few years ago. It is proposed that all employees interview business men and manufacturers in their territory and urge them to get up petitions or write letters to the members of the legislature, asking them to approve a measure which will allow the railroads to charge a three-cent passenger fare and higher freight rates.

Owen Callan, known to the railroads as a clever "personal injury" faker, has been sentenced to six months in jail in Chemung county, New York, after pleading guilty to charges based on evidence given by the Lehigh Valley and the Pennsylvania. Since the date of his arrest, December 24, the railroads have had a chance to compare notes, and it has been found that no less than fifteen roads have been victimized by claims for alleged injuries sustained by Callan under various aliases. On some railroads he has repeated two or three times, collecting from $125 to $1,000 per "injury." But his last escapade, in tripping over a carpet in a Lehigh Valley coach, while in the station at Ithaca, from which he developed a hemorrhage, a broken arm and several other injuries, proved to be his Waterloo. It was while filing this claim that he was recognized and apprehended on a warrant sworn out by the Pennsylvania Railroad.

The Illinois State Civil Service Commission has announced that examinations will be held at an early date for the following positions to be filled in the accounting and engineering departments of the Illinois Public Utilities Commission: Accounting service—Transportation rate expert, rank 3, $300 to $375 a month; transportation rate expert, rank 2, $135 to $250; accountant, rank 2, $200 to $250; utilities statistician, rank 2, $175 to $250; tariff clerk (examination March 6), $100 to $125; accountant, rank 1, $125 to $175; utilities rate expert, $125 to $175; utilities statistician, rank 1, $100 to $150.

Engineering service:—Assistant chief utilities engineer, $300 to $375 a month; gas engineer, $250 to $333; railroad engineer, $250 to $333; electrical engineer, $200 to $300; telephone engineer, $200 to $300; mechanical engineer, $160 to $250; service engineer, $200 to $300; assistant railroad engineer, $150 to $200; case man, $125 to $150; assistant utilities engineer, $90 to $125; service inspector, $90 to $125; utilities investigator, $100 to $150; draftsman (examination March 6), $75 to $100.

Railroad Men Needed by the State

W. W. Atterbury, vice-president of the Pennsylvania Railroad, in an address delivered this week before the Philadelphia Chamber of Commerce exhorted railroad officers to co-operate in making governmental regulation a continued benefit to the railroads and to the community. He said, in part:

"Regulation has largely confined itself to correcting abuses. The evils were obvious, but we have allowed ourselves to think of them so much that we have forgotten about the transcendent merits of the regulation as a whole. We have been devoting so much attention to killing the weeds in our transportation garden that we have neglected the very important duty of cultivating and strengthening the growth of the healthy and useful plants. The great transportation machine of this country was and is sound. It needs continued regulation, but the regulation must be competent and sympathetic. . . . . My suggestion is that a minority of the railroad commissioners of the states and nation should consist of men trained in the practical conduct of railroad affairs. All appointments should be for life or during good behavior; the salaries should be such as to attract the ablest brains in the country; and these positions should be surrounded with such prestige and honor that any citizen would feel that he could serve his country and his fellow man in no more exalted capacity than in representing the people in pro-

moting, encouraging and regulating the development of its transportation agencies. The country and its commerce cannot progress while the railroads are weak."

Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for the month of November, 1914. No reports are included for roads whose operating revenues for the year ended June 30, 1914, did not reach $1,000,000. The figures are compiled as rendered and should not be considered final, inasmuch as scrutiny of the reports may lead to their modification before acceptance.

For the Month of November

Item	United States			Eastern District			Southern District			Western District		
	Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated	
	1914	1914	1913	1914	1914	1913	1914	1914	1913	1914	1914	1913
Average number of miles operated	228,460.87	...	...	58,755.04	...	...	42,313.29	...	...	127,392.54	...	...
Revenues:												
Freight	$163,550,041	$716	$830	$69,310,170	$1,179	$1,355	$24,291,766	$574	$721	$69,948,108	$549	$621
Passenger	48,398,199	212	243	21,076,828	359	392	6,537,176	155	190	20,764,105	163	191
Mail	4,748,664	21	20	1,731,257	29	29	626,467	15	15	2,390,940	18	17
Express	5,826,524	25	30	2,689,262	46	53	831,763	20	25	2,305,499	18	21
All other transportation	6,554,277	28	33	3,626,128	62	69	511,884	12	16	2,416,265	19	22
Incidental	4,535,748	20	22	2,357,296	40	43	560,059	13	16	1,618,393	13	14
Joint Facility—Cr.	305,461	1	1	144,813	2	2	55,410	1	1	105,238	1	...
Joint Facility—Dr.	*106,485*	...	...	*63,717*	*1*	*1*	*11,297*	...	...	*31,471*	...	...
Railway operating revenues	$233,812,429	$1,023	*$1,180	$100,872,037	$1,716	†$1,949	$33,403,228	$790	$985	$99,537,164	$781	$886
Expenses:												
Maint. of way and structures	$28,997,413	$127	$149	$12,452,819	$212	$256	$4,535,761	$107	$128	$12,008,833	$94	$106
Maintenance of equipment	40,614,349	178	205	19,363,592	330	384	6,330,427	150	178	14,920,330	117	130
Traffic	4,942,556	21	24	1,921,774	33	37	934,141	22	22	2,086,641	17	18
Transportation	85,433,980	374	430	39,684,544	675	776	12,048,472	285	337	33,700,964	265	300
Miscellaneous operations	1,825,130	8	9	857,648	14	16	169,115	4	5	798,367	6	8
General	6,101,282	27	27	2,541,288	43	43	1,000,782	24	24	2,559,212	20	21
Transportat'n for Investm't—Cr.	*689,890*	*3*	*1*	*73,403*	*1*	...	*116,646*	*3*	...	*499,841*	*4*	*3*
Railway operating expenses	$167,224,820	$732	*$844	$76,748,262	$1,306	‡$1,516	$24,902,052	$589	$694	$65,574,506	$515	$580
Net revenue from railway operations	$66,587,609	$291	$336	$24,123,775	$410	$433	$8,501,176	$201	$291	$33,962,658	$266	$306
Railway tax accruals	$11,143,626	$49	$52	$4,698,824	$80	$86	$1,540,608	$37	$37	$4,904,194	$38	$41
Uncollectible railway revenues	35,565	...	...	17,133	...	...	7,669	...	...	10,763	...	...
Railway operating income	$55,408,418	$242	$284	$19,407,818	$330	$347	$6,952,899	$164	$254	$29,047,701	$228	$265

* Includes $1 unclassified. † Includes $7 unclassified. ‡ Includes $4 unclassified.

For the Five Months Ending with November

	1914	1914	1913	1914	1914	1913	1914	1914	1913	1914	1914	1913
Average number of miles operated	228,138.97	...	...	58,736.31	...	...	42,268.13	...	...	127.134.53	...	...
Revenues:												
Freight	$863,225,289	$3,871	$4,203	$381,746,239	$6,499	$7,104	$128,933,059	$3,050	$3,390	$372,545,991	$2,930	$3,116
Passenger	293,851,233	1,288	1,424	130,526,699	2,222	2,403	38,648,080	914	1,022	124,676,454	981	1,100
Mail	23,784,839	104	93	8,663,023	148	144	3,135,388	74	73	11,986,428	94	86
Express	29,015,514	127	143	13,056,323	222	255	4,211,385	100	107	11,747,806	93	103
All other transportation	36,862,755	162	172	20,604,407	351	361	2,894,299	68	78	13,364,049	105	115
Incidental	25,634,434	112	120	13,396,325	228	235	2,914,613	69	78	9,323,496	73	80
Joint Facility—Cr.	1,561,667	7	7	711,575	12	11	294,486	7	7	555,606	4	4
Joint Facility—Dr.	*544,357*	*2*	*2*	*349,010*	*6*	*5*	*64,482*	*1*	*1*	*130,865*	*1*	*1*
Railway operating revenues	$1,293,391,374	$5,669	*$6,174	$568,356,581	$9,676	‡$10,542	$180,966,828	$4,281	$4,754	$544,068,965	$4,279	¶$4,604
Expenses:												
Maint. of way and structures	$167,340,687	$734	$838	$69,586,951	$1,185	$1,425	$26,016,262	$616	$660	$71,746,474	$564	$623
Maintenance of equipment	216,558,025	949	1,032	100,468,722	1,710	1,910	36,072,814	853	895	80,016,489	629	667
Traffic	24,720,130	108	121	9,376,647	160	188	4,691,771	111	109	10,651,712	84	92
Transportation	436,811,277	1,915	2,104	203,198,278	3,459	3,842	62,651,216	1,482	1,608	170,961,783	1,345	1,456
Miscellaneous operations	10,056,813	44	50	4,701,225	80	83	903,501	21	23	4,452,087	35	43
General	30,431,776	133	135	12,792,562	218	217	4,962,150	118	119	12,677,064	100	103
Transportat'n for Investm't—Cr.	*3,134,786*	*14*	*8*	*284,960*	*5*	...	*556,152*	*13*	*1*	*2,293,674*	*18*	*13*
Railway operating expenses	$882,792,922	$3,869	†$4,278	$399,839,425	$6,807	§$7,688	$134,741,563	$3,188	$3,413	$348,211,935	$2,739	$2,971
Net revenue from railway operations	$410,598,452	$1,800	$1,896	$168,516,156	$2,869	$2,654	$46,225,266	$1,093	$1,341	$195,857,030	$1,540	$1,633
Railway tax accruals	$56,779,542	$249	$250	$23,440,941	$399	$403	$7,794,749	$184	$183	$25,543,852	$201	$201
Uncollectible railway revenues	202.552	1	...	80,196	1	...	32,339	1	...	90,017	...	...
Railway operating income	$353,616,358	$1,550	$1,646	$144,995,019	$2,469	$2,451	$38,398,178	$908	$1,158	$170,223,161	$1,339	$1,432

* Includes $9 unclassified. † Includes $6 unclassified. ‡ Includes $34 unclassified. § Includes $23 unclassified. ¶ Includes $1 unclassified.

Dynamometer Car for the Japanese Railways

The Imperial Government Railways of Japan have recently put in service a dynamometer car, which was built in this country to the designs of Edward C. Schmidt, professor of railway engineering, University of Illinois. Its general dimensions and specifications were determined by S. Matsuno, chief of the motive power section of the Japanese railways, but the designer was allowed to use his own judgment in the choice of the car design, the type of equipment and the details. The car was designed to measure and to record data needed in making tests to determine train resistance and locomotive performance on steam roads. It is equipped to record drawbar pull, drawbar work, time, distance traveled, position of mile-posts and stations, the direction and velocity of the wind with respect to the car, the vacuum in the brake cylinders and, if desired, the position of the reverse lever, throttle, etc.

The car is 47 ft. 10 in. long over the buffers, 8 ft. 6 in. wide over-all and 12 ft. high. It has a steel underframe, a wood body, and the interior finish is of quartered oak. It is equipped for 3 ft. 6 in. gage and has the buffers, vacuum brake, and hook and link couplers common in Japanese railway practice. A space of 13 ft. at the rear of the car is occupied by a berth section, lockers and lavatories, leaving a workroom 7 ft. 9 in. wide by 27 ft. long, which contains the recording apparatus, work bench, desk

and other equipment. An axle generator and storage battery equipment furnishes current for the lights and the motor and magnets of the recording apparatus.

Motion for all apparatus within the car is obtained by means of gearing from the axle of an auxiliary truck located behind the forward car truck. This truck carries a pair of small wheels on a single axle whose relation to the car axis remains fixed. The dynamometer for measuring the drawbar pull is an oil-filled cylinder mounted on the center sills toward the front end of the car.

Another indication of Japan's progressiveness along this line is shown by the thoroughly equipped laboratory for testing locomotives which the Japanese Government Railways have recently established in Tokio. With this plant and the dynamometer car, the Japanese railways have facilities for experimental study of the problems of locomotive and train operation equaled on only one American railway.

Proposed Railway Legislation

The senate committee on common carriers of the Texas legislature has voted to report unfavorably the full crew bill.

A bill before the New Hampshire legislature, which already has been passed by the lower House, gives the Public Service Commission authority to allow an increase in the price of mileage tickets.

A bill has been introduced in the Iowa legislature providing for semi-monthly payments of wages by railroads.

An extra crew bill has been introduced in the Iowa legislature which would prohibit the flagman from helping the baggageman at stations and forbid duties being imposed upon him which would interfere with his duty to protect trains while they are at stations.

Representatives of the conductors', trainmen's, enginemen's and firemen's unions, in Ohio, have announced that they will concentrate their efforts before the legislature this year on the effort to secure the passage of the train limit bill and to oppose the repeal of the extra crew law, but will urge no other anti-railroad legislation.

A bill has been introduced in the lower house of the New York legislature, by Mr. Mead, of Erie, making it illegal to run trains, the length of which is more than half a mile.

A bill introduced in the New York legislature by Senator Whitney, of Saratoga, would allow employees of railroads doing an interstate business, if not enjoying the benefit of the federal compensation law to secure indemnity for injuries under the New York State Workmen's Compensation Law. The bill makes it compulsory for employers in this class to provide such compensation under the terms of the New York law.

A bill has been introduced in the Missouri legislature to require interstate railroads to establish stations not more than five miles from the state line, to put an agent in charge and to stop trains long enough to enable passengers to buy new tickets and have their baggage rechecked, in order to take advantage of the lower intrastate passenger fares.

The Commercial Club of Webb City, Mo., has adopted resolutions opposing anti-railroad legislation and urging the representative of the district in which the city is located to use his efforts toward improving the condition of the railways.

The lower house of the Utah legislature has defeated a bill making it unlawful to trespass on the right of way or property of a railroad company. At a hearing before the public utilities committee of the house officers for the railroads estimated that the seven bills now before the house, introduced at the behest of railway employees, would impose a burden of nearly $3,000,000 a year on the six largest railroads of the state, if they should be enacted. These include an extra crew bill, a train limit bill and a headlight bill.

A resolution has been introduced in the Minnesota legislature calling for a detailed investigation by the Minnesota Railroad & Warehouse Commisison of recent increases in railroad rates in Western Classification Territory.

A bill has been introduced in the Minnesota legislature providing for an allowance of $2 a car to grain shippers for cooperage of cars used for loading grain shipments. Attorneys for the principal railroads of the state appeared before the senate transportation committee on January 28, to protest against the bill. They told the committee that such a law would cost the Great Northern approximately $1,000,000 annually, the Chicago, St. Paul, Minneapolis & Omaha approximately $200,000, the Northern Pacific approximately $600,000, and the Chicago, Milwaukee & St. Paul about $300,000 a year, and would make it possible many times for shippers to collect the $2 charge whether the cars did or did not need coopering.

Bills have been introduced in the legislature of Pennsylvania to require all locomotives to have headlights of a specified candle power; to require all locomotives to be equipped with bell ringers; to make real estate of railroad companies, street railway companies, etc., subject to taxation by counties, cities and towns; to provide for the incorporation of omnibus lines and define their motive power; to provide for compensation by employers for accidental injuries to employees, etc., and to establish an industrial accident board; and to impose numerous requirements on street railways, including air brakes and automatic air pipe couplers on all street passenger cars running on the public streets.

A bill has been introduced in the legislature of Maine providing that nine hours in 24 shall constitute a day's work for all employees in and about freight and passenger stations and roundhouses. These employees are more specifically designated as baggage men, cleaners, engine house employees, freight checkers, freight handlers, janitors and persons performing the work of janitors, platform men and train callers, receiving and delivery clerks, watchmen, flagmen and crossing tenders. Each day's work of nine hours must be so arranged that it will provide a lay off of at least 14 hours in 24 unless an employee shall voluntarily request otherwise in writing. Maximum penalty for violation, $100. There is a law now in force, in Massachusetts, something like this.

A bill has been introduced in the Nebraska legislature said to be aimed at the claim made by the Union Pacific for a 400 ft. right of way through certain counties of the state. The bill provides that the right of way of railroads through the state outside of cities or villages shall be of a uniform width in each county, except where additional property is required for yards, stations, freight houses or roundhouses. The bill also forbids railroad companies to acquire or hold any real estate outside of this uniform width. As a penalty for failure to comply with the act it is provided that a railroad company shall lose its right to proceed by condemnation for acquiring any other real estate in the county. The theory is that the railroads will either be required to give up a part of their present right of way or buy more land to make the entire right of way wider.

The railroad committees of the house and senate of the Kansas legislature held a hearing on February 1, on the extra crew, the train limit and other bills affecting railroads and their employees. Officers of the railroads and representatives of the employees appeared and presented arguments. All of the employees' representatives favored the bills, except a negro porter, representing the porters, who opposed the extra crew bill, on the ground if an extra brakeman or flagman were required on passenger trains the elimination of the train porters would follow. A. De Bernardi, general superintendent of the Missouri Pacific, said that if the bill were passed, for every extra brakeman added it would be necessary for many roads to lay off two trackmen as a measure of economy, and that the trackmen were more essential to safety than the extra brakeman. Representatives of the roads also brought out the fact that the trainmen had never attempted to negotiate with the officers of the road for extra brakemen.

Canadian Railway Development

Sir William Mackenzie, president of the Canadian Northern, reported in a press despatch of February 8, charges Sir Thomas G. Shaughnessy, president of the Canadian Pacific, with making remarks tending to impair the credit of Canada. Sir Thomas was quoted as saying that the only threatening feature in Canada was the situation resulting from the wild and stupid railway policy which has been pursued there, exemplified by the construction of two additional transcontinental lines, almost en-

tirely under the auspices of the government, many years in advance of their time.

Sir William said: "When the Canadian Northern began building in 1896, there was 16,270 miles of road in Canada; and in 1913 there was 29,304 miles. During the eighteen years in which the mileage had not quite doubled, the foreign trade of Canada more than quadrupled, and although full statistics of the domestic trade are not available, there is no doubt that that expanded in proportion. At any rate, the aggregate earnings of the Canadian railways increased by five times.

"If there was not a need for more railways, what justification was there for Sir Thomas to spend millions of dollars annually for several years in double-tracking the company's main line? Why did the company recently spend millions on a new line between Toronto and Ottawa, when it already possessed one between these points?

"Sir Thomas criticises the assistance which the Canadian government has given to development of the sources of the country through new railways, forgetful that his own company has received from the Dominion government more than all the other railways put together.

"What, then, are the 'threatening features' in the Canadian railway situation? Two additional transcontinental lines will soon be under operation, both with better grades, and better prepared to perform their functions than the transcontinental line of the Canadian Pacific. The maximum grade of the Canadian Northern through the Rocky mountains is 0.4 per cent, with the exception of 60 miles in the Albreda Pass, where the maximum rises to 0.7 per cent. The maximum grade of the Canadian Pacific through the Rocky mountains is more than 2 per cent. The Canadian Northern last year carried one-third of the grain moved to the head of the Great Lakes. During the period in which the railway mileage of Canada has not been doubled the grain annually produced on the prairies increased from thirty million to more than five hundred million bushes yearly."

New York Merchants for Sane Regulation.

The Chamber of Commerce of the state of New York, at a meeting in New York City, February 4, adopted a resolution endorsing the views presented by Samuel Rea, president of the Pennsylvania Railroad in his address which was given before the Chamber in December, and which was printed in the *Railway Age Gazette* of December 11, page 1089.

Mr. Rea, it will be recalled, suggested the improvement of the personnel of the Interstate Commerce Commission, the extension of the authority of the commission over mail transportation and other things, and that Congress should refer to the commission all proposed legislation affecting wages, taxes, safety appliances, etc.; that valuation of railroad property should be first undertaken in a limited territory, and that proposed increases in freight rates should not be suspended without a hearing for more than sixty days.

The chairman of the Chamber of Commerce Committee, in presenting the resolution said:

"Mr. Rea's recommendations, coming as they do from one who has had the broadest experience in dealing with the problems of railroad policy, should receive the approval of all business men. The recommendations are in the interest not merely of the railroads, but of the stability and prosperity of the nation. They represent business statesmanship of the highest order. The wisdom of the recommendations is so self-evident that your committee does not believe that it is necessary to enter into an elaborate explanation or advocacy of them. We believe that the stamp of the Chamber's approval upon Mr. Rea's suggestions will serve to promote a public opinion that eventually will force their enactment into legislation."

The Chamber instructed the committee to make further study of the problem with the view of specific recommendations to Congress for a more enlightened policy of public regulation of railroads.

New York Railroad Club

At the regular monthly meeting of the New York Railroad Club, to be held in the Engineering Societies building, on Friday, February 19, a paper will be presented by L. J. Foley, superintendent of telegraph of the Delaware, Lackawanna & Western, entitled "Train Despatching by Wireless."

Western Railway Club

At the regular monthly meeting of the Western Railway Club, to be held in Chicago, at 2 o'clock in the afternoon of February 16, a paper will be presented by George S. Goodwin, mechanical engineer of the Chicago, Rock Island & Pacific, entitled "The Value of the Locomotive."

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, April, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1914

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.				
Alabama & Vicksburg	143	$86,089	$35,816	$133,442	$19,027	$30,936	$3,819	$49,724	$2,499	$5,530	$111,534	$21,908	$7,226	$14,682	—$15,092
Alabama Great Southern	309	256,052	95,262	384,304	43,226	82,932	13,815	137,295	2,842	7,903	288,013	96,291	15,538	80,753	—37,973
Ann Arbor	301	117,247	41,542	169,759	15,709	27,695	4,192	81,405	303	8,341	137,645	32,113	10,580	21,403	—27,612
Arizona Eastern	367	111,158	21,787	145,641	27,139	20,258	1,914	41,662	704	10,743	102,418	43,223	16,711	26,511	—68,465
Atlanta & West Point	93	48,129	35,659	97,604	13,837	20,181	5,425	29,649	1,696	5,194	75,921	21,683	5,785	5,788	10,226
Atlanta, Birmingham & Atlantic	646	178,296	45,138	246,136	34,485	45,020	11,701	96,912	.....	10,861	198,979	47,156	3,645	43,458	—31,073
Atlantic Coast Line	4,701	2,118,122	718,939	3,073,852	359,641	448,979	61,064	991,879	8,469	75,742	1,938,391	1,135,461	138,000	998,163	—315,122
Baltimore & Ohio Chicago Terminal	79	.....	487	111,389	7,665	16,356	960	53,927	1,545	3,936	81,180	30,208	19,021	11,107	11,005
Bangor & Aroostook	631	208,993	49,366	274,626	47,945	50,984	2,657	83,324	471	9,475	194,619	80,007	9,522	70,484	—15,460
Belt Ry. Co. of Chicago	24	.....	.....	284,922	2,905	26,106	1,002	135,188	.....	6,247	171,449	113,473	10,116	103,357	36,665
Bessemer & Lake Erie	205	278,731	26,478	315,333	46,085	127,162	8,798	128,001	5	13,530	319,378	—4,046	20,001	—24,068	77,438
Bingham & Garfield	27	65,345	3,044	68,818	6,388	7,357	908	16,173	74	1,722	32,621	36,197	2,713	33,484	—49,435
Birmingham Southern	44	38,089	913	66,582	7,122	10,228	496	28,783	.....	4,130	50,758	15,824	3,885	11,939	—6,613
Buffalo & Susquehanna R. R. Corp	253	121,913	6,794	131,919	24,646	39,413	829	37,616	.....	5,806	108,311	23,608	2,600	21,008	.....
Buffalo & Susquehanna Railway	91	9,780	5,521	17,723	3,025	5,765	366	11,780	14	2,446	23,397	—5,674	1,600	—7,274	8,206
Buffalo, Rochester & Pittsburgh	586	617,078	89,851	731,897	75,043	168,015	11,788	265,091	1,328	20,484	541,750	190,148	20,000	170,136	—30,540
Central of Georgia	1,924	716,864	267,892	1,102,463	142,741	190,834	32,097	378,121	1,074	32,785	771,089	331,374	31,624	299,404	—142,990
Charleston & Western Carolina	341	114,728	29,196	150,555	28,014	25,869	3,578	54,700	.....	5,584	117,674	32,881	5,000	27,882	—24,528
Chesapeake & Ohio Lines	2,367	2,257,599	444,850	2,936,242	287,365	613,152	56,035	1,053,048	19,217	75,574	2,104,391	831,851	109,922	721,445	—66,669
Chicago & Alton	1,033	761,796	303,483	1,166,645	118,604	253,080	35,116	491,870	9,483	30,030	938,182	228,463	46,110	181,781	108,754
Chicago & North Western	8,108	4,216,290	1,574,996	6,474,086	618,383	1,039,801	100,686	2,610,181	45,835	148,977	4,551,628	1,922,458	375,000	1,546,706	—85,690
Chicago Great Western	1,429	840,774	245,983	1,182,154	127,032	222,480	47,234	466,172	5,952	33,750	901,138	281,015	48,668	232,008	14,287
Chicago Junction	24	.....	.....	163,385	17,577	20,455	927	100,033	.....	4,283	143,276	20,109	1,128	18,973	34,273
Chicago, Milwaukee & St. Paul	10,067	5,108,758	1,404,589	7,282,244	661,821	1,036,731	150,454	3,112,919	57,635	150,887	5,058,161	2,224,083	397,598	1,823,541	—817,943
Chicago, Peoria & St. Louis	255	98,710	21,805	127,843	21,544	25,116	5,664	58,961	.....	5,225	116,511	11,333	5,700	5,633	31,518
Chicago, Rock Island & Gulf	477	215,364	51,096	285,899	30,004	35,733	9,320	111,814	1,787	7,682	196,340	89,560	5,946	83,607	32,257
Chicago, St. Paul, Minneapolis & Omaha	1,753	983,339	380,326	1,472,771	118,676	214,065	27,804	578,610	12,923	35,654	975,876	496,896	87,576	409,125	—82,344
Chicago, Terre Haute & Southeastern	374	175,916	16,012	196,297	22,071	37,852	3,389	66,540	1,029	11,375	142,265	54,032	12,500	41,532	42,000
Cincinnati, Hamilton & Dayton	1,015	463,818	118,304	653,435	81,476	172,791	19,375	351,143	.....	19,604	643,653	9,782	27,159	—17,486	—78,485
Cincinnati, New Orleans & Texas Pacific	337	543,189	165,216	754,248	68,978	190,293	25,009	251,602	7,727	20,104	563,713	190,535	31,000	159,353	—116,089
Cincinnati Northern	246	93,370	16,391	114,736	13,325	24,590	2,531	44,306	.....	3,430	88,083	26,653	3,463	23,169	1,543
Cleveland, Cincinnati, Chic. & St. Louis	2,381	1,965,348	672,977	2,901,172	270,967	553,383	72,557	1,161,273	18,583	63,714	2,135,266	265,906	136,527	628,946	165,814
Colorado Midland	338	95,504	13,142	127,382	15,308	31,612	6,912	51,692	798	5,441	111,764	15,618	8,530	7,088	15,060
Cumberland Valley	164	148,484	48,092	210,549	28,119	41,057	4,611	84,557	821	11,844	171,010	39,540	4,518	35,022	—19,651
Delaware & Hudson Co.—R. R. Dept	881	1,532,898	170,099	1,807,869	123,364	365,263	22,903	705,060	12,174	78,775	1,307,137	500,733	52,369	448,360	.....
El Paso & Southwestern Co	1,027	466,273	105,151	612,885	74,207	96,845	17,797	183,656	5,921	24,677	403,063	209,822	15,354	194,464	—32,666
Elgin, Joliet & Eastern	776	476,295	6	505,590	59,656	126,404	5,774	212,180	.....	21,137	425,148	80,441	33,185	47,223	—9,690
Florence & Cripple Creek	87	85,000	11,325	98,172	6,698	10,653	1,744	28,854	.....	3,989	51,938	46,233	5,542	40,691	54,943
Georgia	307	161,625	64,650	244,778	27,132	49,382	11,123	104,908	899	7,402	200,846	43,932	5,621	38,268	—18,480
Georgia, Southern & Florida	395	117,000	63,333	206,986	23,862	42,315	7,576	78,105	656	11,130	163,645	43,341	5,524	37,674	—18,136
Grand Rapids & Indiana	575	234,570	126,223	395,816	25,476	66,754	10,336	194,761	169	14,904	312,400	83,416	24,090	57,049	—19,166
Gulf & Ship Island	308	94,919	27,532	131,189	17,209	31,753	2,328	40,558	187	6,700	98,735	32,454	7,161	25,290	—25,777
Hocking Valley	351	315,230	68,391	414,792	43,992	105,190	15,225	159,874	.....	15,035	339,316	75,476	38,800	36,676	—79,828
Illinois Central	4,769	3,785,026	1,065,845	5,255,472	553,026	1,019,894	109,212	2,003,096	29,332	130,000	3,809,095	1,446,376	269,000	1,176,345	—208,411
Indiana Harbor Belt	110	.....	.....	247,178	38,682	9,244	2,804	133,413	.....	7,350	191,494	55,684	7,482	47,976	8,325
International & Great Northern	1,159	601,236	150,696	807,965	105,645	154,847	22,028	356,027	3,107	29,846	671,501	136,464	35,000	101,447	165,933
Kanawha & Michigan	177	169,907	28,288	205,029	28,679	65,659	2,726	68,878	6	7,195	173,144	31,885	11,160	20,723	—22,262
Kansas City Southern	827	645,361	118,837	839,412	85,583	100,650	26,871	301,502	.....	39,978	553,655	285,757	48,170	237,179	—58,833
Lake Erie & Western	906	311,970	60,144	396,047	46,867	79,925	26,146	194,247	.....	13,003	360,187	35,859	24,514	11,339	—17,100
Lehigh & Hudson River	97	125,527	9,224	135,696	15,894	20,861	1,511	54,476	.....	5,918	98,661	37,035	4,150	32,885	—17,236
Lehigh & New England	294	172,495	1,146	184,867	23,936	30,099	1,621	54,725	.....	6,079	116,459	68,408	5,670	62,738	—9,367
Lehigh Valley	1,444	2,690,705	303,684	3,210,874	392,037	626,043	90,053	1,381,911	10,470	88,215	2,588,063	622,812	144,000	478,757	—129,980
Long Island	398	293,809	472,021	899,885	94,161	118,694	7,952	467,833	7,652	32,920	729,213	170,673	71,000	98,642	25,917
Louisiana & Arkansas	279	111,172	18,645	133,877	19,054	20,919	2,595	38,317	.....	3,833	84,718	49,160	6,250	42,910	2,610
Louisiana Ry. & Navigation	351	147,916	21,661	179,462	25,584	21,244	5,576	83,555	.....	5,372	141,331	38,131	7,500	30,631	—6,402
Louisville & Nashville	5,034	2,915,207	908,797	4,136,922	621,658	827,572	117,578	1,437,561	18,407	104,230	3,121,927	1,014,995	184,340	830,357	—252,930
Louisville, Henderson & St. Louis	200	69,078	30,479	106,434	21,034	17,292	5,394	42,638	.....	3,240	89,599	16,835	3,800	13,029	—1,312
Maine Central	1,219	510,203	230,817	797,004	127,507	150,433	8,910	357,481	1,302	30,813	676,446	120,558	50,560	69,998	—101,100
Midland Valley	380	78,176	34,461	120,549	22,104	18,421	1,930	40,374	.....	5,459	88,287	32,262	6,584	25,671	21,459
Missouri & North Arkansas	365	61,961	26,883	95,667	28,507	23,867	2,800	53,357	.....	4,708	113,239	—17,572	6,000	—23,623	—21,922
Missouri, Oklahoma & Gulf	334	85,739	18,674	108,781	22,385	16,142	4,080	61,367	122	5,669	109,766	—984	6,462	—7,501	18,825
Missouri, Oklahoma & Gulf of Texas	19	10,688	230	11,079	4,397	839	264	4,720	.....	638	10,858	221	197	24	4,357
Monongahela	75	77,455	1,920	80,736	13,855	7,305	842	23,639	.....	2,102	47,743	32,993	828	32,165	—34,148

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
New Orleans Great Northern	283	$91,414	$25,587	$127,830	$17,351	$18,807	$2,589	$41,337	$217	$6,706	$87,007	$40,823	$1,667	$39,154	—$24,090
New Orleans, Texas & Mexico	286	93,827	20,950	119,414	25,158	10,686	3,189	54,502	.....	9,763	103,289	16,124	1,978	14,146	—31,549
New York, Chicago & St. Louis	568	820,835	98,200	960,113	84,796	104,791	39,373	460,828	4,687	20,505	714,979	245,134	31,267	213,537	—24,613
New York, Philadelphia & Norfolk	112	202,546	41,359	268,021	22,867	53,621	4,439	134,791	5,131	10,475	231,323	36,698	12,000	24,516	—4,420
Norfolk & Western	2,044	2,502,957	371,897	3,021,440	294,904	596,588	63,781	1,008,505	8,332	70,050	1,992,707	1,028,733	155,000	873,665	—191,203
Norfolk Southern	900	218,846	86,301	329,212	37,877	45,885	6,901	132,800	163	19,072	242,699	86,514	9,525	75,625	—15,645
Northern Pacific	6,498	3,230,143	992,987	4,679,791	374,365	440,469	84,905	1,587,738	71,178	109,521	2,589,076	2,090,716	378,619	1,711,591	—486,340
Oregon Short Line	2,162	1,115,450	332,542	1,588,800	163,261	258,480	35,335	420,076	24,237	51,710	948,617	640,183	61,862	578,066	—85,120
Oregon-Washington R. R. & Nav. Co.	2,025	694,148	323,775	1,132,132	121,395	145,780	40,281	408,505	10,876	57,676	779,899	352,233	80,571	271,621	—38,421
Pennsylvania *Company*	1,757	2,349,990	780,921	3,551,308	554,138	768,573	82,830	1,581,428	33,601	117,703	3,138,274	413,035	244,529	168,243	—310,294
Pennsylvania *Railroad*	4,521	9,852,342	3,092,817	14,366,256	2,121,744	3,223,264	224,715	5,995,438	223,076	408,191	12,196,429	2,169,828	596,314	1,571,748	—1,115,919
Philadelphia, Baltimore & Washington	717	696,663	706,907	1,583,957	253,414	322,008	29,413	713,994	17	44,828	1,363,675	220,282	63,287	156,442	—123,974
Pittsburgh, Cincinnati, Chic. & St. Louis	1,472	1,849,462	647,823	2,856,153	356,640	573,529	72,616	1,212,997	22,478	86,686	2,324,946	531,207	148,066	382,563	20,498
Richmond, Fredericksburg & Potomac	88	118,883	78,982	226,703	26,919	28,992	3,789	89,692	1,872	7,392	158,657	68,047	6,476	61,558	—9,652
St. Joseph & Grand Island	258	82,346	24,486	116,021	10,278	19,736	4,327	45,149	.....	5,713	85,203	30,817	14,344	16,469	22,593
St. Louis & San Francisco	4,746	2,281,791	863,585	3,364,465	418,168	563,247	63,933	1,189,286	.....	91,647	2,326,280	1,038,185	95,353	939,669	88,449
St. Louis, Brownsville & Mexico	548	89,372	53,226	158,832	33,420	24,607	5,105	67,019	.....	12,195	142,169	16,662	3,673	12,989	47,856
Seaboard	3,101	1,260,266	400,684	1,845,154	192,817	261,949	57,269	678,439	7,603	56,843	1,254,920	590,234	91,141	497,666	—172,540
Southern Pacific	6,522	4,339,440	2,201,709	7,259,094	714,423	1,041,382	156,572	2,535,309	126,913	234,364	4,787,679	2,471,416	344,722	2,121,930	—363,033
Tennessee Central	294	72,817	30,800	110,848	25,376	16,601	5,410	47,042	.....	6,998	101,347	9,501	4,480	5,007	—29,842
Union Pacific	3,617	3,098,064	760,941	4,320,770	343,691	653,665	87,643	1,207,068	66,515	142,085	2,498,643	1,822,127	223,485	1,598,212	305,550
Union Railroad of Baltimore	9	104,612	20,179	126,702	13,508	.....	.....	4,532	.....	3,568	21,608	105,094	2,789	102,305	—19,165
Union Railroad of Pennsylvania	31	.....	.....	156,624	34,996	91,764	100	115,995	.....	6,684	249,540	—92,916	1,567	91,349	—11,388
Vandalia	910	625,354	182,031	925,466	83,278	183,369	21,979	375,724	987	22,046	687,379	238,087	30,283	207,654	—29,453
Virginian	503	357,299	30,509	417,465	58,302	73,647	4,981	108,666	9,207	14,945	269,340	148,125	20,000	128,125	—77,730
Washington Southern	36	35,163	38,931	99,571	9,319	16,559	1,541	43,902	780	3,147	75,248	24,323	3,236	21,076	—6,162
West Jersey & Seashore	356	130,827	211,691	383,905	94,635	88,565	12,861	233,115	2,644	12,825	444,646	—60,741	30,216	—90,966	—97,344
Western Maryland	661	533,363	67,920	640,838	89,871	107,996	20,112	245,535	1,575	20,676	485,459	155,379	25,500	129,879	71,597
Western Ry. of Alabama	133	54,430	37,369	101,423	18,488	22,303	5,814	33,102	1,562	4,309	85,318	16,105	5,728	10,349	—35,650
Wheeling & Lake Erie	459	240,277	40,158	321,887	34,835	99,037	10,136	161,027	1,080	13,366	319,481	2,406	29,906	—27,500	—185,786
Yazoo & Mississippi Valley	1,381	888,059	224,171	1,164,458	128,637	127,306	17,118	409,588	2,400	24,372	708,249	456,209	50,000	405,903	—279,038

SIX MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Alabama & Vicksburg	143	$491,545	$226,983	$792,615	$126,124	$198,484	$22,067	$293,549	$18,472	$33,149	$691,844	$100,770	$43,186	$57,585	—$125,421
Alabama Great Southern	309	1,652,934	585,276	2,445,797	282,961	624,260	82,932	838,784	19,326	56,802	1,905,066	540,731	93,003	447,653	—195,102
Ann Arbor	297	833,795	302,646	1,215,030	139,019	171,117	29,691	473,349	2,704	44,398	860,278	354,752	79,980	274,409	—37,907
Arizona Eastern	367	790,061	161,761	1,029,983	162,972	145,850	12,695	282,600	5,291	60,283	669,668	360,315	82,849	277,178	—198,561
Atlanta & West Point	93	297,507	229,197	604,787	96,679	141,278	31,993	187,839	9,180	27,516	494,424	110,363	41,409	68,782	—65,961
Atlanta, Birmingham & Atlantic	646	960,433	298,827	1,377,653	210,127	264,351	76,526	587,499	.....	60,892	1,199,396	178,258	68,993	108,925	—207,180
Atlantic Coast Line	4,701	9,963,186	3,860,061	15,007,498	2,430,028	2,871,080	344,543	5,630,596	42,549	462,871	11,746,523	3,260,974	828,000	2,430,093	—1,688,817
Baltimore & Ohio Chicago Terminal	79	.....	3,849	821,646	87,017	120,834	5,436	341,802	14,681	27,042	593,603	228,043	114,127	113,836	—3,919
Bangor & Aroostook	631	1,246,338	360,450	1,709,336	299,932	293,895	15,793	530,317	6,802	57,247	1,203,547	505,788	52,272	452,475	—100,826
Belt Ry. Co. of Chicago	24	.....	.....	1,677,592	91,180	144,606	5,486	581,398	.....	36,917	859,586	818,006	65,672	752,334	288,430
Bessemer & Lake Erie	205	4,920,565	228,566	4,232,441	391,791	963,408	60,592	1,082,725	10,106	69,702	2,559,575	2,672,866	114,003	2,558,825	537,601
Bingham & Garfield	27	555,705	23,072	582,489	61,207	77,810	5,489	107,114	487	11,123	263,229	319,260	11,628	307,632	—229,223
Birmingham Southern	44	248,295	6,400	449,749	103,371	77,586	2,756	170,650	.....	21,514	375,657	74,092	16,571	57,521	—146,649
Buffalo & Susquehanna R. R. Corp.	253	708,402	43,332	770,373	149,544	225,252	6,571	226,501	.....	32,672	640,540	129,833	15,600	114,233	.....
Buffalo & Susquehanna Railway	91	89,221	44,906	149,524	30,225	52,125	2,922	73,678	203	14,651	173,804	—24,280	9,600	—33,880	60,179
Buffalo, Rochester & Pittsburgh	586	4,253,153	619,818	5,057,915	702,439	1,193,065	69,089	1,608,757	8,073	108,418	3,689,840	1,368,075	120,000	1,247,882	—508,099
Central of Georgia	1,924	4,026,081	1,671,130	6,333,382	896,230	1,202,562	207,613	2,216,315	7,498	202,850	4,710,924	1,622,458	272,109	1,348,389	—538,119
Charleston & Western Carolina	341	670,794	178,390	894,940	184,277	174,200	23,413	331,571	.....	27,367	740,254	154,185	30,000	124,178	—111,421
Chesapeake & Ohio Lines	2,367	15,139,350	3,161,515	19,519,486	2,302,892	4,216,175	333,303	6,368,665	127,152	438,485	13,786,672	5,732,814	659,532	5,072,203	—299,967
Chicago & Alton	1,033	4,826,062	2,113,562	7,546,618	837,785	1,647,911	218,733	2,641,464	60,896	177,819	5,584,608	1,962,010	270,360	1,690,310	412,126
Chicago & North Western	8,108	27,735,644	11,350,345	43,499,025	6,260,650	6,822,855	661,458	15,246,997	315,390	866,795	30,061,769	13,437,256	2,250,000	11,184,636	—1,010,332
Chicago Great Western	1,428	5,097,775	1,675,727	7,385,415	1,047,673	1,253,589	285,836	2,589,482	39,818	212,276	5,420,824	1,964,591	292,011	1,670,637	—39,653
Chicago Junction	24	.....	.....	987,173	129,217	108,631	5,975	529,952	.....	27,274	801,048	186,125	12,147	173,915	—76,600
Chicago, Milwaukee & St. Paul	10,067	33,845,840	10,017,634	48,790,069	6,126,195	6,750,428	914,984	18,539,433	388,958	882,532	32,450,450	16,339,619	2,432,821	13,888,756	—1,214,293
Chicago, Peoria & St. Louis	255	549,093	130,390	720,908	120,777	125,966	29,466	296,006	.....	26,253	598,467	122,441	28,500	93,941	147,310
Chicago, Rock Island & Gulf	477	1,156,853	314,792	1,585,866	194,638	228,924	57,904	606,326	10,800	46,070	1,144,662	441,204	45,026	395,896	19,134
Chicago, St. Paul, Minneapolis & Omaha	1,753	6,092,547	2,795,278	9,595,055	1,177,768	1,258,797	172,989	3,403,593	91,582	216,056	6,305,074	3,289,981	541,090	2,747,384	97,790
Chicago, Terre Haute & Southeastern	374	1,025,841	105,228	1,164,522	173,093	277,058	21,302	347,235	5,404	59,689	283,781	280,741	70,000	210,741	95,873
Cincinnati, Hamilton & Dayton	1,015	3,802,220	830,209	5,170,414	719,517	968,885	122,684	2,263,168	.....	111,901	4,187,420	982,993	222,737	758,563	113,525
Cincinnati, New Orleans & Texas Pacific	337	3,585,508	908,026	4,762,695	498,784	1,329,494	150,916	1,491,240	34,569	126,488	3,631,491	1,131,204	186,000	945,021	565,748
Cincinnati Northern	246	676,012	122,639	833,872	115,623	150,597	16,437	266,091	.....	20,329	569,077	264,795	31,463	233,052	234,267

REVENUES AND EXPENSES OF RAILWAYS

SIX MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance—Way and structures.	Maintenance—Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
Cleveland, Cincinnati, Chic. & St. Louis.	2,381	$12,569,549	$4,537,613	$18,781,845	$2,006,260	$3,559,809	$482,639	$7,027,217	$145,563	$366,726	$13,560,464	$5,221,382	$781,027	$4,431,746	$2,205,594
Colorado Midland	338	797,423	144,213	1,045,410	167,060	220,654	46,431	406,217	7,904	34,044	882,310	163,100	51,179	111,921	99,488
Cumberland Valley	164	1,076,818	355,630	1,518,593	288,789	209,644	26,760	522,324	4,727	49,640	1,101,884	416,709	34,069	382,638	—83,315
Delaware & Hudson Co.—R. R. Dept.	881	9,628,297	1,642,409	11,920,645	847,259	1,889,789	157,821	4,207,306	76,426	376,157	7,543,790	4,376,854	333,619	4,042,884	.....
El Paso & Southwestern Co.	1,027	2,857,540	626,552	3,780,490	468,084	546,018	107,836	1,027,460	34,488	138,667	2,310,331	1,470,159	191,407	1,263,538	54,297
Elgin, Joliet & Eastern	776	3,995,099	35	4,249,402	438,649	814,580	33,820	1,271,863	.....	111,928	2,670,502	1,578,900	197,350	1,381,517	—453,839
Florence & Cripple Creek	87	495,322	100,868	607,436	65,853	57,397	12,256	180,706	.....	25,300	341,512	265,925	33,889	232,036	—5,080
Georgia	307	990,458	406,773	1,512,878	177,827	302,393	71,167	650,584	1,557	46,522	1,250,050	262,828	25,082	237,466	—120,210
Georgia, Southern & Florida	395	679,995	360,933	1,192,205	158,169	252,727	44,881	465,310	680	61,309	983,076	209,130	55,419	152,245	—50,445
Grand Rapids & Indiana	575	1,528,601	1,074,562	2,849,216	289,712	431,377	67,040	1,162,724	13,499	84,469	2,018,822	800,394	145,342	652,776	71,137
Gulf, Colorado & Santa Fe	308	618,387	166,001	836,112	107,308	180,111	14,740	225,677	1,453	42,118	571,407	264,705	43,554	221,103	—136,295
Hocking Valley	351	2,814,249	470,190	3,539,651	446,856	687,247	57,214	1,100,622	.....	85,195	2,377,134	1,162,517	232,800	929,717	—357,264
Illinois Central	4,769	23,239,836	6,909,480	32,623,834	4,571,894	7,140,621	620,554	11,578,515	181,643	756,776	24,681,409	7,942,425	1,638,000	6,293,474	—192,811
Indiana Harbor Belt	110	.....	.....	1,694,254	235,067	160,285	16,423	714,657	.....	45,678	1,172,110	522,144	46,407	475,116	139,592
International & Great Northern	1,159	3,450,605	1,032,075	4,823,457	785,517	786,055	142,672	2,094,642	17,262	179,495	4,005,643	817,814	180,000	637,497	—674,079
Kanawha & Michigan	177	1,356,846	188,753	1,585,597	222,040	380,272	15,192	462,619	18	41,157	1,121,298	464,298	69,511	394,771	—81,125
Kansas City Southern	827	3,998,784	790,992	5,288,527	585,957	638,213	127,155	1,745,031	.....	258,678	3,392,568	1,896,008	285,279	1,608,980	—228,002
Lake Erie & Western	906	2,343,670	422,117	2,917,510	411,368	494,837	87,424	1,161,139	.....	72,729	2,227,497	690,012	146,541	542,500	119,622
Lehigh & Hudson River	97	832,186	60,377	904,945	134,285	119,717	8,053	328,724	.....	23,865	614,644	290,301	24,900	265,401	78,222
Lehigh & New England	294	1,302,488	8,197	1,368,856	178,386	187,749	10,546	329,012	.....	35,447	741,140	627,716	34,019	593,697	194,383
Lehigh Valley	1,444	18,549,693	2,310,029	22,117,027	2,433,868	4,396,528	459,339	7,751,031	77,519	428,871	15,546,491	6,570,536	841,000	5,723,309	—312,130
Long Island	398	1,941,354	4,375,108	7,265,082	705,638	702,210	75,229	2,903,333	143,312	164,852	4,595,074	2,670,008	397,185	2,270,751	510,295
Louisiana & Arkansas	279	699,086	120,767	844,646	160,129	140,134	15,799	228,474	.....	25,668	569,763	274,883	37,500	237,383	—37,994
Louisiana Ry. & Navigation	351	802,304	135,110	999,497	193,262	108,309	34,101	405,045	.....	31,674	772,390	227,106	47,000	180,106	—4,913
Louisville & Nashville	5,034	19,133,344	5,850,415	26,844,279	4,249,915	5,514,593	669,516	9,190,763	94,685	618,476	20,309,673	6,534,606	1,105,715	5,425,854	—1,874,728
Louisville, Henderson & St. Louis	200	472,428	211,405	730,967	150,392	105,422	32,039	242,895	.....	18,639	549,387	181,580	22,800	158,736	—14,846
Maine Central	1,219	3,509,704	1,980,772	5,910,393	856,580	896,457	70,421	2,200,502	34,782	161,690	4,220,432	1,689,960	306,525	1,383,293	78,628
Midland Valley	380	490,925	223,359	760,171	151,578	135,732	12,330	245,732	.....	43,564	573,936	181,235	39,494	141,465	—3,653
Missouri & North Arkansas	365	393,653	204,993	643,866	174,833	131,235	22,012	308,922	.....	34,291	671,293	—27,427	36,000	— 63,701	—132,434
Missouri, Oklahoma & Gulf	334	472,815	124,413	627,161	129,441	99,700	24,630	280,874	634	32,346	567,625	59,536	38,816	20,312	—12,847
Missouri, Oklahoma & Gulf of Texas	19	59,260	2,119	62,552	10,037	9,617	1,339	26,362	.....	3,177	50,531	12,021	1,180	10,841	7,288
Monongahela	70	498,908	12,996	522,389	100,639	41,147	3,830	138,090	.....	12,122	295,828	226,561	9,408	217,153	—232,263
New Orleans Great Northern	283	585,940	159,588	817,541	102,135	120,854	16,062	251,030	1,080	39,225	530,386	287,155	17,000	270,141	—114,985
New Orleans, Texas & Mexico	286	641,742	122,475	801,215	172,722	92,404	22,998	315,543	.....	53,419	657,087	144,128	10,083	134,045	—15,634
New York, Chicago & St. Louis	568	4,697,823	768,910	5,732,069	734,786	676,720	247,919	2,540,980	31,891	117,014	4,349,310	1,382,759	241,267	1,140,866	—64,028
New York, Philadelphia & Norfolk	112	1,505,398	274,599	1,950,210	188,490	374,041	25,883	838,241	28,551	58,523	1,513,720	436,482	58,800	377,479	8,311
Norfolk & Western	2,044	18,050,038	2,542,977	21,446,398	3,020,170	4,190,209	359,618	6,372,093	57,489	411,511	14,107,330	7,338,869	870,000	6,468,800	—435,672
Norfolk Southern	900	1,228,655	582,702	1,963,838	269,627	311,003	44,778	728,826	524	118,908	1,473,666	490,172	68,051	420,755	—135,487
Northern Pacific	6,498	24,770,308	7,722,200	35,579,876	4,855,691	4,604,070	561,086	10,196,328	512,847	560,382	20,563,332	15,016,545	2,436,383	12,579,031	—1,639,857
Oregon Short Line	2,162	7,899,130	2,442,435	11,240,871	1,588,990	1,435,397	180,744	2,679,943	167,378	330,367	6,315,795	4,925,076	624,890	4,299,008	—869,909
Oregon-Washington R. R. & Nav. Co.	2,025	5,395,254	2,394,368	8,495,639	965,293	961,999	233,648	2,723,041	78,461	338,593	5,241,181	3,254,458	558,153	2,695,731	243,748
Pennsylvania *Company*	1,757	20,346,285	5,171,211	28,436,711	4,210,482	5,104,984	468,214	10,276,924	223,525	668,955	20,953,084	7,483,627	1,585,911	5,897,087	1,835,933
Pennsylvania *Railroad*	4,521	66,240,131	20,548,740	95,512,203	12,441,198	18,411,120	1,181,700	35,358,531	1,394,992	2,421,546	71,209,087	24,303,116	3,800,491	20,401,312	—687,498
Philadelphia, Baltimore & Washington	717	5,156,812	4,313,683	10,538,636	1,604,388	1,911,770	156,713	4,409,936	80	261,244	8,347,131	2,191,505	349,042	1,841,619	194,497
Pittsburgh, Cincinnati, Chic. & St. Louis.	1,472	13,416,876	4,240,872	19,972,419	2,616,188	3,792,434	402,203	7,293,506	148,499	472,103	14,724,932	5,247,487	992,941	4,253,390	246,222
Richmond, Fredericksburg & Potomac	88	714,635	458,132	1,347,732	127,475	182,388	21,088	519,377	19,579	42,742	912,649	435,082	43,499	391,434	—15,298
St. Joseph & Grand Island	258	628,157	161,741	850,456	152,748	124,344	28,553	296,866	.....	32,417	634,929	215,526	49,543	165,951	76,087
St. Louis & San Francisco	4,746	14,359,599	5,614,547	21,340,176	2,940,715	3,347,301	388,417	7,118,586	.....	521,282	14,316,301	7,023,875	613,883	6,401,667	—317,689
St. Louis, Brownsville & Mexico	548	663,636	382,560	1,149,258	217,267	129,295	31,213	437,844	.....	64,871	872,401	276,858	37,423	239,435	24,209
Seaboard	3,100	6,980,350	2,294,441	10,370,194	1,243,298	1,586,052	386,398	3,850,421	41,857	324,577	7,430,345	2,939,849	546,141	2,390,400	858,166
Southern Pacific	6,512	31,398,862	14,146,241	50,220,509	4,939,628	6,964,255	948,827	15,838,083	821,719	1,396,122	30,815,585	19,404,925	2,470,498	16,919,451	—2,615,301
Tennessee Central	294	507,080	210,677	766,732	179,684	104,249	33,349	300,936	.....	40,546	658,673	108,060	26,846	81,113	—130,889
Union Pacific	3,617	21,038,308	5,321,679	29,289,570	3,528,190	3,774,773	538,756	6,972,125	441,200	731,196	15,974,509	13,315,062	1,143,080	12,169,775	118,535
Union Railroad of Baltimore	9	669,939	138,037	818,987	81,846	.....	.....	27,550	.....	14,969	124,364	694,623	33,841	660,782	— 68,141
Union Railroad of Pennsylvania	31	.....	.....	1,930,342	250,004	601,520	608	788,739	.....	20,899	1,661,771	268,571	14,171	254,400	—268,954
Vandalia	910	39,080,035	1,269,235	5,815,887	816,818	1,113,481	141,044	2,201,153	58,793	128,044	4,459,332	1,356,555	189,273	1,167,132	—249,396
Virginian	503	2,543,093	213,805	2,942,288	377,954	528,311	32,272	681,424	61,633	66,534	1,728,041	1,214,247	132,500	1,081,515	—405,539
Washington Southern	36	216,474	224,449	597,496	73,910	94,134	8,081	247,923	8,093	17,963	450,104	147,392	19,753	127,622	14,568
West Jersey & Seashore	356	951,533	2,473,812	3,756,269	569,748	528,261	77,487	1,488,328	17,083	78,796	2,759,702	996,567	171,403	825,002	18,327
Western Maryland	661	3,451,720	546,263	4,200,197	615,071	691,906	125,812	1,551,435	10,651	116,874	3,106,556	1,093,641	149,000	944,641	340,390
Western Ry. of Alabama	133	345,180	229,759	633,145	116,767	153,365	35,310	194,693	8,983	26,681	535,540	97,605	33,191	64,030	—124,300
Wheeling & Lake Erie	459	2,294,817	311,689	2,867,832	323,282	505,165	54,284	1,059,402	8,037	89,747	2,039,916	827,915	191,350	636,566	—606,702
Yazoo & Mississippi Valley	1,381	4,457,150	1,253,417	6,052,330	904,682	868,834	102,310	2,221,443	9,019	140,121	4,240,502	1,811,828	300,000	1,510,865	—463,568

Traffic News

The Traffic Club of Chicago has announced that its annual banquet will be held on the evening of February 25, at the Hotel LaSalle, Chicago.

There was a decrease of 449,315 tons in the shipments of anthracite in January as compared with January, 1914. Total shipments were 4,831,329 tons as compared with 5,280,644 tons. The amount of coal on hand at tidewater shipping ports increased from 669,833 tons on December 31, to 798,125 tons on January 31.

The National Automobile Chamber of Commerce has issued a statement to the effect that shipment of automobiles from factories of this country in the year 1914 amounted to 138,250 carloads, each car usually containing from two to six complete automobiles. It is estimated that the freight bills on these shipments amounted to $15,000,000.

The Department of Agriculture reports the conviction of two men, with heavy fines, for conspiracy to violate the Food and Drugs Act and other federal statutes. These were a prominent coffee merchant and a shipping agent who conspired to violate the Food and Drugs Act in the shipment of coffee in interstate commerce from New York to the west. The two defendants were each fined $3,000, and by reason of their conviction of a felony lost their citizenship, under the provisions of a New York statute. In New Jersey several indictments for conspiracy to violate the Food and Drugs Act have been found against a number of egg handlers who have been illegally shipping spoiled eggs in interstate commerce for food purposes.

Quarantines

A quarantine was placed at the stock yards in Jersey City, N. J., August 5, because of the discovery of 13 cases of foot-and-mouth disease. The union stock yards at Richmond, Va., were quarantined on Monday of this week by the governor of the state, because of the discovery of infected animals in a pen adjacent to the stock yard. The quarantine at Chicago was discontinued February 8. The government has issued orders that no cattle may be held for more than 48 hours.

The Department of Agriculture reports that foot-and-mouth infection has again been discovered in the stock yards of nine cities—Chicago, Pittsburgh, Indianapolis, Louisville, Buffalo, Cincinnati, Columbus, Jersey City and Baltimore; and these stock yards were ordered closed until thoroughly disinfected. This is a setback in the campaign to eradicate the plague, but it is considered to be by no means as serious a matter as if the disease had broken out in stock held on the farms. All the cattle affected were destined for immediate slaughter. No stockers or feeders were included among them. But it will be necessary to disinfect all cars used in these shipments and all yards through which they have passed. The new outbreak, however, in the opinion of the federal authorities emphasizes the necessity of adhering for some time longer to the quarantine regulations that prohibit the shipment of any stock from the quarantined area for any purpose except immediate slaughter. The government also holds that cattle bought for slaughter and found to be affected with foot-and-mouth disease shall not be paid for, but may be condemned under the federal meat-inspection law like any other diseased stock. Purchasers of cattle for slaughter in territory where there is reason to suspect the existence of the disease purchase at their own risk.

Good Farming Promoted Without a Special Train

The Sunset-Central Lines with a view of stimulating interest in diversified farming, along the lines in Texas and Louisiana, have offered the following cattle prizes for 1915:

For the best general field of corn not less than 10 acres, one thoroughbred Shorthorn sire.

For the second best field, one thoroughbred Duroc-Jersey boar.

For the best 10 acres or more of diversified crops, showing the greatest cash profits and largest production per acre of not less than four crops or as many more as may be profitably employed, one thoroughbred Jersey, Guernsey or Holstein sire.

For the second best, under the same conditions, one thoroughbred mature Berkshire boar.

For the boy or girl making the best corn production, under the boys' and girls' corn club rules, one thoroughbred Jersey heifer, two years old.

For the boy or girl making the best production of diversified crops on two acres or more, under the same rules, one thoroughbred Jersey heifer, two years old.

Effects of the Two-Cent Fare on Michigan Roads

In connection with the campaign of the Michigan railroads for a repeal of the two-cent fare law, A. W. Towsley, vice-president and general manager of the Ann Arbor, has compiled and circulated "An appeal to the people of Michigan for justice for the railroads of Michigan," giving statistics and arguments to show that the two-cent law is unreasonable. He shows that the Michigan railroads employ approximately 50,000 men, who earn about $35,000,000 a year in the state, and that there are about 250,000 people in the state, or one person in each 11, directly dependent on the railroads for their livelihood. He then quotes from the decision of the Interstate Commerce Commission in the five per cent rate case in which the commission recommended an effort to advance state passenger fares, and gives a number of figures showing how railroad expenses have been increased by increases in wages to employees and by state and federal legislation.

"No absolutely correct method," he says, "has yet been devised of dividing the expense of operating freight and passenger trains, but a generally accepted method has been in use on a large number of railroads for a great many years. Using this method of computation and basing it on figures taken from the annual reports of the Michigan Railroad Commission, and allowing 6 per cent interest on tax assessment value of facilities used in passenger service, we find that there has been an annual loss to the Michigan roads in every year from 1908 to 1912, inclusive (the 1912 figures being the last immediately available) as follows:

Year	Income for each passenger carried, all passenger train earnings	Expense of operation, taxes and interest on tax assessment valuation per passenger carried	Deficit per passenger carried
1908.....	$0.9072	$1.1479	$0.2407
1909.....	0.6699	1.0594	0.3894
1910.....	0.6963	1.0917	0.3954
1911.....	0.7112	1.1672	0.4559
1912.....	0.7036	1.0981	0.3945

The average freight rate per ton per mile for the Ann Arbor has decreased from 6.9 mills in 1903 to 5.1 mills in 1914, he says, and if the company had received the same rate during the year 1914 as it received during 1903, it would have earned $510,484.47 more revenue for the handling of freight than it did. He also gives the average passenger rate for the years 1900 to 1914, showing a decrease from 2.41 cents per mile in 1903 to 1.81 cents in 1914, to show that had the company received the same rate from September 28, 1907, the date the new law was passed, to June 30, 1914, as was received prior thereto, it would have earned $813,765 more revenue from passenger service than it did.

The circular also gives figures based on a division of total operating expenses between freight and passenger service, showing a loss from all passenger train service of 39.98 cents per train mile, 29.69 cents per passenger carried, and 1.31 cents per passenger mile on the Ann Arbor Railroad for the last fiscal year. These figures show a loss of 8.19 cents per train mile from operation alone, without counting return on the value of the property used or the proper proportion of taxes. Other figures are given to show that the reduction of the passenger fare to two cents in Michigan in 1907 did not result in any material increase in the number of passengers carried.

Knitting Cars for Russian Ladies.—The Russian Ministry of Communications has arranged for cars to be coupled to all long-distance trains, with material for making jerseys, waistcoats, stockings, and other warm garments for the troops so that this can be supplied to lady passengers who desire to work during their journeys.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has announced new dates for the hearings in Chicago on the freight-rate increases proposed by the western railroads. The hearings will be held before Commissioner Daniels, beginning March 4, and lasting until early in April, but if sufficient opportunity is not afforded for consideration of evidence within the dates set, additional dates may be arranged after April 2. The new schedule of hearings follows: March 4-8, railroad evidence supporting claim that increases are reasonable; March 9-12, grain and grain products; March 13-16, livestock, fresh meat, packing house products, and fertilizer materials; March 17-18, hay, straw, and broom corn; March 19-20, cotton piece goods; March 22-25, coal and coke; March 26-27, fruit and vegetables; March 29, rice and rice products; March 30-April 2, evidence of protestants and interveners in rebuttal of evidence of carriers.

Northbound Rates on Hardwood From the Southwest

Opinion by the commission:

The carriers have proposed to increase the northbound rates on hardwood from the lumber producing region of the southwest, extending from the lower Mississippi river to eastern Texas and Oklahoma, about 2 cents per 100 lb. over existing group rates. The commission finds that the proposed rates will be just and reasonable except in so far as certain of them exceed the present rates on yellow pine lumber for the same hauls, and with the exception of rates from group A, which includes Cairo, Ill., and points from which the same rates apply to Missouri river points, and points taking the same rates or rates basing thereon, in so far as they exceed the present rates by more than 2 cents, and with the exception also of rates from certain points in southeastern Arkansas, which would be affected by a proposed change in the present groups of origin to St. Louis, East St. Louis, Cairo, Thebes and Memphis and points taking the same rates or basing thereon, in so far as they exceed the present rates by more than 2 cents. Similar proposed increased rates on yellow pine and cypress lumber, however, are not found justified. (32 I. C. C., 521.)

The Illinois Coal Cases—Increased Rates Justified

Opinion by Commissioner Harlan:

This group of cases results from a concerted effort on the part of coal operators in Illinois to bring about a regrouping of the coal mines in that state for rate making purposes, the particular destinations involved in the first complaint being points in Iowa, Minnesota and western Wisconsin. The other cases involve the reasonableness of the present and of proposed increased rates from coal mines in Illinois to St. Louis.

The Auburn & Alton Case. The coal producing area of Illinois covers nearly three-fourths of the entire state. The mines are divided into a number of rate groups. On coal destined to points in the northwest, the northern Illinois mines, comprising the Third Vein, Wilmington, Fulton and Peoria fields, with certain exceptions, all take the northern Illinois or Chicago group rate. This is the controlling rate to northwestern destinations, and the other groups take differentials over it as follows: Springfield, 40 cents; Danville, 57 cents; Belleville and Centralia 60 cents and southern Illinois 70 cents. It is alleged that the Springfield group is unduly large, that the differential of 70 cents on coal from the southern mines is not sufficient and that the northern mines are deprived the natural advantages of location. The complainants propose that the Springfield group be divided so that on northbound traffic the mines north of the Christian-Montgomery county line extended shall have a differential of 15 cents a ton under the rates from the mines south of the line, and that the differential of 70 cents in the rates from southern Illinois be increased to $1.

The commission finds, however, that the present rates are equitable. It is its opinion that the present adverse conditions are due chiefly to an overdevelopment and overproduction of coal in Illinois and to the superior quality of the southern Illinois coal rather than to any maladjustment of the Illinois coal groups or to any maladjustment of their rates and rate differentials.

The St. Louis Cases. These cases involve an attempt by the carriers to increase by 5½ cents a ton the rates on coal to St. Louis from the mines in Illinois, similar increases to East St. Louis also having been filed but not yet put in effect. In the same group of cases discrimination against St. Louis is alleged in that to St. Louis the rate from the so-called inner and outer groups of mines is 20 cents higher than to East St. Louis, this being the amount of the charge of the Terminal Railroad Association for accepting the coal in East St. Louis and delivering it within the switching district of St. Louis at designated points on its own rails or to connecting carriers, and in that the carriers on shipments of coal moving from points within the so-called 100-mile zone do not absorb this charge of 20 cents, whereas they do absorb it on shipments from points beyond the 100-mile zone.

The commission holds that the carriers have justified the proposed increase of 5½ cents a ton. It finds no sufficient basis for holding that the differential against St. Louis of 20 cents a ton, either in the present or the proposed rates on coal from the Illinois mines, offends any provision of the act to regulate commerce. The delivery of coal after it has reached East St. Louis can be effected only by the performance of an additional transportation service over bridges or by car ferries that involve not only additional expense to operate, but a very substantial additional outlay of capital. The distance the coal is carried is also greater, and while the two communities may be one from a commercial point of view, it cannot be held that they also form one community for rate making purposes. In addition, it is also held that there is no just basis for requiring the line carriers to absorb the charges of the Terminal Association on their short haul traffic from the mines within the 100-mile zone. On long-haul traffic from points outside the zone the revenue is sufficient to permit of such absorption, but from points within it is not. (32 I. C. C., 659.)

Hearing on Lighterage and Tunnel Absorptions at Chicago

Examiner Brown of the Interstate Commerce Commission began a hearing at Chicago on February 3, in an investigation of the cancellation by Chicago railroads of the absorption of the charges of the tunnel and lighterage companies in the Chicago district. H. C. Barlow, traffic director of the Chicago Association of Commerce, urged the necessity of absorbing such charges in order to treat the entire Chicago district as one rate area. He said that if shippers situated in one part of Chicago were obliged to pay a higher rate than those in other parts of the city they would be at a disadvantage as compared with shippers in other cities whose rates are on a parity with those of Chicago, as in the case of Milwaukee. He said that if the shippers are compelled to pay a charge in addition to the through freight rate for the service of the tunnel or the lighterage companies in getting freight to the railroads, a very large part of the freight that is now transported by the lighters and the tunnel will be teamed to the nearest railroad freight station, which will mean a big increase in the traffic of the Chicago & North Western and Chicago, Milwaukee & St. Paul on the north side of the city, the Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific on the west side, and the New York Central and Pennsylvania Lines on the south side, to the disadvantage of the weaker lines.

J. J. Wait, president of the Merchants' Lighterage Company, described in detail the organization and history of that company, which was organized in 1903, to connect shippers on the north side and along the river with the terminals of railroads which do not have access to that section of the city. He said that the question had been discussed with members of the Interstate Commerce Commission, who had given the opinion that it was not unlawfully discriminatory for the railroads to pay his company five cents per hundred pounds for its service. Other witnesses who testified were Robert T. Benedict, western manager of the Pennsylvania Salt Manufacturing Company, who asserted that the business of his company would be made unprofitable if it were obliged to pay drayage charges or a charge to the tunnel and lighterage companies, and S. W. Tracy, vice-president of

the Illinois Tunnel Company, who said he did not see how his company could continue in business if the railroads refused to absorb its charge, because so many shippers would team their freight. Martin Van Persyn, manager of the transportation department of Sprague, Warner & Co., also opposed the cancellation of the absorption. Other testimony was given regarding the cost of teaming. The railroads were represented by W. D. McHugh of Omaha.

STATE COMMISSIONS

The Kentucky Railroad Commission has relieved the Louisville & Nashville from the operation of the long and short haul clause of the state law, in relation to rates on certain commodities from Covington to Central City and from Louisville to Glenns Creek and other points. In the first named case the Louisville & Nashville has to meet the competition of a line running through Ohio and Indiana.

The Michigan railroads have filed a petition with the Michigan Railroad Commission asking authority to make a 5 per cent increase in the rates on coal, coke, iron ore, plaster, starch, sugar beets, bricks, tile, cement and clay. The commission has announced that a hearing will be held this week. Last year the Michigan commission allowed a 5 per cent increase in class rates in the state, but excepted the commodities mentioned, many of which are also excepted in the original decision of the Interstate Commerce Commission in the eastern 5 per cent rate case.

PERSONNEL OF COMMISSIONS

Howard C. Hopson, chief of the division of capitalization of the New York State Public Service Commisison, Second district, has resigned, the resignation to take effect March 1.

Walter Alexander, who has just been appointed a member of the Railroad Commission of Wisconsin, has for the past 13 years held positions as assistant district master mechanic and district master mechanic at Minneapolis and Milwaukee of the Chicago, Milwaukee & St. Paul. The law creating the Railroad Commission requires that one member be familiar with transportation conditions and problems, and it was Governor Philipp's idea that a man who has had practical experience in railroad operation, as well as a technical training as a mechanical engineeer, would be best suited for the position. Mr. Alexander was born in Glasgow, Scotland, in 1872, and went to Milwaukee in 1873. After receiving a common school education he served an apprenticeship as a machinist and draftsman with the Chicago, Milwaukee & St. Paul, and was also employed as a fireman on that road. While so employed he prepared himself for college and entered the University of Wisconsin in 1893, graduating in the mechanical engineering course in 1897; and he received a second degree in engineering the following year. After three years' instructional work in engineering at the University of Wisconsin, one year at Armour Institute and one at the University of Missouri he returned to railroad service as assistant district master mechanic of the St. Paul at Minneapolis. Two years later he was transferred to Milwaukee to a similar position, and later was made district master mechanic, which position he has held up to the present time. As district master mechanic he has had charge of the motive power work on the lines east of the Mississippi river.

Walter Alexander

Railway Officers

Executive, Financial, Legal and Accounting

M. Eckert has been appointed auditor, secretary and treasurer of the St. Louis, Brownsville & Mexico, with headquarters at Kingsville, Tex., succeeding O. H. Nance, resigned.

W. W. Collin, Jr., has been appointed commerce counsel of the Michigan Central, with headquarters at Chicago, and Ernest H. Ballard has been appointed commerce counsel, with headquarters at New York.

Bertram Lord, until recently financial manager for Europe of the American Express Company, with headquarters in London, has been appointed financial and foreign manager of Wells, Fargo & Company, with office at New York City. He will be in general charge of the company's money order, travelers' check, telegraph and financial transfer department, as well as the company's oversea freight business and all foreign transactions.

J. W. Wardlaw, whose appointment as assistant to president and purchasing agent of the Central Vermont, with headquarters at St. Albans, Vt., has already been announced in these columns, was born on October 16, 1882, at Galt, Ont., and was educated in the public and high schools of Ontario, Canada. He began railway work on September 24, 1902, in the office of the superintendent of the Grand Trunk at Toronto, remaining in that position until December 31, 1904, and then served as private secretary to the general manager of the Central Vermont until October, 1911. He was then secretary to general manager of the same road until February, 1913, and then to June, 1914, was secretary to the vice-president. Mr. Wardlaw subsequently became secretary to president, which position he held at the time of his recent appointment as assistant to president and purchasing agent, with headquarters at St. Albans, Vt., of the same road as above noted.

Announcement is made by the New York Central Railroad of the following appointments in the land and tax department: Oscar G. Getzen-Danner, general land and tax agent in general charge of tax matters in New York, Pennsylvania and New Jersey; and of land matters in New York, Pennsylvania and New Jersey (excepting portions of the Erie division and of the Franklin division in New York and Pennsylvania), with headquarters at New York. Herbert D. Howe, general land and tax agent, in general charge of land and tax matters in Illinois, Indiana, Michigan and Ohio, and of land matters on portions of the Erie division and of the Franklin division in New York and Pennsylvania, with headquarters at Chicago. Edwin E. Pettibone, assistant general land and tax agent, with headquarters at Cleveland, Ohio. Joseph Moses, assistant general land and tax agent, with headquarters at Cincinnati, Ohio, and Leon C. James, land and tax agent, with headquarters at Cleveland, Ohio.

T. F. Steele, whose election as vice-president and traffic manager of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at New Orleans, La., has already been announced in these columns, was born on September 27, 1856, at Austin, Tex. He began railway work on December 11, 1880, with the Alabama Great Southern, and has been in the continuous service of lines included in the Queen & Crescent Route ever since. He first served as claim clerk, and later as assistant agent at Chattanooga, Tenn., until April, 1886. He was then consecutively soliciting agent at Birmingham, Ala., agent at New Orleans, and then agent at Birmingham, Ala. In November, 1891, he was appointed division freight agent, and about three years later was appointed general freight agent at Birmingham. He was transferred as general freight agent in April, 1898, to New Orleans, La., and on December 1, 1909, was promoted to freight traffic manager of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at New Orleans, which position he held at the time of his recent election as vice-president and traffic manager of the same roads, as above noted.

Larz A. Jones, who has been elected president and general manager of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at New Orleans, La., as has already been announced in these columns, was born on April 19, 1860, near Cincinnati, Ohio, and was educated in the public schools. He began railway work on July 15, 1878, as a clerk in the auditor's office of the Cincinnati Southern, and was in the service of that road and its successors, the Cincinnati Railroad, and the Cincinnati, New Orleans & Texas Pacific in a clerical position until August, 1883, and then was traveling auditor of the C. N. O. & T. P. until January, 1884. He was subsequently chief clerk of freight accounts of the Queen & Crescent System, and from January, 1890, to October, 1895, was assistant comptroller of the same system. On October 1, 1895, he was appointed auditor of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, and in August, 1907, was elected vice-president and comptroller, which position he held at the time of his recent election as president and general manager of the same roads. From March, 1904, to April, 1911, he was also auditor of the New Orleans Terminal Company, and since April, 1911, vice-president and auditor of the same company.

Operating

J. M. Guild, assistant general safety agent of the Union Pacific, at Omaha, Neb., has been appointed general safety agent.

J. W. Trueb has been appointed superintendent of car service of the Vandalia, with headquarters at Terre Haute, Ind., succeeding J. W. Roberts, promoted.

C. E. Leverich, assistant general superintendent of the Great Northern at Spokane, Wash., has been transferred to Great Falls, Mont., in a similar capacity. G. S. Stewart, division superintendent at Spokane, succeeds Mr. Leverich. T. B. Degnan, superintendent of terminals at Seattle, Wash., has been appointed division superintendent at Crookston, Minn. Joseph Webber, local freight agent at Seattle, succeeds Mr. Degnan. F. D. Kelsey, division superintendent at Great Falls, Mont., succeeds G. S. Stewart at Spokane.

Arthur Hatton, whose appointment as general superintendent of car service of the Canadian Pacific, with headquarters at Montreal, Que., has already been announced in these columns, was born on April 12, 1869, at London, Eng., and was educated in the public and high schools. He began railway work in June, 1888, as agent of the Central Ontario, and remained in the service of that company until July, 1890. In June of the following year he entered the service of the Canadian Pacific as a telegraph operator, and has been in the continuous service of that road ever since. He was promoted to train despatcher in June, 1896, and became chief despatcher in September, 1901, remaining in that position until January, 1907, when he was appointed inspector of transportation. In March, 1912, he was appointed superintendent of car service for the Western Lines, with headquarters at Winnipeg, Man., which position he held at the time of his recent appointment as general superintendent of car service for the entire system, with headquarters at Montreal, Que., as above noted.

Traffic

J. L. Harris, live stock agent of the Chicago & Alton, has resigned to become live stock agent of the Wabash.

H. V. Dinniene, who recently was appointed acting Pacific Coast agent of the Traders' Despatch at San Francisco, Cal., has been appointed Pacific Coast agent, effective February 1.

K. B. Hannigan, commercial agent of the Southern at St. Louis, Mo., has been appointed assistant general freight agent at that place. C. F. Laure, freight soliciting agent at St. Louis, succeeds Mr. Hannigan.

E. A. Weiberg, district passenger agent of the Chicago & Alton, at Peoria, Ill., has been appointed milk traffic agent at Chicago, succeeding E. M. Linzee, who has been appointed passenger agent at St. Louis, Mo. E. H. Yarkey succeeds Mr. Weiberg.

Engineering and Rolling Stock

The headquarters of E. F. Needham, superintendent of the locomotive and car department of the Wabash, has been removed from Springfield, Ill., to Decatur.

G. Whiteley, master mechanic of the Alberta division of the Canadian Pacific, at Calgary, Alta., has been appointed assistant superintendent of motive power of the Eastern Lines, with headquarters at Montreal, Que., and C. Kyle has been appointed master mechanic of the Atlantic division, with headquarters at St. John, N. B.

E. J. Bryant, general foreman of the International & Great Northern at Houston, Tex., has been appointed master mechanic at Mart, Tex., succeeding W. G. Hall, who has been appointed general foreman at Palestine, Tex., in place of S. T. Armstrong, who has been appointed master mechanic at that point to succeed T. Windle, resigned. P. Roquemore has been appointed mechanical engineer, a newly created position.

John J. Reid, master mechanic of the Pennsylvania division of the Delaware & Hudson at Carbondale, Pa., has been appointed master mechanic of the Susquehanna division, with headquarters at Oneonta, N. Y., succeeding William Malthaner, who has entered the service of another company, and George S. Graham has been appointed master mechanic of the Pennsylvania division, with headquarters at Carbondale, succeeding Mr. Reid.

Special

D. J. Corkery, real estate and tax agent of the Chicago & Alton, has resigned to become connected with the tax department of the Chicago, Burlington & Quincy at Chicago.

OBITUARY

James M. Warner, general manager of the Chicago & Western Indiana, died at his home in Chicago on February 8.

S. E. Flanagan, superintendent of the New Orleans & Northeastern at New Orleans, La., died at that place on February 6, at the age of 51.

Chester W. Witters, vice-president and attorney of the Central Vermont at St. Albans, Vt., died on February 9, at his home in St. Albans, at the age of 79.

Charles N. Lee, who formerly was connected with the Chicago, Burlington & Quincy for 45 years, and for 20 years was superintendent at Hannibal, Mo., died on January 30, at Kansas City, Mo., aged 83 years.

Peter J. Nichols, formerly from June, 1891, to July, 1898, general superintendent of the Nebraska division of the Union Pacific, and subsequently superintendent of the Denver Union Depot Company, died recently at the home of his daughter in Indianapolis, Ind., aged 85 years.

Norman B. Ream, one of the most prominent capitalists in New York City, died there on February 9, at the age of 70. Mr. Ream was a director of the Baltimore & Ohio, the Seaboard Air Line, the Pere Marquette and the Pullman Company, also a director or trustee of many industrial and financial concerns.

James C. Fargo, who was president of the American Express Company from 1881 until June, 1914, died on February 8, at his home in New York at the age of 86. He was born at Pompey, N. Y., and when he was 15 years old entered the employ of Wells & Company, at Buffalo, N. Y. He afterwards went to Detroit and Chicago in the service of the same company, and later became agent and Chicago manager for the firm's successor, the American Express Company. In 1866 he was appointed general superintendent and manager at New York, and in 1881, was elected president of the same company. Mr. Fargo resigned as president of the American Express Company on June 16, 1914, after a service of 70 years spent in the express business. He had been president also of the Westcott Express Company, the National Express Company, Merchants' Despatch Transportation Company and a director of the Chicago & North Western Railway. He is survived by two sons, William C. Fargo, who is secretary, and James F. Fargo, treasurer of the American and of the National express companies. An appreciation of Mr. Fargo, which was issued by the American Express Company, at the time of his retirement from the presidency of that company, contained the following: "Mr. Fargo's connection with the company has been exceptional for the length of service, in an absolute and unceasing devotion to its interests and affairs, and has been marked by a high degree of ability in the management of the company's complex and extensive business."

Equipment and Supplies

LOCOMOTIVE BUILDING

The French Government has ordered 100 locomotives from the Baldwin Locomotive Works.

The Eureka Nevada has ordered one Prairie type locomotive from the Porter Locomotive Works.

The Cleveland, Cincinnati, Chicago & St. Louis, which some time ago ordered 10 switching locomotives from the American Locomotive Company, has recently increased that order to 13.

The Servian Government has ordered 10 Mallet type locomotives from the American Locomotive Company, in addition to 7 locomotives reported as ordered in the *Railway Age Gazette* of January 22.

CAR BUILDING

The Boston & Maine is in the market for 6 postal cars.

The United Fruit Company is in the market for from 30 to 35 freight cars.

The Delaware, Lackawanna & Western has ordered 5 postal cars from the American Car & Foundry Company.

The Colorado & Southern is reported to be inquiring for prices on 2,000 center sills. This item has not been confirmed.

The Atchison, Topeka & Santa Fe has ordered 200 80,000-gal. capacity tank cars from the Pressed Steel Car Company. This order is in addition to two orders for 100 cars each placed last November and December.

The Richmond, Fredericksburg & Potomac, reported in an unconfirmed item in the *Railway Age Gazette* of last week as preparing specifications on 6 passenger cars, is actually in the market for 6 all-steel passenger coaches.

The Pennsylvania Railroad has given its Altoona shops authority to proceed with the construction of 48 B-70 all-steel baggage cars, 10 B-60 all-steel baggage cars and 10 MBM all-steel baggage and mail cars.

IRON AND STEEL

The Boston & Maine has ordered 15,000 tons of steel rails from the Lackawanna Steel Company.

The Baltimore & Ohio has ordered 7,000 tons of steel rails from the Carnegie Steel Company, and 5,000 tons from the Illinois Steel Company, of a total order of 25,500 tons.

Germany's Railway System.—In the current issue of the Great Eastern Railway Magazine there is an article which shows what an extraordinary advantage Germany possesses over other European countries in the matter of railways. They are of course, essentially strategic in character and were originally laid down, not as ours were for the convenience of commerce, but for military use. In comparing Belgium, France, Russia, Germany and Austria-Hungary, it is seen that Germany has 6 miles of territory for every railway mile, whereas in Russia there is only one railway mile to 234 square miles of territory. But it is in their distribution even more than in their quantity that Germany possesses an advantage. Main lines run from the eastern to the western frontier almost direct, especially in the north. A cordon of lines runs along the French and Belgian frontiers and the facilities up and down the Polish frontier are nearly as great. Most likely a preponderating reason for the seizure of Luxemburg was that it gave a straight good line from Verviers to Metz, with connections on the Rhine.—*Railway Gazette.*

Supply Trade News

The Daniels Safety Device Company has moved its offices from 327 South LaSalle street, to the Continental & Commercial National Bank building, 208 South LaSalle street, Chicago.

The O. H. Davidson Equipment Company, Denver, Colo., has been appointed representative in Colorado, Utah, Montana, Wyoming, South Dakota, New Mexico and Arizona for the Electric Controller and Manufacturing Company, Cleveland, Ohio.

William H. Kinney, formerly master mechanic of the New York, Ontario & Western at Carbondale, Pa., has entered the railroad sales department of the Dearborn Chemical Company, Chicago, and will have headquarters at the company's New York office.

The Bucyrus Company, South Milwaukee, Wis., the Western Wheeled Scraper Company, Aurora, Ill., and the General Equipment Company, New York, have recently opened a new office at Room 715, Commercial Trust building, Philadelphia, Pa. The office is in charge of E. G. Lewis.

B. F. Affleck, general sales agent, has been elected president of the Universal Portland Cement Company, owned by the United States Steel Corporation, to succeed Edward M. Hagar, who has resigned to assume the presidency of a new company which he is forming to acquire a chain of Portland cement plants. Mr. Affleck entered the service of the Illinois Steel Company in 1896 and, from 1901 to 1903, represented the cement department of the company in the St. Louis territory. When the Universal Portland Cement Company was incorporated in 1906 to take over the cement business of the Illinois Steel Company, he became general sales agent. The company now has plants at Chicago and Pittsburgh with one under construction at Duluth.

B. F. Affleck

Mr. Affleck is also vice-president of the Cement Products Exhibition Company, under whose management the annual cement shows have been held in Chicago. The eighth show opened in the Coliseum on February 10. He has been active in promoting the use of concrete as a paving material.

F. A. Molitor, consulting engineer, 35 Nassau street, New York, has been retained by the receiver of the Brazil Railway Company to make an examination of the physical and operating conditions of the lines owned and leased by that company. He will be absent from this country for four or five months.

The Industrial Works, Bay City, Mich., has added to its line of locomotive and wrecking cranes a small locomotive bucket crane operated by a gasoline engine which is especially adapted for light or intermittent work, such as handling coal, ashes, etc., or for services in places where the use of steam is objectionable.

Due to the existence of a battery jar marketed under the name "Titan," and the fact that any battery using these jars might appear as a Titan battery, the Titan Storage Battery Company, Newark, N. J., has changed its name to the General Lead Batteries Company. No change whatever in ownership, officers or policy is involved. The change is made merely to avoid confusion.

H. H. Symmes, of H. H. Symmes & Brothers, Montreal, Que., has returned to Indianapolis, Ind., and will handle the company's business in the United States. Mr. Symmes has two specialties, the Symmes grease resisting mastic rock floor and the Symmes method of applying waterproofing on bridges and subways.

The Roberts & Schaefer Company, Chicago, has been awarded a contract by the Cottonwood Coal Company, Great Falls, Mont., for the construction of a complete fireproof coal tipple and coal washing plant at the company's mine at Lehigh, Mont. The tipple will have a daily capacity of 3,500 tons and the washery, 2,000 tons. The approximate cost is $120,000. The Cottonwood Coal Company is a subsidiary of the Great Northern Railroad.

W. S. Ottinger, district sales manager of the Cambria Steel Company, has been appointed assistant general manager of sales, effective, March 1, to succeed C. B. McElhany, who, as previously announced, has been appointed general manager of sales to succeed J. L. Replogle, resigned. Mr. Ottinger will be succeeded as district sales manager by F. J. Krouse. Albert S. Johnson will become assistant district sales manager, succeeding Mr. Krouse.

James F. McElroy, president of the Consolidated Car Heating Company, Albany, N. Y., died at Laconia, N. H., on February 10. Mr. McElroy was prominent as an inventor and business man, and was identified with several of Albany's banking and mercantile institutions. He was born in Greenfield, Ohio, November 25, 1852, and was graduated from Dartmouth College in 1876. For four years following Mr. McElroy was the principal teacher of the Indianapolis Institution for the Blind, and then for seven years was superintendent of the Michigan Institution for the Blind. In 1887 he organized the McElroy Car Heating Company, operating its own patents. Two years later it was combined with the Sewall Car Heating Company. Mr. McElroy was a member of several of the city clubs.

The patent suit brought against the B. F. Sturtevant Co., Boston, Mass., by the Sirocco Engineering Company, Detroit, Mich., which has been in the courts for the past six years, has just been decided by the United States Circuit Court of Appeals for the Second Circuit, in favor of the Sturtevant Company. It was claimed that the Sturtevant Multivane Fan infringed the Sirocco Company's patents, and in the lower court this claim was sustained. The Court of Appeals, however, reversed the former decision and held that there was no infringement. The Court of Appeals further decided that the Sirocco patents in suit were void in view of the development of the fan building art prior to the alleged inventions upon which these patents were based. As there are probably more Multivane fans in use than any other make, the monetary consideration at stake was large.

Negotiations are reported as practically completed for the sale by the Westinghouse Electric & Manufacturing Company of its French company, the Societe Ananyme Westinghouse, and the latter's subsidiary, the Societa Italiana Westinghouse, to the British Westinghouse Electric & Manufacturing Company, Ltd., the controlling interest in which is owned by the American company. As the Russian plant is in process of liquidation, it is not involved. No change is made at this time in the status of the Austrian company, but it is expected that later it may also be sold to the British company. The entire transaction is not a war measure nor forced by the war, but strictly a matter of business policy. Heretofore all the Westinghouse companies in Europe have competed for orders instead of working co-ordinately. In consequence of the transfer of control to the British company, this competition for orders will be abolished.

Yesterday, on the occasion of Thomas A. Edison's 68th birthday, all the executives and members of the factory and sales forces of the Edison companies and their distributors followed the custom which has been established for several years of wearing in honor of the day a small badge, bearing a picture of Mr. Edison. Mr. Edison's birthday this year is of more than usual interest, because it comes while his entire force is feeling proud of the rapid recovery after the great fire on December 9. "Tips," the "Chronicle of Edison Events," so-called, states the men's attitude well in the following words: "The real, perennial secret of Edison's strong mind and body, is his 'tomorrow' attitude. With him today is tomorrow in the embryo, tradition is twaddle and the past is only useful in discovering ways for the future. So when that pesky blaze caused us all some inconvenience there is no doubt about it that Edison found in the reconstruction something that was new, big, creative and worth while to engage his inexhaustible energies. All of us should get this lesson from Edison on his birthday and appreciate that a whole life's training of tomorrow work prepared him for this fire check and the job of rehabilitating his industries—a job of magnitude that would turn the average man into a phonographic pessimist and his business over to the junkman."

The Chicago Pneumatic Tool Company

The annual report of the Chicago Pneumatic Tool Company for the fiscal year ended December 31, 1914, is one of the first reports of the railway supply companies so far issued for the year and one of the first, therefore, to show the effect of the war on the supply trade field. In the year the company had net profits of but $655,104 as compared with $1,171,245 in 1913. It charged to depreciation but $195,122 as compared with $300,549 in 1913 and it wrote off for developing and perfecting new tools $15,153. Bond interest for the year totaled $116,175, and there was set aside as an installment for the sinking fund $50,000. The balance carried to the surplus account was thus $278,655. Deductions from surplus account were made, however, of $104,449, representing profits of foreign subsidiary companies retained by them for working capital, and dividends were paid, aggregating 4 per cent. for the year, of $257,952, the same as for each of the last four years. The total surplus on December 31, 1914, was $2,165,357 as against $2,249,104 on December 31, 1913.

On December 31, 1913, the company had real estate, buildings, plant, machinery, patents and good will, less reserves, valued at $7,075,932. It also held capital stock of other companies and other investments of $1,191,370. Its current assets were cash of $96,818; accounts and bills receivable, including undivided profits of subsidiary companies, less reserves, of $1,186,535, and its inventories of material, finished work and work in process totaled $2,009,252, the increase being said to be due to the efforts to retain the company's organization as far as possible by furnishing work to its employees and to provide a stock sufficiently large to take care of any sudden increase in the demand for products. The company's totaled capital stock outstanding is now $6,485,800 and there are also first mortgage bonds to the value of $2,500,000. The current liabilities on December 31, 1914, however, were as follows: interest accrued on bonds payable January 1, 1915, and dividend payable January 25, 1915, $123,738; bills payable, $287,017, and accounts and vouchers payable, $178,143.

TRADE PUBLICATIONS

Air Compressors.—The Chicago Pneumatic Tool Company in bulletin No. 34-K treats of class N-SO and N-SG fuel oil and gas driven compressors and their application to the unit system of air power plants. In common with all the bulletins issued by the company the booklet is well illustrated and treats of the product with which it deals in full detail.

Valves.—A 40-page catalog recently issued by the Homestead Valve Manufacturing Company, Homestead, Pa., deals with the different types of valves which this company manufactures. Illustrations and the principal dimensions of the different types are given and a cross-section showing the construction of the Homestead straightway valve is included on page 7, with detailed descriptive matter.

Paint.—The first number of a publication to be known as The Scientist has been received from the Goheen Manufacturing Company, Canton, Ohio. It is intended to devote the space in this booklet to the advancement of the iron, steel and galvanized iron preservatives, as well as the water-proofing compound and damp-proofing paint of which the Goheen Manufacturing Company is the maker.

Oil Testing Set.—The General Electric Company has just issued bulletin No. 49,901, describing an oil testing set, by means of which the dielectric strength of oil can be easily determined. The proper use of this set insures the successful operation of high tension oil insulated apparatus. The set consists of a 30,000-volt testing transformer with an induction regulator for voltage control and an oil spark gap, all of which are assembled as a unit.

Railway Construction

Arizona Roads.—A contract has been let for building a railroad, it is said, from Willcox, Ariz., on the Southern Pacific, east to Dos Cabeza, 14 miles. The line is to be built by the Mascot Copper Company, to provide an outlet from its mines. T. N. McCauley, San Francisco, Cal., is president.

Buckhannon & Northern.—See Monongahela Railroad.

Canadian Northern.—This company has been authorized to open for traffic the line from the junction with the Balke River sub-division north of Camrose, Alta., to a junction with the Canadian Northern Western near Strathcona, 46 miles.

Canadian Northern Ontario.—Surveys are about finished for a line to be built from Toronto, Ont., to Niagara Falls, 79.13 miles.

Canadian Northern, Quebec.—The Canadian parliament is being asked for an extension of time in which to build from Rawdon, Que., northerly to the National Transcontinental Railway, with a branch to Joliette, also to build from St. Jerome to St. Eustache.

Application has been made to the Canadian parliament for an extension of time in which to complete the James Bay & Eastern, from Lake Abitibi, easterly across the province of Quebec, passing along the south end of Lake St. John to the mouth of the Saguenay river. About 30 miles of the line from Roberval, westerly, is under contract to J. P. Mullarkey, Montreal.

Carolina & Yadkin River.—An officer writes regarding the report that surveys for an extension are to be started soon from a point near the southern end of the existing line at Denton, N. C., southeast to Troy, about 25 miles, that the company is merely making preliminary surveys and no construction work will be started until conditions are better. The company now operates a line between High Point, N. C., and High Rock, 35.6 miles. (February 5, p. 251.)

Dauphin Island Utilities Company.—See Tidewater Securities Corporation.

Eastern Ontario Electric.—The Ontario legislature has been asked to extend the time in which to build lines from Cornwall, Ont., to Toronto, and from Ottawa to Brockville, also a number of branch lines. The company was incorporated in 1909, with headquarters at Cobourg, Ont., and in 1913 was granted an extension of time in which to build the lines. G. E. Smith, L. R. Murdock, C. S. Foss and G. T. Taylor, Boston, Mass., are interested.

International Railway Company (Electric).—This company has been given permission by the New York Public Service Commission, Second district, to build a high speed electric line between Buffalo, N. Y., and Niagara Falls. (December 25, p. 1207.)

James Bay & Eastern.—See Canadian Northern, Quebec.

Marion & Eastern.—See Southern Illinois & St. Louis.

Middletown, Monticello & Callicoon.—Plans are being made to build a line from Middletown, N. Y., northwest via Monticello, to Callicoon, about 40 miles. Funds have already been secured to make the surveys. The promoters expect to use gasolene motor cars for operating the line. Blake A. Mapledoram is engineer, Monticello, N. Y.

Monongahela Railroad.—According to press reports the Buckhannon & Northern is making surveys for an extension from Fairmont, W. Va., southwest to Clarksburg, about 25 miles. The B. & N. finished track laying in 1912 from a point at the Pennsylvania-West Virginia state line, where a connection was made with an extension of the Monongahela Railroad south to B. & N. Junction, 30 miles, from which point trackage rights were to be secured over the B. & O. to Fairmont.

Norfolk & Western.—An officer writes regarding the construction of a low grade line between Pamplin, Va., and Burkeville that some surveys have been made in the vicinity of Farmville, but the company has not yet decided when to begin the work.

Southern Central Pacific.—This company has applied to the Canadian parliament for an extension of time in which to build from Vancouver, B. C., via Kootenay pass and the Old Man river to Hudson Bay, at a point not less than 100 miles north of Fort Churchill, with branch lines from the Blindman river, Sask., via Dunvegan to the Pacific coast at Gardner's canal, and from the Elk River, B. C., to the international boundary at Milk river. The following were named provisional directors in an amending act of 1913: G. F. McDonnell, A. E. Honeywell, W. N. Graham, J. C. Dingman, K. P. Young, Ottawa, Ont

Southern Illinois & St. Louis (Electric).—This company plans to build from St. Louis, Mo., southeast via East St. Louis, Ill., Belleville, Duquoin, Herrin, Johnston City and Pittsburg to Harrisburg, about 140 miles, where a connection is to be made with the El Dorado-Carriers Mills line of the Southern Illinois Railway & Power Company. The plans also call for a 13-mile branch from Johnston City north via West Frankford to Benton, and for a cut-off from a point east to Johnston City south to a point east of Marion, where connection is to be made with the Marion & Eastern operating a 7-mile steam road between Pittsburg and Marion, which is to be electrified. The company expects to complete work on the main line from Pittsburg west via Johnston City to Herrin during 1915. Also on the branch north from Johnston City and on the cut-off. The section from Herrin northwest to Duquoin, 20 miles, is expected to be finished during 1916; the 72-mile section to Belleville will be finished in 1917, and the remainder of the line in 1918. The steel bridges on the line include 30 spans, all to be deck girders, varying in length from 20 ft. to 40 ft. each, and the plans include putting up car shops in Johnston City. W. H. Schott, president, 111 West Monroe street, Chicago; Frank Payne, chief engineer, Johnston City, Ill. (March 6, 1914, p. 493.)

Southern New England.—This company has petitioned the state legislature of Rhode Island for an extension of time, to July, 1917, in which to complete work on the section in Rhode Island. This company was organized by the Grand Trunk, and started work in 1912 on the line from Palmer, Mass., southeast via Blackstone and Woonsocket, R. I., to Providence, about 75 miles. Under the terms of the original charter the section in Rhode Island was to be finished by July, 1915.

Tavares & Gulf.—This road has been extended from Winter Garden, Fla., to Ocoee, 2.4 miles, and the company now operates a main line from Tavares south to Waits Junction, thence east via Winter Garden to Ocoee, 31 miles. A branch is also in operation from Waits Junction west to Clermont, 6 miles.

Tidewater Securities Corporation.—An officer writes that under the name of the Dauphin Island Utilities Company a line is to be built from the terminus of the Mobile & Ohio tracks, near Alabama Port, Ala., to Cedar Point, 3.66 miles, which is later to be extended to Dauphin Island, a total of about 9 miles, and when completed the new line will probably be operated by the Mobile & Ohio. In addition to the use of steam as the motive power for freight service the company plans to use gas electric motor cars for passenger service. The right of way has recently been secured and contract will probably be let in the near future either to the Dauphin Island Contracting Company or to the construction department of the M. & O. for the section from Alabama Port to Cedar Point. The line is being built to carry general freight and passengers to Cedar Point, and after it is extended to Dauphin Island in addition will carry coal, also general freights for export and import, it being the intention to make Dauphin Island a port and coaling station. J. M. Dewberry, president, and T. W. Nicol, chief engineer, Bank of Mobile building, Mobile, Ala.

Toronto Eastern (Electric).—Application has been made to the Canadian parliament by this company for an extension of time in which to complete the line authorized to be built from Toronto, Ont., easterly to Cobourg, with branches as follows: From Cobourg or Port Hope northerly to Peterborough; from Scarborough to Markham, Stouffville or Uxbridge; from Oshawa northerly via Lake Scugog to Lindsay; and from Oshawa south-

erly to Lake Ontario. Ewan MacKenzie, Toronto, has a contract for some of the work, and track has been laid on about 15 miles. E. W. Oliver, chief engineer, Toronto. (November 27, p. 1030.)

Vancouver Railway & Ocean Terminal.—See Vancouver Terminal.

Vancouver Terminal.—This company is asking the Canadian parliament for incorporation to build a railway and terminal works, tunnels and transfer and connecting tracks and other railways in Vancouver, B. C., New Westminster, B. C., and at the mouth of the Fraser river, B. C. The Canadian parliament was asked to incorporate a similar company in 1914, under the name of the Vancouver Railway & Ocean Terminal Company, but the bill was withdrawn last April. J. B. Noble, Vancouver, B. C., is solicitor for applicants.

RAILWAY STRUCTURES

Camden, N. J.—The Philadelphia & Camden Bridge & Terminal Company has been incorporated in New Jersey with $125,000 capital, to build a combined railroad and highway bridge over the Delaware river between Philadelphia, Pa., and Camden. J. Disbrow Baker, J. T. Murray and F. Stanley Saurman are incorporators.

Galveston, Tex.—The contract for the construction of the superstructure of the grain elevator of the Southern Pacific Terminal Company has been let to James Stewart & Co. (January 15, p. 116.)

Kiowa, Kan.—The Atchison, Topeka & Santa Fe is preparing plans for the construction of yards and the building of a new depot.

Los Angeles, Cal.—The San Pedro, Los Angeles & Salt Lake has plans made for putting up a new passenger station on Seventh street, in Los Angeles. The building is to be 110 ft. x 162 ft.; it will be two stories high of reinforced concrete construction, finished in glazed terra cotta with tile roof. There will be a lobby 16 ft. x 40 ft., and the main waiting room will be 40 ft. x 70 ft. There will also be a ladies' waiting room, and a smoking room for men. The ticket office will open off the main waiting room. The plans also provide for a lunch room, a baggage room, a news and parcel room and an information desk. In the rear of the station it is planned to construct a concourse to be covered with glass leading directly to umbrella sheds covering all the passenger tracks. As soon as the city officers of Los Angeles grant the necessary franchises, bids will be asked for carrying out the work. The estimated cost of the station is between $250,000 and $300,000.

Mangum, Okla.—The Chicago, Rock Island & Pacific is contemplating the construction of a two-stall engine house at this point.

New York.—The Long Island will start work soon on the elimination of grade crossings through the Forest Hills and Richmond Hill sections of the borough of Queens. This is the last of the important grade elimination projects of the Long Island within the city limits.

The Lehigh Valley's Reports.—Once a railroad president's chief duties were to build and operate a railroad, distribute dividends and accommodate the public. Now his heaviest job is to answer questions. That veteran graybeard, Eben B. Thomas, president of the Lehigh Valley, says that last year he had to make 25,000 reports, involving answers to a few million queries propounded by various politically created and politically manned commissions. And of those 25,000 reports, it is likely that 24,990 covered useless information. But the silliness of the questions asked and the futility of the information could not abate the zeal of these commissions for more carloads of reports. To please Senator La Follette the people are saddled with that valuation question which is to cost a tidy $50,000,000. No other one question is quite so expensive as that, but they all cost some money, and nearly all of them as unpractical and useless as would be a scheme to propagate fish in the Sahara desert.—*Philadelphia Public Ledger.*

Railway Financial News

Cincinnati, Hamilton & Dayton.—The following protective committee has been formed for the first mortgage 5 per cent bonds of the Cincinnati, Dayton & Ironton: Alvin W. Krech, president of the Equitable Trust Company of New York; Frederick H. Shipman, treasurer of the New York Life Insurance Company, and L. E. Zacher, treasurer of the Travelers Insurance Company of Hartford, Conn.

Chicago, Rock Island & Pacific.—The annual meeting of the stockholders for the election of directors which had been adjourned to March 15 has been further adjourned to April 12.

Denver & Rio Grande.—Plans are being discussed, it is understood, for modifying in some way the requirements of the Denver & Rio Grande's guarantee of the $50,000,000 Western Pacific first mortgage 5 per cent bonds. One of the plans discussed is to scale down the $50,000,000 Western Pacific first mortgage bonds to $25,000,000 and to give bondholders in lieu of the $25,000,000 face value thus taken from them $25,000,000 new adjustment income bonds which will be an obligation of both the Denver & Rio Grande and Western Pacific.

Erie.—The $7,000,000 Erie & Jersey 6 per cent bonds, which issue, as was mentioned in these columns last week, was approved by the New York Public Service Commission, have been sold by J. P. Morgan & Co., the purchasers from the railroad, to the Guaranty Trust Company, New York, which company has formed a syndicate for the sale of the bonds, and is offering them to the public at 104½, yielding 5.70 per cent on the investment.

Michigan Central.—J. P. Morgan & Co. have bought $4,000,000 first mortgage 3½ per cent bonds subject to the approval of the Michigan Public Service Commission.

Missouri Pacific.—The Wall Street Journal says: Four St. Louis men are slated to go on the Missouri Pacific and the St. Louis, Iron Mountain & Southern board of directors when the contemplated program is carried out at the annual meeting on March 9, next. They are Frank O. Watts, president of the Third National Bank of St. Louis; William H. Lee, president of the Merchants Laclede National Bank; Edward H. Faust of the Anheuser-Busch Brewing Company, and Festus J. Wade, president of the Mercantile Trust Company.

The New York members of the board, it is stated, will be Alexander J. Hemphill, chairman of the board of the Guaranty Trust Company; Nicholas F. Brady, president of the New York Edison Company; Cornelius Vanderbilt, Newcomb Carleton, president of the Western Union Telegraph Company, and Robert Winsor, of Kidder, Peabody & Company. Seven of these men will serve on the Missouri Pacific board and all on the Iron Mountain board.

Present Missouri Pacific directors who will be retained on the board are Edgar L. Marston, E. D. Adams, Edwin G. Merrill, R. Lancaster Williams, B. F. Bush and Finley J. Shepard. Four of these are also directors of the St. Louis, Iron Mountain & Southern.

New York Central Railroad.—See editorial comments on the new bond issue.

Pittsburgh, Cincinnati, Chicago & St. Louis.—Kuhn, Loeb & Co. and Speyer & Co., both of New York, have bought $3,000,000 consolidated mortgage 4½ per cent bonds of the Pittsburgh, Cincinnati, Chicago & St. Louis, guaranteed by the Pennsylvania Company.

Western Pacific.—See Denver & Rio Grande.

Railway Construction in Mongolia.—An inter-departmental committee has been nominated by the Russian government to consider the construction of railways in Mongolia, either at government or private expense. The first line to be considered is one to connect Kiachta and Ugra.

Railway Age Gazette

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WE GUARANTEE, that of this issue (the monthly Engineering & Maintenance Edition) 10,900 copies were printed; that of these 10,900 copies 7,384 were mailed to regular paid subscribers to the weekly edition, 1,831 to subscribers who get the Engineering & Maintenance Edition only, 250 were provided for counter and news companies' sales, 1,054 were mailed to advertisers, exchanges and correspondents, and 381 were provided for samples and office use; that the total copies printed thie year were 74,550, an average of 9,320 copies a week.

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Contents

*Illustrated.

Deferred Suspensions on the B. R. &. P.

Brown's discipline, three-fourths full strength, has now been in force on the Buffalo, Rochester & Pittsburgh for two years, and with marked satisfaction to all concerned. This arrangement (described on another page) is quite similar to that which has been in effect on the New York Central (east of Buffalo) for about the same length of time; and the New York Central officers seem to be equally well satisfied. Some, no doubt, will be of the opinion that leaving the fear of actual suspension hanging over a man's head for a few months is an improvement on the plan of universal abolition of suspensions; and that instead of calling this scheme 75 per cent pure, we ought to rate it at 125, or some higher percentage. Railroad superintendents have the habit of judging largely by results; and pretty good results (as well as pretty bad) have been found under all plans—suspensions, deferred suspensions and no suspensions. Pure theory, however, still deserves consideration. The theorist has no responsibility, and therefore can set his standard very high; but can the railroad superintendent afford to do any less? The theorist, in this matter says, simply, "My conductors, enginemen, brakemen and firemen must be men of good enough quality to be at all times amenable to reason." That is all. If a man can be reasoned with he need not be suspended. The B. R. & P. rule ought to have a constant educational effect on all classes, and we shall look for further progress in the future. Meanwhile the Burlington and the Baltimore & Ohio, whose thoroughgoing abandonment of suspensions was the subject of articles in this paper last year (January 16 and June 12) report continued satisfaction with their practice.

A Railroad Man as State Commissioner

One of the most frequent criticisms of state railway regulation is that the membership of state railway commissions is seldom, if ever, allowed to include practical railway men of any extended experience. Therefore, the appointment to the Wisconsin Railroad Commission of a railroad officer in active service, Walter Alexander, district master mechanic of the Chicago, Milwaukee & St. Paul, is interesting and significant, especially in view of the importance of the Wisconsin commission. The new governor of Wisconsin, E. L. Philipp, was formerly a railroad man himself, and more recently, as president of the Union Refrigerator Transit Company, has been in a position to understand some of the problems involved in railway operation and regulation. It is, therefore, quite natural that he should have taken advantage of the opportunity presented to him to fill a vacancy on the commission by an appointment well calculated to strengthen a body that has for several years commanded the respect of railroad officers. And he has apparently been fortunate in his selection. It is difficult to get the right kind of a railroad man to leave a good position to accept an appointment to an office, the tenure of which is likely to be limited, and the mere fact that an appointee has had practical experience in the business he is to regulate is likely to create a prejudice against him in political circles. There was some opposition among the members of the legislature to Mr. Alexander, simply because he was a railroad man, and his appointment was confirmed by the senate last week by a vote of only 17 to 15. Mr. Alexander has not only had an extended practical experience in an important department of his railroad, having had jurisdiction over the motive power east of the Mississippi river, but he is a self-made man. He began his railway work after a common school education, prepared himself for college while working as machinist, draftsman and fireman, and after receiving a thorough technical education, spent five years as an instructor in engineering at the University of Wisconsin, Armour Institute and the University of Missouri before returning to railroad service as an officer. The spirit which prompts the appointment of such a man to a railroad commission is highly gratifying.

Regulation of Security Issues

The New York Public Service Commission, Second district, division of capitalization, which is in charge of Howard C. Hopson, has passed on 787 applications since it was created in 1907. The division in the commission's annual report quite properly points with some pride to the success of its efforts to pass promptly on applications for approval of security issues, calling attention to the fact that whereas there were 73 applications pending at the beginning of 1914, there were but 24 at the end of the year. This question of promptness is a very important one in connection with the discussion which is now going on of giving the Interstate Commerce Commission power to pass on the issuance of securities by all interstate railroad companies. There is also another point of general interest touched on in the New York commission's report for 1914. The report says:

> The commission has found it to be for the best interests of all concerned to permit corporations with generating stations of large capacity which operate at a low cost to acquire small plants in their territory, especially when approved by local authorities. This results, in some cases, in the immediate retirement and abandonment of a considerable portion of the physical property involved.

Although this statement is made in regard to one particular form of public service corporation, it brings out quite clearly the conversion of one state public service commission to the principle which has so strongly been contended for by railroad and other public service companies and has so often been bitterly opposed by public sentiment and state commissions, namely, that the buying out of small competitors by a large monopoly may be an economic gain.

FALSIFICATION BY MISQUOTATION

THE representatives of the engineers and firemen in the western territory, in their testimony before the board of arbitration, have made a remarkable attempt to misrepresent the facts regarding the work done by these employees. They have introduced an exhibit entitled, "Evolution of Increased Power and Tonnage," which consists of quotations from statements of railway officers, railway newspapers and advertisements of railway equipment concerns purporting to show, as the title suggests, how, in the past few years, locomotives have increased in size and power, and how the train tonnage has increased, and having the underlying purpose of leading the board to believe that the labors of both the engineers and firemen have been correspondingly increased. This underlying purpose was sought to be accomplished by omitting from the quotations correlated phrases and sentences, the inclusion of which would have left an entirely different impression on the minds of the arbitrators.

The Conference Committee of Managers, representing the railroads, has countered by presenting an exhibit in which many of the quotations given by the engineers and firemen are printed in black and the qualifying statements which they omitted are printed in red. A few examples will illustrate the bald way in which the representatives of the engineers and firemen have tried to mislead the board.

In speaking of the conversion of simple locomotives into Mallet compounds on the Chicago Great Western, as described in the *Railway Age Gazette* of November 4, 1910, this paper said: "The maximum tractive effort of the engine was thus increased from 33,000 lb. to 52,000 lb., or 57.5 per cent." The representatives of the employees quoted the foregoing, but omitted the following, which appeared in the same article: *"The steam generating portion of the old locomotive remains the same. . . . It is claimed that converted Mallets on other roads are hauling 50 per cent greater tonnage with the same amount of coal consumed by the old locomotives."*

W. L. Park, vice-president of the Illinois Central, was quoted as having said in 1910 that the locomotive engineer was hauling 100 per cent more tonnage than he did 10 years before; but the following statements made by Mr. Park at the same time were omitted: *"The people have received the benefit of this, for, notwithstanding the increase in wages amounting to from 25 to 50 per cent, increased cost of supplies and material, and the entire cost of the railroads' living, they have maintained the cost of transportation to the public at the lowest rates in the world, 7.5 mills per ton per mile."*

The *Railway Age Gazette*, in its issue of March 28, 1913, referring to the locomotives built by the Baldwin works in 1912, said: "Under favorable conditions, such locomotives"—Mikados—"equipped with superheaters, are hauling 30 per cent more tonnage than the saturated steam Consolidation type engines formerly used in the same service *with no increase in actual coal consumption."* The labor people quoted the first part of this sentence, but carefully suppressed the part of it which we give in italics. Further on in the same article we said: "A notable order for Mallet locomotives was filled for the Great Northern, which received 25 engines of the 2-8-8-0 type. These exert a tractive effort of 100,000 lb. *working compound, and are fitted with Emerson superheaters."* In a sentence further on it was stated that—*"Seventeen of these locomotives are coal burners, while the remaining eight use oil for fuel."* The words here italicized were carefully left out of the employees' exhibit.

In an article describing the Mikado locomotives for the Lake Shore, published in the *Railway Age Gazette* for May 2, 1913, it was stated that although the tractive effort of these engines was only 22½ per cent greater than that of the Consolidations which they replaced, they handle 35 per cent greater tonnage. The exhibit of the brotherhoods quoted the foregoing statement, but omitted the following: *"The average for three trips of a superheater Consolidation locomotive. . . . showed that it burned 15.9 tons of coal per trip of about 130 miles when hauling a 60-car train of 2,335 tons. . . . The average of three trips over the same division with a Mikado was 12.85 tons of coal when hauling a train that averaged 70 cars of 3,203 tons."*

Under the heading of "Labors of Engineers and Firemen Have Increased with Increased Power and Tonnage" in the brotherhoods' exhibit the following quotation is made from the *Railway Age Gazette* of November 11, 1910, page 911: "The operation of a Mallet engine involves somewhat more work and responsibility for the engineer than the operation of a smaller engine." The railroads, in their exhibit, finished the sentence as follows: *"and for this reason the railway managers concede that engineers on them should be paid more,"* and added the following, which appeared in the same article: *"They, therefore, offered them a differential of 75 cents a day; but the officers of the Brotherhood insisted that engineers on Mallets be paid practically double what others received. . . . The adoption of the principle that engineers running Mallets shall receive anything like twice as much as engineers on other engines would very seriously interfere with the economies for which these engines have been invented and introduced."*

Again, the representatives of the employees quoted from an editorial in the *Railway Age Gazette* of April 26, 1912, page 944, as follows: "Firemen have been known to shovel between 6,000 and 7,000 lb. per hour, but they worked under such a pressure that they could not be expected to secure the most efficient results." The sentence immediately following, which they omitted, read thus: *"Realizing the necessity of . . . keeping within the limitations of the average fireman, the locomotive designers have introduced a number of important features during recent years which have gradually increased the capacity of the locomotive without making additional demands upon the engineman or the fireman."*

The above are but a very small number of the quotations successfully challenged by the railroads, but they are typical, and show quite clearly the methods adopted by the brotherhoods in preparing this exhibit. They are a fine example of falsification by misquotation. A cause which is supported by such methods must be very unfortunate either in its intrinsic merits or in its spokesmen.

FEDERAL BOILER INSPECTORS SEEK ENTIRE CONTROL OF LOCOMOTIVES

THE potential evils in the amendment to the Federal Locomotive Boiler Inspection Act, which has already passed the House and is now under consideration in the Senate, giving the Bureau of Locomotive Boiler Inspection the same jurisdiction over the entire locomotive and tender as it now has over the locomotive boiler, are so numerous and of such a character that determined action should be taken to prevent it from becoming a law. As it now stands it gives the federal boiler inspectors absolute authority to decide whether or not in *their* opinion a locomotive is safe to operate in the service to which it is put. We quote below Section II of the amendment:

Section II. That the chief inspector and the two assistant chief inspectors, together with all the district inspectors, appointed under the Act of February 17, 1911, shall inspect and shall have the same powers and duties with respect to all the parts and appurtenances of the locomotive and tender that they now have with respect to the boiler of a locomotive and the appurtenances thereof, and the said Act of February 17, 1911, shall apply to and include the entire locomotive and tender and all their parts with the same force and effect as it now applies to locomotive boilers and their appurtenances. That upon the passage of this Act all inspectors and applicants for the position of inspector shall be examined touching their qualifications and fitness with respect to the additional duties imposed by this Act.

The framers of the amendment evidently assume that a $1,800 a year boiler maker is competent to determine at a glance whether locomotive wheel tires are too badly worn, whether a spring has too great a deflection, whether there is too much lateral play in the wheels, whether the side bearings of trucks are correctly located and their clearance sufficient, and so on. In other words, it is assumed that these $1,800 inspectors are all around mechanical experts, or that men could be procured at that salary who are so familiar with *all* of the conditions on *all* of the railroads in their district, and who have such a knowledge of *all* of the different designs of locomotives and tenders, in addition to possessing the concrete knowledge of boilers necessary under the present law that they can competently determine when a locomotive is safe to operate in the service in which it is placed.

It thus becomes strikingly apparent to what grave injustice the railways will be subjected by this amendment, unintentionally perhaps, but none the less disastrously to satisfactory railway operation. What a weapon this amendment would place in the hands of those behind this proposed act—organized labor. Locomotives could be held out of service on the slightest pretext, and the operation of a railway materially crippled. If the people of this country, through their representatives in Congress, desire that locomotives and tenders be inspected by government inspectors the railways might be willing to submit to such inspection, but the public, in justice to the railways, and in its own interest, should not permit this unlimited authority to be placed in the hands of a body of men whose training does not qualify them to exercise it. If any such extension of the locomotive boiler inspection act is necessary, and it is to fulfill its purpose, elaborate standards must be adopted for the inspectors and the roads to follow, and in these standards allowance must be made for the varying conditions throughout the country. It is not a subject that can be passed on lightly. It deserves the most careful consideration by railway mechanical experts.

If it is necessary to inspect the locomotives and tenders at all the work should be done thoroughly, and it is far beyond the capabilities of the Bureau of Locomotive Boiler Inspection to handle it in this manner. A special department under the Interstate Commerce Commission would be necessary, officered by men familiar with all phases of locomotive design and construction. As the amendment now stands, the inspection required by it could not be adequately performed, it would be a source of constant controversy, and it would cause great injustice to the railroads, tying them hand and foot, and placing them at the mercy of a subordinate department of the Interstate Commerce Commission, and through it at the mercy of organized labor. It is hardly conceivable that the Senate will pass the proposed amendment in its present form.

FULL-CREW LAW ARGUMENTS

THE movement for the repeal of "full-crew" laws, more accurately called "extra-crew" laws, is in danger of being weakened because of its very strength. The arguments against repeal are so poor and thin that nobody states them; and persons who have not followed what has been published on the subject during the past two years are mystified by the presentation of an issue which seems to have only one side. The fair-minded citizen who is in the habit of deciding for himself looks habitually at both sides of every question; but here he finds that there isn't any adverse side.

Assuming, for the time being, the role of attorney for the defense, we will try to put the issue into a more presentable form. The real reasons why the extra-crew laws have been passed are only two, and very simple ones; the desire of the brotherhood leaders to make more jobs for brakemen, and the desire of legislators to please "labor," no matter what it may ask for. Back of these outward motives, the labor leader is seeking to intrench himself in his position as leader; and the legislator has a purpose equally selfish. But the movement for legislation has had a tiny thread of respectability. These selfish interests—aiming, of course, to conceal their selfishness—have claimed that a long freight train was more dangerous than a short one, and that, therefore, more trainmen were needed to guard against the dangers. This claim was not asserted very loudly, because the danger was admittedly rather small. Moreover, there was no need of loud proclamation; the legislative committee man can hear a whisper, if it comes from one whom he believes to be backed by a majority of the voters.

There is, then, theoretically, a useful function on a long train for a third brakeman; on a train, say of 80 cars, extending back more than half a mile from the engine. If the rear-end man goes back with a flag, and if, while he is gone, it is necessary to do some switching, the conductor will wish that he had another man; he cannot set out a car, or take on a car, and make the necessary exchange of bills with the station agent, quite so quickly as he could if he had both his assistants with him. This consideration may lead crews to neglect flagging, and so introduce a theoretical danger. Another element of danger on a long train is the possibility that a wheel or an axle may fail under a car in the middle of the train, or a brake-beam fall on the track, and the danger not be promptly discovered because the trainmen are so far away from it. The philanthropic legislator, stern in his devotion to the safety of the public, quickly votes to employ an additional man to ride on the middle of the train to guard against this risk. The legislator is oblivious to the fact that the insurance companies—if statistics could be gathered—would be glad to insure against this danger for, probably, a hundredth or a five-hundredth part of the extra brakeman's wages.

The other reasons which have been set up in favor of these laws are equally thin—or thinner. In actual practice the occasions when time can be saved or convenience promoted, or dangers averted, by the third man, are so infrequent that the benefit which results cannot be measured.

There is no denying that a third man on a train—or a fourth, and a fifth—might, if possessing ideal intelligence, vigilance and faithfulness, occasionally do something to ward off some danger. So could a third man in the locomotive, acting as second assistant lookout man. This extra lookout has been advocated many times, and the idea has even been favored by some railroad men; but only a little calm reflection is needed to show that, admitting a trace of reason in the idea, the money spent to carry it out would do a thousand times more good if spent in other directions. Another notion of the same sort is that an important function of the train despatcher is to watch the train-

sheet so closely that he will discover when some one of a hundred enginemen is on the point of disobeying an order, and send a message to head him off. Train despatchers have, indeed, prevented collisions by acts of the kind suggested; but to call this other than an incidental function is to reverse the natural order.

It is the same in the case of the lookout man and the extra brakeman. The railroads are wrong when they declare so persistently that the $1,600,000 spent in Pennsylvania each year for extra brakemen is wholly wasted. Looking at the matter in the narrowest possible way, the extra service may be worth a fraction of the sum spent; say $16, or $160, or even $1,600. But no concern engaged in serving the public and deriving its income from the public has any right to spend its money in such an extravagant way. And beyond this narrow and short-sighted consideration of the question, it is to be remembered that an extra brakeman may do positive harm. Unless he is a very exceptional man he is likely to impair discipline, and to depress the morale of the force in other ways. Idle men need watching. And he may get hurt in getting on or off the cars, or in other ways, causing expense to the company or himself.

THE DECISION IN THE TRANSCONTINENTAL FOURTH SECTION CASE

THE Interstate Commerce Commission in its latest decision in the transcontinental fourth section rate cases, has shown a disposition to co-operate with the railroads in solving one of their most difficult problems. Although the decision does not grant the roads the full measure of relief that they asked for from a hard and fast application of the fourth section rule, the commission has shown a willingness to recognize the changes in conditions since the issuance of its previous order in the case in 1911. In the new order it has departed considerably from the rule it laid down at that time. The rule then laid down made the rates to the intermountain points dependent on the rates to the coast terminals. The order embodying this rule, it will be remembered, was held up by litigation for nearly three years, and when it was finally sustained by the Supreme Court the Panama Canal was about to be opened for traffic, thus bringing about a new set of conditions.

The roads have already put into effect rates conforming to the requirements of the original order except on the list of about 100 commodities involved in the latest order and concerning which the roads asked relief which would enable them to meet the low rates via the Panama Canal without disturbing their intermediate rates. These commodities include the bulk of the traffic on which the water competition would be most keenly felt and at the hearing before the commission in October the roads were able to show definitely what low rates they would have to make to participate in the competitive business. Since the hearing the roads have withdrawn 27 of the commodities from the list on which they asked relief and as to some of the rest the commission has granted something less than the full relief requested, and imposed certain requirements as to the maxima to be observed at the intermediate points. Since the hearing, however, another change in conditions has occurred of which the commission has not taken cognizance in its decision which will be of benefit to the roads for a time.

The high ocean freight rates caused by the war have attracted away many of the boats that were competing actively with the railroads for the Pacific coast traffic via the Canal and the slides in the canal have made it impossible for some of the other boats to carry their full tonnage, so that there is now a large accumulation of freight on the Atlantic seaboard for the Pacific coast which the railways are likely to get.

The Interstate Commerce Commission is not in sympathy with the ideas of many people who have considered the construction of the canal as indicative of a governmental policy to divert as much of the coast-to-coast business as possible to the water lines. "This suggestion," it says, "loses force under the consideration that the Panama Canal is but one of the agencies of transportation that the government of the United States has fostered between the Atlantic coast and the Pacific. . . . Some of these transcontinental lines would not have been built had it not been for the liberality the government extended to them at the time of their construction. As we view it the Panama Canal is to be one of the agencies of transportation between the East and the West, but not necessarily the sole carrier of coast-to-coast business." With this idea in mind the commission may be expected to meet changed conditions as they arise in the way that the situation requires.

EASTERN RAILWAYS APPEAL TO THE PUBLIC

THE statement which the eastern railways have issued to the public in opening their campaign for the repeal of the train crew laws in Pennsylvania and New Jersey is a remarkable document. It is remarkable because of the overwhelming conclusiveness of its argument against such legislation. It is more remarkable, however, as a kind of confession of faith by the railway presidents who issued it. They admit that in the past railroads have been too slow in introducing safety devices "largely because of a stupid and stubborn attitude of mind once too prevalent among railway managers." They agree that "far too many are killed an injured on the railroads" and that "property rights fall secondary to human rights." They refer to the fact that "railroad officers are merely salaried men" and concede that "their duties and responsibilities are those of stewards." Having thus condemned the attitude which formerly prevailed among railway managers and stated the attitude assumed by them now, they contend that their attack upon the full crew laws is entirely consistent with their relation of stewardship to the public, and, in fact, grows out of it. The train crew laws, they contend, cause economic waste by giving employment to men who have nothing to do and reduce rather than increase the safety of operation. They are, therefore, unmitigatedly harmful to the public; and it is in the performance of their stewardship to the public that railway officers appeal to it to cause the repeal of these laws.

One of the notable statements in the document is, "It is frankly recognized that railroad employees have a right to organize," and "we believe it to be as impossible for the individual employee in a great transportation system to be certain of fair treatment acting by himself as we know it would be impossible for one man to provide the capital necessary for creation of the huge Pennsylvania Railroad System." The tone and candor of this expression from the eastern railway presidents has provoked some manifestations of astonishment from certain newspapers. But there is nothing in it to cause surprise in it. The change in the attitude of railway executives has been well known for some years to those who have been in close touch with the railway business. When railway presidents go before the public in such a statement the public is pretty certain sooner or later to respond in kind. If the roads continue to take their case to the public as they are doing now it will not be long until there will be a great change in railway regulation and until agitation against railways will become a liability instead of an asset to the politician.

NEW BOOKS

Railway Fire Protection Proceedings. Published by the Railway Fire Protection Association, C. B. Edwards, fire insurance agent, Mobile & Ohio, Mobile, Ala., secretary. 167 pages. Bound in paper.

These proceedings are for the second annual meeting of the Railway Fire Protection Association, held at Washington, D. C., October 6 and 7, 1914. The several papers presented were published in some detail in the *Railway Age Gazette* of November 20, 1914, page 943. They included reports on Fire Hazards, Statistics and Forms, Fire Fighting Organization and Fire Fighting Apparatus. The report of the committee on Fire Hazards, Charles N. Rambo (Norfolk & Western) chairman, was especially important, and with the discussion covers 76 pages. The several committee reports contained excellent recommendations.

Is the Railroad Y. M. C. A. Really Worth While?

PART I—Reasons Why This Organization Gives Better Results Than What Is Known as the Club House Plan

The Railroad Y. M. C. A. has not been spectacular in its development or in the accomplishment of its work. Steadily, but gradually and quietly, it has been extending its operations and perfecting its methods for many years—since 1871. It has had the backing of many farsighted railway executives and has received financial assistance from many roads; but the very nature of its work—providing clean, comfortable and uplifting surroundings for the trainmen and enginemen who lay over at terminals at the opposite ends of the runs from their homes—and the fact that the quarters are frequently far removed from the business and social centers of the communities in which they are located, has kept it from attracting the general attention which its importance deserves.

In late years much has been printed in popular magazines concerning reading rooms and social clubs which have been established by some of the railroads. The writers have embellished these descriptions with striking and human interest incidents, with fine figures of speech, and sometimes it would seem with rhetorical flights of imagination. Most of them, however, seem almost entirely to have overlooked the less spectacular but larger and more thoroughly established work of the Railroad Y. M. C. A. Why? Has the latter institution been remiss in its work, and has it failed in the accomplishment of the high ideals for which it stands? Has the "C" in the Y. M. C. A., standing for all it does in character building and broad brotherly sympathy, given offense or narrowed the field of its work? Have the railways which have helped to support the institution been giving their money for something which has produced intangible results? In a word, is the whole movement really worth while?

With this in mind, it was decided to investigate the work more or less thoroughly on three of the eastern railroads which were selected for the following reasons: Each one, small in physical size as compared with some of the larger systems, is known because of its progressive and, to a certain extent also, aggressive attitude. All three have had much experience with the Railroad Y. M. C. A. and believe in it. On each, however, this work is administered and supervised differently so far as details are concerned. Operating in different territories and under varied conditions, physical and otherwise, and particularly as concerns the religious beliefs of the greater part of the employees, it was thought possible to obtain a good idea of the adaptability of the institution to varying conditions. Practically one week was devoted to visiting and studying the fourteen Railroad Y. M. C. A. institutions on these three roads, the visits varying in length, depending largely on the importance of the location, and being made at all times of day and night. In the greater number of cases the railroad officers on the division, foremen and many of the employees were interviewed. In some cases the local boards having in charge the direction of the work, together with such railway officers and foremen as were available, gathered for luncheon or dinner conferences. The editor who made the study conducted the interviews in the attitude of "the man from Missouri" and critically inspected the different buildings from top to bottom, special attention being given to sleeping rooms, kitchens, storerooms and out of the way corners, including that part of the property directly back of the kitchen, and also to the attitude of the men in and about the buildings. Almost a year has elapsed since this trip was made; meanwhile the work has been looked into more or less incidentally in connection with trips over several other railroads, and several days were spent during August at the Railroad Y. M. C. A. summer school at Silver Bay, N. Y.

THE ORGANIZATION

In the first place it should be understood that the Railroad Association work at each point is in direct charge of a trained secretary who works with both the railroad and the general Railroad Association organizations. Associated with him is a board of managers usually made up of local railroad officers and employees. The railroad department of the International Y. M. C. A. is directed by a railroad committee of seven members, with Dr. John P. Munn, of New York, as chairman. The other members are B. D. Caldwell, president of Wells, Fargo & Company Express; W. E. S. Griswold; William A. Patton, assistant to the president of the Pennsylvania Railroad; Abner Kingman; John Carstensen, vice-president of the New York Central, and A. M. Schoyer, vice-president of the Pennsylvania Lines.

The work is directly supervised by the international and the several state committees. John F. Moore is the general railroad secretary of the former, and is assisted by several traveling secretaries, each of whom covers a particular section of the country. For instance, J. M. Dudley is located at Montreal and looks after the Canadian associations; E. L. Hamilton has general charge of the associations on the New York Central Lines, the Delaware, Lackawanna & Western and the Buffalo, Rochester & Pittsburgh; A. G. Knebel, with headquarters at St. Louis, looks after the Gould lines and the Southwest; A. B. Minear, with headquarters at Chicago, has jurisdiction over the central and northwestern associations; H. O. Williams, with headquarters at New York, looks after the New England and southeastern associations, and G. K. Roper, Jr., whose headquarters are at Richmond, looks after the southern district.

There are also connected with the general department several specialists, each of whom is retained in an advisory capacity for some special branch of the work. D. S. Hanchett looks after educational work and co-operates with Mr. Moore in the publication of the Railroad Association Magazine; W. H. Ball, in charge of physical development, also gives attention to sanitation, ventilation, dormitory equipment, games and building arrangement; W. A. Cochran is in charge of installing a uniform system of accounting; A. W. MacNeil is the restaurant expert and during the summer months is in charge of the summer school hotel at Silver Bay, N. Y.; M. S. Safford is in charge of the development of membership campaigns; H. F. Reinhardt is emergency specialist, and W. G. Mason looks after evangelistic work. The traveling secretaries keep in close touch with the local secretaries and with the needs of the work and supervise it in a general way in more or less detail.

In approaching the local railroad officials at the various points in connection with the investigation, two questions were invariably put to them, not always in the same way and never in the early part of the conference, but always amounting in effect to the following: Is the Railroad Y. M. C. A. really worth while, and what is it accomplishing in a practical way? If it is capable of performing an important work in the interests of the railroads, why not have this work done by the railroads themselves? More directly, this second question might be stated in this way: Why cannot the railroads handle the work to better advantage without assistance from an outside organization? The purpose of this article is to answer these two questions. The last one will be considered first because in large part it will explain the reason for the answer which will be given to the first one.

BIG LEADERS REQUIRED

The amount of equipment which may be necessary and the work accomplished by the Railroad Y. M. C. A. depends on the size, nature and location of the terminal, and on its relation to the other points on the system and to the operation of the road as a whole. For instance, at some points it may be neces-

sary to provide a large number of sleeping accommodations both day and night and to serve meals at all hours. At other places it may not be necessary to provide any meals, and only a few sleeping rooms may be required. At some terminals conditions may be such as to make it necessary to place special stress on the educational work or on the recreation features. In all cases it is necessary to maintain a reading room, to carry on some educational work, to maintain Bible classes, attendance on which is entirely optional, and to keep in close personal touch with the men in order to help them to lead clean, upright lives so that they will be in such physical and mental condition at all times as properly to perform their duties and be a credit to the service.

What sort of man is required to act as the director and leader of this work? Is it easy to find a good Railroad Y. M. C. A. secretary? Let us examine the requirements. In the first place he must be something of a financier, for good meals and clean and comfortable sleeping quarters must be provided at a comparatively small cost. While the men pay a nominal price for this service, and the railroads help out with a large or small appropriation, as the case may be, it is only by the most careful planning that the secretary can make ends meet. He must be more or less of a promoter in order to extend and build up the work and make its influence felt to as great a degree as possible. He must be something of a teacher, for even if he does not personally have to take charge of the educational classes, he must be able to secure and direct those who can do so to the best advantage. He must be a religious leader, and in a broad way, for necessarily the men who make use of the buildings are of different or no religious beliefs and this work must be carried on diplomatically in order not to give offense. The necessity of this qualification will appear throughout this article, and particularly in the second part. More than anything else, he must be a good executive or administrator in order to keep the various parts of the work well balanced and to carry it forward in an effective and progressive manner.

Manifestly there is no department in a railroad for the development and training of these men. There is no officer who has the time or training to select such men and encourage them to take up the work, even if the facilities were at hand to train them. On the other hand, the Y. M. C. A. has a splendid opportunity of locating and bringing out men of this type because of its intimate contact with the best type of Christian youth throughout the country. In addition to this it has two special schools or colleges, one at Chicago, and one at Springfield, Mass., especially devised for the training of secretaries and workers. These schools offer a three-year course, a high school education being required for entrance. Several summer schools are carried on each year in various parts of the country for the continued training and inspiration of those men who have taken places as secretaries or assistant secretaries, or are looking forward to training themselves for these positions. Moreover, because of the large number of railroad associations—251 to be exact—some of them quite large and requiring a force of assistant secretaries, it is possible to try men out and gradually to develop them by first using them as assistants at some important point.

Men who possess the above mentioned requirements and who enter this work, manifestly do not go into it primarily for the financial returns, for secretaryships do not pay as much as men of this type could earn in other fields. Generally speaking, it would appear that the men who become trained secretaries are attracted to the work in much the same way as teachers or religious leaders because of the opportunity of being of service and helping their fellow men. It speaks well for this day and age that so large a proportion of our young men are accepting these calls for service. The success of the work at any one point depends on the personality of the secretary and the degree to which he is able to fill the requirements outlined above. Benjamin McKeen, general manager of the Pennsylvania Lines, has tersely expressed this thought in the following words: "Knowledge of its work impresses one with the character and ability of those directly in charge. To their singleness of purpose and personal sacrifice may be attributed its continuing success." In this same connection Frank Trumbull, chairman of the board of directors of the Chesapeake & Ohio, has expressed himself as follows: "These associations are doing most effective work, and the thing that distinguishes this movement, in my opinion, from the ordinary club house work is that it is well organized. In the second place, the secretaries are men of sacrificial devotion to their work, a thing we cannot buy with money if we go away from the methods of the Y. M. C. A. and put such work simply on a secular basis."

Because the railroads are not in a position to secure, develop and train these men and to supply the means of continued training and inspiration after they have entered the work, it is necessary to depend on the Railroad Y. M. C. A. which is so well fitted to perform this duty. In addition, the general organization of the Railroad Association, with years of experience and a thorough knowledge of the work in all its details, is especially fitted to supervise and direct the work in a broad way, although it should be emphatically understood that the railroads must do their part in backing up and checking the work and in seeing that it is carried on efficiently and economically.

If one is at all skeptical as to whether the Railroad Y. M. C. A. is successful in finding and training the right kind of secretaries, a visit to a number of the institutions will dissipate the idea. If a secretary lacks somewhat in some of the qualifications, the traveling secretary is apt to discover the deficiency and focuses his attention upon it. Often it is possible to upbuild and develop men, thus overcoming their peculiar weaknesses, or it may be possible to supply an assistant to protect the weak point. If a mistake in judgment is made in placing a secretary, it does not take long to find it out and he is soon placed elsewhere, or if he is totally unfit is eliminated from the service.

As suggested by Mr. Trumbull, in the extract above quoted, another prime factor in the success of the Railroad Y. M. C. A. is in its organization. W. J. Cunningham, professor of transportation at Harvard University and president's assistant on the Boston & Maine, covered this point quite fully in an article on "Elements of Strength in the Railroad Association," which appeared in the first number of the Railroad Association Magazine, November 15, 1911. The following extract is taken from that article:

"The organization, in which the men themselves have a direct part, is designed to hold the interest of the membership. The board of management, on which every branch of the service may have representation, provides for local autonomy, and prevents the harmful effect of paternalistic government. A comparison of the typical railroad association with rest rooms managed directly by the railroad company will show a marked difference in club spirit, or *esprit de corps*. The former is governed by members (as members, not as employees of contributing companies) through their own board of managers or executive committee, and no member is permitted to forget that it is his association and that his membership fee or any other contribution he may make toward its support is not a tax but a participation in an enterprise of which he is a part. He understands also that the appropriations of the railroad companies are based on business principles; that it is not paternalism but an investment in a project which is known to be mutually advantageous. On the other hand, the company rest room can hardly be regarded in any other light than a company institution, and it would be unnatural for the men to take as much interest in it as in an association in which they are a vital part."

So much for the reasons why the railroads find it wise to go outside of their own organizations for assistance in carrying on this work. In the second part of this article, which will appear in an early issue, a more direct answer will be given to the question, "Is the Railroad Y. M. C. A. Really Worth While?" by showing the practical benefits which have followed its introduction on different roads.

Commodity Rates to the Pacific Coast Terminals

Railroads Granted Additional Fourth Section Relief as to Rates on Commodities Also Moving by Panama Canal

The following is an abstract of the decision of the Interstate Commerce Commission given in 32 I. C. C., 611, bearing the above title and dealing with applications for relief under the fourth section with respect to commodity rates from points of origin east of the Missouri river to Pacific coast terminals and intermediate points. The case deals with a large number of commodities which move to a large extent by water and upon which the present rail rates to the Pacific coast terminals are already quite low. The carriers by rail desire further to decrease these rates so that they may continue to compete for this traffic with the carriers by water now using the Panama Canal, and find that to do so they will need further relief from the requirements of the fourth section if they are not to suffer serious loss of revenue on shipments to intermediate points. In the abstract the language of the commission has been retained insofar as possible.

The commission in Fourth Section, Order 124, dated June 2, 1911, refused to permit the carriers to maintain lower commodity rates from points west of the Missouri river to the Pacific coast than to intermediate points, but authorized higher rates to intermediate points than to the coast on traffic originating in territory contiguous to Chicago (zone 1), other territory west of the Buffalo-Pittsburgh line (zone 3), and territory east of that line (zone 4), by 7, 15 and 25 per cent, respectively.

Appeal was taken to the Commerce Court from this decision, and on November 9, 1911, that court set aside the order. The United States Supreme Court, however, in the *Intermountain Rate Cases*, 234 U. S., 476, decided June 22, 1914, upheld the commission. Last July [as noted in the *Railway Age Gazette* of July 24, 1914], at the request of the carriers and to give them time to compile rates conforming with its order, the commission extended the effective date of that order from June 2, 1911, to October 1, 1914 [the order having been held in abeyance pending the court decision], except as to the rates on the commodities in schedule C, concerning which the order was extended to January 1, 1915. Upon the commodities in this schedule the rail carriers need additional relief to enable them to compete with the carriers by water.

Schedule C is a list of 107 commodities, covering generally manufactured articles subject to the most severe water competition and on which the rates to the coast are less than $1 c. l. and $2 l. c. l. The schedule embraces such articles as sulphate of ammonia, chloride of calcium, carbide of calcium, canned fruit, figs, corn, meat, mince-meat, tomatoes, etc.; green coffee, cotton piece goods, hardware and tools, pig iron, structural iron, iron fence, iron posts, iron wires, wire fencing, paint, paper, rice, radiators, sectional boilers, etc.; pig and flat tin and insulated copper wire. The entire list of the commodities named in the schedule, the rates now applicable and the proposed rates are shown in an appendix to the report.

The proposed rates to the north Pacific coast on these items are usually, but not invariably the same as to the California terminals. The railroads assert, with truth:

That the commodities included originate in large volume on the Atlantic seaboard.

That as a whole they are adapted to water transportation and in fact move in considerable quantity from the Atlantic seaboard to the Pacific coast by water.

That the rates by water on them are extremely low and necessitate correspondingly low rates by rail.

That the low rates so imposed from the eastern seaboard to the Pacific coast necessitate correspondingly low rates from the Buffalo, Detroit, Chicago, St. Louis and Missouri river territories (a) so as to permit rail movement from these points to the Pacific coast in competition with the same or similar commodities moving from the Atlantic seaboard; (b) in order to comply with the fourth section—

That since the opening of the Panama Canal the water carriers have materially reduced their rates, shortened the time for transportation, increased the frequency of their sailings and materially added both to their tonnage capacity and to the actual tonnage obtained.

It may be remarked at the outset that the request for additional relief has been withdrawn with respect to 27 of the items which have been transferred to schedules A or B and on which rates are published in accordance with the original order.

It is evident that whatever may have been the degree of competition in the past between the rail and water carriers as to the rates on these articles concerning which additional relief is now sought, we are witnessing the beginning of a new era in transportation between the Atlantic and Pacific coasts. To secure any considerable percentage of this coast-to-coast traffic rates on many commodities must be established by the rail lines materially lower than those now existing.

It has been suggested that the construction of the Panama Canal by the government is indicative of a governmental policy to secure all of this coast-to-coast business for the water lines, and that no adjustment of rates by the rail lines should be permitted which will take away traffic from the ocean carriers which normally might be carried by them. This suggestion, however, loses force under the consideration that the Panama Canal is but one of the agencies of transportation that the government has fostered between the Atlantic and the Pacific. The government has from the beginning of railroad construction in the United States encouraged their construction and operation by private capital and enterprise. Some of these transcontinental lines would not have been built had it not been for the liberality the government extended to them at the time of their construction. As we view it, the Panama Canal is to be one of the agencies of transportation between the East and the West, but not necessarily the sole carrier of the coast-to-coast business. If the railroads are able to make such rates from the Atlantic seaboard to the Pacific coast as will hold to their lines some portion of this traffic with profit to themselves, they should be permitted so to do. The acceptance of this traffic will add something to their net revenues, and to that extent decrease, and not increase, the burden that must be borne by other traffic. It will also give the shippers at the coast points the benefits of an additional and a competitive service.

Few, if any, of the intervening interests are really opposing the petition of these carriers for relief. The intermountain territory, however, is earnestly protesting against the request of the carriers for relief as to the coast rates without adequate provision at the same time for reasonable rates to intermediate intermountain points.

The carriers should be permitted to compete for this long-distance traffic so long as it may be secured at rates which clearly cover the out-of-pocket cost. The lowest proposed rate from Atlantic seaboard territory is 65 cents per 100 lb. on cast and wrought iron pipe in carloads of 40,000 lb. This gives a per car earning of $260, and upon a basis of a 3,200-mile haul yields a car-mile revenue of 8.1 cents and a ton-mile revenue of 4.05 mills. Since the average ton-mile revenue of these carriers is approximately 9 mills, it is probable that a rate which produces 45 per cent as much as the average pays more than the out-of-pocket cost and therefore does not impose a burden upon other traffic. None of the rates proposed appear, therefore, to be open to the charge that they pay less than the out-

of-pocket cost. Many of them are low as applied to the total haul from the Atlantic seaboard, but they are not for that reason low as applied to the haul from the Missouri river. The average haul from the Missouri river territory to the Pacific coast is approximately 1,850 miles. The rate of 65 cents on iron pipe in carloads of 40,000 lb. yields a revenue for this haul of 14 cents per car-mile and a ton-mile revenue of 7 mills. The lowest rate proposed from the Missouri river to the coast is 42 cents per 100 lb. on coal in carloads, carload minimum 60,000 lb. This rate, applied to a haul of 1,850 miles, yields a car-mile revenue of 13.6 cents and a ton-mile revenue of 4.5 mills.

Another relatively low rate from the Missouri river to the coast is that on pig iron, in carloads of 80,000 lb., of 45 cents per 100 lb. On a haul of 1,850 miles this affords a car-mile revenue of 19 cents and a ton-mile revenue of 4.85 mills. Examination of the list of commodities and the proposed rates shows one item, coal, on which a rate of 42 cents is in effect; one item, pig iron, on which a rate of 45 cents is proposed; 19 items on which a 55-cent rate is proposed; three items on which a 60-cent rate is proposed; six items on which a 65-cent rate is proposed; and one item on which a 70-cent rate is proposed. The most important of these items are those on which a rate of 55 cents is proposed. On 14 of these items the rate is based on a carload minimum of 80,000 lb., and of the other five items two are based on a carload minimum of 60,000 lb., one on a minimum of 50,000 lb., and two on a minimum of 40,000 lb. The 55-cent rate and 80,000 lb. minimum yield a loaded car-mile revenue of 23.7 cents and a ton-mile revenue of 5.9 mills for a haul of 1,850 miles, while the 40,000 lb. minimum yields a car-mile revenue of 11.8 cents and a ton-mile revenue of 5.9 mills.

The two main territories of destination involved are described as follows: (1) All that territory lying along these main trunk lines to which rates are made or will be made by combination on the coast terminals. This may be called the back-haul territory. (2) Territory lying east of that just described. The 55-cent rate and carload minimum of 80,000 lb. yield a higher car-mile revenue and a much lower ton-mile revenue than the average returns of any of these lines. Their average load per car varies from 16 tons on the Atchison, Topeka & Santa Fe to 23 tons on the Great Northern. These heavy cars of 80,000 lb. minimum carry at least double the average load on these systems. We are of the opinion that these 55-cent rates and other carload rates yielding a less revenue than 8 mills per ton-mile for the haul from the Missouri river to the Pacific coast may be considered as relatively low. This, however, should not apply to coal or pig iron. We believe that on these commodities the rate should not be considered unduly low for this haul unless yielding a revenue of less than 5 mills per ton-mile. A revenue of 8 mills per ton-mile for a haul of 1,850 miles corresponds with a rate of 75 cents per 100 lb.

No relief will be given as to rates from the Missouri river to the Pacific coast which are 75 cents or more per 100 lb. Upon commodities in this list, other than coal and pig iron, which move to the terminals on rates of less than 75 cents per 100 lb., the rates to the second territory above described should be graded with distance, reaching a maximum near the point where the terminal rate added to the local or proportional rate back meets the rate of 75 cents. Relief from the long-and-short haul rule of the fourth section as to rates from the Missouri river to the Pacific coast terminals will be afforded upon the following commodities in this list: Chloride of calcium; various iron and steel articles; billets, blooms, ingots, etc.; bolts, nuts, washers, etc.; and nails and spikes, etc.; pipe fittings and connections; cast-iron pipe and connections; wrought-iron pipe; pipe, cast iron and cast-iron connections for same; wrought-iron pipe; iron and steel articles; box straps, shingle bands, bailing ties; shoes—horse, mule and oxen; tubing, open seam, n. o. s.; strawboard, n. o. s.; ship and boat spikes; soda ash; tin and terne plate; wire and wire goods; wire, iron, plain, galvanized, etc.; wire rods; zinc (spelter); steel rails; rail fastenings.

If, however, the rate from the Missouri river to the Pacific coast ports upon any commodity covered by the above-described items is hereafter increased so as to equal or exceed 75 cents per 100 lb., such rate must be carried as a maximum to intermediate points. Upon all other schedule C commodities the rates made from Missouri river territory to the Pacific coast terminals should not be exceeded at intermediate points.

Carload commodity rates from points in zones 2, 3 and 4.—Of the articles in the list of commodities 90 per cent are rated in western classification as fourth or fifth class, in carloads, and more than 60 per cent are rated as fifth class, with a lower carload minimum than is here proposed. The differences by which the fifth-class rates from Chicago, Pittsburgh and New York exceed the rates from the Missouri river are 14, 24 and 34 cents, respectively, and the differences by which the fourth-class rates from Chicago, Pittsburgh and New York exceed the rates on the corresponding class from the Missouri river are 17, 29 and 42 cents, respectively. We are dealing here with a set of commodity rates materially lower than the rates on the classes to which these commodities belong, and the differentials to be applied from Chicago, Pittsburgh or New York should bear a reasonable relation to the rates from the Missouri river, having consideration for the additional and total hauls involved.

We are of the opinion that the petitioner's carload rates upon the commodities shown in schedule C, except those covered by the 27 items above referred to, and with the further exceptions of coal and pig iron, should be made from Chicago, Pittsburgh and Atlantic seaboard territories to the intermountain points by adding to the rates on the same commodities from the Missouri river to the same destinations differentials not exceeding 15 cents from Chicago, 25 cents from Pittsburgh and 35 cents from the Atlantic seaboard. The differential of 15 cents from Chicago over the Missouri river permits a ton-mile revenue of 6 mills for the haul of 500 miles from Chicago to Missouri river; 25 cents from Pittsburgh over the Missouri river rate permits a ton-mile revenue of 5 mills for the haul of approximately 1,000 miles from Pittsburgh to the Missouri river; and 35 cents from the Atlantic seaboard over the Missouri river permits a ton-mile revenue of 4.66 mills for the haul of nearly 1,500 miles from New York to the Missouri river. These differentials correspond approximately with the fifth-class differentials, and the rates applied from points in zone 2 should increase from the western to the eastern boundary of that zone, not exceeding at Mississippi river points the fifth-class differential of the Mississippi river over the Missouri river. They should increase from the western toward the eastern boundary of zone 3, not exceeding at the Cincinnati and Detroit points the amounts by which the fifth-class rates from these points exceed the Missouri river fifth-class rates.

Less-than-carload commodity rates.—There are about 50 items in this list on which l. c. commodity rates apply from all eastern defined territories to the Pacific coast. These less-than-carload rates vary from $1.75 to $1 per 100 lb. Eighty-five per cent of the commodities move on rates of from $1.25 to $1.50 per 100 lb. The table of rates quoted by the water lines from the Atlantic seaboard to the Pacific coast shows that the competition of these lines for the less-than-carload business has been and is likely to be just as severe as is the competition on the carload rates. This less-than-carload list is more varied in character than is the carload list, and comprises many articles in all the first three classes and a few in the fourth class. The 75-cent rate used as a minimum on the carload commodities is approximately 60 per cent of the rate on the class to which these commodities belong. These carload rates, however, apply on very large carloads of from 60,000 to 80,000 lb., while the carload minima to which the class rates usually apply are from 30,000 to 40,000 lb. This being the case, a lower rate may properly apply on the higher carload minimum.

We are of opinion that relief should be authorized on all articles rated as first or second class on which the proposed less-than-carload commodity rates from the Missouri river to

the Pacific coast are less than $1.50 per 100 lb., and on all articles rated as third class or lower on which the proposed less-than-carload commodity rates are less than $1.25. Relief will be denied in all other cases.

Less-than-carload commodity rates from Chicago, Pittsburgh and New York.—The differentials by which the rates from these points to intermountain territory exceed the rates from the Missouri river ought not to exceed 25 cents from Chicago, 40 cents from Pittsburgh and 55 cents from the Atlantic seaboard. These are the same differentials as apply on first-class traffic and are taken because the articles shipped are divided about equally among the three higher classes.

Commodity rates to points in territory 1.—This is the so-called back-haul territory just east of the terminals. Rates to many points in it are made by taking the rates to the Pacific coast terminals and adding thereto the local rate from the terminal to destination. The practice of thus making rates to these points had resulted in complaint on the part of the shippers. It is suggested that it would be better if rates to these intermediate points were made by adding to the terminal rate something less than the local rate or by making basing rates to the terminals less than the local rates to such points, to be used in connection with the local rates from the terminals in making through rates from eastern points.

It is believed that if the carriers were to put in effect one or the other of these schemes the policy of liberality to the interior towns would be to their own benefit. It would also result in extending to these towns the full benefits of the increased service by the canal. The commission does not feel that it would be best to make an order as to these rates at this time. The carriers are given 60 days, however, in which to submit a plan for the readjustment of the back-haul rates.

It is not considered necessary to apply the coast terminal rates to any points except the ports of call on the Pacific coast at which the Atlantic-Pacific steamship lines deliver freight.

ACCIDENT BULLETIN NO. 52

The Interstate Commerce Commission has issued Accident Bulletin No. 52, containing the record of railway accidents in the United States during the quarter ending June 30, 1914; and also the record for the twelve months ending on that day. In the quarterly statement the number of passengers killed in train accidents is given as 5, as compared with 13 in the last preceding quarter, and 21 in the quarter ending June 30, 1913.

From the annual records we copy, instead of the short table, No. 1, which we have usually given with the quarterly report, the larger table, No. 1 *B*, in which casualties to persons are shown more in detail.

Table 1 *B* does not include industrial accidents; adding these, the total number of persons killed during the year was 10,302, and of injured 192,622, as shown in the following table:

Casualties, Year Ending June 30, 1914

	Killed	Injured	Killed	Injured
Total of Table 1B	...	...	9,893	79,388
Industrial accidents to employees—				
Working on tracks or bridges	154	26,941		
At stations, freight houses, etc	70	26,126		
In and around shops	101	53,051		
On boats and wharves	22	1,788		
At other places	62	5,368		
			409	113,274
Total			10,302	192,662

In all of the items for 1914, except "other persons," not trespassing, there is a considerable decrease from the record of the year last preceding, as appears from table No. 1 *C*.

Annual table No. 2, showing the number of collisions and derailments, classified according to causes, etc., is given below.

Annual Table No. 1c—Comparisons with 1913 and 1912

Item	1914 Killed	1914 Inj'd	1913 Killed	1913 Inj'd	1912 Killed	1912 Inj'd
Passengers:						
In train accidents	85	7,001	181	8,662	139	9,391
Other causes	180	8,120	222	7,877	179	6,995
Total	265	15,121	403	16,539	318	16,386
Employees on duty:						
In train accidents	452	4,823	557	6,905	596	7,098
In coupling accidents	171	2,692	195	3,360	192	3,234
Overhead obstructions	89	1,490	94	1,835	77	1,523
Falling from cars	497	14,563	560	16,005	573	13,874
Other causes	1,314	27,273	1,533	28,514	1,482	23,391
Total, employees	2,523	50,841	2,939	56,619	2,920	49,120
Total, pass. and emp.	2,788	65,962	3,342	73,158	3,238	65,506
Employees not on duty	327	1,097	362	1,178	315	959
Other persons, not trespassing:						
In train accidents	9	148	9	110	13	277
Other causes	1,298	5,827	1,279	5,932	1,185	4,746
Total	1,307	5,975	1,288	6,042	1,198	5,023
Trespassers:						
In train accidents	75	178	90	174	91	151
Other causes	5,396	6,176	5,468	6,136	5,343	5,536
Total	5,471	6,354	5,558	6,310	5,434	5,687
Total, Table 1a	9,893	79,388	10,550	86,688	10,185	77,175
Industrial accidents	409	113,274	414	113,620	400	92,363
Grand total	10,302	192,662	10,964	200,308	10,585	169,538

The bulletin gives the usual tables classifying personal casualties in great detail, including two tables in which passenger trainmen are separated from freight trainmen; but the statement showing the number of employees in service, and the ratio thereto of certain classes of killed and injured, which appeared in the last annual bulletin (*Railway Age Gazette*, March 6, 1914, page 468) does not appear in the present bulletin. A table on

TABLE NO. 2—COLLISIONS AND DERAILMENTS, YEARS ENDING JUNE 30

Classes.	1914 Number.	1914 Number of persons— Killed.	1914 Injured.	1914 Damage to road and equipment and cost of clearing wrecks.	1913 Number.	1913 Number of persons— Killed.	1913 Injured.	1913 Damage to road and equipment and cost of clearing wrecks.	1912 Number.	1912 Number of persons— Killed.	1912 Injured.	1912 Damage to road and equipment and cost of clearing wrecks.
Collisions:												
Rear	815	80	1,671	$988,388	1,143	183	2,251	$1,380,064	1,142	117	2,019	$1,292,885
Butting	484	100	1,066	817,518	682	157	2,921	1,266,415	704	157	3,136	1,314,292
Trains separating	397	8	94	175,499	474	5	194	204,702	353	4	138	144,495
Miscellaneous	3,545	99	2,145	1,793,874	4,178	112	2,665	1,917,591	3,284	100	2,656	1,578,594
Total	5,241	287	5,876	3,775,279	6,477	457	8,031	4,768,772	5,483	378	7,949	4,330,206
Derailments due to—												
Defects of roadway	1,888	66	1,987	1,516,343	1,959	70	2,230	1,553,929	1,877	102	2,766	1,541,460
Defects of equipment	*4,186	50	1,074	3,358,088	4,366	49	1,245	3,421,037	3,847	68	1,197	3,165,033
Negligence of trainmen, signalmen, etc	426	19	461	314,065	515	23	452	306,163	423	18	548	238,589
Unforeseen obstruction of track, etc	318	52	439	410,268	369	79	791	986,104	412	61	595	478,675
Malicious obstruction of track, etc	58	14	155	87,985	82	8	131	74,046	73	16	378	109,614
Miscellaneous causes	1,689	117	1,445	1,503,153	1,778	105	1,685	1,909,163	1,581	129	1,663	1,664,081
Total	8,565	318	5,561	7,189,902	9,049	334	6,534	8,250,442	8,215	394	7,147	7,197,252
Total collisions and derailments	13,806	605	11,437	10,965,181	15,526	791	14,565	13,049,214	13,698	772	15,096	11,527,458

ANNUAL TABLE No. 1B—CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS—YEAR ENDED JUNE 30, 1914

Causes	Passengers		Passengers on freight trains		Persons carried under agreement		Total		Trainmen		Trainmen in yards		Yard trainmen		Switch and crossing tenders, etc.		Trackmen and bridgemen		Other employees		Total employees on duty		Employees not on duty		Other persons not trespassing		Trespassers		Total persons	
	Killed	Inj'd	Kil'd	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd
Train accidents																												
Collisions	31	3,016	1	103	6	307	38	3,426	128	1,031	29	445	46	435	1	8	14	159	6	172	224	2,250	2	74	7	87	16	39	287	5,876
Derailments	40	2,941	2	279	4	292	46	3,512	159	1,221	9	107	20	213	...	4	15	137	8	138	211	1,820	3	38	2	56	56	135	318	5,561
Misc. train accidents	...	36	...	4	1	23	1	63	1	89	...	12	2	14	...	1	...	3	2	5	6	123	...	1	...	4	2	4	9	195
Bursting of boilers, etc.	...	...	...	...	...	...	...	...	8	380	1	97	...	125	...	2	...	3	2	23	11	630	...	4	...	1	1	...	12	635
Total train accidents	71	5,993	3	386	11	622	85	7,001	296	2,721	39	661	68	787	1	14	30	302	18	338	452	4,823	5	117	9	148	75	178	626	12,267
Other than train accidents																												
Accidents to roadway	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	8	...	1	...	10	...	...	...	2	3	...	3	12
Coupling or uncoupling cars	...	...	...	...	...	...	...	...	46	665	45	457	72	1,516	...	2	...	3	8	49	171	2,692	...	2	...	...	...	...	171	2,694
Other work about trains, etc.	...	...	...	...	...	...	...	...	41	12,077	24	4,465	42	6,645	...	74	...	...	...	4	107	23,265	...	...	...	...	...	...	107	23,265
Coming in contact with overhead bridges, etc.	4	21	...	2	1	6	5	29	51	605	12	276	18	562	...	2	...	4	8	41	89	1,490	3	5	1	2	46	100	144	1,626
Falling from cars or engines	35	268	3	11	9	38	48	317	156	2,023	54	1,206	130	2,520	...	15	27	92	17	209	384	6,065	16	44	12	94	438	621	898	7,141
Getting on or off	65	2,660	3	88	1	40	69	2,788	30	2,994	15	1,653	31	3,282	2	48	16	155	19	366	113	8,498	38	326	9	140	590	1,990	819	13,742
Other accidents on or around trains	3	337	...	358	4	508	7	4,103	...	5	...	2	...	8	3	115	14	600	35	1,154	52	1,884	2	204	17	837	47	426	125	7,454
Being struck or run over at stations or yards	37	119	...	1	4	13	41	133	43	90	69	189	112	347	59	103	165	318	213	435	661	1,482	130	125	106	291	1,238	1,245	2,176	3,276
Being struck or run over at highway crossings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11	15	1,014	2,801	122	119	1,147	2,935
Being struck or run over at other places	4	1	...	...	2	1	6	2	71	68	...	...	5	3	48	19	285	272	62	70	471	432	113	59	78	98	2,796	1,351	3,464	1,942
Other causes	3	741	...	1	1	6	4	748	4	33	2	25	1	32	3	40	3	13	10	57	23	200	9	200	61	1,562	116	324	213	3,034
Total, last 11 items	152	7,047	6	461	22	612	180	8,120	442	18,560	221	8,273	411	14,916	115	418	510	1,465	372	2,386	2,071	46,018	322	980	1,298	5,827	5,396	6,176	9,267	67,121
Grand total	223	13,040	9	847	33	1,234	265	15,121	738	21,281	260	8,934	479	15,703	116	432	540	1,767	390	2,724	2,523	50,841	327	1,097	1,307	5,975	5,471	6,354	9,893	79,388

page 36 gives the total number of accidents each year during the last 13 years, with the number of persons killed, the number injured, and the damage to road and equipment.

Thirty-seven pages of this bulletin are filled with the usual reports of accidents investigated by the agents of the commission since the last preceding quarterly bulletin. These accidents were as follows:

Georgia So. & Florida	Cordele, Ga.	Jan. 9 Derailment
Wabash	Attica, Ind.	Apr. 5 Derailment
Baltimore & Ohio	Wheeling Jn, Pa.	Apr. 10 Butting collision
Toledo & Ohio C.	Mansfield, Ohio	Apr. 21 Rear collision
Seaboard Air Line	Norfolk, Va.	Apr. 27 Rear collision
Atlantic Coast Line	Palmer, Ga.	May 14 Rear collision
Chicago & N. W.	Crystal Lake, Ill.	May 17 Butting collision
Northern Alabama	Hayes Mine, Ala.	May 19 Rear collision
M. K. & T. of Texas	West Point, Tex.	May 27 Derailment
Baltimore & Ohio	Cook's Mills, Pa.	May 31 Derailment
Colorado & So.	South Park Jn, Colo.	June 1 Butting collision
Hocking Valley	Sagrado, Cal.	June 12 Butting collision
Southern	Sadler, N. C.	June 14 Derailment
Southern Pacific	Conley, Cal.	June 15 Derailment
L. & N.	Moore's, Ky.	June 28 Derailment

All of the accidents investigated during the year are summarized and indexed in a table filling six pages.

Electric railways reporting to the commission (not included in the foregoing statistics) had 551 persons killed during the year and 6,108 injured; and there were 154 collisions and 78 derailments. Train accidents are charged with 28 fatalities. The total number of passengers killed from all causes was 58, and of employees 77 (28 in industrial accidents). The number of trespassers struck or run over by cars was 269; 161 killed and 108 injured.

COMBINATIONS IN RESTRAINT OF LEGISLATION

[From the New York Times]

Thirteen Eastern railways publicly announce a combination against full-crew laws. Fourteen Western railways presented to the Governor of Illinois a petition for the repeal of the two-cent fare law. In Oregon the farmers are leading in a protest against the full-crew law. In Missouri 112 members of the legislature have presented petitions signed by constituents urging an increase in passenger rates to 2½ cents a mile.

Through all these and many other signs of the new temper regarding the railways run two characteristics—first, the legislatures are untrue representatives of the people; and, second, the new friends of the railways are such for their own interests. It is because of tardy appreciation of the fact that the interests of the railways are the interests of the people that there are so many new protectors of the railways.

In this state the full-crew law was the work of a discredited administration, false to its trust in this and other respects. . . . The thirteen conspirators in the appeal from the oppressions of the legislatures of Pennsylvania and New Jersey propose to "submit the question directly to the public, that the people may determine what is just, right and fair." There was a time when the railways would not have dared to do such a thing. The railways have bowed to the laws, have repented their misdeeds and now feel that they have a standing to appeal both from persistence in misjudgement and from persecution in the name of reform.

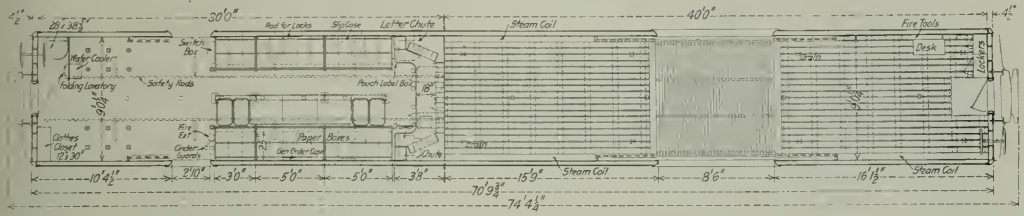
There is pending a Federal full-crew law, and a "long-train" law is proposed in this state which would tend to make two trains do the work of one, and multiply crews accordingly. . . . The present campaign ought to have come before the existing laws were passed, but it comes with added force through the demonstration that the railways are fined to the disadvantage of their patrons under the pretense of "safety first." The true inspiration of such laws is the extortion of money from the railways on whatever pretext. . . . Will the legislatures dare to defend what they dared to pass?

ANATOLIAN RAILWAY.—A message from Constantinople states that the construction of the extension of the Anatolian Railway from Angora to Sivas has been begun.

Jersey Central Steel Baggage and Mail Equipment

The Cars Are 70 Ft. Long, Weigh 144,700 Lb. and Conform to the United States Government Specifications

The Central Railroad of New Jersey has in service seven steel baggage and mail cars having a 30 ft. mail compartment equipped according to the United States Government specifications and a 40 ft. compartment for the transportation of baggage or express. These cars were built by the Harlan & Hollingworth Corporation, Wilmington, Del., are 70 ft. 9¾ in. long over end plates and



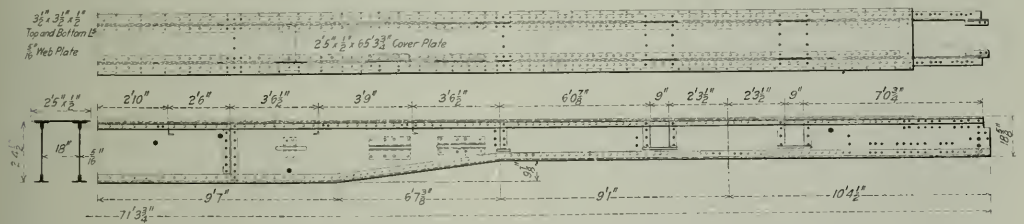
Floor Plan of the Jersey Central Baggage and Mail Cars

weigh 144,700 lb. each. They are mounted on six-wheel trucks equipped with the Commonwealth steel frame, and clasp brakes.

UNDERFRAMES

The center girder, which is the main member of the underframe, is of the fishbelly type, built up of steel plates and angles.

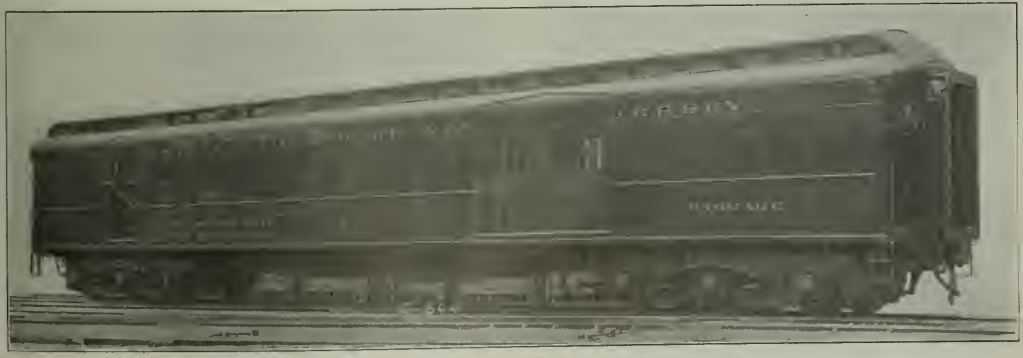
The two center crossbearers are placed 5 ft. 4 in. on either side of the center of the car, and are built up of diaphragms pressed from 5/16 in. plate, which are the full depth of the center sills at the inner end, while the lower flange tapers upward toward the outside of the car till a depth of 6⅛ in. is reached. A 5/16 in. pressed filler is also used between the webs



Center Sill Construction of the Baggage and Mail Cars

The two web plates are 2 ft. 4 in. deep at the center of the car, and are spaced 18 in. apart; this depth is maintained for 9 ft. 7 in. on either side of the center of the car, at which point the web plates begin to taper, and at a point 6 ft. 7⅜ in. farther on they reach a depth of 18⅛ in., which is maintained to the end of the

of the center sills, and the crossbearers are finally reinforced by a 6 in. by ⅜ in. cover plate at the bottom and a 9 in. by ⅜ in. cover plate at the top, both extending across the car. The two intermediate crossbearers are spaced 16 ft. 2 in. on either side of the center of the car and the diaphragms, which are 14 in.



Steel Baggage and Mail Car in Service on the Central Railroad of New Jersey

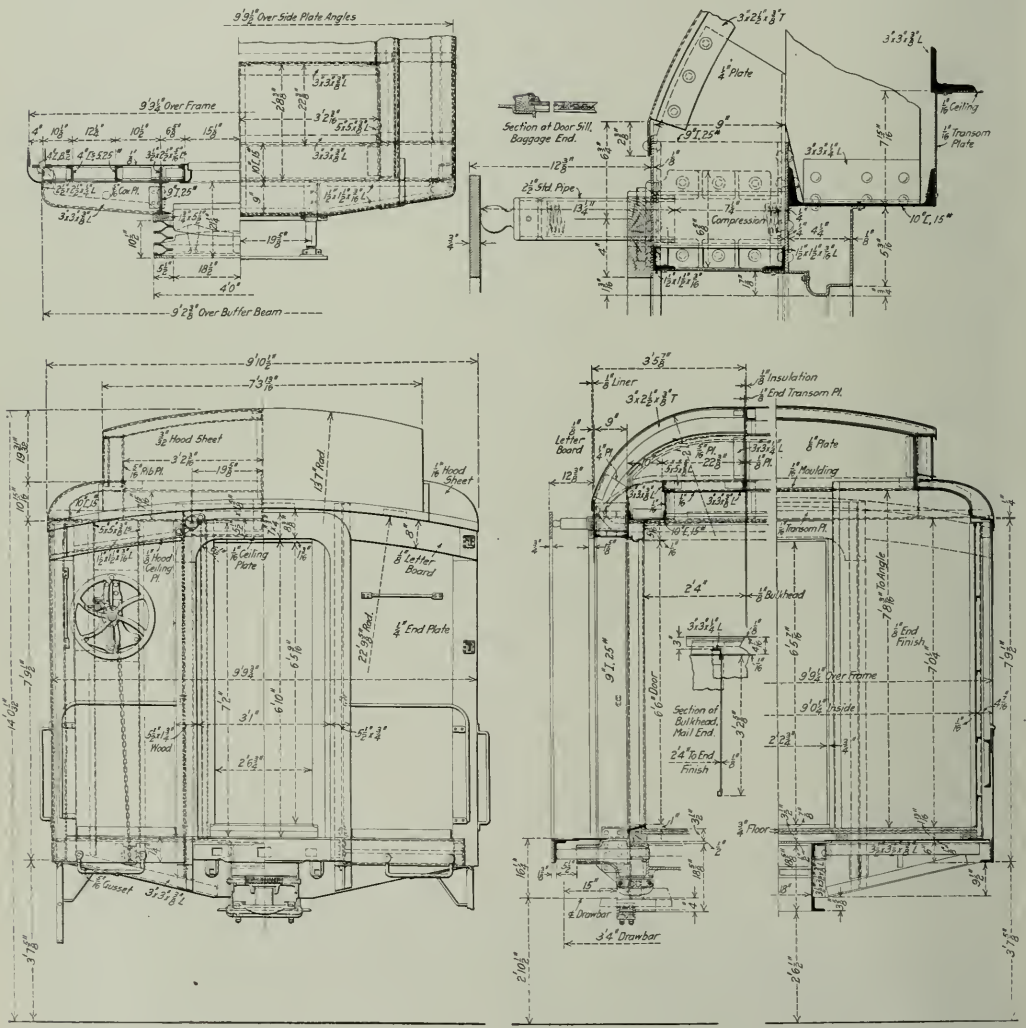
deep at the inner end and 6⅛ in. deep at the outer end, are pressed from 5/16 in. plate with a 5/16 in. pressed filler between the webs of the center sills. A top cover plate 9 in. by ⅜ in. is used on the intermediate crossbearers as well as a 6 in. by ⅜ in. bottom cover plate, both extending the full width of the car.

The double body bolsters are spaced 50 ft. 6¾ in. between centers and consist of two members whose centers are 2 ft. 8 in. on either side of the center of the center plate. These members

ties or floor supports consisting of 6 in., 8 lb. channels are used, and extend between the center and side sills. The side sills are 6 in. by 3½ in. by 7/16 in. angles and extend the full length of the car.

END CONSTRUCTION

The end construction is of the dummy type. The corner post of the car is a 4 in. by 3½ in. by ⅜ in. angle to which is riveted a 4 in., 8.2 lb. Z-bar, and a 2½ in. by 2½ in. by ¼ in. angle is also riveted to this Z-bar as shown in the drawing of the end



End Construction of the Steel Baggage and Mail Cars

are built up of four diaphragms pressed from 5/16 in. plate with 5/16 in. pressed fillers between the webs of the center sills; a 20 in. by ½ in. top cover plate is used and a 16½ in. by ½ in. bottom cover plate, both extending the width of the car and riveted to the pressed diaphragms and fillers. Steel castings of special section are riveted to the two cross members of the body bolster at points 3 ft. 10 in. on either side of the longitudinal center line of the car and support the body side bearings. Cross

construction. A 4 in., 5.25 lb. channel is placed with the flanges toward the outside of the car and the back 10⅛ in. nearer the center of the car than the inside of the web of the Z-bar, and another channel of the same size and weight is placed 12¼ in. nearer the center of the car with the flanges turned inward. At a distance 10½ in. farther in from the back of the inside channel two 3½ in. by 2½ in. by 5/16 in. angles are placed with the long flanges riveted together and the short flanges turned out-

ward at the end of the car. A 4 in., 5.25 lb. channel with the flanges toward the outside of the car and its back placed 6⅝ in. beyond the center of these two angles forms the door post. The main vertical buffing members are 9 in., 25 lb. I-beams, and are riveted to the two connected angles referred to above. An end buffing sill construction of 3 in. by 3 in. by ⅜ in. angles and 5/16 in. plate extends between this I-beam and the corner of the car. The end members are connected at the top by a 10 in., 15 lb. channel, extending across the car with the flanges turned upward.

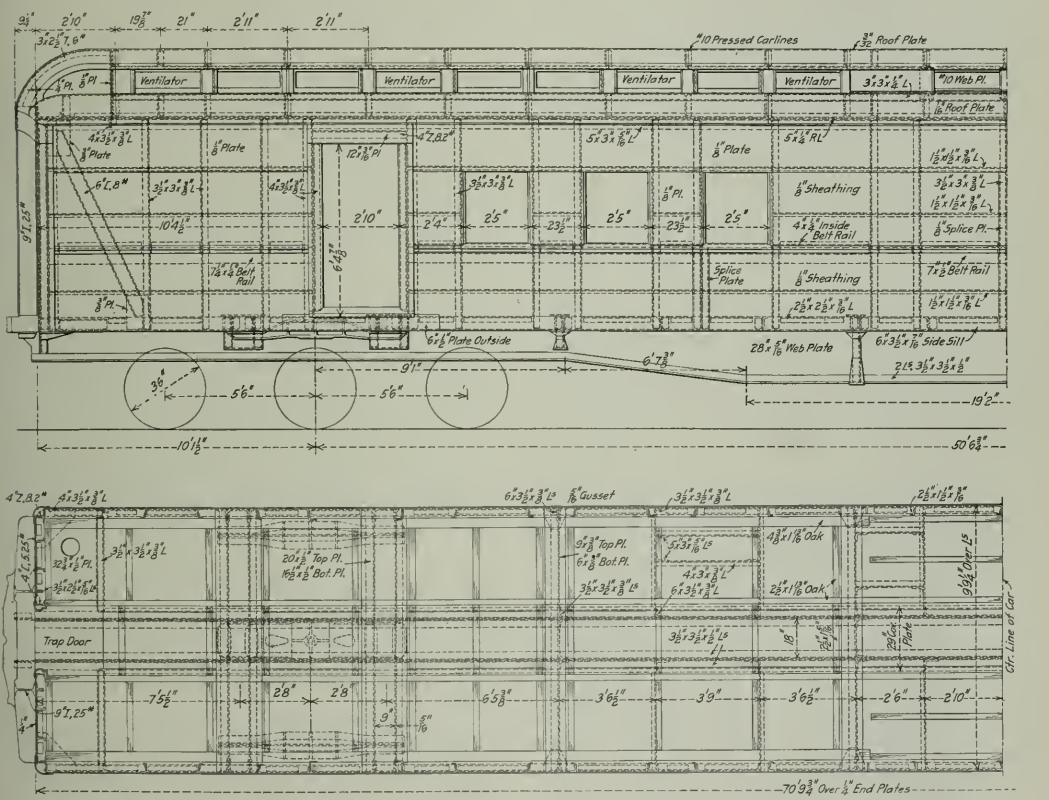
BODY FRAMING

The baggage doors have an opening 8 ft. 6 in. wide by 6 ft. 2⅛ in. in height, while the side doors in the mail end of the car are 2 ft. 10 in. wide and the same height as the side doors in the baggage compartment. There are 6 in., 8 lb. channel diagonal braces used between the top of the corner posts and the bottom of the first side post on either side of the car as well as between the top of the door post and the bottom of the side posts next adjoining. The belt rail is 7 in. by ¼ in. plate from the door posts to the corners of the car and 7 in. by ½ in. plate between the doors; and the side posts are 3½ in. by 3 in., by ⅜ in. angles; the side sheathing is ⅛ in. plate. The side door posts are 4 in. by 3 in. by 5/16 in. angles connected at the top by 4 in., 8.2 lb. Z-bars. The side plate is a 5 in. by 3 in. by 5/16 in. angle, to the upper flange of which is riveted a 5 in. by ¼ in. plate with a 2½ in. by 2½ in. by ¼ in. angle above this. The deck sill is a 3 in. by 3 in. by ¼ in. angle, and the carlines are pressed from No. 10 steel plate. The lower deck roof plates are 1/16 in. thick and the upper deck plates are 3/32 in. thick.

OTHER DETAILS

The trucks are of the six-wheel type, have clasp brakes and are fitted with the Commonwealth cast steel frame, which is 15 ft. 6 in. long over all. The truck wheelbase is 11 ft. and the journals are 5½ in. by 10 in. M. C. B. standard. The wheels are Midvale solid steel and are 36 in. in diameter.

The floor in the mail compartment is of ⅛ in. steel plate with 3-ply Salamander insulation and double wood floors, the bottom floor being ¾ in. yellow pine, while the top floor is ¾ in. maple, 1/16 in. insulating paper being placed between the two layers. In the baggage end the floor is of Flexolith composition laid on Keystone metal with ⅛ in. floor plates and covered with yellow pine grating. There is an oak flooring at the doorway laid cross-



Arrangement of the Members of the Body Frame and Underframing

wise of the car. The inner side of all the outside plates throughout the car is lined with 3-ply Salamander insulation, while the outer side of all the inside plates in the mail compartment is insulated with the same material, excepting the ceiling plates, which are insulated by Agasote strips between the plates and the carlines. There is no insulation on the inside finish in the baggage compartment. The mail compartment is sheathed on the inside with 1/16 in. steel plates on the sides and No. 16 gage plates on the upper ceiling. The lower ceiling is covered with No. 20 gage plate, while the ends are sheathed with ⅛ in. steel plates. This same arrangement is followed in the baggage compartment.

The special equipment includes Gould couplers, centering devices and friction draft gear; Miner friction buffing gear; Ajax vestibule diaphragms; Standard Heat & Ventilation Company's vapor system of heating; Safety Car Heating & Lighting Com-

pany's axle light equipment and lighting fixtures; Edison storage batteries; Adams & Westlake Company's folding lavatory; Westinghouse air brake and signal system; American slack adjusters; Ward ventilators and Gould journal boxes.

REPORT ON GRAY-THURBER TRAIN CONTROL SYSTEM

The report of H. W. Belnap, chief of the division of safety, of the Interstate Commerce Commission,* was sent by the commission to Congress, on January 9, as a supplement to its annual report; and as printed by Congress it includes a report, filling 30 pages, together with a number of illustrations, giving the conclusions of the division of safety on the Gray-Thurber automatic train control system, which was subjected to a series of tests on the Pennsylvania Lines West of Pittsburgh, in April, May and June, 1914. This apparatus was first tried in 1905, but was taken out; and experiments were resumed in 1911. In 1912 the Block Signal and Train Control Board made some tests, which were continued by the present engineers of the commission, after the abolition of the board. A report was made in July, 1913, but changes were made in the apparatus and then the work was gone over again. The present report is in some respects conditional, and the proprietors have proposed a number of further changes, which are noted at the end of the report.

This is an electrically operated system, the principal distinctive feature being the insulation of a truck of the tender from the frame of the locomotive; this for the purpose of regulating the conveyance of electric signals from the roadside to apparatus on the engine by means of wires connected to the rails. At each signaling point there is a short section—66 ft.—insulated at both its ends. The insulated track section is sufficiently long to permit the engine, exclusive of the tender, to stand between the insulated joints.

The insulation between the tender and its truck is made of two sheets of fiber, with a metal detector plate between them, the plate being included in an electric circuit so that broken-down insulation will de-energize a relay on the engine, and thus provide against false-clear signals. The side-bearing plates, the brake hangers, and the rear drawbar of the tender are also insulated, and all the bolts are included in the detector circuit. There is an insulator in the brake rod and also in the uncoupling chain at the rear of the tender. There are two sets of circuits on the engine, with a storage battery for each. On the roadside there is the usual track battery and a detector battery, the latter being used to energize a polarized relay. A Boyer speed indicator is used to make the apparatus inoperative at a certain predetermined low speed. The proper performance of certain functions in the apparatus depends on having the circuit of the track battery always of one polarity.

Following are the conclusions of the report:

CONCLUSIONS

I. The system as installed and tested constitutes a material improvement as compared with other arrangements of the same system previously tested.

II. With the installation of this system the following features must be provided:

1. All insulated joints, except the opposite insulated joints required at the entrance to each block section, must be staggered a distance equal to the longest distance between front tender wheels and rear locomotive wheels of all locomotives equipped; all other rail joints must be properly bonded.

2. Means must be provided to insure that track batteries will not oppose the detector batteries, and that the battery in the primary engine circuit will always oppose the detector batteries.

III. The system is deficient in the following respects:

1. The use of sand in starting trains will cause undesirable stops or "safe failures" of the system unless the pick-up key is held closed.

2. False-clear failures of the system may occur, due to (*a*) a ground on wire S-102; (*b*) bridging the tender drawbar insulation, or an electrical conductor from tender body or frame to car truck or steel car in the train; (*c*) intermittent low resistance ground on short insulated rail section; (*d*) intermittently broken-down insulated joint; (*e*) foreign current in the track rails.

3. Protection against certain dangerous conditions and against failures or defects of apparatus at one point is transmitted to the signal location in the rear; if these conditions arose or failures or defects occurred after an approaching train had passed the entrance to the block section in rear, protection would not be afforded in time to be of any avail.

The tests conducted have resulted in the accumulation of a large amount of data which should be useful in further development of the system. Such further development, however, can not properly be made by means of experimental tests with only one locomotive and but few locations equipped, and covering but a comparatively short period of time. Properly to develop a system of this character to meet all the needs of actual service it should be installed and used for the purpose intended.

Notwithstanding the defects and deficiencies pointed out in this report, the system in its present state of development, if properly installed and maintained as an adjunct to a block-signal system, would increase the safety of train operation.

REVISED APPARATUS

Following the conclusions, Mr. Belnap says:

During the conduct of the tests and since their completion the proprietors of this system have proposed certain revisions in the apparatus employed. None of these revised arrangements has been thoroughly tried out. Briefly, the proposed changes consist essentially of the following:

In order to insure that current from track batteries will always flow in the propert direction to allow the system to provide protection against broken-down insulated joints, all track relays should be polarized. The proprietors also stated that polarized track relays were not employed in this installation for the reason that the railroad company had not used them heretofore in this territory and the understanding when the installation was made was that the existing block-signal system must not be interfered with.

With the installation of this system as an adjunct to an automatic block-signal system, some of the functions performed by relays provided for that particular purpose in the installation tested would be accomplished by utilizing relays of the signal system.

An electro-pneumatic valve, having relay points attached to its armature, has been designed, the purpose being to combine the functions of engine relay, magnet valve, and brake valve in one instrument, and to eliminate one set of engine circuits.

It is intended to locate the speedometer in the box or case on the tender and to include the speedometer frame and metal parts of valves in the detector circuit for the purpose of detecting the grounding of any wire.

The electrical contacts attached to the speedometer are intended to be closed when the rate of speed is between 1 and 15 miles per hour, and at these low speeds the train-control valve is intended to be maintained energized through speedometer contacts for the purpose of obviating undesirable stops due to the use of sand.

*Noticed in the *Railway Age Gazette*, January [illegible], page 99.

RAILWAY CONSTRUCTION IN BRAZIL.—The Brazilian Chamber of Deputies has authorized the government of Brazil to contract with the concessionaires of the Paraguayan Northeastern Railway for the prolongation of the lines of that company so that they will connect with those of the Brazilian Railway system. This will mean direct railway communication between Asuncion and Rio de Janeiro.

Value of a Locomotive in Terms of Earning Capacity*

Its Consideration Suggests Possibilities of Improving Present Practice; Importance of Reducing Shop Time

By George S. Goodwin

Mechanical Engineer, Chicago, Rock Island & Pacific, Chicago, Ill.

Consideration of the potential value of locomotives, expressed in terms of average daily earning capacity, suggests several important possibilities for the improvement of general practice, which it is the purpose of this paper to discuss.

For the fiscal year ending June 30, 1913, the total operating revenue from 251,277 miles of railroad was $3,181,177,898, divided as follows:

Freight	$2,203,860,284	69.28 per cent
Passenger	716,174,021	22.51 per cent
Other transportation revenue	224,939,393	7.07 per cent
Total revenue from transportation	$3,144,973,698	.98.86 per cent
Non-transportation revenue	36,204,200	1.14 per cent
Total operating revenue	$3,181,177,898	100.00 per cent

This revenue was produced by the use of 63,198 locomotives having an average tractive effort slightly over 30,000 lb. If it is assumed that 11 per cent of these locomotives are in the shop receiving repairs, 56,246 locomotives are left to earn the above revenue. Dividing the total revenue from transportation by the number of engines gives nearly $56,000 per year, or $153 per day, as the gross earnings of an engine. Applying to this figure the operating ratio, 71.33, we have $44 per day as the net earning power of the locomotives of the United States. This figure includes all locomotives and the net earning power for freight locomotives alone would be somewhat higher than this. This money was earned after the locomotive had paid for repairing the track, the cars and itself.

The most notable thing about these figures is that nearly 99 per cent of the total operating revenue of the railways is received from the operation of trains, for the successful operation of which there are three essentials, namely:

Locomotives to move the trains, which is the subject of this paper.

Equipment to carry the tonnage.

Track on which to move the trains.

No two essentials are of any benefit without the third, and the importance of all three is shown by the fact that for the fiscal year ending June 30, 1913, $544,000,000 was spent for maintenance of equipment and $538,000,000 was spent for maintenance of way.

In order to show the monetary value of a locomotive more clearly, statistics were obtained from 24 of the larger roads in the middle and western states for the fiscal year ending June 30, 1913. The average gross earnings of freight locomotives, excluding 11 per cent in shops, is $189 per day; applying the operating ratio given above for all roads, the net earnings for freight locomotives are $54 per day, as against the $44 already shown for all the roads of the United States. It was found that the average rate per net ton-mile accounted for the fluctuation in the value of a locomotive. A locomotive capable of earning $75 per day on one road may be able to earn only $40 per day on some other road, and this is further affected by the size of the engine, the amount of work for it to do, etc.

The value placed on a locomotive when rented of course varies on different roads, both as to the amount and as to the basis of computation. (Invariably running repairs are taken care of by the borrower, and general repairs by the lender.) Some use the size of cylinder, and others the weight on drivers or total tractive effort in computing this value. The general minimum charge is $10 per day, increasing to from $25 to $40 for the modern engine. Two of the roads from which this information was solicited base the rental on a fixed charge per 1,000 lb. tractive effort, a good average being 50 cents per 1,000 lb. Five roads base their rental charges on the interest and depreciation figured on the value of the locomotive in question. To this is added charges for general repairs, taxes, insurance, and profit on the transaction. An example of this with the profit omitted will show what might be termed "out of pocket" value of a locomotive. The following table shows approximately what this would amount to for different original costs between $10,000 and $30,000 with assumed charges for interest, depreciation, taxes, etc., and repairs. The charges for repairs are based on the assumption that 100 miles represents a day's work for a locomotive.

Rental Per Day, Based on Interest, Depreciation, Taxes, Insurance and Repairs

Original cost	Interest at 5 per cent	Depreciation at 5 per cent	Taxes and insurance at $1.09 per $100	Repairs on basis of 100 miles per day	Total
$10,000	$1.37	$1.37	$0.30	$7	$10.04
15,000	2.06	2.06	0.45	8	12.57
20,000	2.74	2.74	0.60	9	15.08
25,000	3.43	3.43	0.75	10	17.61
30,000	4.11	4.11	0.90	11	20.12

Of the four methods, namely, size of cylinder, weight on drivers, rate per 1,000 lb. tractive effort, and the interest and depreciation method, the last two are more accurate and the third is more simple. One must admit, however, that the last discriminates between the modern, highly efficient engine and the older engine which is less efficient. The modern engine with the latest devices to give more economical performance certainly is worth more than the same size engine built ten or even five years ago.

We have thus developed three measures of the value of a locomotive, viz.: What it can actually earn; what it is worth from an investment standpoint, or what might be termed the "out-of-pocket" value, and what it is usually rented for. We have shown also that 99 per cent of the total operating revenue is produced by these locomotives while moving trains. This brings us to another phase of the problem.

An engine only earns money while it is moving freight, and is unproductive when not working. In order to bring out forcibly the actual miles an engine makes per day, I have taken from the reports of the Interstate Commerce Commission the freight revenue miles for a few roads and from this ascertained the average miles per day the engines on those roads make. These are, of course, approximate, but since all are taken the same way, the results are probably fair to all. To say the least, the results are startling and were it not that the sources of information are unquestionable it would sound very reasonable to argue that an average of 57 miles per day or 4 hours at 14 miles per hour is ridiculous. On the road with which I am connected a study has been made of just how a freight locomotive day is spent. A special form or report,* developed under the direction of N. D. Ballantine, assistant to the second vice-president, which accounts for every movement of the locomotive during the day, was used for this purpose. Reports are made independently by the roundhouse foreman, yardmaster and train conductor, and these are combined with the information regarding the engines in the shop into a single report which is summarized for the month. This report was described in an address by Mr. Ballantine before the Rock Island Railway Club and later printed in the July number of the Rock Island Employes' Magazine. (In comparing the data with other lines great care should be taken to know on just what basis their data is prepared, and unless the information

*An abstract of a paper presented before the Western Railway Club, February 16, 1915.

*See *Railway Age Gazette*, October 27, 1911, and October 25, 1912, for descriptions of these reports.

is developed from a similar record, its accuracy may be open to serious question.) The following is an analysis of these reports for the month of October, 1914:

FREIGHT LOCOMOTIVES

Mechanical Department Care

Roundhouse	6 hr. 49 min.	28.40 per cent
Running repairs	2 hr. 41 min.	11.18 per cent
Classified repairs	3 hr. 27 min.	14.38 per cent
Total mechanical department	12 hr. 57 min.	53.96 per cent

Terminal Detention

Regular schedule	2 hr. 55 min.	
Stock, fruit, vegetables	7 min.	
Superior trains	3 min.	
Insufficient tonnage	20 min.	
Main line obstructed		
Rest for crews	7 min.	
Miscellaneous	14 min.	
Time between call and departure	16 min.	
Total terminal detention	4 hr. 2 min.	16.80 per cent

Time Between Terminals

Actual running time	4 hr. 16 min.	17.78 per cent
Meeting trains	53 min.	(mi. per day 68)
Station work	1 hr. 20 min.	
Track conditions	1 min.	
Sixteen-hour law	1 min.	
Accidents, etc.	1 min.	
Block signals	2 min.	
Engine failures	2 min.	
Car failures	3 min.	
Weather conditions		
Miscellaneous	22 min.	
Total time between terminals	7 hr. 1 min.	29.24 per cent
Total time accounted for	24 hr.	100.00 per cent

This brings out clearly the following points:

An engine is in the hands of the mechanical department being made ready to move tonnage	12 hr. 57 min.	53.9 per cent
An engine is in the hands of the transportation department ready to move tonnage	6 hr. 47 min.	28.3 per cent
An engine is actually moving tonnage and therefore earning money, only	4 hr. 16 min.	17.8 per cent

This brings us to the third division of the paper, viz.: What can be done to make the engine more available for handling tonnage? This same thought is very aptly stated by George R. Henderson, quoted in Bulletin No. 60 of the Baldwin Locomotive Works. Mr. Henderson believes in "wearing out the locomotives as fast as possible, not by improper treatment or careless maintenance, but by the legitimate work of hauling trains. The faster they can be worn out the sooner they will be replaced with modern engines, and the strides made in power and type of locomotives in the past few years have been such that an engine only 10 years old is of comparatively little use, except for branch service."

In the example of the distribution of a locomotive day the roundhouse is charged with 6 hr. 49 min., or 28.4 per cent of the day. There are several items in connection with this work in the roundhouse which will suggest opportunities to reduce the time. Improved dump grates, good ash pan designs, properly maintained turntables, and hot water boiler washing systems are all vital factors in reducing the time in the roundhouse. Good inspection is necessary in order to save failures on the road. Inspection pits have been found to be advantageous, especially when engines are to be turned quickly and have not time to be placed on the roundhouse pit. There should be enough men in the roundhouse to do the work needed and the machine shop of the roundhouse equipped with adequate tools.

Running repairs are charged with 2 hr. 41 min., or 11.2 per cent of the day. This item, no doubt, will vary closely with the time an engine has been out of the shop, and with the thought in mind of reducing the running repairs the road with which I am connected has reduced the mileage between shoppings. Changes in design have been instituted with a view to eliminating the running repairs. With the advent of the gas and electric welding outfit it has been possible to make many repairs at a saving in cost and time that heretofore would not have been possible.

All roads have some form of report showing failure of engine parts. On our line this is tabulated under the different detail parts, and a monthly report which shows the nature of the failure and the numbers of the engines making the failures. This is watched closely and when any particular class of engines shows a repeated weakness in any particular detail we study it with a view to correcting the design and overcoming the trouble. After the engine has made its mileage it gets a general overhauling and wherever possible we make our engines pull a train to the point of shopping. If it be assumed that an engine receives general repairs every 18 months and that 60 days is the average time the engine is out of service, that means that 11 per cent of the engines are always in the shop. Sixty days multiplied by $44 equals $2,640, the loss while the engine is in the shop.

Everyone knows there are ups and downs in the traffic movement, and during the slack business when locomotives are not needed to move trains it is obvious that we should put them through the shop, provided, of course, that they are ready for the shop and the shop can take care of them. When an engine is about to go to the shop many railroads, ours among them, make a practice of sending advance notice to the shop of just what material will be needed. On firebox work 30 days' advance notice is desirable, so that the new firebox will be ready to put in as soon as the old one can be cut out.

After the engine reaches the shop what improvement can be made there with a view of cutting down the time in the shop? The first thought is modern shop facilities, and considering that an engine is worth $44 per day, it ought not to be difficult for anyone to show substantial savings by the use of more modern shops. Assume that a shop can turn out 360 engines per year, and that by making certain changes the time per engine could be reduced four days; assume further that for three months of the year there is sufficient business to provide work for these engines just as soon as they are turned out; the saving then will be 90 engines multiplied by four days, or 360 engine days, which at $44 per day equals $15,840. In addition to this, repairs can be made more cheaply in the modern shop and the capacity of the shop is increased in this specific case 6.7 per cent.

When one considers that the average locomotive is worth $44 per day it is a simple problem to calculate what the lack of material means in engine delays. For this reason the mechanical department and the stores department should co-operate with each other with a view to having the necessary material on hand. A great deal of this material for which engines are delayed is of very moderate price, so that no great valuation is involved, and in practically all cases this class of material is common to several engines. Too often the fact seems to be lost sight of, that an engine is worth money, and only the fact is seen that there is so much invested in stock, without regard to whether the equipment can be repaired promptly.

While this paper has dealt particularly with what improvements the mechanical department can make in the engine performance, the study of the locomotive shows a remarkable opportunity for all concerned to aid in its work by co-operation. This includes all departments having anything to do with the movement of trains, or the equipment necessary for the movement of trains.

BUSINESS ON THE BUENOS AIRES SUBWAY.—The Compagnie Générale de Tramways de Buenos Aires, of Brussels, reports, with regard to the first section of the underground railway of the Anglo-Argentine Tramways Company in Buenos Aires, which was opened for traffic in December, 1913, the length being 4.2 miles, that during the first nine months of operation the average receipts, if applied to a whole year, would amount to $138,000 a mile per annum, as compared with $93,600 in Paris, $67,200 in London, and $141,600 in New York. As a consequence of the financial crisis in Argentina the construction of the second underground section has been indefinitely postponed, although the hope is expressed that an extension of time will be granted by the authorities. The European war has reacted unfavorably on Argentina.

Arbitration of Engineers' and Firemen's Demands

Testimony of J. W. Higgins on Schedule Provisions; Work of Firemen and Hostlers; Present Cost of Living

J. W. Higgins, general manager of the Missouri Pacific, was the principal witness last week at the hearing at Chicago before the board of arbitration on the wage demands of the engineers and firemen on the western roads. Mr. Higgins testified in connection with Exhibit 38, outlining the development of the various schedule provisions, to show that many of them were adopted to meet local conditions and practices of years ago which no longer exist, but that the railroads have been unable to get rid of the rules and that now the brotherhoods are seeking to have them applied generally.

For example, he said, "We have a rule on the Missouri Pacific providing that the engineer need not run his engine between the trains and the roundhouse. If he does he gets one hour's pay. This single rule cost the Missouri Pacific $256,696 in 1914, or eight per cent of the total wages paid to engineers and firemen. The rule was brought about in the early days under pioneer conditions when, because of the prevalence of desperadoes and the resulting danger by night to men who had to walk to and from the roundhouse, the hazard was so great that the men secured a provision that someone at the roundhouse would run the engines in and out. The Kansas City roundhouse was in an inconvenient location and the men had to walk across a long bridge to reach it, and they feared to take the risk. All the reasons for the rule have been removed but the men not only insist on its retention but now demand its universal application. The Missouri Pacific has often tried in vain to get relief from this burdensome rule and in the present arbitration cannot secure relief because the brotherhoods have succeeded in limiting it to only their side of the question."

EARLY SCHEDULE PROVISIONS

The exhibit outlined the development of the schedules on the Chicago & North Western, Chicago, Milwaukee & St. Paul, Missouri Pacific-Iron Mountain System and the Northern Pacific. Mr. Higgins said it had been intended to compile an exhibit that would show the growth of schedules on all the railroads involved in the movement, but that it was not possible to do so because of the absence of records on most of the roads. Prior to the eighties, Mr. Higgins said, locomotive engineers were paid by the month, trip or day, without overtime, generally speaking, in the western territory, although in 1877 the Chicago & North Western made an agreement to pay extra time for mileage above 2,600 miles in any one month. In the early schedules rates only were named and there were no compensatory rules. Only miles were considered in the makeup of a day, or trip.

In 1880 on the North Western the rate of pay for engineers in road service for the first six months of service was $2.75 a day; for the second six months $3 a day; for the third six months $3.25, and for the fourth, $3.50; for the third year and thereafter the rate was $3.70. For yard service the rate was $2.75 a day. There was no differential between freight and passenger service or for any difference in the type of engine.

In the first printed schedule of the Missouri Pacific-Iron Mountain system, dated 1885, the basis for a day's work was 100 miles or less, in 12 hours or less, both freight and passenger service, and time began one hour after the man was called. There was an overtime rate of 35 cents an hour, applying after 12 hours of continuous service. Prior to the adoption of this schedule the men had been paid on a straight mileage basis, without relation to the time; then, on account of the number of short runs, it was recognized that even if a man's run was less than 100 miles he should be paid for a day's work, for 12 hours' service or less.

TERMINAL DELAY RULE

The provision for payment for terminal delay was first made in 1892. This rule provided that in case engineers were held on duty more than one hour at terminal points after the time fixed for the departure of their trains or more than 30 minutes after arrival at terminals, they should be paid for such delay at 35 cents an hour, but that such time should not be counted in computing overtime. In case the delay, before leaving exceeded one hour, or after arrival exceeded 30 minutes, payment was to be made for the entire delay based on actual minutes. Mr. Higgins said that although the hostler rule was intended in part to take care of some of the things that the initial and final terminal delay rule took care of, the adoption of the new rule had no effect in relieving the road from the responsibilities of the previous rule. Under the hostler rule, if an engineer takes his engine from the roundhouse to the train, which may often be done in 10 or 15 minutes, he is paid for one hour's time. If, for any reason, the train is delayed an hour he gets another hour's terminal delay, and although he might make 150 miles in the next five hours he would get the arbitrary allowance in addition to the payment for his mileage. The managements at various times have made efforts to get relief from that rule, but have not succeeded. The terminal delay rule was a remedial rule, and provided for a basis of less than the pro rata rate, whereas the demands now under consideration require the full pro rata rate.

On December 1, 1901, rates were classified on a cylinder basis, and a classification based on cylinder dimensions has continued until the present time. The men are now asking for a classification based on weight on drivers. At the same time a differentiation was made in the rates for local and through freight service, and a very material increase was made in the rates. In 1903 there was a further revision of rates and rules which involved a number of increases in rates. The switching service was put on a 10-hour instead of a 12-hour basis, an arbitrary allowance was provided for grades on the line, and a deadheading rule was adopted. A special allowance of one hour for crossing the Eads bridge at St. Louis and two hours for crossing the Merchants' bridge was adopted, so that the men are paid both for the mileage and for the arbitrary allowance. As an illustration Mr. Higgins mentioned the local passenger run between St. Louis, Mo., and Herrin, Ill. A train leaves St. Louis at 4:00 p. m. and arrives at Herrin at 9:35 p. m., in 5 hr. 35 min. The distance is 133 miles, for which the engineers are paid at the rate of $4.40 per hundred miles, or $5.41, and they also are paid for one hour for taking the engine to the train at St. Louis, 44 cents, for a distance of less than one mile; one hour for taking the engine from the train to the side-track at Herrin, which Mr. Higgins said would not take 10 minutes, and one hour for crossing the Eads bridge, a total of $6.73, in spite of the fact that the men are guaranteed a day's pay. Some of the Missouri Pacific's competitors do not have such rules.

The next revision was on November 1, 1905, when a rate was made for Consolidation engines and other special rates were fixed. Another revision was made effective in February, 1907, as the result of the first concerted movement of engineers in the western territory. This was a general upward revision of rates and a number of new rules were adopted. Effective December, 1910, as the result of another concerted movement, the rates were again increased about 10 per cent

and a number of additional changes in the rules were made.

To show that many of the rules now in existence were originally created to provide for some special conditions which no longer exist Mr. Higgins said the terminal delay rules were brought about by the fact that men were often delayed for many hours and otherwise would not have been paid for their time; but now such long delays are very infrequent, and the rule is out of place.

"Then if there is no delay," said Mr. Burgess, one of the arbitrators, "it does not cost the company anything even though the rule is in the book, does it?"

"You do not have to delay a man in order to have him claim payment," replied Mr. Higgins. "He arrives at his final track in his final terminal yard, and he can claim the time that is actually necessary to take the engine from there to the roundhouse, under the proposed rule. That is why this proposal cannot be compared with the old remedial rule. I was in the service at the time the original rule for final and initial terminal delay was adopted, and I know that we were often laid out for hours getting into the yard, and that we were called and were delayed for hours sometimes in getting out. Naturally the men felt that there was no need of such slowness, and the officers very readily agreed to put in the rule, but now the men say that the trip does not commence when they get on the engine at the roundhouse. They first must have 30 minutes preparatory time before they get on the engine before they leave, and they must have the actual time necessary—not the delay time but the time necessary—to get from that track to the outer switch of the yards from which they are to leave with the train. There are two special allowances. Then they say the trip commences at the outer switch and ends at the switch of the yard at the final terminal. Then they want another allowance from that yard to the roundhouse, the actual time after they arrive. That is far removed from the thought we had at the time we got the rule."

Another rule adopted to meet a special condition, he said, provides that if an engine fails and is returned to the terminal the engineer may go out on another run inside of five hours and combine the mileage of the two runs; but if he is sent out after five hours he gets a day's pay for the first performance, even if it were only a few miles, and then another day for the second run. This rule was adopted on account of the case of a man who had run four miles and returned with his engine, turning it into the roundhouse and claiming an automatic release and payment for 100 miles. The road held he was not automatically released, and after a great deal of negotiation the present rule was adopted.

Similar testimony was given regarding the development of firemen's schedules. In 1885, the Chicago & North Western was paying $55 a month for firemen in road service and $1.75 a day in yard service. Mr. Higgins also gave the dates on which both engineers and firemen were relieved of various incidental duties in preparing their locomotives for service before going out. He gave data also to show that the enginemen's wage movements usually have resulted in cycles of wage advances to other classes of employees both within and without labor organizations. There are relations between the pay of engineers and all the others, he said, and if they get an advance, a disproportion results until other classes are raised proportionately. Engineers have always received more than other employees and the firemen's pay in recent years is greater in proportion to the engineers' pay than ever before, but the relation of most classes of employees to the engineers has remained practically the same for 20 years.

ENGINEERS PAID MORE THAN OFFICERS

W. L. Park, vice-president of the Illinois Central and one of the arbitrators, asked Mr. Higgins whether, if the matter were left to his judgment as an officer, he would not make these adjustments a little differently, giving some classes a little more and some classes a little less. Mr. Higgins replied that there are a number of positions in the different classes of service that should probably receive more consideration and that if the engineers and firemen had not received such large increases there would have been more money for the others.

"Have you technically educated men, or men in authority over enginemen, who receive less pay than they do?" asked Mr. Park.

"Many of them," replied Mr. Higgins. "We have superintendents of divisions on our road who draw smaller compensation than the engineers to whom they give orders, and roundhouse foremen, master mechanics, train despatchers and other men who have direct supervision over them often receive less than the engineers. There has been a tendency in recent years to get very much out of line in that direction. Conditions have become very much distorted, and it is very detrimental to the railroad service. Many officers, who cannot be members of labor organizations and who must stand wholly on their merits are handling men who not only draw more money than they; and they do not have a grievance committee at their beck and call to defend them when they get into trouble of any kind. I think it is very unfortunate that we have reached that stage in the railroad business. There are many cases where an engineer is eligible for promotion, but refuses to take an official position because he would lose money by it. The management has difficulty in making an equitable adjustment of these matters because if there has been a little money left over it has been taken by the organizations in increased wages about as fast as it has appeared."

Mr. Higgins said that the argument that one road pays higher rates than another in its territory is continually used to bring up the wages on the road that has the lower rates, although different rules on different railroads may result in even greater compensation to the men with the lower rates; and these rules are continued in the schedules in spite of changed conditions, because of the saving clause in arbitration agreements, no matter what the board decides. It had been the intention of the roads in this case, he said, to get before the board some rules of this character with a view to standardization, but the saving clause prevented this, and as a result, any higher rates or more favorable rules that might be awarded would be superimposed on the "high spots" of the present schedules.

Superintendents, he said, receive about $250 a month, and the Missouri Pacific has one engine run which for a 31-day month would pay $328. The engineer, however, works only 20 days, because the other men will not permit him to work the full month. Only two division superintendents on the road receive more than this. The run referred to is a motor car run from Madison, Kan., to Butler, Mo., leaving Madison at 6:30 a. m., arriving at Butler at 11:25 a. m., leaving Butler again at 1:30 p. m. and arriving at Madison at 6:30 p. m. Roundhouse foremen of the Missouri Pacific, he said, receive from $100 to $135 a month; train despatchers from $110 to $150, most of them between $135 and $150, for about nine hours' work; chief despatchers receive $165 to $170 a month, and work from 10 to 16 hours a day; master mechanics receive from $183 to $220, and are responsible and liable to be called upon at all times.

"My position," said Mr. Higgins, in reply to a question by the chairman, "is not that the engineers are getting too much for the work they perform, but that certain engineers, under certain rules, are getting more than they are entitled to; if the rules were standardized and under those rules the same earnings were produced, measuring the service fairly, I would not find fault. But leaving out the question of inequitable rules, the engineers and firemen, considering their responsibilities, are going ahead entirely too fast by comparison with other classes of employees, considering their responsibilities. I am not in favor of a reduction in pay, but the rates are high enough and many rules are inequitable."

Mr. Nagel asked if it would be safe or wise to continue to build upon the basis which has thus far been accepted in fixing rates of pay, considering the power of the engine, as well as the miles and hours. Mr. Higgins, in reply, said that the demand is not only built upon the previous basis, "but proposes to go further and segregate certain time that has always been included in the trip as a whole into arbitrary payments and additions."

On cross-examination Grand Chief Stone of the engineers tried to show that low rates in the early days were in proportion to the size and capacity of the engines in those days. Mr. Higgins thought that the size of the engine was not the governing factor. "I have put in some trips of 140 miles, taking 23 or 24 hours," he said, "and the engine was small, but that was not what was troubling the engineer and me. It was the number of hours. As a conductor on the Illinois Central I once handled a train from Chicago to Kankakee, consisting of 12 loaded cars and 90 empties, with one engine. It was no easier for that engine to haul its capacity than for the bigger engines now to haul their rated tonnage. We received lower rates of pay then and we worked harder and for longer hours."

Mr. Shea, one of the arbitrators, asked if the size of the engine did not have an effect on the revenues of the company. Mr. Higgins thought that the Illinois Central was paying bigger dividends then than it does now. The Missouri Pacific has not paid a dollar in dividends since 1907, he said, but since that time it has increased its payroll by more than $3,000,000 a year. In 1907 and 1910 the increases to engineers on the Missouri Pacific cost $305,000 a year, an increase of 19 per cent. Firemen and hostlers got an increase of $206,000 a year. During the same period conductors and brakemen secured an increase of $530,000 a year, yardmen, $246,000; telegraphers, $214,000, and mechanical and shop forces $573,000. These are all represented by organized labor, but the non-organized men received increases as well. Station agents, section foremen and laborers, bridge carpenters and other non-union employees, received an increase of $444,000 in 1907 and $493,000 more in 1910.

Speaking of the demands for time and a half for overtime, Mr. Higgins said the situation in railroad service is not comparable with that in the industrial field. "The engineer is guaranteed a minimum day," he said, "which the industrial worker is not. The engineer is assured more than a minimum day, without reference to the measure of time, on runs over 100 miles, and often he makes several days' pay in one. The industrial worker has no guarantee of a minimum day and cannot make more than a day's pay without working outside of his regular hours. The industrial employer absolutely controls the overtime, for he can put work off until the next day, and if he does pay overtime he can put the cost into his prices. The railway on the contrary is not so protected; at the end of the 10 hours the engineer in yard service, for instance, may be in the most important work of the day, as making up a train for passengers or perishable freight, which must be completed and may be completed in one or two hours. Under the proposed rules this would be at penalty rates and the only remedy would be elimination of the guaranteed minimum day, making it possible to relieve the regular man and use an extra man who would be paid only for the hours he worked."

THE HOSTLER AND HIS DUTIES

H. Clewer, supervisor of locomotive operation of the Rock Island Lines, continued his testimony before the board on February 9, dwelling principally on the effect of the rule asked by the engineers and firemen requiring the employment of hostlers at certain points, fixing their rates of pay and providing that hostlers shall be recruited from the ranks of the firemen. Mr. Clewer testified that the latter rule would close the avenue of promotion to many men who are giving efficient service, but whose training is different from that of the fireman. He described in detail the work of the hostlers at various points on the Rock Island Lines, showing that the character of the work differs greatly at different points. In many cases there is so little hostling work to do that men who spend most of their time at other work perform this service and many men may qualify for the position of hostler or hostler's helper after a short roundhouse experience, without ever having been firemen. He also said it was a common practice to employ as hostlers men who have been in the engine service but who have become incapacitated.

Vice-President W. L. Park, of the Illinois Central, one of the arbitrators, asked President Carter, of the firemen's brotherhood, if he represented the hostlers by a vote of the hostlers themselves.

"No," replied Mr. Carter, "but we have been petitioned by a number of them to represent them and if every word of our proposition is included in the award of this board it will not disturb any man at any point who is now filling the position of hostler."

"No," said Mr. Park, "but it will close the door hereafter to those men absolutely."

"It might close the door to the man who is coming in on the next ship," said Mr. Carter. "It might say to those people who are coming here after this war is over: 'Hereafter you will have to fire an engine before you can hostle one.'"

Mr. Carter said that, if the railroads will agree, the men who are now helping the hostlers will be included in the next wage movement. He took the position that it is necessary for a man to fire an engine in order to be competent to be a hostler, but he admitted that he would consider that men now employed who have been hostling for some time should be competent. Generally, he said, the men who are working in the pits around roundhouses or wiping are "the latest importations, men who usually cannot speak the language."

"As I understand it," remarked Mr. Byram, "the question of the competency of a hostler is now determined by the railroad company's officers."

"I am sorry to say, yes," said Mr. Carter.

"You do not think the officers of the company are competent to select competent men for these places?"

"I will not say they are not competent, but they would rather have an incompetent man at 17 cents an hour than a competent man at 30 cents an hour."

"But it is your contention," said Mr. Sheean, "that these men now in these positions who have been recruited in the way that you object to, should have their compensation increased?"

"Yes, sir."

"Is it your idea that the men, wherever they are recruited from, will be more efficient by a change in compensation?"

"Invariably so," said Mr. Carter, "because when the railroads have to pay for efficient men they will hire no others. That is, I am sorry to say, the policy of getting the most efficient work out of the men for the money."

Mr. Nagel asked, "Have we not here another case where men are looking around for a pair of suspenders to lift themselves out of a job with?"

OIL-BURNING LOCOMOTIVES AND AUTOMATIC STOKERS

Mr. Clewer also described in detail the operation of an oil-burning locomotive and the duties of a fireman on such a locomotive. "Practically no manual labor is connected with his duties," said Mr. Clewer. "All of his manual work together consumes only about 10 per cent of his time. His principal work is to regulate the atomizer spraying oil into the firebox, and to control the amount of oil by means of the regulator handle. This operation is performed while he is sitting on the seat box. It is necessary occasionally to use sand to clean the soot out of the flues.

A. N. Willsie, chairman of the fuel committee of the Chicago, Burlington & Quincy, explained to the board how the mechanical stoker has lightened the firemen's work on a large number of locomotives. "If a movement of the hand to control the mechanical stoker may be called manual labor," he said, "the fireman is working 20 per cent of the time. The remaining 80 per cent he has nothing to do. If, in a run consuming 20 tons of coal, he scoops one ton by hand it would be excessive. His only duty is to see that there are no holes in the fire and that the

distributors do not become clogged. If a hole appears in the fire, admitting cold air through the grates, he must occasionally put coal on these spots with his scoop, seldom more than one or two scoops of coal. The heavy work and the hot work are almost entirely eliminated. The stoker is better than any two firemen and the engine can be worked to capacity hour after hour, and on some trips only a few hundred pounds of coal need be thrown on by hand."

COST OF LIVING AND WAGES

Ray Vance, an economist of St. Louis, testified on Monday, February 15, in connection with an exhibit comparing increases in the cost of living with increases in wages to the western engineers and firemen, and wages in other skilled occupations. He showed that the increase in pay received by the railway men has been almost double the increase received by bricklayers, carpenters, painters, plasterers and plumbers in the building trades, and machinists and moulders in the metal trades.

"In the western territory," said Mr. Vance, "the average daily pay of enginemen increased 11.3 per cent, and of firemen 11.4 per cent from 1910 to 1913. The average weekly rates in six of the seven trades increased less than 5 per cent and in the other trade, that of painters, only 7 per cent. That is, the pay of western engineers and firemen grew in greater ratio than did that in the seven other skilled trades. Against the increase of 11.3 per cent and 11.4 per cent in the wages of engineers and firemen the average expenditure for food and rent in this western territory increased only 9.3 per cent.

"The annual compensation of bricklayers in the west in 1913 averaged $1,259; carpenters, $1,001; painters, $994; plasterers, $1,268; plumbers, $1,335; machinists, $963, and molders, $979." Against these earnings engineers in passenger service were shown in the month investigated to have earned an average of almost $184 while firemen in the same service earned an average of $115.53.

Mr. Vance went on to show that unemployment in the railway service was far below that in the building trades. "In the building trades," he said, "unemployment in the western territory is 10.1 per cent, while for the 4 classes of railway trainmen it is only 4.3 per cent. In both east and west unemployment in the building trades is from two to three times as high as for the several classes of railway trainmen.

"Although wages in the west generally are higher than in the east, the cost of food, rent, fuel and light, which absorb two-thirds of the annual expenditure of the working man, is slightly less in the west than in the east."

S. E. Cotter, general superintendent of the Wabash, presented a statement by E. B. Pryor, receiver of the Wabash, showing how the proposed rates and rules would affect this road, which, while competing with eastern lines, is forced to pay engineers and firemen the higher western scale of wages as far east as Detroit and Toledo.

"On Mikado type engines," said he, "we have to pay engineers $5.30 and firemen $3.75 a day. Our competitors, one running partly over the same rails as we, pay only $5 and $3.30, though some of them earn over twice as much gross per mile. If the west is raised still further the difficulty will be increased."

Mr. Carter sought to show that the Wabash should pay this higher rate.

"But wasn't your own position in the eastern arbitration," asked Mr. Byram, "that eastern wages should be as high as western?"

"We asked that they equal the western average," replied Mr. Carter.

"Yet if your requests now are granted, the west will be still further above the east?"

"Yes, that is true," replied Mr. Carter.

A. W. Trenholm, general manager of the Chicago, St. Paul, Minneapolis & Omaha, and chairman of the Conference Committee of Managers, took the stand Tuesday and described the effect of each of the enginemen's demands on operating conditions.

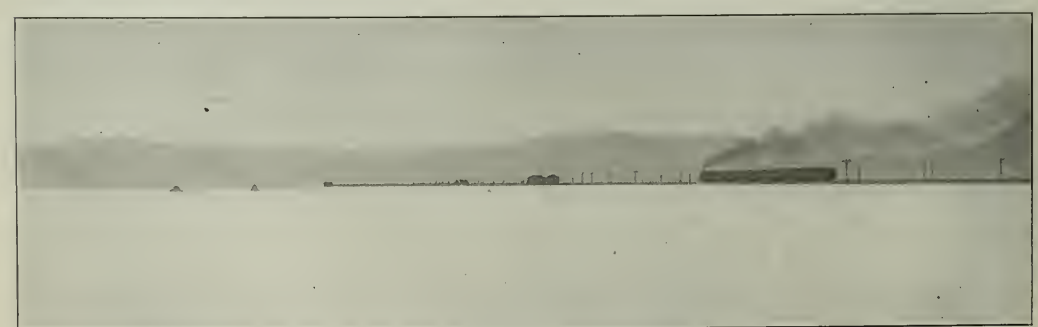
A HIGH SPEED RECORD

Some of the Western plains are intensely uninteresting from the point of view of the tourist in the observation car. This we have on the authority of a passenger-traffic manager who, once on a time, had a sudden accession of candor, and stated the fact in one of his advertisements. But not all Western plains are in this class, and we present herewith a view of one which is of the opposite kind. This is a bed of salt, on the line of the Western Pacific. The picture was taken on the occasion of an automobile speed test. The scene is at Salduro, Utah, 112 miles west of Salt Lake City. The view is looking north. The racing automobiles are seen at the left of the picture. These are not extremely distinct; but the picture is printed more for the purpose of showing the novel landscape.

The automobile run was made by Teddy Tetzlaff on August 12, last, and the best time for one mile was 25.2 seconds, which is equal to 142.85 miles an hour, a trifle better than the best preceding record, which was made on the beach at Daytona, Fla., in April, 1911. This is the highest speed ever traveled by man on the face of the earth.

The best speed ever made by a vehicle running on rails was that recorded in the Berlin-Zossen tests of electric cars, in 1903, when a rate of 130.5 miles an hour was made, on October 27.

The crystallized salt in this Utah bed makes a hard and absolutely level surface, and it is said that even in the hottest weather it does not heat the tires of automobiles. The salt beds are 65 miles long and 8 miles wide. The estimated depth, in the middle, is 12 ft. to 15 ft. The salt is white, and averages 98 per cent pure. Tetzlaff says that with more preparation he can make still better speed. In racing over the salt beds the motorist has an unusual feeling of security because of the entire absence of obstructions



Scene on the Western Pacific at Salduro, Utah

RAILROADS' APPEAL TO NEW JERSEY AND PENNSYLVANIA VOTERS

R. L. O'Donnel, chairman of the special committee of the railroads of Pennsylvania and New Jersey, pursuant to the announcement issued last week, has sent to the newspapers and a large number of individual citizens an eight page pamphlet containing the principal arguments in favor of repealing the extra-crew laws of those states; and he will follow this with another containing editorial expressions from prominent newspapers in different parts of the country. Twenty roads are now members of Mr. O'Donnel's committee. Following are the salient points of the circular:

THE MAIN POINTS

First of all, let it be distinctly understood that the railroads make no war upon their trainmen. This move is not to deprive of a job any man for whom there is real work or a legitimate position. It is made to uphold the larger interests of the whole body of railroad employees, and the far greater interest of the public. For more than three years a full-crew law has been in effect in Pennsylvania and for nearly two years in New Jersey. The avowed objects for which they were enacted have not been realized. They have arbitrarily put on thousands of passenger and freight trains extra men for whose presence there is no need. They have created employment without real service going with it, and have worked violence to economic laws and forced waste into railroad operation. They have added to the expense of railroad operation in Pennsylvania and New Jersey more than $2,000,000 a year. These laws have added a burden to the public which the people are not fairly called upon to stand. They have put organized labor in the false and untenable position of demanding employment by edict of law.

FALSE CLAIMS

It is claimed that they make for safe railroad operation; but the railroad companies, their managers and their security-holders have very direct interest in safety. They stand for safety because humanity demands; also as a plain business proposition. Accidents and wrecks are costly as well as fatal.

Property rights fall secondary to human rights. In that contention the trainmen's organizations which forced through the full-crew laws and which now fight, in error, as we believe, to continue them, stand exactly where we do. The railroads will give ready and hearty support to all measures really protective of the persons and property of all those who use railroad service. But where human rights are properly recognized and safeguarded, it becomes an abuse of property rights, and does violence to economic laws, to force the railroads and so the public to carry the load of thousands of men whose employment the present laws require regardless of necessity.

NO GOOD RESULTS

These laws have not increased safety. They have divided responsibility by forcing extra men into train crews. This works against rather than for safety and efficiency in railroad operation. Statistics and actual results prove that this is the case.

We agree that far too many are killed and injured on the railroads. We also frankly admit that in the past railroads have been too slow in introducing safety devices, partly owing to the costs involved, but largely because of a stupid and stubborn attitude of mind, once too prevalent among railroad managers. In many cases they did what was obviously right, and as results amply demonstrated to the advantage of railroads, their employees and the public, only under compulsion of public opinion and enforcing laws. Railroad managers as a body have reached a more enlightened state of mind. They are ready not only to listen to the public, but to trust the people to decide upon the merits of any proposition in which the public is a third party, where railroad managers find their judgment and conclusions controverted by employees or by laws which work badly and unjustly.

[The committee here quotes statistics showing that there has been no decrease in the number of persons killed and injured since the adoption of these laws, and quotes also the decision of the Connecticut commission (*Railway Age Gazette*, December 18, page 1118) condemning the extra-crew bill proposed in that state.]

NORMAL OPERATION

The railroads intend to man every train—passenger and freight—to the requirements of safety and operating efficiency. Their contention is merely that the right number of men cannot be fixed arbitrarily and without regard to the service to be performed by each train. Under the laws there is no latitude, and operating conditions constantly arise which make it necessary to delay traffic or inconvenience the public, or else violate the law. There is less and less, rather than more work for trainmen. Hand braking is virtually a thing of the past, except in yard shifting. Freight, as well as passenger trains, are now operated with air brakes applied to every car, except in cases of emergency defects. Mechanical interlocking has greatly reduced switching duties of trainmen. Automatic signals have also made work safer for trainmen.

EFFECTS OF THE LAW

In effect the law works as follows:

A twenty-nine-car freight train can be lawfully operated with a crew of five men. Add a car, and an extra man must be put on. The law requires no larger crew on one-hundred-car trains. A four-car passenger train can run with a crew of five men. On a five-car train there must be a crew of six men. Even if all the cars are Pullmans, with porters and a Pullman conductor, a six-man railroad crew is required. A milk train of twenty or more cars, running through virtually without stops, must carry a crew of six. The only place four of them would ride would be in the caboose.

When the Pennsylvania full-crew law became effective, the Pennsylvania Railroad was operating in the state of Pennsylvania, week days, trains as follows: 609 through passenger, 990 local passenger, 863 through freight, 234 local freight, 275 road shifting freight—a total of 2,971 trains

Of these 2,971 trains, 2,205 were manned up to or in excess of what the law required. Of the passenger trains 1,198, or 74.9 per cent, were so manned. The trainmen's organization lays particular stress upon the need of the extra man on freight trains. Of 1,372 such trains, 1,061, or 77.3 per cent, of the total were manned by the company up to or beyond what the law required.

Of the 401 passenger trains affected by the act, 353 were through trains, composed largely of Pullman, express, mail and baggage cars, making few stops, and often no stops throughout division runs. Forty-eight were local trains, handling a comparatively small number of passengers. On through trains, the Pullman cars were in charge of Pullman conductors and porters, while mail and express cars were in charge of messengers, all in addition to the regular train crews.

Of the 311 freight trains on which an additional brakeman was added by the law, 118 were preference freight trains, averaging about forty cars each, running on assigned schedules and making no stops between division terminals to do any work, except in case of emergency. The other 193 trains ran over divisions and had some shifting to do at intermediate points. These trains handled on some divisions an average of about fifty cars and on other divisions from thirty-five to forty-five cars.

The 1,198 passenger trains which were provided with crews equal to or in excess of the law's requirements consisted principally of local or semi-local trains, making frequent stops and handling a large number of passengers. The second brakeman was employed to expedite the departure of trains from stations and to assist the conductor in collecting tickets.

The 1,061 freight trains on which the law required no additional men consisted of local freight trains, carrying package freight, on which brakemen were required to load and unload cars; road shifters, doing a large amount of work, necessitating the throwing of switches and much hand-braking on cars; mine

trains, placing empty cars and picking up loaded cars, and through slow freight trains of heavy tonnage on the Philadelphia and Middle divisions on which the brakeman riding on the front part of the train was required to assist the fireman.

The railroads seek only that which they are convinced to be right. They expect that the trainmen's organization will impugn the motives actuating this campaign. They anticipate that an effort will be made to deceive railroad employees into a belief that the companies' ulterior purpose is to cut down forces in unwarranted manner and in ways to impose hardship upon trainmen. They also look for an attempt to convince the public that in this effort the railroads make covert attack upon safety and efficiency in operation. None of these allegations, if made, will be justified. The railroads frankly recognize that if these laws, avowedly made to protect railroad trainmen and the public against possible abuses shall be repealed, as the larger interests of all require, justice equally demands that some authority above the railroads shall stand by to make certain that trains are manned adequately. [Here is quoted the pledge given out last week.]

NO ATTACK MADE ON LABOR

In their present action the railroads make no attack upon organized labor, but upon a mistake it has made. Labor cannot successfully defend any proposition in defiance of economic law. Organized labor in this instance is doing itself and its membership, also the railroads and the public, a wrong and an injustice. Upon such a proposition labor must ultimately yield to laws stronger and higher than any legislature can enact, but not successfully enforce. Labor does not want to load itself with the burden of men employed without need. Working men should repudiate indefensible acts by labor unions. In doing so they will gain.

It is frankly recognized that railroad employees have a right to organize. Further, let trainmen and the public clearly understand that we believe it to be as impossible for the individual employee in a great transportation system to be certain of fair treatment, acting by himself, as we know it would be impossible for one man to provide the capital necessary for creation of the huge Pennsylvania Railroad system.

Let no one think this is a fight of railroad managers. It is essentially a fight for the public. Railroad officers are merely salaried men. Their duties and responsibilities are those of stewards—to give conscientious service in the conduct of the properties in their charge.

This implies, first, the best they can do in providing transportation and service to the public, an essential of which is liberal and even treatment of the whole body of railroad employees. Their ability to perform this highest duty—which is to the public and employees—is curtailed by the full-crew laws. The other chief responsibility of railroad managers is to the host of people—men and women—who, directly, or indirectly, as depositors in banks, trust companies and savings funds, are investors in railroad bonds and stocks. . . . With $2,000,000 a year, now wasted in employment of men whose services add nothing to the safety or efficiency of railroad operation, more steel passenger cars could be bought, new stations could be built, block signal systems could be extended, additional freight terminal facilities could be provided, more grade crossings could be abolished. All this would make much work for labor generally. It would help the steel industry, the cement and building trades, give work to electrical concerns, to contractors, to skilled workmen and mechanics, to day laborers.

FATE OF FULL-CREW LAWS

The full-crew bills have been defeated in many states. Full-crew laws have not always survived. The court of public opinion, when it has been appealed to for a decision, has decided emphatically against the idea. [Here the committee tells of the recent referendum vote in Missouri and quotes from the veto message of the governors of New York, Massachusetts and Oklahoma.]

Attempts to get full-crew laws in Colorado, Delaware, Virginia and Ohio also failed. Thus in nine states there has been failure, and in another a law enacted was figuratively torn up by the people. In the east full-crew laws are in effect in Pennsylvania, New Jersey and New York, while in Maryland there is a full-crew law as to freight trains only.

These laws should be repealed in the interest of the public, the railroads and the great body of railroad employees. Figures show that all the railroads operating in Pennsylvania are now employing about 2,500 extra brakemen. There are in all some 65,000 men employed in train service in the state.

Much of what the trainmen's organization did last year in Missouri to keep a full-crew law on the statute books of that state, the railroads operating in Pennsylvania and New Jersey will now do in these states to bring about repeal of like laws. It is to be an open, square and above-board direct appeal to the intelligence and judgment of the people. The railroads will conduct the campaign in every legitimate way. They will publicly stand for what is done and said. There is to be no lobby; neither will there be any star chamber conferences or private deals to influence either public opinion or legislative votes.

The methods by which the public can impose its will in Pennsylvania and New Jersey are not as immediately final as was the referendum vote taken last year in Missouri. But without this the railroads now go to the people of Pennsylvania and New Jersey to present a case in which the public interest is directly involved. This is done with a firm conviction that upon presentation of the question the public will decide what is right and that a ground swell of expressed opinion from the people of these states will be recognized and acquiesced in by their elected representatives at Harrisburg and Trenton. The case being put before the people, the power rests with them to enforce such decision as the court of public opinion shall render.

SUSPENSIONS SUSPENDED ON THE B. R. & P.

The Buffalo, Rochester & Pittsburgh has made an interesting trial of discipline without suspension. It is only a cautious and partial adoption of the system, but the experiment has been kept up for over two years and further progress may confidently be looked for. An officer of the road writes us as follows:

"Recognizing that the purpose of discipline should be the education and desirable development of employees, and that disadvantages accrue, not only to the individual employee, but to the company when discipline is enforced solely by actual suspension, the management on October 1, 1912, put in effect a plan which provided that discipline be decided on in the same manner as before; that is, by a "court" presided over by the superintendent, or his representative; but that its application would be withheld unless there should be cause for further discipline within a prescribed period of probation. For example, a man who has committed some fault which the "court" decides should be visited with a suspension of ten days or less, is put on probation for six months; a decree of suspension of over ten days and less than thirty days, makes the period of probation nine months, and a decree of suspension of thirty days or over, calls for a period of probation of one year. But should the employee get into trouble during his period of probation, he must at once serve the suspended sentence which the court found him liable for; and a new period of probation is started.

"That this plan has been of material benefit is evident from the fact that during the two years to October 1, 1914, but 25 per cent of the sentences imposed on train and enginemen were put into effect. These caused a loss of time equivalent to only 32 per cent of the time covered by the total number of sentences, or one-fourth of 1 per cent of the total employee-days involved. The total number of sentences put into effect without allowing the delinquent employee the opportunity afforded by the designated probation period, was approximately 2 per cent of the whole. These sentences, also the days served, are included in the 25 per cent of sentences and 32 per cent of time served. But a very small percentage of long term sentences were served."

Maintenance of Way Section

THE Maintenance of Way Section for March will appear in the issue of March 12, instead of in the third issue of the month. This is because the convention of the American Railway Engineering Association comes the following week, during which time we will, as usual, publish four daily issues, which will be sent to all subscribers to the maintenance of way edition.

Contest on Bridge Construction Methods

The reconstruction of almost every bridge under traffic presents a special problem requiring the development of methods adapted to the particular location and conditions. The consequence is the use of a wide variety of methods in handling work of this class. The particular conditions may require the adoption of special methods for solving either the entire problem or certain parts of it. In general, the manner in which these conditions are met is known only to those connected with the work and other men confronted with similar difficulties do not secure the benefit of their experience. We have therefore announced a contest on Bridge Construction Methods to include descriptions of methods new or not generally known for handling special problems involved in the reconstruction of bridges and their substructures, the purpose being to bring such methods to the general attention of bridge engineers. To stimulate interest we have offered prizes of $25 and $15 for the two best papers submitted, and will pay our space rates for all other papers accepted and published, the prize awards to be based on the originality and practical value of the ideas presented. All papers to be considered must be sent to the Engineering Editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, and be received not later than March 10.

An Overlooked Opportunity

Both Mr. Bowser and Mr. Schott call attention in articles in this issue to one point of contact between the public and the railroads which has not been cultivated to the greatest extent by the roads. The section foreman comes into more or less intimate contract with the farmers along the line in the relation of a neighbor in the handling of such details of common interest as the repair and maintenance of fences, farm and highway crossings, open ditches, etc. By his attention to these details he can do much to gain the good will of the farmer for himself and for his road which will extend to other farmers in the community as well. The cultivation of this spirit is of advantage to the railway in several ways. In the first place, it is a material aid in the creation of a favorable public sentiment, which is an important factor in the relations of the railroad with the rural communities. Such a sentiment is also an important factor in the routing of traffic. The efforts of the agent to secure the shipments of live stock and other agricultural products will amount to little at any competitive point if the farmers are antagonistic to his road. Another direct return results in the securing of the cooperation of the farmers in the prevention of the causes for stock, overflow and other claims. A large part of these claims is preventable, but if a feeling is allowed to develop that "the road will pay for it," claims will provide a considerable source of revenue for the farmers and will show a strong tendency to increase, while at the same time a spirit of hostility is created. Being a resident of the community, the section foreman and his workmen can do more to secure for his road the good will of the rural residents, and operators of small industries as well, than can the superintendent, traffic solicitor, or claim agent from the distant terminal. In these days of so much unfair agitation it is worth while for the supervisors of track and higher officers to impress upon their foremen the importance of equitable relations with the public.

Long Tie Plates

Trackmen will watch with interest the results secured with the 70-in. tie plates which the Pennsylvania is now using under the joints of its 100-lb. rail, as described on another page. Such a tie plate is a distinct innovation, and in addition to retarding rail creeping by extending over four ties it should give a stronger joint and better riding track. The increased support should also materially decrease the battering of the rail, and thereby increase its life, for it has been common experience during recent years that it is necessary to remove much rail from main tracks before it is worn out, because of battered joints. This latter condition is becoming increasingly expensive. A few years ago conditions on many roads were such that battered rail could be used to good advantage on branch lines after sawing off the ends. On many roads, however, branch lines are now completely relaid with rail sufficiently heavy for the traffic, and it is desirable to secure the full life of the rail before removing it from the main line. On some roads main line rail is being removed, taken to a central point, the battered ends sawed off and the rail then returned for relaying in main lines. To avoid this heavy expense at least one prominent road is endeavoring to devise a machine which will saw the ends from these rails without their removal from the track, with the intention of driving the rails together until there is sufficient space to drop a new rail in. Any means which will reduce the battering of rail at the joints and thereby increase its life deserves serious consideration.

THE MARCH CONVENTION AND EXHIBIT

WITH each succeeding year the convention of the American Railway Engineering Association becomes more representative of the development of the railway engineering of the country. From its inception in the offices of the Railway Age in Chicago in October, 1897, this association has grown until it now has over 1,200 members, representing 90 per cent of the railway mileage of the United States and Canada. It is not surprising, therefore, that its proceedings and recommendations carry a weight second to those of no other association without official relation to the roads.

The convention this year should be one of the best in the association's history. Because of the general inactivity in railway construction the committees have been able to spend more time in the preparation of their reports, while because of the small amount of work under way more engineers will be able to attend the convention than usual. While the association's conventions are considered as being primarily for the higher engineering officers, the younger men can attend its sessions very profitably, for a great deal of information is presented in which they are vitally interested.

Hardly secondary to the sessions of the convention is the annual exhibit of the National Railway Appliances Association at the Coliseum. While the exhibit is arranged primarily for selling purposes, the assembling of such a large amount of construction and maintenance of way equipment in a compact space makes the exhibit of great instructional value. The exhibit this year will be even more accessible than in previous years, as it is all consolidated on the main floor of the Coliseum. No engineer can afford to attend the convention without visiting

the exhibit, for it is important that he be informed regarding new devices and developments in old devices as well as in the theory of his profession. No better commentary on the value of this exhibit to practical men can be afforded than the large number of roadmasters and track foremen who annually visit it and study the exhibits in detail. Many of these men from nearby points come of their own accord, while a number of the roads have found the exhibit of sufficient value to their men to send them to visit it.

COMPARING MAINTENANCE EXPENDITURES

IN common with the experience in other departments of railway work, maintenance expenditures have shown a continual tendency to increase during recent years and the end does not yet appear to be in sight. The expenditures for maintenance of way and structures per mile of road for all roads in the country, as reported to the Interstate Commerce Commission, have risen over 65 per cent in the last 15 years, while a comparison of the average expenditures of 53 representative roads for the last two five-year periods shows an increase of 14 per cent in spite of the efforts to retrench. The maintenance of way officers must necessarily be able to explain to their higher officers these increases on their own lines and justify the standards to which they are working. It is not difficult to show causes for the increased expenditures—the increased unit costs of labor and materials, the heavier traffic requiring more work, etc.

It is more difficult to justify a standard. One manner of doing this is by comparison with other roads. However, this must be done very cautiously and with a full knowledge of the conditions. To show what a blind comparison on the basis of expenditures per mile of road will lead to one can secure figures which vary from $5,000 on the Pennsylvania to less than $800 on a few western branch line roads. Such figures make no allowance for the amount of traffic handled or the number of multiple main tracks. A more significant figure is that showing the percentage of gross earnings expended for maintenance of way, but this figure again varies from 8 per cent on an eastern road with a heavy freight business and relatively little passenger traffic to 23 per cent on one road with a very light business. However, the great majority of roads spend from 11 to 15 per cent of their gross earnings for maintenance of way, and the 10-year average of 52 representative roads is 13.3 per cent. But even when comparisons are made on this basis they must be made with great caution, for almost anything may be proved, if allowances are made for differences in conditions on the roads compared. For his own information the officer in charge of maintenance of way should compare his expenditures with those on other roads with which his lines are fairly comparable, but he must be exceedingly careful not to mislead himself.

THE PREVENTION OF WATER WASTE

ONE of the most difficult problems with which the railway officer is contending continually is that of preventing wastes. Mr. Brandeis told nothing to railway men that they did not already know when he made his famous statement regarding the opportunities for economies in the transportation business; for railway men have been working on this problem ever since the railway was invented. But the widespread publicity given to the subject of efficiency has served to focus attention on it more directly than ever before.

At first thought there might appear to be no opportunity for making savings of any consequence by a reduction in water consumption. The cost of five to ten cents per 1,000 gallons appears so small that even if the amount of water used were excessive its aggregate cost would generally be considered small. But a recent investigation on one road has shown an estimated possible annual saving in this one item alone of $10,000 at two terminals. Another road on which a campaign has been made along this line for over a year is now effecting a reduction in the cost of its water supply of over $2,500 monthly as compared with a year ago, after making full allowance for the decrease in traffic. At one terminal where the water was purchased from the city and paid for by meter measurement the bill has been reduced $800 a month. At another terminal the average monthly reduction for the past six months has been $550. In general, it has been found possible to reduce the cost of the water used 20 per cent at terminals to which attention has been directed.

This condition arises from a number of causes. At one place it was found that city water purchased at a relatively high rate was being used for cooling an air compressor and other shop purposes, whereas the ordinary water pumped by the railway at its own plant and supplied to locomotives would do equally well and could be furnished at less than half the cost. Leaking pipes and flush boxes and the careless use of hydrants are other common sources of waste. When it is figured that a ¾-in. orifice will discharge 6,000 gallons per hour under ordinary city pressure the importance of small leaks is evident.

In the elimination of water waste it is very necessary to secure the co-operation of all departments concerned. If, for instance, an attempt is made to reduce waste about shops, the mechanical department is very apt to defend this upon departmental grounds unless the problem is presented in the proper manner. The same is true of other departments. If the matter is properly presented to the officers in these departments, they can then co-operate in extending the proper supervision. The savings mentioned above form only a small part of those possible when such a campaign becomes effective over an entire system, and the question of water waste is only one of numerous so-called minor opportunities for effecting savings which will reach large amounts in the aggregate.

NEW BOOKS

Resistance of Materials. By S. E. Slocum, professor of applied mathematics, University of Cincinnati. Size 6 in. by 9 in., 250 pages, 152 illustrations, 17 tables. Bound in cloth. Published by Ginn & Company, Boston, Mass. Price $2.

This is a text book on applied mechanics which eliminates calculus in the solution of the problems to which it is usually applied in such books. The author mentions as advantages of this treatment that the subject can be taught at the same time or preceding the study of calculus in universities and can be used in trade schools where calculus is not taught. It also has the advantage of fixing firmly in a student's mind the principle of moments which is used repeatedly in place of calculus methods. This feature of the book will also make it of value to those practicing engineers who find that after a number of years have separated them from their college training it becomes increasingly difficult to use higher mathematics in the solution of their problems. The volume covers stress and deformation, moments, strength of beams, columns and struts, torsion, strength of spheres and cylinders, flat plates, riveted joints and connections, reinforced concrete, and simple structures. The tables cover properties of materials and mathematical functions sufficient for a student of this subject. The problems included in the book are noteworthy for their direct application to engineering subjects which should make them of practical value.

The Theory and Design of Structures, and Further Problems in the Theory and Design of Structures. By Ewart S. Andrews, lecturer in theory and design of structures at the Goldsmith's College, New Cross, England. Size 6 in. by 9 in., 618 pages and 236 pages, respectively, illustrated, bound in cloth. Published by the D. Van Nostrand Company, 25 Park Place, New York. Price $3.50 and $2.50, respectively.

Andrew's Theory and Design of Structures was first published in 1908. It is distinctively an English text book using graphical methods in many instances, but avoiding mere graphical artifices for making calculations. The third edition, which has just been published, has been revised and corrected and an appendix added to include some additional matter, most important of which is a description of Stanton's experiments on wind pressure.

As the author considered the treatment of the elements of design and the discussion of framed structures, columns, suspension bridges and arches, masonry structures, reinforced concrete structures, steel work for buildings, roofs, bridges and girders sufficient for average readers, it was decided to prepare an additional volume covering recent developments in structural design, the most important of which are the use of influence lines and the method of internal work. The second volume also includes discussions of stresses in redundant frames, in rigid or elastic arches, in portals and wind bracing, and secondary stresses in structures. In both volumes an attempt has been made to give practically all of the steps in mathematical deductions to avoid the difficulty frequently found in supplying the missing steps.

Structural Engineers' Handbook. By Milo S. Ketchum, dean of the college of engineering, University of Colorado. Size 6 in. by 9 in., 896 pages, illustrated, bound in flexible leather. Published by the McGraw-Hill Book Company, New York. Price $5.

A large majority of the books on the design and construction of bridges and buildings are prepared primarily for students or are intended to present predigested data that can be safely used by non-technical men. This new book by Milo S. Ketchum, however, is not a text for classroom use and the tables are not arranged for application by non-technical men. The elimination of the elements of design, necessary in a work intended for students, allows the full space of the somewhat bulky volume to be filled with a wide variety of data bearing on the design and erection of steel bridges and buildings, retaining walls, abutments and piers, timber bridges and trestles, steel bins, grain elevators, head frames, coal tipples, standpipes and elevated tanks. Chapters are also included covering structural drafting, estimates of structural steel, erection of structural steel, engineering materials, structural mechanics and the design of steel details. The tables include the properties of sections, safe loads for angles, beams and channels, and of angle struts, properties of rivets and riveted joints and miscellaneous data for structural design. Trigonometric and logarithmic tables are not included. The typography is good and special care has been taken in the preparation of drawings and tables to make them easily readable. Dean Ketchum is also the author of a number of books on thedesign of structures, from which some material has been taken; but in general, the new handbook is intended to supplement such works rather than to replace them.

Structural Engineering. By J. E. Kirkham, professor of structural engineering, Iowa State College. Size 6 in. by 9 in., 669 pages, 452 illustrations, bound in cloth. Published by The Myron C. Clark Publishing Company, Chicago. Price $5.

Kirkham's "Structural Engineering" is intended primarily for text-book use. It contains a considerable amount of elementary material, such as the chapter on Structural Drafting and three chapters on Fundamental Elements of Structural Mechanics; Theoretical Treatment of Beams and Theoretical Treatment of Columns. Four more chapters are then devoted to general subjects including: Rivets, Pins, Rollers and Shafting; Maximum Reactions, Shears and Bending Moments on Beams and Trusses and Stresses in Trusses; Graphic Statics, and Influence Lines. The last five chapters are devoted to design, covering I-beam and plate-girder spans, simple railroad bridges, simple highway bridges, bridges on curves, economic height and length of trusses and stresses in portals and the design of buildings. It should be stated, however, that the chapter on the Design of Simple Railroad Bridges occupies 338 pages and is divided into four parts, beam bridges, plate girders, viaducts and truss bridges. Under each of these types a complete analysis of the steps in design is made with plates to illustrate the necessary shop drawings. Original designs worked out by the author have been used throughout in preference to standard designs taken from actual practice. This gives a commendable uniformity to the plates and tends to simplify the work of following through the steps in design with reference to the typical plans shown.

Letters to the Editor

THE OPERATION OF HAND CARS

EAST LAS VEGAS, N. M.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the issue of the *Railway Age Gazette* of January 22, page 148, the lower left-hand picture is presumably intended to show the correct arrangement of men on a hand-car. This photograph shows that it was made on a single-track railway, therefore it would appear to be incorrect, as a train may be expected from either direction. Also the disposition of two men between the handles is not conducive to the best results. One of the men should be on the front of the car, facing backwards, so that a train approaching from their rear may be seen at the earliest moment.

While undoubtedly the disposition as shown is to offset that shown in the right-hand picture, it is apt to mislead men who might see the picture into the belief that to be without a man facing the rear would be an approved action by reason of the precedent established in the approval of such a picture for "safety" purposes.

C. CLAY.

AN EARLY NARROW GAGE-STANDARD GAGE CROSSING

TOPEKA, KAN.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with interest the articles published in your issues of Dec. 18 and Jan. 22, relative to the crossing of a standard gage by a narrow gage track. In 1907, when assistant engineer on second track construction for the Atchison, Topeka & Santa Fe, in Missouri, I installed such a crossing east of Elmer, to move steam shovel dirt trains from one side of the main line track to the other, and found its operation very satisfactory for such temporary work. It being necessary for me to use stock material, No. 9 frogs with 10-ft. switch points were employed, each switch point being operated independently from a switch stand, and one operator throwing all four points when changing the line up from one track to the other.

I am advised by a reliable source that as early as 1881, in the construction of the Leavenworth, Topeka & South Western, a similar device was employed by J. R. Ellinwood, a former chief engineer of the A. T. & S. F. He, of course, employed stub switches, as there were no switch points in use at that early date; however, the general arrangement was exactly the same as the above.

T. H. MCKIBBEN,
Engineer, Atchison, Topeka & Santa Fe.

COST OF THIRD RAIL MAINTENANCE

The cost of maintenance for 1913 of 20 miles of third rail in the Detroit and Windsor terminals was given as $2,690 by J. C. Mock, electrical engineer of the Michigan Central, in an article in a recent issue of the General Electric Review. This figure, which includes supervision, amounts to $134.50 per mile, or $7.40 per day. One of the largest items entering into this was $936 for the replacement of burned and broken insulators. Of the total number of burned insulators on the tunnel tracks 317 were in the eastbound tunnel and only 5 in the westbound. This difference is attributed to the fact that practically all refrigerated freight is eastbound and brine drippings from these cars fall on the third rail. The application of grease and roofing paper over these insulators has greatly reduced the trouble from burned insulators, although it has not entirely eliminated it.

CHILEAN RAILROAD CONSTRUCTION.—The construction of the railway line from Iquique to Pintados commenced about January 1. One thousand workmen are engaged on it.

Service Secured from Corrugated Iron Culverts

A Description of the Results Attained by Their Use Under Sliding Banks and in Other Unfavorable Locations

The corrugated pipe culverts manufactured from Armco-American ingot iron have been installed under widely varying conditions, in all parts of the country, and by a large number of railroads to carry minor waterways under the tracks. The mechanical advantage of the corrugated pipe in securing strength without great weight is evident, and in the culverts referred to this advantage has been combined with a material of so high a degree of purity that its resistance to corrosion is greatly increased. The properties of this material which make it more rust resistant than steel or the common forms of iron were discussed in the *Railway Age Gazette* of July 18, 1913, and September 30, 1910. These culverts have now been in service for a sufficient time to give evidence of their permanent qualities and a number of difficult problems have been solved by their installation.

Probably the greatest advantage of the ingot iron corrugated culverts is the ability of these pipes to maintain a clear waterway under a settling or shifting embankment. One of the best possible examples of this conditions was furnished in the construction of the Northwestern Pacific between Eureka, Cal., and San Francisco, where for about 100 miles the line follows the Eel river at an elevation of 10 ft. or more above extreme high water. The formation is generally of a shaly nature or a decomposed serpentine, the strata pitching towards the river with a surface slope averaging about 30 deg. The shale is soft and friable, is slacked to a considerable extent by air and through decomposition forms the typical soil of the district, a tough clay. This clay bakes hard in the summer, but during the rainy season absorbs a large amount of water which often causes it to slide.

The country is covered with small slides forming broken terraces in certain localities which have been caused by excessive saturation of the soil, the water following some channel or crack which localizes the saturation. In these cases there is probably no subsequent movement. In other places large slides are found which in their action are analogous to glaciers, having a movement of 6 in. to 5 ft. per month and covering several acres. This tendency to slide was aggravated by the excavation of the cuts for the new line and also by loading the slopes with fills. Nearly all of the cuts are widened at grade to the river on the one side and in many cases the bank on the high side of the cut, even during the dry season, continues to move slowly, impelled by the slide behind it. The soil cracks off in slabs 5 ft. thick or so, the cracks extending in series back 50 ft. or more. During the rainy season this movement puddles the material and the slides may resemble runs of muck.

On the first 20 miles constructed the unimportant drainage was carried under the track in 24-in., 30-in. and 36-in. concrete pipe culverts with concrete headwalls. These culverts were built in place without reinforcement, a form of construction commonly used, and which has been found to be inexpensive and very satisfactory under usual conditions. The foundations of the pipes were good locally, but due to the movement of large areas in which they were laid, many of these pipes broke, some failing entirely when the movement was not uniform throughout the foundation.

It was decided, therefore, that where the nature of the foundation appeared doubtful, corrugated iron culvert pipe would be used. If this pipe was moved down the hill by slides it was planned to remove the lowest joint and place it at the upper end. This has not yet been done in any case, but one 48-in. pipe has moved so far that at different times four 10-ft. lengths have been added to the upper end. Many other pipes have moved a smaller amount, although none have been more than two years.

The effect of these slides on concrete pipe is well illustrated by

Fig. 1—A 24-in. Corrugated Iron Culvert Pipe Under an Earth Fill on the Northwestern Pacific

Fig. 2—A 24-in. Corrugated Iron Pipe Replacing a Failed Concrete Culvert
Fig. 3—Five Lines of 24-in. Corrugated Pipe on the Southern Pacific

Fig. 4—Failure of a Concrete Culvert under Shifting Load, Later replaced by a Currugated Iron Pipe

three of the accompanying views. In Fig. 2 is shown the upper headwall of a concrete culvert and all that was left of a 24-in. concrete pipe which crushed due to the movement of the foundation. The lower end wall was carried down hill 6 ft. and had to be blasted out and used as riprap under the spill of a 24-in. corrugated pipe which was used to replace the concrete culvert. The upper end wall shown in the picture was chiseled out and the pipe inserted from back to face and concreted in place.

Fig. 4 shows part of a 4-ft. concrete arch with a 12-inch floor

Fig. 5—A 4-ft. Concrete Arch Culvert Destroyed by a Sliding Fill Which Moved It a Distance of 70 ft.

which had been built on a firm shale partially decomposed. It was broken in two places when the original ground under the fill settled. This culvert was replaced by a 36-in. corrugated iron pipe inserted in the end of the upper section of concrete pipe shown in the background of the picture, laid on the top of the second or middle section and on a back fill made in the third section after blasting off the top. In this case the move-

Fig. 6—A Corrugated Iron Culvert Laid Inside a Wooden Box on the Western Pacific

ment of the ground continued and the corrugated pipe was pulled apart at one joint a distance of 2 ft., this break being repaired by inserting a 10-ft. section of 30-in. pipe in the two ends. A case of a solid rock foundation failure is shown in Fig. 5, which is a 4-ft. arch built on a slight grade on solid shale. This fill was partially made during the fall and in the following winter slid out, carrying the arch toward the river about 70 ft.

Instances of corrugated iron culverts that have given satisfactory service under shifting loads are also reported on the Minneapolis, St. Paul & Sault Ste. Marie and the Western Pacific. On the Soo, a culvert was installed near Superior, Wis., under an embankment composed of a material that decomposes rapidly and settles when exposed to the air. This pipe was not injured by a settlement of 6 ft. On the Western Pacific a number of corrugated iron culverts have been installed in locations where it has been difficult or impossible to maintain masonry on account of shifting foundations. One of these installations is shown in Fig. 6, where the pipe was laid inside a wooden box and back filled by ramming the material around the pipe. One or two installations of 60-in. culverts on this road made about 1½ years ago in locations where other culverts had failed repeatedly have proved entirely satisfactory up to date.

The stability of corrugated iron culverts under severe conditions has been demonstrated in many cases. In the earlier years of the use of this material and to some extent yet, the installation of corrugated pipe has been limited to low fills or other places of light service. This form of culvert is not absolutely invincible under all conditions and there are cases where large culverts made of 14-gage material have deflected under fills of 30 to 60 ft. of sand or gravel. One of the advantages of this material, however, is that for exceptionally severe installations it may readily be had in gages heavier than the standard. While a 14-gage is standard for a 36-in. culvert, a

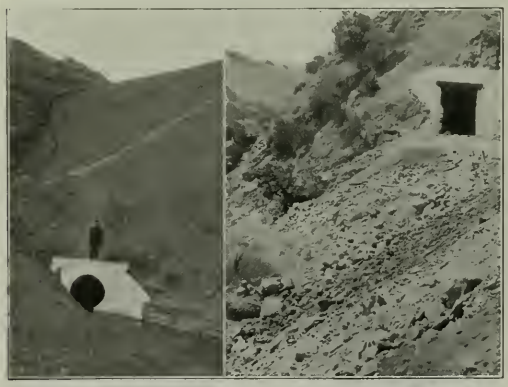


Fig. 7—A Ten-gage, 60-in. Corrugated Iron Culvert under an 85-ft. Fill on the Western Pacific

Fig. 8—A 48-in. Corrugated Iron Culvert Pipe under a 15-ft. Rock Fill on the Northwestern Pacific

12-gage or even a 10-gage can be had at an added expense which represents merely the added cost of the iron.

There are many cases where corrugated culverts of the heavy gages, which should be employed for such installations, are giving good satisfaction under very heavy service. The Atlanta Terminal has one 12-in. pipe buried about 4 in. below the tie under a track which carries upwards of 200 movements a day. This installation was made five years ago and shows no signs of stress as yet. It is not recommended, however, that the pipes be installed with less than one foot of cover. An installation of a 60-in. 10-gage pipe under an 85-ft. fill on the Western Pacific is shown in Fig. 7.

Some of the Northwestern Pacific culverts have shown their ability to withstand a large amount of abrasion due to carrying debris including boulders. Fig. 9 shows some of the typical stones that are carried by the hundreds during the winter months through this 48-in. pipe on a 20-deg. slope. It is reported that in this and similar cases, the damage has been confined to the galvanizing. This is after two years of wear. The least grade that will carry this debris with certainty is a slope of about 1:5. Pipe laid level or on a flat grade will carry fine material such as gravel without choking, however. In this con-

nection, a considerable quantity of corrugated pure iron pipe has been employed in the form of inverted siphons to carry the water of irrigation ditches or natural streams under railroad tracks. Where these siphons have been properly installed they have been successful and it is a curious fact that the corrugated pipe clears itself of silt or other obstructions better than smooth material. This is explained by the fact that the corrugations excite ripples in the flowing water which keep the silt in suspension and allow it to be carried through instead of settling in the lowest portion.

In many cases it is found that corrugated iron pipe is cheaper than other forms of construction. On the Northwestern Pacific work for instance, it was found that a 24-in. concrete pipe would have to be laid at a cost of $17.68 per cu. yd. and a 30-in. pipe at a cost of $19 per cu. yd. to be as economical as corrugated iron pipe. These figures are exclusive of the headwalls. The average cost of installing the corrugated pipe on this road has been $0.35 per lineal ft. for 24-in. pipe, $0.55 for 30-in. pipe $0.68 for 36-in. pipe and $0.74 for 48-in. pipe. In installing these culverts, the excavation was made by the contractor at the regular grading price, but the installation of the pipe was paid for by force account, that is, the cost of labor plus 10 per cent. The work was usually done by gangs of Greeks, Italians or Mexicans with little or no skill. The pipe was furnished in 20-ft. lengths, these sections being connected by the coupler shown in Fig. 11. On 48-in. pipe two turnbuckles on opposite sides of the pipe were used. To insure satisfactory installation it was found absolutely necessary to have an inspector on the job to superintend the connecting and laying of the pipe and the making of the back fill. It was also necessary for the engineer directly in charge to see that a wrench for manipulating the turnbuckles and a hammer suitable for heading the cold rivets were on the job. The 24-in.

Fig. 9—A 48-in. Pipe Set on a 20-deg. Slope under a 25-ft. Rock Fill Showing Typical Boulders Passing Through this pipe

Fig. 10—A Gang Installing an Ingot Iron Corrugated Pipe Culvert Under the Tracks of the Southern Pacific

pipe was usually connected on the bank and rolled into the trench. Larger pipes were rolled in first and the sections were launched endwise with block and tackle. Two jacks used to spread the ends of the large pipe were found to be a great saving in labor. "Bell holes" were necessary to provide a working space for riveting. After the pipe had been connected the trenches were back-filled, the material being carefully tamped under the pipe and nearly to the top. A continuous cover was laid by hand before allowing material to run down the end of the fill as a large boulder rolling onto a bare pipe would dent it badly and cause a weak spot, inviting failure by crushing.

The cost of freight and of hauling is often an important element in the cost of culverts, particularly on extensions of lines at a considerable distance from existing transportation. On the new line of the Chicago, Milwaukee & St. Paul between Lewistown, Mont., and Great Falls, it was necessary to haul material in many cases an average of 12 to 14 miles at a cost per ton mile of $0.35 to $0.50. This was one of the deciding factors in the decision to use American ingot iron corrugated pipes up to 42 in. in diameter under the low fills on this line.

Another advantage possessed by the pure iron corrugated pipe is its adaptation to temporary as well as permanent locations. If it becomes necessary to relocate a highway or a track under which corrugated pipes have been installed it is not difficult to move the pipes to a new location at a small cost

Part-circle culverts made of corrugated iron have also been

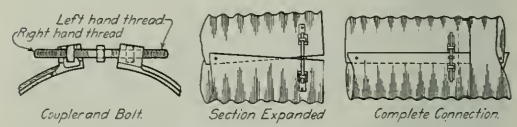


Fig. 11—Details of the Coupler and Bolt Used to Connect Sections of Corrugated Iron Culverts and Sketches Showing the Method of Applying It

used in many instances under railroad tracks principally in municipalities where much of the surface drainage is cared for in this way. This form of construction consists of a segment of corrugated iron of heavy gage set between angle irons held in a concrete base. It is employed only in locations where sufficient head room cannot be obtained for the full circle pipe of the requisite capacity. These culverts are built in sizes ranging from 7-in. base and 2-in. rise to 84-in. base and 42-in. rise. They have given good satisfaction where the width of the base is not excessively great in proportion to the rise and the culvert has a reasonable amount of covering.

We are indebted to J. Harold Lane, assistant bridge engineer, Northwestern Pacific, for the data referring to the installations on that line, and to the National Corrugated Culvert Manufacturing Company, Middletown, Ohio, for the remaining information in the foregoing description.

BRIDGE RENEWAL WITHOUT FALSEWORK OR INTERFERENCE WITH TRAFFIC

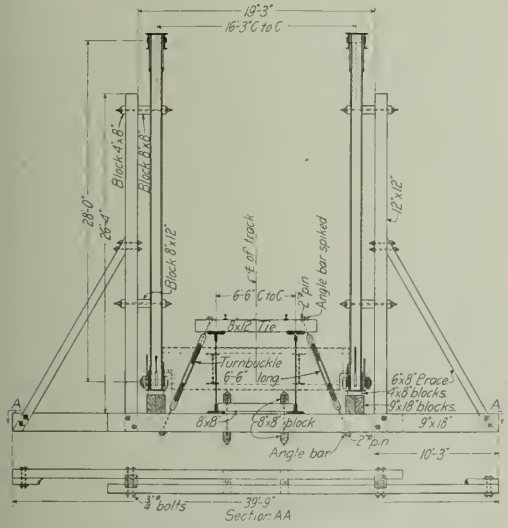
The Wheeling & Lake Erie recently replaced nine bridges, consisting of 130-ft. through Pratt trusses, over Short creek on the east end of the Toledo division, in connection with which an unusual method of dismantling the old trusses was developed. The old bridges were designed for Cooper's E-35 loading and were built by the Edgemoor and the Toledo Bridge Companies in 1897. Their renewal was made necessary by the purchase of a number of locomotives with a loading practically equivalent to Cooper's E-60 that were put in service to handle the increasing traffic from the coal fields.

It was found at all of these spans that successive raises of grade on either side had left the bridges at low points in the profile and as high water data and measurements of the channel showed that additional piers supporting deck plate girders would not unduly increase the danger from floods, it was decided to use 65-ft. deck girder spans designed for Cooper's E-60 loading. The designs were made in the bridge department of the Wheeling & Lake Erie, the steel was fabricated by the American Bridge Company and the King Bridge Company and was erected by the Ferro Construction Company, Chicago.

Although no foundations on this stream were damaged during the flood of March, 1913, it was decided to carry all new footings to rock or to support them on piling. No new abutments were necessary, the old ones being of first-class masonry and still in good condition. They were altered to accommodate the new bearings for the girders, the backwalls be-

ing rebuilt with plain concrete and the bridge seats with reinforced concrete.

The erection of the new spans and the dismantling of the old trusses were handled by a derrick car specially arranged for this work. This car was 47 ft. 9 in. long over all and equipped with a Lambert engine and a three-drum hoist with 10-in. by 12-in. cylinders. The weight of the car was 39,000 lb. and its capacity 100,000 lb. It was provided with a 47-ft. boom con-



Details of the Framing Used to Support Old Through Trusses During Dismantling, Traffic Being Carried on New Deck Girder Spans

trolled by cables running over blocks at the top of a 23-ft. "A"-frame. This boom had a still capacity of 30 tons and a carrying-out capacity of 20 tons. Preparatory to the erection of the girders practically all the rivets connecting the stringers to the floor beams and the floor beams to the posts of the trusses were knocked out and replaced with bolts. The stringers in the panel directly over the new pier were cut by an acetylene torch and were blocked up at points which would not interfere with the new girders. The trains were allowed to pass over the bridges in this condition until all was in readiness for the erection of the new span.

As traffic on this line was light it was decided to hold trains during the operation of renewing each span. At one of the typical bridges shown in the accompanying views, the last train passed over the old bridge at 9:25 a. m. The work of removing the old floor system was begun immediately, the end stringers being removed first and dropped into the creek, the water in which averaged only about 3 ft. deep. This operation was continued until the stringers and floor beams in the first half of the span had been removed. This left a clear space between the old trusses from the abutment to the new middle pier, and the new girders could then be picked up one at a time by the derrick car and placed in position. The top and bottom laterals and the cross frames were then bolted up and the ties and the rails laid on this span, the work being accomplished by 11:25 a. m.

The erection of the second span was carried out in the same manner and was completed, ready for traffic, at 12:40 p. m., 25 min. ahead of the first scheduled passenger train after the beginning of the work. The whole operation consumed 3 hr. and 15 min. The erection was so planned that work could have stopped after the first span was in place, the traffic being carried on the new girders and half of the old truss span. This was done at all of the other bridges.

During the erection of the new span all of the top bracing in the old truss span was removed with the exception of one end portal and one strut which were left to steady the trusses. After the new spans were in place two gallows frames, illustrated in the accompanying drawing, were placed equi-distant from the ends of the trusses to which they were bolted to support these trusses while the chords were cut and the sections taken down. As indicated in the drawing, the gallows frame consisted of two 9-in. by 18-in. timbers under the new girders and attached rigidly to the span by two sets of rods. These timbers supported a vertical 12-in. by 12-in timber, just outside of each old truss, braced from the outer end of the bottom cross timbers and bolted to the truss posts at two points.

This work was handled under the direction of W. L. Rohbock, chief engineer, and Edward U. Smith, assistant engineer. We are indebted to Mr. Smith for the above information.

German Tramways in South America.—It is reported that the German Electric Tramways Company at Santiago de Chile has suspended operations, owing to a disagreement with the local authorities, who have prevented it from charging double fares.

One of the 130 ft. Through Truss Bridges After All Work Preparatory to Renewal Had Been Done

Placing One of the Girders for the Second Span of New Bridge. Derrick Car Working on First Span Just Completed; Photograph Taken About 2½ Hours After One Reproduced at Left

The Handling of New and Scrap Maintenance Materials

The Third and Last Series of Contest Papers, Outlining Several Suggested Improvements in Present Methods

PRACTICAL CONSIDERATIONS IN THE HANDLING OF MATERIAL

By J. W. Powers

Supervisor of Track, New York Central & Hudson River, Oswego, N. Y.

Those employees of the maintenance of way department, whose duties require it, should familiarize themselves with instructions given with the system of accounts, reports and records prescribed for their department. The object of these instructions should be to secure uniformity in reports, to enforce responsibility for the proper disposition of material and to secure accurate returns for material on hand, received, consumed and taken from track or shipped away. With such information at hand, the requirements of any system may be carried out.

Owing to the increased speed of trains, and the greater weight of engines and cars, it has become necessary to increase the weight of rails on many roads. There is perhaps no one condition more responsible for the necessity of ordering, distributing and carrying large quantities of material, as the difference in weights and dimensions of rails, switches, frogs, guard rails, clamps and braces, tie plates, rail anchors, comprises and insulated joints, etc. It is necessary to have a portion of each kind of material on hand for emergency use, which represents a large amount of money from which little benefit is derived.

The policy on many roads has been to lay the lightest weight of rail that can be operated on, consistent with safety, without a thought to the extra cost of track maintenance. Many roads are using rails 30 ft. long, while the majority of roads are using 33 ft. rails. There is no question as to the relative economy of using longer rails. We believe it is possible to use rails 45 ft. long in many of the southern states and in any locality 36 ft. lengths could be used. The economy of using 36-ft. rails or longer is evident when it is considered that there are ⅙ less joints in a track laid with 36-ft. rails than in one using 30-ft. lengths. Including the saving in angle bars and bolts and the decreased cost of installing 36-ft. rails as compared with 30-ft. ones, the total saving due to the increased length would amount to over $80 per mile of track. In addition to this saving it would improve the riding quality of the track.

To reduce to a minimum the material held in stock for emergency use on main track, rails for all tracks, as far as possible, should be of uniform length, weight, and height, except for curves and lead rails in turnouts, where special lengths should be used to bring the joints in the proper position. As to the weight and height, this is also true of frogs, switches, guard rails, clamps, braces and all track appliances.

The most economical and efficient method of distributing material depends upon the nature and magnitude of the work to be performed and the territory to be covered. For heavy work such as unloading and distributing large quantities of rails, ties, etc., or picking up and removing such materials from the scenes of repairs, work can be done more economically, in most cases, by the use of regular work trains. In delivering or picking up small quantities of supplies, it is usually more economical to have the work done by the use of way freight or pick-up trains.

The high cost of handling material by manual labor makes it imperative that labor saving and mechanical devices be used as much as possible to secure economical and satisfactory results. Sometimes substantial saving is effected by using motor cars to pick up and distribute small quantities of material. The loading and unloading of rails, frogs and switches should be done with the best mechanical devices that the company can furnish as such material is often bent and sometimes irreparably damaged by careless handling. Great care should be taken to prevent such material from rolling down embankments and it should be unloaded in such a manner as to require the least amount of labor to place it in track. Rails or other material should be loaded so as to require the least handling at destination. Track spikes, bolts, switch rods, braces, guard rail clamps and other fixtures should be kept where they are not exposed to the weather until they are applied.

Maintenance of way and other officials should make frequent personal examinations of all tools, appliances and supplies on their respective territories, and if any surplus material or tools be found they should have them returned promptly to headquarters. They should also watch the efficiency of tools and material in service in order to determine their effectiveness. They should see that requisitions for tools and supplies are made sufficiently in advance of the time required to insure their delivery. The lack of proper tools and material is often the cause of unnecessary expense, delay and confusion. Great care should be taken to order nothing except that which is absolutely needed for the efficient and economical execution of work to be performed. When making up monthly requisitions for tools and materials, catalog reference should be given, when possible, with a view of assisting the purchasing agent. Requisitions should also show the quantity and quality of material on hand.

A report should be made to the proper officials of surplus material on hand each month. This will enable them to locate even a temporary surplus and to place the material where it is most needed, thus saving the necessity of purchasing new material. After surplus material has been reported on hand, if any portion of it is used, it should be reported to the proper authorities promptly so that they will be in a position to know what material can be furnished from one division to another.

Material should be distributed, picked up and disposed of with the least amount of labor. This can be accomplished by prearranged plans. To illustrate, if a quantity of rail is to be released from main track, provisions should be made in advance for disposing of it, and if sold to outside parties it should be disposed of when the market is favorable. If it is retained for company use, either for emergency or to replace defective, worn out or curve worn rails, it should be picked up and shipped at once to points designated. Large quantities of rail removed from main track should be picked up before the work of spacing and renewing ties under new rail commences, as the old rail, if allowed to remain by the side of the track, retards the work of spacing and renewing ties and increases the cost of this work.

Much time and money can be saved by using good judgment in the unloading and distributing of ties. To do this all ties about to come out should be marked, care being taken not to mark any that would last a year or two longer, but none should be left in track that should be removed. When distributing ties, if marked in this manner, the exact number of ties needed at each point can be determined. Care should be taken to see that they are unloaded where needed. By doing this, money will be saved which would otherwise be lost on account of the time required to re-handle them. If ties are not to be put in track soon after being unloaded they should be piled neatly at proper distances from the track and small trenches dug around them to prevent them from catching fire. If ties to be piled are treated, small quantities of earth should be placed on top of the piles in addition to the trenches, as treated ties catch fire more easily than untreated ties.

The renewing of ties is one of the great items of cost in the maintenance of a railroad and the company should provide the best ties within its means. The proper time for estimating new ties needed is in the fall. If estimates are submitted at this time, favorable contracts can be made and ties delivered when required. When preparing estimates, the foreman should

test every tie of which he is in doubt and request only the actual number needed.

The prompt collection and sorting of scrap and the reclaiming of usable material is not a new subject on many roads, but some roads have only recently realized the importance of giving these matters the attention they deserve. We reclaim a large percentage of track bolts removed from main track in the following manner: We do not allow the nuts to be removed entirely from the bolt until the bolt is loosened in the angle bars. When the nuts are nearly off the bolts, we strike the angle bars with hammer, which loosens the bolt without injuring the thread. After bolts are removed we oil them and screw the nuts on so that they are complete and in readiness for service when needed.

During the construction of new tracks or repairs to old ones, we keep all material picked up as the work progresses, and only enough supplies are distributed to keep the forces engaged and working to good advantage. If material such as bolts, spikes, anglebars, tie plates, etc., is not picked up as the work advances, portions of such material will be wasted and will show evidence of carelessness about work and disregard of company property.

Scrap bins should be built as convenient as possible to tool houses and should be large enough to keep the various kinds of material separate. Foremen and others whose duties require it should be compelled to pick up scrap as often as necessary to secure good results. Employees should never be allowed to leave scrap material where they are working, but should take it to headquarters each night, sort and place it in the bins. This should be picked up once a month on outlying sections either by work trains or by way freights, depending on the amount of scrap that has accumulated. Care should be taken not to mix the various kinds when loading on cars. These cars should then be taken to headquarters and the track scrap sorted and classified by the track forces. The other scrap should be shipped or turned over to the departments where such material is used in order to reclaim the usable material and for the proper classification of various kinds as shown on the forms prescribed for that purpose. A memorandum should be sent to those in charge of the scrap platform showing the approximate tonnage of the various items. They in turn should acknowledge its receipt.

It is important that no labor or time, except what is absolutely necessary, should be expended in handling scrap or other material. Besides the revenue derived from the prompt collection of scrap, it is also in accordance with the Safety First movement now so active on all railroads.

WRONG AND RIGHT WAYS OF HANDLING SCRAP AND NEW TRACK MATERIALS

By W. O. Houston

Division Engineer, Michigan Central, Jackson, Mich.

With the necessity of enforcing economies on our railroads in the past few years, the proper handling of scrap and the reduction of surplus track materials and tools has been a live issue. Some of the methods which have been tried have resulted in a considerable saving, but in many cases the results really obtained have been greatly exaggerated. For example, the writer happens to know of a case on a neighboring road where 60 cars of scrap, were collected by a pick-up train. That sounds like a lot of scrap and the official who originated the scheme and who had only recently come to the road did not fail to call attention to the great saving he had made.

But, as a matter of fact, most all of the scrap collected would have been forwarded to the scrap yard, a carload at a time without extra cost. As it was, the 60 cars were not all loads and several of them contained old barbed wire that had no value and had to be shipped out and buried after it was received.

This train, which was called by the track forces the "robber" train, was on the road a week. It was in charge of a storekeeper who had with him a clerk, a cook, a roadmaster from another division who passed on the material and tools that might be left, and a force of eight laborers and a foreman. The local roadmaster went along and had the right to protest, but not to decide. The visiting roadmaster was so bound by instructions that he had to take many things that his judgment directed him to leave.

The mode of operation was to stop at every car house, look through, behind and under it, check over all the tools and leave one tool of each kind for each man in the gang. As this road has a great many different kinds and sizes of track bolts there are more different sizes and shapes of nuts on a section than there are men, so that when the wrenches were cut down to one per man there were not enough left to fit all the nuts.

The stock of repair rails offered an apparently good opportunity to make a big showing so all but a very few were loaded up. In the yards there are numerous sizes and sections of rails, and the rails are old and require many changes in a month. A short time after the "robber" train made its trip, the repair rails left were all gone, and they are being shipped back, a few at a time, at a considerable cost for handling.

In the desire to collect all the surplus scrap, the rails that were used to run the section motor cars from the track to the car house were taken, and the foremen were forced to pull boards from the right of way fences to make runways for their heavy cars.

The useless expense described above was not the worst effect of the so-called economy; the effect on the men was much worse. Section men as a rule have trouble in getting all the material they need and when that little they have is taken away they are naturally discouraged and become dissatisfied and do not work with the spirit they should.

Fearing another trip of the "robber" train, the men have resorted to taking such extra tools as they can get hold of to their homes, and otherwise hiding them so they can not be found. As these men leave the service, the company will in most cases lose the tools and the loss will be greater than that caused by having a few extra tools in each car house. Most foremen have been compelled by the methods of furnishing them supplies to conceal quantities of tools and materials, and month after month they fail to report them as on hand. Our best foremen, those who are looking ahead and trying to do the best they can for their companies, have been forced by necessity into such practices, which should never exist. Quantities of materials and tools are always on hand and always will be (under cover) until our foremen learn by experience that it is not necessary for them to misrepresent.

It must be made plain to the roadmaster by his superior officer that the surplus material and tools must be kept to a minimum and that as he goes over the division it is one of his duties to know personally what each foreman has on hand, and, for example, when one man needs a switchstand, and some other foreman has two, to have one of the two shipped instead of making a requisition on the store. It is possible in this way to keep the surplus down, but the mistake must not be made, as it has so often of late, of keeping the stock so low that it is necessary to spike important switches for a day or two at a time while waiting for something that the foreman should have had in stock. It is certainly economy to keep a few switch points and an extra stand or two in a yard where points are apt to be run through.

The most economical method of collecting scrap that the writer knows of and one he has successfully tried is to have a scrap bin at each car house and in convenient places in large yards where the section men collect scrap from time to time. Occasionally, as conditions warrant, have two flat cars start at one end of the division, placing them at each station as near as possible to the scrap bins. The car scrap can be loaded on one of these cars and the track scrap on the other. The cars are then billed to the next station and so on until loaded, when they go to the division scrap yard where the scrap is sorted

by experienced men and the material that can be repaired is sent to the shop. A few days after the first cars start out, two more are started from some other part of the division, and so on, so that a few cars are coming in all the while and the scrap men are kept busy without being flooded with a trainload at a time which would result in tying up a lot of equipment and blocking the yard.

For the distribution of new material it has been found desirable to have a storekeeper make a trip over the division once a month with a couple of supply cars on the way freight, leaving what has been ordered at each car house. This results in prompt and proper delivery and prevents losses which occur when small shipments are made by local freight, especially where material has to be transferred at junction points, because, as a rule, conductors and agents do not take the care in handling company material that they should, and it is often lost or put off at the wrong station, and when found it is a great temptation for foremen to help themselves to what they need when they see it lying around.

DISTRIBUTING NEW MATERIAL AND COLLECTING SCRAP

By P. Quinlivan

Roadmaster, Delaware, Lackawanna & Western, Buffalo, N. Y.

In distributing rails, I find it very profitable as well as labor-saving to distribute and set out rails just as they are to go in the track. This saves both labor and train detention, and avoids the necessity of trucking or carrying rails back and forth.

In distributing ties, I find that where a man has a great many ties to put in, it is cheapest to give him about five cars of ties, if possible, and have his gang help the train crew with the unloading. This saves a great deal of work train serivce.

The distributing of switch timber, switch points and frogs, as a rule, can be handled most easily and economically by billing them in a car direct to where they are to be used, and having the section gang at that point unload them. By this means one can save the cost of a work train.

In my opinion, tie plates should be distributed according to the number of ties a foreman has to put in. That is, if a man has a great many ties to be put in, one can save a great deal of extra handling of this material at the storeroom by sending out about 3,000 plates at once. In this way, he could bill one car of plates to two different foremen. When unloaded these tie plates should be piled up at once and oiled, and if possible put under cover.

Spikes should be shipped out to the different sections in quantities large enough to take care of the requirements of each section for a full month. The foreman could put these in his tool house, and take what he requires out with him each day.

When distributing rails, ties, ashes, or in fact any heavy material, if a full day's work can be arranged, it will save a great deal of expense, for more men are put on the work train to unload this material, and if a shift is made to light material, such as spikes, tie plates, etc., there will be a number of idle men. If, on the other hand, a full day's work unloading small material can be arranged, only a few men need to be used on the work train.

After the renewal of rail, the old rail should be piled in piles of four each between the two main tracks, so that they can be picked up easily by the work train. If this rail is to be used on sidings or yard tracks, it will be well to pick it up just as it is to be handled at the point where it is to be relaid. If this rail is all picked up at once and taken into the yard, it will have to be unloaded and piled, and then loaded up again and unloaded, where it is to be used.

Each day scrap should be picked up where a gang is working and as far as possible put in kegs. The work of picking up this scrap should be given to one man, to be held responsible for any usable material that is with the scrap. This scrap when picked up should be sorted over so as to keep the scrap and usable material separate. These kegs of scrap should be taken to the tool house once a week and placed where they can be taken up by the work train without any trouble. Scrap anglebars, switch plates, braces, switch rods and other small materials should be kept in separate piles; and scrap frogs, switch points and guard rails should be loaded in separate cars.

SOME PRACTICAL HINTS ON THE DISTRIBUTION OF NEW MATERIAL

By J. C.

The two general requisites in handling material are prevention of loss or waste and reduction of labor cost. Watchfulness and training will generally overcome the former, although the task may prove long and tedious. But to keep down labor cost is a more difficult matter, beset with ever-changing conditions which demand the closest attention. Versatility and ability to quickly see and take advantage of favorable opportunities are required. Large quantities of material, in carload lots, unquestionably can be distributed most economically by work train. It is necessary to assemble a sufficient number of carloads to insure a full day's work in one locality, so that unnecessary train movement may be avoided. A rail unloading machine will prove very serviceable, not only for rails, frogs and switches, but for bridge timbers and other similar material. Such machines reduce the labor cost and make the handling safe, and as their cost is comparatively low, few railroads can afford to be without them.

Material is easily lost or damaged by careless unloading. Rails, ties and other heavy material should not be allowed to roll down embankments. The cost of reclaiming it, if it is ever done, is a dead loss. Ballast should be distributed evenly to prevent waste and rehandling. The unloading of small material, or such as may be inadequately packed, calls for precaution to prevent waste. Such articles are easily lost and rarely ever found.

Bridge material should almost invariably be handled by a work train. Timber should be deposited, if possible, on level ground and in such a manner as to afford carpenters easy and convenient access for framing. Timber should not be stored in big piles, or closely stacked, for then a fire may result in heavy losses. A wrecking crane may be conveniently employed for this class of work, or, if the job justifies the cost, a derrick may be erected for unloading.

It may frequently happen that there are only one or two cars to be released, or that the holding of cars under load for a few days is not objectionable. Under these conditions permission may be secured for a local freight to handle one car each day until all cars are released. This delay is not serious, as a section gang can unload a car of ties in 30 minutes or a car of ballast in 10 minutes. This practice has frequently been tried with success. A load of small material, to be distributed over a long section of line, can be placed in a freight train, and the unloading done by two or three men at station stops. The knowledge of a number of different methods helps the supervisor to decide quickly as to the best manner of disposing of carload stuff.

The intelligent use of this new material demands value received for the expenditure. Rails should not be cut unnecessarily or large timbers cut to pieces. Ties should not be removed when they are good for another year. Switch timbers should not be renewed in sets, as it is common knowledge that those ties under the switch points and frog will go to pieces years before the intermediates. Such ties should be "patched in." All material not intended for immediate use should be safely stored or piled. Unlike other material, there is no salvage in ties.

There is another class of material, however, that presents a very different problem—that intended for emergency use. There can be no set rule for the amount to keep on hand, conditions varying widely on different sections. It is always necessary to keep a supply of ties and rails convenient. This may be safely accomplished by having one central supply of such material and

reducing the amount retained on each section. In yards and on important pieces of track, it is frequently essential to keep duplicate articles on hand. It is a common fault among track men to have a superabundance of such material, the practice doubtless arising from the commendable desire to prevent "tie-ups" on the line. Experience will soon point out the key to a proper reserve supply for each section, not only of track material, but tool equipment also. It is erroneous to allow all sections equal amounts of material. True economy is subserved by adjusting this reserve supply to local conditions. Reserve track material is an accident insurance policy for a railroad and is entirely proper, provided the annual premium is not out of proportion to the benefits derived.

But all of this good material will some day be unfit for use, will be removed from track or structure and the trackman will again find himself face to face with economy, efficiency and responsibility. What is scrap? Material may be taken from the main line, unfit for service, and yet be very serviceable in secondary tracks and yards; timber may be unsound at ends and in good condition for three-fourths of its length; a frog may have a broken wing rail, readily repaired at the shop. Such material is not scrap, but is too often classified as such, resulting in very large loss. The temptation to use new material is always alluring, but constant supervision and training must teach men that no material, fit for further use, should be discarded.

Large quantities of second-hand or scrap material may be collected in a manner very similar to that laid down for material distribution. In such instances it is very desirable that shipping notices of such carload lots be furnished promptly so that material may be forwarded and the expense of rehandling avoided. Smaller quantities of scrap, such as ordinarily accumulate on the roadbed, should be gathered up daily by track men in the vicinity of their work. It can be taken on the hand car to tool house or some convenient commercial siding. In this manner there can be no undue accumulation on the line at any time. About once a month a car should be started over the division in the direction of scrap headquarters, and "set off" at points where track men have deposited the gathered material. Usually a fraction of an hour is sufficient for loading scrap and the car is ready to move forward next day. Upon reaching scrap headquarters, the material is classified and deposited in proper bins. This method entails some additional work on the local freight, but has the advantage of reducing track labor to a minimum as well as avoiding the use of a work-train movement over a division, resulting not only in a large loss of time, but interference with train service as well.

HANDLING OF MAINTENANCE MATERIAL BY THE MAINTENANCE DEPARTMENT

By J. T. Bowser

Queen & Crescent Route, Danville, Ky.

The "general stores" system has recived so much favorable mention, and has apparently succeeded so well in many cases, that it requires some hardihood to raise one's voice against it. But I will venture to say, that hardly 10 out of 100 maintenance of way officers will agree that the general stores plan serves this department as well as it could be served with a store room of its own, operated independently of all other departments.

In theory, a general store for all departments is ideal. The large purchases bring lower prices, and simplify accounting; the stock is centralized and is in the care of a skilled storekeeper. In practice, however, is it so satisfactory to the maintenance of way department as the store devoted entirely to the material used by the maintenance of way department and supervised, in a general way at least, by the division maintenance of way officer? Can he not, with a little attention, keep his stock down to a proper figure as well as a general storekeeper who probably possesses little or no intimate knowledge of the needs of the maintenance department?

The lack of this intimate knowledge of maintenance affairs may result either in an overstock of some classes of material, or a shortage in others. Such conditions do not necessarily indicate any lack of ability in the general storekeeper. It is manifestly impossible for a man in charge of a large general storeroom to keep in as close touch with conditions in the maintenance department as could a division storekeeper serving only this department and directly under the supervision of the division maintenance officer.

A good maintenance of way storekeeper can no doubt be readily selected from the same material from which supervisors are drawn. At any rate, he should be a man of some track and bridge and building experience, possessing a fair education and some executive ability. A man of this character should experience no difficulty in looking after the maintenance material for one or possibly two divisions, and, in addition to this, should be able to supervise the classification of scrap material and the reclaiming of good second-hand material. With the comparatively small territory supplied from his storeroom he should be able to keep in very close touch with conditions through the supervisors and the division office and increase or decrease his stock of certain materials as necessary.

Further, reporting, as he would, direct to the division maintenance of way office, that office can more readily supervise his orders and issues. The money which might be lost on making a number of small purchases for local storerooms, as compared with the large purchases of the general store, would probably be more than covered by the saving effected by prompt shipments of small quantities, not always to be had with the more unwieldy organization.

A local maintenance of way store should provide, not only storage room for the material which must be kept under cover, but should also have yards for timber, bins for scrap, sheds for spikes, bolts, etc., and a small shop of some description for reclaiming second-hand material requiring only light repairs. The maintenance of way storekeeper should have entire charge of the storeroom, lumber, skidways, scrap bins and shop, and should be held entirely responsible for the conditions thereabout, and for the amounts of material on hand.

Orders from section foremen or other maintenance of way department employees, should be approved by the supervisors to whom these men report, and should be checked in the division maintenance of way office before being sent to the storekeeper to be filled. The storekeeper should be required to keep a record of issues so that a check is available on material issued to each foreman, but all accounting should be handled in the division of general offices.

Requisitions to replenish stock should be forwarded by the storekeeper each month to the division maintenance of way office. These requisitions should show the amount of material on hand, the average monthly consumption as well as the amount required. A very careful check of these orders should be made in the division office.

In order that the chances for a shortage in any particular line may be reduced to the minimum, the storekeeper should be required to make a monthly report with his requisition, showing the amount of material which he has on hand of which heavy issues are made, such as spikes, bolts, etc. With such a report at hand the division officer can more readily avoid a shortage in stock when work which he may have in mind will cause an unusual demand for certain classes of material.

The storekeeper should keep the office advised of any over stock or of any obsolete material on hand, so that arrangements can be made to dispose of such material. He should, of course, take inventories of stock on hand as required and should also be required to make regular reports of scrap material on hand for sale.

Arrangements should be made to provide the storekeeper with the necessary labor to handle heavy material, to classify and load scrap, and for other work about the store or yard. A section gang with a short section will provide enough men to handle his work, in case there is not enough work to keep a gang busy at all times, and there will be no loss of time as the

gang could return to track work when released by the storekeeper.

It should not be necessary for road supervisors to make monthly requisitions, though it is not a bad idea to permit them to keep a small supply of spikes, a frog and switch, and similar material on hand at their headquarters for emergency use. Special requisitions submitted by bridge and building supervisors for special jobs should be submitted to other supervisors, with the view of ascertaining if any of the material can be furnished by them from stock left over from other jobs.

Periodical inspections should be made of tool houses, tool and supply cars by the proper officers, and foremen should be required to return to the storeroom all material or tools not needed for immediate use. Employees should be impressed with the scrap or second-hand value of the material which they handle, so that they will care for it properly and return it to the storeroom. Scrap material should be collected regularly. A plan which is giving satisfaction on some roads is outlined below: Foremen are required to assemble all car and track scrap at convenient points on their sections. Scrap cars are placed on local freights each month on fixed days, and the conductors on these trains are instructed to stop when flagged and permit section men to load the scrap. Car and track scrap should be loaded in separate cars so as to avoid rehandling at scrap yards. In this manner any great accumulation of small scrap on the line of road can be avoided.

When these cars arrive at the storeroom they are placed at the classification bins so that both the unloading and classifying are done in one handling. With the proper care at the time the classification is being made, a great deal of good material may be recovered and made fit for further use. Reports of scrap material on hand for sale should be made by the maintenance of way storekeeper.

With the maintenance of way stock divided into reasonably small units, each in charge of an experienced maintenance of way man reporting directly and solely to a maintenance of way official, there should be no difficulty in keeping the stock balance down to a reasonable amount, and still furnish the material promptly and in the quantities needed.

DISTRIBUTING TIES, RAIL AND BALLAST

By W. S. Taylor

Superintendent of Terminals, Chesapeake & Ohio, Covington, Ky.

In distributing new ties the cars should be billed to various sidings along the line convenient to points where they are to be used so that the work train will not have far to run for ties. A supply of 21 cars should be contemplated for a day's work, using three forces of six men each, and placing a force at work on each car. Before starting, each force should be instructed as to how many ties are to be unloaded at each stop, the train crew, of course, having been advised as to what stops to make and where ties will be unloaded.

After rail is received the work train and rail derrick should be secured and the cars distributed at points along the line so they can be easily reached by the work train which is to pick up two cars at each time, placing one at each end of the rail derrick. In this way two cars can be handled at a time without any switching. A car of joint splices should be carried along with this train and one man placed in charge to distribute rail joints with each rail unloaded. When new rail is laid the old rail should be unjointed and the nuts taken off the bolts with wrenches and put back in the old joints. Those nuts that cannot be unscrewed should be broken off, the old bolts placed in the keg the new ones were taken from, and when the kegs are full placed at the tool house to be loaded on the scrap train. The old rail is to be loaded in the same manner that the new rail was unloaded, that is, with a car on each end of the rail derrick, the scrap rail being allowed to remain until last and picked up by itself in the same manner, using two cars at each end of the derrick, if there is enough scrap rail to justify the use of two cars.

In distributing ballast a work train should be ordered and enough cars given it for one day's work. The supervisor of track should go along to see that the ballast is properly distributed and not too much dumped at any one place. When conditions will permit, the same engine and train crew should be kept on the work train until the job is completed. If the work is done in the terminal, the yardmaster should pick his best yard crews, while if on the road, the trainmaster should pick his best road crews and see that the train despatcher gives the work trains all the help possible.

THE DISTRIBUTION OF NEW MATERIAL AND COLLECTION OF SCRAP

By E. K. Coggins

Chief Clerk to Roadmaster, Southern, Knoxville, Tenn.

The work of distributing or picking up the heavier track materials, such as rail, crossties, switch timber and ballast, can best be done with the use of a regular work train, and movable force under the supervision of the track supervisor or roadmaster. The material can be put where needed and handled more satisfactorily and economically with a gang of men which is organized and trained for the purpose than by bunching several section crews to load or unload the material with the local freight trains.

The miscellaneous roadway scrap, such as spikes, bolts, tie plates and anglebars, together with all kinds of car and engine scrap, that is continually falling from trains, should be picked up daily by the section men in connection with their other work and assembled at their headquarters for shipment to the division or district scrap pile. One day in each month should be known by all concerned as "scrap day," and each section force should be required to go over the entire section with a push car, the whole gang walking, and search the track and right of way carefully, gathering every piece of scrap from the broken spike or bolt to the draw head, brake rigging or car door, and hauling it to the nearest station.

Before the end of each month the supervisor should arrange for his month's supply of spikes, bolts, tools and other light material and supplies, to be handled in a car over his territory, preferably by the local freight on scrap day. The roadmaster or supervisor should accompany this car, and furnish each crew with the actual amount needed for the next month's work. The section men can arrange to meet the train on that day, receive their supplies, exchange their old tools for repaired ones and load the scrap and surplus material.

At least two cars should be used for the scrap, so that the roadway and mechanical material can be kept separate. This is necessary when applying the scrap on sale orders, as the different classes are sold at different prices, and besides, each department should have the proper credit for its material. It is also necessary for the mechanical scrap to go direct to the shops for the purpose of being sorted, as a greater part of that which has dropped from trains can be used again. The time spent by section men in gathering scrap is profitable and a section crew will soon pick up enough at the price it brings to pay for their time and have a nice surplus for the railway company.

The Railways of German East Africa.—In the construction of their Colonial Railways the Germans apparently were not unmindful of their defense. Their greatest system, the Dar-es-Salaam-Tanganyika Railway, commonly called simply the Tanganyika Railway, was completed last year, and is approximately 780 miles in length. At Tabora, 530 miles inland from Dar-es-Salaam, where many great trade routes converge, the Germans constructed a massive modern fortress. The great value of the railway as an economic factor lies in the fact that it borders on three great inland seas—Nyassa, Tanganyika and Victoria Nyanza—thus linking up the trading centres, the great lake system of Central Africa, and the River Congo with the east coast ports.

Methods of Conducting Annual Track Inspections

A Resume of the Practices of a Number of Roads to Stimulate the Efficiency of the Maintenance Forces

There is a wide divergence of opinion regarding the advisability of making annual track inspections and awarding of premiums as a means of promoting efficiency among the employees in the maintenance of way department as well as regarding the advantages secured from such practices. The objection most frequently raised to the annual inspections and to the award of prizes is that track work receives a temporary stimulus immediately preceding the inspection and that the efforts of the track forces are directed towards having the track in the best possible condition at the time of inspection to its possible neglect at other seasons. Those opposing this practice argue that better results may be secured by giving close personal attention to the matter of supervision and to the maintenance of a uniform condition of track throughout the entire season. On the other hand, officers of those roads on which the track inspections have been regularly adopted feel that such inspections are supplementary to continued close supervision and therefore do not result in the standards being lowered during the early part of the season, but provide an added incentive for good work.

An important advantage of a systematic inspection, especially when participated in by supervisors and track foremen in conjunction with the higher officers, is the opportunity for instruction regarding standards. Such a trip also offers an opportunity for these men to meet and to discuss many matters of interest to their departments while on the ground, enabling conclusions to be drawn with reference to methods of doing work more satisfactorily or for making improvements while the conditions are clearly before them without the delay resulting from correspondence.

On the roads which maintain a systematic method of inspection, the methods differ widely, from that of basing the awards upon one annual inspection to that of determining them upon several inspections made at intervals as frequent as six weeks to overcome as far as possible the tendency of the men to create a temporary artificial standard.

The number of roads which conduct such inspections, several of whom have retained this practice for a considerable number of years, indicates that they have found them profitable. The plans followed vary to a considerable extent according to the attempts of the officers of the individual roads to overcome objections which may appear more or less important to them. Because of the general interest in this subject we will outline the methods adopted in making inspections on a number of roads during the past season.

Probably the first road to adopt a system of track inspection permanently was the Pennsylvania Railroad. This road has also developed one of the most comprehensive methods of inspection, while the prizes offered are the largest. As the development of this system was described in detail in a recent issue (*Railway Age Gazette*, January 22), we will not refer further to it here.

PENNSYLVANIA LINES

The Pennsylvania Lines also conduct an annual track inspection which, however, differs materially from that on the parent system east of Pittsburgh. On the Pennsylvania Lines the inspection is confined to one annual trip over certain of the main lines, usually covering the Pan Handle from Pittsburgh to Chicago and the Fort Wayne on the return. The inspection party consists of the general manager and his staff, including the chief engineers maintenance of way and their assistants, the general and division superintendents, the division engineers, the assistant division engineers and the supervisors, and it travels by special train.

Three main prizes are awarded annually; one for the best supervisor's sub-division based on line and surface; another for the best track foreman's section based on line and surface, and a third for the best supervisor's sub-division based on all points. In addition, a smaller prize is given to the track foreman on each supervisor's sub-division having the best section based on all points. The first two prizes are determined by the markings of a special committee composed of two superintendents, two division engineers and two supervisors, all from portions of the line not under inspection. The third prize and those for the section foreman are awarded by another committee composed in a similar manner.

LACKAWANNA

The Delaware, Lackawanna & Western adopted a new method in making its annual inspection this year in that the inspection was made by a committee composed of three experienced maintenance of way engineers not connected with the road. This committee consisted of A. H. Weston, track engineer of the Lackawanna Steel Company; H. S. Rogers, engineer maintenance of way of the Delaware & Hudson, and S. B. Rice, engineer maintenance of way of the Richmond, Fredericksburg & Potomac. This committee was accompanied by the chief engineer and principal assistant engineer of the Lackawanna with the roadmaster in charge of each sub-division under inspection.

Each section and sub-division is given a rating. The best section on each division is recognized by awarding to the foreman a gold medal, while a silver medal is given to the foreman having the second best section. Section foremen winning the first prize for three consecutive years receive an additional reward of $10 per month in addition to their salary, while their names are also placed on an efficiency list. This honor has already been secured by several foremen. If the result of the annual inspection for any year shows this section inferior to any other on the division the extra compensation heretofore granted the foreman ceases.

NORFOLK & WESTERN

The Norfolk & Western makes an annual inspection in October of each year. Previous to this year it was made by the section foremen, who were divided into committees, each committee being composed of all the foremen on one roadmaster's division. The party travels on an inspection car which is carried on regular trains wherever that is practicable. No committee was allowed to inspect the same division two years in succession, nor to participate in the inspection of its own division. Before beginning the trip the roadmaster appointed one subcommittee on line and surface, another on switches, frogs and road crossings, a third on ditches and roadbed, another on right of way and fences and one on station grounds and policing. Each member of each subcommittee was furnished an inspection blank and gave his undivided attention to the particular subject assigned to him. A rating was given to each section and at the end of the trip the forms were taken up and the averages figured.

By this method the inspection was made by the foremen instead of by the higher officials and there were no complaints of unfairness or partiality. Aside from the rivalry created one of the principal advantages noted was the promotion of uniformity of work and compliance with standards. A disadvantage of this method of inspection was that each division was inspected by a different corps of men, some of whom marked on a higher basis than others. It was not, therefore, possible to make a comparison between the different divisions, although the relative standing of sections on any one division was clearly shown.

The method was changed last year, therefore, so that the roadmasters on each of the two general divisions made an

inspection of their respective divisions similar to that made by the section foremen. Committees are now selected from the roadmasters and prizes are awarded to section foremen from the markings made by the roadmasters' committee, a roadmaster being excluded from the committee when his own district is involved. The section foremen also make their inspection as heretofore, although their markings are used for comparative purposes only.

The section on each roadmaster's division showing the highest total average rating is awarded the first prize of $30. Second and third prizes of $20 and $10 are also given. An additional prize of $25 is also given to the foreman on each roadmaster's division whose section shows the greatest improvement during the year, this latter prize being awarded by the division officials familiar with the conditions which have existed during this period and the extent of the improvement made.

THE LEHIGH VALLEY

The Lehigh Valley conducts an inspection each fall by special train with a special observation car, which is a converted steel express car with one end removed and with a sloping floor. The inspection covers only the main line from Jersey City to Buffalo and the Perth Amboy branch. The engineer maintenance of way and his assistant, the division superintendents, division engineers and track supervisors compose the inspection party. The division engineers and supervisors are divided into two committees, one of which marks the condition of the track with reference to line and surface, joint bolts, anti-creepers and insulated joints and the other with reference to ties and tie spacing, ballast and ballast line, sod line, drainage and general appearance. The train moves over the line slowly and all ratings are made by individual miles. These cards are turned in to the engineer maintenance of way, who compiles this data into a report, copies of which are furnished to each division engineer, supervisor and foreman. In establishing the rating the committees consider only the actual condition of the track as it exists, without reference to any heavy renewal work which may have been done during the season.

No prizes are awarded, the reports being prepared only for the information of and as a stimulus to his supervisors and foremen. One of the benefits derived from this inspection is in having the party inspect the entire main line to see how work is progressing beyond the limits of their immediate territory. This method of inspection has now been in use for five years.

HOCKING VALLEY

The Hocking Valley regularly makes an inspection of track early in November under the general direction of the chief engineer and the engineer maintenance of way. The inspection is made by special trains consisting of three combination sleeping and dining cars with a special inspection car on the rear. About 20 officers, including the general manager, the heads of departments, the master mechanic, supervisors of track, certain foremen and frequently officials of other lines, participate in the inspection and assist in making the ratings. Each member of the party is provided with a book containing about 100 pages, one of which is allotted to each section. On a page each inspector assigns a rating to each mile, considering all points.

The inspection party is divided into four groups, one paying special attention to line and surface, another to ballast and ditches, the third to ties and crossings and one to sidings and policing. Following the inspection the data are compiled in the office of the chief engineer. In determining the final ratings line and surface is given five times the weight of sidings and policing, while the other two are given twice its weight. Two prizes of $20 and $10, respectively, are awarded to the section foremen receiving the two highest ratings on each of the five supervisors' districts. A prize of $50 is also awarded to the supervisor receiving the highest rating. In addition, the section foremen receiving the first and second prizes have boards sent to them for erection on their section houses stating that theirs are the premium sections.

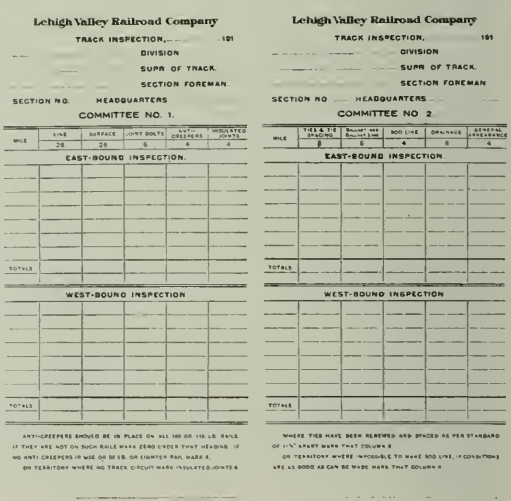
QUEEN & CRESCENT

The annual track inspection on the Queen & Crescent is made in November of each year, by special train with an observation car at the rear. Four men grade the line by individual miles, their marks being averaged for each section foreman's section and for each supervisor's district and roadmaster's division. One man marks with reference to line and surface, another on the condition of the joints and spacing of ties, a third on drainage, ditches and banks and also policing, and the fourth on spiking and also on switches and sidings. A committee termed the revisory committee exercises general supervision over the marking of these four men in an effort to preserve uniformity.

In preparing the averages the markings on the various subjects are given the following relative importance:

Line	20	
Surface	25	
Total		45
Joints	15	
Spacing ties	10	
Total		25
Drainage, ditches and banks	15	
Policing	5	
Total		20
Spiking	5	
Switches and sidings	5	
Total		10
		100

A premium of $50 is awarded to the foreman of the section receiving the highest mark. A prize of $25 is also awarded to



Sample Cards Used in Lehigh Valley Annual Inspection

the foreman of the section receiving the second highest mark and one of $75 to the supervisor of the district receiving the highest average mark for the entire district.

THE WEST POINT

The Atlanta & West Point Railroad and the Western Railway of Alabama conduct an inspection of track annually some time between April and October, the date varying from year to year to keep the men on the alert and expecting the inspection at any time. In this way the foremen are encouraged to keep their track in good condition throughout the season and there is no incentive to temporary stimulus at any one

time. The inspection last year was made in June and covered about 600 miles of track. Three days were required for the trip, which was made by a special train consisting of the necessary tourist sleepers, a dining car and a coal car fitted up with a canopy and with seats for use as an observation car.

The inspection is made by the section foremen themselves under the supervision of the superintendent maintenance of way and such other officials as he may designate. Last year all the section foremen were assembled at one end of the line. The supervisors, trainmasters and roadmasters accompanied the inspection train over their own districts. The entire party was composed of about 80 men. Each man was provided with a rating card and each division was inspected and rated by the foremen from other divisions. The men were required to inspect personally each frog and switch on the ground to impress upon them the importance of this detail of track maintenance. Rails, ties, embankments, ditches, etc., were also examined and the men discussed in detail any apparent faulty or good work that came to their attention. In the evening short talks were made by the superintendent maintenance of way on general subjects such as safety, discipline, loyalty, etc., and the foremen were called upon to express their opinion on these subjects in open discussion.

Premiums are awarded to the track supervisors having the best maintained districts and to the section foremen on each supervisor's district having the best section. In addition, an attractive sign is placed on each premium section.

NORFOLK & WESTERN RAILWAY COMPANY.

INSPECTION BLANK. *October* ________ *191*__

________ *Division.* *R. M. Division No.* ________

	SECTIONS—CONDITION (10 Perfect.)	Average
SECTION No		
Line and Surface		
Switches, Frogs and Road Crossings		
Ditches and Roadbed		
Right of Way and Fences		
Station Grounds and Policing		
TOTALS		
AVERAGE		

Hocking Valley

22d Annual Track Inspection

District ________ **Section** ________

Inspector will note his opinion of the average condition of each mile by numbers ranging from 50, very poor, to 100, perfect.

60 indicates poor, 70 fair, 80 good, 90 very good, and intermediate numbers, other variations.

Miles			REMARKS
1			
2			
9			
10			

________ **Inspector.**

Sample Inspection Record Blanks

THE ERIE

The Erie also conducts an annual track inspection, using a car which records automatically the gage and the cross level of the track, low joints and car swings or lurches. In connection with this autographic record consideration is also given to line and surface, ditching, policing and the general appearance of the track and right of way, officers marking on these various points entirely independent of the autographic record. In awarding prizes consideration is also given to the expenditures made on the various sections and due credit is given to those supervisors and foremen maintaining the best track at the least cost.

A prize of $200 is awarded to the supervisor having the best maintained sub-division and another prize of $100 to the supervisor having the second best sub-division. The section foreman maintaining the best section on each supervisor's division receives a prize of $100, while a second prize of $50 is awarded to the foreman having the second best section on each sub-division. A special prize of $150 is also awarded to the section foreman having the best section on each grand division. Similar prizes are also awarded on branch lines, those for the supervisors being the same as on main lines, while those for the section foremen are $50 and $25, respectively. Suitable signs are also placed at the section houses of the prize sections. In awarding prizes the winners of the previous year are not allowed to compete, but are expected to maintain the showings made previously. This inspection is made at the close of the track work each year.

CANADIAN PACIFIC

For the past two years the Canadian Pacific has awarded annual prizes for the maintenance of track. Sixty-two prizes in all are awarded, consisting of 1 general manager's prize, 4 general superintendents' prizes, 14 division superintendents' prizes and 43 roadmasters' prizes, all of which go to section foremen.

These prizes are based upon the quality of the work done by the various forces throughout the season rather than on the actual physical conditions on the different sections at the end of the season. Careful consideration is given to the condition of and the work done on ditches, spiking, lining, maintenance of surface, rail wear, switches, sidings, station grounds, fences, etc. The amount of labor expended, the physical condition of the sections as regards grades, alinement, drainage, etc., and the character of the roadbed are also taken into consideration, as is the amount of extra gang work. As the end of the season approaches each roadmaster carefully considers these conditions for each section on his territory and reports to the superintendent of that division the foremen who should receive the prize. The division superintendent and the resident engineer then select the prize sections on each roadmaster's district on that division and select the winner of the superintendent's prize, reporting this to the general superintendent. The latter officer in consultation with his division engineer then decides which superintendent's prize section is entitled to the general superintendents' prize. The best section on each division is then inspected by the general manager, the engineer maintenance of way and the division officers who award a general manager's prize.

ROCK ISLAND

The Chicago, Rock Island & Pacific conducts a track inspection during October and also in the spring of each year. The Rock Island is divided into three grand districts. A committee on each district, consisting of the general manager, the assistant general manager, the engineer maintenance of way and the division superintendents, goes over the track early in the spring before active work begins and again

after the season's work has been completed. These committees mark the several points on the following basis:

Line and surface	Value 65	marks	(Maximum)
Ditches, drainage and roadbed	" 15	"	"
Frogs, switches and joints	" 10	"	"
Spacing ties	" 5	"	"
Right of way, fences and station grounds	" 5	"	"

In the spring the markings are made for each section strictly in accordance with the above. Between the spring and fall inspections a record is made of the actual expenditures on each section, due regard being given to the placing of new rail or ballast for any extra gang work. On the fall inspection the markings are again compiled, due consideration being given to the condition of the track, the amount of money spent, etc. The improvement in percentages on each section is noted and the section foreman whose track shows the greatest percentage of improvement on each roadmaster's territory is awarded a prize. In this award the actual physical conditions existing on those sections such as the character of the soil composing the roadbed, the condition of the rail and other items which would materially affect the work of the foremen are also considered. In the same general way prizes are awarded to the roadmasters on each division whose territories show the greatest percentage of improvement on all sections. It is the belief of the officers of this road that material benefit has been secured since the adoption of this system four years ago. One defect, however, has been realized in that while the section foremen may by the application of hard work receive a high rating in the spring, this acts against him in the comparison in the fall when the percentage of improvement is not as great as on such sections where the track may have been neglected during the winter. Studies are now being made to remedy this condition.

as they pass over them on the basis of 10 as perfect. While these results are tabulated, no prizes are awarded to the foremen or supervisors.

That evening the men are given a banquet and a theater party. On the following day the party travels by special train over the main line of a neighboring road to give the men an opportunity to observe the track conditions and the standards of maintenance on other lines. Three years ago this party traveled from Erie to Buffalo over the Lake Shore and then to Niagara Falls and return over the New York Central & Hudson River. In 1912 this trip covered the lines of the Pittsburgh & Lake Erie and the Lake Shore & Michigan Southern from Pittsburgh to Erie, while in 1913 the party went over the Baltimore & Ohio from Pittsburgh to Cumberland, returning over the Western Maryland and the Pittsburgh & Lake Erie. Last fall the trip was concluded at Pittsburgh without a visit to any other line.

NEW YORK CENTRAL

The New York Central & Hudson River has conducted an annual inspection of main and branch lines for a number of years. The main line between New York and Suspension Bridge is inspected by a main committee, while the branch lines are inspected by sub-committees composed of maintenance officers from other divisions. No prizes are awarded to the supervisors, but the foremen receiving the highest rating

BESSEMER & LAKE ERIE RAILROAD CO.

Report of Condition of Track 1914

Supervisor		SECTION FOREMAN	COMMITTEE No. 1		COMMITTEE No. 2			Sec. No.	COMMITTEE No. 3		COMMITTEE No. 4				Total	Average
			Line	Surfacing	Ballast	Switches	Sidings		Joints	Spacing Ties	Ditches	Road Crossings	Station Grounds	Policing		
W. G. SUTTLES	36	C. M. Pomeroy						36								
	4	W. D. Pellver						4								
	5	J. P. Sheehan						5								
	6	L. W. Wescott						6								
S. B. MARTIN	7	T. M. Sheehan						7								
	8	M. A. Hunt						8								
	9	T. W. Wescott						9								
	10	J. S. Swartz						10								
	35	Joseph Bell						35								
		TOTAL														
		AVERAGE														

PARTY USING THIS CARD WILL SEE THAT HIS NAME IS WRITTEN ON THE BACK

Bessemer & Lake Erie Inspection Card

BESSEMER & LAKE ERIE

The method of conducting the annual track inspection on the Bessemer & Lake Erie varies considerably from those described above. Ordinarily the inspection covers two days. The first day the party, composed of all the section foremen and supervisors, the engineer of track, and the chief engineer, assembles at one end of the line and travels over it to the other end. Four committees, each consisting of four men, are appointed to consider line and surfacing; ballast, switches and sidings; joints and tie spacing; and ditches, road crossings, station grounds and policing. The members of these committees mark the condition of the various sections on each main line subdivision receives a premium of $3 per month for the ensuing year, while the foreman having the best section on each main line division, except the Electric division, receives an additional premium of $2 per month. On branch lines the foreman having the best track on each subdivision receives a premium of $2 per month, while a premium of $3 per month is awarded to the foremen receiving the highest ratings on yard sections. The object of the system on this road is to reward the foremen for individual efforts during the year rather than for the appearance of their sections on the day of inspection. For this reason the amount of work done on the different sections during the year is taken into consideration and certain sections receiving high marks are excluded in making the award of premiums because of extra gang work on them or because the foremen have been in charge of these sections for only a short time.

ENGLISH RAILWAYS

It may be interesting to note that similar methods of inspection are employed on several foreign railways, including the London & Southwestern and the Northeastern railways

of England. On the latter road challenge cups, medals and money prizes are awarded to the maintenance of way forces. To determine these awards an inspection is made by special trains with observation cars traveling at a rate of about 20 miles per hour. Ten days are spent in the inspection of the main lines, while three days additional are spent in the inspection of the yards, which latter inspection is made on foot.

One committee confines its attention entirely to the alinement and surface of the track and to the condition of the joints, while the second committee observes the general appearance of the ballast, fences, policing of the right of way, etc. These committees are divided into sections each of which remains on duty about an hour at a time.

In the marking of the first committee all faults noted by the judges are recorded and values are assigned to them according to their nature. The number of these defects is then divided by the distance traveled over in each section to bring them to a standard of so many defects per mile. The supervisor is present during the inspection to advise the judges of the limits of the sections and to answer any questions they may desire to ask. A list is prepared giving the number of defects per mile on each section, that with the least number receiving the highest award. In arriving at the final decision, allowances are made for sections being short-handed, for the age of rail, the nature of the traffic, etc.

The prizes consist of a director's challenge cup and a silver medal for the best supervisor's division, an engineer's challenge cup and a silver medal for the best section, and a district engineer's challenge cup and a silver medal for the best section in a busy yard. Money prizes of $15 each are also awarded to each of eight supervisors, and of $5 to each of 45 section foremen, with smaller prizes to the laborers in their gangs.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since January 22, 1915:

One Effect of Retrenchment in Maintenance of Way Expenditures.—An editorial commenting on the relations between maintenance of way and maintenance of equipment expenditures was published in the issue of January 29, page 175.

New I. C. Station and Track Elevation at Memphis.—The new union station built by the Illinois Central at Memphis, Tenn., and used also by three other roads, and the track elevation work involved in the construction of the new line to reach this terminal were described in the issue of January 29, page 179.

New Car Ferry of the Florida East Coast Railway.—An illustrated description of a car ferry recently completed for the Florida East Coast to complete the "all-rail" route between the United States and Cuba was published in the issue of January 29, page 188.

A Comparison of the Old and New Lines of the Canadian Pacific at Rogers Pass, B. C.—An abstract of a statement by J. G. Sullivan, chief engineer of the Canadian Pacific, outlining the economies which it is expected will be effected by the construction of the five-mile tunnel at the summit of the Selkirk mountains, was published in the issue of January 29, page 194.

New Bridge Across the Mississippi River at Keokuk.—An illustrated description of the double-deck structure for which the contract has been let, to replace an existing structure across the Mississippi river at Keokuk, was published in the issue of January 29, page 200.

Unemployment on Railroads.—Attention was called to the possibility of reducing the amount of unemployment by distributing maintenance work more uniformly over the year, in an editorial on this subject in the issue of February 5, page 214.

Some Record-Breaking Construction Projects.—An editorial recalling the numerous construction projects now under way which are of unusual size was published in the issue of February 5, page 216.

Progress on Summit Cut-off of the Lackawanna.—An illustrated description of the present stage of the construction work on this 40-mile cut-off, including two reinforced concrete viaducts of exceptional size and a tunnel 3,630 ft. long, was published in the issue of February 5, page 235.

The Price of Rails.—An editorial commenting on the action of the Algoma Steel Company, a Canadian corporation, in quoting open hearth rails at $25 per ton on board cars at the mills, as compared with $30 at the mills quoted by manufacturers in the United States, and the purchase of such rails by at least three American roads, was published in the issue of February 12, page 253.

Plans for the New Union Station at St. Paul, Minn.—The details of a plan proposed by the St. Paul Union Depot Company, representing the nine roads entering the city, covering a new union station and passenger terminal development to cost about $15,000,000, was described and illustrated in the issue of February 12, page 261.

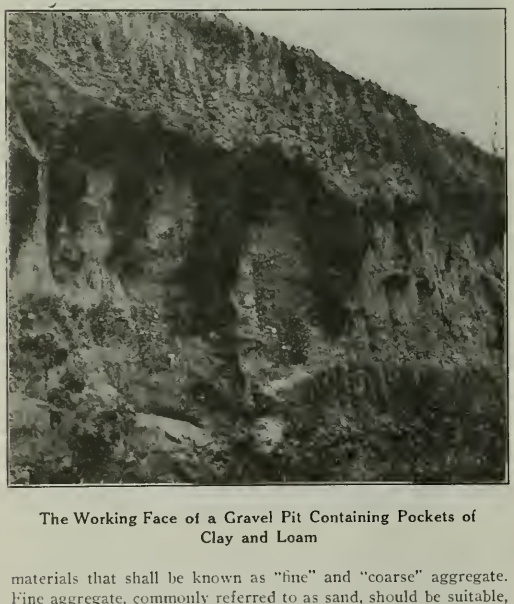
National Association of Scale Experts' Convention.—The report of this convention, including an abstract of a paper by A. Malmstrom, chief scale inspector, Atchison, Topeka & Santa Fe, on Foundation, Construction and Care of Track Scales, was published in the issue of February 12, page 269.

IMPORTANCE OF PROPER AGGREGATES IN CONCRETE CONSTRUCTION

By MacRae D. Campbell

Although there is an enormous amount of concrete apparently giving satisfactory service, there is also much that is not as good as it might be, as the result of one of several causes. Perhaps the greatest amount of poor concrete results from indifference in selecting and proportioning aggregates.

Only good, hard, clean, well-graded aggregates should be used. No bank-run material should be used without screening and reproportioning the fine and coarse materials, so as to produce a properly graded bulk of aggregate containing a minimum percentage of voids. Standard specifications carefully define the



The Working Face of a Gravel Pit Containing Pockets of Clay and Loam

materials that shall be known as "fine" and "coarse" aggregate. Fine aggregate, commonly referred to as sand, should be suitable, hard, durable, clean material, passing a No. 4 sieve. It should not contain more than 10 or 12 per cent of material passing a No. 50 sieve nor more than 5 per cent passing a No. 100 sieve. The coarser particles should predominate to produce strength and density. Coarse aggregate is material retained on a No. 4 sieve and containing particles which range from ¼ in. up to and including 1½ or 2 in. in greatest dimension, although in some cases this maximum may be exceeded in massive construction. This should be clean granite, trap rock, conglomerate, gravel or other hard, durable material, free from dust, loam, vegetable or other objectionable matter.

Clay, when it exists as a coating to the particles of aggregate, is undoubtedly injurious, as it prevents the proper adhesion of the cement to the surface of the sand particles. When clay of a silicious nature exists to a small extent throughout the mass of

the aggregate, in the form of separate particles, it appears to cause no serious harm in many kinds of concrete work; nevertheless, it is an adulterant and its presence is not desirable.

In many instances it is absolutely necessary to wash sand and gravel to remove objectionable matter before using them in a concrete mixture. This necessity is made apparent by one of the accompanying illustrations, which shows a gravel bank with overlying soil consisting largely of loam and organic matter, in part distributed in pockets through the bank. One can readily see that concrete made from material taken from such a source, and used without washing out the loam and other refuse, would be of very poor quality.

Forceful proof of this statement appears in the second illustration, which shows a pier in which bank-run aggregate obtained from the pit mentioned was used for the concrete. The disintegration that took place in the surface concrete before the pier had even been placed in service is apparent. Presumably the

Disintegration of a Concrete Pier in Which Bank Run Gravel From the Pit Shown in the Other Illustration Was Used

composition of the concrete throughout the structure is of a quality indicated by the surface.

That bank-run material is not suitable for concrete aggregate in its natural state can easily be shown by screening it. The average bank-run gravel will be found to contain at least twice as much fine material as coarse, while the proportions of fine to coarse material for good concrete should be practically the reverse; that is, about twice as much gravel as sand.

Two important and desirable qualities requisite in most concrete construction depend in great part upon proper grading and proportioning of materials; first, density and hence maximum strength; and second, watertightness. In the majority of gravel pits there is a great variation in the sizes of grains and pebbles and in the quantities of each. The same applies to deposits of gravel found in river beds and streams, where the current of water usually separates the different particles and makes regrading necessary.

One load of apparently good gravel from a pit is no indication of the run of the entire pit. No two loads from the same deposit will show the same proportions of sand and gravel. The fine and coarse materials are usually distributed in irregular seams and pockets, and when excavating begins on the face of the pit consequent drifting or falling down of materials does not produce a proper mixture of fine and coarse particles, regardless of how well mixed they may appear.

Aggregates may appear good yet be totally unfit for use. Casual examination is far from being a safe guide. Actual laboratory tests are sometimes necessary, but in all cases, construction foremen should be warned against using bank-run gravel without properly screening and reproportioning the fine and coarse materials.

Concrete mixtures made from bank-run gravel not only contain less cement per cubic foot of concrete, but the strength is reduced by the excess of sand. Experiments have shown that it is not only necessary but economical to pay laborers to screen bank-run material, so that it can be properly regraded and reproportioned.

It is not possible to produce an actual 1:2:4 mixture by taking 1 part of cement to 6 parts of ordinary bank-run gravel. A simple demonstration will show that the 1:2:4 mixture is richer in cement than the 1:6.

Take for example 2 cu. ft. of sand to which 1 cu. ft. (1 sack) of cement is added. When mixed together the cement is practically lost in the voids in the sand, so that the resulting mortar is very little over 2 cu. ft. in volume. When this mortar is added to 4 cu. ft. of crushed stone or screened gravel, properly graded, the same condition is repeated. The mortar is practically lost in the voids of the stone or gravel. As a result the volume of concrete is but little in excess of 4 cu. ft.

Even assuming that a bank-run material is well graded and that it contains approximately twice as much gravel as sand, the voids between the particles will be nearly one-half of the total volume, and the 6 cu. ft. of bank-run material would separate into 3 cu. ft. of sand and 6 cu. ft. of gravel.

If one sack of cement is added to 6 cu. ft. of bank-run gravel, the cement will be lost in the large amount of voids between the particles, the resulting concrete being 6 cu. ft., or the volume of the bank-run gravel. In one case there will be slightly over 4 cu. ft. of concrete containing one sack of cement and in the other case 6 cu. ft. of concrete with a like amount of cement, which means that the latter is a much leaner or weaker mixture. In addition, the excess of sand contained in the bank-run material will further weaken that concrete.

A 1:4 mixture of cement and bank-run gravel may produce a volume of concrete equivalent to that of a 1:2:4 mix, but the resulting concrete will be weaker because of an excess of sand, even though the material may be clean. If the bank-run material contains twice as much sand as gravel, it will require practically a 1:2½ mixture to equal the strength of the ordinary 1:2:4 mixture, since the proportions of the materials mixed with water must be the same. The volume of concrete secured from the same amount of cement would be reduced 40 per cent.

Railway Tunneling in the Pyrenees.—Despatches from Foix (Department of Arriège) state that the piercing of the tunnel under the Pyrenees at Puymorens was completed on December 31 under excellent conditions. The tunnel will be on the new line from Paris to Barcelona, via Toulouse.

Advantage of a Power Line for Electric Signals.—In the vicinity of Kansas City it has been found expedient to use alternating current for electric signals in order to prevent excessive damage to the apparatus by floods. In former times occasional overflows of the river ruined the batteries and caused great damage to relays and other delicate machinery. With alternating current, however, the batteries and their containers are eliminated; and all working parts, and those liable to damage, can be placed at the top of the signal post, out of reach of the highest flood.—W. H. Arkenburgh, in *The Signal Engineer*.

Relations of the Section Foreman and the Public

Two Discussions of a Field Now Largely Neglected for the Cultivation of Favorable Public Sentiment

The railways are coming to an increasing realization of the importance of educating the public regarding the problems now confronting them and considerable attention has been devoted to this subject during the past few years. The two papers published below call attention to one possible factor in this work which has been overlooked to a large extent.

THE SECTION FOREMAN A REPRESENTATIVE OF THE RAILROAD

By J. T. Bowser

Maintenance of Way Department, Queen & Crescent Route, Danville, Ky.

The local agent is usually spoken of as the representative of the railroad in the majority of its dealings with the public and, while the importance of the right attitude on the part of the agent is acknowledged, we should not overlook the importance of the right attitude of the section foreman as well. The latter employee is seldom considered except in connection with the maintenance of track or similar duties, yet he is in daily touch with many people whom the agent sees perhaps not oftener than once or twice a year, and his relations with these people, farmers in the main, often take on an intimacy that is closely akin to the neighborliness that is found among the farmers themselves. While mowing the right of way, the foreman borrows an extra scythe while the farmer borrows an extra pick or shovel, and numberless other small accommodations are exchanged. With the right attitude on the part of the foreman, the railroad becomes an agreeable neighbor instead of a "greedy corporation" to be "held up" on every opportunity.

The right of way fence should be kept in good condition by the foreman, or if it is too large a job for him to handle he should report it to the proper authority and so advise the property owner. Should the local law divide the responsibility for the maintenance of the fence, the foreman should, on advice from the office, explain this to the property owner.

If the foreman's relations with the owners of adjoining property are what they should be, he can often succeed in getting the farmer to plow fire guards to prevent the spread of fire in dry weather. If he has succeeded in making the railroad the right sort of a neighbor he has largely counteracted the spirit of "let it burn, the railroad will have to pay me a good price for it." As the first investigator of fire and stock claims, the foreman's relation with the claimant will have no little influence on the attitude of the claimant or the reasonableness of the claim.

A tactful foreman may often succeed in impressing the man who is careless about allowing his stock to get on the right of way with the fact that, though the railroad may reimburse him for his loss, there is still a loss to the community at large through the fact that this particular animal has served no useful purpose, and further, that such carelessness endangers the lives of the traveling public and the property of the railroad.

The matter of drainage is also a very fruitful source of complaint and even of legal controversy. In the construction and maintenance of a railroad it is of course necessary for drainage to be diverted from its natural channel in many cases. In the course of maintenance, the foreman should scrupulously respect the rights of adjoining property owners when he is ditching or otherwise disposing of water from the right of way, and in cases where the diversion of drainage onto adjoining property is absolutely necessary, he should, if possible, secure the permission of the owner, or failing in this, report the matter to his superior officer.

Foremen should endeavor to keep the right of way clear of weeds of a character harmful to the adjoining farm or pasture lands. Though the right of way may not be injured thereby, it is an injustice to the adjoining property holder. It is often good policy, if rules permit, to allow the farmers to remove old ties released from the track from the right of way. These are of no value to the company, but are of considerable value to families, more especially in sparsely timbered country. For this privilege there are other privileges which the foreman is often obliged to ask in return, such as drinking water for the gang when a supply on the right of way is not convenient.

The right sort of an acquaintance among shippers or others using the station grounds at small stations will be of material assistance in keeping these grounds free from trash, etc. Proper respect for private property should be required of men in the gang at all times. The animosity of neighbors is often incurred by untoward acts on the part of rowdies among track laborers. The foreman should be allowed considerable latitude in his dealings with the farmers, as it will increase his loyalty and self-respect, and an interchange of courtesies will create a spirit of fairness toward the railroad, which is badly needed in public sentiment.

THE SECTION FOREMAN AND THE PUBLIC

By W. E. Schott

Section Foreman, Southern Pacific, Benson, Ariz.

Like any other business enterprise, the financial success of a railroad system depends upon the volume of patronage it receives from its respective customers. To get as much business as possible, large amounts of money have been expended by our railroads for advertising purposes and for a force of commercial agents; sales men, to bring the respective advantages of each road before its customers, the general public; but only during late years steps have been taken to induce railway employees in different departments to secure customers for their roads.

The intelligent section foreman has many chances to make customers and what is infinitely more to the point, to make friends for the railroad which employs him. The territory, which he controls, is a narrow strip of land from 100 to 200 ft. wide and from 5 to 10 miles long. Sometimes along this stretch of ground he can be found every day in the year, working his small crew of laborers. All around him, joining the right-of-way fence on both sides, live his neighbors, the farmer and the rancher, and incidentally the railroad's patrons.

If he has been on his particular section for any length of time and is not a confirmed grouch, he knows every one of these men personally and many intimately. Hardly a day passes without his meeting or speaking to one of them. Often one of his neighbors has a job on hand which he cannot handle without a little help, such as pushing a wagon out of a mudhole and the foreman and his crew are asked for a minute's assistance; now and then the foreman takes a few rotten ties out of the track which, while useless for the railroad, are accepted gladly by the farmer for stove wood. In fact, there are a thousand occasions where the foreman can extend little favors to his neighbors which are highly appreciated by them and which are bound to create a neighborly, friendly feeling between the section foreman and the people along the line. By impressing upon them the fact that those favors are really given by the railroad, the foreman can aid considerably in having this friendly feeling also extended towards the railroad company.

Being a working man himself, just like the farmer or ranchman, the foreman's advice and counsel in matters concerning the railroad will always be accepted with more trust and confidence than anybody's else.

Nine times out of ten when the settler along the right of way

has some real or imagined grievance against the railroad, the section foreman is the first one to whom he will come for advice. He is the nearest representative of the railroad, and knowing him as a good friend and neighbor for many years, he has no doubt but that the foreman will give him his unprejudiced opinion as to whether he has a real complaint or not, or whether he will gain anything by making such kick.

Many small damage suits, perhaps not very important individually, but forming quite an item in the aggregate, have been settled by the section foreman convincing the irate farmer of the unfairness of his demand. Perhaps his argument was not quite as strong from a technical standpoint as the one the company's counsel or claim agent would have made; but as he was a fellow toiler and had proven a good friend, his argument carried far more weight than any word any high-priced lawyer, representing the road, could have said.

Another possibility of immense value to his railroad lies in the foreman's power to change to some extent public opinion towards corporations. Unfortunately, relations between the general public and the railways are not always friendly, and in consequence laws have been passed which hamper the railroads enormously, without being of great advantage to anybody. There is no question but that some of these laws have been passed on account of the antagonism for the railroads; and more will be passed if the railroads do not exert their utmost to change such public sentiment.

The best and about the only way to do this is through the employees. None of them has a better chance to accomplish something worth while in this line than the section foreman, who is in daily intercourse with a certain portion of the public.

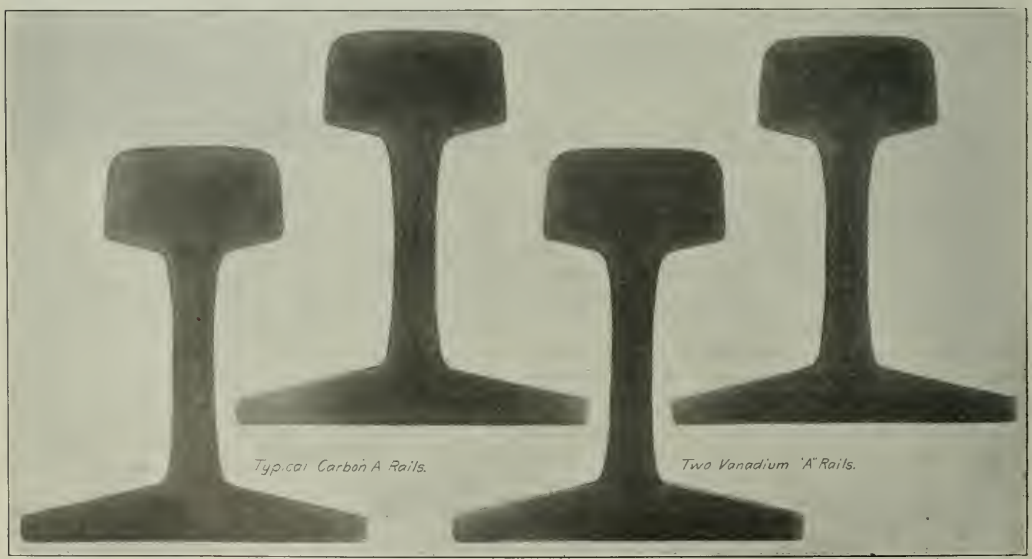
VANADIUM STEEL RAILS FOR THE D. L. & W.

Two 100-ton heats of vanadium steel rails were recently rolled by the Pennsylvania Steel Company for the Delaware, Lackawanna & Western. These rails were of the road's standard 105-lb. section with the same chemical composition that is used in the carbon basic open-hearth rails except for the addition of vanadium and the reduction of 0.10 per cent. to 0.15 per cent in carbon. The only requirement in the road's specifications as to chemical composition is that the phosphorus content must be less than 0.04 per cent. Two typical open-hearth heats rolled at the same time showed the following average composition: Carbon, 0.65 per cent; manganese 0.66 per cent; nickel, 0.45 per cent; phosphorus, 0.020 per cent; sulphur, 0.057 per cent; chrome, 0.24 per cent, and silicon, 0.14 per cent. The corresponding chemical contents of the two vanadium heats were: Carbon, 0.52 per cent; manganese, 0.70 per cent; nickel, 0.41 per cent; phosphorus, 0.012 per cent; sulphur, 0.056 per cent; chrome, 0.19 per cent; silicon, 0.11 per cent, and vanadium, 0.150 per cent.

The vanadium rails were required to meet the same drop test requirements as to deflection and ductility prescribed for the standard D. L. & W. rails, which limit the deflection for the first blow to a minimum of 0.85 in., and a maximum of 1.30 in. The minimum deflection in the six vanadium rails tested was 0.88 in., and the maximum 1.08, the average being 1.00 in., as compared with a minimum of 1.00 in., a maximum of 1.08 in., and an average of 1.04 in., for the carbon open-hearth heats. In elongation under the drop test three of the six vanadium rails tested met the specifications under the first drop and the other three under the second drop, while none of the carbon rails met it under the first drop.

In the tensile test the two vanadium heats showed an elastic limit of 85,800 lb. per sq. in., as compared with 60,437 lb. for the two carbon heats and a tensile strength of 139,280 lb. per sq. in., as compared with 132,032 lb. per sq. in. The average elongation in 2 in. was 10.5 per cent for the vanadium and 10.4 per cent for the carbon heats and the reduction of area 18.0 per cent and 17.7 per cent, respectively. The vanadium rails also showed greater hardness, the average Brinnell number for the vanadium test being 297 and for the carbon 274. In brief, then, the vanadium rails showed in the tests an increased strength and hardness with approximately the same deflection under the first blow of the drop test and a slightly better ductility.

Accidents to Trackmen.—As a result of the safety campaign on the Chicago & North Western the number of trackmen killed was reduced from 21 in the year 1910 to 17 in 1914 and the number injured from 1,777 to 1,203. During this period the mileage of line operated by the company has increased from 7,650 to 8,000.



Etched Cross Sections of Two Carbon and Two Vanadium Rails Showing Segregation

THE ESSENTIAL ELEMENTS IN THE DESIGN OF SWITCH CONNECTIONS

By W. F. Rench

Supervisor, Pennsylvania Railroad, Perryville, Md.

The design of switch connections embraces the determination of two distinct questions: First, the number of frog best adapted to the space available and the service required; and, second, the length of switch most suitable for use with the selected number of frog. The former is largely an operating question, while the latter can only be decided by a close analytical study of the mathematical functions. A purely theoretical consideration of the physical question indicates that the ideal relation exists when the switch angle is no greater than one-fourth the frog angle. But experience has shown that quite satisfactory results are obtained when this ratio is as low as 1 to 3½. It is readily seen that any increase in the length of switch employed with a particular frog tends to increase the degree of curve of the turnout, and it is this fact mainly which restricts the choice of length.

In the table of the principal functions for various combinations the lead has been modified within practical limits from the strictly theoretical dimension, with a view to the use of commercial lengths, in the main rail, assuming these to be generally 25 ft., 27 ft. 6 in., 30 ft., and 33 ft., or where this is not practicable, of such lengths cut in two in the proportions necessary to make the difference between the main rail and the turnout arc. This difference follows a regular ratio and is obtained in every case by dividing 12 in. by the number of the connection, which it should be noted is not always that of the frog employed, but is the one which most nearly corresponds with the resultant curvature.

By the uses to which they are applied connections are divided into four general classes, viz.: siding connections; main track and siding connections for low speed; main track connections for medium restricted speed, and main track connections for the greatest practicable restricted speed.

Connections which are exclusively of the first class consist of those over which road power cannot operate, and they are therefore less than No. 6. Because of the menace to passenger traffic such frogs should be rigidly excluded from main tracks carrying passenger traffic. The typical frog of this class is the No. 5, which average practice fixes as the lowest number that will satisfy the requirements of the safety appliance law. It requires no demonstration to show that the proper length of switch to be used with this number of frog is 10 ft. In fact, it is generally recognized that this length of switch is the minimum that may be employed with any connection.

The second classification includes by far the largest percentage of all the frogs that are in use on American railways, embracing those between Nos. 6 and 9. Bearing in mind the general use of these numbers it is plain that the adoption of a common length of switch for all is exceedingly desirable. Since each is of frequent occurrence in main tracks the ability to cover all by a single length of switch is of unquestionable advantage.

The determination of the proper length of switch for use with this group concerns particularly the No. 6. This number must sometimes be used for main track connections, through which road power, including the modern types of passenger locomotives, operates not only in drill service, but quite often in main line movement. Practice permits the employment of any length of switch between 10 ft. and 18 ft. with this number of frogs, but the 10 ft. length introduces a too abrupt change in direction for comfortable operation in passenger service and causes a very considerable shock with consequent wear upon the point in the case of drill movement. On the other hand, while the 18-ft. length supplies the requisite improvement in the detour feature, the degree of curve is increased nearly 10 per cent, and the minimum thus created becomes somewhat precarious for road movement.

A reference to the table shows that the use of a 15-ft. length does not unduly increase the degree of curvature, while the switch angle is reduced one-third. This length of switch therefore appears to be more generally desirable for the No. 6 frog than either of the other lengths. It will also be seen that in the case of the No. 7 an equal curvature to that with an 18-ft. switch results and that the curvature of the No. 8 and No. 9 with the 15-ft. switch is materially less than that obtaining with the 18-ft. switch. The middle ordinate of the chord of the turnout arc is uniformly 6¼ in., which practically may be used as 6 in. with 4½ in. at the quarters. Thus exact line may be obtained readily, which is an essential feature in switch construction. This length is therefore recommended as one of the standard lengths in preference to 18 ft.

The one objection is that this length is not desirable with the No. 10 frog, which is in very common use on many roads, but this turnout more properly belongs with the class of main line turnouts through which a medium restricted speed is not only safe but comfortable, and a longer switch even than 18 ft. is desirable. It will be observed upon reference to the table that the use of a 24-ft. switch with a No. 10 frog but slightly increases the curvature above that which obtains with the 18-ft. switch, while the detour feature is again one-third improved. This also applies to the No. 11 and No. 12 frogs, which are often employed in preference to the No. 10 when space for the No. 15 is lacking. The 24-ft. length is quite favorable for the No. 15 and No. 16 frogs, and in all of these the middle ordinate is seen to be very close to 6 in.

There still remains the fourth class wherein detour must be made at the greatest speed practicable, both as a means of maintaining headway and of avoiding loss of time while passing through the connection. The former is the more important consideration, as headway once lost usually requires a dozen miles

Table of Turnout Dimensions

Frog	Frog angle	Switch	Switch angle	Lead	Lead rail	Turnout arc	Radius	Degree	Middle ordinate
4	14° 15′	10′	2° 41′	37′ 00″	20′ 00″	20′ 3″	98′	58° 28′	6″
5	11° 25′	10′	2° 41′	42′ 00″	25′ 00″	25′ 2½″	162′	35° 22′	6″
6	9° 32′	10′	2° 41′	47′ 00″	30′ 00″	30′ 2″	250′	22° 55′	5½″
6	9° 32′	15′	1° 47′	54′ 00″	32′ 00″	32′ 2″	237′	24° 00′	6¼″
7	8° 10′	15′	1° 47′	59′ 5¼″	37′ 5¼″	37′ 6¾″	337′	17° 00′	6¼″
8	7° 09′	15′	1° 47′	66′ 11¾″	44′ 11¾″	45′ 0¾″	480′	11° 54′	6¼″
9	6° 22′	15′	1° 47′	72′ 00″	50′ 00″	50′ 1¼″	626′	9° 09′	6½″
6	9° 32′	18′	1° 30′	57′ 00″	32′ 00″	32′ 2″	227′	25° 14′	6¾″
7	8° 10′	18′	1° 30′	62′ 8½″	38′ 8½″	38′ 10″	332′	17° 16′	6¾″
8	7° 09′	18′	1° 30′	69′ 11¼″	44′ 11¼″	45′ 0¾″	455′	12° 36′	6½″
9	6° 22′	18′	1° 30′	75′ 00″	50′ 00″	50′ 1¼″	588′	9° 45′	6¼″
10	5° 44′	18′	1° 30′	80′ 00″	55′ 00″	55′ 1¼″	744′	7° 42′	6″
11	5° 12′	18′	1° 30′	85′ 00″	60′ 00″	60′ 1″	928′	6° 10′	6″
12	4° 46′	18′	1° 30′	91′ 00″	66′ 00″	66′ 1″	1,158′	4° 57′	5¾″
10	5° 44′	24′	1° 07′	88′ 6″	57′ 6″	57′ 7¾″	714′	8° 01′	6¼″
11	5° 12′	24′	1° 07′	94′ 00″	63′ 00″	63′ 1″	900′	6° 22′	6¼″
12	4° 46′	24′	1° 07′	98′ 5¼″	67′ 5½″	67′ 6½″	1,075′	5° 20′	6¼″
15	3° 49′	24′	1° 07′	119′ 6″	87′ 6″	87′ 6¾″	1,858′	3° 05′	6″
16	3° 35′	24′	1° 07′	125′ 0″	93′ 0″	93′ 0¾″	2,149′	2° 40′	6″
12	4° 46′	30′	0° 54′	108′ 6½″	71′ 5¼″	71′ 6½″	1,058′	5° 25′	7¼″
15	3° 49′	30′	0° 54′	128′ 00″	90′ 00″	90′ 0¾″	1,767′	3° 15′	6¼″
16	3° 35′	30′	0° 54′	134′ 00″	96′ 00″	96′ 0¾″	2,049′	2° 48′	6¾″
20	2° 52′	30′	0° 54′	156′ 00″	118′ 00″	118′ 0½″	3,490′	1° 40′	6½″
24	2° 23′	30′	0° 54′	185′ 00″	145′ 00″	145′ 0½″	5,600′	1° 01′	5¾″

to regain, and if adverse grade is present it may require a much greater distance. It will be conceded that a conservative limit for the unbalanced elevation of a curve is 1½ in. This fact considered alone would permit the operation of No. 20 and No. 24 connections, whether of turnouts or crossovers, at a speed of 45 miles per hour. But it is neither comfortable nor entirely safe to detour through the angle made by a 30-ft. switch at a speed faster than 30 miles per hour, unless the alinement through the switch is adjusted to furnish equal advantage to the main track and the turnout routes, which would, of course, require that the speed through both routes should be restricted alike, when a speed of 45 miles per hour would be entirely proper.

It is recognized that the 18-ft. switch is extensively used and by many of our best roads, and that it covers a very wide range of numbers viz.: between No. 6 and No. 12. But it has been shown that neither the 10-ft. nor the 18-ft. switch is desirable with the No. 6 frog, and, similarly, neither the 18-ft. nor the 30-ft. length is adapted to the No. 12 frog. While the 18-ft length is quite satisfactory with the No. 10 frog as regards curvature, it is not easy enough in the detour feature to fully meet the needs of this number in main line movement. The fact that by its use the number of working lengths may be kept at three with a saving in stock account has heretofore justified its use. But the increase in the size of both passenger and freight power warrants the revision of standards to meet the new conditions, even though the fourth length be introduced.

The choice of stock numbers of frogs will probably always be a matter of individual preference, but a study of some of the practical considerations in such a selection may be of interest. The No. 5 frog will be used where only drill power operates. If the drilling must be done by road power the No. 6 should be the minimum permissible. This number is almost invariably chosen for wye tracks, not alone because of the considerably less room required, but also because the shorter length can be traversed in less time, an important item at terminal points. But it is desirable on account of the natural shifting of the track beyond the connection that the general radius be no less than 300 ft.

The No. 8 frog is the most frequently used of the group of smaller numbers. It is a common selection for main track connections with private industry tracks, with set-off sidings for crippled cars, and especially for yard ladders. The feature that renders it desirable for this last purpose is the fact that it is the lowest number that can be used at 15 miles per hour, and thus the greatest conservation of room will obtain without sacrifice of celerity in operation.

Nos. 10, 11 and 12 frogs are preferred for main track crossovers where moderate speed only is required, not alone because they are safer if greater speed than the established limit should be used, but because they encroach less upon the clearance with the traffic running upon adjoining tracks, an important consideration with 12-ft. centers of tracks. The Nos. 15 and 16 frogs are very useful where space is limited and it is desirable to make movements with speed, or where a fair degree of headway must be maintained. The No. 20 and higher frogs are preferable where ample space is available and the highest speed practicable must be used.

The numbers from No. 15 are not infrequently very useful to render the curvature favorable when the turnout springs from the inside of a sharp curve, and, similarly, the No. 10 and No. 12 frogs supply the needed operating advantages of the higher numbers when the turnout is from the outside of a curve.

The question of what numbers will best serve the uses of a trunk line railroad can be readily determined from the foregoing discussion. These will be found to be Nos. 5, 6, 8, 11, 15 and 20. It will be noted that these numbers increase in a regular progression and that in a general way the curvature of all except the second number is just twice that of the next lower number. The suggested numbers will be found to supply a regularly increasing length for crossovers, and they thus furnish the means for economical use of the space available. The No. 15 and No. 20 turnouts, which are much used in interlocking layouts, employ rails that vary 5 ft. in length and thus supply the required spacing for insulated joints without the introduction of unusual lengths.

The use of the 10-ft. length with the No. 5, of the 15-ft. length with the No. 6 and No. 8, of the 24-ft. length, with the No. 11 and No. 15, and of the 30-ft. length with the No. 20, all give a uniform middle ordinate of practically 6 in. for the chord of the turnout arc. This feature supplies the opportunity for general use of a uniform rule in lining the turnout curve, which is of very considerable advantage. It is well known that even on main line divisions poor line through the turnout arc is quite common, and this defect may be traced to the practice of lining the curve by eye or what is almost equally unsatisfactory, by a system of offset measurements. In the rush of lining such connections the simpler the process the better the result obtained.

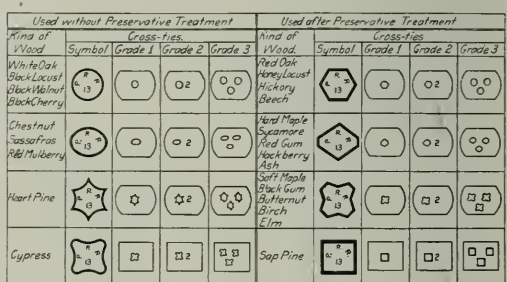
The approximate speed in miles per hour that may be used through connections, assuming that the curvature is at least 100 per cent greater than will just pass the power in question, is about double the frog number, and it will thus be seen that the numbers recommended furnish a regular progression in this respect also.

The ultimate supplanting of the No. 10 by the No. 11 is inevitable, because in the case of crossovers, which is their most common use, the length is increased but 15 feet, while a 25 per cent lighter curvature obtains.

STANDARD METHODS OF PILING AND MARKING TIES ON THE PENNSYLVANIA

The Pennsylvania Railroad has given special attention to the best methods of piling ties previous to inspection and purchase and also when stored along the line awaiting insertion in the tracks, to reduce the decay to the minimum. Special methods have also been devised for the marking of ties to maintain their identification as regards kind of wood.

Sketches have been prepared showing the approved and improper methods of piling ties, copies of which have been sent to the foremen along the line. Efforts have also been made to get the tie producers to pile the ties for inspection in accordance with these standards. To this end the inspectors have

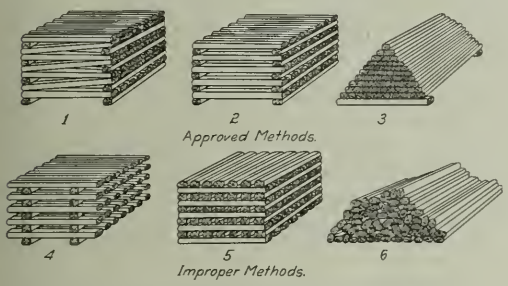


Methods of Marking Ties with Hammer Brands

been supplied with small cards, showing the approved method of piling the ties, to distribute among the tie producers, while the purchasing department has added this information to its price circular. The results secured in this direction have been quite satisfactory.

As shown in one of the accompanying sketches, pile No. 1 shows the recommended method for stacking any kind of wood while awaiting use or treatment. In this way the ties rest on the edges only, and thus have the least area of contact, and this area is close to the end where the final stresses in the tie are the least. Pile No. 2 shows the method which is permissible for the stacking of ties to be inspected. While with this method

the ties have a flat contact, the weight is applied at the ends where it retards checking, and even if the contact results in decay the minimum amount of harm is done. In this respect this method differs from that shown in pile 4, where checking



Correct and Wrong Methods of Piling Ties

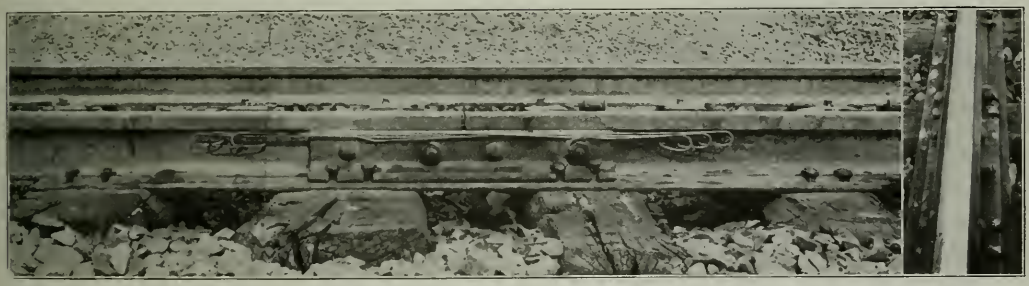
may extend as far as the rail seat and decay or "pile burning" may also start at the rail seat or the point of greatest stress. These differences between piles 2 and 4 have not always been realized by the foremen or tie producers, and special efforts have been made to instruct them in this regard.

Pile No. 3 shows the improved method of stacking creosoted and heart pine ties at right angles to the track when within reach of locomotive sparks. When beyond the reach of sparks, creosoted and heart pine ties are stacked solidly, 10 ties to the layer. Only creosoted or rejected ties are placed on the ground under the piles. All untreated ties are piled with an open side toward the prevailing wind, while only creosoted and heart pine ties are allowed to be piled solidly. The instructions require that all inflammable vegetation be removed for at least a foot around each pile and where any quantity of ties are stored on an area surrounded by grass or timber a fire line is plowed around them at least 100 ft. from any adjoining structure.

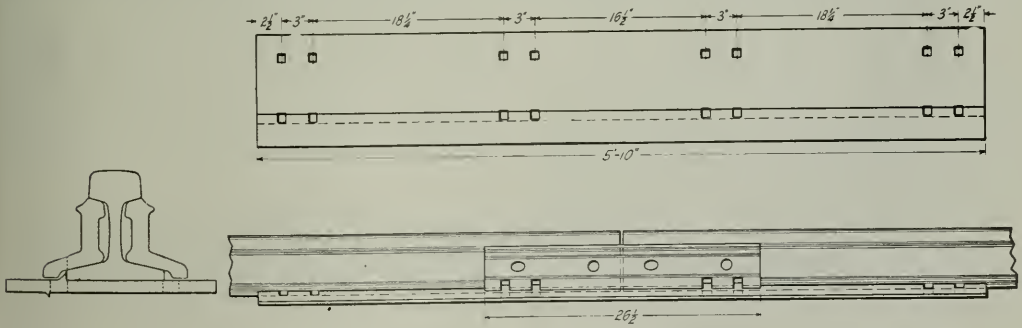
The standard system of marking ties accepted by the inspectors is shown in Fig. 2. Previous to July 1, 1914, the distinctions as to kinds were indicated by paint, but on this date symbols were added to the hammers which formerly branded only "P. R. R." and the inspector's number on each tie. The advantages of the new system are that it is cheaper, it saves the clothes and lightens the equipment of the inspector, it is quicker to apply and it enables all kinds of wood to be distinguished permanently, whereas the various colors of paint looked alike after the ties came out of the creosoting cylinder. All class-A ties or those which are to be inserted in the track without treatment are marked with characters composed of curved lines. Class-B ties, which are used only after treatment, are indicated by symbols composed of straight lines. In this way all that the track laborers have to remember is that ties with straight lines are not to be used in the track except when black, showing that they have been creosoted.

NEW PENNSYLVANIA STANDARD ANTI-CREEPING TIE PLATE

The Pennsylvania Railroad has adopted as standard for 100-lb. rail a joint tie plate 5 ft. 10 in. long extending over four ties. This plate, which is 10½ in. wide and ⅞ in. thick, is used with the plain angle bar joint. It is slotted to correspond with this standard angle bar and also for double-spiking to the two ties beyond the angle bar. The details of the plate are shown in the accompanying photographs and drawing. This plate not only gives a strong rail joint, but has also proved an excellent anti-creeper.



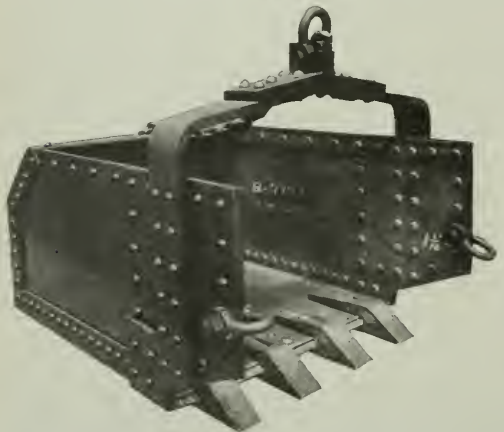
A Side and Top View of the Pennsylvania's New Anti-Creeping Tie Plate Extending Over Four Ties



Details of Pennsylvania's Joint Tie Plate Used Under 100-lb. Rail

A CABLEWAY COALING STATION

A new type of coaling station having special advantages for points where it is necessary to store coal frequently, has been designed by Sauerman Brothers, Chicago, utilizing the Shearer & Mayer drag line cableway and bucket for which this firm is the agent. The station consists of a coal receiving hopper alongside a coal storage pit, a coal pocket with overhead bins and proper facilities for discharging the coal into locomotive tenders, and the overhead cableway with the mast and anchor so located that the bucket will travel from the receiving hopper over the storage pile to the coal pocket.

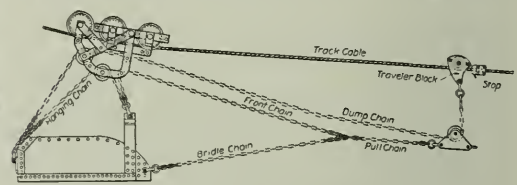


Bucket Used with Shearer & Mayer Drag Line Cableway

The entire plant is located between two tracks, one on which the coal is brought in and dumped into the receiving hopper and the other on which locomotives receive coal from the picking up stored coal by a steam shovel or locomotive crane.

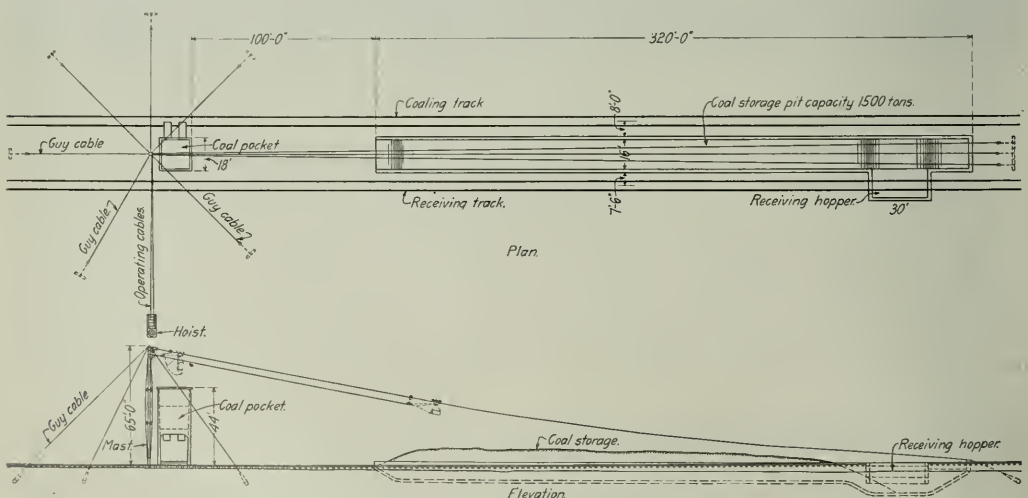
The drag line cableway consists of a bucket and carriage mounted on a slack track cable shown in the accompanying drawing. The track cable is supported at the power end by a mast or tower and at the opposite end by an anchorage which can be arranged to allow it to be shifted readily in order to change the line of operation of the cableway. The operating power is furnished by a double friction drum engine, the front drum controlling a steel cable called the "load" line which leads through a sheave on the mast to the bucket mounting, and the back drum controlling a tension line leading to a set of fall blocks attached to the mast. The former cable serves the double purpose of loading the bucket and pulling it along the track cable to the dumping point. The latter cable affords a means for slackening and tightening the track cable, one end of which is supported by the fall blocks.

When the bucket is loading, the track cable is slack. After the bucket is loaded, this track cable is gradually tightened, thus lifting the load at the same time that the load cable hauls the bucket up to the dumping point. The operation of dumping is accomplished by a stop clamp on the track cable which engages a block traveling on this cable and arrests its movement. The pull of the load line is thereby transferred from the pull chain to the dumping chain connected with the rear end of the bucket, which automatically dumps the material. After dumping, the bucket returns to the loading point by gravity.



Drag Line Bucket and Operating Lines Used for Handling Coal

This cableway, which is covered by patents, has been used in pockets. Under normal operation, the coal would be taken direct from the receiving hopper to the bins in the coal pocket, but when desirable to store coal in anticipation of a shortage, it could be moved by the bucket from the hopper to the storage pile and later reclaimed from storage in the same manner, thus eliminating one handling as compared with the usual method of gravel pits, in levee construction and general excavation work with success. A variety of materials, including coal, have been handled by the bucket shown in the accompanying illustration, the teeth of which are removable in order to secure the best results in handling various classes of material under different conditions.



Plan and Elevation of Cableway Coaling Station

General News Department

The midwinter convention of the American Institute of Electrical Engineers was held at the Engineering Societies' building, 33 West Thirty-ninth street, New York, February 17, 18 and 19. A number of prominent engineers gave addresses on "The Status of the Engineer."

F. M. Swacker, United States District Attorney at New York, is again investigating the doings of the former directors of the New York, New Haven & Hartford. It is said that all of the indictments against directors, for alleged offenses against the anti-trust law, which have been hanging over them for several months will have to be redrawn, because of some technical illegality in their preparation.

H. W. Thornton, formerly general superintendent of the Long Island Railroad, now general manager of the Great Eastern of England, has "made good." This statement came in a press despatch from London, last Saturday, saying that at the annual meeting of the shareholders of the Great Eastern, Lord Claud Hamilton, the chairman of the company, paid Mr. Thornton a special tribute; and that the meeting unanimously agreed that Mr. Thornton, already, before filling out a year's service, had fairly justified his selection as manager.

Clifford Thorne, chairman of the Iowa Railroad Commission, appeared before a joint committee of the Iowa legislature on February 5, and asked that an appropriation be made for a valuation of the railroad property in the state. He said the valuation is needed both to ascertain the reasonableness of rates and also for purposes of taxation, and that it could be made in either of two ways—by employing a few engineers to make a check of the Interstate Commerce Commission appraisal, which he said would cost $15,000 or $20,000, or to make a complete independent valuation, which he estimated would cost $100,000 or $125,000.

About 300 of the employees of the New York and Staten Island divisions of the Baltimore & Ohio held their second annual banquet and fellowship meeting at the Broadway Central hotel, New York, on the evening of Saturday, February 6. C. C. F. Bent, general superintendent of the New York division, J. M. Watkins, auditor of revenue, W. H. Averell, general superintendent of the Staten Island line, and R. M. Van Sant, editor of the Baltimore & Ohio Employees' Magazine, addressed the meeting, and C. W. Tomlinson, general eastern freight agent, read a paper on the Best Way to Obtain Efficiency in Railroad Operation.

The Pennsylvania Railroad reports that 427 fires—more than three-quarters of all that occurred on the property of the system last year—were extinguished by company employees before receiving the aid of public fire departments. The average loss was $43. Organized fire brigades among the employees last year checked 34 fires, and other employees, by the use of chemical extinguishers, put out 71. The total fire loss on the Pennsylvania system during the year 1914, including fires where the assistance of city fire departments was received, was $658,483, while the value of the entire property was nearly $400,000,000, the fire loss being only 16 cents per each $100 of property value at risk.

The recent action of the Oregon Wool Growers' Association in adopting resolutions at its annual meeting appealing "to our national and state legislators and officials, and to our own membership and the general public, to adopt an attitude of encouragement towards transportation, public utility and business enterprises, to urge the repeal of legislation which, though exalted in purpose, has proved destructive in effects and to support legislation that will foster the investment of capital, stimulate industry and increase material prosperity, so there will be better markets for our products, more profit for the producers and more employment and better wages for labor," has been followed by similar action by two other influential organizations in that state. Resolutions of a similar tenor indicating a new attitude towards business have just been adopted by the Oregon Irrigation Congress, one of the strongest associations of farmers in the state of Oregon, and by the Oregon Pure Bred Livestock Association.

The Pennsylvania reports that of 3,861,962 efficiency tests and observations made last year, more than 99.9 per cent showed perfect obedience to the rules. In other words, regulations were followed to the letter 1,494 times in every 1,495 cases observed. In the observance of stop signals, 24,798 tests were made, and in only 34 cases was there failure to live up to the strict letter of the rule. An absolutely perfect record was made by enginemen in observing flagmen's signals; 18,203 tests showed not one failure. In 113,747 instances observed, there were only 314 in which the rules governing the handling of explosives and inflammables were not followed exactly. In all save nine out of 16,251 cases, the rule requiring trainmen to be stationed at all unprotected grade crossings, during the shifting of cars, was obeyed. There were only 17 infractions, in 53,430 instances, of the rules governing watchmen at protected crossings. Out of 17,642 observations to see whether first aid equipment was kept in proper order, six cases requiring criticism were found.

The New York Central reports that during the last year the number of surprise tests made on its lines was 323,292, and the number of cases of inefficiency was 389, showing a percentage of efficiency of 99.88. To the report of safety on this road, for the year ending June 30, 1914, which was given in the *Railway Age Gazette* last week, may be added the statement that no passenger has been killed in a train accident on that road during the past four years.

Employees of the St. Louis & San Francisco, who held a mass meeting at Springfield, Mo., on February 7, to begin a campaign for higher freight and passenger rates in Missouri, have appointed an executive committee and sub-committees for each 100 miles of road in the state, to circulate petitions. The executive committee has issued a statement to the press stating that there are more than 26,000 idle laboring men in the state of Missouri at the present time, and that this is because the railroad rates are so low that they are unable to earn the money to buy material and employ the labor necessary to keep up a safe and efficient condition of the roadbed, rolling stock and machinery. It is stated also that in the United States at the present time there are 1,450,000 laboring men idle for this reason, and over 1,500,000 who are working on short time. The earnings decreased from 33 1/3 to 50 per cent per month. This means, the statement says, that this vast number of employees is in a position where they must retrench and purchase less of the goods from the retail merchants of the cities in which they reside.

Report on Lackawanna Derailment Near Alford, Pa.

The Interstate Commerce Commission has just issued a report on the derailment of the Delaware, Lackawanna & Western passenger train No. 32 near Alford, Pa., on October 31, 1914, resulting in the injury of 23 passengers and 12 employees. This train, consisting of 4 wooden coaches, was running at a speed of approximately 15 miles an hour when it was derailed by a broken rail on the inside of a 4-deg. curve. The rail was broken squarely across in six places, four of these breaks showing transverse fissures in the head. Subsequently four other fissures were found in the rail, ranging in diameter from 7/16 in. to 1¾ in.

Passenger train No. 14 had passed over this track about one hour previous to the accident and the engineman felt a jolt, such as would result from a broken rail. He made a special stop at Alford, two miles beyond and instructed the operator to inform the chief despatcher of this condition. The despatcher then instructed the operator to notify the section foreman, which was not done until about 45 minutes after the accident. The despatcher did not notify train No. 32 of the broken rail before it left the preceding station.

In the report of the engineer-physicist on this rail it is stated

that all the transverse fissures were located on the gage side of the head or over the web of the rail. The presence of internal compression strains in the head of the rail immediately below the running surface was indicated by the head assuming a convex shape when released from the web showing a deflection of 15/16-in. in 12 ft. The report concludes by again calling attention to the increasing prevalence of transverse fissures and to their danger, showing two photographs of 78 individual rails in which transverse fissures have recently occurred.

Summary of Revenues and Expenses of Steam Roads

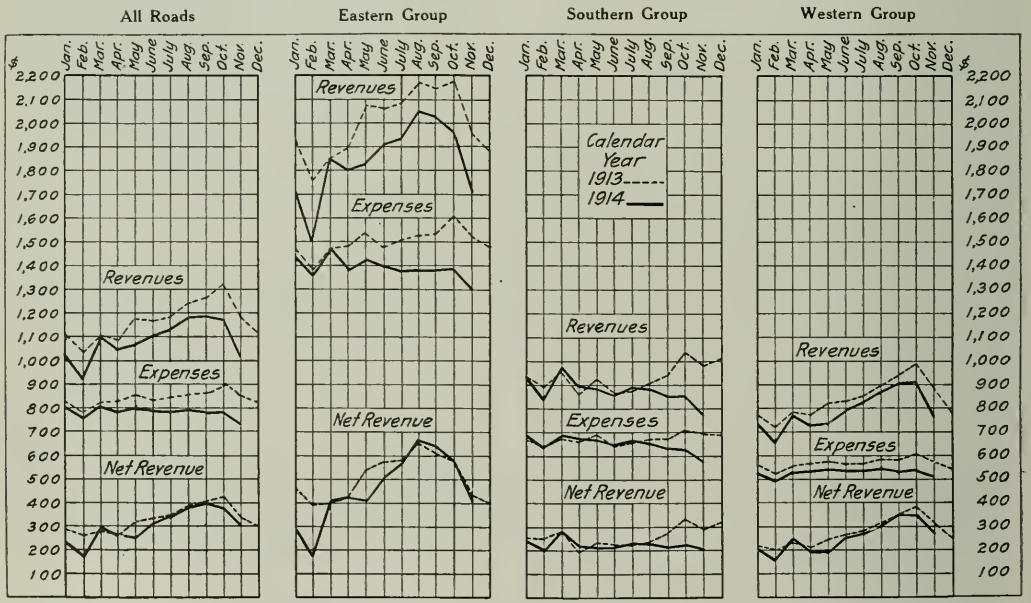
The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for November, 1914, are as follows:

Railways operating 228,461 miles of line are covered by this summary, or about 90 per cent of all steam railway mileage in the United States. Their operating revenues for the month of November, 1914, amounted to $233,812,430. This amount includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail and auxiliary operations. Compared with November, 1913, these operating revenues show a decrease of $32,836,569, decreasing $42, or 14.7 per cent. Operating income for each mile of line for each day in November averaged $8.08, and in November, 1913, $9.47. Operating income is that proportion of their operating receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and for dividends.

The railways of the Eastern district show a decrease in total operating revenues per mile of line as compared with November, 1913, of 11.9 per cent, those of the Southern district a decrease of 19.9 per cent, and those of the Western district a decrease of 11.9 per cent.

Operating expenses per mile decreased 13.8 per cent in the East, decreased 15.2 per cent in the South, and decreased 11.3 per cent in the West. Net operating revenue per mile decreased 5.2 per cent in the East, decreased 31.0 per cent in the South, and decreased 12.9 per cent in the West. Taxes per mile show a decrease of 7.6 per cent in the East, a decrease of 2.9 per cent in the South and a decrease of 6.1 per cent in the West. Operating income per mile decreased 4.7 per cent in the East, decreased 35.2 per cent in the South, and decreased 14.0 per cent in the West.

The operating ratio for November, that is, the per cent of total



Monthly Revenues and Expenses per Mile of Line in 1914

Total operating revenues per mile averaged $1,023 in November, 1914, and $1,180 in November, 1913, a decrease of $157, or 13.3 per cent.

Operating expenses, which include the cost of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to $167,224,821. This was $23,435,399 less than for November, 1913. These operating expenses per mile of line averaged $732 in November, 1914, and $844 in November, 1913, a decrease of $112 per mile, or 13.3 per cent.

Net operating revenue, that is, total operating revenues of rail and auxiliary operations less operating expenses, amounted to $66,587,609, which was $9,401,170 less than for November, 1913. Net operating revenue per mile of line averaged $292 in November, 1914, and $336 in November, 1913, a decrease of $45 per mile, or 13.4 per cent.

Taxes for the month of November amounted to $11,143,626, or $49 per mile, a decrease of 6.5 per cent from November, 1913.

Operating income, which is net revenue from rail and auxiliary operations, less uncollectible revenues and taxes, averaged $242 per mile of line, and in November, 1913, $284, thus de-

operating revenues absorbed in operating expenses, was 71.5 per cent, which is comparable with 71.3 per cent in November, 1913, and 66.4 per cent in November, 1912. The operating ratio in the Eastern district for November was 76.1 per cent, as compared with 77.8 per cent in 1913; was 74.5 per cent in the Southern district as compared with 70.4 per cent in 1913; was 65.9 per cent in the Western district, as compared with 65.5 per cent in 1913.

Comparison of returns for five months of the current fiscal year with the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 8.2 per cent, a decrease in operating expenses per mile of 9.6 per cent, and a decrease in net operating revenue per mile of 5.1 per cent.

This net operating revenue per mile increased 0.5 per cent in the East as compared with the corresponding period of the previous year, decreased 18.5 per cent in the South, and decreased 5.7 per cent in the West.

When the returns for the eleven months of the calendar year 1914 are compared with the corresponding months of 1913, they show a decrease in total operating revenues per mile of 7.3 per cent, a decrease in operating expenses per mile of 6.6 per cent,

and a decrease in net operating revenue per mile of 9.1 per cent. This net operating revenue per mile decreased 10.3 per cent in the East as compared with the corresponding period of the previous year, decreased 11.2 per cent in the South, and decreased 7.0 per cent in the West.

The diagram shows the variations in operating revenues, operating expenses, and net operating revenue per mile for the separate months of the calendar year 1913 and of the calendar year 1914 to date.

The following table shows the per cent of operating revenues consumed by such class of expenses:

Per Cent of Total Operating Revenues

	November, 1914				Five months of the
	United States	Eastern District	Southern District	Western District	fiscal year 1915
Freight revenue	70.0	68.7	72.7	70.3	68.3
Passenger revenue	20.7	20.9	19.6	20.9	22.7
Mail revenue	2.0	1.7	1.9	2.4	1.8
Express revenue	2.5	2.7	2.5	2.3	2.3
All other revenues	4.8	6.0	3.3	4.1	4.9
Maint. of way and structures.	12.4	12.4	13.6	12.1	12.9
Maintenance of equipment	17.4	19.2	18.9	15.0	16.8
Traffic expenses	2.1	1.9	2.8	2.1	1.9
Transportation expenses	36.5	39.3	36.0	33.8	33.8
General expenses	2.6	2.5	3.0	2.6	2.4
All other expenses	0.5	0.8	0.2	0.3	0.5
Total operating expenses	71.5	76.1	74.5	65.9	68.3

Proposed Railway Legislation

The bill before the Alabama legislature to require the use of high-power headlights on all locomotives, has been passed by the Senate, and has been favorably reported by the committee in the House.

The New Jersey Senate has passed by a vote of 11 to 7 Senator Pierce's bill, requiring the removal of one grade crossing each year by each railroad in the state, for every thirty miles of its line in the state.

There is a bill before the legislature of Ohio to make Eastern time the standard of the state, instead of Central. A number of hearings have been held and it is said that the committee in charge of the bill is divided, six to four, six being against the adoption of the proposed law. The city of Cleveland has adopted Eastern time and evidently wants the rest of the state to take the same action; but at Cincinnati there is strong objection.

Bills presented in Pennsylvania include one to require that signalmen and similar employees shall be given two days' holiday each month at full pay; one permitting railroads to issue tickets to clergymen at reduced rates; requiring all men to have one day of rest in seven; for medical inspection of employees of dining cars; allowing second class cities to tax all tracks, sidings, switches, turnouts and other facilities on highways and wharves; allowing municipalities to tax real estate of all corporations; repealing the anthracite coal tax act of 1913, now in the courts; regulating acid lubricating oil; restricting use of state police in lockouts; requiring advertisements for strike breakers to contain notice of labor disturbance; adding 116 men to the state police force, which now contains 228 men; regulating sub-leases of company houses; punishing trespassing on lands or waters of water companies; requiring all locomotives to be equipped with automatic bell ringers, and the regular biennial bill to require all locomotives to be equipped with headlights which will enable a man to be seen 600 ft. away. The bill to repeal the "full crew" law has not yet appeared, but the railroad men have organized to fight it.

Proposed Additional Accident Statistics

The new forms for use by railroads in reporting accidents to the Interstate Commerce Commission, proposed recently by the commission and noticed in the *Railway Age Gazette*, January 22, page 164, were the subject of a conference in New York City this week between the committee of the American Railway Association, Julius Kruttschnitt, chairman, and W. J. Meyers, statistician of the commission. There were present also Dr. Meeker from the Department of Labor, Washington; representatives from the state railroad commissions of New York, Pennsylvania and Illinois, and officers of two railway brotherhoods, the conductors and enginemen. It is expected that a second revision of the blanks will be made and distributed, and that therefore the discussion of details will take no final form for several weeks yet. The committee representing the railroads has proposed a single blank, to contain all necessary spaces to make it suitable for use in recording any and all kinds of accidents which are reported to the government. Efforts will be made to secure the co-operation of all the principal roads, the state commissions and the Interstate Commerce Commission in a movement to standardize accident records, so that the primary record, that made by the railroad superintendent, can be made acceptable to all interests—the federal government, the state governments and the legal departments of the railroad companies, with the least practicable modification.

Cost of Valuation Forty-Five to Sixty Millions

Mr. Prouty, chief of the valuation division of the Interstate Commerce Commission, in a statement made before the House Appropriations Committee at Washington, recently gave some estimates of the probable cost of the work of valuing the railroads of the country, which must have made even the most "progressive" Congressmen pause for a moment.

The commission for the next fiscal year asks for $3,000,000. The last annual appropriation was $2,000,000 and $400,000 had been appropriated before that. The cost of the current work now going on is about $2,000,000 a year, of which about $500,000, according to Mr. Prouty, is what may be called overhead expenses. He desires to carry on the field work faster than at present and therefore asks for a larger appropriation. There are now at work 40 parties, eight parties in each one of five districts. These men go over about 2,000 miles of road a month. He desires to double this rate; that is, to make it about 50,000 miles a year; and even at that it would take at least four years from next July to finish the work. At the present rate—$2,000,000 a year for 24,000 miles, the total cost to the government for all the roads would be around $21,000,000. Possibly, if the overhead charges do not increase in proportion, the total might be a million or two less. The smaller figure, however, is more than *six times* the amount of the estimates which were common when the valuation law was first discussed in Congress.

Speaking of what the railroads are doing, Mr. Prouty said that at present they were doing more talking than work; but some of them, he says, have made a good deal of progress. The Boston & Maine, at present one of the poorest of the large roads in the country, is expending on this work an average of $100 a mile. Other roads, however, may have more complete records and very likely will not have so large an expense for new surveys. At $100 a mile the 250,000 miles of road in the country would cost $25,000,000.

In another part of his statement, Mr. Prouty says that the government is spending about half as much as the railroad companies. This would make the total expenditures of the railroads of the country somewhere from thirty-six to forty-two millions.

Answering questions of congressmen as to when the results will be available, Mr. Prouty could not speak very definitely. If "certain fundamental questions" as to methods of valuation could be settled, then there would be no reason why the commission could not act promptly, on the completion of the surveys. Finally, he hinted that if the commission should go into extended detail—meaning, presumably, investigations of financial history—much more time would be taken and a much larger expense incurred.

Lobbying at Harrisburg

Messrs. Rea, Voorhees, Willard and O'Donnel, representing the railroads of Pennsylvania and New Jersey have issued a statement denying charges of improper conduct in their dealings with legislatures, employees and citizens. They hear from Harrisburg that certain underhand and wrong methods are being pursued to prevent repeal of the "full-crew" law.

The statement says in part: "The railroads are not responsible. They will stoop to no such measures. Their case has been taken directly to the court of public opinion and they challenge proof of any lobby of the kind that the public understands by that word. There is none, nor will there be any.

"With that statement, we also assert the inalienable right of any and every citizen to talk with and write to his elected representatives and to impress upon them in every honest way his views, whatever they are. It is the privilege of every railroad employee to do this. The railroads have no objection.

"We are advised that trainmen have gone to legislatures and

stated that they were sent by railroads under compulsion to urge repeal of the full-crew law and to oppose certain bills before the legislature. If any railroad officer has attempted to coerce any man under him, he has acted in direct conflict with the roads' publicly announced policy. There is no thought to coerce trainmen or other railroad employees. On proof of coercive or improper methods the man or men guilty, no matter what their positions in the service, will be disciplined.

"The railroads are taking the full-crew law directly to the people. The Brotherhood of Railroad Trainmen, in a statement issued February 11, protests against this, saying: 'They intend to present the question to the public; but why is left to conjecture. The power to repeal the law is vested in the legislature. The senators and representatives in the general assembly are chosen by the people to perform such service and the constitution of the commonwealth declares that the legislative power shall be vested in a general assembly, which shall consist of a senate and House of Representatives.'

"All of this is true. What the railroads seek is to let the people know the effect of the full-crew laws. Then, as citizens, the people can inform their elected representatives what they want done. The trainmen's organization evidently fears the consensus of informed public opinion. . . . The railroads are perfectly willing to let the people, men and women of the state, determine."

A. S. M. E. Boiler Code

The boiler code committee of the American Society of Mechanical Engineers has made a final report on this subject, which has been accepted by the council. This final report is the result of the work of the original committee, of which John A. Stevens is chairman, and an advisory committee consisting of engineers representing various phases of the design, installation and operation of boilers. This advisory committee included the following representatives from the railway field: F. H. Clark, general superintendent of motive power of the Baltimore & Ohio; A. L. Humphrey, vice-president and general manager of the Westinghouse Air Brake Company; H. H. Vaughan, assistant to vice-president, Canadian Pacific Railway, and W. F. Kiesel, Jr., assistant mechanical engineer of the Pennsylvania Railroad. The code is considerably shorter than when originally brought out by the committee; and the rules laid down in it, of course, do not apply to boilers which are subject to federal inspection and control. The original committee and the advisory committee have been continued as one and will meet once a year in order to make any changes that advances in practice may make necessary. At these meetings will also be taken up any change which may seem necessary in a rule because it works unnecessary hardship on any particular class of boiler makers or users.

Society of Technical Associations' Secretaries

The first annual meeting of the Society of Technical Associations' Secretaries will be held in the Engineering Societies building, New York, on Saturday, February 27.

The business session will start at 10 a. m., followed by luncheon at the Engineers' Club at 1 p. m., and the afternoon session will start at 2:30 p. m. The afternoon session will be opened by an address by Harry D. Vought. Secretaries of a number of important societies are to be invited to open the discussion, including: Edgar Marburg, secretary of the American Society for Testing Materials; Charles Warren Hunt, secretary of the Society of Civil Engineers; George P. Conard, secretary of the Association of Transportation and Car Accounting Officers, and Calvin W. Rice, secretary of the American Society of Mechanical Engineers. It is also expected that representatives of the railroad clubs will be asked to tell how the railroad clubs and their members can be benefited by the society.

A Talk to Apprentices

On Monday evening of this week George M. Basford, chief engineer of the railroad department of Joseph T. Ryerson & Son, made an address before the apprentices of the Chicago & North Western at Chicago. The talk was intended to give the boys a bigger and broader view of the opportunities which lay before them and of the possibilities which might result if they were to follow their work in the right spirit. The title of the address was "Making Heroes." "Choose to be heroes," said Mr. Basford, "in the heroism of simple honesty in the work which shows and in that which lies concealed, that you may look back in years that are to come proud that you have done an important part in making the Chicago & North Western a better railroad. To see what is right and not to do it, is want of courage." The address was received most enthusiastically.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, 1915, Jefferson Hotel, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 3d Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1914

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Operating revenues: Passenger.	Operating revenues: Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Operating expenses: Maintenance: Of equipment.	Operating expenses: Traffic.	Operating expenses: Transportation.	Operating expenses: Miscellaneous.	Operating expenses: General.	Operating expenses: Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atchison, Topeka & Santa Fe	8,514	$5,062,185	$1,917,018	$7,689,720	$1,055,762	$1,449,422	$172,353	$2,288,803	....	$152,088	$5,112,257	$2,577,463	$342,231	$2,233,538	$108,982
Atlantic & St. Lawrence	167	156,286	21,967	200,823	13,847	33,421	4,094	70,419	....	5,059	126,841	73,982	10,800	63,182	70,118
Atlantic City	170	54,710	61,659	126,520	27,444	12,266	1,400	80,958	$107	1,098	123,273	3,247	13,500	—10,253	35,042
Baltimore & Ohio—System	4,516	5,042,893	1,077,683	6,674,075	587,101	1,117,388	156,851	2,782,108	43,599	165,572	4,852,504	1,821,572	268,216	1,552,229	—205,889
Boston & Maine	2,301	2,043,777	1,202,920	3,588,975	438,256	556,947	32,047	1,696,891	15,594	121,523	2,861,259	727,717	199,292	528,425	109,154
Canadian Pacific Lines in Maine	233	100,015	27,845	135,860	26,025	16,639	5,299	72,195	....	4,065	124,223	11,637	12,000	—363	—20,652
Carolina, Clinchfield & Ohio	248	144,877	12,539	161,314	14,295	23,331	5,690	35,944	....	9,621	87,917	73,397	14,250	58,992	—46,468
Carolina, Clinchfield & Ohio of S. C.	18	9,795	1,516	11,645	1,039	85	1,645	1,932	....	638	5,338	6,307	750	5,557	—3,319
Central of New Jersey	678	1,655,929	396,067	2,179,214	175,267	457,702	27,067	830,912	12,496	47,952	1,549,433	629,781	120,928	508,853	32,571
Central New England	304	243,411	38,036	296,724	27,956	35,941	1,182	114,442	....	1,353	180,873	115,850	12,001	103,849	8,595
Central Vermont	411	207,881	61,285	291,930	25,963	51,544	8,358	151,248	2,294	9,000	248,408	43,522	15,760	27,762	40,776
Chicago & Eastern Illinois	1,282	907,126	231,028	1,229,861	152,874	238,440	23,353	488,099	7,682	38,086	947,650	282,211	30,400	251,733	137,174
Chicago & Erie	270	362,630	43,950	456,145	83,189	75,269	17,540	239,147	2,779	11,819	413,248	42,896	Cr. 5,650	48,547	108,248
Chicago, Burlington & Quincy	9,377	5,428,765	1,577,336	7,729,151	460,667	1,292,127	149,016	2,633,611	65,030	174,754	4,775,204	2,953,947	331,488	2,622,459	175,925
Chicago, Det. & Canada Gr. Trunk Jctn.	60	45,657	8,385	61,206	7,141	16,264	1,317	46,977	....	1,778	73,476	—12,270	2,870	—15,145	—22,373
Chicago, Indiana & Southern	359	296,199	24,891	332,267	72,888	117,517	11,182	132,742	1,362	10,325	346,015	—13,748	16,372	—30,395	—69,927
Chicago, Indianapolis & Louisville	618	294,628	136,026	474,033	36,549	102,115	20,282	204,091	291	20,700	383,948	90,085	26,744	63,112	—48,020
Chicago, Rock Island & Pacific	7,852	3,808,843	1,398,981	5,602,306	722,851	893,883	145,689	2,513,982	37,332	148,149	4,458,427	1,143,879	266,984	876,482	—277,298
Colorado & Southern	1,092	525,716	100,295	679,504	46,566	125,784	10,572	217,341	2,253	21,042	423,559	255,945	35,600	220,341	234,886
Delaware, Lackawanna & Western	960	2,546,258	657,026	3,562,409	316,424	591,882	71,126	1,219,139	27,465	76,751	2,293,254	1,269,155	25,832	1,242,529	—71,824
Denver & Rio Grande	2,569	1,235,321	292,928	1,631,485	103,982	316,694	36,352	517,315	19,653	50,895	1,044,891	586,594	85,500	500,978	31,075
Denver & Salt Lake	255	118,522	17,841	143,573	13,632	22,676	1,653	51,157	....	4,973	94,077	49,496	6,000	43,496	54,780
Detroit & Mackinac	400	38,877	24,525	69,677	8,810	16,366	2,186	30,947	....	2,807	61,116	8,561	5,615	2,946	2,080
Detroit & Toledo Shore Line	79	136,930	....	137,184	1,535	15,274	1,222	37,991	....	2,788	58,810	78,374	6,300	72,074	5,940
Detroit, Grand Haven & Milwaukee	191	139,089	45,249	210,684	25,050	33,407	5,953	105,857	842	5,204	176,313	34,372	3,360	30,921	—7,746
Detroit, Toledo & Ironton	441	111,133	12,477	131,106	22,943	38,087	3,900	112,977	....	5,855	183,762	—52,656	6,000	—58,656	12,182
Duluth & Iron Range	292	42,675	19,340	67,852	39,722	53,720	890	60,932	2,330	10,415	168,010	—100,158	Cr. 2,244	—97,914	50,446
Duluth, Missabe & Northern	369	27,355	26,166	58,252	11,918	98,423	1,878	63,382	1,654	24,282	201,538	—143,286	9,647	—152,933	38,483
Duluth, South Shore & Atlantic	628	114,322	67,926	199,540	29,050	34,869	9,165	89,545	3,544	9,027	175,201	24,340	970	23,370	5,743
Duluth, Winnipeg & Pacific	185	79,314	17,188	99,044	6,014	2,018	2,473	39,982	1,344	5,837	75,833	23,211	4,952	18,259	—23,932
Erie	1,988	3,000,561	696,701	4,092,108	643,734	1,375,672	97,409	1,725,782	30,531	99,591	3,957,863	134,245	Cr. 176,592	309,343	—695,768
Florida East Coast	696	230,876	159,738	446,298	60,122	65,236	11,180	135,687	3,286	14,116	283,693	162,605	18,000	144,605	5,173
Fort Worth & Denver City	454	362,234	141,367	526,596	48,099	78,467	6,434	215,885	3,270	13,702	365,856	160,740	12,150	148,590	36,684
Galveston, Harrisburg & San Antonio	1,350	561,413	278,413	906,192	134,424	152,960	33,043	419,280	8,541	36,241	784,304	121,888	38,286	83,251	104,407
Grand Trunk Western	347	437,512	92,278	568,303	121,491	95,532	16,794	269,204	7,952	17,819	528,792	39,511	35,920	3,234	—62,950
Great Northern	8,077	3,092,105	956,837	4,595,680	435,492	601,789	93,316	1,444,399	61,547	98,529	2,729,602	1,866,078	331,348	1,534,669	—113,367
Gulf, Colorado & Santa Fe	1,937	1,347,297	257,004	1,670,619	190,913	236,360	26,391	546,013	....	34,974	1,034,651	635,968	41,854	593,645	514,000
Houston, East & West Texas	191	68,311	24,006	97,526	17,779	16,927	1,856	46,926	....	3,713	87,201	10,325	5,245	5,065	—33,683
Houston & Texas Central	857	380,722	121,115	535,247	88,080	81,695	16,022	219,385	1,494	18,483	424,691	110,555	26,717	83,679	80,644
Lake Shore & Michigan Southern	1,852	2,490,136	1,036,767	4,046,920	309,378	726,811	70,187	1,511,295	45,199	209,495	2,872,366	1,174,554	232,400	941,883	1,035,301
Louisiana Western	208	126,982	61,627	200,119	17,001	26,719	7,135	60,685	2,790	6,113	120,417	79,702	15,928	63,771	29,644
Michigan Central	1,800	1,556,485	728,349	2,656,591	238,141	412,854	63,842	1,177,408	55,050	56,280	2,003,575	653,016	130,350	522,346	—88,559
Minneapolis & St. Louis	1,646	666,608	157,552	872,771	77,748	107,287	16,321	356,095	86	20,671	578,207	294,207	39,496	255,068	48,093
Minneapolis, St. Paul & Sault Ste. Marie	4,127	1,416,491	437,650	2,023,432	121,072	328,984	46,378	763,429	13,674	51,875	1,315,289	708,143	59,999	648,144	68,337
Missouri, Kansas & Texas System	3,865	2,003,881	731,984	2,931,064	366,677	309,598	52,634	1,126,162	26,122	81,863	1,961,338	969,726	95,267	874,168	505,140
Missouri Pacific	3,920	1,684,998	371,249	2,242,726	300,244	437,038	52,468	1,025,031	5,609	53,461	1,873,850	368,876	98,590	268,698	197,208
Mobile & Ohio	1,122	712,589	104,624	878,750	60,197	102,446	37,876	332,432	2,449	28,395	563,795	314,955	30,347	284,455	13,934
Morgan's La. & Tex. R. R. & S. S. Co.	405	328,368	99,851	464,963	49,003	63,718	11,613	165,130	2,402	11,929	303,690	161,273	19,976	139,322	—53,677
Nashville, Chattanooga & St. Louis	1,230	560,235	210,900	844,405	103,013	168,444	46,828	376,121	8,578	29,940	732,924	111,481	27,213	84,130	—121,775
Nevada Northern	165	60,359	5,061	68,497	14,962	13,459	407	21,936	47	3,594	54,404	14,092	3,651	10,441	—64,261
New Orleans & North Eastern	204	215,166	47,951	290,006	26,080	52,711	9,873	101,408	5,996	11,307	207,375	82,631	15,090	67,541	4,980
New Orleans, Mobile & Chicago	403	111,295	24,836	143,988	29,341	13,112	3,540	52,115	Cr. 3	6,769	104,873	39,115	6,480	32,621	—32,071
New York Central & Hudson River	3,699	5,003,296	2,482,255	8,897,546	1,003,202	1,766,887	150,873	3,425,036	178,379	342,048	6,766,425	2,131,121	433,408	1,696,874	—148,419
New York, New Haven & Hartford	2,003	2,300,615	2,114,604	5,015,072	605,453	845,114	36,366	2,060,883	50,172	149,044	3,746,642	1,268,429	205,000	1,063,267	—37,655
New York, Ontario & Western	568	493,989	81,181	673,103	72,174	146,645	8,306	306,505	....	16,260	549,889	123,213	20,000	103,211	11,294
New York, Susquehanna & Western	140	206,143	41,285	276,521	21,350	36,050	1,749	139,010	....	5,403	203,532	72,989	—60,771	133,760	73,898
Northwestern Pacific	401	83,450	114,919	227,689	45,260	38,752	4,327	111,821	....	8,115	204,602	23,087	16,068	6,980	—15,123
Oahu Ry. & Land Co.	109	57,668	22,823	87,707	12,733	7,568	741	21,424	....	8,573	51,039	36,669	7,018	29,651	—4,847
Panhandle & Santa Fe	668	243,744	60,812	320,242	53,003	57,835	3,805	103,221	....	8,466	226,331	93,911	7,898	86,013	55,665
Pere Marquette	2,319	998,419	306,404	1,421,699	118,619	294,638	31,764	645,790	3,790	37,744	1,132,262	289,438	52,621	236,576	135,699
Philadelphia & Reading	1,120	2,956,465	519,190	3,682,161	270,562	688,947	40,540	1,453,869	21,455	71,005	2,544,230	1,137,931	99,662	1,037,716	—381,640
Pittsburgh & Lake Erie	224	766,610	125,690	934,762	161,224	236,010	18,410	312,409	3,332	28,346	759,732	175,030	50,746	124,159	—154,629
Pittsburgh, Shawmut & Northern	294	163,171	10,701	176,076	16,558	35,654	1,491	57,452	....	3,986	115,142	60,934	1,609	59,325	19,100
Port Reading	21	108,869	....	132,761	8,367	6,663	38	50,903	....	129	66,098	66,663	12,000	54,663	—13,999
Rutland	468	133,922	85,089	253,802	31,617	42,561	7,309	112,089	1,103	8,612	203,292	50,510	17,111	33,399	—807
St. Louis, Iron Mountain & Southern	3,365	1,888,450	430,458	2,497,925	391,370	425,425	65,438	862,332	6,957	66,938	1,818,460	679,465	113,032	564,890	—535,942
St. Louis Merchants' Bridge Terminal	9	....	132	144,196	18,218	5,055	778	82,685	....	5,455	112,192	32,004	5,049	26,956	10,746
St. Louis, San Francisco & Texas	235	63,490	25,540	94,837	18,912	17,377	2,531	47,777	....	4,532	91,129	3,708	900	2,808	—9,955
St. Louis Southwestern	943	432,839	103,936	571,586	93,116	107,246	25,141	183,149	3,031	32,123	443,632	127,954	31,680	96,196	—202,855
St. Louis Southwestern of Texas	811	207,306	78,719	311,802	65,956	84,715	12,967	171,856	588	18,286	338,645	—26,844	19,598	—46,547	—59,551
San Antonio & Aransas Pass	724	225,322	76,971	322,071	70,549	55,633	6,556	160,473	....	11,365	304,576	17,494	12,000	5,484	80,575
San Pedro, Los Angeles & Salt Lake	1,132	445,003	207,235	718,187	54,413	100,076	32,780	247,157	12,414	18,503	465,342	252,845	42,231	210,608	—59,589
Southern	7,036	3,316,386	1,445,175	5,284,248	656,773	908,721	182,086	1,906,567	30,396	179,452	3,843,681	1,440,567	181,607	1,258,004	—750,946
Southern in Mississippi	281	62,806	31,691	103,343	19,072	8,603	2,113	41,693	....	4,135	75,615	27,728	15,256	12,468	—35,029
Spokane International	163	40,824	13,109	56,585	8,512	4,490	1,989	22,392	....	3,888	41,271	15,314	8,675	6,637	—14,546

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
Tennessee Central	294	$72,817	$30,800	$110,848	$25,375	$16,601	$5,410	$47,042	.....	$6,998	$101,347	$9,501	$4,480	$5,007	—$29,842
Terminal R. R. Ass'n of St. Louis	35	.....	183	219,632	16,376	9,044	903	89,498	.....	5,789	121,610	98,022	26,097	71,925	43,340
Texas & New Orleans	469	193,724	87,267	309,617	59,701	70,138	8,599	172,785	$5,343	10,506	327,067	—17,451	17,460	—34,992	—64,599
Texas & Pacific	1,887	1,133,616	391,224	1,654,739	157,337	238,547	37,305	706,396	16,911	40,315	1,194,565	460,175	77,836	381,852	—81,241
Toledo & Ohio Central	446	297,361	46,467	362,385	57,492	76,804	14,197	158,755	1,623	9,980	318,852	43,532	26,498	17,027	—34,785
Toledo, Peoria & Western	248	47,944	36,152	88,976	10,950	25,059	2,575	44,223	.....	3,533	86,340	2,635	6,100	—3,465	—6,109
Toledo, St. Louis & Western	451	294,559	24,905	344,463	37,258	56,804	16,973	157,855	.....	8,660	277,550	66,913	17,864	49,049	—68,236
Trinity & Brazos Valley	315	71,055	13,889	90,242	16,242	12,312	2,498	61,368	.....	7,949	100,368	—10,126	3,190	—13,337	—23,478
Ulster & Delaware	129	38,701	13,597	65,119	14,961	18,503	982	36,530	67	9,055	80,098	—14,979	3,300	—19,060	—21,544
Vicksburg, Shreveport & Pacific	171	63,249	40,324	116,358	18,571	26,849	3,862	45,147	2,067	5,217	101,713	14,644	9,207	5,437	—52,127
Virginia & Southwestern	240	135,431	12,308	151,935	22,029	36,342	3,314	46,672	.....	4,551	112,908	39,027	6,666	32,361	1,463
Wabash	2,519	1,586,835	484,110	2,286,392	236,636	458,813	79,997	1,079,015	13,724	65,937	1,933,042	353,350	79,053	274,103	—39,401
Western Pacific	943	297,901	65,201	388,035	50,428	59,789	32,184	155,275	8,837	20,886	327,400	60,635	26,949	33,637	51,892
Spokane, Portland & Seattle	556	210,681	104,356	343,557	41,318	36,434	6,703	88,677	3,056	13,386	189,502	154,055	53,400	100,512	4,252
SIX MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915															
Atchison, Topeka & Santa Fe	8,514	34,038,876	11,999,589	50,170,001	7,258,595	8,548,100	998,135	13,778,288	.....	915,528	31,471,259	18,698,742	2,329,040	16,362,725	1,522,653
Atlantic & St. Lawrence	167	539,836	186,042	800,812	126,149	118,905	24,320	326,579	.....	19,804	615,756	185,056	64,800	120,256	105,014
Atlantic City	170	410,785	956,165	1,436,148	154,375	137,861	15,773	671,310	531	9,190	1,079,040	357,108	81,000	276,019	—14,705
Baltimore & Ohio—System	4,516	35,694,359	7,933,646	47,138,435	4,860,833	8,765,543	959,408	18,174,917	283,797	1,067,224	34,111,308	13,027,127	1,599,851	11,419,939	—1,233,779
Boston & Maine	2,302	13,725,548	8,706,881	24,603,435	3,876,554	3,756,916	228,265	10,370,801	105,952	587,771	18,926,259	5,677,176	986,001	4,691,175	—23,959
Canadian Pacific Lines in Maine	233	358,528	123,581	524,853	138,461	90,120	35,045	252,877	.....	21,260	537,762	—12,909	72,000	—84,909	53,093
Carolina, Clinchfield & Ohio	248	968,409	99,225	1,094,575	98,756	139,034	39,804	213,426	.....	53,729	537,647	556,927	85,500	471,229	—268,169
Carolina, Clinchfield & Ohio of S. C.	18	55,132	9,663	66,458	5,592	540	10,538	12,612	.....	3,646	32,927	33,531	4,500	29,023	—20,522
Central of New Jersey	678	10,855,766	3,315,238	14,972,076	1,313,342	2,598,423	182,725	5,069,665	80,253	293,244	9,535,313	5,436,762	706,702	4,730,023	—243,203
Central New England	304	1,546,119	253,736	1,887,026	475,253	216,729	6,656	655,768	.....	21,551	1,375,663	511,363	68,001	443,329	—310,922
Central Vermont	411	1,338,999	494,534	1,988,252	283,719	325,080	48,468	900,756	16,447	41,831	1,616,300	371,951	94,560	277,383	168,903
Chicago & Eastern Illinois	1,282	5,517,469	1,485,898	7,594,876	896,755	1,584,736	137,466	2,780,562	45,987	217,949	5,660,417	1,934,459	314,900	1,619,145	537,443
Chicago & Erie	270	2,318,176	317,626	2,895,516	495,959	73,921	115,053	1,381,136	13,748	77,794	2,110,911	784,605	79,993	704,570	955,709
Chicago, Burlington & Quincy	9,377	34,281,615	11,258,812	49,794,216	5,100,982	8,060,426	825,630	15,090,511	400,034	1,035,982	30,513,564	19,280,652	1,969,019	17,311,632	5,791
Chicago, Det. & Canada Gr. Trunk Jctn.	60	326,473	97,441	488,023	71,460	75,747	10,350	258,322	.....	8,847	424,727	63,296	17,220	46,059	—40,003
Chicago, Indiana & Southern	359	1,890,271	165,740	2,130,999	317,998	571,364	47,733	728,592	9,694	69,210	1,744,591	386,409	113,927	272,051	—77,365
Chicago, Indianapolis & Louisville	618	2,216,485	903,394	3,407,416	386,278	668,285	125,303	1,245,373	1,028	106,696	2,530,937	876,479	160,093	716,068	—194,541
Chicago, Rock Island & Pacific	7,852	24,583,568	9,550,400	36,648,692	5,420,384	5,959,148	874,271	14,156,276	248,327	823,986	27,453,262	9,195,430	1,602,185	7,590,980	—96,771
Colorado & Southern	1,095	3,091,315	806,674	4,193,276	520,879	895,296	65,123	1,275,596	26,183	116,435	2,901,713	1,291,563	209,441	1,082,464	173,295
Delaware, Lackawanna & Western	960	15,978,878	4,536,791	22,664,386	2,602,013	3,559,118	416,000	6,960,679	193,598	440,767	14,057,923	8,606,463	950,832	7,654,390	—120,362
Denver & Rio Grande	2,569	8,922,689	2,529,306	12,197,360	1,672,515	2,168,378	231,408	3,463,227	174,495	318,877	8,019,796	4,177,564	535,500	3,641,430	—50,492
Denver & Salt Lake	255	699,509	202,815	953,474	111,033	157,685	14,514	304,030	.....	32,757	617,007	336,467	32,000	304,467	107,803
Detroit & Mackinac	400	339,026	175,328	559,516	73,366	94,387	13,953	202,555	1,021	16,264	401,546	157,971	52,311	105,660	38,246
Detroit & Toledo Shore Line	79	735,591	.....	737,350	80,989	60,791	10,310	203,332	.....	16,501	371,923	365,427	36,200	329,227	61,454
Detroit, Grand Haven & Milwaukee	191	838,089	354,249	1,380,323	225,490	201,791	42,153	663,445	5,922	28,999	1,167,801	212,522	20,160	191,562	—83,601
Detroit, Toledo & Ironton	441	885,787	100,818	1,046,688	147,563	156,407	23,296	610,157	.....	35,267	972,690	73,998	36,000	37,998	258,367
Duluth & Iron Range	292	2,513,562	116,869	2,730,862	2,730,862	487,672	414,169	6,503	591,330	18,112	52,770	1,570,556	1,160,306	1,021,135	1,344,754
Duluth, Missabe & Northern	369	2,945,593	175,426	3,192,728	361,762	453,728	12,670	614,676	16,253	81,792	1,540,881	1,651,847	172,426	1,479,421	—1,513,267
Duluth, South Shore & Atlantic	628	841,419	511,353	1,501,753	293,141	215,451	49,538	570,828	24,279	64,490	1,217,727	284,026	95,970	187,988	—83,313
Duluth, Winnipeg & Pacific	185	513,302	115,829	646,357	126,948	124,047	15,061	239,891	6,402	35,982	548,330	98,027	32,318	65,709	—146,859
Erie	1,988	20,892,099	4,947,686	28,321,192	3,336,763	6,821,902	556,853	10,172,916	195,842	594,121	21,600,031	6,721,161	581,788	6,125,486	—1,137,014
Fort Worth & Denver City	454	1,901,138	859,815	2,910,109	270,662	404,978	46,410	1,131,607	21,896	84,247	1,959,801	950,308	69,184	881,124	266,287
Florida East Coast	696	1,114,548	715,042	2,109,621	362,546	324,108	42,016	743,433	17,423	105,930	1,574,550	535,071	116,000	419,025	257,577
Galveston, Harrisburg & San Antonio	1,350	4,008,021	1,568,759	5,990,814	1,060,575	1,047,418	173,260	2,504,742	53,794	214,111	4,790,093	1,200,721	226,499	973,260	—55,296
Grand Trunk Western	347	2,459,511	976,278	3,688,188	651,767	678,798	120,674	1,537,259	48,779	89,982	3,127,260	560,928	216,500	344,834	—111,836
Great Northern	8,077	28,910,200	7,704,237	40,286,076	3,774,675	3,761,071	596,472	9,864,613	454,403	636,811	19,049,479	21,230,598	2,341,770	18,887,322	244,961
Gulf, Colorado & Santa Fe	1,937	6,643,737	1,702,335	8,766,371	1,097,427	1,239,393	162,617	2,935,836	.....	205,696	5,640,969	3,125,402	285,482	2,837,522	1,333,931
Houston, East & West Texas	191	461,146	171,622	668,117	134,956	106,043	11,509	282,192	.....	19,027	553,475	114,642	24,593	89,922	—83,817
Houston & Texas Central	857	2,451,760	836,979	3,503,902	615,702	482,343	91,377	1,378,793	9,966	105,495	2,681,462	822,439	145,271	676,492	—18,991
Lake Shore & Michigan Southern	1,882	16,375,877	6,710,311	26,543,556	2,715,675	5,201,785	486,638	9,011,873	304,947	817,569	18,538,487	8,005,069	1,236,900	6,763,196	1,167,996
Louisiana Western	208	716,251	352,475	1,138,210	116,192	203,268	40,454	345,832	17,704	38,547	761,894	376,316	63,407	312,847	65,091
Michigan Central	1,800	10,301,191	4,813,285	17,202,681	1,807,579	2,633,451	390,876	6,906,368	305,885	328,116	12,372,274	4,830,407	800,350	4,026,718	811,654
Minneapolis & St. Louis	1,647	3,960,323	1,060,255	5,316,893	609,290	763,488	107,499	1,955,607	490	122,620	3,558,995	1,757,898	236,488	1,521,409	172,319
Minneapolis, St. Paul & Sault Ste. Marie	4,127	10,948,273	3,376,676	15,460,233	1,789,548	2,145,186	284,244	4,729,608	92,580	303,324	9,295,514	6,164,719	636,014	5,528,705	17,332
Missouri, Kansas & Texas System	3,865	11,466,442	4,526,639	17,202,213	2,244,679	2,429,549	337,249	6,064,310	162,544	530,472	11,678,704	5,523,508	654,324	4,866,566	714,654
Missouri Pacific	3,920	11,617,629	2,577,982	15,418,822	1,957,801	2,838,329	373,136	5,741,883	45,848	369,529	11,326,528	4,092,294	591,540	3,494,594	1,356,062
Mobile & Ohio	1,122	4,612,562	689,351	5,640,764	603,191	1,032,730	246,178	2,180,966	16,206	176,788	4,256,059	1,384,705	184,273	1,199,873	—268,931
Morgan's La. & Tex. R. R. & S. S. Co.	405	1,650,678	553,067	2,385,186	282,859	427,074	68,110	901,976	15,347	71,259	1,766,174	619,012	118,855	496,898	—31,416
Nashville, Chattanooga & St. Louis	1,231	3,816,065	1,375,821	5,664,900	757,270	1,150,235	267,490	2,280,058	54,419	177,663	4,687,134	977,766	163,278	814,083	—412,835
Nevada Northern	165	452,013	52,636	526,156	102,002	82,336	2,654	134,344	365	22,927	344,647	181,509	30,240	151,269	—253,847
New Orleans & North Eastern	204	1,317,777	282,846	1,758,336	189,814	376,829	58,511	618,058	35,469	70,446	1,349,127	409,209	88,490	320,719	—89,587
New Orleans, Mobile & Chicago	403	704,876	163,091	918,526	177,247	127,142	22,996	318,017	3	40,666	686,065	232,462	37,404	194,968	—209,153
New York Central & Hudson River	3,699	32,034,963	17,373,921	58,070,768	6,764,909	10,649,118	920,871	20,114,685	1,077,826	1,333,907	40,861,316	17,209,453	3,041,117	14,165,583	1,786,855
New York, New Haven & Hartford	2,003	15,227,338	14,280,430	33,095,293	4,261,114	4,957,490	225,330	12,457,148	284,516	797,364	22,973,051	10,122,243	1,384,000	8,736,318	—202,711
New York, Ontario & Western	568	3,244,539	1,015,024	4,939,635	671,819	877,693	50,038	1,836,724	.....	92,484	3,528,760	1,410,876	118,824	1,292,020	25,490
New York, Susquehanna & Western	140	1,085,947	274,717	1,513,925	158,722	179,594	12,134	679,541	.....	32,742	1,062,602	451,323	4,854	435,068	99,654
Northwestern Pacific	401	805,168	1,019,035	2,047,129	359,014	243,187	28,416	724,076	.....	52,453	1,377,733	669,396	95,993	573,328	—83,443

Traffic News

A press despatch from Butte, Mont., reports cotton, by the trainload going through there on the way to the Pacific coast, bound for Russia.

The Canadian Pacific has notified the Canadian Railway Commission that the Canadian railroads are preparing to apply to the board for permission to make a general increase in freight rates east of Port Arthur. It is reported that the plan contemplates a general advance of 5 per cent. Canada is about to impose new taxes, war taxes, which, no doubt, will bear heavily on the railways.

The Department of Agriculture on February 15 extended its quarantine regulations against foot-and-mouth disease to include all territory east of the Mississippi river and north of the state of Tennessee. Shipments from this territory to the south or west cannot be made except of animals to be killed within 48 hours. The state of Rhode Island has ordered the closing of all slaughter houses in the state for an indefinite period.

Mr. Ford, of the Cincinnati, New Orleans & Texas Pacific, has issued a second three-page circular telling agents and shippers of business opportunities in foreign countries as gleaned from the publications issued by the government. Mr. Ford's survey includes the whole world. Cast iron pipe, for water, is wanted in the Canary Islands; Zurich, Switzerland, wants from a million to five million oak railroad ties; Chile wants machinery for making wood pulp; and so on.

It is reported that a flood of petitions, both from individuals and from commercial organizations, urging increases in freight and passenger rates for the railroads, have been received by the Missouri legislature. On February 8, petitions of this kind were presented to the legislature by five state senators and 125 members of the house, and were referred to the committees on railroads. It is said that approximatly 10,000 names were signed to the petitions and that about 5,000 letters were received by the legislators.

The Traffic Club of New York

At the regular monthly meeting of the Traffic Club of New York, to be held at the Hotel Astor, on Tuesday, February 23, W. S. Kies, manager of the foreign trade department of the National City Bank, will speak on "Our Expanding Foreign Trade."

Annual Dinner, Traffic Club of Pittsburgh

The Traffic Club of Pittsburgh has announced that its thirteenth annual dinner will be held in Memorial Hall, Pittsburgh, Pa., on the evening of Friday, March 5. George A. Blair, assistant freight traffic manager of the Chicago, Milwaukee & St. Paul, will act as toastmaster, and the speakers will be W. L. Clause, president of the Pittsburgh Plate Glass Company, who will speak on "The Federal Trade Commission," and Hon. John W. Weeks, senator from Massachusetts, who will speak on "The Relation of the Government to Business." President E. S. Lalk will preside.

Car Surpluses and Shortages

The American Railway Association's Committee on Relations Between Railroads, Arthur Hale, chairman, resuming the work discontinued last autumn, has issued statistical statement No. 1, giving a summary of freight car surpluses and shortages for February 1, 1915, compared with similar figures for November 1, 1914. The total surplus was, on February 1, 1915, 227,473; November 1, 1914, 172,325; February 1, 1914, 211,960. (The statement for November was given in the *Railway Age Gazette*, November 20, page 986.)

Reports as of February 1, 1915, have been received from 159 roads, operating 1,854,150 cars, while figures for November 1, 1914, were furnished by 192 roads operating 2,203,414 cars. It is therefore probable that had reports been received from the same number of roads in February the surplus would have been increased by approximately 50,000 cars, or to a total of 277,000. The greater part of the surplus increase over the figures of November 1, 1914, is in Group 2 (Eastern) and consists chiefly of coal cars.

In the surplus grand total this increase is offset to some extent by a large reduction in box cars in Group 11 (Canada), due to the failure of two large roads in that section to report.

The total shortage was, on February 1, 1915, 832; November 1, 1914, 2,229; February 1, 1914, 2,282. The shortage is negligible.

The figures showing the surplus and shortage by classes of cars follow:

Classes.	Surplus.	Shortage.
Box	40,533	493
Flat	16,243	56
Coal and gondola	133,200	201
Other	37,497	82
Total	227,473	832

Two-Cent Fares in Missouri

The Missouri Public Service Commission reports to the legislature of that state that, according to returns sent in by nine principal railroads of the state, the receipts of those roads for passenger fares in 1914 amounted to $992,946 less than in the year 1913. The falling off in passenger receipts on the Burlington road in Missouri was $330,912, and on the St. Louis & San Francisco $323,756.

Illinois and Iowa Campaigns for Higher Passenger Fares

The Illinois railroads are having published in newspapers throughout the state a reply to a statement made by Ralph D. Rosestiel of the United Commercial Travelers' Association, that 50,000 traveling men in Illinois spend $25,000,000 a year in traveling expenses. The railroads' statement shows that the official report of the Illinois Railroad & Warehouse Commission for the fiscal year ending June 30, 1913, gives the total passenger traffic earnings on Illinois railroads as $41,642,000; so that the assertion that more than 60 per cent of the railroad traveling in Illinois was done by commercial travelers, appears ridiculous on the face of it. It is also stated that the records of the mileage bureaus of the passenger associations of Illinois railroads show that only about 8 per cent of the passenger traffic comes from commercial travelers. Eight per cent of the total passenger earnings in Illinois in 1913 would be $3,331,360. It is also shown by the railway mileage bureau records that over 90 per cent of the railway fares of commercial travelers are paid by their employers. The remainder is paid by commercial travelers who work on a commission basis and pay their own expenses. The statement also says that a majority of the members of the Travelers' Protective Association of Ohio have written to the secretary of the organization that they are in favor of increasing the passenger fare in Ohio to 2½ cents a mile. The Merchants' & Manufacturers' Association of Cincinnati, including large employers and traveling salesmen, has also unanimously adopted resolutions in favor of a 2½ cent a mile law in Ohio.

As a result of the first week's campaign of the passenger officers of the Illinois railroads for an increase in the state passenger fare from 2 cents to 2½ cents per mile, resolutions endorsing the petition of the railroads have been adopted by seven commercial organizations before which the railroad men presented their case. Other organizations have referred the matter to their boards of directors. The commercial clubs that endorsed the plan were those at Galena, DeKalb, Danville, Dixon, Peoria, LaSalle and Peru. The resolutions which the railroad men asked the clubs to adopt include a recommendation to the representatives and senators in the legislature that "upon proper showing by the railroads that such an increase is reasonable, that the law be so amended as to fix the maximum railroad rate for passengers traveling in Illinois at 2½ cents per mile instead of 2 cents per mile, thus restoring to the railroads one-half the reduction which was made in passenger fares when the present law was enacted." The speaking campaign will be continued this week at a large number of additional cities throughout the state.

A committee of presidents of railroads running through Iowa held a conference with Governor Clarke, at Des Moines, on Tuesday, to ask the support of the state officers in their proposed campaign for an increase in the passenger fare from 2 to 2½ cents a mile and a general revision of state freight rates.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

A hearing was held in Chicago on February 10, before an examiner for the commission, on complaint of shippers in the East Chicago and Indiana Harbor districts of Indiana, against a 5 per cent increase in freight rates to Illinois points. The points affected have been considered heretofore as a part of the Chicago switching district, and have had Chicago rates, but in connection with the general 5 per cent advance in interstate freight rates in Central Freight Association territory the rates were advanced in October, 1914. The industries affected are complaining because of the discrimination created, because the Illinois Public Utilities Commission suspended the 5 per cent advance as applied to intrastate business, which gives shippers in the Chicago district on the Illinois side of the state line an advantage over their competitors just across the line in Indiana. The railroads obtained an order from the Interstate Commerce Commission giving relief from the operation of the fourth section from the Calumet district, but on later complaints the commission ordered a new hearing. The railroad defense at the hearing was that the discrimination was created by the action of the Illinois commission in suspending the intrastate rates.

Kansas-California Flour Rates

Opinion by Commissioner Clements:

This proceeding is supplementary to *Kansas-California Flour Rates,* 29 I. C. C., 459, *Arizona Wheat Rates,* 29 I. C. C., 424, and *Arizona Corporation Commission v. Arizona & New Mexico,* 29 I. C. C., 424. Following the decision in those cases the carriers involved asked permission to increase the rates on wheat and flour in connection with the general readjustment of rates contemplated by them, pursuant to the Supreme Court's decision in the *Intermountain Rate cases.* Upon further hearing the commission finds that the defendant carriers have justified proposed increases in the rate on flour in carloads from 65 to 75 cents per 100 lb. from points in Kansas, Nebraska, and neighboring states to California terminals, and such a rate will be permitted to become effective, provided the difference between the rates on wheat and flour does not exceed 8 cents; and provided the rates on said commodities to the terminals are not exceeded at intermediate points. (32 I. C. C., 602.)

Rates to Columbia, S. C.

Columbia Chamber of Commerce v. Southern Railway et al. Opinion by Commissioner McChord:

In its original decision in this case the commission held that Columbia was discriminated against in favor of Augusta, Ga., in rates from eastern and western points of origin. It was held with respect to commodity rates from the east and to class and commodity rates from Cincinnati, Louisville and Knoxville, that the differences in the location of the two cities or their competitive relationship to the ports were not sufficient to justify the differences in rates in favor of Augusta, and it was ordered that in the future the rates from these points of origin to Columbia should not exceed the rates from the same points to Augusta. The commission also ordered that on specific commodities by rail or by water-and-rail from Baltimore, Md., to Columbia rates should not exceed those from the same points to Augusta. Rates on classes and on specific commodities from Cincinnati, Louisville and Knoxville were ordered not to exceed those from the same points to Augusta. This decision is now so amended that the conclusions with respect to commodity rates from points from which the rates are made with relation to the rates from Baltimore to Columbia and to Augusta, Ga., shall not cover points in New England. In view of the re-adjustment of rates in the southeast, now progressing, no order is made at this time with respect to class and commodity rates from Cincinnati, Louisville and Knoxville to Columbia and to Augusta. (32 I. C. C., 504.)

Reshipping Rates on Grain from Omaha

Opinion by the commission:

The commission finds that the carriers have not justified proposed increased joint reshipping rates on wheat, corn and articles taking the same rates in carloads from Omaha and South Omaha, Neb., and Council Bluffs, Ia., applicable via the Wabash to Mexico, Mo., to stations in Illinois on the line of the Chicago & Alton. It is found, however, that the carriers have justified such rates on these commodities in carloads, applicable via Mexico, to stations on the south branch of the Chicago & Alton, which extends from Mexico to the Missouri river. The carriers also proposed joint reshipping rates via Mexico to stations on the line of the Chicago & Alton from Mexico to Blue Springs, Mo. As these rates are lower than the combination or class rates now in effect, they also are found justified.

The fourth section application filed by the Wabash which asks authority to continue carload rates on wheat, corn and articles taking the same rates from Omaha, via Mexico, to points on the Chicago & Alton east of the Mississippi river lower than those contemporaneously in effect on like traffic to intermediate points is denied. (32 I. C. C., 590.)

Omaha Grain Exchange v. Chicago & Alton et al. Opinion by the commission:

The commission finds that the carriers should establish joint reshipping carload rates on wheat, corn and articles taking the same rates, from Omaha and South Omaha, Neb., and Council Bluffs, Ia., via the Wabash to Mexico, Mo., and the Chicago & Alton beyond to certain stations on the main line of the latter between Mexico and the Mississippi river. The complainants also requested similar rates to all south branch stations of the Chicago & Alton from Mexico to the Missouri river, which rates are covered in *Reshipping Rates on Grain from Omaha* abstracted above. Reparation is awarded, however, on certain shipments to south branch stations. (32 I. C. C., 597.)

Rate Suspensions

The commission has issued the following notice to the public:

While the law authorizes the commission to suspend proposed increased rates, fares or charges, it does not contemplate that such suspension will necessarily follow every request therefor, but does contemplate that the power will be exercised with judgment and due consideration for circumstances and conditions.

In the exercise of that power, the commission desires to act intelligently and to have opportunity to exercise a reasonable discretion in the matter before the increase in question becomes effective. It is therefore important and very desirable that such protests, if made, should be made at the earliest practicable moment, so that the members of the commission can be advised in the premises before determining what action they will favor. In instances it has been necessary to deny requests for suspension because they came so late that it was impossible to act upon them intelligently, and sometimes they are so late as to render affirmative action impossible even if it were desired to take it.

The commission wishes to exercise this power in every case where it ought to be exercised and to withhold exercise of it in every instance in which it ought to be withheld. It desires to act intelligently and to do substantial justice as nearly as that can be judged upon a partial showing, which is all that can be had pending full hearing.

To the end that this line of work may be conducted in an orderly and proper manner, the commission requests that when such protests are to be made they be made as far in advance of the effective date of the rate, fare or charge protested against as is possible, and calls attention to the fact that because of the short time afforded it may be necessary to deny suspension in instances in which the protest is not filed with the commission at least 10 days prior to such effective date.

Fourth Section Violations in Rates on Sugar

Opinion by the commission:

The carriers serving the territory affected by Fourth Section Order No. 4086, entered in *Sugar Rates from New Orleans and points taking the same rates to Ohio river crossings, Memphis, St. Louis and intermediate points,* 31 I. C. C., 495, find that readjustments of their sugar rates in accordance with the mileage scale prescribed will result in large reductions in revenues. Each

of them, therefore, has submitted a scale which it is desired to establish in lieu of the prescribed mileage scale. The rates proposed are designed to preserve the revenues on this traffic and to bring about a more uniform and logical adjustment of rates under the fourth section.

The commission finds that the suggested rates are in many ways better than the average mileage scale. It will allow the carriers to use their proposed scale with certain modifications.

The proposed rate to Montgomery for a distance of approximately 320 miles is 21½ cents, which will be observed as maximum at intermediate points on the direct line. The proposed rate to Birmingham is also 21½ cents for 355 miles, which also will be observed as maximum to intermediate points.

The proposed rate to Memphis via the Illinois Central is 13½ cents, and to intermediate points 25 cents. These two rates do not bear a reasonable relation. These carriers are, therefore, authorized to establish rates not exceeding 21½ cents to all points not more than 360 miles from New Orleans on routes from that point to the Ohio and Mississippi river crossings.

The proposed rates to points north of Memphis and Birmingham in Mississippi, Alabama, Tennessee and Kentucky vary from 25 to 28 cents per 100 lb. These points are from 360 to 800 miles from New Orleans, and the proposed rate of 28 cents to the more northerly of these points is not unreasonable. The carriers are authorized to establish rates to points more than 360 miles from New Orleans and south of the southern boundary of Tennessee, which do not exceed 25 cents, and rates to points on these lines north of said boundary line not in excess of 28 cents, provided the rates which have been proposed by the carriers are not exceeded.

The carriers proposed also to cancel l. c. l. rates from New Orleans to certain points in the southeast. There being no real necessity for such rates, the commission will allow the discontinuance to go into effect.

In accordance with the wishes of the carriers, reference to the rates to points intermediate to St. Louis and north of the Ohio is left for consideration with the rates to points in Illinois and points in central freight association territory. (32 I. C. C., 606.)

Southern Pacific Retains Control of Pacific Mail

In this case, the first decided under the Panama Canal Act, the commission finds that it is in the public interest for the Southern Pacific to retain its controlling interest in the Pacific Mail Steamship Company, but that it would be unlawful for the latter as long as it is controlled by the railway to run its boats through the Panama Canal to Colon, even as an extension of the present service, from San Francisco to Balboa, at the Pacific end of the canal. The Southern Pacific is therefore authorized to continue its control of the steamship company, but within 60 days it must amend its petition so as to eliminate the proposed service beyond Balboa.

The Southern Pacific owns 110,800 of a total of 200,000 shares of stock in the Pacific Mail Company. That company owns two large fleets. One operates between San Francisco and Honolulu and ports in Japan and China. The other operates between San Francisco and Balboa, stopping at various points on the southwestern coast of Mexico and Central America. The steamships on this line make regular trips, stopping at Mazatlan, San Blas, Manzanillo, Acapulco and Salina Cruz, on the coast of Mexico, ports that are near to, and some of them directly served by, the Southern Pacific Railroad of Mexico. The traffic carried between San Francisco and Balboa has principally been transported over the Panama Railroad to or from Colon and via steamships bound for or from Atlantic coast points, Europe, and other foreign countries. It had been proposed, also, to operate the boats from San Francisco and the Mexican and Central American ports through the canal to Colon because the Panama Railroad had withdrawn from the through billing arrangements across the isthmus; but, as noted, the commission finds that such would be contrary to the act.

Section 5 of the act to regulate commerce, as amended by the so-called Panama Canal Act, provides among other things, that:

> From and after the 1st day of July, 1914, it shall be unlawful for any railroad company or other common carrier subject to the act to regulate commerce to own, lease, operate, control, or have any interest whatsoever (by stock ownership or otherwise, either directly, indirectly, through any holding company, or by stockholders or directors in common, or in any other manner) in any common carrier by water operated through the Panama canal or elsewhere with which said railroad or other carrier aforesaid does or may compete for traffic or any vessel carrying freight or passengers upon said water route or elsewhere with which said railroad or other carrier aforesaid does or may compete for traffic; and in case of the violation of this provision each day in which such violation continues shall be deemed a separate offense.
>
> Jurisdiction is hereby conferred on the Interstate Commerce Commission to determine questions of fact as to the competition or possibility of competition, after full hearing, on the application of any railroad company or other carrier.

It is, however, also provided that there need be no discontinuance of railroad ownership and control of water lines, if after investigation—

> the commission is of the opinion that such existing specified service by water, other than through the Panama canal, is being operated in the interests of the public, and is of advantage to the convenience and commerce of the people, and that such extension will neither exclude, prevent nor reduce competition on the route by water under consideration.

There is indicated a clear, unmistakable policy on the part of Congress, to separate from railroad ownership, control, or influence such common carrier water lines, as may, when thus separated, compete with the present owning or controlling companies, except where, upon investigation, it is found by the commission that the existing service by water, other than through the Panama Canal, is being operated in the interest of the public, is of advantage to the convenience and commerce of the people, and that its continuance will neither exclude, prevent, nor reduce competition on the route by water. This being so, a construction of the act must be adopted which will properly and effectively carry out the purpose of Congress. The commission may not nullify or weaken the force of the plain intendment of the act for any reasons, however plausible they may appear to be. The words "may compete for traffic" do not mean a vague, possible though improbable competition, but mean a probable, potential competition, as when the water line is entirely divorced from the railroad. It must, therefore, look at the conditions as they will exist if this divorce is effected. From a practical view the question is, Will the steamship company, when free to consult only its own interests, compete for traffic with the railroad line? In the light of experience this will not be a difficult question to determine in most cases. Self-interest will surely develop an effort to secure desirable traffic—traffic that will produce revenue for the carrier.

It must also be observed that the competition is "for traffic." There are no words of limitation in this clause; it covers all interstate coastwise or foreign traffic.

It is the opinion of the commission that the railway and the steamship company compete for coastwise traffic between points in the United States; traffic between San Francisco and ports on the coast of Mexico and Central America; and for European and other foreign commerce.

But, on the other hand:

There are several boat lines of American and foreign ownership plying between San Francisco and these Mexican and Central American ports and Balboa in direct competition with the Pacific Mail Steamship Company. The uncontradicted testimony of witnesses for petitioner and of shippers is that the service of the Pacific Mail is the most dependable, and that it is operated in the interests of the public, and is of advantage to the convenience and commerce of the people. It appears that the service proposed, other than through the Panama Canal, would be in the interests of the public and of advantage to the convenience and commerce of the people, and that its continuance would neither exclude, prevent, nor reduce competition on the route by water under consideration. (32 I. C. C., 689.)

STATE COMMISSIONS

The Railroad Commission of Louisiana has suspended, until after a hearing, at some date yet to be fixed, its order of January 27, requiring the railroads of the state to cease charging car-rental in addition to the ordinary demurrage charges.

The Railroad Commission of California has made permanent the order issued by it about a year ago making radical reductions in the rates for the transportation of merchandise by express. It is said that the Wells-Fargo Company has its income reduced by this order to the amount of about $750,000 a year.

The Missouri Public Service Commission has announced that at St. Louis on February 23, it will resume its hearings on the applications of the railroads for general advances in freight and

passenger rates throughout the state. Another hearing will be held beginning on March 8, at St. Joseph, and another at Kansas City, on March 10.

The Colorado Public Utilities Commission began a hearing at Denver on February 8, under its order to the Denver & Rio Grande, Colorado & Southern, Atchison, Topeka & Santa Fe and Midland Terminal railways, to show cause why the passenger fares between Cripple Creek and Divide and between Pueblo and Trinidad should not be reduced.

The Pennsylvania Public Service Commission has ordered that the fare, on the Delaware, Lackawanna & Western, from Taylor to Scranton, about 2½ miles, which was increased from five cents to ten cents, shall be put back to the lower figure. The report of the case indicates that the railroad company advanced the rate because it desired to reduce the travel from Taylor to Scranton on a certain train, in the morning, so as to enable it to run that train with one day coach instead of two. The company frankly stated that it had sought to make the rate high enough to divert to other carriers most of the passengers for that short distance.

COURT NEWS

Misleading Passenger—Nominal Damages

Action was brought by a female passenger against a railroad company for damages for having been negligently misled by the company's employees in charge of the train and caused to leave it at a time when it stopped on a side track some 600 yards before it reached her destination. The jury awarded the plaintiff $1 damages, and she appealed. On appeal it was held that as the plaintiff did not appear to have sustained any damages of a character susceptible of a pecuniary measurement in any wise exact, other than the value of the ride, which she lost, from the siding to her destination, the verdict could not be disturbed as contrary to the evidence. Although the jury found that the plaintiff suffered injuries, they were justified in believing that they were so slight that nominal damages would be adequate compensation. Hilley v. Central of Georgia, Alabama Court of Appeals, 66 So. 883.

Federal Employers' Liability Act—Interstate Commerce

In an action in the federal courts for personal injuries the plaintiff's declaration alleged that he was engaged in tearing down a roundhouse which had been rendered useless by a fire, and was injured by a falling timber. The active function of the roundhouse had ceased to exist, and the employment, therefore, was in connection with the removal of a useless structure, to the end that a new one might be built for railroad purposes, and very likely for uses in connection with interstate commerce. The court decided against the employee, sustaining a demurrer to the declaration; saying that there must be a line somewhere. If this case were within the line, it might as well be said that all employees on railroads, engaged both in interstate and intrastate commerce, might have the benefit of the federal Employer's Liability Act, with the result that, with few exceptions, all personal injury litigation would be in the federal courts. Thomas v. Boston & Maine, 218 Fed., 143.

Obstruction of Road Crossing—Willful Injury—Punitive Damages

A traveler on a highway sought to recover punitive damages for the alleged willful obstruction of a road crossing by a railroad company for an unreasonable time. The court held that the burden was on the plaintiff to establish a willful or intentional injury before he could recover punitive damages. The complaint alleged that the crossing was obstructed while the train men had gone with the engine to a nearby mine, but it did not allege that they knew the conditions so as to show a consciousness on their part that their conduct would probably result in injury. Nor was it alleged that the highway was one that was much or little used, or that the blocking occurred at a time when persons would likely be traveling on the highway, or what, if any, knowledge the defendant's employees had concerning such matters. It was held that the complaint was insufficient to charge a willful injury, and judgment for the plaintiff was reversed. Southern Ry. Co. v. Jarvis, Alabama Court of Appeals, 66 So. 936.

Railway Officers

Executive, Financial, Legal and Accounting

Charles W. Hotchkiss has been elected chairman of the board and of the executive committee of the Virginian Railway, with headquarters at New York. Mr. Hotchkiss was born on June 19, 1863, at Unadilla Forks, N. Y., and was educated at West Winfield Academy. He began railway work in August, 1886, as a rodman, and was engaged in construction work first on the New York, West Shore & Buffalo, now the West Shore, and then on the South Pennsylvania Railroad. He was then consecutively assistant engineer of the Michigan Central, chief engineer and general manager of the Chicago, Indiana & Southern and the Indiana Harbor Belt, the New York Central's industrial terminals and coal road in the vicinity of Chicago. In 1912 he was elected president of the Chicago Utilities Company and of the Chicago Tunnel Company, and is president also of the Richmond Light & Railroad Company, New York, and chairman of the board of the Atlantic Coast Electric Railway Company, Asbury Park, N. J. Mr. Hotchkiss is a member of the American Society of Civil Engineers, the Western Society of Engineers, the American Railway Engineering Association, the Chicago Club and the Mid-Day Club, Chicago, Engineers' Club, Lawyers' Club, and Richmond County Country Club, New York.

C. W. Hotchkiss

Raymond Du Puy, vice-president and general manager of the Virginian Railway, with office at Norfolk, Va., has been elected president with headquarters at Norfolk. Mr. Du Puy was born on January 4, 1860, at Pittsburgh, Pa., and was educated at Georgetown University. He began railway work in 1877, as water boy on the Missouri, Kansas & Texas, and from 1878 to 1881 was assistant engineer on the same road and the Missouri Pacific. He was then to 1885, chief engineer and superintendent of the Tioga Railway, now a part of the Erie, and later for two years was general superintendent of the Minnesota & North Western. From 1887 to February, 1888, he was general manager of the Chicago, St. Paul & Kansas City, now a part of the Chicago Great Western. In 1891 he was elected president of the Leavenworth & St. Joseph, and from 1895 to 1896 was president of the DeKalb & Great Western; both these roads are now a part of the Chicago Great Western. On April 15, 1898, he was appointed general superintendent of the Chicago Great Western, remaining in that position until July, 1899, when he was appointed superin-

Raymond Du Puy

tendent of the Morris & Essex division of the Delaware, Lackawanna & Western. He left the latter company in May, 1900, and then served for five years as general manager of the St. Joseph & Grand Island, at St. Joseph, Mo. In April, 1905, he was appointed general manager of the Tidewater and the Deepwater Railways at Norfolk, Va., which were later consolidated to form the Virginian Railway, and in April, 1907, Mr. Du Puy was elected vice-president and general manager of the Virginian Railway, which position he held at the time of his recent election as president of the same road as above noted.

Edwin W. Winter has resigned as one of the receivers of the Chicago & Eastern Illinois.

Ralph M. Shaw has been appointed assistant general counsel of the Chicago Great Western, with office in the First National Bank building, Chicago.

Edward F. Kearney, first vice-president of the Texas & Pacific, with headquarters at New Orleans, La., has been appointed a receiver of the Wabash.

D. D. Curran, who has been elected chairman of the board of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at New Orleans, La., as has already been announced in these columns, was born in Ireland, and began railway work in 1873, as a brakeman on the Pennsylvania Railroad, which position he held for five years. He was then successively freight conductor on the Mobile & Montgomery, then passenger conductor on the same road, and later yardmaster of its successor, the Louisville & Nashville at Montgomery, Ala. He was then appointed trainmaster on the same road at Birmingham, remaining in that position until 1887, when he entered the service of the Central of Georgia, and until February, 1893, served as superintendent successively on the South Carolina division, the Southwestern division, the Columbus & Western division and the Savannah & Western division, having been appointed to the last named position in 1892. In February of the following year he became superintendent of the New Orleans & Northeastern, and in August, 1907, was elected president, later becoming also general manager of the same road and president and general manager of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, and now becomes chairman of the board of the same roads as above noted.

D. D. Curran

Operating

A. A. Woods, resident engineer of the New Orleans & Northeastern, at New Orleans, La., has been appointed superintendent, vice S. E. Flanagan, deceased.

Charles Hicks has been appointed general manager of the Tennessee, Alabama & Georgia, with office at Chattanooga, Tenn., vice E. F. Blomeyer, resigned.

A. N. Umshler has been appointed trainmaster of the Illinois Central at Centralia, Ill., and F. E. Hatch has been appointed trainmaster at Carbondale, Ill.

R. W. Stevens, superintendent of the Chicago & Western Indiana at Chicago, has been appointed general superintendent, succeeding J. M. Warner, whose title was general manager.

H. Eicke, local freight agent of the Wabash, at Chicago, has been appointed superintendent of transportation, with headquarters at St. Louis, Mo., succeeding F. E. Bolte, resigned to accept service elsewhere.

James D. Welsh, general superintendent of the Colorado & Southern at Denver, Colo., has resigned, and E. S. Koller, assistant general manager of the Chicago, Burlington & Quincy lines west of the Missouri river, at Omaha, Neb., succeeds Mr. Welsh, with headquarters at Denver, with the title of general manager.

J. W. Knapp, superintendent of terminals of the Chesapeake & Ohio at Newport News, Va., has been appointed superintendent of the Richmond division, vice E. I. Ford, who has been appointed superintendent of the Newport News and Norfolk terminals in place of Mr. Knapp, and J. F. Briant, assistant superintendent at Clifton Forge, Va., has been appointed assistant superintendent of the Richmond division, with headquarters at Richmond, and the office of assistant superintendent of the Clifton Forge division has been abolished.

O. K. Cameron, trainmaster of the Southern Railway at Birmingham, Ala., has been promoted to superintendent of the Mobile division, with headquarters at Selma, Ala., vice F. S. Collins, transferred. J. M. Hudspeth, superintendent of the Richmond division at Richmond, Va., has been appointed superintendent of the Richmond terminals, with headquarters at Richmond. C. G. Arthur, superintendent of the Charleston division at Charleston, S. C., succeeds Mr. Hudspeth. C. P. King, trainmaster at Columbia, S. C., succeeds Mr. Arthur. C. C. Hodges, superintendent of the Asheville division at Asheville, N. C., has been appointed superintendent of the Transylvania division, with headquarters at Brevard, N. C., and F. S. Collins, superintendent of the Mobile division at Selma, Ala., succeeds Mr. Hodges.

W. E. Williams, whose appointment as general manager of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., has already been announced in these columns, was born May 29, 1864, at Houston, Tex. He began railway work in 1881 with the International & Great Northern as clerk to the roadmaster, and was subsequently in the bridge department, clerk in the superintendent's office, timekeeper, transportation clerk, chief clerk to the superintendent of transportation, to the general superintendent and to the general manager, and secretary to the receivers, until June, 1895. He was then purchasing agent and general storekeeper for two years. Mr. Williams became connected with the Missouri, Kansas & Texas in September, 1897, as chief clerk to the general superintendent, and was consecutively car accountant and trainmaster until November, 1902. On the latter date he was advanced to superintendent at Greenville, Tex., and from December, 1905, to October, 1911, was successively superintendent at Denison, Tex., McAlester, Okla., and Sedalia, Mo. He was then appointed general superintendent, which position he held until his promotion to general manager on February 1, as above noted.

W. E. Williams

J. L. McLendon, assistant superintendent of the Southern Railway at Macon, Ga., has been appointed terminal trainmaster, with headquarters at Macon, Ga.; A. P. Johnson, trainmaster at Atlanta, Ga., has been appointed trainmaster of the South end of the Atlanta division, with office at Macon, with jurisdiction over lines south of Roseland, with the exception of Macon terminals. B. F. Langford has been appointed trainmaster of the North end of the Atlanta division, with jurisdiction over lines north of North Inman, with office at Atlanta; G. W. Adams has been appointed chief despatcher, with office at Atlanta; W. T. Sutphen has been appointed trainmaster of the Richmond division, with office at Richmond, Va., vice W. C. Herbert; B. Haggard, trainmaster of the Northern Ala-

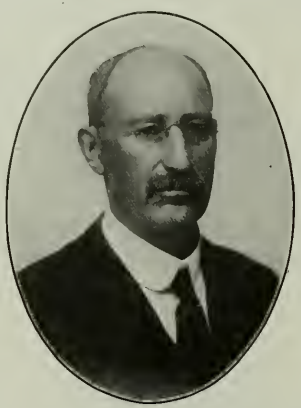
bama Railway at Sheffield, Ala., has been appointed trainmaster of the east end of the Birmingham division of the Southern Railway, with office at Birmingham, Ala., vice O. K. Cameron, and T. O. Crane has been appointed trainmaster of the Northern Alabama, with office at Sheffield, Ala., vice Mr. Haggard.

Engineering and Rolling Stock

W. McC. Bond has been appointed supervisor on Sub-Division No. 1 of the Baltimore & Ohio, Cleveland division, with headquarters at Akron, Ohio, vice T. Delaney, retired.

A. Young, roundhouse foreman of the Chicago, Milwaukee & St. Paul, at Chicago, has been appointed district master mechanic at Milwaukee, Wis. C. Lundburg succeeds Mr. Young.

William C. Armstrong, engineer of bridges of the Chicago & North Western at Chicago, has been appointed chief engineer of the St. Paul Union Depot Company, St. Paul, Minn., and will assume charge of the construction of the new union station. Mr. Armstrong was born in Marshall County, Iowa, June 21, 1859, and was graduated from the Iowa State College, Ames, Iowa, in 1881. He began railway work the following year as transitman and draftsman for the Wisconsin, Iowa & Nebraska (now a part of the Chicago Great Western), and the succeeding year was chief draftsman for that road. From 1884 to 1886 he was resident engineer of the Burlington, Cedar Rapids & Northern; during 1886 he was resident engineer of the Chicago, Milwaukee & St. Paul, in charge of construction in South Dakota, and also was engaged on location survey in South Dakota and Wyoming; and in 1887 was resident engineer on the St. Paul, Minneapolis & Sault Ste. Marie. The next two years he was resident engineer on the Eastern Minnesota (now a part of the Great Northern); and from 1890 to 1893, was engineer of track and bridges on the Pacific extension of the Great Northern, and in 1894 was bridge agent at Spokane, Wash. Mr. Armstrong went to the Toledo Bridge Company for four years as designer, returning to railway work in 1899 as resident engineer of the Chicago & North Western. From 1902 to 1905 he was bridge engineer of that road; during 1905 he was superintendent of construction for the Missouri Pacific at Sedalia, Mo.; in 1906 he was with the Chicago, Rock Island & Pacific as bridge engineer at Chicago, and the following year he returned to the North Western as terminal engineer at Chicago. In 1912 he was made engineer of bridges, which position he now resigns to become chief engineer of the St. Paul Union Depot Company, as above noted.



W. C. Armstrong

A. Berg has been appointed general foreman car department of the New York Central at Wesleyville, Pa., in place of O. Blodd, who has been transferred to Sandusky, Ohio, as general foreman, succeeding R. A. Fitz, transferred to Nottingham, Ohio.

Joseph Chidley, assistant superintendent of motive power and rolling stock of the New York Central Railroad, with office at Cleveland, Ohio, now has jurisdiction over the Illinois division. J. T. Flavin has been appointed master mechanic of the Illinois division, with office at Gibson, Ind., and the jurisdiction of George Thompson, district master car builder, with office at Englewood, Ill., has been extended over the Illinois division.

R. B. Kendig, chief mechanical engineer, of the New York Central Railroad, at New York, announces that the following appointments have been made in the mechanical department of that road: A. R. Ayers, who was general mechanical engineer of the Lake Shore & Michigan Southern and other New York Central lines west of Buffalo, with office at Chicago, has been appointed principal assistant engineer, general duties car design and construction, with headquarters at New York. R. M. Brown has been appointed assistant engineer, in charge of engineering and drafting at locomotive and car shops, with headquarters at Cleveland, Ohio; P. P. Mirtz, who was mechanical engineer of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed assistant engineer, in charge of locomotive design and specifications, with headquarters at New York; F. S. Gallagher has been appointed assistant engineer, in charge of car design and specifications, with headquarters at New York; H. E. Smith, who was chemist and engineer of tests of the Lake Shore & Michigan Southern at Collinwood, Ohio, has been appointed chemist and engineer of tests, with supervision of laboratories and material inspection, with headquarters at Collinwood, and W. B. Geiser, who was acting chemist and engineer of tests of the New York Central & Hudson River at West Albany, N. Y., has been appointed assistant chemist and engineer of tests, with headquarters at West Albany.

OBITUARY

Richard Morgan, general manager of the Savannah & Northwestern, with office at Savannah, Ga., died in that city on February 8.

N. C. Collier, who was for many years a director of the Nashville, Chattanooga & St. Louis, died on February 6, at Murfreesboro, Tenn., at the age of 82.

James M. Warner, general manager of the Chicago & Western Indiana, who died in Chicago on February 8, was born on a farm near Syracuse, N. Y. He received a common school education and commenced railway work with the Erie as an office boy, with which road he remained for several years, filling consecutively the positions of telegraph operator, despatcher, chief despatcher and trainmaster of the Delaware division. He was then trainmaster for the Terre Haute & Peoria (now a part of the Vandalia), at Decatur, Ill., and in 1888 he became master of transportation of the Belt Railway of Chicago. Subsequently he was appointed trainmaster of that road and the Chicago & Western Indiana until 1892, when he was made superintendent of those roads. In 1905 Mr. Warner was appointed general superintendent, and in 1908 he was promoted to general manager. Mr. Warner for many years was a member of the Committee on Relations between Railroads of the American Railway Association, and for several years also was chairman of the General Superintendents' Association of Chicago.

J. M. Warner

L. C. Hill, horticultural agent of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., died at Rogers, Ark., on February 2, aged 58 years.

George T. Williams, formerly until 1892, superintendent of telegraph of the New York, Chicago & St. Louis, died on February 10, at his home in East Cleveland, Ohio, at the age of 82.

W. I. Trench, division engineer maintenance of way of the Baltimore & Ohio at Baltimore, Md., died in that city on February 7, aged 36 years. Mr. Trench was graduated from the Sheffield Scientific School in 1902, and immediately began railway work on the engineering corps of the Baltimore & Ohio Southwestern. He was advanced to assistant division engineer in April, 1906; was promoted to division engineer of the Ohio division in 1908, and had been division engineer of the Baltimore & Ohio at Baltimore for the past three years.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Chesapeake & Ohio is in the market for 20 Mallet type locomotives.

The South Dakota Central is in the market for one ten-wheel locomotive.

The Missouri, Kansas & Texas is in the market for 10 Pacific type locomotives, with 25 by 28 in. cylinders, and 20 Mikado type locomotives, with 28 by 30 in. cylinders.

CAR BUILDING

The Union Pacific has ordered 750 stock cars from the Haskell & Barker Car Company.

The Atchison, Topeka & Santa Fe has ordered 700 box cars from the Haskell & Barker Car Company.

The Chicago & North Western is considering the purchase of some passenger cars, but as yet the number and type have not been decided on.

The Philadelphia & Reading has divided an order for 20 coaches and 5 combination cars between the Harlan & Hollingsworth Company and the Pullman Company.

The Illinois Central is now asking prices on 100 gondola cars. This inquiry supersedes the inquiry for five gondolas, as previously reported. In addition to the 900 refrigerator cars recently ordered from the American Car & Foundry Company, this company also ordered 100 refrigerator cars with passenger trucks.

IRON AND STEEL

The Great Northern is in the market for about 10,000 tons of steel rails.

The Denver & Rio Grande has ordered 10,000 tons of 90-lb. rails from the Colorado Fuel & Iron Company, Denver, Colo.

The Vicksburg, Shreveport & Pacific has ordered 1,502 tons of steel for a bridge over the Red River in Louisiana, from the Modern Steel Structural Company.

The Chicago & North Western, as reported in the *Railway Age Gazette* last week, has placed orders for rails. The exact figures are 20,000 tons of 100-lb. section for the Chicago & North Western proper, which is distributed between the Illinois, the Cambria and the Lackawanna steel companies, and 6,000 tons of 90-lb. section for the Chicago, St. Paul, Minneapolis & Omaha, which was awarded to the Lackawanna Steel Company.

SIGNALING

A contract has been taken by the Federal Signal Company for the installation of a mechanical interlocking plant at Beacon, N. Y., on the Hudson division of the New York Central. This consists of a 72 lever style "A" machine having 57 working and 15 spare levers, operating a standard four-track interlocking layout.

The London Bakerloo Tube Extension.—The London Bakerloo Tube, which has recently been extended beyond Paddington to Queen's Park, four stations beyond, was on January 31 opened for service to Kilhun Park—or Cambridge avenue station—the third station beyond Paddington. Of the two intervening stations, Warwick avenue and Maida Vale—or Elgin avenue—the latter is not quite completed, so trains omit the stop at that point. This extension is intended eventually to connect with the London & North Western at Queen's Park. The rails to the latter point are laid and it is expected that the station will be ready for service some time in March.

Supply Trade News

The Chicago Bridge & Iron Works opened on February 15, a city sales office in the McCormick building, Chicago, Ill.

The New York office of the General Railway Signal Company will be situated at room 1041, 30 Church street, beginning Tuesday, February 23.

The Fairmont Machine Company, Fairmont, Minn., has changed its name to the Fairmont Gas Engine & Railway Motor Car Company, and has increased its authorized capital stock to $1,000,000.

Blaine S. Smith has been appointed general sales manager, effective February 3, of the Universal Portland Cement Company, Chicago, Ill., succeeding B. F. Affleck, who has been elected president, as noted in the *Railway Age Gazette* of last week.

C. H. Rhoader, who has been connected with the St. Louis Surfacer & Paint Company, St. Louis, Mo., for four years, and with the Valentine Varnish Company for two years, was recently appointed western railway representative of the Kay & Ess Company, Dayton, Ohio.

The East Broad Top Railroad & Coal Company contemplates the remodeling or reconstruction of its facilities at Mt. Union, Pa., for transferring coal from narrow gage to standard gage cars after screening, and will consider plans and prices from engineering or contracting firms.

C. F. Quincy, president of the Q. & C. Company, New York, has acquired the entire capital stock of the Railway Appliances Company, Chicago, formerly owned by Percival Manchester. The business of the Railway Appliances Company will hereafter be operated by, and in the name of the Q. & C. Company.

After a thorough test for over 15 months, the United States government has just adopted the new style planfile, manufactured by the Art Metal Construction Company of Jamestown, N. Y., for use in the Interstate Commission for filing its various plans, drawings, etc. In this planfile drawings of all sizes are filed vertically, and in the same file. This arrangement affords a great saving in space as compared with the old style method.

TRADE PUBLICATIONS

Nut and Bolt Fasteners.—The Bartley Automatic Nut & Bolt Fastener Company, Pittsburgh, Pa., recently issued catalog No. 1, a 30-page booklet which describes and illustrates the Bartley automatic fasteners for nuts and bolts for use on rails, frogs and crossings, and on cars and locomotives. It also gives price lists for the various kinds of fasteners.

Culverts.—The United States Cast Iron Pipe & Foundry Company, Burlington, N. J., recently issued a 16-page pamphlet devoted to comments on the requirements for a good culvert, characteristics of the various types, the length, thickness and special shapes of culverts, etc. It also contains a table of standard thickness and weight of cast iron culvert pipe.

Electric Meters.—The Sangamo Electric Company, Springfield, Ill., has issued bulletin No. 40, dealing with the company's single-phase and polyphase alternating current watt-hour meters. The bulletin describes the type H Watthour Meter in detail and treats of it under such heads as, Importance of Sustained Meter Accuracy, Superior Features, Construction, Adjustment, Performance Characteristics and Capacities. A few pages are also devoted to the Sangamo Current and Potential Transformers.

Centrifugal Pumps.—This is the title of a 64-page bulletin, No. 19, just issued by the Terry Steam Turbine Company, Hartford, Conn., giving details and data on various turbo-pump applications. Principles of operation and construction of the centrifugal pump are explained, as are details of the steam turbine. Because of the wide latitude of speed possible with the turbine, the unit occupies a much smaller space than would be required for a pump performing the same duty but driven by a reciprocating engine.

Railway Construction

Boston Subways.—Bids are wanted until February 25, by B. Leighton Beal, secretary of the Boston Transit Commission, for building section H of the Dorchester tunnel. This section is located in Dorchester avenue between Old Colony avenue and Woodward street in the city of Boston, and is about 2,200 ft. long. It is to be a single span, double track tunnel mainly of reinforced concrete construction, and is to be built by the cut and cover method.

Canadian Northern Pacific.—The grading on the new line west of Victoria, Vancouver, towards Alberni, for a distance of 140 miles, and on the Patricia Bay branch, from Victoria to the ferry terminal on Patricia Bay is practically completed. No steel has been laid over these portions of the line.

Carolina, Greeneville & Northern (Electric).—This company expects to let contracts on May 1, to build an electric line from Kingsport, Tenn., southwest to Newport, about 75 miles. There will be five steel bridges on the line. The company expects to develop a traffic in agricultural products, minerals, timber, coal and passengers. H. S. Reed, president, 205 Grant building, Los Angeles, Cal., and F. A. H. Kelly, chief engineer, Greeneville, Tenn. (January 15, p. 115.)

Mascot & Western.—As reported in the *Railway Age Gazette* of last week, the company is building a line between Wilcox, Ariz., and the Mascot mines, a distance of 14 miles. The contract for grading, which will be light, has been awarded to J. A. Vaness, Seattle, Wash. The maximum curvature on the line will be 3 deg., and the maximum grade 3½ per cent. Contracts for track laying and for bridges, which will be only minor structures, will be let about May 1, at which time the company also expects to buy some rolling stock. The work on this line is about 10 per cent completed. Preliminary surveys have also been made from the Mascot mines to Caliente, a distance of 36 miles. C. S. Henning, Dos Cabezos, Ariz., is chief engineer, and T. N. McCauley, Chicago, is president.

McConnellsburg & Fort Loudon (Electric).—As soon as a charter is secured, this company will let a contract to build an electric line from McConnellsburg, Pa., east to Fort Loudon, about ten miles. E. J. Post, president, and S. Dandridge, chief engineer, McConnellsburg. (See Pennsylvania Roads, January 22, p. 1717.)

Texas Roads.—Plans are being made to build a railway from Lubbock, Tex., west to Roswell, N. Mex., about 160 miles, it is said, and surveys will soon be started. Alpheus Judd and associates of Lubbard are back of the project.

Western Dominion.—Application is being made to the Canadian parliament for an extension of time in which to build the projected line from Calgary, Alta., south to Cut Bank, Mont., on the Great Northern, about 232 miles. O. E. Culbert, secretary, Calgary. (June 19, p. 1566.)

RAILWAY STRUCTURES

Milwaukee, Wis.—The Chicago & North Western will float the new bridge, which is to carry its main line across the Milwaukee river, into place on February 21. The Cleary-White Construction Company, Chicago, is the contractor. (See *Railway Age Gazette*, August 21, 1914, p. 370.)

St. Augustine, Fla.—An officer of the Florida East Coast writes regarding the report that improvements to include new shops, a roundhouse, and yards are to be carried out at St. Augustine, that the entire proposition is being held up pending an easement in the money situation.

Shreveport, La.—The Vicksburg, Shreveport & Pacific has given a contract to the Blodgett Construction Company, Kansas City, it is said, to build a new bridge over the Red river, between Shreveport and Bossier City.

Trenton, N. J.—The Pennsylvania Railroad is making plans for a new freight house, to be built at Trenton. The company also has under consideration the question of making other improvements.

Railway Financial News

Atlantic Coast Line.—White, Weld & Company and the Guaranty Trust Company, both of New York, are offering $1,100,000 first mortgage 4 per cent bonds of 1902-1952 of the Atlantic Coast Line at 92½, yielding 4.40 per cent on the investment.

Boston & Maine.—The directors have asked the holders of the $23,000,000 notes due March 2 either to extend them for six months at 6 per cent, or to accept as part payment notes of the Maine Railways Company to the extent of 35 per cent, and extend the remaining 65 per cent. The Maine Railways notes are 5 per cent 5-year notes with privilege of conversion into Maine Central stock for 4/7 of par value up to October 1, 1918, and the other 3/7 payable in cash.

Erie.—This company has decided to change from the fiscal year ended June 30 to the calendar year for the period for which it will issue its annual report to stockholders.

Minneapolis & St. Louis.—The Wall Street Journal says: "Local bankers say that negotiations have been started looking toward the acquisition of the Minneapolis & St. Louis by the Soo line" [Minneapolis, St. Paul & Sault Ste. Marie, a subsidiary of the Canadian Pacific]. The Wall Street Journal adds: "Newman Erb, president of the Minneapolis & St. Louis, is silent on the reports, but it is certain that he would not be adverse to selling the road if an equitable bargain could be struck."

New York, New Haven & Hartford.—The directors, in making a formal announcement of their future plans, reiterate the pledge already given to the Massachusetts legislature that the company will get rid of its steamship and trolley lines and other interests as soon as possible and will conserve all of its resources to the upbuilding of the steam railroad property.

Wabash.—The issue of $1,545,000 receiver's certificates has been approved by Judge Adams. E. F. Kearney has been appointed co-receiver with E. B. Pryor.

Railway Construction in Ecuador.—The topographical studies of the Huigra-Cuenca Railway are now completed for 15 miles, the preliminary localization to Lugmas Pass, 10 miles, and the definite localization, 2,488 ft. Grading was to have commenced January 1, with a force of 300 men, which number will be increased gradually to 1,000, as provided in the estimates.

Overland to Peking.—The severance of international means of communication has made it necessary to devise new routes and connections. One of the routes where new arrangements have had to be made is that to and from the Far East. There is of course no rail connection between England and Petrograd via the German railways, and on the outbreak of war, in addition, Siberian traffic via Moscow and Petrograd became wholly disorganized as a result of military requirements, the journey from China to the Russian capital taking as much as a month. Things have now improved and a traveler has recently told how he managed to get from London to Peking via Siberia in 26 days, which is a record under existing conditions. He left King's Cross station in London at 5 p. m., on December 6, sailed from Newcastle at daybreak the following morning and reached Bergen at 5 p. m. on December 8, which enabled him to take the 6:40 p. m. train for Christiania, and thus to connect the following morning with the mail to Stockholm. Here there was a delay, but eventually the traveler arrived at Petrograd at 2 a. m. on December 15. After this, everything was plain sailing, for the weekly Siberian train left the same evening and the Chinese capital was reached on January 2. It seems probable that this schedule of 26 days will be improved before long. The Russian authorities are about to inaugurate various improvements in eastern travel, including a through express service between Petrograd and Vladivostok, and there is hope that the connection at Christiania could easily be so arranged as to obviate the necessity of spending a night and day at Stockholm.

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Contents

*Illustrated.

Locomotive Improvements and Operating Costs

The discussion of improvements in locomotives is very frequently passed over by transportation officers as being of interest only to representatives of the mechanical department. While this attitude may at times be justified, the outline of the results obtained by modernizing a Consolidation locomotive on the Kansas City Southern, which is given elsewhere in this issue, should be of direct interest, not only to mechanical department officers, but to all those who have to do with the movement of trains. The possibility of modernizing some of the older locomotives is a question that has been brought up on many occasions on different railways. There are thousands of locomotives, built within comparatively recent years, which are capable of much better results from a transportation standpoint, if some means could be found of increasing their capacity. The alterations made on the Kansas City Southern in a Consolidation locomotive, with only 33 sq. ft. of grate area, have resulted in marked improvements in those items which most directly affect the cost of conducting transportation, namely, fuel and water consumption, tonnage hauled and overtime paid to engine and train crews. While the changes made in this engine to accomplish these results are, of course, of special interest to mechanical department officers, their chief interest is from the standpoint of the cost of conducting transportation, and viewed from this point they indicate the possibilities of reducing transportation costs by modernizing many of the locomotives which are now being relegated to way freight, branch line and switching service.

Working Hours of Station Men

Massachusetts has an hours-of-service law which comes near being a freak. It is well calculated to make more trouble even than the federal law relating to telegraphers. It is Chapter 746, passed last year, and reads: "Employees in and about steam railroad stations designated as baggagemen, laborers, crossing-tenders and the like, shall not be employed for more than nine working hours in ten hours' time: the additional hour to be allowed as a lay-off. . . ." At Worcester, January 21, the grand jury, in the Superior Court, returned indictments against the Boston & Maine for violation of this law. Both here and in the federal law there is evidence of some good intent, but if the main purpose of their authors had been to cause confusion and needless expense, they could hardly have succeeded better than they did. Freight houses employing dozens of laborers may often be classed as "stations" and, perhaps, ought to be so classed in nearly every case; yet this Massachusetts law does not seem to be intended to apply to such men. The suit against the Boston & Maine is designed, presumably, to get the statute construed. Why should baggagemen need more time off than telegraphers, clerks, switchtenders and signalmen? What meaning can be found in the word "like," as used in the statute? Why should crossing-tenders near a station be favored above those a half mile away? An officer of the Boston & Maine tells us that relief crossing-tenders, required by this law, are now costing that road $7,800 a year. It is probable that a fraction of this sum, paid to the "first trick" watchmen, would satisfy them far better than the time off which is allowed them, and would afford the public equally satisfactory service. In short, the law appears to be a shining illustration of the way in which labor leaders "work" the legislatures for the mere pleasure of conquest, with little regard for the interest either of the public or the alleged "laboring men."

Correction of An Erroneous Statement

In its issue for January 15, page 80, the *Railway Age Gazette* published an editorial entitled "The Suspension of Advances in Rates." In the course of this editorial the following statements were made:

> The coal originating railroads leading into St. Louis and East St. Louis gave notice in January, 1913—just two years ago now—of an advance in coal rates from Illinois territory to the St. Louis group, effective on April 1, 1913. The commission suspended the tariffs until July 30, 1913, and later to January 30, 1914, when its statutory authority of suspension expired. The case was heard on December 1, 1913, and argued in February, 1914; and, at the request of the commission, on the ground that it was as yet unable to dispose of the case, the rates were further suspended until March 31, 1914. Then, on the ground that it could not decide the case before the summer recess the commission asked that the rates be further suspended until November 1, 1914, which also was agreed to. On still another request from the commission the rates were still further suspended until January 1, 1915; and now the commission has asked for another postponement to November 1, 1915!

The information on which these statements were based was given to us in writing by a railway officer. Secretary McGinty

of the Interstate Commerce Commission subsequently wrote us saying that the statements which we have quoted had been considered by the commission in conference, and that he had been "directed to say that the statement to the effect that the carriers had been called upon to suspend the coal rates into St. Louis until November 1 (1915) is wholly incorrect and without foundation." We communicated the substance of Mr. McGinty's letter to the railway officer who had called our attention to the St. Louis case, and he replied that the date "November 1" in his communication to us should have been "February 1," the mistake being due to an error in copying. Inquiry of Secretary McGinty has brought confirmation of the statement that the commission did ask for a further postponement to February 1, 1915. We make this statement in justice to all parties concerned.

"BUY IT NOW"

SOME time ago the Agricultural Publishers' Association, publishers of the principal farm papers of the country, began a campaign to get the farmers to commence buying at once all the things they would need within the next few months. The movement extended to other lines of business; and now an attempt is being made to get all classes to "buy it now."

The railways ought to be included in the movement. The traffic and earnings of all roads are comparatively small at present. Many companies buy as much as they can when their earnings are large and as little as they can when they are small. There are poor roads and rich roads. The poor roads have to follow this policy because it is only when their earnings are up to or above normal that they can buy much. For rich roads to follow the practice is bad business and bad citizenship.

Regarding the matter from a narrow, selfish standpoint, it is bad business for a rich road to concentrate its buying and its improvement work in years of large earnings. All kinds of supplies and equipment can be bought and work done cheaper in the lean than in the fat years. The prices of most kinds of equipment and supplies are lower, the wages of some kinds of railway labor are lower, and all kinds of labor are more efficient, which is equivalent to lower wages. Every railway man knows these things. Every railway men also knows there will be use in the good times, which are sure to come, for many improvements in and additions to facilities that can be made in the bad times. Why, then, do so many railways which could spend more money to advantage in periods of light business postpone expenditures until traffic gets heavy and lines and yards are congested?

Largely, no doubt, because this is the fashion. Another reason is the widespread and chronic desire to make a paper showing. Many roads are dominated from Wall street, and many Wall street bankers don't know enough about railroading to appreciate the advantage of doing work when it can be done cheapest. They want a certain margin maintained between income and outgo in bad as well as in good times, and don't realize that both the stockholders and the public often lose by having good paper showings made in hard times. There probably is hardly a strong railway in the country which will spend in the calendar year 1915 as much as its permanent interests would warrant.

There is another point to be considered besides the effect produced on the individual road's prosperity by its policy of making expenditures. The policy of doing almost nothing in hard times and a great deal in good times causes violent alternations of feast and famine in the railway supply market and the railway labor market. One year the supply and equipment concerns are glutted with orders. The next year, perhaps, they will have hardly any. One year the demand of the railways for unskilled labor exceeds the supply, and they boost wages greatly in the unskilled labor market. The next year their demand falls off heavily, resulting in thousands of men being thrown out of work. The bigger a concern or an industry is the larger are the effects its business policy produces on economic and industrial conditions in general. Individual railways and the railway system as a whole have become so big that the violent fluctuations from year to year in their expenditures are a demoralizing influence on business of all kinds.

There are several strong roads which already follow the practice of making extensive improvements in periods of light traffic; and many more would do so if their managements were controlled by sound business considerations and proper regard for the public good.

The injunction to "buy it now" and the complementary injunction to "do it now" ought to be acted on within the coming months by every strong railway in the country. Neither good business nor public spirit dictates that they shall buy or build anything they will not need, but good business and public spirit both demand that they shall buy and build many things they are certain to need. If those who finance railways do not recognize these facts the executive officers should carry the message to Wall street.

AN OUTRAGEOUS APPEAL TO THE PLAIN PEOPLE

THE mistrust of the intelligence and fairness of the plain people shown by the higher classes in the United States threatens the peace of the nation and the perpetuity of free institutions. The down-trodden railroads of Pennsylvania and New Jersey ventured to appeal regarding the train crew laws to the plain people of those states. The Brotherhood of Railroad Trainmen, whose members belong to our intellectual aristocracy, and our political oligarchy, has taken great offense at this attempt of the roads to draw the rabble into the controversy. It has issued a statement denouncing the course of the companies, in which it says: "Briefly stated, their (the railroads') announcement declares they intend to present the question of the repeal of the full crew laws to the public; but why, is left to conjecture. The power to repeal is vested in the legislature and . . . . the average citizen knows about as much concerning the practical operation of a railroad as the man in the moon knows about building sewers."

Plainly, the railroad presidents and general managers don't know anything about the practical operation of a railroad. Neither do the public utility commissions, to which the railroads would be glad to have the question referred. And, manifestly, the plain people don't know anything about it, either. The members of the legislatures are the repositories of all the wisdom on the subject. They have just been snatched from the lawyer's office, the store, and the plowhandle, where they have had opportunity to learn everything about the operation of a railroad. Furthermore, they have direct access to the inspired lips of the paid lobbyists of the Brotherhood of Railroad Trainmen, and can learn from them not only all they need to know about how to operate a railroad, but, what is more important, all they need to know about how to get the millions of votes the Brotherhood controls.

All this is plain as a pikestaff. And it is, of course, most pernicious for the railroads and the people to get together and talk things over. It is so much easier for the labor lobby and other altruistic interests to get what they want when the people are saying, "To the bow-wows with the railroads!" and the railroads are saying, "The public be d——!" If the people and the railroads get too close together they may put both the lobbyist in the labor organization and the demagogue in the legislature out of a job, which would be sad.

But remember that, after all, it is the railroads that are being regulated and the railroads and the people that together are footing the bill, and be patient with them if they cry out when they are gouged unusually hard or are treated with the scorn that they so richly merit. And don't carry the gouging and scorning too far. The error of gouging the plain people too much, and treating their wishes and opinions with too open contempt, is one which oligarchies ever have been prone to commit, and always in the long run with unhappy results for the oligarchies.

AMERICAN RAILWAY MECHANICAL ASSOCIATIONS

AMERICAN railroads enjoy much more free interchange of ideas and information regarding their individual practices in the design and maintenance of cars and locomotives than do the railroads of any other country. We have various railway mechanical associations, composed of men representing the majority of American railways, which meet annually for the sole purpose of discussing their problems in an endeavor to find practical and economical solutions. As a natural result there is found a certain uniformity in locomotive and car construction and in shop practice which, of course, is of economic value to the railways in particular and to the country as a whole.

English roads, on the contrary, are very conservative in giving information to the public, or even to each other, and, in consequence, nearly as many special designs are found on them as there are roads. Their locomotives represent distinctly the ideas of the individual chief mechanical officers to such an extent that whenever such men are mentioned the mind will simultaneously recall their special hobbies in design. Their purpose seems to be to have something distinct from other roads. Cases have been known where, with a change in the administration of the mechanical department, individual features, such as compounding, have been entirely eliminated at a large cost to the roads.

In this country we have ten railway mechanical associations, of which the Master Car Builders' and Master Mechanics' associations are the most important. Their work is quite thoroughly understood and is considered authoritative by the railway managements. The field has so broadened since their inception, some 48 years ago, that they are now unable to consider the numerous detail problems that they once did. Naturally this work has been taken up by other associations which are composed of subordinate mechanical officers, and the justification for the existence of these associations becomes more apparent each year. A brief review of their proceedings for the past year will indicate in some degree the scope of their work.

Pre-eminent in the proceedings of the Traveling Engineers' Association are the papers on "Efficient Operation of Locomotives," "Locomotive Air Brake Equipment," and "Practical Chemistry of Combustion." These papers with their discussions are text books in themselves, containing information of material value to railway mechanical men. Papers were also presented on mechanical stokers, smoke prevention and speed records which give results obtained in actual practice. This association has also compiled examination questions and answers of recognized merit for locomotive engineers and firemen.

At the convention of the General Foremen's Association detailed papers were presented on engine house efficiency, autogenous welding and the maintenance of air brakes, all live subjects to the members of the association. The Air Brake Association considered the advantages to be derived from caboose gages, and strongly recommended their use as a profitable protective feature, especially on long freight trains. The efficiency of the foundation brake gear was also discussed, some members showing how they had increased the braking power by simply stiffening some of the elements in the gear. Regarding air brake hose, it was believed that less failure would occur and a more efficient service would be obtained if a specific time limit for the life of the hose were adopted. The proper distribution of empty cars throughout a long train was shown to have materially reduced the possibilities of break-in-twos.

The Master Boiler Makers' Association presented valuable information regarding the use and maintenance of combustion chambers, showing the advantages as well as the disadvantages from a maintenance standpoint. The questions of the effect of bad water and the use of oxy-acetylene and electric welding on boilers were also considered, the results of actual practice being given An especially noteworthy feature of the Tool Foremen's Association has been its investigations of standard tools. In 1913 standard taps were adopted, and last year a discussion of the standard reamer was begun, and the standards are to be adopted at the next convention. The subjects discussed last year included shop kinks and special tools, milling cutters being especially considered. Marked advances have been made by some roads in developing these special tools and valuable information may be obtained from the discussions on this subject. Other reports considered related to grinding, machine tool repairs and the distribution of shop tools.

The Master Blacksmiths' and the Master Painters' associations both deal with problems of especial interest in their fields, the former being particularly interested in the new methods of welding and the handling and heat treating of the special steels. The painter's chief problem at the present time is the proper protection of all-steel equipment, and for the past few years the experiences of the different roads have been presented at the conventions, with material benefit to all the members. This association maintains a test committee that is to be commended for the work it has done. Exposure tests of paints and varnishes are made each year in different parts of the country, and the members are given the results of the tests at the conventions.

The Chief Interchange Car Inspectors' and Car Foremen's Association meets annually to study and discuss the M. C. B. rules of interchange, and in many cases finds opportunities to clear up difficulties which have arisen from misunderstandings of these rules. In some respects this association is handicapped by not having an authorized member of the M. C. B. Association present at its meetings to guide the members in placing correct interpretations on the rules, especially those that have been adopted at the preceding M. C. B. convention.

In addition to the information obtained from the convention proceedings, great benefits are derived by those attending the conventions from the chats they have with their fellow members. Meeting and conversing with others handling similar problems in different ways has a very broadening effect, giving the members new ideas and freshened ambitions which are surely reflected in their work. In order to make the mechanical conventions entirely successful, representatives of all the roads should be present with definite instructions to add what information they can to the subjects under consideration and to learn all that is to be learned from their fellow members. By doing this the good ideas of the several men will be collected in a concise form for the benefit of all the members, and consequently for the benefit of the roads they represent.

IMPROVEMENTS IN HANDLING RATE SUSPENSION CASES

THE Interstate Commerce Commission has sent out two circular letters regarding the suspension of advanced rates which should result in an improvement in the administration of the law pertaining to this subject. They will do so if the shippers and railways give the commission co-operation.

One of the circulars is addressed to the public. It calls attention to the fact that, while the law authorizes the commission to suspend proposed increased rates, it contemplates that "the power will be exercised with judgment and due consideration for circumstances and conditions." It is necessary, if the commission is to exercise a sound discretion, that protests against advances be filed a reasonable time before they are to go into effect. In many cases this has not been done. The commission, therefore, requests that protests be made as early as possible, and gives warning that "it may be necessary to deny suspension in instances in which the protest is not filed with the commission at least ten days prior to such effective date."

The second circular is addressed to traffic officers, tariff issuing officers and agents of carriers. "The commission," it says, "desires not only to deal with these matters justly in the first instance, but with due consideration for circumstances, to finally dispose of investigation and suspension cases at the earliest practicable date following the suspension." To this end it requests that, when tariffs carrying increased rates are filed, the proper

officer of the carrier shall present to the commission a concise statement of the increases proposed, showing in a general way the measure thereof and the reasons therefor.

The suggestions in both circulars are obviously reasonable. The initiative regarding the suspension of rates should be taken, not by the commission, but by the shippers and other persons affected. Apparently, many have proceeded on the assumption that it is the commission's duty, or at least its practice, to suspend every advanced rate against which there is a protest and many against which there is none. This is not its duty, and is not, and ought not to be, its practice. Some real investigation on the merits ought to be made before any advance, small or large, is suspended, and in order that this may be done a considerable time should elapse between the filing of protests and the effective date of the rates protested.

The commission cannot require the railways to inform it as to the reasons and extent of proposed advances in rates except at a formal hearing. But it is desirable that before the commission decides whether it will suspend a tariff it shall have before it information which will enable it to form a reasonable judgment. It cannot have such information unless the carriers furnish it; and the sooner the carriers furnish it the more intelligently can the commission consider the questions involved. There doubtless have been numerous cases where suspensions of advances would have been avoided if the carriers had furnished to the commission on filing their tariffs concise but frank statements of the extent of and reasons for the proposed advances.

The issuance of these circulars is a gratifying indication of a disposition on the part of the commission to improve its work in connection with the suspension and investigation of proposed advanced rates; and it is to be hoped that both the shippers and the carriers will respond in the right spirit.

THE PANAMA RAILROAD

IN the early days railways used to supersede canals. The Panama Railroad, however, is now about to take the figuratively backward step of being superseded by a canal. The United States Government has controlled the Panama Railroad Company by stock ownership since May, 1904, and the railroad in these years has progressed wonderfully, but a fair comparison of its operations with those of the average privately owned railway furnishes no argument for government ownership.

The railroad at present operates 62 miles of line, 48 miles of which is main line, mostly single track, paralleling the Panama Canal from Colon to Panama. The total trackage is 150 miles, of which 60 miles is at terminals. The company's operations for the past few years have been varied. In addition to acting as carrier for the Isthmian Canal Commission, the railroad has also conducted a local "commercial" service in the canal zone and a commercial service across the isthmus for both passengers and freight. It has also engaged in the transportation of passengers and freight by sea from New York and other ports, and has constructed a number of docks at the entrances to the canal and expects in time to derive a large revenue from them.

The annual report for the fiscal year ending June 30, 1914, does not show the effect that the opening of the canal will have on the railway's revenues. That the company's business will suffer greatly from the diversion from rail to water-borne transportation across the isthmus is, however, a foregone conclusion. The railroad has already cancelled the through billing arrangements with its foreign and domestic connecting steamship lines on both the Atlantic and Pacific, and the effects on the earnings of the company will show decidedly in next year's annual report.

In 1914, the company's operating revenue from all classes of service was $6,823,000, an increase of $72,000 over the $6,751,000 of 1913. The operating expenses, on the other hand, were $4,682,000 as compared with $4,700,000, a decrease of $18,000. The net operating revenue of $2,140,000 was thus $90,000 greater than in 1913, and the ratio of expenses to earnings was 68.63 and 69.63 per cent, respectively, in 1914 and 1913. There was also other income from interest and exchange and rentals of $277,000, making a total of $2,417,000 from which deductions were made of $93,000 for rentals of terminals and terminal offices and $21,000 for the government income tax so that the total net income for the year was $2,303,000. This is the amount carried to the credit of profit and loss.

The total railroad revenue of $4,567,000 was $32,000 greater than in 1913 and was made up of the following items: total revenue from transportation, $3,965,000 as compared with $3,942,000 in 1913; revenue from operations other than transportation, including revenue from station and train privileges, freight and baggage storage, telephone and telegraph service, etc., $30,000, or $9,000 more than in 1913; harbor terminal revenue, $445,000 as compared with $436,000 in 1913, and other operating revenue of $127,000, $74,000 less than in 1913. The railroad's total freight revenue traffic was 1,544,252 tons, a decrease of 404,963 tons, or 20.78 per cent as compared with the previous year. The total revenue from this traffic, however, was $2,846,000, an increase of $61,000 or 2.18 per cent, the increased revenue with a smaller tonnage being due to the loss of a large amount of cement and other low grade traffic and an increase in traffic of higher grade. The passenger traffic showed an increase in the number of passengers carried but a decrease in the amount of revenue received. The total number was 3,124,974, or 7.14 per cent more than in 1913, and of this total 2,231,563 were second class passengers. The revenue received was $764,000, a decrease of $62,000 or 7.55 per cent. The operating expenses of the railroad in 1914 were $2,741,000 and in 1913, $2,770,000. the ratio of expenses to earnings in the two years being but 60.02 and 60.24 per cent respectively. The net revenue from the railroad was $1,826,000, approximately equal to the $1,829,000 of 1913.

The steamship line had a total revenue in 1914 of $2,255,000, or $104,000 greater than in 1913. The expenses, on the other hand, were $1,941,000 as compared with $1,930,000 in 1913, and the net revenue was $314,000 or $93,000 greater than in 1913. The per cent of expenses to revenue was 86.06 and 89.70 in 1914 and 1913 respectively. The steamship line during nearly the entire fiscal year operated two ships which it owned and four which it chartered. It is important to note, however, that the expenses of operation as given include no item for insurance nor any for charter of ships.

The Panama Railroad Company on June 30, 1914, had total capital assets of $22,474,000. Its working assets amounted to $6,655,000, of which $3,804,106 was cash. The total stock outstanding was but $7,000,000, but there was also a capital liability of $3,247,000 representing the company's indebtedness to the United States Government. This amount still remains unchanged from the previous annual report. The company is, of course, in an exceedingly strong financial position; its total surplus on June 30, 1914, was $17,534,000.

This railroad is indeed in an enviable position among railroads. For one thing it pays practically no taxes. It owes no allegiance to the Interstate Commerce Commission, and can set its own rates and use its own system of accounts of its own free will. The fact has been enlarged upon so often that it is almost unnecessary to treat of the matter again. It is interesting, nevertheless, to see why the Panama Railroad should be as successful as it is. In the fiscal year ended June 30, 1914, the total ton mileage of revenue freight carried was 66,213,890 tons, a decided decrease from 80,641,423 of 1913, largely due to a drop in the ton mileage of Panama Canal freight from 43,777,053 to 27,801,469. The average revenue per ton per mile in 1914 was no less than 4.35 *cents*. In 1913 it was 3.48 *cents*. The average for all roads in the United States in 1913 was but 7.29 *mills*. It is not strange, then, that the road should have a freight revenue per mile of road of $46,748, whereas the average for all roads in the United States in 1913 was but $7,962. The total passenger mileage in 1914 was 36,140,440. The average distance each passenger was carried was only 12 miles, which to some extent explains why the number of passengers in each train should have been 141. In 1913, it was 188. In the United States in 1913 it was but 55.

The average revenue per passenger per mile was 2.11 cents in 1914 and 2.37 cents in 1913 as compared with a similar figure for the United States in 1913 of 2.008 cents. The passenger revenue per mile of road in 1914 was $18,110. The railroads of the United States in 1913 obtained a similar revenue of but $3,301.

It has been stated above that the operating revenue from the railroad alone in the fiscal year ending June 30, 1914, was $4,567,000; that the operating expenses were $2,741,000, and that the net revenue, or the difference, was $1,826,000. It is worth the trouble, however, to examine the latter figure closely and to see what would become of it if it were treated as similar figures are treated on private roads. First, there would be deductions for taxes. The taxes paid by the railroads of the United States in 1913 amounted to over 4 per cent of their operating revenues. At this rate the Panama Railroad would have paid in taxes $183,000, which, subtracted from the net revenue given above, would leave a net operating income of $1,643,000. The isthmian line also does not have to allow for payments of interest or dividends. The value of the railroad alone (excluding the floating equipment) was on June 30, $21,480,000. Interest charges on this at three per cent, much less than United States roads have to pay, would be $644,000, which, subtracted from the operating income of $1,643,000, would have a surplus of only $999,000. Of the operating revenue $4,567,000, $2,846,000 was derived from the carriage of freight at a ton mile rate of 4.35 cents. This rate is almost *six times* as much as the average revenue of 7.29 *mills* per ton mile received by the railways of the United States in 1913. If the average rate per ton mile of the Panama Railroad had been *only three times* as great as that of the railways of the United States, or 2.19 *cents*, its freight earnings in 1914 would have been only $1,440,000, or $1,406,000 less than they were. These deductions for taxes and interest on the value of the railroad, and a reduction of the average freight rate to a mere *three times* as much as that paid in the United States, would have left the Panama Railroad with a deficit of $407,000, instead of the "surplus" shown on its books.

Furthermore, the Railway Mail Pay Committee has just called attention to the fact that besides receiving an average freight rate almost six times as great as that of the railways of the United States, the Panama Railroad is treated with the greatest generosity by the postoffice department. From the statement issued by the Railway Mail Pay Committee it appears that the Panama Railroad in the last fiscal year received more than $2.77 for each ton of mail carried one mile by it, which is 28 times as much as the average rate paid by the postoffice department to the privately-owned roads of the United States. The Railway Mail Pay Committee adds: "Had the Panama Railroad been paid at the average rate allowed the railroads of the United States, it would have received last year only about $9,000 for carrying the mails. It actually received $250,306. On the other hand, if the railroads of the United States last year had been paid the Panama Railroad rate, their receipts for carrying the mails would have been $1,557,000,000, or more than five times the total revenues of the postoffice department. They actually received $56,000,000, or about one-fifth of the department's revenues."

All of which indicates how fortunate it is for this government-owned road that it is not subject to the same burdens and restrictions as the privately-owned railways of the United States.

The following table shows the principal figures for operation as they are given in the Panama Railroad's annual report, but they are misleading unless they are qualified by the considerations just discussed, namely, the freedom from taxes and fixed charges and the high ton mile rate:

	1914	1913
Average mileage operated	62	62
Freight revenue	$2,846,103	$2,785,513
Passenger revenue	763,973	826,340
Total operating revenue	4,567,406	4,599,163
Maint. of way and structures	414,444	391,193
Maint. of equipment	464,467	470,824
Traffic expenses	16,926	13,852
Transportation expenses	1,396,210	1,427,401
Other expenses	449,439	467,040
Total operating expenses	2,741,486	2,770,310
Net revenue for operation	1,825,920	1,828,853

NEW BOOKS

Proceedings of the Master Car and Locomotive Painters' Association. Compiled and published by Alfred P. Dane, secretary of the association, Reading, Mass. 108 pages, 6 in. by 9 in. Bound in cloth.

This is a report of the forty-fifth annual convention of the Master Car and Locomotive Painters' Association, which was held in Nashville, Tenn. The convention considered the painting of steel equipment, with special attention to passenger car roofs. The question of sand blasting the steel before painting was also thoroughly considered, and among some of the members this practice found ardent support. The paint shop apprenticeship system, as in effect on the Delaware, Lackawanna & Western, was described in some detail. There was considerable discussion on the question of standard freight car lettering. As usual, the association also presented an interesting and instructive report on tests with paints and varnishes.

Proceedings of the American Railway Master Mechanics' Association. Compiled and published by Joseph W. Taylor, secretary of the association, Chicago, Ill. 1,045 pages, 6 in. by 9 in. Two volumes. Bound in cloth. Price, $5 per volume.

This year it was found advisable to publish the proceedings of the American Railway Master Mechanics' Association in two volumes, on account of the large amount of material presented. Volume I contains the full report of the convention with the exception of the report on Locomotive Headlights which, with its discussion, is published in Volume II. This report alone, with its appendices and discussions, occupies 377 pages of the proceedings and presents the results of the most exhaustive investigations ever made on locomotive headlights. In addition there are reports on Locomotive Stokers, Standardization of Tinware, Locomotive Superheater Tests, Code of Rules for Testing Locomotives and papers on Flange and Screw Couplings for Injectors, and tests of the Locomotive Superheater and Brick Arch. Volume I contains the constitution and by-laws, list of members, etc.

Heat-Treatment of Steel. Compiled by the Editors of Machinery. 278 pages, 6 in. by 9 in. Illustrated. Bound in cloth. Published by the Industrial Press, 140 Lafayette street, New York. Price $2.50.

During the past two decades developments have taken place in the processes involved in the building of machinery as well as in the materials of construction, which have produced many changes in the heat-treatment of steel. The introduction of high speed steel for cutting tools and the various alloy steels, the usefulness of which depends almost entirely upon proper heat-treatment, has made necessary the careful study of processes and has produced many remarkable changes in practice. In the preparation of this book it has been the purpose to place on record the modern methods of heat-treatment, and although largely descriptive in its dealing with the subject, the book will be found to contain much practical data of value to those who have to do with heat-treating operations.

The first chapter is devoted to a theoretical discussion of the effect of heat-treatment and a brief digest of the results to be obtained by various methods of treating carbon and alloy steels. In the following chapters the various processes of hardening, quenching, tempering, annealing and casehardening are described in detail, the text being amplified by numerous engravings showing the construction and methods of operation of the furnaces and other appliances. The application of the electric furnace to heat-treating operations is dealt with at considerable length and a chapter is included on the newly developed method of casehardening by carbonaceous gas.

A brief treatise is included on the methods used to measure the hardness of metals, and various types of hardness testing machines, developed in this country and abroad, are described.

The information contained in the book has been mainly compiled from articles published in Machinery and from the well known Machinery Reference Books, and it forms a very comprehensive treatise on a subject about which little of a practical nature has been written.

Letters to the Editor

A CARPING CRITIC

Pittsburgh, Pa.

To the Editor of the Railway Age Gazette:

We had flattered ourselves that there were no longer any "two-faced" men in the railroad service; but look at the Chesapeake & Ohio's "Suggestions for Safety," on page 151 of your issue of January 22 reading: "Don't move hand car at all, without a man facing both directions!"

Anonymous letters are, of course, objectionable; but as this is neither a complaint nor a "grouch" the signature, for obvious reasons, is omitted. * * *

NOT MAKING FRIENDS

New York.

To the Editor of the Railway Age Gazette:

I read with great interest the article entitled "Are You Making Friends for Your Railroad?" which appeared on page 129 of the *Railway Age Gazette* for January 22, 1915, and since reading it have had an experience on a suburban train entering New York City which brings out the value of the teachings of this article and the ill feeling that may be caused by practices of a contrary nature. I decided, on the occasion referred to, to take a later train than usual and on consulting a timetable, found that because of the day's being a holiday, several of the regular week day trains did not run. I judged, therefore, that the trains that remained would be amply supplied with cars and was much surprised to note, when the train which I decided to take pulled into the station, that it consisted of but four cars which were already crowded. As the train made four more stops, at each of which passengers were picked up, the occupants were soon packed into the cars in a way that would make a New York subway guard green with envy.

So far as I can see this condition was the result of poor judgment on the part of those in charge of the making up of the trains; but there does not seem any reasonable excuse for such poor judgment as was exercised in this case. If the general manager, or some other of the higher officers who are constantly endeavoring to keep this road in the good graces of the public, could have been on this train and heard some of the numerous comments that were made, they would realize that in order to make and keep friends a railroad should not confine its efforts in this direction to urging politeness on ticket agents and trainmen.

Commuter.

TWO PLANS FOR CAR POOLING COMPARED

Chicago, Ill.

To the Editor of the Railway Age Gazette:

The proceedings of the Central and Western Association of Car Service Officers, recently published, contains the report of the Committee on Pooling Freight Equipment, which is to be discussed at the next meeting of the association which will be held on April 15. The report was made in November, 1914, so it may be presumed that the committee was not familiar with the car equalization agreement which went into effect between the International & Great Northern and the Sunset Central Lines on October 1, 1914, and which was discussed in your issues of January 15 and 29.

The Committee on Pooling Freight Equipment is made up of E. E. Betts of the Chicago & North Western; W. E. Beecham of the Milwaukee & St. Paul, H. G. Earl of the Chicago Junction, and T. H. Hervey of the Ann Arbor, so that the plan may properly be called the Central and Western pooling plan, and it is interesting to compare its features with those of the Texas equalization agreements.

The Central and Western plan is to cover box cars only. Other equipment is to be considered as "special" and subject to the car service rules as administered by the Commission on Car Service. The first of the Texas equalization agreements applies to absolutely all cars, so that it is practicable under this to even up a box car with a flat car, for instance. In making the second agreement, however, it was found necessary to except the "special fruit and vegetable cars" of one of the subscribers which apparently are to be handled under the car service rules. It seems quite logical that exceptions of this kind should be made.

Both plans contemplate agreements. The Central and Western agreement is to be "similar to the per diem rule agreement," which provides for termination on three months' notice. The Texas agreement allows termination on 30 days' notice. The provision for the furnishing of cars differs probably more in language than in effect. Under the Central and Western plan "each member must furnish the full number of units its maximum traffic requires." The unit alluded to is to be an 80,000-lb. box car, cars of smaller capacity being accepted in proportion to that capacity.

The Texas arrangement, as above, accepts car for car, simply providing that each subscriber may use as its own the cars of each other subscriber, and each shall undertake to supply an equal number of cars. The Texas agreement also provides that a subscriber may include as its own cars, those belonging to other railways when the authority of the owner is given.

Both plans contemplate settling for repairs on the basis of the present Master Car Builders' rules, although the Central and Western plan recommends certain changes in these rules.

It is when we come to the administration of the plans that we find the most difference between them. The Central and Western provides for the dividing of the continent into zones, each under the supervision of an Assistant Commissioner. These Assistant Commissioners are to report to the pool commissioner who is to be appointed by the American Railway Association and receive his instructions through the Executive Committee. The commissioner is to be given "authority" to move the cars so as to equalize them properly during the periods both of surplus and shortage. On this point the committee states that it would be practicable to introduce a pooling statement "provided sufficient latitude and power be conferred on a duly constituted board of competent jurisdiction."

The committee does not state, however, just what recourse the Commissioner would have in case his orders are disregarded, although in several places, as above, it states that he will "have authority."

The Texas plan provides for no Commissioners, Assistant Commissioners, Committees, or "authority." On the other hand, it provides that if one road is holding a 10 per cent excess of cars, it must equalize on demand within 10 days or pay a penalty of $2 per car per day in addition to the per diem rate. It may be judged that this penalty is sufficient to deter wrongdoing, as we understand that the balance has been so well preserved between the railways concerned that it has not been necessary to ask for equalization. The Texas plan also provides for arbitration of "misunderstandings which cannot be possibly settled."

These differences are pointed out not in the way of criticism of the Central and Western plan, which is presented only tentatively. Undoubtedly in its meeting in April, this plan will be amplified and the experience of the Texas roads will undoubtedly be utilized.

Arthur Hale,
General Agent, American Railway Association.

HOME ROUTING FOREIGN CARS

Chicago, Ill.

To the Editor of the Railway Age Gazette:

The following method is suggested as a possible solution of the problem of home routing foreign cars:

A road receiving a foreign car in other than switching business, for which it has no loading, must return the car to the owner, if it is a direct connection; or, it may return the car to the delivering line, provided the delivering line has a direct con-

nection with the owner of the car, and provided the movement to be made is in a homeward direction. A car, however, cannot be back-hauled in order to return the car to the delivering line; it must be kept moving in a homeward direction at all times.

If the road receiving the car has no direct connection, and the road from which it is received has no direct connection, with the owner line, the car must be billed home via the most direct route at a rate of five cents per mile, to be paid by the billing road, this rate to apply from the junction point at which the car is delivered to its connection. It should be understood that if any road over which the car moves in a homeward direction can load the car, it will do so, and bill against the billing road only for the number of miles it is necessary to haul the car empty. The rate above named is sufficiently high to enable the roads hauling the car to pay the per diem to the owner. The car would be entitled to free empty movement over any line that had hauled it in the opposite direction loaded.

Some arrangement would have to be made that would protect the transcontinental lines from being obliged to send foreign cars home a long distance. In this case the line that took the car out to the coast should be obliged to haul it back, or pay the line that does haul it back, if it has to move empty, and because there may be a load on one line eastbound and none on the other, probably all cars in the coast territory would have to move back via the line that took them west. There should be some local agreement between the transcontinental lines whereby the empty mileage would be equalized in some mutually satisfactory way.

E. E. Betts,
Superintendent of Transportation, Chicago & North Western.

ECONOMICAL CAR DISTRIBUTION

Roanoke, Va.

To the Editor of the Railway Age Gazette:

I submit herewith a skeleton plan of economical car distribution and compensation to owners, which, in view of the importance of the subject, might draw forth comment. The following factors are governing:

(1) Keeping enough cars in service to move the business of the country.

(2) Sufficient compensation to justify carriers putting cars in service to meet the requirements.

(3) Elasticity and economy in operation; (a) to handle the maximum business; (b) to handle light business and provide track storage for idle cars.

Since the first depends upon the others separate discussion is unnecessary.

We may proceed with the second on the theory that elasticity and economy in operation are controlling, and depend on free interchange of cars between carriers and reloading at the nearest possible point to where they are made empty, with the result that the burden of furnishing empty cars is thrown upon the lines that originate the heavy volume of traffic.

Coal, flat and refrigerator cars, by reason of their not being suitable for the general run of freight, can only be handled economically by returning them promptly to the owning carrier when they are made empty. It follows that these cars should be settled for between carriers at a per diem rate sufficiently high to force their return to their owners promptly. Since these types of cars represent those which lines heavily supplied with cars are obliged to put in service in large volume, due to the necessity for originating carriers to furnish all equipment, it should be to their interest as well as that of others to adopt some plan in the interest of elasticity and economy in operation as regards the remaining types.

Therefore, as to the third principle the following is suggested: As to the interchange of box and stock cars, the lines should be grouped in a manner similar to that used by the American Railway Association in computing car surpluses and shortages. A daily report should be made by all lines to the representative heads of the individual groups, showing the surplus or shortage.

(a) To handle maximum business:—If a line is short of cars, and desires the group to furnish them, it will state at what point or points delivery is desired, and the representative of the group will have cars billed and forwarded to it at the present rate for short-hauling worn-out cars, provided other roads in the group have a surplus. If surplus cars are insufficient, the number available should be pro-rated among the roads making application. No road should be called on to furnish cars to other lines unless it actually has a surplus. Cars should be billed via the shortest route as to mileage and per diem should be paid to the owners as heretofore; the expense of short-hauling to be borne by the line calling for cars. The line should obtain free of the haulage expense any cars other lines participating in the business might be able to furnish for return loading. This is the limit of free assistance available at present since owners cannot secure the return of their cars empty when needed.

(b) To handle light business and provide track storage:—When more surplus cars turn up in a group than are needed by its member lines, or are required by other groups, they could be disposed of economically as follows:

Storage tracks should be constructed or set aside at convenient points as designated by the representative of the group, acting as chairman of a committee formed by the member lines. On account of the particular convenience and economical advantage to it, a line constructing or setting aside a group storage yard adjacent to its tracks should do so at its own expense. When a surplus exists in a group, therefore, the representative should order the delivery of cars to storage tracks; each such storage yard being in charge of an employee reporting only to the representative of the group. Cars forwarded to the storage tracks should be short-hauled at the regular rate at the expense of the forwarding line.

Cars should be reported to the owners when they are received at the storage yard, by the employee in charge or his representative, and per diem should cease until they are moved. When cars must be removed from storage to fill a member line's requisition, the representative of the group should order the delivery of the number needed by such of its immediate connections as are members of the group, in the proportion that they have received the same types of cars under load during 60 days from the short carrier—thus gradually withdrawing the stored cars without cost.

To sum up:—Attention is drawn to the principle that to handle the maximum business a carrier would pay a minimum cost for aid in times of extended shortage, and to handle a light business would be able to dispose of surplus cars more economically than under the present practice.

While there is a particular advantage in the group system because temporary surpluses and shortages rarely extend beyond the territory included, some change in the country-wide situation might result from the stoppage of cars moving to owners. If so, it would be necessary to exchange cars between groups on the same basis as suggested above for removing cars from storage, cars being returned from one group to another in proportion to the receipts under load for the previous 60 days.

It may appear doubtful whether cars could be thrown to the road or group needing them, on the principle of each line turning over cars in proportion to its receipts, but should any line be unable to deliver its proportion, the fact that more cars accumulated at another storage yard correctly located would be evidence that the lines were originating more than their proportion of the surplus, and that if delivery were forced on them, these railroads would not be carrying an undue share of the burden.

Although the theory would have to be tested, it seems a safe assumption that, with a rule requiring the withdrawal of the oldest cars from storage first, the owner of an individual car would not lose in so far as return on his investment in these types of equipment was concerned, more than he ordinarily would in times of depression.

K. V. Conrad.

Is The Railroad Y. M. C. A. Really Worth While?

PART II—The Practical Advantages are Outlined and the Extent of the Religious Activities Is Discussed

Is the Railroad Y. M. C. A. really worth while? Yes, for a great number of reasons, and on a strictly business basis.

As one division superintendent put it, the railroads cannot afford to invest in any enterprise which will not earn at least 10 per cent on the investment. On the surface it would seem that the results are largely indirect and could not be traced, inasmuch as the greater part of the return is in the insuring of keener, brighter and more intelligent workmen. Actually, however, it is not difficult to obtain evidence of results of a most practical and concrete nature.

Unfortunately most of the railroad terminals are located in the most undesirable parts of the community, and usually the district is more or less thickly infested with saloons and other places of vice. Unless some special provision is made, the men who come in from their runs and are in need of refreshment and rest have great difficulty in securing good accommodations at any reasonable price, or any price, and are driven to the saloon, where they will at least be sure to find companionship and a certain amount of recreation. The result is that they are often far from fit when the time comes for them to take their trains out. When we consider the complications in making up and getting the trains over the road and the possibilities for preventing damage to goods, and accidents to life and limb, if keen, bright men are in charge, it is not hard to see where railroads can make big savings by doing their part to keep the men in a fit condition.

General Superintendent Rine, of the Lackawanna, after relating a number of specific instances of the benefits of the Railroad Y. M. C. A., exclaimed emphatically: *"It is a real asset to the railroad.* It has raised the standard of the men and improved their condition by giving them an opportunity to spend the day or night at their layover point, away from their home terminal, amidst proper surroundings, where good, plain food is furnished and clean sleeping quarters are provided at low cost, and where their thoughts are turned in the right direction to have them lead better lives and to fulfill their duties to the public, to the railroad, to their co-workers and to themselves and their families. *I don't see how we could get along without the Railroad Y. M. C. A."* J. B. Yohe, general manager of the Pittsburgh & Lake Erie, expressed the same thing in this way: "I firmly believe that the Railroad Y. M. C. A. stands today as one of the greatest factors for safety first on American railroads and as such deserves the support and co-operation of railway managers. Speaking of the results obtained so far from the work on the Pittsburgh & Lake Erie, the management is satisfied with its investment and believes the return to the company in vastly improved service received from employees who have co-operated most heartily in availing themselves of the privileges offered, has more than justified the expenditures of time and money which have been made."

Few railroad executives are fortunate enough to have escaped experiences which have cost their companies thousands and thousands of dollars because some engineer or conductor, after spending an afternoon or evening in a grog shop, allowed an accident to come about which never would have happened had he been in proper physical and mental condition. Emphasizing this point of view, a division superintendent outlined in detail the great care which is exercised in the maintenance of locomotives in order that they may properly perform their functions. It had been his observation that the more care taken to keep these machines in prime condition the less the total cost of maintenance over an extended period of time. "Why," said he, "do the railways place so much emphasis upon keeping the machine in 100 per cent condition and yet give so little attention to keeping the men in a similar condition? A 100 per cent machine operated by a 50 per cent man will give 50 per cent returns, not 100 per cent."

The same division superintendent directed attention to the fact that he had never had a man on the carpet for missing a run or reporting late who had spent the previous night in a Y. M. C. A. building. On the other hand, many times trains had been delayed and the schedules over the entire division have been disarranged because men who had spent the night elsewhere were not in condition to report promptly when they were called the next morning. Several officials emphasized the fact that if it became necessary to run an extra train, crews can always be quickly assembled where the men spend their leisure time in the Association building.

Another feature of very considerable importance is that when the engine and train crews stop over at the Association building, those at the head end of the train get acquainted in a most intimate personal way with those at the rear end and thus get to understand each other better, resulting in closer co-operation and team work in handling the trains on the road. Moreover, the local officers and foremen often frequent the building and meet the men on a social basis, resulting in a better understanding all around.

At many points the Railroad Y. M. C. A. secretaries arrange to cash the pay checks of the members of the association and sometimes for all of the employees of the terminal, regardless of whether they are affiliated with the Y. M. C. A. or not. Usually there are no banks in the immediate vicinity of the terminal, and if the Railroad Association does not extend this courtesy, the men must depend upon the tradesmen, which in the majority of cases means that they have to patronize the saloons, for these are always wide awake to the possibilities of attracting men by performing some service, inexpensive in itself, which will encourage the men to frequent their places.

Because the men are assured of satisfying, well cooked food at their lay-over points, and because clean, comfortable sleeping quarters and healthful recreation are available at the Y. M. C. A. building, it has been possible to attract a better class of men for trainmen and enginemen, and this has been a considerable factor in improving the efficiency of operation on many divisions. It is reflected in the fact, and this was mentioned by several railroad officers at different points and on different roads, that the men are more prompt and more careful in paying their bills, and the standard of their method of living and their home life is much higher than before the Railroad Y. M. C. A. was established.

The superintendent of a division on the Buffalo, Rochester & Pittsburgh said that it would be practically impossible to get along without the Railroad Y. M. C. A. on his division, and that if for any reason the building was suddenly burned down or wiped out of existence, steps would be taken to replace it before the ashes had cooled.

A superintendent of motive power is authority for the statement that since the new Y. M. C. A. building had been built on one division the appearance of the men as to neatness and dress was distinctly noticeable. "After all," as he expressed it, *"the strength of a railroad is in its men,* and anything which may be done to raise the standard morally, mentally or physically is bound to pay good returns."

Following is a typical instance of what is being done by the Railroad Y. M. C. A. secretaries in bringing up the standard of the men, and thus helping to promote efficiency. The road with which one secretary is connected hired a boomer fireman. He was dead broke and the Y. M. C. A. people staked him for the

first month by providing his meals and sleeping accommodations on credit. He made a splendid record in his work, but at the end of a year, having saved up $100, was attacked by the "wanderlust." The Railroad Y. M. C. A. secretary had become interested in him and had been watching him closely. He persuaded him not to give up his job and thus lose his rights, although in order to do this it was necessary to cultivate the man and keep in touch with him for a considerable length of time. Under the advice and inspiration which he received from the secretary he continued to save his money and is now married and happily located. In many cases the secretaries have been instrumental in helping to patch up domestic and other difficulties, thus relieving the minds of the men of the worry which, if it had continued, would have seriously affected their efficiency.

L. H. Turner, superintendent of motive power of the Pittsburgh & Lake Erie, is well known by his friends and intimates as being of a most practical nature. Within the past two or three years he has been led to take a very deep interest in the Railroad Y. M. C. A. work; this because of a belief on his part, based on experience, that it presents a wonderful opportunity for improving the efficiency of the staff. It also provides the opportunity for the officers and men to cultivate and better understand each other, thus automatically preventing many of the misunderstandings and difficulties which are liable to develop under other circumstances. Here is what Mr. Turner has to say on the question from a business standpoint: "Railroad companies will be forced to recognize the fact that when they put up buildings for the comfort of their men and equip them with libraries and other facilities for instruction along the lines of their work, that they are not contributing to a charity but simply taking a common sense view of a business proposition, as it seems to me that a railroad that has the greatest number of sober and intelligent men is bound to set a high mark in economical and efficient operation."

THE RELIGIOUS PROBLEM

The railroads in all cases contribute to the cost of conducting the work and employees are invited to take advantage and make use of the buildings. The question will undoubtedly occur as to whether the nature of the religious work which is carried on will offend or antagonize any of the employees, who naturally have different religious beliefs, and many in fact may be non-Christian. The Y. M. C. A. is generally known to stand for aggressive Christian work. In light of this, what should be the attitude of the secretary and how does he handle this most difficult problem?

The following quotation is taken from that part of the Railroad Association Handbook which refers to the relations of the railroad secretary to the church and particularly to church factions: "A secretary should be broad in his church relationship, always glad to assist any effort whose purpose is to help men and extend the kingdom of God. He should be to railroad men a concrete example that deep conviction is not inconsistent with broad sympathy and generous co-operation. He should remember that the church is not confined within the walls of any building or the limitations of any system of doctrine." In other words, he must stand on the broad simple teachings of the Master and his work will be effective only to the degree to which his character and example conform to these teachings. Can this meet with serious objection on the part of any Christian sect or faith? Surely not!

In talking with railroad officers on the different roads which were visited, and regardless of whether they were on the local board of managers of the Association or not, and regardless also of denominational affiliations, it was suggested time and time again that a most noticeable development and upbuilding of character invariably followed the installation of the Y. M. C. A., and that this development of bigger and broader men was a real asset to any railroad, the value of which was beyond computation.

In every case where the Railroad Association secretary eased up on or neglected active Christian work, such as the conducting of Bible study classes and religious meetings, either because of lack of interest or fear of offending others, the tone of the whole institution was noticeably lower than it should be. This in some cases is said to be so evident that railroad officers, not always particularly interested in religious work, have found serious cause for complaint as to the effectiveness of the institution as a whole. Doubtless, although time did not permit sounding out the men on this phase of the subject, the men themselves were much less impressed with the character of the establishment than would otherwise have been the case.

A young secretary had been placed in charge of the work at an important point. He felt that he ought to start a Bible class and decided that the best time of day to hold it would be about ten o'clock in the morning. He made up his mind to call the men together and start the work at a certain date. Somehow or other when the time actually came he did not quite have the never to take this step. From day to day he put it off, until after a severe struggle he made up his mind that he would surely get started on the following day. When the time came he found a group of the toughest men on the division in the building. Two of them were playing pool and their conduct and language was anything but polished. The young secretary screwed up all his courage, feeling almost certain of meeting defeat, and walked over and invited these men to come into the Bible class meeting. They thanked him, put up their cues and went with him into the study room. Needless to say their example was followed by many of the other men in the building. The meeting proved to be a big success and was followed by similar meetings at frequent and stated periods. It is not hard to believe that the whole spirit of that particular association was changed for the better.

It only emphasizes the truth that humanity in general has a natural tendency toward higher and better ideals. What is needed most of all is fearless and capable leaders. It is this feature that sets off the Railroad Y. M. C. A. in distinct contrast to the club house or social clubs and is responsible for its greater success and effectiveness. The club room can supply social and educational features and can meet the physical needs of the men by providing restaurants and dormitories; but something vital is missing. It is the spirit of broad Christian sympathy which is inspired and directed by the trained Railroad Y. M. C. A. secretary.

Of course there is no compulsion as to attendance at the Bible study or religious services. Men who, because of the nature of their work, seldom have opportunity to take advantage of other religious privileges are invited to attend but the invitation is not insistent. Naturally also each of the services must be simple and complete in itself, for most of the trainmen and enginemen cannot be present with any marked regularity.

If any criticism were to be made of the religious work it would be that some of the secretaries do not follow it up progressively enough. The comparatively small number of Bibles which are in evidence in some of the buildings is also something of a surprise. In these days when the activities of the Gideonites have placed Bibles in each room of most of the hotels throughout the land, we would rather expect to find a more plentiful supply in the Railroad Y. M. C. A. buildings.

CONCLUSION

In conclusion there can be no question but that the Railroad Y. M. C. A. gives a handsome return on a strictly business basis, provided, first, that the proper type of secretary is available; and, second, that the work receives hearty support and co-operation from the railroad officers. J. B. Yohe, general manager of the Pittsburgh & Lake Erie, has expressed this latter truth in the following words: "This development

could not have been available without hearty co-operation on the part of railway managers induced by sympathy with the aims of the association and a belief in the practical value of the object it seeks to achieve, as well as confidence in the attainment of that object for the benefit of both company and men."

THE GENERAL MANAGER'S SUPERVISION OVER DIVISION PERFORMANCE

The cost of the three items, road enginemen's wages, road trainmen's wages and fuel for road locomotives, forms almost half of the total transportation expenses of many large roads and over a third of the total transportation expenses of the great majority of railroads in this country. Furthermore, a considerable proportion of other transportation expenses depends directly on the volume of these three expense accounts. Thus, lubricants, water, engine house expenses and train supplies and expenses vary more or less directly as do these three accounts. Yard expenses may or may not vary inversely with road expenses; but it needs no argument to demonstrate that one of the most important duties of the division superintendent is to reduce to a minimum the three items which bulk so large in transportation costs. It follows that one of the most important duties of the general manager is to keep strict supervision over these three items of expense.

Adequate supervision can only be obtained through a prompt, accurate and comprehensive knowledge of the results being obtained on each division from day to day, as well as from month to month. One of the most effective methods of constructive supervision of the work of division superintendents is to place before them a record of their own and other superintendents' past performance; but one great difficulty with American operating statistics has been that they are a record of past performances so far in the past that they have only the academic interest of ancient history. Besides promptness in collecting and distributing operating statistics, simplicity of form as well as simplicity of compilation is essential.

For the purposes of this study the expenses of road enginemen, trainmen and fuel in freight service only will be considered. That being so, ton-mile cost is, of course, the common denominator to which fuel and wages should be reduced.

The Western Maryland under its new management has shown one of the most remarkable improvements in performance of which there is any record in recent railroad history in this country, partly, of course, because the performance in previous years was very far from satisfactory. This was not due entirely to conditions which any management, no matter how able, could have altered. Conditions quite beyond the control of the management had to be lived through and the new management is reaping the benefit of a comparison with a period of sickness. Nevertheless, discounted as much as is necessary to be entirely on the safe side, a reduction in the ratio of transportation expenses to total operating revenues in the first six months of the present fiscal year as compared with the corresponding six months of the previous year from 45.07 to 36.04 is a remarkable achievement. With transportation revenues only about 3 per cent less in the six months ended December 31, 1914, than in the corresponding six months of 1913, transportation expenses amounted to $1,551,000 in 1914 as compared with $1,943,000 in 1913, a reduction of $392,000. The Western Maryland management believes, and probably rightly, that only a beginning has been made in the solution of the problems on that road, and the present study deals only with the steps that have been taken to secure adequate supervision over the expenses of each division for enginemen and trainmen's wages and fuel for road locomotives.

The Western Maryland is divided into two divisions, the Eastern and the Western, and each division is divided further into three districts. One of the primary objects to be attained by the introduction of a new method of supervision, was to place before the general manager, general superintendent and division superintendents as promptly as possible the cost per 1,000 ton-miles of the three items of expense. A second and equally important object was to have sufficiently detailed figures accompany this report of cost per 1,000 ton-miles to permit of exhaustive analysis. The Western Maryland has devised a system which goes further than this and compels the superintendent to make his own analysis. A daily report of cost of trainmen's wages and of fuel is made up in the general superintendent's office within 36 hours of the events recorded and is sent out on that day, or the next, to the general manager and to the division superintendents. On this report each freight train is

FORM C T 180.

THE WESTERN MARYLAND

19___

Per Cent. of Total Engine Efficiency Loosed

TONNAGE TRAINS

Sheet No. 1	Rating Haul This Date		Total Ton Miles to Date: This Month	Total Ton Miles to Date: Last Month	Total Cost to Date: This Month	Total Cost to Date: Last Month	Cost Per 1000 Ton Miles to Date: This Month	Cost Per 1000 Ton Miles to Date: Last Month	Cost Per 1000 Ton Miles: This Date	Cost Per 1000 Ton Miles: Last Year	No. of Train Miles: This Date	No. of Train Miles: Last Year	No. of Engine Miles: This Date	No. of Engine Miles: Last Year	Cost Per Train Mile: This Date	Cost Per Train Mile: Last Year
	1st Acctg. Dist.	%														
	2nd " "	%														
	3rd " "	%														
	Eastern Division	%														
	4th Acctg. Dist.	%														
	5th " "	%														
	6th " "	%														
	Western Division	%														
	System	%														

Helper Eng	From	To	TRAIN, ETC. Division	Conductor	Engineer	Train	Engine	OUT OF TERMINAL Leaving	Connection Time	Tons Moved	% of Capacity Moved	No. of Cars	Actual Ton Miles Moved	TON MILES OF ENGINE EFFICIENCY LOST AND CAUSE Mech'l Defects	Fast Freight	Set Outs and Local Work	Nothing to Move and Car Limit	Weather Conditions	Ton Miles Should Have Moved

Form of Daily Report

shown separately, with the train number, engine number and name of crew. Each locomotive is given a rating over each district in which it is in service. The daily report shows this rating together with the actual number of tons moved, the per cent which this actual tonnage is to total capacity, the number of cars in the train, the actual ton mileage, the reason for the difference between the potential ton mileage and the actual ton mileage, divided under the heads "mechanical defects," "fast freight," "set outs and local work," "nothing to move and car limit," and "weather conditions." In addition there is shown the number of tons of coal consumed over the dis-

trict, total cost of fuel, wages of crews without overtime, cost of overtime, total cost of labor and fuel, miles run, hours on duty of crews, average miles per hour, and cars handled showing revenue loads, deadhead loads, and empties. Overtime made is analyzed as between Orders and Trains, Accidents, Engine Failures, Maintenance of Way and Signal Work, Waiting for Helper, Station Switching, and Terminal Delay. Cost of helpers is shown separately. Then the total cost per 1,000 ton-miles is arrived at. *All of this information can be obtained or derived from train despatchers' sheets and conductors' reports.*

The actual time consumed in making such a report as this for each train for each district is small, but for all the trains over all the districts of a busy railroad for a month it makes a very considerable aggregate. On the other hand, the more trains that are run and the busier a road is the more necessary it is that the superintendent have an adequate means of supervision and the general manager an adequate check upon the work of the superintendents; also, the amount of money which may be saved through more economical operation of each train varies directly with the number of trains and the volume of business.

One of the thorns in the flesh of the division superintendent is the necessity for making an explanation of a bad monthly showing weeks after the close of the month, and one of the factors which rob such explanations of much of the value which they might have to superintendents is that they are made to repel an attack, to win a particular case, and are therefore in the nature of special pleading.

One of the most admirable features of the Western Maryland form of daily reports here described is that these reports do away in large measure with the necessity for demanding explanations from superintendents. The report is itself an explanation, as it is also an analysis; and another important feature is that the report, insofar as such a thing is possible, compels a superintendent to himself make an analysis of the performance on his division and at the same time gives him a scientific method to be applied in making this analysis. There is nothing personal about the method; it is detailed enough and comprehensive enough so that the superintendent cannot claim the "showing" does not correctly represent the facts, or is against him because of reasons beyond his control. The report is self explanatory. Furthermore, there is nothing in it which the superintendent can mistrust. There was a letter printed in the *Railway Age Gazette* recently commenting in a joking way on "statistics," which, however, probably struck a responsive chord in the great majority of operating men. In the Western Maryland form of daily report there are neither adulterated figures nor arbitrarily assigned figures.

THE MERCURY FREIGHT HOUSE TRACTOR TRUCK

The continually increasing cost of handling l. c. l. freight has led within the past two or three years to the substitution of motor trucks for hand trucks in a number of freight houses where the trucking distances were relatively great. A further development has recently been made by the use of these motor trucks as tractors pulling carrier trucks as a locomotive hauls a train of cars.

The Mercury Industrial Tractor

The Mercury Manufacturing Company, Chicago, has designed and built a tractor truck for service of this character in freight and ware houses. The frame is of heavy channel iron with riveted and welded connections. It is supported on three wheels, the single front wheel being directly connected to the steering lever and giving it a very short turning radius, so that it is able to turn inside a car. The rear wheels are 21 in. in diameter and the front one is 15 in.; all three being equipped with 3½ in. solid rubber tires. The electrical controller providing four speeds ahead and two reverse, is at the right of the driver's seat. The control handle is automatically locked and cannot be moved unless the driver is in his seat, while a large brake drum is provided on each axle operated

RAILWAY COMPANY. TRANSPORTATION DEPARTMENT—DAILY TRAIN TONNAGE REPORT.

UNIT VALUES — WAY FREIGHT TRAINS

Avg No Tons Per Train Mile		Avg No Tons Per Engine Mile		Avg. Miles Per Hour		Avg Cars Per Train		Overtime % of Total Wages		Helper Service % of Cost		% of Crews Paid Local Rate		No. Trains Run		No. Cars Handled		Cost Per Train		Avg. Miles Per Hour		Avg. Cars Per Train		Overtime % of Total Wages	
This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year	This Date	Last Year

No Tons Coal Consumed	Total Cost of Fuel	Wages of Crews No Overtime	Cost of Overtime	Total Cost Labor and Fuel	Miles Run	Hours on Duty	Avg Miles per Hour	CARS HANDLED			OVERTIME MADE (AND CAUSE)								Cost of Helpers	Cost Per 1000 T. M.	REMARKS
								Rev Loads	D. H. Loads	Empties	Orders and Trains	Accidents	Eng. Failures	Car Failures	M. of W. & S. Work	Waiting for Helper	Sta. Swtg	Term Delay	Total			

Form of Daily Report

by a foot pedal. The motor and the axles are ball bearing throughout, while all parts are readily accessible for inspection and repair. Power is supplied by a storage battery with 250 ampere hours capacity, sufficient to operate the car continuously for a full working day. The tractor has a wheel base of 38 in., a length over all of 67 in., a width over all of 38 in., and weighs approximately 1,900 lb.

One of these tractors has been used continuously at the freight

Pulling a String of Trucks Loaded with Miscellaneous Freight

house of the Chicago Junction Railroad, Chicago, since August 1, 1914, and the accompanying photographs show it in service at that point. This tractor is used in the same manner as a switching locomotive, picking up the ordinary Reynolds trucks at the point of loading in the order in which they are to be cut off and leaving them at the doors of the cars in which they are to be unloaded. Each Reynolds truck is loaded only with material for one car. The tractor is operated by one man with one assistant to couple the various trucks together and drop them off. It is not necessary to stop the train to cut off the carrier trucks. This tractor has been operated by a foreigner, a regular employee of this house, since it was received.

By the proper arrangement of the connecting chains the trucks are made to track perfectly, and one of the photographs shows a string of these trucks being pulled around a sharp 90 deg. angle without any special assistance. In this way it is possible to pull a string of trucks through a crowded house without hitting other trucks or freight standing alongside. As many as 15 trucks have been pulled in one train, although in regular work from 8 to 10 trucks are hauled at a time.

An average of from 140 to 160 cars of l. c. l. freight is handled at this station daily, the largest portion of which is transferred from one car to another with an average trucking distance of 200 ft. As the one tractor cannot handle all of this freight, the shorter haul is still being made by hand trucking, although it is expected that this will be eliminated on the receipt of a second tractor truck now ordered. With the one truck in service the trucking force and the cost of trucking have been reduced 25 per cent. The Chicago & Eastern Illinois has also used one of these trucks at its freight house at Twelfth street, Chicago, with similar results.

"WHO PAYS FOR MY RAILROAD TICKET?"

[From the Chicago Herald]

Governor Dunne, in his reply to the request of the Illinois railroads for a reconsideration of the two-cent fare law, remarked on the absence of "vigorous protest" from the railroads against the two-cent rate "for nearly eight years." This suggests the statement of a fact generally overlooked, though long well known to students of railroad statistics.

This is the fact that the passenger service of the railroads, taken as a whole, has long been done for less than its cost. Why haven't railroad managers said something about it before? Well, occasionally they have. They have not, as a rule, made much of a point of it.

Probably they have failed to do so on the theory on which a State street retailer delivers a five-cent purchase away out at One Hundred and Sixteenth street. There is a loss on that, but it may be made up by gains on other sales. Usually it is.

The fact is that people have been largely traveling on the railroads partly at the cost of shippers of merchandise. The shipper pays for the traveler. If shippers and travelers were the same persons this would be "as broad as it is long." But they are not the same persons, except to a limited extent.

Noting this fact, the Interstate Commerce Commission has told the railroads that they shouldn't take from their freight income to pay for their passenger service—that each service should pay its own bills.

So the question for each man to ask himself when considering the railroads' request for higher passenger fares is:

"Who pays for my railroad ticket? Am I fairly paying for it myself, or sponging on my neighbor?"

Tractor Pulling Five Reynolds Trucks Around a Sharp Corner

Arbitration of Engineers' and Firemen's Demands

A. W. Trenholm, Chairman of Committee of Managers, Explains Effect of Men's Demands on Operating Conditions

At the hearing in Chicago last week before the board of arbitration on the wage demands of the engineers and firemen on the Western railroads, it was agreed by stipulation of both sides that as it was impossible for the board to complete the hearing of testimony in time to reach a decision within the 90 days provided for in the law, which would expire on February 27, the time limit would be extended until April 20.

A. W. Trenholm, general manager of the Chicago, St. Paul, Minneapolis & Omaha, and chairman of the Conference Committee of Managers representing the 98 western railroads affected, took up in detail on February 16 the 16 articles comprising the demands of the engineers and firemen, showing the effect of each article on operating conditions. Mr. Trenholm occupied the witness stand throughout the week.

"It is the first time in the history of railroading," said Mr. Trenholm, "that any such arbitrary, unreasonable set of rules has ever been submitted to any railroad. There is no reason for splitting up a road trip from the time the engine leaves the roundhouse till it reaches the other end of its run, except the one the men set up, namely, the creation of additional compensation and getting away from giving the railroad a reasonable day's service.

"The allowance of time and one-half for overtime would not reduce overtime, but, on the contrary, would be an incentive to increase it. The movement of trains is dependent largely upon the prompt carrying out of orders and the desire of the men under present conditions to get over the road and receive their compensation on the speed basis. This would be destroyed and the incentive would be, if the train were near the average of 10 miles per hour, for the crew to take little interest in making meeting points, feeling that if they ran into overtime they would be receiving 50 per cent greater compensation."

HELPER AND PUSHER SERVICE, ETC.

With reference to the proposal that engineers and firemen in pusher, helper, mine run, work, wreck, belt line and transfer service, and all other unclassified service, shall be paid through freight rates, Mr. Trenholm said that a large proportion of such service is unassigned and is performed as a part of switching or other regularly assigned service, to which the higher rates of pay ought not to be applicable. For example, out of St. Paul practically every train has to be helped over a short grade of approximately two per cent, and a regular helper is not assigned to the service because one helper would not be of any particular use. Every engine that works in the yard some time during the day will help a train, and under the proposed automatic release rule, if an engine works for 15 minutes in helper service of this kind the men would be entitled to claim a full day's pay.

As to belt line and transfer service, the conditions vary so in different localities it would be difficult to apply a hard and fast rule. In most cases, while a man probably would be on the road for long hours the work required was not such as to justify road rates, except on particular runs. As to helper service, if it were necessary to put a second engine on a passenger train on account of a snowstorm, the proposed rule would require payment of the through freight rate for one crew and the passenger rate for the other, which Mr. Trenholm thought would be improper.

The rule requiring an increase of 10 per cent on divisions on which there is a grade of 1.8 per cent, according to the witness, would require the roads to pay mountain rates on a large number of divisions because of a very short grade, perhaps of only a few thousand feet, on some part of a division. A strict interpretation of the rule would apply on trains going from the depot level up to an elevation. At present peculiarities as to grade or mountain operations are covered by various schedule provisions to meet the peculiar situations in the territory involved. Some roads allow a day for less mileage than 100 miles, others give an increased rate, such as 10 per cent additional.

STANDARDIZATION WITH A SAVING CLAUSE

Chairman Pritchard asked whether the witness thought language could be employed by the board which would obviate the difficulties as to local conditions. Mr. Trenholm replied that if it was desired to standardize the rates and rules it could be done by a committee of operating officers and a committee of the men, who should systematically analyze the schedules and work out rules that would allow a general application, but it would be necessary to eliminate some rules that are now in some schedules and possibly put in some that are not in other schedules, because some roads do not have certain rules, but have other rules which offset them. If it were not for the saving clause he thought the board could ignore all the schedules in existence and make a uniform set of rules to apply throughout the whole territory on broad lines.

"I believe," he said, "that compared with any other labor, the engineers and firemen of the western territory are adequately paid today. Some of the special rules in the different schedules I feel are unfair. It has always been my thought that if we could co-operate with the men and agree to eliminate these rules that disturb and hurt the discipline, and are irritating, the roads could well afford to reimburse them for anything they take away, so that when we get through we would have an ideal wage schedule without loss to the men. We have never asked to reduce their pay. To make a standardization with a saving clause seems to me to be impossible unless you take the very best schedule in the territory that has everything in the way of a perquisite, and apply that schedule to every other road and bring it up to the highest level of arbitrary allowances."

PREPARATORY TIME

If preparatory time were paid for by one road in one way, Mr. Trenholm said, and a rule were adopted providing for payment in another way, it might result that on some roads the preparatory time would have to be paid for twice. On his road (the Omaha) a rule had been adopted providing for an arbitrary payment of 30 minutes preparatory time in all cases where the men worked 10 hours, but if they were paid mileage and made a day's pay in less than 10 hours they were not allowed the 30 minutes.

F. A. Burgess, one of the brotherhood representatives on the board, tried to show that as there were 386,662 trains run in the month of October, 1913, which were paid for on the mileage basis, the engineers had contributed 193,331 hours, which at 63 cents an hour, the average rate for engineers, would amount to over $121,000 without payment. "I claim we have paid for it in the mileage," replied Mr. Trenholm; "if a man takes 30 minutes to get his engine ready and leaves at 7 o'clock, and completes his run at 12 o'clock, in five hours, he has made 100 miles. He is paid for 10 hours' work, and I don't concede that because he works 5½ hours by having been on duty 30 minutes before he started he has contributed any time that he has not been paid for. I contend that it is unfair, unjust and unreasonable to pay a man both miles and hours for the same piece of work."

Mr. Burgess said that the men also contributed 29 minutes

on each trip before overtime would accrue, which he added to the 30 minutes preparatory time, and he proposed that an expert accountant be selected to ascertain the value of this time on the basis suggested.

"I would like to arrange," said Mr. Trenholm, "at the same time to compute the amount that the railroads paid to men when they did not work at all, and where they were paid 20 hours for 4 hours' service, and 10 hours for 3 hours' service, and all the elements that go into the wage of an engineer or fireman. I believe, and the committee I represent believes, that the time you speak of as having been contributed should be paid for. I am perfectly willing to concede that the railroads should pay a man for every minute he works where he is paid on the hourly basis, but there are as many cases where a man is paid an hour for 31 minutes' work as there are where he is not paid anything for 29 minutes."

As to narrow-gage service, Mr. Trenholm showed that although a simple five per cent increase above the ordinary rate is asked, the compounding of other increases, such as the differential for grades, would bring the total percentage on some roads up to about 27 per cent. On one run on the Denver & Rio Grande the engineers' increase would be 174 per cent and the firemen's increase 189 per cent. The engines used in narrow-gage service are very small and there is no reason for any increase in the rates. The demand that through or irregular freight trains, when they have to set out or pick up cars en route, shall be paid for at overtime rates in addition to the time or mileage made on the trip, Mr. Trenholm said, would result sometimes in paying the crews four times for the same work.

"If a crew makes a run in 7 hours, it is paid the minimum of 10 hours," he said. "Suppose it used one hour on the road setting out cars. For the 8 hours, it is getting 10 hours' pay, yet it would get also time and one-half for the hour setting out cars, in addition to the straight time for that hour. If the added hour brings the crew into overtime, an additional hour at time and one-half would be necessary, making four times the regular rate for one hour's work."

The rule providing for continuous time in yard service, with an allowance of 30 minutes for meals during the time paid for by the company, Mr. Trenholm said, would in many cases result in shortening the period of actual time on duty so that overtime would have to be paid, and the company would in reality be paying time and one-half for the meal hour.

INITIAL TERMINAL DELAY

The rule as to initial terminal delay, he said, is different from anything he ever knew of in any schedule, as it provides additional payment for something that heretofore has been part of the day's work.

"Regardless of the fact that the engine may be ready for the engineer and fireman to step on and move the engine," he said, "there would be no escape from paying 30 minutes' preparatory time, even if the whole day be 6 or 7 hours' work with 15 hours earned. Where there is now a switching allowance the men may hold to this under the saving clause and secure even double time. The 30 minutes would have to accrue to the men at the beginning of each trip regardless of any service, and where engines are double-crewed one man could step off and another step on, one claim final terminal delay and the other preparatory time, resulting in payment to two crews for the same time."

Whether the board of arbitration has power to prevent such pyramiding by careful construction of the wording of the award aroused a lively discussion. Mr. Nagel asked whether, if an award should be made on a subject which is not covered by the rules of one road, but which is covered by a rule on another road more advantageous to the men, the men on one road might accept the award and the men on the other road reject it, or whether the brotherhood must act as a unit with respect to the award. Mr. Stone insisted that the men on the individual roads could accept or reject any article of the award if they preferred to retain the rules already in effect.

AUTOMATIC RELEASE

The rule providing for automatic release at the end of a run, Mr. Trenholm said, would severely penalize the roads on short runs, and make it possible for men to earn two or three or four days' pay in one, unless the wording of the rule were changed. He admitted that some such rule should be provided to protect the men against abuses, and that a man, having completed his day's run, even if it required only six or seven hours, should be compensated properly if he were required to perform additional service, but he thought such conditions were generally provided for at present in the various schedules in one way or another. The schedule of the Omaha road provides that a man may be called for an additional run only up to the limit of 100 miles or 10 hours.

"The application of this rule, in its technical interpretation," said Mr. Trenholm, "is so far-reaching in its effect, that this committee hesitates to attempt full description of what the result would be, applied to so vast a territory. It is such a radical departure from the present rules and practices and impresses us as being so unreasonable and unfair to the railroads that we are at a loss to understand the purpose of it."

An actual run described by Mr. Trenholm is covered by six trains daily except Sunday on the Rock Island between Elmira, Ia., and Riverside. The engine crew on each of these trains covers 115.2 miles per day, working 9 hours and 57 minutes, for which it receives 15 hours' pay, $6.22 per day for the engineer and $3.97 for the fireman, the engines being very small. On these runs, there would be, under the men's demands, a pyramiding of rates and rules covering preparatory time, initial terminal delay and final terminal delay at three points daily, plus 100 miles under the automatic release rule for each of six runs daily by each crew, while on top of all would be added 10 per cent because part of the track is 1.8 per cent grade. As a net result, each engineer would receive $33.66 per day, or $1,009.80 for a 30-day month, while each fireman would get $21.69 a day, or $650.70 for the month, an increase of 441 per cent for the engineer and 447 per cent for the fireman.

In discussing the demands that crews "tied up" under the federal 16-hour law between terminals be paid continuous time without deduction for time so tied up, Mr. Trenholm said: "This would abrogate the agreement signed in 1908 with the four brotherhoods, in which specific provision was made for this situation. Conductors and trainmen still would be bound by this agreement. The rule makes no exceptions, and the company could not release a crew between terminals without paying full time, even when necessary because of washouts, snow blockades or other conditions over which we have no control. Such tie-up or release might be at a point where there are liberal accommodations for sleeping and ample rest. Under the overtime rule the men would even claim time and one-half for time thus spent in rest. Under the "deadhead' rule, an engineer or fireman riding in a coach would get not only the rate, but all the added arbitrary payments going to the crew working on the engine, such as preparatory time, initial and final delay, running for coal and water, icing cars, loading or unloading cars.

"Another rule demands continuous time after 15 hours when held away from home terminals, including the rest period. Having once exceeded this time, the pay would become continuous whether for 24 hours or a week, regardless of snow blockades, washouts or other emergencies. If a man made 100 miles in four hours at the $5 rate and was then held for 24 hours in excess of the limit set, he would draw $30 for the 24 hours. This committee cannot conceive any justification for this when no service is rendered."

SURPRISE TESTS

As to the demand for the elimination of surprise tests under certain conditions, Mr. Trenholm said: "The committee is

of the opinion that properly conducted efficiency tests are necessary to safe operation. The tests should always have due regard to the safety of employees, and while it may be true that in so large a territory there might be a few individual cases where the zeal of some local officials may have gone somewhat beyond this, we are very strongly of the opinion that matters of this nature are not a proper subject for a wage schedule, and that the maintenance of discipline, proper obedience to rules and regulations and the manner of their enforcement should be left to the operating officials of the railroads."

In describing the efficiency tests on his road he said: "After some time it developed that unfair reports were being made, and after long thought I conceived the idea of inviting the labor organizations to elect a committee of five men, one from each, while I selected five officials. These men meet once a month in my office. They have all the authority I have to examine records and it is their vote which decides a complaint of the men. In case of a tie I cast the deciding vote, but we have met every month for several years since the board was formed and I have never been called on to vote. Every decision has been unanimous. When 100 tests have been taken of any engineer with no failures, the man is given a '100 per cent efficiency' certificate, which shows that he has been tried and found 'there.'"

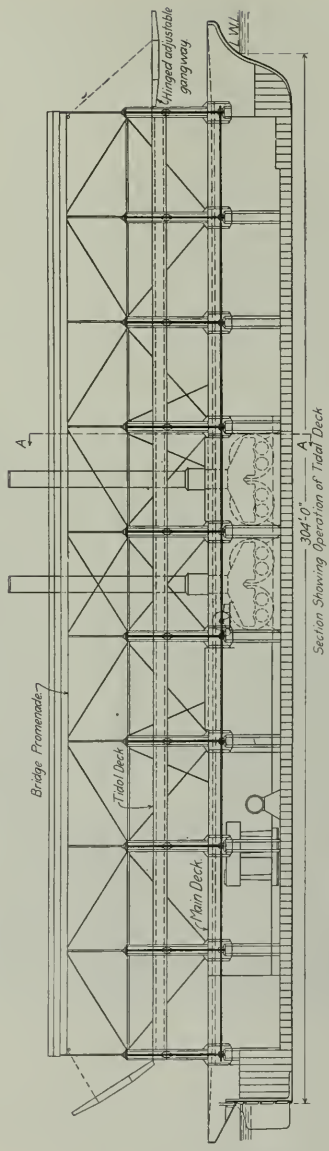
A NEW CAR FERRY WITH ADJUSTABLE DECK

It is planned to extend in the near future, the operated section of the new National Transcontinental Railway in eastern Canada, which is now in service from its eastern terminus, Moncton, N. B., to a point across the St. Lawrence river from Quebec. As the Quebec bridge will not be ready in time to start operation as soon as desired, a car ferry of unusual design has been built to handle both freight and passenger trains between Quebec and Levis. It is designed to carry a maximum train load of 1,440 tons in an estimated time of 45 min. for loading, moving the 2½ miles across the river and unloading.

A Portion of the Main Deck Showing the Track Supports on the Movable Deck Overhead

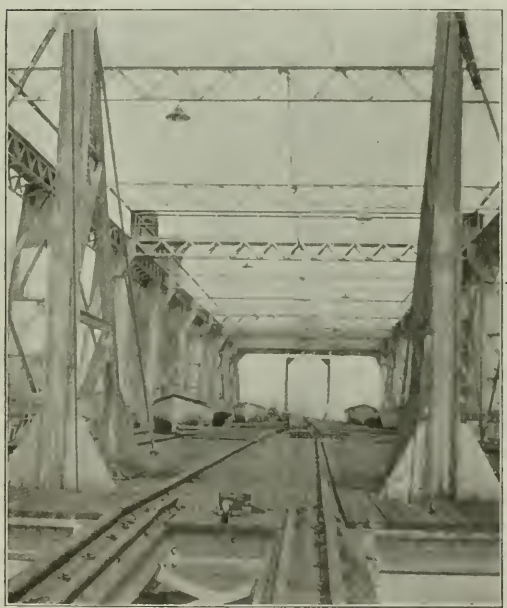
The two principal difficulties in providing a ferry for this service were the large amount of ice encountered in this latitude during the winter months and the tidal variation in the water level which amounts to about 18 ft. The ways in which these difficulties were met in the design of the boat constitute its chief features of interest.

The hull of the new ferry is 304 ft. long and 65 ft. wide at the 15-ft. load line. It has a molded beam depth of 23 ft. to the main deck and a mean draft not exceeding 15 ft. under the full train load. The trains will be carried on a movable car deck supported above the main deck by 10 columns on each side,



Longitudinal and Cross Sections of New National Transcontinental Railway's Car Ferry

the position of this deck being adjusted by large gun metal nuts at the ends of the transverse girders supporting the deck which engage vertical screws hung on ball bearings from the top of supporting columns. The side columns are connected at their tops by transverse latticed girders; longitudinal bracing is provided between all columns, and exterior struts are carried out to the edge of the main deck, making the superstructure rigid in all directions. The load on these columns is distributed to the keel by special struts below the main deck. Three tracks 272 ft. long are provided on the movable deck, these being carried on latticed girder stringers under each rail. No adjustment in the elevation of the tracks on the landing piers will be necessary, the slight inequality due to the motion of the vessel under changing load being taken up by adjustable hinged gangways at each end of the car deck. These gangways are attached to the end of the movable deck by ball and socket joints and their outer ends are adjusted to the desired level by two lines of three-part cable attached to the top of a braced steel frame on the deck. The steel superstructure above the highest position of the car



Looking Down One of the Tracks on the Movable Car Deck

deck supports a promenade around the vessel with a bridge platform forward from which all of the operations of steering and maneuvering are directed. The space below the main deck is occupied by the boilers, coal storage, engine rooms, accommodations for the crew, etc.

The vessel will be propelled by two sets of twin-screw triple-expansion surface-condensing engines with cylinders 23 in., 35 in. and 55 in. in diameter, having a 33-in. stroke. They are designed to run at 120 revolutions per minute with a steam pressure of 165 lb. A special feature of these engines is the shafting, which is made much stronger than usual to withstand the shock received when the propellers strike ice during the winter. The propellers themselves are of nickel steel and of an especially strong design. An ice-breaking propeller is provided in the forward end of the vessel, driven by a set of compound surface-condensing engines, the cylinders being 15 in. and 32 in. in diameter with a 21-in. stroke. This propeller, which is also of nickel steel, runs idly during the summer months. The vessel is strengthened throughout for heavy ice-breaking service. The car deck is raised and lowered by worm wheels driven from horizontal shafting which runs the length of the vessel on each side, the gearing being arranged to lift the deck fully loaded at a rate of one foot per minute through a distance of 18 ft. The engine operating this deck is of the four-cylinder high-pressure type, of massive design, driving a transverse shaft through double helical spur gears. This shaft drives the main line shafting through miter wheels at each end. The worms which drive the vertical screws carrying the car deck are of forged steel and the wheels of cast iron. The screws are driven through a loose forged steel sleeve and sliding key arrangement fitted into the box of the wheel. Steam will be supplied by two batteries of four single-ended return tube boilers, 12 ft. 4¼ in. in diameter and 9 ft. 6 in. long, having a total heating surface of about 10,400 sq. ft. and a grate area of about 350 sq. ft. An electric winch with two drums operated by a 41. hp. motor is located on the car deck for hauling cars on and off the boat. Two 25 hp. motors are provided for raising and lowering the gangways and two generators of 40 kw. and 20 kw., respectively, are installed for supplying the electric current for the operation of motors and for lighting. Two steam windlasses with slip drums are provided for mooring.

BEAM LIGHT SIGNALS ON THE PENNSYLVANIA

The new arrangement of electric lights (uncolored) to take the place of semaphores, as signals, on the Pennsylvania Railroad, between Philadelphia and Paoli, to be used both day and night, was described in the *Railway Age Gazette* of January 8, page 61. These signals have now been put in service over a distance of five miles, Overbrook to Bryn Mawr, and a photographic reproduction of one of the signal bridges, sent to us by the courtesy of the Philadelphia Public Ledger is given in the accompanying engraving. This is a four-track line and the observer sees the two signals for the two right-hand (west-bound) tracks. For the outer track the stop indication, protecting the train seen in

"Beam-Light" Signals at Rosement, Pa.

the picture, consists of the four lights which are arranged in a horizontal line in the upper part of the hood or background. The next track is clear for three blocks in advance and the clear indication in the signal (at the left) consists of the four lights arranged in a vertical line.

On this electrified section the block sections are about 3,500 ft. long and "three-block information" is given. If the line is clear for only two blocks ahead, the clear signal is given by the lights in the lower part of the signal (corresponding to a second semaphore arm) indicating "proceed, prepare to pass next signal at medium speed."

The wires to be used for electric traction, seen in the engraving, are not yet in regular use. It is expected that electric motor cars will be put in service within a month or two.

Meeting the Problems of the Express Companies*

Express Service Must Respond to the Public's Demands; Must Earn Revenues Commensurate With Its Service

By B. D. Caldwell
President, Wells Fargo & Company

The slogan "Made in America," or "Made in the United States of America," now current throughout our land, will undoubtedly spur our people to new initiative and creative endeavor. It should have another and, to my mind, more immediate effect, namely, a revival of appreciation of the usefulness of institutions whose prosperity has been affected through lack of that public encouragement and protection which are essential to their well being.

Extremes of criticism and regulation, moderation in which would have been salutary, have driven many of these institutions to the trenches of defense and slowed the wheels of progress. As measures of reform, some of this regulation has been in response to a wholesome public sentiment of disapproval of hurtful tendencies caused by unwise use of great power or wealth. When rationally applied it has served its legitimate purpose in checking selfishness and discrimination, but too often it has been so extreme as to be repressive of legitimate and laudable endeavor. Just criticism and wise processes of reformation are wholesome and invigorating. When inconsiderate or extreme they always produce the contrary effect. Other efforts at reform have been based upon a lack of understanding of the problems involved or upon a blind following by those who, without knowledge themselves, do not investigate the underlying basis of criticism before joining in its expression. There have also been the harmful effects of fickleness of appreciation which condemns today what it exalted yesterday. Institutions which have been used as ladders to success have been assailed when the beneficiaries have thought they were strong enough to climb alone, finding too late that in bringing injury to their benefactors they have hurt themselves.

We all realize that transportation is as essential to our commerce as the sun is to the day. The slogan "Made in America" would be meaningless without transportation to carry our products of mine, soil and manufacture to all the worlld. We seem to forget not only that our railroads were "Made in America," but that they are its greatest creation. They are admittedly the greatest railroads in all the world! As the children of our creation, they may require regulation and sometimes correction, yet our paramount obligation is their protection, encouragement and best development rather than mere discipline. Let us make them greater, more efficient and more useful by making them more prosperous.

While my talk of tonight has to do mostly with the express, I could not forbear this expression of appreciation of the greatness of the service of our railroads and of the urgent need for an extension to them, by the American public, of definite and substantial support in their efforts to maintain their credit and usefulness. Nor should we forget that the railroads, for their services, receive approximately one-half of the gross earnings of the express companies, and share correspondingly in reductions made in express rates.

ADVANTAGES OF THE EXPRESS

Indeed, in correlating the many railroad lines into a unit of public service, similar in principle to the Pullman service, the express, in its usefulness as well as its need of public encouragement and support, is kindred to the railroad. The character and scope of the express, as we know it in its relation to the activities of our people, entitle it to be considered one of the greatest transportation agencies in existence. To the everlasting credit of the American people, be it said, it was also "Made in the United States." After three years of service with one of the largest of these companies, during which period the express has been, most of the time, under fire of both criticism and regulation, I am convinced that as a specialized personal service for the transportation of packages of all descriptions, combining the highest measure of safety, speed and responsibility, it has no equal anywhere. It is ideally adapted to, as well as a development of, the needs of the American people, and, in my judgment, the express is now giving a service which in expedition, correctness and reliability cannot be replaced to advantage, should it retire or be destroyed, nor can its place in business activity and promotion ever be satisfactorily filled by a governmental service.

Moreover, the unit of service supplied by the express through its unique organization as now constituted, would not be the same if each separate railroad operated its own express. This is true not only because of the difficulty of proper correlation, but on account of the duplication of service and the accompanying confusion and delay which would result if each railroad were obliged to provide its own separate express organization, including vehicles for pick-up and delivery service. On the other hand, the increased cost to the railroads of such a duplication of service, beyond their ordinary function of transportation, would be practically prohibitive. With very few exceptions—which are subject to special conditions—the railroads which have undertaken to operate their own express have abandoned the experiment because of lack of success in their own, as well as the public, interest. Such an unlimited extension of duplicate service as would be required if the individual railroads throughout the country were to handle the express direct would not only *not* bring a satisfactory solution of present problems, but would transfer them in an enlarged degree from the express companies to the railroads.

The express assumes the fullest carrier obligation of any system of transportation, in that it guarantees personal service from the door of the shipper to that of the receiver, between all principal points, upon the hundreds of millions of packages which move yearly, and 90 per cent of which traffic originates or terminates with business concerns. The shipments between individuals represent less than 10 per cent of the whole. The express service, in the main, is required to serve an immediate need either of food, fashion or other daily requirement of our people—a single messenger, as it were, carrying not one message, but a whole shipment, to Garcia—with the added guarantee of indemnity to the owner for damage or loss.

The express has no counterpart in any other country, except Mexico and Canada, and these were "Made in the United States." It has always been financially responsible. It has been the pioneer in transportation of money, gold, silver and currency. It serves the world through simple and effective forms of money orders and travelers' checks. It is a notable fact that in Europe, at the outbreak of the war, the express companies were practically alone in paying cash to Americans traveling abroad. Their service in recovery of American baggage from the war zone in Europe constitutes a red letter chapter in reclamation work.

DEFECTS OF THE PARCEL POST

The following is quoted from an analysis of the relative merits

*An address delivered at the annual dinner of the St. Louis Traffic Club, December 18, 1914.

of the express and the parcel post made by one of the great merchant bodies of this country, viz.:

"The parcel post omits the following essentials of a complete service:

"1. It does not collect parcels.

"2. It does not give receipts.

"3. It does not provide indemnity for loss, except upon extra payment, and only to the amount of $50.

"4. It does not provide any indemnity for damage.

"5. It does not provide controlling records, by reason of which omission the volume of loss is increased.

"6. It does not provide special means of security for valuable parcels.

"7. It does not provide adequate protection against damage, but, on the contrary, promotes damage and loss by opening in transit.

"8. It does not provide for the transportation of a wide range of special commodities.

"Unless the parcel post removes these defects it cannot by any possibility fill the entire field of quick transportation. It can invade it to a considerable extent, but the service performed by it will be materially less efficient and less comprehensive than that now supplied by the express companies. . . . It would partially supplant an adequate service by an inferior service, and by compelling the express companies to retire by depletion of their traffic would leave a considerable part of the field without needed traffic facilities."

More than a hundred business organizations throughout the country have expressed to the President, Congress, the postmaster general and the Interstate Commerce Commission a protest against further extension of the parcel post, as being not only unnecessary in the public interest, but, on the contrary, inimical to it because of the danger of driving out a service of higher efficiency—namely, the express.

It has not been the position of the express companies, at least within my knowledge, to oppose a parcel post within logical limits. The present-day consensus of opinion of business interests of the country, however, as voiced by the organizations referred to, is that any extension beyond its present scope is neither justified by the country's need, nor by the ability of the parcel post to serve. On the other hand, they contend that because of the detrimental effect upon the greater and more essential service of the express companies, its further extension becomes an injury to the public instead of a benefit.

It is my conviction, based on careful observation, that the parcel post cannot, in its present form, and it is doubtful if it can in any form, handle to material advantage perishable shipments for farmers or other producers. It can never furnish that personal service in direct helpfulness to the grower and the producer which has always been a feature of the work of the express and which has now been extended, through food products departments, to bring into closer relation the producer and consumer, thereby contributing to the success of the widespread movement for a reduction in the cost of living. Our company has formed over one hundred buying clubs in New York City alone in which the express company makes the delivery in bulk to the store employees who constitute the clubs. As a means of economy, members of these clubs make the distribution between themselves.

The loss by the express to the parcel post is estimated to be about 15 per cent of its gross earnings of the year prior to the installation of the latter. These shipments represent mostly small packages of limited value, including practically all of the small package business for "rural free delivery."

During the two years of investigation of express rates and practices by the Interstate Commerce Commission a mutual understanding was reached between the express companies, the shippers and the commission for the adoption of improved methods of handling the traffic. To the co-operative efforts of the various merchant associations, in joint conference with the representatives of the express companies, much is due for the progress made in this direction, thereby insuring correctness and efficiency of service.

The criticism which preceded these mutual conferences, however, was a remarkable illustration of the extremes to which the pendulum of criticism can go and how easily it may go past the point of benefit and produce serious injury, as was reflected in the radical reduction in rates provided for in the order of the commission by which a new plan, as well as an entirely new basis of rates, was made effective on February 1, 1914. It is fair to say that in tariff simplicity and insurance of correctness in quoting rates the new plan is a great improvement over the old and, to that extent, as well as for the improvements made in methods of handling referred to, the commission is entitled to commendation both from the express companies and the shippers.

As to the reduction in the rates—the companies expressed willingness to make a substantial reduction in long-haul rates, but vigorously opposed the radical reduction in the whole fabric of rates proposed by the commission, which they anticipated would unjustly reduce the earnings of both the railroads and the carriers, and might wipe out entirely the net earnings of the express companies.

It was estimated by the companies at the time the order was issued that the reduction would amount to about 15 per cent of their total revenue on interstate traffic. This would necessitate securing a still greater percentage of increased business at the lower rates if the former gross earnings were to be maintained unless material reductions in expense were made, since if a greatly increased business should result, the handling expense would also be increased. It seemed to the companies that it would be exceedingly difficult, if not impossible, to secure such economies as would overcome the losses which the extreme reduction in rates must inevitably produce. In the meanwhile, the express companies, like all other transportation agencies, were confronted with an actual increase in their cost-of-living expense.

REDUCTION IN EXPRESS REVENUES

The result of nine months of operation under these reduced rates is now available. Five months were reflected in the figures of the fiscal year closing with June 30, 1914. Commissioner Decker, of the New York state commission, in his report to the recent meeting of the National Association of Railway Commissioners, called attention to the gross revenue loss in express earnings for that fiscal year. This amounted to $10,000,000 as compared with the previous year. The net income fell from $4,400,000 to $400,000, a decrease of about $4,000,000, or 90 per cent. The resultant loss to the railroads was approximately $5,000,000, being one-half the loss in gross express receipts.

In this report Mr. Decker stated: "It is, of course, too early to hazard an opinion based upon these figures that the express business of the country cannot be continued to be operated under present conditions, but all must concede that such figures constitute a basis for apprehension and for serious thought and consideration in the future in connection with further reports of financial returns. . . . We are likely to have under consideration in the comparatively near future the question of providing sufficient revenue for the continued profitable operation of the express service over railroads in the United States."

The effect upon the *net* earnings of the express companies of the existing situation is strikingly shown by the following: Out of each dollar received by our company from the public the profit fell from 6.33 cents for the fiscal year ending June 30, 1912, to 4.25 cents in 1913, and to 2.71 cents in 1914. For the first quarter of the current fiscal year the profit was less than *one cent* for each dollar received. The fiscal year ending June 30, 1913, included 6 months of parcel post, while that of June 30, 1914, included, in addition to 12 months of the parcel post, 5 months' operations under the new reduced express rates. The more significant effect of the rate reduction, however, is shown in the figures quoted for the first quarter of the current fiscal year.

On interstate traffic, the average charge per shipment of our company, from July to October, inclusive, of this calendar year, decreased 18.1 cents, or 16.55 per cent as compared with the same period of the previous year. In 25 of the larger cities east of the Missouri river our average charge per shipment decreased in October of this year from 85.8 cents to 70.8 cents, or nearly 18 per cent. St. Louis fell from an average of 90 cents to 72 cents, or 20 per cent. The average charge per shipment for the entire system, state and interstate, for the 4 months fell from 81.39 cents to 73.02 cents, a decrease of 8.37 cents per shipment or 10.28 per cent.

The problem at the moment, therefore, is one of preventing *deficits* rather than of showing profits. We must all agree, however, that if the express companies are to continue to serve their present useful function they must be conducted at a profit. It is by no means clear, in view of the present outlook, how this is to be accomplished.

NEEDS OF THE EXPRESS BUSINESS

Two things, however, seem reasonably certain: first, the express must respond to the demand of the public for a virile and aggressive administration such as will command both the respect and good will of the latter. It is our conviction that this obligation is now being fulfilled. It must also have an earning capacity that will insure to its stockholders a profit proportionate to its usefulness and value in public service and to the company the maintenance and improvement of its service, including the personnel and efficiency of its employees. The figures herein quoted show that such an earning capacity is now lacking. Second, the public must be responsive to the situation in protective support against measures for the extension of governmental competition which may weaken or destroy, but which cannot replace, the express service. There must, likewise, be a realization by the public not only of the necessity, but the merit, of compensation to the express commensurate to the specialized service and general usefulness which constitute its value as an essential agency of transportation.

I can at least speak for the company with which I am connected in saying that the problem of making income exceed the outgo has been undertaken with the spirit of accomplishment to the greatest extent possible. In the fiscal year ending June 30, last, our operation cost, through efficiency work, was reduced so substantially, as compared with the previous year, as to reflect a net earning which would not otherwise have been available.

We have made and will continue to make an earnest and conscientious effort to make the best of the rate bases which, by process of law, have been prescribed, however reluctant we were to adopt them as affecting our earning capacity, or how difficult seemed the task before us. We have approached the task with energy and even optimism, with a full appreciation of the stimulus to progress which is to be derived from such an attitude, especially in its effect upon our large force of officials and employees who, after all, are the men behind the guns in all such accomplishment.

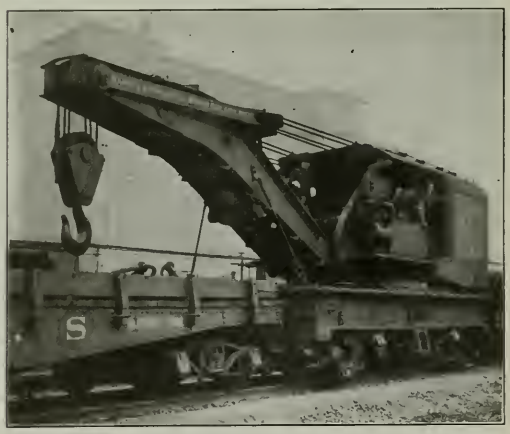
We are striving, through efficiency and inventive effort, to find new or cheaper methods of handling. We are, however, constantly met with the fact that the specialized personal service and responsibility of the express necessitate such an extraordinary amount of detail in the speedy handling of not only the packages, but the way-bills and other safety records required, as to make it difficult to find new methods that are not fatally defective to this expeditious and insured service, which is the very essence of the express.

But in the effort being made by the express, notwithstanding the losses in earnings as a result of the reduction in rates, not only to keep up but to improve the service to the public, we must have constantly in mind our obligation to our stockholders. Express stocks are held just as are railroad stocks—by banks, insurance companies, trust companies, women, estates and even churches. With our company, women constitute approximately one-half our total stockholders. Our officials likewise feel most keenly their duty to our army of loyal and faithful employees. They regard it as a most worthy ambition to preserve to these employees their positions by the continuation of the express, and that we should not only be in a position to improve their working condition, but to extend our pension system and other methods of welfare work. By these means the express would continue to attract the grade of employees so essential to its highly specialized service—in which 150,000 persons are now employed in an operation of over 250,000 miles of railroad lines in the United States.

Without any thought of relief from the responsibilities which are properly ours, it seems to us that we may now with propriety bring to the public, whom we serve, an account of our stewardship and of the effect upon the earnings of the express, as well as those of the railroads, under the new conditions. In other words, the time for retrospection seems to have arrived. The public can with satisfaction view the results of its co-operative effort in the improved efficiency and usefulness of the express. At the same time the public may well be concerned as to the effect upon express earnings and the need of further co-operative effort in the providing of sufficient revenue for the continued profitable operations of the express service as one of the great transportation agencies "Made in the United States of America."

MICHIGAN CENTRAL STEAM-ELECTRIC WRECKING CRANE

A wrecking crane built to operate either by steam or electricity has recently been received by the Michigan Central for use in and adjacent to the Detroit river tunnel. This crane differs from the electric tunnel cranes of the Pennsylvania Railroad and the Grand Central Terminal in the provision for steam operation, and further in being single-ended. It is hoped, of course, that an accident may never occur in the tunnel itself,



New Wrecking Crane of 120-Tons Capacity Designed for Operation by Either Steam or Electricity

and in order that the crane need not be idle under normal conditions, it is adapted for ordinary uses outside the tunnel as well as the special use underground. When operated within the electric zone, current is supplied from the third rail or from a flexible cable carried on the crane. At points where the electric power is not available the crane can be operated by steam from any outside source, such as an accompanying locomotive, through a suitable system of piping. This makes it available for regular wrecking duty or for construction and yard work.

The construction of the crane is similar to that of the 120-ton

capacity steam wrecking crane used on many roads. The car body is 26 ft. long and 9 ft. 6 in. wide. The weight of the crane is distributed over a wheel base of 19 ft. 8 in. Telescopic outriggers are provided to add to the stability during heavy lifting. It is equipped with air and hand brakes, with provision for both automatic and straight air. The complete air brake system is under the control of the operator, with engineer's valve, electric air compressor, etc.

The electric motor is wound for 600 volts direct current, and has a capacity varying from 200 hp. for a short period to 115 hp. for one hour's continuous service. This motor will operate on fluctuations of line voltage between 300 and 700 volts. The controller is of the street railway type with cast grid resistance. The current is delivered from the third rail or cable to a switchboard that is furnished with all necessary switches and instruments for operating the electric air compressor, cable reel, third rail shoes, light, etc.

The main power cable is automatically paid out and reeled in. A reel is provided with a capacity of 500 ft. of insulated power cable, which is operated by a motor. The automatic control of the reel is secured by the action of this motor without the use of any intermediate or internal mechanical devices, such as friction, clutches, etc. This motor is supplied with current whenever the crane is taking current through the cable, so that practically a constant torque is exerted on the reel, resulting in practically a constant pull on the cable. Any change in this pull, such as would be produced by the crane moving forward or back, results in the automatic paying out or reeling in of the cable. The motor is capable of standing "stalled" continuously without danger to its parts from overheating.

When the crane is operated by steam the piping system is so arranged by means of a steam-tight slip joint at the center of revolution that the crane will slew more than 180 deg. in either direction under the pipes without interference. When the crane is operated electrically this piping revolves with the crane.

The motions of hoisting with either the main or auxiliary hoists, varying the boom radius, and slewing are independent of each other, and with loads up to the limit of its power the crane can perform all of these motions simultaneously. With the maximum load of 120 tons it is capable of slewing at the rate of a complete revolution in one minute if this speed is deemed safe. The boom may be raised or lowered under full load. A special drag or pulling line is attached to the underside of the boom. When self-propelled by either steam or electricity the crane has a speed of about four miles an hour, but it may safely be handled in regular trains over main line tracks at a speed of 60 miles an hour.

The maximum radius of the main block is 25 ft. and the minimum 16 ft. The capacities of the crane are as follows: With outriggers in position, main hoist, 240,000 lb. at 17-ft. radius or 160,000 lb. at 20-ft. radius; with end outriggers only, main hoist, 140,000 lb. at 16-ft. radius and auxiliary hoist, 30,000 lb. at 25-ft. radius; without outriggers, main hoist at right angles, 44,000 lb. at 16-ft. radius and 32,000 lb. at 20-ft. radius and auxiliary hoist, 24,000 lb. at 25-ft. radius. This crane was built by the Industrial Works, Bay City, Mich.

Swedish Railways Place Orders for New Equipment.—The Swedish state railways have recently placed orders, for 1916 delivery, with Swedish companies, for locomotives to the value of $250,000 and cars to the value of $700,000.

Opening of New Swedish Railway.—The Alfsbyn-Pitea branch of the Swedish government railways was recently opened for provisional traffic. This line, the construction of which was begun in 1912, extends from Pitea, on the northern bank of the Pite river, to Sikfors, where it crosses the river and follows the valley of the Tvara for some distance up to Alfsbyn. The cost of the railway is estimated at $974,000. It is not yet entirely completed, several station buildings, in particular, being lacking or only partially finished.

DENVER RECLAIM AGREEMENT

The Colorado roads are now working under a new reclaim agreement for the guidance of car accountants in the settlement of bills for rental on freight cars switched by one road for another, which went into effect on January 1. This agreement has the distinction of being so free from objectionable or questionable features that *all* of the roads in the territory affected have unconditionally given their approval. The agreement is as follows:

AGREEMENT,

OUTLINING BASIS FOR SETTLEMENT OF RECLAIMS UNDER PER DIEM RULE NO. 5*

FOR THE YEAR 1915 AND THEREAFTER UNTIL AMENDED.

Rules.

1. Reclaim statement must show initials and numbers of cars, date received, date delivered, and days on the line. Days on the line to be determined by subtracting the date of receipt from the date of delivery.

2. The average detention shall be determined from the cars that make round trip movements in switching service; that is, received from and delivered back to the same road, including cars that are received and returned the same day. Such average detention to be expressed in days and hundredths of days. Cars must appear on the reclaim statement for the month in which the loaded movement is made.

3. A car received with a switch load which is unloaded [and the car], reloaded within the switching limits, and returned to the same road, shall be counted as two cars and the total days shown subject to a maximum of ten days. An item of this kind is to be included in arriving at the average detention, as per Rule 2. The reclaim for both moves must be included in the month in which car was received.

4. The reclaim on cars picked up or diverted shall be on basis of the average as per Rule 2, but the number of cars so handled, and the days detained, shall not be used in computing the average.

5. In the event the average detention is five days or less, and no pick-up or diverted cars are in the statement, the reclaim will simply cover the actual per diem paid by the switching road.

6. Each month's business with each road shall be settled on its own basis. Per Diem Rule 5 provides for an arbitrary amount for each car in switching service, based on the average number of days, not to exceed five, actually required in switching service.

7. In arriving at the average detention, ten days shall be the maximum time figured on any one car.

8. Supplemental reclaims covering omitted cars shall be made on basis of the average time as shown by the reclaim statement from which the cars were omitted, and the average for that month shall not be refigured. Supplemental reclaims for cars included in error, shall be on basis of the actual number of days which were allowed on such cars.

9. No supplemental reclaim shall be made on account of error in date of interchange, discovered after reclaims have been settled.

The roads parties to the agreement are the following:

Atchison, Topeka & Santa Fe, all points in Colorado; Colorado Midland; Colorado & Southern; Chicago, Burlington & Quincy, all points in Colorado and Wyoming; Chicago, Rock Island & Pacific, all points in Colorado; Denver & Rio Grande, all points in Colorado; Denver & Salt Lake; Denver & Intermountain; Denver, Laramie & Northwestern; Florence & Cripple Creek; Great Western; Missouri Pacific, all points in Colorado; Union Pacific, all points in Colorado, and Cheyenne, Wyo.

*An arbitrary amount for each car in switching service may be reclaimed by each individual switching line from the roads for which the service was performed. This amount shall be based upon the average number of days, not to exceed five, actually required in such switching service, to be determined annually by an examination of the records of each individual switching line by the roads directly interested for each local territory. No reclaim shall be allowed for an intermediate switching movement. No reclaim shall be allowed under this rule to a non-subscriber.

Modernizing Locomotives on the Kansas City Southern

Comparative Tests of Consolidation Type Which Are of Special Interest from a Transportation Standpoint

The Kansas City Southern is one of the few steam roads that have taken up the matter of modernizing existing locomotives on a practical basis. The great improvements made in motive power equipment during the past five years have caused many locomotives built a few years previously to become quite expensive to operate as compared with locomotives of more recent construction. This is particularly true in view of the constantly increasing cost for fuel, water, engine and train crew overtime, car service per diem and like transportation expenses.

In order to bring its power that will remain in service for at least ten more years up to the present new locomotive standard of effective and economical working, the management of this road has recently made the following alterations in two out of a lot of forty-eight consolidation type locomotives, built in 1907-1908, and having the original general dimensions shown:

Item	Locomotive as originally built	Conversions No. 477	Conversions No. 497
Fuel	Bit. coal	Bit. coal	Bit. coal
Tractive effort, lb.	44,880	44,880	44,880
Weight on drivers, lb.	182,650	186,000	185,000
Cylinders, diam. and stroke, in.	22 x 30	22 x 30	22 x 30
Drivers, diam., in.	55	55	55
Boiler pressure, lb.	200	200	200
Grate area, sq. ft.	33.5	33.5	62.5
Heating surface, sq. ft., total	3,039	2,831	2,907
Superheater	None	Schmidt, 32 unit	None
Valves	Slide	Universal Piston 8 in.	Slide
Brick arch	None	Security	None
Fire door opener	Hand operated	Automatic, Franklin Butterfly	Automatic, Franklin Butterfly
Cost to convert		$2,775	$4,850

From the foregoing data it will be noted that the changes made in locomotive 477 consisted of the application of a superheater, 8 in. diameter piston valve chests, brick arch and automatic fire door, while those made in locomotive 497 consisted of enlarging the grate area from 33.5 to 62.5 sq. ft., and applying an automatic fire door, the idea being to test these altered locomotives against each other in order to determine their relative hauling capacity, fuel, water and speed performances.

An exhaustive comparative fuel test has just been completed of locomotives 477 and 497 in tonnage freight service. This test was made during November, December and January, over a 102 mile freight division having a ruling grade of .5 per cent, compensated for 72 miles and 1.0 per cent compensated for 30 miles. The average results per round trip of 204 miles are shown in the accompanying table:

Results of Comparative Fuel Tests of Locomotives 477 and 497 on a Round Trip Basis

Item	Average performance 477	Average performance 497	Per cent in favor of 477
Weather conditions; temperature, max. and min.	71 deg.—41 deg.	71 deg.—29 deg.	.....
Ton-miles, total actual	418,157	413,094	1.23
Time in motion, total	12 hr. 1.6 min.	13 hr. 50.4 min.	15.08
Coal per mile, lb.	151.25	196.69	23.10
Water per mile, lb.	953.38	1,416.14	32.67
Coal per 100 ton-miles, lb.	7.378	9.718	24.08
Water per 100 ton-miles, lb.	46.508	69.934	33.49
Running speed, average m. p. h.	16.96	14.72	15.22
Equated result, lb. coal used per 100 ton-miles	6.507	8.602	24.34
Equated result, lb. water used per 100 ton-miles	41.736	68.265	34.03
Steam pressure, average, lb.	196.9	199.44	.....
Superheat, deg. F.—Max.	355	.....	.....
Superheat, deg. F.—Min.	65	.....	.....
Superheat, deg. F.—Average	223	.....	.....

A comparative tonnage test was also made of the two locomotives over the same division in the direction of the flow of traffic against the maximum gradient, with the results per single trip of 102 miles given in the table:

Results of Comparative Tonnage Tests of Locomotives 477 and 497, on a Single Trip Basis

Item	Average performance 477	Average performance 497	Per cent in favor of 477
Weather conditions; temperature, max. and min.	45 deg.—42 deg.	49 deg.—41 deg.	.....
Ton-miles, total actual	275,418	238,716	15.4
Time in motion, total	7 hr. 21 min.	8 hr. 12 min.	10.6
Coal per mile, lb.	240.71	248.00	2.9
Water per mile, lb.	1,481.36	1,812.66	18.3
Coal per 100 ton-miles, lb.	8.914	10.596	16.0
Water per 100 ton-miles, lb.	54.862	77.452	29.1
Running speed, average m. p. h.	13.88	12.44	11.6
Equated result, lb. coal used per 100 ton-miles	7.881	9.604	18.0
Equated result, lb. water used per 100 ton-miles	49.053	71.399	31.3
Steam pressure, lb., average	198.1	199.3	.....
Superheat, deg F.—Max.	324	.....	.....
Superheat, deg. F.—Min.	134	.....	.....
Superheat, deg. F.—Average	253	.....	.....

Kansas City Southern Consolidation Type Locomotive as Originally Built

The data in these tables shows that on a fuel test the percentages in favor of locomotive 477 were:

Ton-miles ..... 1.33 per cent increase
Running speed ..... 15.22 per cent increase
Fuel consumption ..... 24.08 per cent decrease
Water consumption ..... 33.49 per cent decrease

On a tonnage test the percentages in favor of locomotive 477 were:

Ton-miles ..... 15.4 per cent increase
Running speed ..... 11.6 per cent increase
Fuel consumption ..... 16.0 per cent decrease
Water consumption ..... 29.1 per cent decrease

On the basis of about the same tonnage hauled the average

saving in coal per round trip of 204 miles would approximate 5 tons, which at $2 per ton equals $10. Allowing 14 round trips per month, with one month out for general repairs, gives 154 round trips per year, which at $10 gives $1,540 saving in fuel cost per year. If capitalized this represents the interest at 6 per cent on over $25,000 per year. This leaves out of consideration the reduced cost for about one-third less water used as well as for probable less engine and train crew overtime due to the 15 per cent increased running speed. At any rate the cost for the conversion on a comparative tonnage and fuel saving basis will be more than paid for by the reduction in coal consumption during the first two years of service.

On the basis of the greater tonnage hauled, and assuming an average of one-third empty and two-thirds loaded cars per train, as well as an average of 21 revenue tons per loaded car, this would approximate an increase of 125 revenue tons and 25,500 ton-miles per round trip. Allowing a rate of 7.8 mills per revenue ton mile gives about $199 increased *gross freight revenue* per round trip, or for 154 round trips per year, a total of $30,646 increase in gross operating revenue. This still leaves out of consideration the 16 per cent saving in fuel and 29 per cent saving in water, as also the probable less engine and train crew overtime due to the 11 per cent increase in running speed. At an operating ratio of 63 per cent (exclusive of taxes) each locomotive converted in the way employed with No. 477 can increase the *net operating revenue* by at least $11,500 per annum, or over four times the cost for the conversion.

Therefore, while the cost to convert No. 477 ($2,775) was about 43 per cent ($2,075) less than for No. 497 ($4,850), its performance from either a fuel, a tonnage or a combination standpoint was much more effective and economical. As compared with the unconverted locomotives of the same class the saving in fuel will average from 25 to 30 per cent, and this, with the additional savings through increased average train load and running speed, less number of stops for water and fuel, decreased steam failures and overtime, all of which are reflected in reduced transportation expenses, has made the conversion of this class of power practically imperative.

The more effective and economical performance of locomotive No. 477 with 33.5 sq. ft. of grate area, as compared with No. 497 having 62.5 sq. ft. of grate area, was contributed to largely by the superheater and brick arch.

The application of the superheater to this locomotive without removing the existing slide valve cylinders and making an expensive renewal with piston valve cylinders, as well as alterations in the frames and auxiliary parts, was made possible by the use of the Universal piston valve chest, manufactured by the Economy Devices Corporation, 30 Church street, New York, and the effective performance of these 8 in. diameter piston valves is shown by the accompanying indicator diagrams. No trouble was experienced in the lubrication of the valves and cylinders with saturated steam valve oil under sustained temperatures of 700 deg. F. in the steam chest and on several occasions this temperature was increased with no damage to any of the wearing parts.

The Kansas City Southern is one of the few remaining dividend paying railways in the section of the country which it serves, and this plan that it has taken to substantially increase its earning capacity, for a relatively small expenditure on capital and maintenance accounts, will continue to improve the financial strength of the property, as well as its standard of operation.

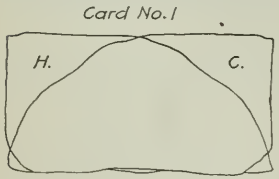
ANTI-FULL-CREW LAW CAMPAIGN

Messrs. Samuel Rea, president of the Pennsylvania Railroad; Daniel Willard, president of the Baltimore & Ohio; Theodore Voorhees, president, of the Philadelphia & Reading, and R. L. O'Donnel, chairman of the executive committee of twenty-one associated railroads of Pennsylvania and New Jersey, have issued a third circular answering an "Appeal to the Legislature," which has been presented by the Pennsylvania legislative committee of the trainmen's organizations. The trainmen's committee states that the railroads opposed the air brake law (in 1893); but with this statement of fact, says the committee, there is no issue. In the very first statement of the full-crew law matter, as given out by the railroads February 14, this fact of a dead past was frankly admitted, and stated far more strongly than the trainmen now put it. . . .

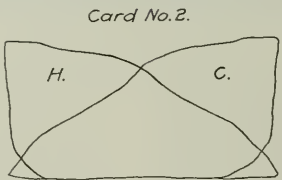
In their statement, the trainmen's legislative committee, referring to the beneficent results of air brakes in making railroad operation safer and more economical, declare that the full-crew law will have the same result. But, say the railroads, "The actual, not the theoretical result of railroad operation under full-crew laws, has been a large increase in the casualty list. This is particularly true as to the class of accidents which the trainmen have most emphatically asserted the laws would prevent—injury to passengers getting on and off trains. Figures at hand for fourteen of the twenty-one railroads operating in Pennsylvania and New Jersey show accidents as follows:

	Before law First six months of 1911		*Under law* First six months of 1914	
	Killed	Injured	Killed	Injured
Trainmen killed or injured by falling from trains, getting on or off trains, coupling or uncoupling, or doing other work on or about trains	45	2,307	30	3,008
Passengers, by falling from cars, or getting on or off cars	5	293	3	350
Total	50	2,600	33	3,358

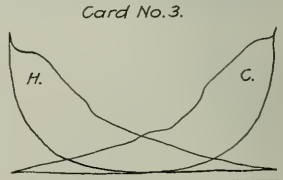
"The railroads did man trains for safety and efficiency of operation before the law required an arbitrary manning of trains, and they continue to do so now quite irrespective of the law's requirements. At the time the full-crew laws went into effect, eleven railroads were operating in Pennsylvania and New Jersey 276 passenger and 540 freight trains, or 816 out of 7,805 trains with crews larger than the law required. Today the same railroads are operating 316 passenger and 414 freight trains, or 730 out of a total of 6,853 trains, manned in excess of the full-crew law requirements. Thus when the trainmen say, as they do in their statement, that 'the full-crew law is not an experiment—is not an innovation in railroad operation,' they are entirely correct. The railroad managers, as a plain business proposition, had full-crewed all trains. The laws which were enacted had nothing to do with it, nor have they since. . . ."



Boiler pressure, lb..... 200
R. P. M..... 73.3
M. P. H..... 12
Piston speed, ft. per min..... 366
Total I. Hp. 1,318



Boiler pressure, lb..... 200
R. P. M..... 91.6
M. P. H..... 15
Piston speed, ft. per min..... 458
Total I. Hp. 1,324



Boiler pressure, lb..... 200
R. P. M..... 232
M. P. H..... 38
Piston speed, ft. per min.....1,161
Total I. Hp. 1,418

Cylinders, 22 in. by 30 in.; diameter of drivers, 55 in.; piston valve diameter, 8 in.; tractive effort, 44,900; indicator spring, 100 lb.
Note: Cards Nos. 1 and 2 taken when locomotive was hauling 2,429 actual tons in 52 loaded cars on .5 per cent compensated grade.

Indicator Cards Taken from Consolidation Type Locomotive with Universal Valve Chests

Transportation Exhibits at the Panama Exposition

A Brief Description of the More Important Features of Interest to Railway Men, Showing Recent Developments

By William S. Wollner

The completion of the Panama canal marks an epoch in the history of transportation and in planning the Panama Pacific International Exposition in commemoration of this event, due notice has been taken of the important part that transportation bears to the manifold activities of this busy era. In opening its doors last Saturday, the San Francisco Exposition placed before the world the most complete exhibit of the progress of transportation methods on land and sea and in the air, that has ever been assembled, and railroad men will be particularly interested in the exhibits made by the different railway companies and by the railway supply and equipment houses.

The Palace of Transportation is one of the main group of exposition buildings surrounding the Court of Honor on one side and the Court of Abundance on the other. The building is of frame construction 617 ft. by 574 ft. 6 in. in size and contains 174,323 sq. ft. of exhibit space. The clear height in the main part of the building is 40 ft. and the center of the building consists of a dome 82 ft. in diameter, with a clear height of 87 ft. 5½ in.

Immediately under this dome and so situated that it is visible to the spectator from any portion of the building, is a 65-ft. steel deck turntable bearing a 4,000 h. p. articulated Westinghouse electric locomotive constructed for use in the Pennsylvania tunnels under the Hudson river and actually operated in this service for several years. The turntable is rotated by an electric motor driving through a series of reducing gears by means of rack and pinion and makes a complete revolution each minute. As the locomotive alone weighs 150 tons, a special foundation was provided for the turntable. The deck of the turntable is 12 ft. above the main floor of the building.

In the northwest quarter of the building, which is the part devoted to railroad exhibits, 14 standard-gage railroad tracks have been constructed of an aggregate length of 3,348 ft. The four tracks nearest the north wall of the building, 963 ft. in length, are built to carry a load of 5,000 lb. per lineal foot and the remaining ten tracks, 2,385 ft. in length, are constructed for a load of 12,000 lb. per lineal foot. All these tracks are carried on pile foundations and are connected with the Exposition railway system, which in turn connects with the State Belt railroad through which cars are interchanged with the various transcontinental roads. A transfer table has been installed for use in placing the various exhibits.

On track No. 1, immediately inside the main north entrance, are located the following cars of the Southern Pacific: A single-sheathed, steel frame automobile car of 80,000-lb. capacity, 44 ft. long, equipped with the latest type of end doors; a 100,000-lb. capacity double-sheathed steel frame box car; a single-sheathed box car of the same capacity and type, and an 80,000-lb. capacity Pullman stock car.

Track No. 2 carries the exhibit of the McCloud River Railroad Company, consisting of a complete logging train as used by that company on its lines in Northern California. The locomotive, which is of the type built specially for this road by the Baldwin Works, carries 90 tons on small drivers and weighs 120 tons in working order. Next to the engine is a flat car loaded with six white and sugar pine logs, 32 ft. long and containing an aggregate of 12,466 ft. of finished lumber. The second flat car carries 6 logs 16 ft. long containing an aggregate of 10,294 ft. of lumber. The next car is a box car containing rough lumber and the last car in the train is a caboose finished in white pine left in the natural shades. The entire train, with the exception of the locomotive, was built in the railroad company's shops, and by walking its length one may view the logs as they come from the woods, the rough lumber as it leaves the mill and the finished product, as it is used in the constructive arts.

The west end of tracks Nos. 3 and 4 carry the exhibits of the German-American Car Company, consisting of a cork insulated tank car especially designed for wine and mineral water; an acid tank car; a tank car for petroleum products, cotton oil, molasses, etc., and a tank car for vinegar, cider, wine, etc. On the east end of track No. 3 is located the latest type of refrigerator car used by the Pacific Refrigerator Express and a standard Southern Pacific steel postal car in which will be demonstrated the handling and sorting of mail as it is carried on in daily service on the various railroads. The east end of Track No. 4 is occupied by a new type of wine tank car built and used by the California Despatch Line. This car resembles a box car, but contains 6 redwood tanks of approximately 1,000 gal. capacity each.

American Locomotive Company

On tracks 11, 12, 13 and 14 the American Locomotive Company has four engines on display, and as these will probably be of especial interest to mechanical department officers and employees visiting the exposition some of their dimensions, etc., are here given. There are two tank locomotives, one of the 36 in. gage and one of 4 ft. 8½ in. gage. The dimensions of the standard gage engine are as follows:

Loaded weight	89,000 lb.
Wheel base, driving (also total of engine)	7 ft.
Diameter of cylinders	16 in.
Stroke of piston	24 in.
Type of valves	Slide
Outside diameter of driving wheels	46 in.
Driving wheel journals	8½ in. by 9 in.
Type of boiler	Straight top
Working pressure	165 lb.
Total heating surface	933 sq. ft.
Water capacity	1,300 gal.
Fuel capacity	2,500 lb.
Maximum tractive effort	18,710 lb.

The dimensions of the 36-in. gage engine are:

Loaded weight	37,000 lb.
Wheel base, driving (also total of engine)	4 ft. 9 in.
Diameter of cylinder	10 in.
Stroke of piston	16 in.
Type of valves	Slide
Outside diameter of driving wheels	30 in.
Driving wheel journals	5 in. by 6 in.
Type of boiler	Straight top
Working pressure	165 lb.
Total heating surface	408 sq. ft.
Water capacity	700 gal.
Fuel capacity	600 lb.
Maximum tractive effort	7,480 lb.

These engines have been displayed as the best type, as reflected by actual experience for contractors, quarry, mine and industrial plant service. To illustrate the best types of engines used in logging and freight service two Mikado locomotives are shown. The logging engine is one of the usual kind employed in various parts of the United States, but the freight engine was especially constructed for the Pekin-Kalgan Railway in China. The comparative dimensions are as follows:

	Logging engine	Freight engine
Loaded weights—		
On driving wheels	144,500 lb.	138,500 lb.
On leading wheels	16,500 lb.	17,500 lb.
On trailing wheels	29,000 lb.	30,000 lb.
Total of engine	190,000 lb.	186,000 lb.
Tender	100,300 lb.	110,400 lb.
Wheel base—		
Driving	13 ft. 6 in.	14 ft. 3 in.
Total of engine	29 ft. 6 in.	30 ft. 9 in.
Total of engine and tender	56 ft. 3¾ in.	57 ft. 11¾ in.
Cylinders—		
Diameter	20 in.	20 in.
Stroke of piston	28 in.	28 in.
Type of valves	Slide	Piston
Wheels—		
Outside diameter of driving wheels	48 in.	50 in.
Diameter of engine truck wheels	30 in.	30 in.
Diameter of trailing truck wheels	33 in.	36 in.
Diameter of tender wheels	33 in.	33 in.

	Logging engine	Freight engine
Boiler—		
Type	Straight	Straight
Working pressure	180 lb.	180 lb.
Total heating surface	3,092 sq. ft.	1,834 sq. ft.
Superheating surface	.....	358 sq. ft.
Tender capacity—		
Water	5,000 gal.	5,000 gal.
Coal	18,000 lb.	18,000 lb.
Maximum tractive power	37,500 lb.	34,300 lb.

BALDWIN LOCOMOTIVE WORKS

The Baldwin Locomotive Works display on tracks Nos. 5 and 6 is of interest to the railroad visitor as showing the best practice in locomotive building as adapted for different parts of the country and for different classes of service.

On the west end of track No. 5 is shown San Pedro, Los Angeles & Salt Lake engine No. 3708. This engine is of the Mikado type and was built for use in heavy freight service and in some classes of passenger service over heavy grades and on moderate speed schedules. The particular engine displayed is for use in passenger service and has driving wheels 63 in. in diameter and a tractive force of 51,000 lb. This engine has a special trailing truck designed so that the truck frame acts as the rear equalizer. Ragonnet power-reverse mechanism is used and the engine is equipped with a Vanderbilt type tender.

On this track is also located Atchison, Topeka & Santa Fe Pacific locomotive No. 3600. This is a single expansion engine using superheated steam and developing a tractive effort of 41,000 lb. The Baker valve motion and the Ragonnet power-reverse with a mechanical locking device are used. The rear truck is of the Rushton type with outside journals. Oil fuel is used in the service for which this engine is intended, which is transcontinental passenger service on the Pacific Coast Lines.

Chicago, Burlington & Quincy engine No. 6110 stands opposite the 3600 on track No. 6, and is an excellent illustration of the latest type of coal burning engine fitted with a Street mechanical stoker superheater, brick arch and combustion chamber. It has the 2-10-2 wheel arrangement and exerts 71,500 lb. tractive effort in heavy road service. It has been standard on the Burlington since 1912.

The Southern Pacific Mikado No. 3270, which is also shown on track No. 6, has as a special feature a vestibule connection on the rear end and a Hodges pattern trailing truck. In other respects it is similar to the other Mikados shown in this exhibit. The third engine on this track is a Mikado especially designed by the Baldwin people for logging service and bears their number 41710. It exerts a tractive effort of 27,000 lb. and will work on curves of 30 deg. The trucks are of the radial type, the front truck being center bearing and the rear truck side bearing; these trucks are equalized with the driving wheels so that each finds a bearing and carries its load in passing over uneven track.

On tracks Nos. 8 and 9 are shown the "Giant" and "Pigmy" of the locomotive world. These engines are displayed by the Southern Pacific and demonstrate the progress of locomotive building during the past 50 years. The "Collis P. Huntington," which is the pigmy of the exhibit, was operated over the lines of the Central Pacific during the early sixties, and the giant is a Mallet compound of the class that is being operated over this same stretch of track today.

The "Collis P. Huntington" is one of six engines purchased by the Central Pacific when its line was first put into operation. These were shipped "around the Horn" and arrived in San Francisco March 19, 1864, and were shipped to Sacramento by river boat. Of the six, the "Huntington" and the "Leland Stanford" are the only ones still in existence, the latter now being on exhibition in the museum of the Leland Stanford Junior University at Palo Alto, Cal. These engines are carried on two driving wheels 54 in. in. in diameter, and the weight on the drivers is 18,500 lb., the total weight being 39,000 lb. The total wheel base is 21 ft. 2 in. and the heating surface of firebox and flues 419 sq. ft. Compared with these dimensions are the following proportions of the Mallet, which is really two engines in one as it has two separate sets of cylinders, two sets of drivers, etc. This engine has an over-all length of 68 ft., exclusive of tender, a wheel base of 56 ft. 7 in. and a total heating surface of 6,786 sq. ft. It carries 395,300 lb. on the drivers, and has a total weight of 437,100 lb. when loaded. The "Collis P. Huntington" is mounted on a track composed of steel rails on redwood ties which rest on 30 in. of rock ballast. This track is protected with automatic block signals, so mounted that their operation can be fully observed by and explained to the interested visitor.

An exhibit of unusual merit is being made by the Southern Pacific in its engine No. 1457, which is also located on track No. 9 This engine has the coverings of its working parts "cut away" so that their operation can be seen as the machinery is electrically operated. Some of the parts cut away are the smoke arch about to the top of the cylinder saddle to give a view of the steam pipes, petticoat pipes and the front end arrangement, and through the steam chest, valve and a portion of the cylinder, 3 in. off center, to show the piston and valve action. There is a second cut through the center line of the dome, throttle valve and standpipe, and through the third course of the boiler, the shell plate being removed down to the throat sheet flange, giving a clear view of the water tubes, the staying on the water-leg and on the top.

This engine is of the eight-wheel model, with 73 in. drivers and cylinders 20 in. by 24 in. It carries 92,000 lb. on the drivers. The sectional work was done in the Sacramento locomotive shops of the Southern Pacific under the direction of the motive power department officers.

THE PENNSYLVANIA EXHIBIT

The exhibit of the Pennsylvania Railroad is the first one to be seen by the visitor as he enters the railroad exhibits from the center of the building. Immediately in the rear of the Westinghouse display the Pennsylvania has placed two standard all-steel passenger coaches in which will be displayed moving pictures of various trips that may be made over the Pennsylvania. These cars were built in the Altoona shops, and were run to San Francisco as a part of a regular passenger train. Upon arrival at the exposition, one side of each of the coaches was removed and the cars placed side by side on standard gage tracks with flooring and roofing connecting the open sides. At the close of the exposition these cars will be restored to normal condition and placed in regular service on the Pennsylvania.

In the rear of the cars will be displayed relief maps showing the territory traversed by the system, one of the city of Greater New York and models of the terminals in New York City and Washington, the proposed terminal in Chicago and Hell Gate bridge. The relief map of the Pennsylvania System is 26 ft. by 42 ft. and is said to be the largest relief map that has ever been constructed. It shows the country between the Atlantic ocean and the Mississippi river and from Chesapeake bay to Quebec. The model of Greater New York is 26 ft. square, and is said to be the second largest relief map ever constructed. All the large buildings, parks and places of interest are shown.

The entire Pennsylvania exhibit is surrounded by signal masts, such as are standard on their lines, and the iron railing is similar to that used around stations, etc. The furniture is of the standard used in the general offices of the company, and it is planned to place everything used in the exhibit, with the exception of the maps and models (which will probably be used for advertising service) in regular railroad service at the close of the exposition.

OVERFAIR RAILWAY SYSTEM

In order to facilitate travel between points within the exposition grounds there has been constructed a railroad known as the "Overfair Railway System," which in itself is a part of the transportation exhibit. This road is of 19 in. gage and is of 20-lb. rail laid on redwood ties in rock ballast. Besides the two terminals there are three intermediate stations on the line which is three miles long, including a one-half mile branch. Fifteen miles per hour will be the average speed over the line, which will be covered in from 10 to 15 minutes.

Trains will consist of an engine and 10 cars. The engine is of the Pacific type, 5.5 ft. tall and 25 ft. long, including tender,

will burn coal and will have cab of such size that the engineer and fireman can remain inside when the train is running. Its weight in running order is 12 tons. The passenger coaches are 42 in. wide and 20 ft. long. They will accommodate 16 persons, and are equipped with Pullman trucks, Westinghouse air brakes and Sharon couplers. During the construction of the road a work train was used consisting of flat and box cars and a switching engine. All the equipment was built at Oakland, Cal., by Louis M. MacDermot, who will be in charge of its operation.

OTHER EXHIBITS

The railways have many other exhibits scattered throughout the grounds, and there are many displays in the other exhibit palaces that will especially interest railroad men. The Santa Fe has a six-acre reproduction of the Grand Canyon of Arizona, and the Union Pacific has a four-acre replica of the Yellowstone Park and a full size reproduction of Old Faithful Inn. The Southern Pacific has its own building inside of the exposition grounds where tickets will be sold, information given and moving pictures of the system shown.

TRAIN ACCIDENTS IN JANUARY[1]

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of January, 1915:

Collisions

Date.	Road.	Place.	Kind of Accident.	Kind of train.	Kil'd.	Inj'd.
*2.	N. Y. C. & St. L.. } Erie ..... }	Blasdell, N. Y.	xc	F. & F.	0	3
30.	Penn.	Sizerville.	xc	F. & F.	1	2

Derailments

Date.	Road.	Place.	Cause of Derailm't.	Kind of train.	Kil'd.	Inj'd.
†3.	St. Louis & S. F....	Olathe, Kan.	malice	F.	4	0
4.	Minn. & St. Louis...	Emmons.	acc. obst.	P.	0	13
12.	Phila., W. & B.....	Perryville.	acc. obst.	P.	1	1
†15.	Wabash	Runnells.	.....	P.	1	13
16.	Atlantic C. L.....	Deland, Fla.	cow	P.	0	1
19.	Seaboard	Osgood, N. C.	malice	P.	1	2
*20.	Southern	Warrenton.	b. rail	P.	0	5
22.	Southern	Claremont.	b. rail	P.	0	7
23.	Erie	Glen Eyrie.	neg.	F.	3	0
25.	Chicago & A.....	Wilmington.	b. rail	P.	0	0
27.	Wabash P. T.....	Bridgeville.	unx	P.	1	1
28.	Chicago, M. & St. P..	Pembine, Wis.	.....	P.	0	5
30.	Chicago, M. & St. P..	Oakwood.	b. wheel	P.	0	6
30.	Atlantic C. L.....	Callahan	unx	P	0	15

The trains in collision at Blasdell, N. Y., on the 2d, were an eastbound freight of the New York, Chicago & St. Louis and an eastbound freight of the Erie. The first mentioned ran past a signal indicating stop, and into the other, at the crossing of the two roads. Seventeen loaded cars were destroyed by fire, which started from an overturned stove in the telegraph office, which was knocked down by one of the derailed cars. Three trainmen were injured, one seriously.

The trains in collision at Sizerville, Pa., on the 30th were a southbound freight and a switching engine. Both engines were badly damaged and 15 cars were thrown off the track. One trainman was killed and two were injured.

The train derailed at Olathe, Kan., on the night of the third was freight No. 135, engine 1292. The engine was overturned and five cars were wrecked. The engineman and a brakeman on the engine, and two men riding in a car as custodians of livestock were killed. The derailment was due to a misplaced facing point switch, evidently turned, maliciously, after the train had passed the last automatic block signal.

The train derailed at Emmons, Minn., on the fourth, was a southbound passenger, and two passenger cars were badly damaged. Nine passengers and four trainmen were injured. The cause of the derailment was a loose switch, the bolts holding the switch rail having been cut off by a brake rod of the baggage car, which became loose and was dragged along the track.

The train derailed at Perryville, Md., on the 12th was northbound passenger No. 64. The locomotive was overturned and the engineman was killed. The fireman jumped off and was injured. The derailment was caused by a car door, lying on the track, which had fallen from a southbound freight.

The train derailed near Runnells, Ia., on the 15th, was a northbound passenger No. 1, and two sleeping cars fell down a bank. One passenger was killed and 13 were injured.

The train derailed at Deland, Fla., on the 16th, was northbound passenger No. 92, and the engine was overturned. The fireman was injured. The train, while running about 35 miles an hour, struck a cow on the track and the body of the animal was thrown against a switch stand in such a way as to allow the engine to split the switch.

The train derailed at Osgood, N. C., on the 19th, was southbound passenger No. 3. The engine was overturned. Three of the 11 cars in the train went off the rails. The engineman was killed and the fireman and one trainman were injured. The derailment occurred at a switch, and it is believed that the rails had been maliciously misplaced or loosened.

The train derailed near Warrenton, Va., on the night of the 20th, was westbound passenger No. 331. The baggage car took fire and was destroyed. Three passengers and two trainmen were slightly injured. The cause of the derailment was a broken rail.

The train derailed near Clarement, N. C.,, on the 22nd, was passenger No. 15, and two passenger cars were ditched. Seven passengers were injured, none seriously. The derailment was due to a broken rail.

The train derailed at Glen Eyrie, Pa., on the 23rd, was a westbound freight, and the locomotive was overturned and fell down a bank to the Lackawaxen river. The engineman, fireman and one brakeman were killed. The train was moving on a passing siding and went over an open derail.

The train derailed near Wilmington, Ill., on the night of the 25th, was westbound passenger No. 5, and three cars were overturned. No injuries reported. The train, running at 45 miles an hour, was thrown off the track by a broken rail.

The train derailed near Bridgeville, Pa., on the 27th, was an eastbound local passenger. The engine was overturned, causing the death of the engineman and slight injury of the fireman. The tender was the first vehicle to leave the rails.

The train derailed near Pembine, Wis., on the 28th, was a southbound express passenger and three sleeping cars fell down a bank.

The train derailed on the Chicago, Milwaukee & St. Paul, near Oakwood, Wis., on the 30th, was a northbound express passenger, and the engine and first three cars were overturned. Six passengers were injured. The cause of the derailment was a broken wheel.

The train derailed at Callahan, Fla., on the 30th, was southbound passenger No. 85. Fifteen passengers were injured, but none very seriously.

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc, butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail——Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

NEW RUSSIAN RAILWAY.—It is reported that the Russian Government has decided to build immediately a railway from Petrosavodsk (north of Petrograd) to the Bay of Sorotsk, on the White Sea. The probable cost is $8,750,000.

THE LONDON "TUBES" AND AIR RAIDS.—Gates are now being placed at the top of the stairways at the various "tube" stations in London supposedly for the purpose of regulating the traffic in the event of an air raid and a sudden rush for safety to the Underground. The employees have already received full instructions as to what they shall do in cases of emergency, and a system of private telephones has been installed communicating with all the departments concerned.

Appraisal of the Pere Marquette Lines in Michigan

Abstract of a Report to the Railroad Commission by M. E. Cooley, Based on a Careful Field Inventory

Prof. M. E. Cooley has recently completed an appraisal of the Pere Marquette lines in Michigan and submitted a report to the Michigan Railroad Commission. The following information is abstracted from the report:

The Pere Marquette embraces properties in Michigan, Ohio, Indiana, Illinois, Wisconsin and Canada, with 2,966.87 track miles in the system. The cost as found, to reproduce these properties as of July 1, 1914, is $96,962,771, and this cost less depreciation, $78,545,241.

In Michigan there are 1,823.88 miles of first main track, 59.87 miles of second main track, and 703.04 miles of side track. Outside of Michigan there are 251.83 miles of first main track, 0.55 miles of second main track, and 127.71 miles of side track. The reproduction cost new of road per mile (first and second main track), including equipment is $45,151 in Michigan, and $55,755 outside of Michigan. These costs less depreciation are $36,422 in Michigan and $46,512 outside of Michigan. For the entire system the cost per mile of road is $45,392, and this cost less depreciation, $36,770.

It will be of interest to compare the results of this appraisal with those obtained in the appraisals of 1900, 1902 and 1905. In the appraisal of 1900 the object was to determine whether it would be advisable to go from a specific to an ad valorem basis of taxation. Prices for materials and labor were taken as an average for 10 years (1890-1900) in order to cover periods of business depression and prosperity. The 1902 appraisal was for the purpose of fixing values as of a particular date, that of the assessment under the ad valorem tax law passed by the legislature of 1901. The 1905 appraisal was to determine the propriety of the values assessed that year by the state board of assessors. The 1900 appraisal was made under the direction of the state tax commission and the 1902 and 1905 appraisals under the direction of the attorney general.

In the earlier appraisals the properties known as the Detroit Union Railroad Depot & Station Company, and the Fort street Union Depot Company were valued separately and not included as Pere Marquette Railroad property. In the 1914 appraisal, 51 per cent of the latter company is included as Pere Marquette property, both real estate and other physical items. The value of tracks and other structures on the land owned by the Detroit Union Railroad Depot & Station Company is also included in the 1914 Pere Marquette appraisal; however, no value is included for the land, as it is all owned by the Detroit Union Railroad Depot & Station Company.

To make the 1914 appraisal comparable with the earlier appraisals the value assigned to each of these companies has been deducted from the total Pere Marquette value in Michigan. Cash and current assets, working capital, and stores and supplies have also been deducted. The comparisons are given in the following table, only Michigan properties being considered.

PERE MARQUETTE APPRAISALS OF DIFFERENT YEARS

Year	Main track miles	Cost of reproduction, new	Per cent condition	Cost of reproduction, less depreciation
1900	1,498.56	$36,543,130	78.70	$28,769,972
1902	1,732.69	43,520,470	79.96	34,798,973
1905	1,859.72	50,871,701*	83.35	42,403,309*
1914	1,883.75	79,851,210	80.58	64,349,449

*Does not include floating equipment, for which in 1902 the cost of reproduction was $1,412,000, and this cost less depreciation, $942,340.

Perhaps the most obvious reason for the marked increase in the 1914 appraisal over former appraisals is the greater care taken in making it. In 1900 the entire appraisal of all the railroads of Michigan, embracing a total of nearly 11,000 miles of track, was practically completed in 120 days. While more time was taken in the 1902 appraisal, the roads were not reinspected, and the appraisal of that date was based primarily on the 1900 appraisal. The same is true of the 1905 appraisal, except that the work was completed in about one month's time.

In the 1914 appraisal of the Pere Marquette system alone, embracing a total of nearly 3,000 miles of track, more than six months have been given to the work, with a force larger even than that used in 1900. Ten parties of three men each were engaged three months on track inspection, and six parties of three men each four months on earth work. Each of these parties was in charge of an experienced railroad engineer, his instructions being to do the work with such care as would enable him to testify in court as to its correctness. The same care has been used in collecting the data on mechanical and marine equipment, and in the land department work.

While there has been some increase in track mileage it alone answers for only a relatively small part of the total increase in value.

MILEAGE IN MICHIGAN

Year	1st Main track	2nd Main track	Side track	Total track
1914	1,823.88	59.87	703.04	2,586.79
1900	1,647.86	2.00	701.47	2,351.33
Increase	176.02	57.87	1.57	235.46

Among the things which have increased the value of the properties are many additions and betterments. Hundreds of old wooden bridges have been replaced by modern steel-concrete bridges; hundreds of miles of main line track have been relaid with 75, 80 and 90-lb. rail, taking the place of 56 and 70-lb. rail used in 1900, 1902 and 1905; automatic block signals have been installed on a part of the system; large additions to facilities for doing business have been built, as well as many hundreds of new buildings, including coaling stations of modern type and the new shops at Wyoming. These improvements represent in the aggregate very large sums.

The mechanical and marine equipments have been largely increased. The locomotives, for instance, while increased only a few in number are much more powerful. Due to their increased tractive power, the 468 locomotives of 1913 are equal to 592 locomotives of the average capacity used in 1905. This is equivalent to an increase of 141 locomotives, or 31.26 per cent. Expressed in dollars the comparison between the locomotives of 1905 and 1914 is as follows:

COMPARISON OF LOCOMOTIVES IN 1914 AND 1905

Year	Cost of reproduction, new	Cost of repro duction, less depreciation	Average cost per 1,000 lb. tractive power: Cost of reproduction, new	Average cost per 1,000 lb. tractive power: Cost of reproduction, less depreciation
1914	$5,440,092	$3,908,815	$440	$315
1905	3,724,782	2,856,703	393	301
Increase	$1,715,310	$1,052,112	$47	$14
Per cent increase	46.05	36.83	11.96	4.65

The investigation of land has been very complete and thorough, as the recent decision of the United States Supreme Court in the Minnesota Rate Cases seemed to make unusual care necessary. Since 1905 the value of Pere Marquette real estate in Michigan has increased nearly $5,000,000.

RIGHT OF WAY VALUES

Year	Cost of reproduction, new	Cost of reproduction, less depreciation
1900	$3,563,521	$3,563,521
1902	4,570,436	4,570,436
1905	4,570,436	4,570,436
1914	9,536,271	9,536,271
Increase since 1905	$4,965,835	$4,965,835

Perhaps the most conspicuous example of difference between the 1914 appraisal and former appraisals in the value of the road

will be found in the grading. As a basis for computing earthwork in 1914 actual measurements were made in the field, while the former appraisals approximate data had to be used. The company had no records of the amount of earth actually moved. The earlier appraisals were therefore based on profile estimates for a part of the lines, and for other parts on field estimates made by an engineer going over the road at the rate of 12 or 15 miles a day, estimating mile by mile without measurement. This year the field parties cross-sectioned all earthwork at frequent intervals. It is interesting to note that on such sections of the road as it was possible to check with the original quantities it was found that the 1914 estimates were within 2 or 3 per cent of the actual quantities paid for.

The grading in the different appraisals for Michigan property only is given in the accompanying table. Since 1905 the value of the grading has increased nearly $6,000,000.

Grading Values—Lines in Michigan

Year	Cost of reproduction, new	Cost of reproduction, less depreciation
1909	$3,537,836	$3,537,836
1902	4,216,612	4,216,612
1905	4,300,944	4,300,944
1914	10,251,354	10,251,354
Increase since 1905	$5,950,410	$5,950,410

Note: Nothing has been added to cover up appreciation, due to solidification and surface improvement.

There are in the main tracks of the Pere Marquette in Michigan today 5,733,600 ties, and in side tracks 1,806,300, or a total of 7,539,900 on all tracks in Michigan. A comparison of their value in the different appraisals is given in the accompanying table. The increase in the cost since 1905 is about $2,500,000, and in cost less depreciation, $1,500,000.

Tie Values

Year	Cost of reproduction, new	Cost of reproduction, less depreciation
1900	$2,492,248	$1,381,331
1902	2,459,722	1,329,436
1905	2,828,680	1,528,851
1914	5,392,598	3,022,979
Increase since 1905	$2,563,918	$1,494,128

During the last 10 years all railroads have been laying heavier rails. This increase has amounted to from 20 to 40 lb. per yard. As the new and heavier rails has been laid on the main lines the rail taken up has been placed on the branch lines and side tracks. This means that a general increase of about 30 per cent in the weight of rail has been made on all classes of tracks. The Pere Marquette has been making such changes until at the present time the main line from Detroit to Chicago, except about 50 miles, is entirely laid with 90-lb. rail where formerly the weight varied from 60 to 70 lb., and the latter rails are now doing service on secondary main lines or on branches. At the present time there are 268,846 tons of rails on the Pere Marquette in Michigan, an increase of approximately 50,000 tons since the 1905 appraisal.

The increase in tonnage of rails, together with the higher prices, represent an increase in cost of approximately $2,000,000 since 1905.

Rail Values

Year	Cost of reproduction, new	Cost of reproduction, less depreciation
1900	$5,831,764	$4,181,001
1902	6,067,464	4,361,823
1905	6,168,588	4,434,520
1914	8,198,132	6,158,913
Increase since 1905	$2,029,544	$1,724,393

Even more conspicuous than the grading schedule is the equipment schedule in which the increase in cost since 1905 is nearly $7,000,000. The locomotives account for nearly $760,000, freight train cars, nearly $3,200,000, passenger train cars $550,000, and floating equipment, $2,380,000. It should be noted, however, that in the 1905 appraisal no schedule of floating equipment appeared. For the different appraisals a comparison of the equipment values is given in the accompanying table.

Summarized these five principal increases since 1905 amount to $22,443,445 in the cost of reproduction and $16,300,780 in this cost less depreciation.

Important items in the 1914 results are the increases in the costs of materials and labor. The general effect of these increases is so well known as to require no particular explanation. Another item is that in the earlier appraisals the cost of transporting construction materials to the places of their use was not included, or at least not in any adequate amount. In the 1914

Equipment Values

Year	Cost of reproduction, new	Cost of reproduction, less depreciation
1900	$7,798,021	$5,166,432
1902	10,681,551	7,394,983
1905	14,147,357	11,308,344
1914	21,081,095	13,474,358
Increase since 1905	$6,933,738	$2,166,014

appraisal, these costs were made the subject of special investigation, and found to be far greater than any allowance made for them in former appraisals. Likewise, as the result of special investigation, it was found that the actual costs of many items as shown on the books of the company included only a part of the expense; for instance, the cost of concrete in bridge abutments was shown at only the contractor's figures, which did not include transportation of materials, sheet piling if required, or unwatering, nor did it include the transportation of men, and many other things which it has been customary for railroads to do in connection with building operations. That is to say, railroads have in the past charged to operation many items which properly were chargeable to construction.

In a number of important railroad appraisals in other states 10 per cent has been added to the grading schedule to cover appreciation due to solidification and improvement of surface due to sinking of ballast. Nothing has been added in this appraisal. If done it would add $1,025,135 to both the cost of reproduction and to this cost less depreciation.

Not all of the properties of the Pere Marquette, however, show marked increases in the 1914 appraisal. Some of the branch lines stand but little above the figures of the earlier appraisals.

In some instances the properties are not being maintained at former values. For example, the docks and wharves in 1905 were appraised at a cost of reproduction of $335,040, this cost less depreciation being $246,336. In the 1914 appraisal the corresponding figures are $219,949 and $148,876 respectively.

In view of the general impression that the Pere Marquette Railroad is in poor condition the following table has been prepared in which the per cent condition is given for a number of the principal physical elements. A comparison is made with the average condition found for the same elements in the 1900 appraisal for the Pere Marquette Railroad system and also for the Michigan railroads in 1900. In general it will be found that they are higher.

Percentage That Present Value Bears to Cost of Reproduction for Characteristic Physical Elements

Account	All Michigan railroads, 1900	Pere Marquette,* 1900	Pere Marquette, 1914
Bridges, trestles and culverts	78.96	77.61	84.75
Ties	55.20	55.42	56.06
Rails	76.18	71.68	75.13
Station and office buildings	75.72	72.35	70.21**
Shops and enginehouses	68.03	65.35	76.53
Steam locomotives	56.44	61.89	72.41
Passenger train cars	71.22	68.72	71.01
Freight train cars	69.37	68.61	60.81

*Obtained by combining the cost of reproduction and the present values, respectively, of the various lines constituting the Pere Marquette System.
**Includes roadway buildings.

Attention should also be called to the so-called overhead charges. In general they are less in the 1914 appraisal than in former appraisals, due primarily to the fact that the greater amount of time available in 1914 made it possible to make more complete inventories, to work up unit costs more carefully, and to make investigations fixing more accurately a number of the individual percentages. In general the overhead charges in the 1914 appraisal aggregate about 15.4 per cent on the entire property, as against 18.4 per cent in former appraisals.

WIRELESS TELEGRAPH ON THE LACKAWANNA*

By L. B. Foley

Superintendent of Telegraph, Delaware, Lackawanna & Western

The Lackawanna first made experiments with wireless in 1909. During the early part of 1913 towers were erected at Scranton and Binghamton. On November 28, 1913, train orders were transmitted between the two points and messages were first transmitted to and from trains and fixed stations at Scranton and Binghamton three days later.

We now have stations equipped with Marconi apparatus as follows:

	Call.	Wave Length Meters.	Height of Tower. Feet.	Capacity of Station. Kilowatts.
Hoboken	WBU	3,000	402	5
Scranton	WPT	3,000	175	2
Binghamton	WBT	1,800	165	2
Buffalo	WBS	1,600	150	2
Limited, Train No. 3	WHT	600		1
Limited, Train No. 6	WBG	600		1

The wireless apparatus on the train is similar to that at the fixed stations. The motor generator, operated on 30 volts direct current from the car-lighting generator, draws about 40 amperes, and provides 500 cycle alternating current at 250 volts for the radio transmitter. The antenna current is about 35 amperes.

We can communicate from a moving train to a fixed station 130 miles away, but are able to receive messages on the train from a fixed station 200 miles distant. The aerial on the train is a phosphor bronze wire arranged in rectangles, one running lengthwise above the roof of each of four cars, with an additional wire lengthwise. These wires are parallel with the top of the car, and 18 in. above it, each rectangle being carried on porcelain insulators at the corners and center of each car, with wire link connections between the cars. The lead is taken from the middle of the antenna through the side of the car near the roof into a compartment two by four feet, which contains the apparatus and the operator.

After the first trip it was found that there was no interference with signals. The speed of the train, or its change of direction, has no effect on the transmission or reception of messages, and communication to and from the train is not retarded while the train is passing through tunnels.

The train radio service has been used for such purposes as reporting the number of passengers on board destined to connecting lines, providing additional cars, or cutting out cars at division points, or ordering an ambulance for persons taken ill on the train. Commercial telegrams are sent for passengers. The wireless telegraph serves as an auxiliary means of communication in the event of interruption to wire facilities, and has already proved its practicability and efficiency under such conditions. The wireless office at each division point is located near the despatcher's office, and in case of total wire failure the wireless is resorted to immediately for communication between the stations named above.

The cost of installation is not prohibitory, considering the advantages to be gained in having a means of communication which can be relied upon when all other sources fail. In 1914 we had a storm in March that completely wrecked pole lines in New York, New Jersey and Pennsylvania, and the only communication we had for 10 days was the wireless. Again, early in December, there was a severe ice storm, and there was absolutely no wire communication in this territory for three days. We had to depend on the wireless, and obtained entirely satisfactory results.

That we are obliged to carry an operator on each train equipped with wireless has led us to take up the wireless telephone. We have obtained some favorable results, having talked from a fixed station to a moving train a distance of 53 miles. The wireless telephone requires 110 volts, and we were obliged to install a 5-h.p. steam turbine in the baggage car, taking steam from the locomotive. In the front end of the car, next to the baggage car, is a small compartment for the apparatus and attendant. The transmitter resembles the quench spark wireless telegraph, and requires no attention after being set to the desired wave length. When adjustments are made to the required degree for receiving in tune with a particular station wave length, no other station can pick up. We have made a number of trips with our installation and have transmitted the voice from trains to fixed stations 15 to 25 miles distant. The wireless telephone is being developed slowly but surely.

Discussion. The paper was discussed by several members. It was the general opinion that the wireless was a useful auxiliary as an insurance against total loss of means of communication when the pole lines were crippled by a severe storm. As such storms occur so seldom, it was doubted, however, whether the use to be obtained from the wireless was sufficient to make the expenditure for it worth while. Several speakers expressed the view that there was little or no advantage in using a wireless telegraph for train despatching except when the wire lines were crippled; and it was conceded that the wireless telephone had not yet reached a practicable stage.

*Abstract of a paper read before the New York Railroad Club on February 19.

THE RUSSIAN BATH TRAINS

Soon after the outbreak of the war the Russian Imperial Ministry of Ways of Communication, formed a committee to superintend the distribution of a fund subscribed by the railway officers and employees for aid to the sick and wounded. The Russian peasant is accustomed to take his vapor bath every Saturday, and the absence of this comfort was keenly felt. One of the achievements of the committee has been to equip a number of bath-trains for the soldiers at the front.

Each of the three trains which have thus far been despatched to Poland is composed of over 20 cars, including four bath cars, subsidiary cars for disinfecting garments and ridding them of vermin, a refreshment car and cars containing supplies of clean linen. In the bathing car it was necessary to provide baths for the greatest possible number at the smallest expenditure of water, for often there is difficulty in getting a supply of water at all. A combined shower-bath and vapor system has been used, the equipment being simple, inexpensive, and economical in time and water, and offering the least danger of infection. The bath car is a large Pullman car divided into two compartments. The larger of these contains 21 shower baths, disposed along the walls, and a number of wooden benches. The smaller compartment forms the vapor bathroom and is provided with three shower baths; fixed to the walls are wide shelves on which the soldiers lie. The car accommodates 24 soldiers at a time and the whole set of four cars a total of 96. The walls are double-panelled and insulated by a layer of felt so that the temperature may be maintained at 69 deg. C. The floor, the ceiling and the upper part of the walls are lined with linoleum, and the lower part of the walls with zinc panels. The water drains off through a sink in the body of the car. The bath cars are connected at one end by means of gangway bellows with two cars where the men undress, and at the other with two others where clean linen and the disinfected overclothes are put on. Each of these cars accommodates 48 men and the walls and flooring are identical with those in the bathing cars.

The cars for disinfecting clothes and getting rid of the vermin form an essential part of the train. Superheated vapor and formalin are used for disinfectants. The disinfection car is divided into three parts, these being, respectively, a room for cast-off clothes, the disinfecting chamber proper and a space where clean clothes are dried. As the car is not sufficiently large to provide for all the bathers, and since the clothes are turned out in a wet condition and require some time to dry, only such clothing as is infected passes through the car, the rest being merely sent to the chamber where the vermin is destroyed.

The next car is a tea room, which is fitted with tables and benches and can accommodate from 80 to 96 men at a time. The dining car is composed of two sections, the first forming the dining room proper for the staff of the train and the second

the kitchen. The officers of the staff are lodged in a special compartment car and the rest of the crew in a third class car.

There are also two more cars; one fitted with closets and chests containing a supply of clean linen and the other carrying the soiled linen, which is deposited at one of the laundries which the committee has established at various places. The train itself and the hot water used in the baths are heated by a superannuated eight-wheel locomotive.

About 2,000 soldiers can be accommodated in the course of one working day of 18 hours. The soldiers are first sent to the undressing rooms where every man gets a ticket and two bags marked with the same number, one for his cast off linen and the other for his outside clothes; these are then carried, respectively, to the disinfection chamber and the soiled linen car. Each man has his hair cut by the barber, after which he proceeds to the bath car, where he is given some soap, a brush and a brass wash basin. When he returns to the dressing car he is supplied with clean linen and given his outside clothes, the latter having been mended if necessary. He is then sent on to the tea room and he is provided with hot tea, sugar, bread and tobacco. The equipment of one of these trains costs about $30,000. The total cost of operating it, including the supplying of the clean linen, is $46,000 a month.

We are indebted to the staff of the Russian Imperial Minister of Ways of Communication for the above information.

AN ENGLISH EXPERIMENT IN RAILROADING

As has several times been noted in these columns, the railways of Great Britain are now under government control and are being operated by a committee of general managers. The government has agreed to pay for the services rendered to it a sum sufficient to make the net revenues practically the same as before the war. The following comments on the way the plan is working out are taken from a letter from a London correspondent of the New York Times' Annalist:

What has been the effect of government control on the earnings of the railways and on the services given to the public? Concerning the former little can be said. The railways have been relieved from the obligation to publish full accounts, which, in view of the arrangement with the government, would be farcical. They have for the same reason ceased to publish the usual weekly returns of approximate gross earnings which formed some guide to the stock exchange of the intrinsic merits of their different stocks. In regard to the services to the public, reliable information is scarce. Freight cars have been rushed from the military bases to the ports, and the process of bringing them back empty has not been too well handled. This, however, may be due to dislocation of the ordinary trade channels, not to mismanagement.

Passenger services, except with the continent, have been maintained fully at the ordinary winter standard, restaurant and sleeping cars running as usual, as well as excursion trains. The only exceptions have been the services to Ireland, which have been reduced owing to the absence of suitable steamships, many of the usual vessels having been taken over as hospital ships or transports. Also certain suburban and underground services have been reduced in London, owing to the earlier hours kept by the inhabitants. On the other hand, some special holiday facilities, which usually end in September, were kept on till November because so many folk had postponed their holidays at the outbreak of war. It is anticipated that this summer the services will be extended as usual.

Efficiency of running trains has on the whole not been so good as in peace time, but it does not appear that this is due to state control. Occasionally, when another 40,000 troops or so, with big guns, ammunition, and impedimenta, go to France, or India, or Egypt, the ordinary traffic on certain sections may be held up. The actual embarkation of troops at Southampton and other ports has been performed with great efficiency. The trains usually come alongside the steamer, discharge their contents, and make room for a successor, in about 12 minutes. This is one of the few departments where the British have little to learn from other peoples; the process is so familiar, owing to the frequent movements of troops overseas in peace time, and the men in charge have three years' experience of the South African war to help them, so that muddle is rare. The melancholy reverse process of bringing back the special hospital trains of wounded is equally well done. There have, however, been rather more accidents than was to be expected since the war began. The cause of this seems to be shortage of labor. There are 600,000 railway men approximately in the country, of whom 70,000 are now with the colors. Enlistment from among them is now being discouraged, but even the places of the 70,000 have proved hard to fill. Thus boys and other untrained persons have often to be employed, with the results that inevitably follow the use of inefficient labor.

Replacement of freight and passenger cars does not appear to be going on as rapidly as usual. Shortage of labor is here the cause again, not economy, for from the shareholder's point of view economy in repairs paid for out of revenue is no advantage, because the government makes up the difference in net receipts, as already described. Moreover, some of the railway manufacturing centers (which are controlled by the railways themselves to a very large extent) have been transformed into armament works.

VACUUM PAINT SPRAYER

The paint sprayer shown in the accompanying illustration is operated by means of a vacuum created in the delivery pipe. The paint is contained in the can under atmospheric pressure, and is drawn up into and through the nozzle by means of air pressure passing over a series of holes in the nozzle. The quantity of paint is regulated by the air valve, as shown in the illustration, and the sprayer itself is controlled by a push valve which controls the flow of air. Air at the ordinary shop pressure may be used to operate this machine, and its construction is of such a simple nature that it may be used by unskilled labor. The only precaution necessary in using this machine is to be sure that it is thoroughly cleaned, after being used, either by turpentine or by benzine, in order that the atomizer may not become clogged with the paint, which would otherwise harden while the machine is idle. The sprayer is sold by the Gustin-Bacon Manufacturing Company, Kansas City, Mo.

Vacuum Paint Sprayer for Railroad Work

General News Department

The seventh annual convention of the American Railway Tool Foremen's Association will be held at the Hotel Sherman, Chicago, Ill., July 19 to 21, inclusive.

In the federal court at Savannah, Ga., February 17, fines for violation of the safety appliance laws were imposed on the Georgia Coast & Piedmont, and on the Savannah & Statesboro railroads.

The Senate Committee on appropriations does not approve the amount named by the House—$3,000,000—in the sundry civil bill for valuation of railroad property, and has changed the amount of $1,900,000.

The New York legislature is likely to repeal the "full-crew" law of that state. The Senate Republican caucus, which is understood to reflect the views of a large majority of the members of both houses has voted in favor of the Spring-Conkling bill, which would repeal the law. In New Jersey a resolution has been introduced to appoint a special committee of nine members to investigate the claims of the railroads in favor of repeal and of the brotherhoods against it.

"Swinging on" freight trains after they have been set in motion is discouraged by the Baltimore & Ohio in a circular recently issued to trainmen. They are urged to get aboard promptly and before starting, in order to minimize the danger of bodily injury as well as to facilitate operation. It is held that boarding trains promptly makes it possible to attain the maximum speed more quickly, while it also obviates the necessity of the engineman dividing his attention.

Under the direction of Surveyor General Frank S. Ingalls twelve more engineering parties have been placed in the field to survey the land grants which are owned by the Atchison, Topeka & Santa Fe in Arizona. These grants aggregate more than three million acres of land in Mojave, Yavapai, Coconino, Navajo and Apache counties. The survey work was started early in January, when twelve engineering parties took the field. This latest addition makes a total of 24 parties that are engaged in the work. It is expected that the surveys will be finished about June 15. The cost will be about $200,000, one-half of which will be borne by the railroad and the other by the government.

The air-brake tests made by the Pennsylvania on the West Jersey & Seashore last year have been made the subject of a pamphlet issued by the road, written in popular style and designed to give the laymen a general idea of the tests and their results. The pamphlet says that the electrically controlled air-brake, which applies on the whole of a long train within two seconds, has been adopted by the Pennsylvania as standard for passenger trains, and the company will equip all new passenger cars with it. Cars now in service will be equipped as rapidly as opportunity and available funds will permit. Most of the tests were made with a train of twelve steel passenger cars; and this train, going at sixty miles an hour, on level track, was stopped within its own length, or in about two-thirds the distance required by ordinary brake control. A single passenger car, without the engine, running at that speed, on level track, was stopped in 725 ft. The twelve car train, with its locomotive, running at eighty miles an hour, was stopped in 2,197 ft. The tests occupied the entire time of 45 men for three months and cost over $50,000. In the electrically controlled brake the emergency and the regular brake features are entirely separated one from the other, so that an emergency applicaton can be made, with full force, at any time.

The Pennsylvania Railroad in the 12 months of 1914 reported as killed 19 people, which are classed in the Interstate Commerce Commission's accident records as passengers, but which the company is anxious to have classified, as they justly should be, as persons who in most or all the cases were killed by their own negligence or want of caution. Six people were killed in falling, jumping or slipping from moving cars or trains; two, in attempting to get on moving trains; two, slipping off station platform in front of trains; two, standing too close to edge of station platform and being struck by trains; one, jumping off ferry boat; one throwing himself between cars of moving train; three, crossing tracks at stations in front of trains; one, struck by coach and thrown under train; one, assaulted by another passenger and thrown from train. Among the 301 trespassers killed on the Pennsylvania in 1914, there were persons from all walks of life; students, lawyers, painters, salesmen, miners, soldiers, stationary engineers, and others. The fruits of the Pennsylvania's aggressive campaign against trespassing during the past eight years are indicated in part by the following:

Year	Number killed	Year	Number killed
1907	572	1911	338
1908	475	1912	255
1909	410	1913	311
1910	336	1914	301

The railroad management proposes to redouble its efforts this year to reduce the practice of trespassing, and to this end it will seek the co-operation of all county, city and borough authorities.

Incendiary Fire

Forty-five freight cars of the Mobile & Ohio at Whistler, Ala., and at Prichard, a suburb of Mobile, were destroyed by fire on the morning of February 17. The fire was apparently of incendiary origin, as every car was found uncoupled so that the switch engines could not move them. While the fire at Whistler was at its height, the one at Prichard broke out. During the fire at the first named place, the hose that the railroad fire department was using was cut in two.

New Haven Officers' Western Observation Trip

A party of officers of the New York, New Haven & Hartford has recently returned from a trip of 3,950 miles over 15 western railroads, made at the direction of President Elliott, for the purpose of seeing what could be learned from the operation of other roads that would be helpful to the New Haven. The party consisted of J. M. Tomlinson, vice-president; David Van Alstyne, assistant to vice-president in charge of operation; C. L. Bardo, general manager; G. W. Wildin, mechanical superintendent; W. J. Backes, engineer, maintenance of way; R. D. Fitzmaurice, superintendent, Providence division; R. A. Weston, general storekeeper, and W. L. Spicer, special accountant.

This was the first trip of its kind ever made by officers of a New England railroad. Particular attention was paid to fuel accounting and fuel efficiency, and to the careful use of material. The trip consumed two weeks. Leaving New York via the Lehigh Valley, the party first went to Buffalo and thence by the Michigan Central to Detroit, where a day was spent in investigating the efficiency in the automobile industry. At Detroit the party also inspected the passenger station of the Michigan Central. In Chicago the party investigated some of the methods of the Illinois Central, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe, the Chicago, Milwaukee & St. Paul, Chicago & North Western and Chicago, Rock Island & Pacific railroads; in St. Paul, the Northern Pacific and Great Northern were studied; in Omaha, the Union Pacific; in St. Louis, the Missouri Pacific, the Wabash and the St. Louis & San Francisco.

The plan followed was first to visit the accounting department and have explained the various reports and statistics sent out to the different operating officers, after which the various department heads visited the respective heads of similar departments of the roads visited to learn the manner in which these reports and statistics are applied to secure great efficiency. Shops, storehouses, fuel depots, stations and yards were inspected personally under the guidance of the officers of the roads. A short time was also spent at Kansas City, where the

new Union passenger station was inspected. Some of the members of the party also visited Springfield, Mo., where the shop methods and the scrap reclamation plant of the St. Louis & San Francisco were studied.

Proposed New Produce Terminals for Chicago

The Produce Terminal Corporation, a subsidiary of the Chicago Junction Railway, has prepared comprehensive plans for a large produce terminal to be located just west of the Union Stock Yards, Chicago, on the property of the Chicago Junction. The tentative plans provide for the handling of all incoming and outgoing fruit and produce, both L. C. L. shipments and carload lots. The main building is to be an eight-story storage plant centrally located, of which the first and second floors, respectively, will be devoted to the handling of outgoing and incoming L. C. L. freight, from which point it is to be distributed to the numerous rows of stores. This central building will have a capacity of 350 cars.

Team tracks are provided for freight in carload lots. These tracks will have a total combined capacity of approximately 500 cars, and are arranged in two separate locations. The proposed general produce freight yards will be located south of the team tracks and buildings and will have a capacity of 10,000 cars. A large dock house for handling water shipments is to be located at the east end of the yard and a central power station at the west end. The administration building is to be near Thirty-ninth street and facing Ashland avenue. According to plans the Chicago Junction, which connects directly with every trunk line entering Chicago, will serve the entire terminal. This arrangement, it is thought, will be much more convenient and economical than the present arrangement on South Water street, where the produce must all enter by two roads, and much of it must also be transported across the river. It is the present congestion on South Water street which has led the commission men to seek a new location.

It is planned that work on this project will be begun about March 15, 1915. The officers of the Produce Terminal Corporation are: President, J. A. Spoor, chairman of the board of the Union Stock Yard & Transit Company, and of the Chicago Junction Railway; vice-president, Arthur G. Leonard, president of the Union Stock Yard & Transit Company; secretary, Anderson Pace, formerly industrial commissioner of the Chicago Association of Commerce; treasurer, Halsey E. Poronto, vice-president, of the Union Stock Yard & Transit Company, and the Chicago Junction Railway. It is estimated that the total ultimate cost of the entire terminal, including land and buildings, will approximate $20,000,000.

The Atchison, Topeka & Santa Fe is also considering plans for a similar terminal to be located between Fourteenth and Twenty-second streets, and west of State street.

Proposed Railway Legislation

Committees of the Utah legislature have held several hearings on a proposed bill to create a public utilities commission for the state.

A bill has been introduced in the legislature of Missouri repealing the present law prescribing a passenger fare of two cents a mile and fixing the maximum at 2½ cents a mile.

A bill has been introduced in the Washington legislature, as a substitute for the train-crew law, to give the state public service commission power to regulate the number of train employees.

Senator Harris of the Illinois legislature has announced that he will introduce a bill providing for a referendum vote on the question of increasing the state passenger fare from 2 to 2½ cents a mile.

The lower House of Congress on Monday of this week refused to take up the bill to require separate accommodations for negroes on cars in the District of Columbia; and this action is understood to have killed the bill for the present session.

The Senate committee of the West Virginia legislature has made unfavorable reports both on the full-crew bill and the railway "experience" bill; but the bill to require high-power headlights was returned to the Senate with a report approving it.

A bill has been introduced in Congress this week to compel railroads to base interstate passenger fares on the rates charged for intrastate passengers; requiring them to make interstate rates not exceeding the combination of intrastate rates over the same route.

A bill before the legislature of Alabama proposes to reduce the rates charged by the railroads for excess baggage, the present rate of one-sixth the passenger fare being reduced to one-eighth the fare. There is a clause also requiring baggage to be stored free, at destination, for 48 hours.

The Michigan legislature has adopted resolutions calling on the state railroad commission to express to the legislature its views in the matter of proposed increases in passenger fares, and to inform the legislature as to the correctness of certain statistics placed before it by the railroads.

The bill before the legislature of South Carolina designed to limit the length of freight trains to fifty cars, which was noticed in the *Railway Age Gazette*, February 12 page 268, was killed in the Senate last week, following a discussion lasting several hours, by a vote of 24 to 15. The Merchants' Exchange of Charleston had presented a strong protest against the bill.

In West Virginia a newspaper published in the interest of colored citizens in the Norfolk & Western coal field, has protested against two bills now before the legislature, a "full-crew" bill, and a so-called "experience" bill; claiming that the enactment of such laws will lead to the displacement of porters on trains and be followed by reductions of wages of negro employees.

Operating officers of the railroads in Indiana appeared before a committee of the Indiana legislature last week at a hearing on the bill to prohibit the running of freight trains more than half a mile in length. They stated that if the bill became a law the railroad companies would be forced to spend millions of dollars in Indiana to provide for new locomotives and additional facilities.

The lower House of the Kansas legislature has passed a bill to authorize the Colorado, Kansas & Oklahoma Railroad, a 50-mile line running between Scott City and Winona, Kan., to charge passengers five cents a mile. The bill aroused a lively controversy in the House; but western Kansas representatives asserted that the railroad would have to go out of business if not allowed an increase in rates.

A bill in the Texas legislature, introduced by Senator Dawin, provides for placing all interurban railways under the regulative authority of the State Railroad Commission. Substantially all companies of this character in the state have appeared before the Senate committee and offered strong opposition to the proposed law, and the committee made an adverse report. There is, however, a minority who will bring the measure before the full Senate.

The legislature of North Carolina has before it a bill to require all railroad employees to pass an examination on signals, and other matters connected with their duties, a catechism of 223 questions. Hearings have been held by a joint committee of the Senate and the House. It is said that the purpose of the bill is to make it possible to tie the hands of the railroad companies in case of a strike of trainmen. Not only the railroad companies but some railroad employees have appeared in opposition to the bill.

The first railroad bill to be put to a vote in the house of the Missouri legislature is a bill to require railroads to construct car sheds at their various terminals. This bill escaped defeat on February 20, it is reported, only by a vote to lay the bill on the informal calendar. Immediately afterward the house refused to take up a headlight bill as a special order.

The Oregon legislature has under consideration a bill to change the manner of electing members of the State Railroad Commission. The members are now chosen from the state at large, but by the proposed law would be selected from different congressional districts. The bill has already passed the lower House. The present commission has the reputation of having been free from sectional prejudices or leanings, and its rulings have never been disapproved by the courts. Candidates from the eastern part of the state—the part which appears to feel that it has been neglected—are already appearing.

Three bills presented in the legislature of Connecticut call for a reduction in the price of mileage tickets from 2¼ cents a mile

to 2 cents; a reduction in the rates for all single tickets to two cents a mile and the reduction of all rates to 1½ cents a mile for passengers who have no baggage. The recent advance in rates for both tickets and mileage books made necessary, as everybody knows, by the increase in the cost of transportation, appears to have had no effect toward dampening the ardor of the legislator who introduced these bills; and the railroad company had to go through the usual process of appearing before the legislative committee and presenting the reasons why the proposed laws should not be enacted.

The Morris canal, extending from Jersey City, N. J., to Phillipsburg, 102 miles, and controlled by the Lehigh Valley Railroad, is the subject of a special message which has been sent to the legislature by the governor of New Jersey. This canal is no longer profitable and the railroad company for several years has been negotiating with the state, looking to the adoption of a plan for its abandonment. The governor suggests that the property be turned over to a state department and that the state develop it. The water rights should be retained by the state and all other property sold or leased. The income should be paid to the Lehigh Valley until 1974, after which date the property would belong absolutely to the state. The governor disapproves all of the bills on this subject which have been presented in the legislature. He would require the railroad company to pay the state $500,000 a year for being relieved of the maintenance of the canal.

TEXAS

That the days of railroad "baiting" in Texas are not ended is shown by the unusually large number of bills affecting the railroad interests of the state which are now before the legislature. Most of the pending bills have originated with the labor organizations and have strong political support.

One bill provides that all employees shall be paid semi-monthly and there are prospects that it will be passed, as it has been favorably recommended by committees in both the Senate and House. This measure if it becomes a law will add about $250,000 annually to the expenses of the railroads.

Another bill which would impose enormous expenditures if it should be passed is that which provides that an enclosed workbuilding shall be erected at all stations where four or more men are employed.

A bill before the Senate provides that employees shall have the privilege of selecting their own bondsmen instead of being bonded by the surety companies. Under the present method the employees pay nothing for making their bonds, this expense being borne by the railroads. The measure is being fought by the railroads because it would tend to confusion.

The bill which was introduced in the House providing for a reduction of the passenger rate from three cents to two cents a mile seems to be meeting with little favor and its passage is considered to be unlikely. It is opposed by the railroads, and also by their employees.

The House has acted favorably on a bill which provides that all railroad hospitals in the state shall be placed under the joint management of the railroads and their employees. At present the railroads have full control of these institutions. The railroads oppose the measure because they claim the efficiency of the hospitals will be lowered if any change is made, and also that the bill would give the right to so-called "damage suit" lawyers to enter the hospitals and solicit suits from injured employees.

The passenger departments of the railroads are fighting the bill which is pending in the House that provides for the redemption by railroads of unused tickets at the destination point. This and other provisions of the bill are said to practically legalize ticket scalping.

The "full-crew" bill which was reported adversely by the House and Senate committees will be taken up on the floor by means of a favorable minority report. It is thought that it has little show of being passed.

Senator Hall has introduced a bill requiring all handcars to be equipped with gasolene or electric motors. The House has passed a bill placing all spur tracks (private sidings) under the jurisdiction of the railroad commission.

Senator Cowell proposes to prohibit a railroad from removing its general offices or shops from one point to another without first obtaining permission of the railroad commission. A bill prohibiting the blocking of crossings by railroad trains in cities and towns has been introduced in the House. A bill by Representative Lewelling, makes it unlawful for a railroad to discharge or coerce an employee belonging or seeking to belong to any labor organization. An anti-blacklisting bill has been introduced in the Senate by Mr. Lattimore and is being opposed by the railroads.

The Senate has before it a bill which gives the railroad commission authority to require railroads to make repairs to their tracks and other property as in the judgment of the commission may be deemed necessary. Another bill requires section foremen to make sworn statements of all domestic animals killed or injured by trains.

Mr. Nichols has introduced a bill to punish the railroads for permitting Bermuda grass to grow on their land and allowing it to spread to other property. Senator McNealus is author of a bill which requires engineers and others operating steam engines and boilers to procure a license. Mr. McFarland has introduced a bill in the House making it a felony for a railroad employee to make false or fraudulent entries of the cost of car repairs and other transactions. A bill is pending in the Senate which makes it unlawful for steam to escape from a locomotive to an extent that would obscure the vision of employees working about it. Senator Townsend is author of a bill which seeks to regulate the salaries of railroad presidents and other higher officers.

The Senate committee has reported favorably the Westbrook bill, which requires all railroads to give certain classes of their employees four days' rest each month. These classes include station agents, tower men and clerks; and all telegraphers who do not now come under the provisions of the eight-hour law. It affects approximately 24,000 persons.

Railway Telegraph Superintendents

The regular meeting of the western division of the Association of Railway Telegraph Superintendents will be held in the La Salle hotel, Chicago, Ill., on March 17 and 18. The business sessions will be arranged to allow the members plenty of time during the afternoons to visit the annual exhibition of the National Railway Appliance Association, which is to be held in the Coliseum, in Chicago, March 15-19. The following papers will be read before the meeting: "Pole and Wire Maintenance," by E. H. Ward of the Western Union Telegraph Company; "Modern Testing Facilities and Their Relation to Railway Wire Plant Efficiency," by W. Rogers, telegraph engineer of the Missouri Pacific, and "Shall Inside Maintenance be Handled by Linemen or Special Equipment Men?" by L. M. Jones, superintendent of telegraph of the Atchison, Topeka & Santa Fe.

Air Brake Association

The twenty-second annual convention of the Air Brake Association will be held at the Hotel Sherman, Chicago, Ill., Tuesday, May 4, 1915. Committees will report on the Accumulation of Moisture and its Elimination from Trains and Yard Testing Plants, Adequate Hand Brakes on Heavy Passenger Equipment Cars, Need of Efficient Cleaning and Repairing of Freight Brakes, What Shall We Do to Improve the Present Pneumatic Signal Device, Difficulties the Railroad Companies Encounter in Endeavoring to Run 100 Per Cent Operative Brakes in Freight Service, and M. C. B. Air Brake Hose Specifications.

National Railway Appliances Association

It is announced that 138 railway supply firms have taken space in the Coliseum for the exhibit of the National Railway Appliances Association, to be held in Chicago, March 15 to 19, in connection with the meeting of the Railway Signal Association and the Convention of the American Railway Engineering Association. This number compares very favorably with that of last year and indicates that the exhibit will be most successful.

Railway Club of Pittsburgh

At the regular monthly meeting of the Railway Club of Pittsburgh, to be held at the Monongahela House, on Friday, February 26, a paper will be presented by Prof. Louis E. Endsley of the University of Pittsburgh, entitled "Some Experiments to Determine Forces on a Truck Side Frame, and Stresses Produced by These Forces."

American Society for Testing Materials

The eighteenth annual meeting of the American Society for Testing Materials will be held at the Hotel Traymore, Atlantic City, N. J., June 22, 23, 24, 25 and 26.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, 1915, Jefferson Hotel, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preced.... 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings. 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

Six Months of Fiscal Year Ending June 30, 1915—Continued

Name of road.	Average mileage operated during period.	Operating revenues—Freight.	Operating revenues—Passenger.	Operating revenues—Total, inc. misc.	Operating expenses—Maintenance—Way and structures.	Operating expenses—Maintenance—Of equipment.	Operating expenses—Traffic.	Operating expenses—Transportation.	Operating expenses—Miscellaneous.	Operating expenses—General.	Operating expenses—Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Oahu Ry. & Land Co.	109	$476,871	$137,005	$652,998	$65,574	$54,458	$3,894	$130,041	....	$27,103	$281,071	$371,926	$43,217	$328,709	$13,115
Panhandle & Santa Fe	668	1,574,464	348,001	2,018,583	358,248	386,065	22,489	630,956	....	51,866	1,449,624	568,959	52,795	515,805	311,523
Pere Marquette	2,319	6,332,065	2,242,496	9,350,708	850,317	1,786,798	192,828	3,519,144	$30,465	270,951	6,647,615	2,703,093	318,025	2,384,308	1,500,086
Philadelphia & Reading	1,120	19,154,024	3,499,306	23,783,287	2,315,033	4,327,480	267,952	8,400,360	76,271	413,421	15,798,368	7,984,919	601,218	7,380,673	—1,211,916
Pittsburgh & Lake Erie	224	6,396,763	887,466	7,601,788	1,047,684	1,659,888	89,022	2,042,580	20,667	165,903	5,025,745	2,576,044	310,596	2,265,323	—1,414,761
Pittsburgh, Shawmut & Northern	294	882,366	67,814	963,030	208,792	264,777	9,195	313,157	....	24,751	820,673	142,356	9,813	132,544	20,893
Port Reading	21	622,002	....	754,271	94,996	52,562	233	247,162	....	2,203	397,154	357,117	72,000	285,117	—15,825
Rutland	468	1,000,185	618,917	1,846,045	230,529	308,920	49,277	712,930	7,573	35,786	1,345,016	501,029	102,851	398,178	—90,604
St. Louis, Iron Mountain & Southern	3,365	11,755,712	2,856,920	15,809,345	2,280,930	2,782,209	340,865	4,980,618	52,282	364,405	10,801,309	5,008,036	678,192	4,323,867	—1,304,355
St. Louis Merchants' Bridge Terminal	9	....	1,117	934,534	126,138	39,209	4,602	468,642	....	40,630	679,222	255,313	43,949	211,359	96,523
St. Louis, San Francisco & Texas	235	452,197	172,883	665,894	155,489	103,748	13,835	288,715	....	28,326	590,112	75,782	7,649	68,112	—152,498
St. Louis Southwestern	943	2,804,656	659,790	3,678,256	464,418	638,414	155,436	1,019,230	20,387	158,873	2,455,541	1,222,714	185,764	1,036,580	—573,204
St. Louis Southwestern of Texas	811	1,271,137	528,756	1,955,360	465,378	497,830	73,589	903,505	5,570	106,279	2,029,396	—74,036	87,098	—161,773	—246,867
San Antonio & Aransas Pass	724	1,421,284	609,534	2,164,862	387,430	393,926	40,088	1,001,461	....	68,994	1,891,898	272,964	72,002	200,754	—422,070
San Pedro, Los Angeles & Salt Lake	1,132	2,977,164	1,268,921	4,673,088	504,141	733,798	192,679	1,520,894	79,349	108,723	3,139,584	1,533,504	246,356	1,286,646	—154,225
Southern	7,036	20,813,067	9,057,231	32,765,576	4,462,787	5,830,087	1,135,812	11,934,030	208,795	1,034,800	24,538,336	8,227,240	1,275,094	6,943,781	—3,165,225
Southern in Mississippi	281	335,343	183,731	567,696	133,745	54,637	14,250	249,186	....	22,248	474,066	93,630	50,907	42,645	—63,501
Spokane International	163	304,392	96,497	421,892	72,836	29,596	13,494	133,543	....	21,481	270,950	150,942	28,476	122,427	110,474
Tennessee Central	294	507,080	210,677	766,732	179,684	104,249	33,349	300,936	....	40,546	658,673	108,060	26,846	81,113	—130,889
Terminal R. R. Ass'n of St. Louis	35	....	1,093	1,384,881	117,387	69,395	5,434	477,036	....	31,789	701,043	683,838	171,141	512,697	191,021
Texas & New Orleans	469	1,261,728	563,405	2,022,124	343,201	482,605	46,718	836,098	66,467	63,540	1,837,877	184,247	95,714	87,175	—116,685
Texas & Pacific	1,887	6,495,338	2,307,293	9,534,563	971,893	1,480,763	224,336	3,877,763	89,971	233,295	6,873,033	2,661,530	421,336	2,238,085	—271,674
Toledo & Ohio Central	446	2,363,692	334,252	2,874,676	406,221	492,603	48,740	1,026,575	10,633	59,544	2,044,316	830,360	137,205	691,403	130,211
Toledo, Peoria & Western	248	353,187	240,872	633,716	97,329	162,003	15,061	268,526	....	21,505	564,426	69,290	36,600	32,690	21,388
Toledo, St. Louis & Western	451	1,947,371	182,040	2,291,970	292,433	360,590	97,734	882,052	....	52,215	1,685,023	606,947	155,388	451,559	—292,940
Trinity & Brazos Valley	315	424,594	119,118	587,116	119,085	62,669	19,706	279,096	....	49,142	529,698	57,418	25,530	31,721	—8,258
Ulster & Delaware	129	287,602	222,387	598,499	92,712	93,105	9,651	266,461	330	24,112	486,371	112,128	19,800	91,547	—53,325
Vicksburg, Shreveport & Pacific	171	409,095	258,396	746,213	127,357	166,888	21,279	283,066	14,643	30,218	643,451	102,762	43,007	59,754	—140,876
Virginia & Southwestern	240	856,654	90,029	875,296	144,134	223,101	14,965	281,969	....	23,646	687,815	287,480	38,333	249,148	—28,326
Wabash	2,519	10,478,498	3,449,960	15,273,342	1,772,001	2,710,118	511,243	6,002,223	91,825	370,551	11,440,920	3,832,422	487,862	3,343,320	—190,669
Western Pacific	943	2,274,652	631,863	3,087,222	690,961	389,135	154,913	997,958	69,496	128,099	2,430,562	656,661	173,981	481,619	—220,793
Spokane, Portland & Seattle	556	1,491,969	813,863	2,532,210	286,137	213,818	47,208	550,760	21,251	80,645	1,199,747	1,332,464	320,400	1,011,716	—36,937

Traffic News

Tolls received by the government for the passage of vessels through the Panama canal for the six months ended February 12, amounted to over $2,000,000.

The railroads west of Chicago have filed tariffs with the Interstate Commerce Commission providing for the issuance of 2,000-mile mileage books, good only for interstate travel, at the rate of 2¼ cents a mile, effective on March 1.

The Chicago & Eastern Illinois has again been awarded the contract for carrying the United States mail between Chicago and St. Louis. To retain the mail the road has promised to reduce the time of its fast mail train from 7 to 6½ hours.

On April 12 a new passenger train from St. Louis to San Francisco will be put on by the Missouri Pacific, the Denver & Rio Grande and the Western Pacific. The train will leave St. Louis at 2 p. m., and arrive at San Francisco at 5:45 p. m., the third day.

Resolutions favorable to the request of the railroads for an increase in the state passenger fare from 2 to 2½ cents a mile have been adopted by 62 commercial and civic associations in Indiana, which were visited by a committee of passenger officers of the roads in the state.

The New York City Association of Passenger and Ticket Agents held its annual dinner at the Hotel Astor, Saturday evening, February 20, about 400 persons being present. The speakers were D. M. Wootton, president of the association; J. F. Dillon, and Dr. Frank Crane.

Twenty-eight new stations with freight facilities have been established recently by the Baltimore & Ohio, according to a circular issued by the traffic department. The new stations are on the eastern lines of the system, embracing the Baltimore & Ohio, the Little Kanawha and the Valley Railroad of Virginia.

The quarantine at Pittsburgh against foot-and-mouth disease was lifted at the beginning of this week. New quarantines continue to be reported from various localities, Erie county, N. Y., being one of the latest. The state of Vermont has prohibited the transportation of live stock into that state from Massachusetts.

The Chicago & North Western, the Chicago, Milwaukee & St. Paul and the Minneapolis, St. Paul & Sault Ste. Marie have filed a petition with the Wisconsin legislature submitting a bill to increase passenger fares in the state from 2 to 2½ cents a mile, and asking the legislature to make a full and complete investigation into the existing rates.

The Atchison, Topeka & Santa Fe on Monday, March 1, the date on which the reduced fares to San Francisco, on account of the Panama-Pacific Exposition go into effect, will run its California Limited train in eight sections; on Tuesday the train will be run in five sections, on Wednesday in three sections, on Thursday in three sections, with an additional Raymond & Whitcomb special train; on Friday in two sections, and on Saturday in three sections. These trains will each be made up of four to six sleepers, one combination car and one observation car.

The Canadian Freight Association, acting on behalf of all of the Canadian railways, has filed with the Board of Railway Commissioners for Canada application for permission to make a general increase of freight rates. It is proposed to advance the first class rates by two cents per hundred pounds, and fifth class rates one cent, in addition to a number of increases in commodity rates, including an advance of 10 cents a ton on coal and coke, 5 cents a ton on sand, gravel and crushed stone, and 5 to 30 cents a ton on pig iron, wire rods, rails and iron ore concentrates; also increases of varying amounts on cord wood, paving blocks, stone, iron and steel, lumber and forest products, petroleum and grain products. An increase of from 1 to 2 cents per 100 lb. on livestock is also proposed.

With the addition of a new passenger train on February 7, the Atchison, Topeka & Santa Fe now has five trains daily from Chicago to California. The new train, called the "Missionary," leaves Chicago at 10:30 p. m., reaches Kansas City at 10:45 a. m., and Los Angeles at 7:50 p. m., the third day. This train will be but 50 minutes slower than the "California Limited," and it runs via Newton, Amarillo and Belen. Through standard sleeping cars have also been put on between New Orleans and San Francisco on a new train known as the "California Special," leaving New Orleans in the evening and arriving at Los Angeles at 7:50 p. m. on the third day. Travel over the Sante Fe to California recently has been very heavy. The "Santa Fe De Luxe," the extra-fare train to southern California, has been running to full capacity, and the "California Limited" has been run in as many as six sections.

In response to a resolution adopted by the Missouri legislature the Missouri Public Service Commission, which was called upon to furnish information as to whether the present freight and passenger rates in the state are, in its opinion, sufficient to yield a reasonable compensation for the service rendered, has filed with the Senate a report of the progress made in the hearings which the commission has already held on the application for increases filed by the railroads. The commission says in its report that while the testimony and exhibits thus far offered in evidence by the carriers make a prima facia showing that the new rates are insufficient to yield a reasonable compensation for the service rendered, the commission does not feel justified in attempting to pre-judge what will be the effect of the testimony hereafter to be offered by the interveners in the cases, and what will be its final conclusions on the whole testimony introduced.

Iowa Campaign for Increased Passenger Fares

As briefly noted in last week's issue, a committee of executive officers of the Iowa railroads held a conference at Des Moines, on February 16, with Governor Clarke, the lieutenant-governor, the speaker of the House and members of the state railroad commission, to ask the state officers to support the petition of the railroads for an increase in passenger fares in the state from 2 to 2½ cents a mile. President S. M. Felton, of the Chicago Great Western, made an address on behalf of the railroad men, in which he said that there are only 13 states in the union that have in effect the maximum rate of 2 cents a mile for passenger service, and that the population per mile of railroad, in those 13 states, averages 472, while in eight eastern states, with an average maximum fare of 2½ cents a mile, the population per mile of railroad is 1,036; and that in 27 other states, with rates ranging from 2½ cents to 6 cents a mile, the average population per mile is 280, while the population per mile of railroad in Iowa is 224, which is less than the average of the 13 two-cent states.

Mr. Felton showed that under the two-cent fare law the gross earnings of the railroads in the state had increased 22.2 per cent; while expenses had increased 31 per cent, and the increase in miles of railroad built has been only 1.5 per cent; while the increase in the corresponding period of years before the passage of the two-cent fare law had been 10.9 per cent.

Governor Clarke made a brief reply saying that he was sure the people of Iowa wished to be perfectly fair and just with the railroads, and that he felt confident that they would not be willing that the railroads should render their great service to the country without a compensation that would return a just and reasonable profit. "The people have always shown a willingness to do exactly the right thing," he said, "and all they ask is a fair, open and frank statement of all the facts and when they are sure that they have them and they are understood I feel certain that the right and honest thing will be done." At the conclusion of this conference the railroad men appeared before a joint session of the senate and house committees on railroads of the Iowa legislature, and made a similar presentation of their case.

New Manchurian Railway.—An agreement has been made by the Bensichu Coal Mines Company and the Southern Manchurian Railway for the construction of a railway from the mines to Tzentchan. The authorization of the Chinese government has already been obtained. At present there is only a 9-mile narrow-gage line at Bensichu, simply for the use of the mines: it ends at Nyusindaya, where there are also coal mines. The new line will serve a rich mining district throughout its whole length. It will be about 50 miles long. If it is found that the narrow-gage line referred to is worth it, it will be widened to normal gage.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The Texas Railroad Commission has filed a formal complaint with the Interstate Commerce Commission, charging that Galveston is being discriminated against as compared with New Orleans, because of the demurrage charges and regulations applying at Galveston.

Hearings were begun on February 16 before Commissioner Meyer on the petition under the Panama Canal Act of the Central of Georgia and the Atlantic Coast Line to continue control of the Ocean Steamship Company and the Peninsula & Occidental Steamship Company, respectively.

The Chambers of Commerce of Cleveland, Toledo, Springfield, Canton, Columbus and Dayton, Ohio, and Detroit, Mich., have filed a joint complaint with the Interstate Commerce Commission, alleging discrimination in the rates from those cities to the southeastern Mississippi valley in comparison with the rates from Chicago, Milwaukee, Peoria and Davenport to the same territory.

Clifford Thorne, chairman of the Iowa Railroad Commission, has filed a protest with the Interstate Commerce Commission on behalf of nine western states, including Iowa, Nebraska, North Dakota, South Dakota, Colorado, Oklahoma, Arizona, Minnesota and Arkansas, asking the commission to suspend, pending investigation, the tariffs filed by the railroads increasing interstate passenger fares in the west from 2 to 2½ cents a mile, to take effect on March 1.

Rates on Wool to Provo, Utah

Knight Woolen Mills v. Chicago & North Western et al. Opinion by Commissioner Hall:

The commission finds that the rates on scoured wool, compressed in bales, from Chicago to Provo, Utah, and other Utah common points should not exceed $2.25 per 100 lb. in carloads, minimum weight 13,500 lb., subject to rule 6-B of the western classification; and $3 per 100 lb. in less than carloads. Reparation awarded. (32 I. C. C., 490.)

Rates on Packing House Products to Points in Utah

Cudahy Packing Company v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Meyer:

The commission finds that the commodity rates on packing house products shipped in mixed carloads with fresh meat from Wichita and Kansas City, Kan.; South Omaha, Neb., and South St. Joseph, Mo., to Utah common points are unreasonable to the extent that they exceed the fifth-class rate. The case is held open for the determination of the amount of reparation. (32 I. C. C., 560.)

Rates on Clay from Points in Georgia to Eastern Points

Opinion by Commissioner Clements:

The commission finds that the carriers have not justified proposed increased rates on clay, crude or ground, in bags, barrels or casks, carload minimum weight 50,000 lb., from producing sections in Georgia and South Carolina to New York, Boston and interior eastern points via rail-and-water routes through Savannah, Ga., and Charleston, S. C. The increased rates were uniformly 28 cents per gross ton higher than the rates which are to remain in effect. (32 I. C. C., 564.)

Rates on Cotton Linters

Salt Lake Mattress & Manufacturing Company et al. v. Atchison, Topeka & Santa Fe, et al. Opinion by Commissioner Meyer:

The commission finds that the present rates on cotton linters from producing points in Texas, Oklahoma, Louisiana and Arkansas, and from Memphis, Tenn., to Salt Lake City and Ogden, Utah, and points taking the same rates are discriminatory against Salt Lake City and Ogden as compared to Denver, Colo., and points taking the same rates and to the California and the North Pacific coast terminals. It is held that the rates to Salt Lake City should not exceed the rates to Denver from points of origin in Texas by more than 49 cents per 100 lb., one cent more than the maximum differential between the fifth-class rates to Denver and Salt Lake City respectively from Chicago. (32 I. C. C., 417.)

Rates On Live Stock In Double Deck Cars

American Live Stock Association et al. v. Southern Pacific. Opinion by Commissioner Daniels:

Upon a supplemental hearing the commission affirms its decision in 26 I. C. C., 37, that rates on sheep or goats in double-deck cars from points in Arizona to points in California should be the same as the rates on fat cattle. The original decision prescribed a schedule of maximum distance rates for the transportation of live stock from points in Arizona to Los Angeles and other points in California, and is now supplemented by the addition of a schedule of maximum additional charges for branch line hauls and for hauls over two or more lines. The defendants are also required to provide in their tariffs that when a double-deck car is ordered, and two single-deck cars are furnished instead, the charges shall be at the rate for a double-deck car of the size ordered, provided the shipment could have been loaded in a double-deck car. (32 I. C. C., 515.)

Rates on Cement and Other Commodities from St. Paul and Other Points to Montana

In re rates on cement, lime, salt and other commodities from St. Paul, Duluth and other points to stations in Montana. Opinion by Commissioner McChord:

The commission finds that the Northern Pacific and the Chicago, Milwaukee & St. Paul are justified in cancelling a commodity rate of 35 cents per 100 lb. on mixed carloads of lime, cement, stucco, plaster, roofing pitch and salt from St. Paul, Minneapolis, Minnesota Transfer, Duluth and West Duluth, Minn., and Superior, Wis., to a group of Northern Pacific stations in Montana commencing at the North Dakota-Montana line and extending to Custer, Mont., and to a group of stations on the Chicago, Milwaukee & St. Paul from Buffalo Springs, N. D., to and including Musselshell, Mont. It is found that small shipments of some of these commodities are included in the car in order to get the carload rate; and no satisfactory reason is given for the continuance of a rate which is applicable alone from St. Paul and points at the head of the lakes to selected groups of stations. (32 I. C. C., 532.)

Kansas City Stock Yards Tariff Rejected

Atchison, Topeka & Santa Fe et al. v. Kansas City Stock Yards Company. Opinion by Commissioner Meyer:

The defendant, doing a general stock yard business in Kansas City, filed a tariff effective April 8, 1914, imposing a trackage charge of 75 cents per car for the use of the stub tracks leading to some of the unloading docks in its yards by complainants and a switching charge of $2 per car for the movement of complainants' cars over these tracks by defendant. Prior to the effective date of this tariff defendant's charge was 50 cents for loading or unloading over its docks. The defendant, however, performed no switching and accorded the use of its stub tracks to the trunk lines gratuitously. The trunk lines absorbed the loading and unloading charge. Since April 8, 1914, defendant has exacted the trackage charge of 75 cents.

The commission finds that this proposed tariff should be struck from its files.

It is held that the movement over defendant's rails leading to its docks is a transportation service and that compensation by complainants to defendant for the use of its tracks and yards or for switching complainants' cars is not unlawful. It is held, on the other hand, that the defendant is not a common carrier and is therefore not entitled to exact compensation through a published tariff.

The Kansas City Stock Yards are not a plant facility, since they transport for shippers and for all shippers offering stock or directing its delivery at that point. The finding is made, however, on the ground that there is not a bona fide holding out coupled with the ability to carry for hire. The defendant at the present time owns no cars or locomotives, and it proposes to use locomotives obtained by an arrangement with the Chicago, Rock Island & Pacific. It did not expect the complainants to avail

themselves of the service offered, but expected that the complainants would continue to handle their cars to and from defendant's yards for themselves with their own motive power. It appears that defendant's real purpose is to secure compensation for the use of its tracks by complainants, and that the defendant holds itself out to transport complainants' cars solely in order to impose a trackage charge through a published tariff. The commission does not attempt to decide whether complainants may avoid defendant's trackage and switching charges by refusing to accept or deliver livestock at defendant's yards or whether they may add defendant s charges to their present live stock rates to and from Kansas City. (33 I. C. C., 92.)

Southwestern Yellow Pine Blanket Rates Upheld

Wisconsin & Arkansas Lumber Company et al. v. St. Louis, Iron Mountain & Southern et al: Opinion by Commissioner Daniels:

The southwestern yellow pine area is bounded on the north by the Arkansas river, on the east by the Mississippi, on the south by the Gulf of Mexico and on the west by a line through Kansas City and Houston. This area, approximately 400 miles long and 300 miles wide, is practically coterminous with the district in which, west of the Mississippi, the yellow pine, both long leaf and short leaf, originates. The rates on yellow pine from this area are blanketed, the rates to the gateways being as follows: to Thebes and Cairo, 16 cents; to Memphis, 14 cents; to St. Louis, 19 cents, and to Kansas City, 24 cents. These are proportional rates, although in some instances they are also quoted as local rates. The complainants seek a reduction of four cents in the rates to all gateways except Kansas City, and a reduction of six cents in the rate to that point. They also desire that the blanket area be divided along the thirty-third parallel, the common boundary of Louisiana and Arkansas, so that there will thereby be a differential advantage to the mills in the region north of that line over mills to the south.

The commission finds that the blanket rates should not be changed. There is perhaps greater warrant for the group or blanket system of rate making when applied to an area containing natural resources than in any other case. When materials are found only in delimited areas and consumed throughout widely extended markets, in which case there is no possibility of shifting the sources of supply, there is much to be said for blanket rates. Such an arrangement tempers to the common benefit of consumers generally the fortuitous advantage conferred by nature upon the localities in which such natural resources are found. The size of the present blanket may fairly raise a question as to the propriety of its permanent maintenance, but until it can be shown that the size of the area bearing common rates works injustice there is sufficient ground for maintaining it intact. It is true that Kensett, immediately north of the Arkansas river, enjoys a rate to Kansas City which contrasts sharply with the rate from Little Rock to the same point, but wherever a blanket boundary is drawn a disparity between the rates per mile and between the last station within the blanket and the first outside is sure to appear. The complainant at Little Rock should perhaps rather direct its attack against this discrimination. It is found that the average ton-mile earnings in this territory are reasonable as compared with similar rates on like traffic in other districts. It is believed also that the proposed remedy of dividing the blanket into two parts would be no fairer than the present arrangement, because by some of the lines the distances in some cases from points in the northern blanket would be greater than points in the southern blanket. The great number of east and west lines south of the proposed boundary makes it probable that were the rates reduced in the northern half of the blanket these lines would accord a similar abatement in rates and thus bring about a new equality in rates between both parts of the blanket.

A dissenting opinion by Commissioner Harlan draws attention to some of the injustices that result from a blanket rate, and especially one of such size as this. It is the commissioner's opinion that the rates would be more equitable if they were put upon a mileage basis. He also draws attention to certain exceptions in the blanket rates and to the fact that the southern mills in the district are accorded mileage rates to the gulf ports on export traffic. (33 I. C. C., 33.)

STATE COMMISSIONS

The Public Service Commission of Pennsylvania is preparing a study of all tunnels used by railroads in the state, and when the data are in hand some measures to regulate them may be prepared.

The New York State Public Service Commission, second district, has suspended until May 1, a tariff of the Long Island road increasing commutation rates filed to take effect March 1. A hearing will be held. The proposed increases were on 60-trip monthly and 46-trip monthly school rates.

The New York State Public Service Commission has ordered the Long Island road to have watchmen to attend the gates at three crossings in Freeport, N. Y., all night; the principal ground of the complaint, on which this order is based, being that the automatic bells, hitherto depended on for night warnings at these places, are kept ringing so much of the time that residents in the houses nearby are greatly annoyed.

PERSONNEL OF COMMISSIONS

The third member of the Railroad Commission of Arkansas is now Thomas E. Wood of Mariana, succeeding G. T. Breckenridge, whose term expired January 1. Mr. Breckenridge is now serving as temporary secretary of the commission, in place of Ernest Tipton, who has resigned to become assistant treasurer of the state. Mr. McKnight, heretofore chairman, is now the second member of the commission, the chairmanship having been taken by J. S. Roland. It appears that the Arkansas Commission, like the federal commission at Washington, changes its chairman every year.

COURT NEWS

The Supreme Court of the United States, in a decision handed down this week, has sustained an order of the Interstate Commerce Commission directing the Pennsylvania Railroad to make the same track connections at New Castle, Pa., with the Buffalo, Rochester & Pittsburgh that it makes with the Baltimore & Ohio.

The Supreme Court of the United States, deciding cases arising in Ohio and in Indiana, holds that employees of railroads working on trains engaged in interstate commerce who seek to recover for personal injuries must bring their actions under the Federal employers' liability act and safety appliance acts, and not under state statutes.

The Supreme Court of the United States, reversing the District Court for the Southern District of New York, decided in favor of the Erie Railroad in its contention for the right to issue passes to employees of steamship companies and other ocean carriers not subject to the Interstate Commerce Commission's jurisdiction.

The Supreme Court of the United States, in a decision handed down this week, holds that the Interstate Commerce law authorizes the Interstate Commerce Commission to award damages to shippers for illegal rates and discriminations, no matter at what date arising, provided claims were filed before August 28, 1907, which, the court held, was the date on which this provision of the law went into effect.

The Supreme Court of the United States has affirmed the judgment of the Circuit Court of Appeals for the Second Circuit that the Wells Fargo Express Company shall not be held liable for more than the stated nominal value of three automobiles ($50 each) in a bill of lading in the absence of a stipulated actual value and the payment of a higher rate. The three cars were destroyed in transit and the Pierce-Arrow Company sought to recover $15,000.

On November 7, 1914, indictments were returned by the federal grand jury at Chicago, against the Chicago Spring Butt Company, an Illinois corporation, on charges of violating the interstate commerce regulations relating to freight tariffs, by fraudulent billing of shipments. On Monday, February 15, 1915, W. J. Keene, president of the company, appeared before Judge Carpenter of the United States court and pleaded guilty of misdescription of shipments of spring hinges, which were described on his shipping instructions to the carrier as iron hinges. A fine of $500 and costs was imposed.

Implied Consent to Use of Yards by Another Railroad—Evidence as to Release

An engineman of the Birmingham Southern sought to recover damages from the Louisville & Nashville for personal injuries sustained by him as a result of the rear end of a train of the defendant being backed in the night time into an engine of the Birmingham Southern, of which he was the runner, while it was standing in defendants' yard. The yard was but a short distance from the junction point of the two roads. A principal contention of the defendant was that the plaintiff was a trespasser, and that the L. & N. employees in charge of the train were under no obligation to look out for a Birmingham Southern engine or train on that track other than the general duty to keep a lookout for obstacles on it. The track had been openly used by the Birmingham Southern for many years for the purpose of interchange of traffic between the two companies, with the acquiescence of the defendants' employees and those in charge of the yard. The court held that this imposed on the defendant, in respect of employees of the Birmingham Southern, a duty to exercise such reasonable precaution in the movement of its own trains on the track as ordinary prudence dictated, to protect from injury the Birmingham Southern men.

Evidence as to the duty of train men to have the rear end of the train lighted, and of the custom of well-regulated railroads to do this, was held to be admissible. Evidence as to a release executed by the engineman to his own company was inadmissible; but evidence as to the amount paid him by his own company on account of the injury was admissible, under the general rule that a partial satisfaction by another may be shown by the defendant in mitigation of damages. Judgment for the plaintiff was reversed, and a new trial ordered. L. & N. v. Burke, Alabama Court of Appeals, 66 So. 885.

Louisville & Nashville Wins in Suit Resisting Search for Papers

The Supreme Court of the United States in the suit of the government against the Louisville & Nashville Railroad, decided this week, says that the Interstate Commerce Commission has no authority under the interstate commerce act to require a common carrier to disclose private letter files and correspondence.

Acting under a special resolution of the Senate the commission made an investigation of the railroad company's affairs to determine the truth of a charge that it had been issuing passes in violation of law and doing other unlawful acts. When agents of the commission entered the offices of the railroad at Louisville to investigate they not only insisted that they should inspect the company's books and papers, but the letter press, books and correspondence file of the general counsel. He forcibly ejected the inspectors. The commission reported the case to the Senate as one of prohable contempt. The attorney general was then directed to apply for a mandamus to compel the company to produce the letter files. The mandamus was refused by the district court and an appeal taken.

The opinion is by Justice Day. The court holds that sections 12 and 20 of the Interstate Commerce Act, authorizing the agents of the commission to require the production of "books and papers" do not empower them to compel the opening of letter files and private correspondence.

The decision does not go to the constitutional question of just how far the right of the commission to inspect might go in such matters; it merely rests on the wording of the statute, holding that under the sections named there is no power to compel the production of private letter files. The clause in question reads: "The commission shall at all times have access to all accounts, records and memoranda kept by the carriers subject to this act." The act also makes it unlawful for carriers to keep any accounts, records or memoranda not authorized by the commission. "Reading these provisions of the act," said Justice Day, "there is nothing to suggest that they were intended to include correspondence relating to the business of railroads. In recommending the passage of the act the commission did not suggest that it was essential to its purposes to have an inspection of the correspondence of railroads. . . . There is nothing from the beginning to the end of the section referred to," said Justice Day, "to indicate that Congress had in mind that it was making any provision concerning correspondence received or sent by railroad companies."

This suit grew out of an attack made on the floor of the Senate by Mr. Lea of Tennessee against the Louisville & Nashville. He charged that the road was issuing passes illegally.

Railway Officers

Executive, Financial, Legal and Accounting

Edward F. Kearney, who was recently appointed a receiver of the Wabash, has been elected president.

G. E. McCaughan, claims attorney for the Rock Island Lines, with headquarters at Chicago, has resigned, and the office has been abolished.

The office of J. M. Eedson, freight claim agent of the Toronto, Hamilton & Buffalo, has been removed from Detroit, Mich., to Hamilton, Ont.

W. P. Kenny, vice-president in charge of traffic of the Great Northern, has been elected president of the Great Northern Express Company, succeeding D. S. Elliott, resigned.

B. A. Worthington, formerly president of the Chicago & Alton, has been appointed receiver of the Cincinnati, Indianapolis & Western, which is a subsidiary of the Cincinnati, Hamilton & Dayton.

J. W. Orr, controller of the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis, with headquarters at Pittsburgh, Pa., has been appointed also auditor of the Cleveland, Akron & Cincinnati, the Waynesburg & Washington, the Wheeling Terminal, and the Pennsylvania Terminal, succeeding J. W. Renner, retired under the pension regulations.

Operating

Joseph B. Walsh, chief train despatcher of the Missouri, Kansas & Texas, at Sedalia, Mo., has been appointed trainmaster at Oklahoma City, Okla.

E. E. Hanna, formerly trainmaster of the Missouri, Kansas & Texas, at Smithville, Tex., has been appointed trainmaster of the St. Louis Southwestern at Waco, Tex.

W. M. Ansley has been appointed acting superintendent of the Second district of the Canadian Pacific, Alberta division, in place of F. Walker, superintendent at Lethbridge, Alta., who has been granted leave of absence.

B. B. Greer, assistant general manager of the Chicago, Burlington & Quincy for the lines east of the Missouri river, with office at Chicago, has been appointed assistant general manager of the lines west, with headquarters at Omaha, Neb., succeeding E. S. Koller, who has been appointed general manager of the Colorado & Southern. L. B. Allen, general superintendent of the Nebraska district of the Chicago, Burlington & Quincy, with office at Lincoln, Neb., succeeds Mr. Greer; W. F. Thiehoff, superintendent of the LaCrosse division at LaCrosse, Wis., succeeds Mr. Allen; E. Flynn, superintendent of the McCook division at McCook, Neb., succeeds Mr. Thiehoff; C. D. Peckenpaugh, superintendent of the Sheridan division at Sheridan, Wyo., succeeds Mr. Flynn; G. L. Griggs, superintendent of the Sterling division, at Sterling, Colo., succeeds Mr. Peckenpaugh, and W. G. Dungan, trainmaster at McCook, Neb., succeeds Mr. Griggs.

R. W. Stevens, who, as noted in last week's issue, has been appointed general superintendent of the Chicago & Western Indiana, with headquarters at Chicago, succeeding J. M. Warner, deceased, was born in 1869, at St. Stephen, New Brunswick. He was educated at the St. Stephen High School, and began his railway work as a brakeman on the Terre Haute & Peoria, now a part of the Vandalia, at Decatur, Ill., under Mr. Warner, who was then trainmaster. He then went to the Chicago & Western Indiana and the Belt Railway of Chicago, and after working successively as switchman and conductor, in 1895 was appointed yardmaster of those roads. In 1904 he was appointed general yardmaster, and while holding that position was also general supervisor of the outside working forces on track elevation in Chicago. In the fall of 1906 he was appointed trainmaster, and in 1909, superintendent, from which position he has now been promoted to general superintendent of the Chicago & Western Indiana, succeeding Mr. Warner, whose title was general manager.

Traffic

The headquarters of J. L. Harris, recently appointed general live stock agent of the Wabash, are at Kansas City, Mo.

H. D. Wilson has been appointed general agent of the passenger department of the Missouri Pacific and the St. Louis, Iron Mountain & Southern at Memphis, Tenn.

H. C. Dinkins, general agent for Latin America of the International & Great Northern, with headquarters at New Orleans, La., has been appointed foreign freight agent, with office at Houston, Tex.

The general freight and passenger departments of the Fort Worth & Denver City and the Wichita Valley will be consolidated on March 1, and will be placed in charge of W. F. Sterley, who will have the title of general freight and passenger agent, with headquarters at Fort Worth, Tex.

Elbert Blair has been appointed southwestern freight agent of the Chicago & Alton, at Dallas, Texas, in place of S. W. Myers, assigned to other duties. Barth Reidy has been appointed general agent traffic department at Little Rock, Ark., and F. W. Birchett has been appointed general agent traffic department at New Orleans, La.

Engineering and Rolling Stock

E. H. Morey, shop demonstrator and chief apprentice instructor, has been appointed foreman of the new erecting and machine shop of the Chicago & North Western, at Chicago, Ill. E. Bloom has been appointed shop demonstrator and chief apprentice instructor, succeeding Mr. Morey.

C. M. Newman has been appointed superintendent of shops of the Baltimore & Ohio Southwestern at Washington, Ind. A. E. McMillan, assistant master mechanic at Cincinnati, Ohio, has been appointed master mechanic of the Indiana and Illinois divisions, with headquarters at Washington, and W. H. Keller succeeds Mr. McMillan.

OBITUARY

George Carter McNally, superintendent of car service of the Elgin, Joliet & Eastern, died on February 22, at his home in Joliet, Ill., aged 51 years.

Railway Extension in Burma.—The first 65 miles of the Southern Shan States Railway have just been opened for traffic, and they bring Kalaw, the finest hill station in Burma, within 24 hours of Rangoon. Kalaw is 70 miles nearer Rangoon than Maymyo, and although, according to present arrangements, a journey will occupy about the same time, when the new line is in thorough working order it will be possible to reduce the *trajet* by several hours. Kalaw is about 1,000 ft. higher than Maymyo, and it has a proportionately cooler climate and a smaller rainfall. The mosquito, which infests Maymyo, is almost non-existent in Kalaw. The new extension comprises a high-level girder bridge at Yinmabin. Upon the main ghaut, 18 miles in length, there is a continuous ascent of 1 in 25, and it is considered the heaviest ascent in India. There are four reversing stations on the section, and the descent will be one requiring great care.—*Engineering.*

New Railway Routes for Neutral Commerce.—The commerce of the neutral countries is being so inconvenienced that the question of establishing new routes engages serious thought. Thus the export of Swedish timber via Norway has not worked quite so smoothly as could have been desired, and an export bureau has been formed. A block occurred on the Norwegian side, and for some days all despatch of Swedish timber via Norway had to be stopped. The Norwegian railway authorities then undertook to forward 60 cars daily; but this soon proved insufficient, and some 350 cars were allowed to accumulate north of Ostersund and on the Norwegian side. The export bureau referred to is to serve as an intermediary both between the Swedish shippers and the Swedish railway authorities, and between the latter and the Norwegian railways. If only sufficient Norwegian rolling-stock, especially engines, can be made available, the new route is expected to become one of great importance.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Delaware, Lackawanna & Western is in the market for 5 locomotives.

The St. Louis Stock Yards have ordered one switching locomotive from the American Locomotive Company.

CAR BUILDING

The Boston & Maine is in the market for 3,000 underframes.

The Missouri, Kansas & Texas is in the market for 1,000 steel underframe and 200 all-steel 100,000 lb. capacity gondola cars.

The Siamese Government, it is reported, will receive bids until July 29 on 159 freight cars. This item has not been confirmed.

The Southern has given an order to the Lenoir Car Works to repair 500 box cars and equip them with steel underframes.

The Russian Government is reported to be inquiring for prices on 50,000 pairs of axles and wheels, 30,000 to 60,000 tires, 30,000 rough axles and 10,000 rough wheels. This item has not been confirmed.

The Chicago, Burlington & Quincy has ordered 2,500 center sills from the American Car & Foundry Company, and 1,200 box and 300 stock cars from the Haskell & Barker Car Company. The cars will be 40 ft. long; they will be of 80,000 lb. capacity, and will be provided with steel center sills.

Railway to Moorish Coast.—It is reported that the section of the railway to Mekinez has been completed, thus uniting Fez with Rabat, on the coast.

Railway Connections Between Russia and Sweden.—Although the Stockholm-Raumö (Finland) route, which has been closed since three Swedish steamers were blown up by German mines, was resumed a day or two before the new year, the Russian authorities appear very anxious to establish a connection by railway between the Russian and the Swedish systems. For this purpose the Russian railway has been pushed on as rapidly as possible as far as Karungi; but the line is only of a temporary nature, and Russian statements about connection to be made between this line and the Swedish railways are being officially contradicted in Stockholm. The Swedish department in question is of opinion that should a Swedish-Russian railway connection some day be established, a plan which the Swedish authorities have never encouraged, it would have to be effected south of Hapavanda, and not at Karungi. The Swedish line from Hapavanda to Karungi is not expected to be ready until the latter part of 1915. Of the Russo-Finnish-Norwegian-Swedish traffic conference, to which leading Russian papers have referred to as about to be held, nothing is known in Sweden.

Electrification of the Italian Railways.—The electrification of the Italian State Railways is progressing steadily, if slowly. It is controlled mainly by the available funds in the hands of the Railway Administrator in each financial year. The progress of the works is shown by the yearly expenditure since 1907. In the three years from 1907 to 1910 the expenditure was $617,000. In the working year 1910-11, $757,000; 1911-12, $960,000, and in 1912-13, about $1,400,000. There was also allotted in 1912-13 for electric traction permanent plants about $2,600,000, besides a sum of about $200,000 for other works. This contrasts with $845,000 allotted in 1911-12. On June 30, 1913, the extent of the transmission lines amounted to nearly 480 miles. The sub-stations numbered 30. Electric operation has worked regularly on the Turin-Modane line, on the old lines of the Giovi, on the Milan-Marese section, and on the Valtellina lines, and a regular electric service of passenger and goods trains has been started on the Savona-S. Giuseppe-Ceva section. There now remains the electrification of the branches of the Giovi, the Lecco-Monza and the Turin-Pinerolo lines.—*The Engineer*

Supply Trade News

William F. Gurley, of the firm of W. & L. E. Gurley, Troy, N. Y., died at Atlantic City on Wednesday, February 17.

Wellington B. Lee has been appointed vice-president of the Track Specialties Company, Inc., New York, effective February 1.

Jed O. Gould, general superintendent and works manager of the Gould Coupler Company, at Depew, N. Y., died Friday, February 19, at Buffalo, N. Y.

George T. Merwin, formerly with the W. W. Butler Company, Ltd., Montreal, Que., has been appointed general sales manager of the Canadian Car & Foundry Company, Montreal.

The Zug Iron & Steel Company, Pittsburgh, Pa., has been acquired by Jos. T. Ryerson & Son, Chicago. The plant is to be dismantled and a warehouse will be erected on the site.

George Gibson Barret, formerly general manager of the Cleveland Drop Forge Company, and at one time connected with the American Locomotive Company, died at his home in Commack, L. I., on Thursday last.

C. W. Rhoades has been appointed western railway representative of the Kay & Ess Company, Dayton, Ohio. In the announcement to this effect, made in the *Railway Age Gazette* of last week, his name was incorrectly spelled.

John H. Trent, formerly railroad representative of the H. W. Johns-Manville Company, New York, at St. Louis, Mo., has been transferred to New Orleans, La., as branch manager, and has been succeeded at St. Louis by W. B. Mallette.

The Lea-Courtenay Company, which has hitherto been represented in Chicago territory by the Maher & Byrne Company, has recently established a branch office of its own in the Conway building. Mr. Maher has resigned from the Maher & Byrne Company, and has been appointed Chicago manager of the Lee-Courtenay Company.

J. B. N. Cardoza & Company, Inc., Citizens Bank building, Norfolk, Va., have been appointed southern representatives for the Track Specialties Company, Inc., New York. The officers of J. B. N. Cardoza & Co., are as follows: J. B. N. Cardoza, president; Edmund R. Cardoza, vice-president; Thomas A. Carroll, treasurer, and Joseph L. Young, Jr., secretary.

H. Ward Leonard, president of the Ward Leonard Electric Company, Bronxville, N. Y., died suddenly of apoplexy, as he was about to attend a banquet of the American Institute of Electrical Engineers at the Hotel Astor, New York, on Thursday, February 18. Mr. Leonard was a prominent electrical engineer and inventor. He was born in Cincinnati on February 8, 1861. He graduated from the Massachusetts Institute of Technology, and when he was 23 years of age became associated with Thomas A. Edison as a member of Mr. Edison's staff of four engineers selected to introduce the Edison Central Station System. When he was 26 years of age he became general superintendent of the Western Electric Light Company at Chicago. The following year he formed the firm of Leonard & Izard, which made many important installations of central stations and electric railways. In 1889, when the firm was bought out by the Edison interests, Mr. Leonard became general manager of the combined Edison interests for the United States and Canada, with headquarters in New York. In 1891 he completed his inventions of the Ward Leonard system of motor control, and later introduced several other important inventions in the electrical field.

TRADE PUBLICATIONS

Automatic Telephones.—The Automatic Electric Company, Chicago, has recently issued a 24-page folder in which are reproduced many of its advertisements as they appeared in the *Railway Age Gazette*, with special attention directed to such features as are particularly adapted to railroad requirements.

Railway Construction

Arkansas, Louisiana & Gulf.—This road, which on December 1, 1914, was consolidated with the Ashley, Drew & Northern, and which now operates between Monroe, La., and Monticello, Ark., a distance of 102 miles, will be extended north to Pine Bluff, Ark. However, it has not been definitely decided when actual construction work will begin.

Atchison, Topeka & Santa Fe.—The extension from Exeter, Cal., to Lindsay, a distance of 10 miles, has been authorized, and bids for the construction work are now being asked.

Black Mountain & Eastern.—This railroad, which is being built by the J. H. Phipps Lumber Company of Fayetteville, Ark., will extend from Cass, Ark., to Combs, connecting with the St. Louis & San Francisco at that point. The line will be 16 miles long, all of which has been graded and steel has been laid on 13 miles. One small frame bridge remains to be built.

British Columbia & White River.—Application is being made to the Canadian parliament for an extension of time in which to build from Bear creek, at the mouth of the Chilkat river, B. C., northwest to White river, thence to the boundary between the Yukon territory and Alaska. The company was incorporated in 1911. C. M. Marpole, G. E. MacDonald, G. E. Wilson, A. McDonnell and J. Ironside are the provisional directors.

Burlington, Mississippi River & Eastern.—A new steam road is being proposed by this company to extend from Keithsburg, Ill., to a point opposite Muscatine, Ia., then in an easterly direction to Cambridge and Kewanee, Ill., connecting with the Chicago division of the Chicago, Burlington & Quincy. It is estimated that 1,600,000 cu. yd. of earth will have to be moved, for which contracts will be let about May 1, 1915. There will be four bridges, varying in length from 50 to 250 ft. These will be concrete arches. The commodities carried will be stock, grain, coal, passengers, etc. M. J. Healy, Joy, Ill., is president and chief engineer.

Canada Western.—This company has asked the Canadian parliament for an extension of time in which to build from the international boundary in Alberta via Pincher creek and Cowley, and along the Old Man river to the Livingstone mountains, thence to Calgary, with a branch from Livingstone mountains to Michel, B. C. The company was incorporated in 1909, and the provisional directors were J. S. Hough, A. S. Kildall, L. L. Metcalfe, H. J. Box and O. L. Boynton, Winnipeg, Man.

Chicago, Milwaukee & St. Paul.—The grade separation work on the Bloomingdale road branch which extends from Pacific Junction to Chicago & Evanston Junction is now being completed.

Florida Roads.—The Port Commission of Jacksonville, Fla., is building a line to connect the various railroads within the city limits of Jacksonville. Work has been started and some contracts are to be let in the near future. The improvements consist of two filled wharves 1,000 ft. x 260 ft., an interchange yard, storage and sorting yard, necessary warehouses, cotton compress and storage, and facilities for handling general commodities. It is a terminal proposition, not a railroad. The commodities to be handled include lumber, naval stores, cotton, fertilizers, phosphate and general merchandise. Montgomery Corse, chairman, and F. W. Bruce, chief engineer. (November 13, p. 924.)

Georgia Roads.—Surveys are now being made, it is said, for a line to be built from Jacksonville, Ga., northeast to Lumber City, about 20 miles. An old lumber line extending about half the distance between these two places is to form part of the new line. C. F. Smith, president of the Ocmulgee River Lumber Company, is back of the project.

Memphis, Dallas & Gulf.—It is expected that the laying of steel on the 16½ mile section just north of Murfreesboro, Ark., will be completed by March 17, 1915. This will complete the line from Murfreesboro, Ark., to Hot Springs.

Minneapolis & St. Louis.—This company is considering the

grading and the laying of a few short storage tracks on its property near First street, Minneapolis, Minn.

Ocilla Southern.—This company, which operates a line from Nashville, Ga., north to Rochelle, 62.3 miles, has given a contract to Martin Tankersley to build an extension from Rochelle northwest to Pope City, 7.3 miles, and this work is now underway. The company projected an extension some time ago from Rochelle north to Macon, about 80 miles, and it is probable that trackage and lease arrangements will be made in the near future with other lines north of Pope City. (February 5, p. 251.)

Radford-Willis Southern.—Organized in Virginia with $300,000 capital to build from Radford, Va., southeast along Little river and Indian creek to Willis, about 25 miles. C. W. Simpson will be in charge of the location survey. J. L. Vaughan, president, and W. L. Castle, secretary and assistant treasurer.

RAILWAY STRUCTURES

Chicago, Ill.—The Chicago city council last week passed the ordinance permitting the Baltimore & Ohio to move its coach yard from Harrison street, on the site which is to be occupied by the Pennsylvania lines freight terminal, to the vicinity of Sixteenth street and Western avenue, and this enabled work to be started at once preliminary to the erection of the Pennsylvania freight terminal between Canal street and the Chicago river, south of Polk street. Work was begun on the erection of a temporary freight house for the Pennsylvania Lines between Polk and Taylor streets, and this will be followed by the work of tearing down old buildings.

A grant has been obtained from the city council, giving permission to build a new coach yard and engine terminal on the Baltimore & Ohio Chicago Terminal property between Lincoln and Wood streets, near Fourteenth street. Work is already in progress on the filling in for the coach yards. The entire improvement will include a yard with a capacity of 300 cars, a storehouse two or more stories high, and 600 ft. long, a 34-stall engine house having a depth of 90 to 100 ft., whose exterior walls will be located on the lines of Fourteenth and Lincoln streets, forming a right angle instead of the usual circular form, a 100-ft. turntable, and necessary ash and coaling facilities, inspection pit and washout platform. Adjacent to, and partially within the engine house will be a machine and blacksmith shop and tool room. All buildings will be of modern construction. Additional tracks will be laid between Union and Western avenues, which will require considerable bridge and grading work. Plans, which will be completed some time during March, are being prepared by M. A. Long, assistant to Chief Engineer F. L. Stuart.

Harrisburgh, Pa.—The Cumberland Valley is asking for bids until March 17, for the construction of the modern arch bridge, to be built over the Susquehanna river at Harrisburgh to replace the present steel deck truss bridge. The new bridge is to carry two tracks; it will have 46 spans and will be 4,000 ft. long. (January 22, p. 171.)

Kansas City, Mo.—The Chicago & Alton is contemplating the building of a 250,000 bu. grain elevator at this point. It is planned to start work some time in March. The estimated cost is $100,000.

Philadelphia, Pa.—Bids were asked for recently by M. L. Cooke, director of the Department of Public Works, Philadelphia, for building a reinforced concrete bridge to carry Broad street over the tracks of the Pennsylvania Railroad, the Baltimore & Ohio and the Philadelphia Belt Line. The proposed structure is to consist of three spans of 35 ft. each, and the greatest height will be 25 ft., with 21 ft. clearance. The city of Philadelphia is to pay 40 per cent of the cost of this bridge, the Pennsylvania Railroad 30 per cent, and the Baltimore & Ohio 30 per cent.

Rahway, N. J.—The Pennsylvania Railroad has given a contract to F. A. Havens & Co., Philadelphia, Pa., for building a shelter shed to be 230 ft. long, and a concrete platform to be 20 ft. by 900 ft., at Rahway. There will also be a small waiting room, a baggage elevator and a stairway connecting with the passenger tunnel. It is estimated that these improvements will cost about $25,000. This is part of the track elevation work now being carried out at Rahway.

Railway Financial News

Birmingham, Ensley & Bessemer.—Augustus Benners, a lawyer of Birmingham, Ala., has been appointed a co-receiver of the Birmingham, Ensley & Bessemer, representing the interests of the independent bondholders' committee.

Central New England.—See New York, New Haven & Hartford.

Cincinnati, Indianapolis & Western.—B. A. Worthington, formerly president of the Chicago & Alton, has been appointed receiver of the Cincinnati, Indianapolis & Western, a subsidiary of the Cincinnati, Hamilton & Dayton.

Des Moines & Ft. Dodge.—See Minneapolis & St. Louis.

Louisville & Nashville.—J. P. Morgan & Co., New York, have bought from the Louisville & Nashville $7,500,000 first mortgage 5 per cent Lexington & Eastern bonds. The bonds are guaranteed principal and interest by the Louisville & Nashville. The Lexington & Eastern is a line built into the eastern Kentucky coal fields of the Consolidation Coal Company.

Maine Central.—A bill has been introduced in the Maine legislature authorizing the Maine Central to retire $10,000,000 of its capital stock and to issue 5 per cent preferred stock to raise funds for retiring the $10,000,000 stock. This $10,000,000 stock is held by the trustees of the Maine Railways Company.

Minneapolis & St. Louis.—Stockholders of the Minneapolis & St. Louis and the Des Moines & Ft. Dodge have approved of the merger of these two companies under an agreement modified somewhat from the earlier one under which the merger had first been planned.

New York Central Railroad.—Judge Hough, in the United States district court, has granted a preliminary injunction preventing the merger of the New York & Harlem and the New York Central Railroad pending the outcome of the suit brought by John Scott Boyd, Jr., and other minority stockholders of the Harlem to stop the merger. The injunction was granted after the plaintiffs had agreed to drop the allegations of violation of the Sherman law and to confine their suit to the civil points involved.

New York & Harlem.—See New York Central Railroad.

New York, New Haven & Hartford.—Further details of the statement made by the directors to the Massachusetts Public Service Commission in regard to their plans for the dissolution of the New Haven system include a proposal to sell outright the real estate along the line of the New York, Westchester & Boston, having a book value of $3,799,000, and the sale of $13,709,000 notes of the New England Investment & Security Company. The New Haven proposes to retain the New York, Westchester & Boston and to retain control of the New York, Ontario & Western and the Central New England, the latter to be continued in operation as part of the New York, New Haven & Hartford.

New York, Ontario & Western.—See New York, New Haven & Hartford.

New York, Westchester & Boston.—See New York, New Haven & Hartford.

Railwaymen's Gift to the Kaiser.—It is reported that the railway employees in Germany have offered the sum of $60,000 to the Kaiser as a birthday present. The German Emperor expressed his thanks to Dr. von Breitenbach, the Minister of Public Works.

Railway Extensions in Russia.—The Russian Ministry of Ways of Communication has decided to raise the question of building a railway from the ice-free port of Kem, on the White Sea, to Petrozavodsk, the chief town of the Olonets government. Should this project be realized, Kem will be connected with the entire railway system of the Empire, as from Petrozavodsk to the station Zwanka, on the northern line, a double-track private railway is already in course of construction.

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Contents

*Illustrated.

The Interstate Commerce Commission has become one of the most important branches of the federal government. Congress has imposed numerous important duties on it and is constantly giving it new ones. Its work affects the material welfare of the people more than that of any other public body except Congress and the Supreme Court. And yet, in some respects, Congress has been so shortsighted and niggardly in dealing with the commission as greatly to interfere with its efficiency. A glaring example is the persistent failure and refusal of Congress to provide the commission with proper office accommodations. It long since outgrew its original offices, and its various departments and bureaus are today dispersed through five different buildings in the city of Washington. Furthermore, its members and its staff who have offices in the Interstate building and the American National Bank building, which are directly connected, are packed in like sardines in a box. With its quarters thus crowded and its organization thus dispersed the difficulties encountered in doing its work efficiently are far greater than they need be. The commission repeatedly has asked Congress to provide for the erection of a suitable building for it or to let it lease one for a reasonably long term. But, while Congress can find the money with which to build $100,000 postoffice buildings in $10 county seat towns all over the United States, it has not been able to persuade itself to provide properly for the housing of this important branch of the government. The way in which the commission has been treated in this regard is discreditable to Congress and the nation, and ought to be changed at the earliest possible date.

The Housing of the Commission

The Oregon-Washington Railroad & Navigation Company in defending the suit of one Chadwick, in an Oregon court, has secured a judicial decision sustaining the binding force of the company's train rules, even, apparently, in the face of careless non-enforcement; the decision being to the effect that the rules "establish the standard by which care is determined; and, though custom may interpret the rules, it cannot contradict them." This is, of course, the only logical view. But, though a bad custom cannot destroy a good rule, it can defy the good superintendent who does not enforce his rule. Again, innumerable situations will arise where a conductor or brakeman must use his best judgment as to whether he is or is not obeying a given rule. Take the flagging rule, for instance. To wait sixty seconds, or two minutes, or longer, before starting back may be disobedience to the rule, or it may be an interpretation of it. But, whatever the difficulties, the responsibility is always resting on the individual employee to take good care that he is not going contrary to the requirement of the rule. In other words, the employee must always be supposed to possess and exercise judgment and discretion; and also to have a conscience. Without these no train rules can be carried out successfully. Train-running is too complicated a business to be subjected to rules, like those of the shoveler, or the water carrier, which so fully fit the case as to need no interpretation. In actual, every-day practice this court decision does not help us much. The employee who claims that, in a given case, he has been justified in acting contrary to a rule, because infractions have been constantly winked at, may be expected to put up a strong fight; and unless the officer's position is impregnable he is likely to surrender—either at once or after a brief and feeble defense. Moral: Don't depend on the court for stiffening of rules; punish rule-breaking at sight.

Train Rules in Court

The advocates of the standard box car will find food for thought in the article by R. W. Burnett, general master car builder of the Canadian Pacific, which appears elsewhere in this issue. Mr. Burnett says plainly that he is not in favor of a standard box car, and it is refreshing to read such a "straight from the shoulder" argument as is given in this article. His statement regarding the cost of the present-day repair bills had a standard box car been adopted ten or fifteen years ago is worthy of attention, and it may be pertinent to consider this also from the standpoint of loss and damage claims. The standard box car, it will be remembered, was first suggested by the American Railway Association, which in November, 1912, and again in May, 1914, passed a resolution requesting the Master Car Builders' Association to design and adopt a standard frame for closed cars in accordance with the present standard inside dimensions of box cars. In May, 1914, the Executive Committee of the American Railway Association appointed a special committee, of which E. P. Ripley, president of the Atchison, Topeka & Santa Fe, is chairman, to consider the subject of standard freight car equipment. This

Design and Construction of a Standard Box Car

committee has appointed a sub-committee with George L. Wall, of the Lima Locomotive Corporation, as chairman, the other four members being representatives of car-building companies. It is understood that the Master Car Builders' committee on Car Construction and Car Trucks are working up designs of a standard car, in accordance with the American Railway Association resolution, which will be presented to the association for consideration at the next convention.

LIMITING THE LENGTH OF TRAINS

THE *Railway Age Gazette* has often commented on the fact that while shippers frequently have made organized efforts to get reductions or prevent advances in rates, they seldom have made organized efforts to prevent action which would increase railway expenses, although such action directly tends to cause raises in rates. All over the country railway employees and politicians have been getting passed train crew laws and similar legislation. Although such legislation directly concerns everybody who pays railway rates or uses railway service, the Farmers' Union and the Commercial Club Secretaries' Association of Texas have been almost the only bodies of shippers making representations to their legislatures against it.

But shippers elsewhere are awakening to which side their bread is buttered on. A bill to limit the length of freight trains to a half-mile has been introduced in Indiana. The Indiana Grain Dealers' Association and the Indiana Millers' Association are opposing it. In a public statement Charles B. Riley, secretary of these organizations, announces that 600 firms have petitioned the legislature not to pass the bill. Mr. Riley says: "The greatest embarrassment to shippers in the past has been due to failure of the carriers to supply adequate equipment with which to move the tonnage. But now that the size of locomotives and cars has been increased, and grades and curves removed, 100 or more loaded cars can be hauled with greater ease, safety and celerity than formerly prevailed in handling 50 cars. The public which has to cross railroad tracks should favor the largest possible unit for freight trains since the hazard connected with operating a large number of trains is reduced correspondingly with a reduction of trains."

These sentences indicate two strong arguments against train limit laws. The so-called "car shortages" of the past have been shortages of all kinds of facilities. Many roads have had enough cars, but not enough engines to move them. Train limit legislation, by restricting the number of cars hauled by each engine, would aggravate the effects of a shortage of locomotives. One of the arguments made against long trains is that they sometimes block the streets of towns. But a train of 25 cars may block a street as effectually as a train of 100 cars; and the shorter and, therefore, more numerous trains are, the more frequently will highways be blocked by them.

The two strongest arguments against train limit legislation are, that it will increase both railway expenses and railway accidents. It will do so for the following reasons:

1. The railways have bought at increased cost locomotives of an increased tractive power. If the law prevents these locomotives from hauling as many cars as they can the investment in the unused part of their tractive power will be rendered valueless and at the same time the roads will be forced to buy more locomotives.

2. The railways have spent large sums to reduce grades and curvature and build longer passing tracks, to enable them to haul longer trains. They expected the saving they would make in operating expenses by hauling longer trains to exceed the addition to fixed charges which would be caused by the investment made in reducing grades and curves and building longer passing tracks. If they are prohibited from hauling long trains the entire investment made for these purposes will be rendered valueless, while the fixed charges on the investment will still have to be paid.

3. By reducing the length of trains and thereby increasing the number of trains that must be run the proposed legislation would make necessary a proportionate increase in the fuel consumed and in the number of engineers, firemen, conductors, trainmen and all other employees directly and indirectly connected with train operation. Every cent of the additional expenditure for fuel and wages thus caused would be absolutely wasted.

4. Other things being equal, an increase in the number of trains run increases the number of accidents. To prevent an increase in accidents resulting it is necessary to build additional trackage, install additional signals and make other investments in additional facilities. But if these additional investments be made the prevention of an increase in accidents will be secured at the price of an increase in operating expenses and fixed charges all along the line.

It is superfluous to say that it is against the interests of those who use the service of railways to have the hazards of their operation increased. It is superfluous to say it is against the interests of those who pay railway rates to have their fixed charges and operating expenses unnecessarily increased. Within recent years many railway measures which have been entirely indefensible from the standpoints of both economics and safety have been introduced in the state legislatures and in Congress. Among all these measures there has not been one which has been so utterly incapable of being advocated on any rational pretext as the train limit bills. How self-respecting and intelligent railway employees can permit the legislative representatives of their brotherhoods to ask for such legislation we cannot understand. How any lawmaker with a ray of intelligence or a particle of self-respect or public spirit can vote for it we cannot understand. The grain dealers and millers of Indiana are amply justified in opposing it. It ought to be opposed by the traveling public and by all classes of the shipping public. The greatest factor which has enabled the railways of the United States to haul freight cheaper than any other railways in the world, while paying the highest wages in the world, has been their success in increasing their freight train loads. To limit the size of their train loads would be to strike the most deadly blow possible at the efficiency and economy of their operation.

THANK YOU FOR THE COMPLIMENTS!

OUR thanks to Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers! After reading some of the compliments he paid to the *Railway Age Gazette* at the hearing in the arbitration between the western railways and their engineers and firemen, we are reminded of the old story of the Southern darky who was asked by a Northern white man to change a ten-dollar bill. "I cain't change no ten-dollar bill, boss," said the darky, "but I thanks you for the compliment."

A. W. Trenholm, chairman of the Conference Committee of Managers, was on the witness stand on February 24. Mr. Stone was questioning him. Thereupon the following colloquy took place, the italics used being our own:

"Mr. Stone: For example, the *Railway Age Gazette*, which is the official organ of the railways and speaks for them—

"Mr. Trenholm: Is that right? Have they got the authority to speak for the railroads?

"Mr. Stone: They generally do, anyway.

"Mr. Trenholm: They haven't mine.

"Mr. Stone: The *Railway Age Gazette* of July 24, 1914—

"Mr. Nagel: Did you want to answer that last statement?

"Mr. Trenholm: They do not have the authority to speak for the railroad I am connected with.

"Mr. Stone: *But they do quote about all the authorities of the different railway experts on all the different subjects and questions that come up, do they not?*

"Mr. Trenholm: They invite from railroad officials and mechanical people communications on different subjects and publish them; and when I write an article and sign it, they are authorized to speak for me, but when I do not, they are not.

"Mr. Stone: And they do have first hand information in regard to all railroad information, and details, long before any other publication is given them, do they not?

"Mr. Trenholm: Not so far as I know.

"Mr. Stone: *Is it not a fact that anything new, strange or startling that happens to any railroad is first seen in the Railway Age Gazette?*

"Mr. Trenholm: Well, I think they make a specialty of trying to treat

with those matters, locomotives, and all things of that kind. That is the business of the paper. But so far as having any inside track is concerned, I do not know anything about it.

"Mr. Stone: Then, perhaps, taking it for granted they have not any inside track, *how do they always get this information before any other publication does?*

"Mr. Trenholm: Well, I do not know their methods. I have had many communications from them asking questions, and some I have answered and some I have not."

Modesty compels us to say that Mr. Stone was partly wrong in his references to this paper. The *Railway Age Gazette* is not "the official organ of the railways" and does not "speak for them." The *Railway Age Gazette* is published by a private corporation, not one dollar of whose securities is owned by any railway company or railway man, and it expresses the views of its editors and of nobody else on earth. Usually its views coincide with those of railway men, but often they do not; and it always says what it thinks regardless of what they think. If it were the "official organ of the railways" many things which have been said in these columns about grafting, high finance and accidents, for example, would never have been said. We thank Mr. Trenholm for having set Mr. Stone right. We haven't Mr. Trenholm's or any other railway man's authority to speak for him, and we haven't any railway company's authority to speak for it. The railways are our patrons, just as the railway supply concerns are. That is the only relation we have to either of them; and we get a lot more business from supply concerns than from railways.

Continuing his questions, Mr. Stone implied that the *Railway Age Gazette* "quotes about all the authorities of the different railway experts on all the different subjects and questions that come up"; that "anything new, strange or startling that happens to any railroad is first seen in the *Railway Age Gazette*"; and that this paper "always gets this information before any other publication does." Here Mr. Stone was on firmer ground. We are unable to deny these various soft impeachments. Blushingly we admit them all. They show that Mr. Stone is one of our diligent and well-informed readers. We regret that in spite of his frank and flattering recognition of our leadership in our field he does not always accept our views, especially those occasionally expressed regarding the Brotherhood of Locomotive Engineers and its distinguished grand chief. But the fact that these little differences of opinion do arise make us appreciate Mr. Stone's good opinion all the more.

It is evident, however, that in his colloquy with Mr. Trenholm Mr. Stone did not get all the information he wanted. He showed an earnest desire to learn why it is that "anything new, strange or startling" that happens in the railway world is "first seen in the *Railway Age Gazette*," and how it "always gets this information before any other publication does." He seemed to think this must be because the *Railway Age Gazette* has some intimate underground connection with the railways. The truth is much simpler than that. The *Railway Age Gazette's* success in "always getting information before any other publication" is due solely to the fact that it has a large editorial staff; in fact, the largest editorial staff of any technical journal in the world, a majority of whose members have had experience in railway service; and that its editors are always on the job. And being on the job does not mean being at their desks. It means being wherever there is an important railway convention, arbitration hearing or rate case to report, or a new locomotive or a piece of new railway construction to describe. In the year 1914 one of our editors traveled 19,000 miles on 11 railways in this country and 8 in Europe—and this was 11,000 miles less than his usual annual mileage on railways. In the same year another of our editors traveled 18,520 miles on 17 railways in this country. Another traveled 20,000 miles on 23 railways in this country and one in Canada. Another traveled over 8,000 miles on six roads; another 6,000 miles on 25 roads; another 5,500 miles on 18 roads, another 5,400 miles on 11 roads. Every mile of this traveling was done for the purpose of getting editorial material for the *Railway Age Gazette;* and every mile was paid for in hard cash.

If information doesn't come to our editors they go and get it. And this, we confide to Mr. Stone, is the sole secret of the success of this paper in getting railway information ahead of other publications. We will confide something else to him. This is that, contrary to his impression, we do not *always* get information before any other publication does. But in saying that we do, he was very close to the exact truth; and we have no disposition to pick a quarrel with him for having very slightly exaggerated our efficiency!

ECONOMICAL RETAINING WALLS

THE justification for the use of retaining walls of the common mass or reinforced concrete design was seriously called in question in the discussion at the meeting of the Western Society of Engineers last Monday night following the reading of the paper on "Retaining Walls on Soft Foundations," abstracted elsewhere in this issue. As was well emphasized in a written discussion by Onward Bates, such walls are very expensive in comparison with other methods successfully used for retaining material, notably the tie cribs frequently built along operated tracks to prevent the flowing of filled material, and the plank cribbing commonly found in coal yards to retain the stored coal.

In the Rock Island track elevation work now under way at Chicago the mass retaining walls 30 ft. high cost about $115 per lineal foot, while cribs of old ties used to protect the operated track were built at a cost of $0.20 per lineal foot. Retaining walls on this work 18 ft. high, which is a common standard for track elevation projects, cost $31.82 per lineal foot, being supported on spread foundations. It must, of course, be remembered that the cribs were only temporary, and they were not advocated as a substitute for mass walls by engineers who have given the subject the most study. However, walls made by cribbing up reinforced concrete members of about the same size as track ties have given satisfactory service on several roads, and on the Chicago & Western Indiana the cost of such walls from 7 to 8 feet high is stated to be from 14 to 17 per cent of that for a mass wall for the same location. This indicates that at least for low walls the crib design retains its economic advantages when built of a permanent material. Further study along this line would be profitable if only to determine the limits within which such a crib wall is advantageous.

Another point suggested in Mr. Bates' comments on the paper is the possibility of utilizing the wall section to better advantage than is done in common mass design, the so-called cellular wall developed by the Chicago, Milwaukee & St. Paul for the track elevation at Milwaukee being an example of this possibility. He showed that in the ordinary walls, if piles are used to support the toe they can rarely ever be placed in sufficient numbers where they are needed, and in all cases a large mass of concrete is placed in the footings for the sole purpose of preventing the top of the wall from tipping or sliding out of place. Comparisons of the symmetrical cellular type illustrated in Mr. Lacher's paper and a typical mass design for a fill 17 ft. high, show a lower sectional area for the former in all cases, this area being less than half for two of the three cases considered where the wall was assumed to be 24 ft. 6 in. and 27 ft. 6 in., respectively, from the center of the adjacent track. In this design the two face walls support each other by the tie walls connecting them, and even the poorest foundation material could support the weight of these walls as no pressure is carried down to their footings from the fill or the live load.

A similar design is being used on the Long Island end of the New York Connecting Railroad's approach to the Hell Gate bridge. In this case the walls are reinforced by 8-in., 16-lb. channels at 10-ft. intervals, vertically and horizontally, and 2¼-in. tie rods are provided at each intersection. Concrete cross walls are spaced about 70 ft. apart, and the fill is placed in each of these sections in thin convex layers carefully rammed so as

practically to eliminate horizontal pressure on the walls. The extreme height of these walls, 72 ft. in the maximum, made this unusual precaution advisable.

The discussion showed a general opinion that too much has been spent for some retaining walls and that possibly a part of the excessive cost is caused by trying to design a wall in which there will never be the slightest movement. The tendency in the face of increasing land values and increasing traffic on the railways is of course to build all structures with greater consideration of permanence, and this tendency is probably justified in many cases. It is worth considering, however, if too much is not being paid for the degree of permanence secured in some retaining walls. A careful analysis of the costs and the advantages and disadvantages of the various types for the particular conditions surrounding the Milwaukee track elevation work is included in Mr. Lacher's paper. The same conclusions might not be reached, however, under different conditions, and a careful study of the requirements for any particular retaining wall and all the possible methods of meeting them will be well repaid by the lower annual charge on the work.

FUEL COSTS AND TRAIN LOADING

IN the endeavor to effect economies in railway operation, attention naturally has first been directed to the larger classes of expenditures, any reductions in which have correspondingly great effects on the total. One of the items entering prominently into the cost of railway operation is the cost of fuel. The report of the Interstate Commerce Commission for the year ending June 30, 1912, shows that practically $225,000,000 or 11.83 per cent of all operating expenses was expended for fuel. This is two-thirds of the amount spent for wages of yard and road enginemen and trainmen. In seeking to promote improvement in this field the problem divides itself immediately into two sections, each of which must be treated separately. The education of the firemen and enginemen in the proper use of fuel is now receiving a great deal of attention and the results secured along this line on the Chicago, Burlington & Quincy, the Chicago Great Western and other roads, have been related in these columns.

Mr. Price emphasizes the importance of the second division of this problem in his article in another column. The conservation of fuel by using it in such a manner as to secure the greatest amount of productive work from it, is a problem which depends for its successful solution upon the chief despatcher, the trainmaster, the superintendent and other men having supervision over train loading as well as on the engine crew, and the best endeavor to conserve fuel on the part of the enginemen will not overcome the results of inefficient train loading. The economy of handling tonnage trains is fairly well realized in the abstract. However, it is not as well realized from the standpoint of its effect on fuel supply.

When the tonnage rating on a division is increased it very frequently meets with the open opposition of the train and engine crews as well as of the traveling engineers and trainmasters. However, if they can be shown that in many cases these increases are made with the use of a relatively small increase in the amount of fuel burned the opposition will be at least partially overcome. This condition was illustrated in a striking manner by the experience of one western road during the past year. Becoming convinced that the tonnage rating for certain classes of engines was too low, the general superintendent ordered that it be increased 100 tons. He at once encountered the active opposition of the traveling engineers particularly. After a couple of months, however, these men saw that the number of ton-miles handled per unit of fuel consumed showed an increase, resulting to the credit of their division in comparison with other divisions on the system. Their attitude was immediately changed and the general superintendent now has their hearty co-operation in raising the ratings still higher. Thus in the endeavor to secure the greatest amount of work from each unit of fuel the entire responsibility for improvement does not lie with the engineer and the fireman, but the superintendent and his staff as well can afford to give this subject their careful attention.

PENNSYLVANIA RAILROAD

IT would appear that the Pennsylvania Railroad in the calendar year 1914 carried out the first experiment on a very large scale in the history American railroading of a comprehensive scientific reduction in operating expenses commensurate with a reduction in both freight and passenger traffic without extending the policy of cutting down expenses to maintenance of way. The experiment was successful within the limits in which it was carried in 1914. It could not have been carried out successfully, probably, by the majority of the other large railroad companies in the country, nor can it be, probably, extended even by the Pennsylvania very much further to meet a continued falling off in traffic.

The calendar year 1914 was a black cloud for the eastern railroads without a vestige of silver lining. The total operating revenues of the Pennsylvania Railroad were $187,252,000, a decrease of $17,828,000 from the 1913 total.* Railway operating income in 1914 amounted to $35,259,000, or $3,983,000 less than in 1913. Freight traffic, measured in ton-miles, fell off 11.67 per cent, and passenger traffic measured in passenger miles, 4.31 per cent. Transportation expenses amounted to $72,234,000, a decrease of $6,021,000, or 8.34 per cent; maintenance of equipment expenses amounted to $37,144,000, a decrease of $5,841,000, or 15.73 per cent; while maintenance of way amounted to $25,020,000, a decrease of $1,315,000, or 5.26 per cent. If maintenance of way had been cut in the same proportion as transportation expenses and maintenance of equipment expenses, there would have been little loss in railway operating income for 1914 as compared with 1913. It will be seen that transportation expenses were reduced in proportion to the loss in business and this reduction was effected by a reduction in train mileage. With the ton mileage smaller by 11.67 per cent, freight train mileage was reduced 13.87 per cent; with the passenger mileage smaller by 4.31 per cent, passenger train mileage was reduced 4.73 per cent. The approximate reduction in number of employees in 1914 as compared with 1913 was 8 per cent.

The reasons why the Pennsylvania could cut its transportation and maintenance of equipment expenses proportionately to the loss in business, while the majority of other roads and the Pennsylvania itself have never succeeded in doing this before, are many and somewhat complicated; but there are two fundamental reasons which are capable of explanation. On the one hand, traffic density, both freight and passenger, on the Pennsylvania is so heavy, necessitating such frequent train service, that with a falling off in business, trains can be taken off in proportion to the loss in business up to a certain definite limit. In 1914 this limit had not been reached. The other reason was a composite one, made up of the strength of the company's credit, the confidence of the security holders in the management, the identity between the final authority and the active management, the Pennsylvania's form of organization which in matters of policy so centralizes and concentrates authority, and the spirit in which the situation which confronted the company at the beginning of the year was met.

The Pennsylvania Railroad operates 4,512 miles of road. In 1913, the year of greatest business in the history of the company, the system handled 25,025,000,000 ton-miles and 2,108,000,000 passenger miles. Thus the freight density (ton-miles per mile of road) in 1913 was 5,587,000, and passenger density (passenger miles per mile of road), 471,000. While, of course, the total capacity of the plant, exclusive of terminals, was not reached even in 1913, so great a percentage of its total capacity was then in use that the vast majority of freight traffic was handled in trains given their full rating of tonnage, and but a very small part of the freight business was handled in light trains, run because the traffic could not wait for a full train tonnage.

With a reduction of a little less than 12 per cent in ton mileage, the total ton mileage in 1914 amounted to 22,104,000,000, and the freight density to 4,899,000. Of the total 135,296,000

* Throughout these comments the combined figures of the Pennsylvania Railroad and the Northern Central for both 1914 and 1913 are used, the Pennsylvania having taken over the Northern Central as of July 1, 1914, and added it to the Erie division to form the Central division.

tons carried on the Pennsylvania in 1914, 69,962,000 tons, or more than half, was coal and coke. The total tonnage of all commodities in 1914 was less by 19,913,000 than in 1913. The tonnage of anthracite coal was slightly larger in 1914 than in 1913; but the total net falling off in coal and coke tonnage amounted to about 8,300,000 tons, and the decrease in tonnage of iron and of castings and machinery amounted to another 2,982,000 tons, so that out of the total loss of 19,913,000 tons, 11,282,000 tons was in tonnage which moved almost exclusively in drag freight trains. To meet the loss in this tonnage it was simply necessary to run fewer drag freight trains. As a matter of fact, with the large loss in tonnage and the large proportion of that loss in low grade freight, the Pennsylvania Railroad's average revenue freight train load in 1914 was 722 tons, an *increase* of 18 tons over the previous year. It would be hard to conceive of more striking testimony to the success of the Pennsylvania operating officers' work in 1914.

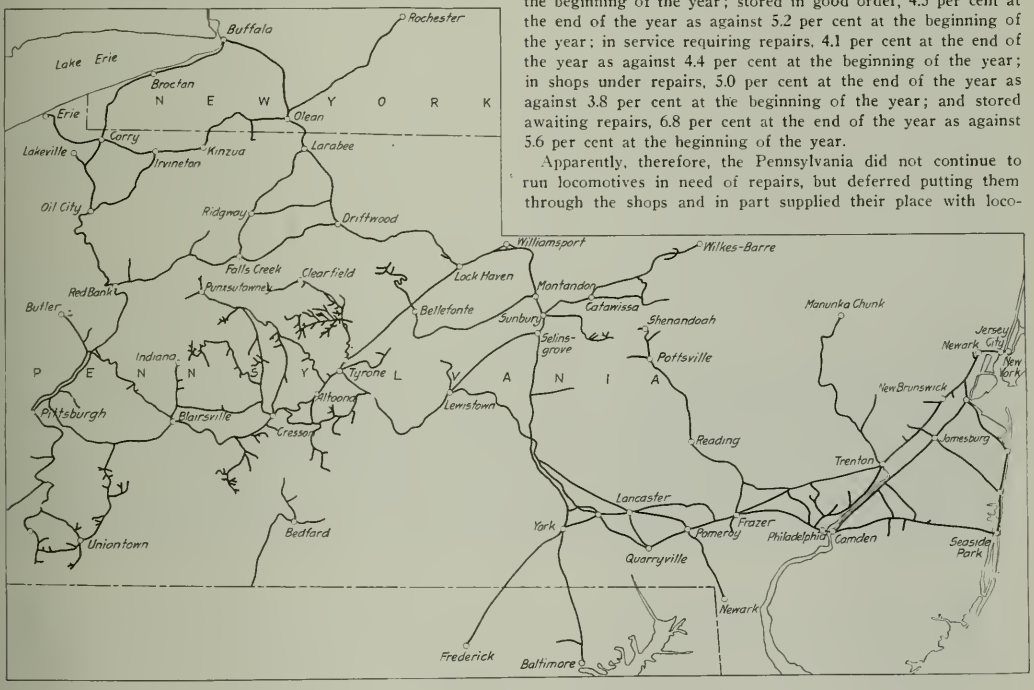
The Pennsylvania allocates its expenses as between freight and passenger, and although the allocation is made on an arbitrary basis, the figures arrived at are accurate for comparative purposes. The freight train revenue per train mile in 1914 was $4.25, an incease of $0.144. Expenses per train mile amounted to $3.135, an increase of $0.076, so that net per train mile was $1.115, an increase of $0.068.

In cutting off passenger train mileage the management was almost as successful as in freight train mileage; but probably largely because of the operation of the full-crew law during all of 1914, the increase in passenger train expenses per train mile offset the economies made through a reduction in train mileage. The total number of passengers carried one mile in 1914 was 2,017,000,000, a decrease as compared with 1913 of 91,000,000. The average revenue per passenger train mile in 1914 was $1.60, an increase of $0.021. The expenses per train mile in 1914 were $1.609, an increase of $0.071. There was, therefore, a net loss in the year 1914 per passenger train mile of 9 mills as compared with a net revenue in the year 1913 of 4.1 cents.

Besides the reduction in transportation expenses there was a reduction in the amount spent for maintenance of equipment of $5,841,000, the total in 1914 being $37,144,000. This is deferred maintenance, in the sense that the cost of repairs which were needed in 1914 and not made will have to be paid for out of earnings of some other year; but unlike deferred maintenance of way expenses, they will not have to be paid for twice. The distinction is important in the case of the Pennsylvania, although under other circumstances it might be just as much of a false economy to defer expenditures on maintenance of equipment as on maintenance of way. What happened in the Pennsylvania case is shown by the following figures: Total locomotive mileage in 1914 amounted to 103,006,000, a decrease of 13,345,000, or 13 per cent; freight car mileage amounted to 1,268,000,000, a decrease of 149,000,000, or 10.5 per cent. The percentage of locomotives in service in good working order at the end of 1914 was 73.6 per cent, exactly the same percentage as at the beginning of the year; stored in good order, 4.5 per cent at the end of the year as against 5.2 per cent at the beginning of the year; in service requiring repairs, 4.1 per cent at the end of the year as against 4.4 per cent at the beginning of the year; in shops under repairs, 5.0 per cent at the end of the year as against 3.8 per cent at the beginning of the year; and stored awaiting repairs, 6.8 per cent at the end of the year as against 5.6 per cent at the beginning of the year.

Apparently, therefore, the Pennsylvania did not continue to run locomotives in need of repairs, but deferred putting them through the shops and in part supplied their place with locomotives which had been repaired in previous years and were stored in good order. Of course deferring maintenance expenses in this way, if there was any prospect of a large and sudden increase in business, would be poor economy. Repairs could be more cheaply made in slack times, but there is no present prospect for a sudden large increase in business on the Pennsylvania. The deferring of repairs, therefore, is not a grossly false economy. When the repairs to the equipment are made, present prospects are that they will cost little, if any, more to make than they would have in 1914.

Deferring maintenance of way, however, on a road like the Pennsylvania is an entirely different matter. A falling off in train mileage of 10 per cent. decreases the actual cost of maintenance of way, if the same standard is to be maintained on the Pennsylvania, by only 2 or 3 per cent. If, however, track is



Pennsylvania Railroad

allowed to deteriorate from standard, the expenditures necessary to bring it back, maybe 2 to 3 or 4 times as great, to those that would have been necessary to maintain it at standard.

The Pennsylvania executive officers are not the only railroad men in America who believe these principles are a fact beyond dispute; but the peculiar situation in regard to the strength of the company's credit and final authority being vested in the management has given the Pennsylvania officers an opportunity to live up to what they believe, where the great majority of other railroad officers have not been so fortunately placed. In 1913 the Pennsylvania spent the largest amount for maintenance of way in any year in its history and its appropriations were generously ample. In 1914 there was $25,020,000 spent on maintenance of way, or only $1,315,000, 5.26 per cent, less than in 1913.

Toward the latter part of 1913 it had become unmistakably plain that there would be a very heavy decrease in traffic in 1914. The Pennsylvania management, after probably very careful deliberation, decided on the policy of economy without *arbitrary* reduction in allowance for maintenance or any other expenses which was later carried out. The operating officers had the situation explained to them very fully. Any reduction in maintenance of way expenses had to be justified as carefully as an increase in expenses would have to be justified. No reduction of any class of expenses was to be made in such a way as might prove uneconomical in the long run. In other words, so far from sending out orders that shop forces must be cut, section men laid off, etc., headquarters put it up to the operating officers not to make reductions in expenses that would prove false economies.

In 1914 the Pennsylvania spent $14,486,000 for additions and betterments. The most important construction work now in progress is summarized in the construction news columns of this issue, and it is only necessary to mention here that the electrification of the main line is proceeding without interruption; that the telegraph and telephone wires between Broad street station and Paoli, Pa., and Jersey City to Rahway, N. J., have been completely placed underground, and the work of placing wires underground between New York and Philadelphia is being carried out.

During 1914 the Pennsylvania sold no securities, but since the close of the year has sold $49,000,000 of its consolidated mortgage 4½ per cent. bonds, which sale makes the consolidated mortgage practically a closed one, almost the entire $100,000,000 bonds which can be issued under it being outstanding. There are $86,827,000 convertible bonds due October 1, 1915. Stockholders had already authorized the issue of $31,000,000 additional securities and at the annual meeting on Monday last authorized an additional issue of $40,000,000, making a total of $71,000,000 securities which may be issued to refund that portion of the $86,827,000 maturing October 1 not provided for by the sale of the $49,000,000 consolidated mortgage bonds and for any other purpose.

The Pennsylvania had on hand December 31 (before the sale of the consolidated mortgage bonds, of course) $15,587,000 cash and $18,648,000 time drafts and deposits. There were $5,110,000 loans and bills payable.

The table shows the principal figures for 1914 and 1913:

	1914	1913
Average mileage operated	4,512	4,512
Freight revenue	$131,158,930	$147,317,395
Passenger revenue	38,977,848	40,599,628
Total operating revenue	187,251,851	205,080,112
Maint. of way and structures	25,019,605	26,334,595
Maint. of equipment	37,143,533	42,984,269
Traffic expenses	2,316,127	2,847,024
Transportation expenses	72,234,108	78,255,026
Miscellaneous	2,624,137	2,653,376
General expenses	4,954,732	4,923,127
Total operating expenses	141,292,243	154,997,418
Taxes	7,689,523	7,840,853
Net operating income*	35,258,772	39,241,841
Gross corporate income	51,792,223	57,712,898
Net income	34,090,765	41,920,833
Sinking and reserve funds	1,785,243	1,882,775
Dividends	29,952,186	28,394,248
Income appropriated for additions and betterments	2,230,336	6,787,583
Held in reserve	.....	2,500,000
Surplus	123,000	540,602

*The figures down to and including net operating income are for the combined properties—the Pennsylvania Railroad and the Northern Central—for both years. The figures below are for the Pennsylvania Railroad, and the Northern Central in the last half of 1914, for 1914. There is not, however, any serious discrepancy in the comparison, because previous to July 1, 1914, the Northern Central paid dividends to the Pennsylvania and its dividends were guaranteed by the Pennsylvania.

Letters to the Editor

CHEMICAL SPECIFICATIONS FOR BRAKEBEAMS

Franklin, Pa.

To the Editor of the Railway Age Gazette:

In a letter on this subject, published in the *Railway Age Gazette*, November 20, 1914, page 940, I stated: "I know of one mill that is rolling sections for the solid type of beam from scrap steel axles."

I find that I was in error in making this statement, as I am informed that axles are not used for this purpose; therefore, not wishing to do an injustice, I retract the statement. There have, however, been thousands of brakebeams made, the members of which were rolled from scrap high carbon steel rails.

B. Haskell, M.E.

ARE THE COMMISSION'S CONFERENCE RULINGS LEGALLY BINDING?

Harrison, Ark.

To the Editor of the Railway Age Gazette:

There are, no doubt, numerous railroad officials in all parts of the United States, whose early training and closely defined duties, have not made possible a satisfactory understanding of the various legal matters confronting the operating man of today.

For their benefit would it not be possible to briefly state through the columns of the *Railway Age Gazette* your views on the following:

Do, or do not, the Interstate Commerce Commission's conference rulings on the various acts to regulate commerce, have any judicial force or effect; or, in other words, considering the conference rulings in the light of working rules, would their violation invite the same penalties as obtains in connection with the Act to Regulate Commerce?

H. E. Cochran.

[It was our own opinion that the conference rulings of the commission had no binding legal effect and were not regarded by the commission itself as having such effect. We considered them merely interpretations of the law, disregard of which would bring punishment only if the courts should hold the rulings disregarded were correct interpretations of the law. However, we submitted our correspondent's question to George B. McGinty, secretary of the Interstate Commerce Commission, who has replied as follows: "This will acknowledge receipt of your letter of February 9, in which you ask to be advised whether the conference rulings of the commission have any judicial force or effect, and whether a deviation from a conference ruling is prohibited under the same penalties as are violations of the act to regulate commerce. As stated in the explanatory note published in Conference Ruling Bulletin No. 6, the conference rulings of the commission are simply expressions of the commission's views in connection with matters submitted informally to it, involving special facts or requiring interpretation and construction of the law. While these rulings are to be regarded as authoritative, and as precedents governing similar cases they do not have the force of formal orders entered by the commission under the authority conferred upon it by sections 13 and 15 of the Act to Regulate Commerce. There is no penalty provided for a violation of a conference ruling, as such, but obviously if a conference ruling is a correct interpretation or construction of the law, a deviation therefrom would necessarily involve an infraction of the law governing the particular matter to which the conference ruling relates. The penalty, if any, would be that attaching to the violation of the law." This statement from Mr. McGinty seems to cover the matter fully.—Editor.]

Viaduct Construction on the Kansas City Terminal

A Discussion of the Conditions Governing the Design of the Many Structures on This Important Project

By A. R. Eitzen
Office Engineer, Kansas City Terminal Railway

The construction work of the Kansas City Terminal included two distinct projects, the first, primarily for the benefit of the public, being the construction of a new union passenger station, and the second, to improve operating conditions, being the reduction of grades on all main line tracks east of the station and the elimination of the grade crossings over the entire system. A general description of the entire improvement at Kansas City was published in the *Railway Age Gazette* of May 23, 1913. The station which was recently completed was described in detail in the issue of October 30, 1914. A description of the design of the subways was published in the issue of December 13, 1912. The grade reduction and the grade elimination necessitated the building of 22,000 ft. of retaining walls, 21 viaducts and 12 subways, with approximately 181,000 cu. yd. of concrete and 8,500 tons of structural steel. A description of the general and detail designs of the viaducts in connection with this work is the purpose of this article.

The topography naturally divides the viaducts into two groups; the first comprising those which are isolated and which were designed independently of each other, as, for example, those crossing the tracks near the station; and the second comprising those in the big cut east of the station which were connected by walls and necessarily had to be considered together to obtain a harmonious result. The general design of the viaducts in the first group was simple, the entire problem being to have approaches of sufficient length at the specified grade to obtain the standard clearance of 22 ft. over the tracks. The spans over the tracks are of an inverted through girder type of steel construction; that is, a type involving stringers, floor beams and main girders, but giving a smooth floor with no girders projecting above it. The approach spans have been built either of steel of the same type or of reinforced concrete, depending on local conditions. A clause in the franchise ordinance requires the structure to be of open construction to a point where 7 ft. minimum clearance is obtained. Beyond this point to the end the structure is made up of earth fill between reinforced concrete retaining walls.

In the second group the viaducts are all comparatively short, the street grade being from 20 to 80 ft. above the main line tracks. Continuous walls were built on both sides of the main line to retain the slopes and to support bench tracks. These walls vary in type in accordance with local conditions. Wherever shale beds in natural formation and resting on limestone were found, facing walls were used. Where earth was found, lightly reinforced gravity walls were built for heights of 25 ft. or less, while above that height buttressed walls were used. In many cases facing walls were constructed for a part of the height with gravity walls above. The retained bench tracks serve industries along the line and either pass under the viaducts through box abutments or, as in two cases, cross the streets at grade.

The first preliminary designs for these structures contemplated a series of three hinged, reinforced concrete arch spans with supplementary spans for the bench tracks, but a detailed study of the borings showed that this type was not feasible owing to the uncertainty of the foundations. The same design was therefore adopted for the spans over the tracks as in the first group, the face walls of the box abutments supporting the spans, while the back walls, together with wing or tail walls, supporting the earth slopes. The building of a coping across the front face of the abutments on a line with the copings of the retaining walls joining them gave the appearance of continuous walls with the bridges rising from them.

The first thing considered in the design of individual structures was their general appearance. The vast majority of people see or think little of the strength or construction of a bridge. They do usually notice, however, any obstructions of the roadway and sidewalks, the general outlines, and in addition the hand rails and lamp-posts. For this reason these points were given first consideration.

Broadway Viaduct at West Entrance to Station

The grades for all structures were carefully studied with a view to securing an unobstructed roadway. In several instances the city was requested to allow changes of grade, which improved the connections with adjacent streets and at the same time allowed this type of construction to be used. The result was that out of 21 viaducts built, 16 have no projections above the street except hand rails and lamp-posts, 1 has trusses and 2 have girders along the curb separating the sidewalks from the roadway, while only 1 has a truss and another a girder in the center of the roadway in addition to those at the curbs. On the latter five structures, local conditions made it practically impossible to change the street grade or the grade of the tracks, the cost of the changes being far in excess of the additional cost of the through girder or through truss construction over the deck construction.

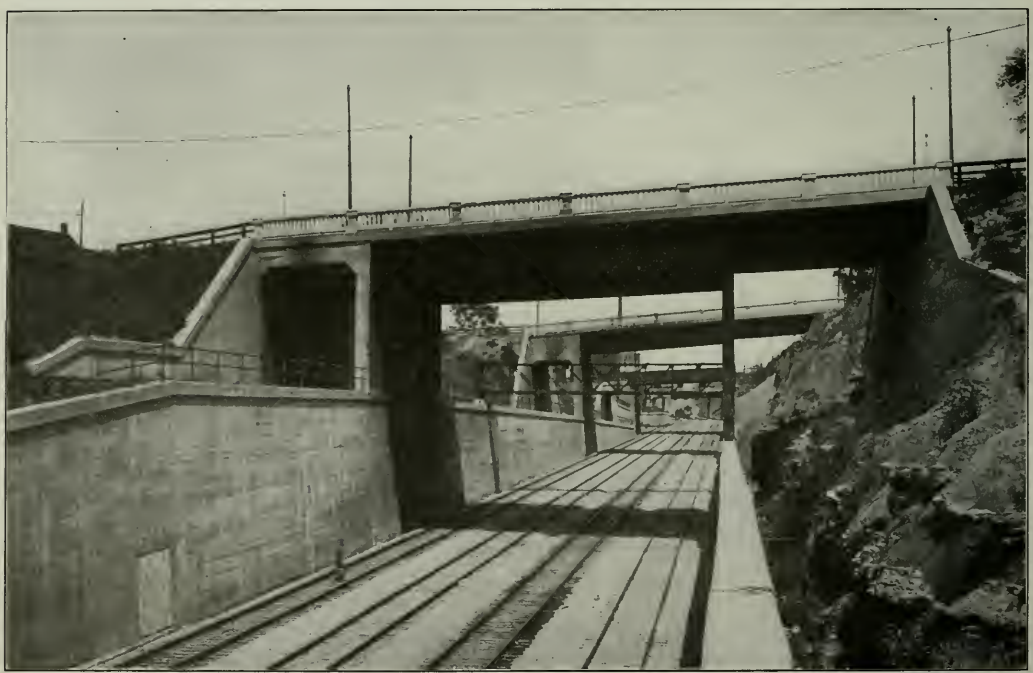
Special attention should, in this connection, be drawn to

the Pennsylvania avenue viaduct. Some question may be raised as to the advisability of designing deck plate girders with a span of 127 ft. 5 in. out to out, especially with a depth of only 9 ft. 8 in. from clearance line to top of pavement. However, it may be said that this structure is at the west throat of the station and that it was impracticable to shorten the span without badly disarranging a complicated track layout. Furthermore, Pennsylvania avenue will shortly become the chief artery connecting the north and south boulevard systems of the city, and the additional expense of keeping the roadway clear and unobstructed was considered justifiable. Ruling grades of 4 per cent were already being used on the approaches and local conditions controlled the length so that greater depth could not be obtained. This structure as well as all others had to be erected without disturbance of railway traffic and in a number of cases temporary structures for highway traffic were also provided.

The next point considered was the best appearance, consistent with economy and simplicity of design, of the structures from adjacent ones or from the back platform of trains passing under them. As a first consideration vertical curves of a length sufficient to give a smooth contour were used at all breaks in grade; second, a heavy coping of a depth sufficient to mask the ends of the sidewalk brackets, but not heavy enough to be out of harmony with the rest of the structure, was made continuous from one end of the structure to the other; third, all girders on any one structure were made of the same depth as far as practicable to preserve parallel lines for the top of the structure, the coping and the bottom line of girders. For those structures adjacent to the station, the divergence of the tracks made necessary the location of column bents at all angles. At first it was thought that this would seriously detract from the general appearance, but it was found that if the girder lines, which are mentioned above, were kept smooth the location of bents had little effect.

The hand rails are of reinforced concrete unit construction and consist of posts 15 ft. to 20 ft. center to center, upper and lower rails, balusters and blocks. Dowels to anchor the hand rail posts were set when the floors of the viaduct were cast. The method of erection was as follows: First, small square blocks to support the ends and third points of the lower rails were placed; next, the lower rails were set in position; then the posts, which are hollow and also notched out for the rails, were set over them and all were accurately lined; the balusters and top rails were then placed in position; the posts filled with concrete to anchor them to the floor of the viaducts and the caps placed on the posts, the ⅛ in. joints left between balusters and rails and between rails and posts to give ease of erection were then carefully pointed. Expansion joints were left in one side of each post.

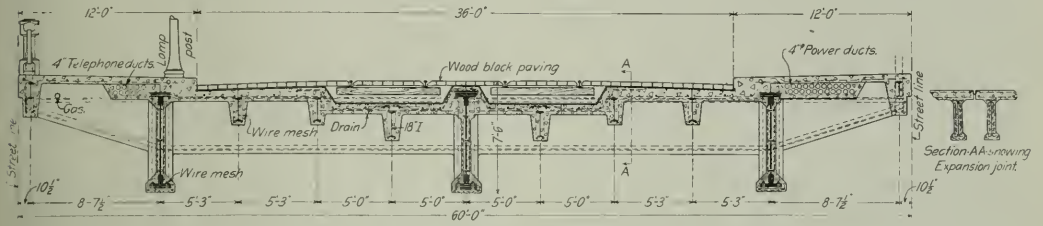
The lamp posts are of reinforced concrete surmounted by a single 100-watt lamp and 14 in. globe. They are arranged to be lighted by electricity but by removing the cables from the conduits and using a gas fixture and globe, gas may be used. A two-inch conduit is run in the curb on each side of the street to feed the lamps. At each post a pull box is inserted and a half-inch conduit carried from the pull box to the top of the post. Of course if gas is used the pipes must be connected through the pull boxes. A standard connection has been provided for this contingency. The lamp-posts are turned on a lathe, the method of manufacture being similar to that of making pottery. Lamp posts and hand rails have a sand finish, while the sidewalks have a float finish.



Typical Structures Built in Connection with Wall Construction

Provision was made for street car tracks on all structures as provided for in the franchise ordinance as well as conduits for the telephone and power companies and supports and protection for water and gas pipes. It may be mentioned in passing that proper provision for conduits and water and gas

pipes is one of the most difficult parts of the design of city bridges. The conduits used were of 3½-in. fiber laid with a minimum of ¾ in. of grout between ducts. The only difficulty experienced in their use was an inclination to float when the concrete was poured. This was prevented by setting pieces of wire in the green concrete of the slab supporting the ducts and using these to fasten pieces of reinforcing bars over the ducts before grouting them in. Inserts were built into the floor on the lines of the water and gas pipes to support hangers from which the gas pipes and the slabs protecting the water pipes will



Cross Section of Charlotte Street Viaduct Showing Typical Construction

be hung. The slabs supporting them are generally 2 ft. 2½ in. wide and reinforced with wire mesh. They will be built in units of about 5-ft. lengths and set in place on straps supported from hanger rods.

The viaduct span lengths were usually fixed by track conditions, although there was some latitude for some of the structures at the entrances to the station. The usual method of procedure adopted in the design was to first outline a tentative cross section so as to place conduits and pipes to the best advantage. Telephone and power cables were always placed on opposite sides of the structure. A detailed study of the arrangement was then made and the elevation of stringers adjusted so as to make the form work for the concrete floors as simple as possible, at the same time not losing sight of the fact that ease of erection of the steel work was very essential. These two points were very carefully watched throughout the work. From this it must not be inferred that design was neglected, for all elements of weakness were thoroughly investigated and complete shop details conforming to the latest modern shop practice were drawn up.

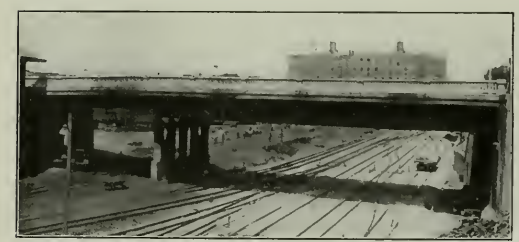
The specifications used for design, materials and workmanship were identical with the American Railway Engineering Association specifications for steel railway bridges, except for loads and a few minor points of design. The loads used were the dead loads already mentioned, a live load of two 100,000-lb. street cars on each track, the distance between end axles of adjacent cars being 10 ft., truck spacing 30 ft. and axle spacing 5 ft., the cars being assumed to occupy 10 ft. in width for each track; a uniform load of 100 lb. per sq. ft. on the roadway and 100 lb. per sq. ft. on the sidewalk. Impact allowance of 25 per cent was used for street car and roadway live loads. A 17-ton road roller was also used, assuming a spacing from center to center of axles of 10 ft. 9 in.; center to center of rear wheels, 5 ft.; load on front wheel, 11,000 lb., and load on each rear wheel, 11,500 lb. No allowance was made for impact on the roller, as this was assumed to be an occasional load. The distribution for road roller loads was assumed to be over a length of 8 in. at the point of contact and spreading longitudinally at a rate such that at any depth "D" below the pavement, the distribution would equal 8 in. plus D. Laterally the distribution was assumed equal to the width of the rollers.

Erecting a 127 ft. 5 in. Girder at Pennsylvania Avenue

Various types of construction were tried, but with the loadings used the best results were obtained by spacing the main girders either 15 or 20 ft. apart, with floor beams at intervals of 14 to 20 ft., supporting lines of longitudinal string-

ers 5 ft. apart center to center. The stringers were framed to outstanding legs of stiffeners on the floor beams. On account of the general direction of the tracks with reference to the streets, all structures were skew, but all stringers were framed square with the floor beams and all floor beams and brackets square with the girders except the end floor beams. At expansion points two sidewalk brackets and two end floor beams were always provided, one on the end of each span. The ease with which the expansion could be taken care of, especially in the concrete encased spans and in the concrete encased fascia beams of the non-encased spans, more than offset any additional weight involved, besides making the structures present a much neater appearance. Expansion joints were made by casting a piece of 3-lb. sheet lead bent into a semi-fold into adjacent spans, as shown in the accompanying drawing. The loop thus formed was then poured full of asphaltic mastic.

The concrete encased spans mentioned above probably require a word of explanation. At the time the Terminal Railway took over the old Belt Line property, there were a number of viaducts over the tracks. Nearly all of these were in serious condition due to the corrosive action of blast and smoke. A few of the later structures were concrete encased and were in much better condition. It was decided that in order to insure a long life to the structures all spans over the tracks with a clearance of 25 feet or less should be concrete encased. This work is now being done with a cement



McGee Street Viaduct

gun. As an additional protection, blast boards 3 ft. 6 in. wide are being placed over all tracks to protect the concrete from the direct blast.

In the wrecking of several of the concrete encased spans it was noticed that water had percolated through the pavement, penetrated between the concrete encasement of the beams and the steel, and cracked and loosened the encasement. For this reason it was thought imperative that all floors should be waterproofed. The waterproofing consists of three-ply fabric, two of burlap with a layer of felt between. Each coat was mopped down with asphaltic material in addition to a priming coat for the concrete. The pavement was laid directly on the waterproofing without any cushion intervening. For all grades, up to and including 6 per cent, creosoted wood block laid with lath joints was used. For steeper grades, brick was used. Along each curb two expansion joints, 1 in. and ½ in., respectively, filled with asphaltic filler, take care of lateral expansion, although it was found desirable to add additional longitudinal joints in several cases. Transverse expansion joints are placed at all expansion joints in the structure. As an additional safeguard, all street drainage was kept away from the structures as much as possible, and the drainage from the structures was conducted to catch basins at short intervals.

The wall, viaduct and subway designs were all made under the direction of George E. Tebbetts, bridge engineer, under the supervision of John V. Hanna, chief engineer. The construction work was executed under contract.

ANTI-FULL-CREW LAW CAMPAIGN

Samuel Rea, president of the Pennsylvania; Daniel Willard, president of the Baltimore & Ohio; Theodore Voorhees, president of the Philadelphia & Reading, and E. B. Thomas, president of the Lehigh Valley, have written letters to the stockholders of their respective companies, urging them to use their influence to have the full-crew law repealed.

R. L. O'Donnel, chairman of the committee representing the 21 associated roads of New Jersey and Pennsylvania, has issued a number of circulars during the past week dealing with certain local phases of the full-crew law question. To the people of a town where a new passenger station is needed, he observes that the $2,000,000, which now is being paid yearly to trainmen whose services are unnecessary, would build two hundred new stations at an average cost of $10,000 each. Mr. O'Donnel cites the stand taken against full-crew measures by the grangers of Texas, Missouri and New York. The farmers, he asserts, should help secure repeal of those laws in Pennsylvania and New Jersey, not only because they are fundamentally bad legislation, but "because of the higher prices for farm produce, making necessary increased plantings, and to meet the drawback of lack of labor." Farmers and business men of Kansas made such sharp protest that the bill which had been introduced in the legislature of that state was killed February 13 in the senate committee.

An effort to enact an excess crew law in West Virginia met with general opposition, and the bill was reported adversely by the legislative committee to which it was referred. In Alabama a legislative committee, after public hearings, concluded that the contentions of the trainmen's union were not well founded and that the measure would only compel employment of extra men not needed on the trains. The bill was consequently adversely reported.

In the state of Washington a bill has been agreed upon by committees of both the senate and the house, which in effect will repeal the full-crew law of that state and leave it to the Public Service Commission to say how the trains shall be manned.

Trainmen are trying to make the point that the railroads seek repeal of the laws in order to underman trains, even to the point of risking safety of passengers and reducing efficiency of operation. Nothing, says Mr. O'Donnel, could be further from the fact. "The best evidence that the railroads would not underman trains is afforded by what they are now doing. Thirteen railroads in Pennsylvania and New Jersey are operating 344 passenger and 446 freight trains manned in excess of what the law requires." He quotes Louis D. Brandeis, "best known of all critics of railroad affairs in the United States," who endorses the position taken by the railroads of Pennsylvania and New Jersey. In an interview at New York February 25 he says: "The railroads appear to me to have the better end of the full-crew argument. They seem to have made out a very good case. The full-crew laws are cumbersome and in an awkward way aim to accomplish something which a commission could do much better."

At last there promises to be a fair and open debate on the full crew question. Francis P. Boland, a brakeman of the Pennsylvania Railroad, who is also a member of the New Jersey legislature, sent a challenge to Mr. Rea, president of the Pennsylvania, asking that he, or such officers as he might designate, debate publicly the question how the law operates on the Pennsylvania in the State of New Jersey. Mr. Rea accepted, and the debate will take place at Elks' Hall, Jersey City, on the evening of Tuesday, March 9. Among several employees who asked the privilege of taking up the argument on the side of the company Mr. Rea has selected H. J. Fackenthall, an engineman who runs between New York and Philadelphia. Mr. Fackenthall has been prominent in the "safety first" work on the Pennsylvania, and is an experienced speaker.

SOME MAXIMA AND MINIMA IN TRAIN OPERATION*

By Alfred Price
Assistant General Manager, Canadian Pacific, Montreal

It has become a trite saying that a railway company has nothing to sell except transportation, but in order to sell its sole commodity it must have an ample supply available at all times, and to do so must buy a variety of materials.

During the past ten years almost every item it uses in construction and in the operation and maintenance of its property has increased in price. For example, steel rails, telegraph poles, car sills and lumber have increased by amounts varying from 29 to 54 per cent, while the wages of its enginemen, trainmen, yardmen, telegraphers and maintenance of way employees have increased from 19 to 79 per cent, an increase in all its purchases, including labor, of approximately 35 per cent.

If a commercial institution had to face the problem of securing sufficient additional revenue to offset such tremendously heavy increases in the cost of raw material and labor, it would adopt the simple and natural expediency of increasing the price of its product, so that the consumer would ultimately "pay the piper." But although a railway is a business conducted under much the same conditions as a manufactory, having many similar problems and difficulties, it does not enjoy the privilege of increasing its rates. In proof of this statement the following table, showing the earnings on all Canadian railways during the past seven years, is submitted:

Year	Passenger mile	Ton mile
1907	1.911 cents	.815 cents
1908	1.920 cents	.723 cents
1909	1.921 cents	.727 cents
1910	1.866 cents	.739 cents
1911	1.944 cents	.777 cents
1912	1.943 cents	.757 cents
1913	1.973 cents	.758 cents

Since 1907, therefore, the earnings per passenger per 100 miles show an increase of 6 cents, and per ton of freight per 100 miles a decrease of 5½ cents. But the ton mile units for 1913 were 23 billions, and the passenger mile units only three billions, so that the figures actually represent a very serious decrease in earnings. To be more specific, had the passenger mile and ton mile earnings of 1907 been applied to the 1913 traffic, the Canadian railways would have shown an increase in their net earnings of over $11,000,000.

But, compared to a commercial enterprise, the railway has other handicaps; it cannot, like a manufactory, for instance, close down its plant in dull times and wait until there is a demand for its product, nor can it warehouse its product, holding for higher prices. The public demands that an ample supply of transportation be kept on hand at all times whether required or not; that the railway company be prepared to take care of the "peak load" whenever an unusual demand occurs, and that the service be efficient. These demands may, or may not, be reasonable, but in any event the railway company must comply with them. In view of these demands and the constantly increasing cost of everything the railway has to buy, and the stationary, or decreasing, cost of everything it has to sell; it is absolutely necessary that the strictest economy, consistent with efficiency, be practiced, and that intelligent, scientific methods of operation be adopted.

Unfortunately, the existing lines and facilities are not likely to be taxed to handle the traffic for some time to come. It would be folly, therefore, to advocate the lowering of transportation costs by reducing grades, eliminating curves, or building better operating facilities. Instead, it is desired to suggest that, under existing conditions, there are opportunities to reduce the operating expenses, for it will be freely admitted that there is a wide field for economy on the Canadian railways without any impairment of efficiency.

*Read before the Canadian Railway Club, Montreal, December 8, 1914.

The operating official naturally desires to provide a service as satisfactory as can be reasonably expected by the public, and at the minimum cost. Efficiency and economy might well be adopted as his slogan. If he can handle the freight without damaging or losing it, he will take a long step towards efficiency, and, at the same time, will accomplish something worth while under the head of economy. Last year the Freight Loss and Damage account of the Canadian railways amounted to over $2,000,000, a sum double the amount paid out in 1911. The shipper wants the goods delivered to the consignee intact, and would gladly waive the $2,000,000 he now receives to have this done. This sum, therefore, may be regarded as a penalty imposed upon the railway for non-fulfilment of an obligation or contract. The railways are almost entirely responsible for this loss. The waste can be stopped by the adoption of up-to-date methods and insistence upon the exercise of greater care on the part of agents, billers, checkers, porters and trainmen.

For clearing wrecks and satisfying claimants on account of injuries the Canadian railways paid out last year over $1,500,000. There were no less than 710 people killed by the movement of trains, besides 2,966 injured. It is quite true that almost half of those killed were trespassers, and we are likely to continue to have a harvest of deaths from this cause every year until there is a law making trespassing a very serious offense, and a severe penalty is imposed for a violation. Most of the other fatalities and injuries might have been avoided by the exercise of ordinary care.

The largest single operating item is the fuel bill. It amounted to $28,000,000 last year on the Canadian railways. For every locomotive mile run there was consumed 113 lb. of coal for which was paid 17¼ cents. It is conceded that in order to secure the maximum tonnage with the minimum consumption everybody having to do with the running of trains must co-operate. The fireman alone might save a considerable sum of money. He now puts 11 scoopsful of coal into the firebox per mile run. If he could manage to get it down to 10, the net earnings of the railways would increase by $2,500,000. The question is, "would he do it if it was his own coal?" But it must not be left to the fireman alone. Coal can be saved by the engineer, the locomotive foreman and his staff, the yardmaster and his staff, train despatchers, operators, trainmen, and, in fact, by everyone from the superintendent to the call-boy.

It does not pay to run trains at high speeds, for aside from the greater liability to accident, and the relatively greater amount of damage and loss when an accident occurs, the service is expensive. Because of keen competition in certain territories, it would appear to be necessary to schedule some fast passenger trains, but when and where possible the actual running speed should not exceed from 45 to 50 miles per hour.

Last year the average number of passengers per train on Canadian railways was only 62, and the average number of cars was 5.6. The tonnage hauled per passenger train mile should be kept down to the minimum; on the other hand and for obvious reasons in freight service, the maximum tonnage per train mile should be handled, and all through freights should be scheduled slow enough to enable engines to pull their full tonnage under normal weather conditions. The effect of high speed upon coal consumption is not easy to express because of varying conditions, but it should be borne in mind that as speed increases beyond a certain point resistance increases and the efficiency of the locomotive decreases. As an illustration: Take a train running over an undulating subdivision with maximum grades of 1 per cent. A maximum speed of 25 miles per hour may be regarded as an economical speed, but to increase the maximum speed to, say, 40 miles per hour would result in a very material increase in the train resistance and a considerable decrease in the efficiency of the locomotive—the increase in the fuel consumed amounting to approximately 50 per cent. On a low

grade line where big tonnage is hauled, to increase the maximum speed from 25 to 40 miles per hour would necessitate a reduction of probably 50 per cent in the tonnage, and then more coal would be consumed than with double the tonnage at 25 miles per hour. Assuming, however, that the engine could handle 90 per cent of its original tonnage and run at 40 miles per hour, the coal consumed would show an increase of approximately 90 per cent.

There is an economical load for a locomotive. What that load is can be determined only by experience and by a series of tests. The maximum tonnage may not be an economical load, especially on what is known as a low-grade line. An engine given the maximum tonnage which it is capable of hauling on a line with grades of 0.4 per cent, or less, would run into overtime, the fuel consumption would be excessive and it would probably be found that the last straw, speaking metaphorically, had broken the back of the locomotive camel. On the other hand, to underload locomotives in through freight service in both directions is an inexcusable waste.

When, by tests made with a dynamometer car, it has been determined what tonnage a locomotive of a certain tractive power is capable of hauling economically over the maximum grades on a subdivision, operating officials should insist upon engines being so loaded, at least in one direction, and under normal weather conditions. Low temperature, a heavy fall of snow, a greasy rail, or any atmospheric condition that will retard the movement of a train will warrant running with a reduced tonnage, so as to permit reasonably good time being made from the initial to the objective terminal. It does not pay to haul maximum tonnage at the expense of excessive fuel consumption and overtime.

Theoretically, engines should be given their full tonnage rating in both directions, but in practice it is found that this cannot be done, as usually there is a preponderance of traffic one way, and locomotives must run in the opposite direction with reduced tonnage in order to keep the freight moving. However, under the circumstances, if engines haul the maximum load in one direction, the results should be satisfactory.

It might be well to demonstrate the effect of running trains with greatly reduced tonnage. The following statement makes a comparison of actual results on a certain subdivision, the periods "A" and "B" representing two summer months. During "B" the gross tonnage handled one mile was 87,008,449, and items indicated by "x" in "A" are based on this ton mileage:

Item	Period "A"	Period "B"
Average weight of train per mile	1,737 tons	2,133 tons
Train miles	50,136 x	40,876
Pounds coal used per train mile	129	128
Pounds coal per thousand tons hauled one mile	75	61
Cost	$22,893.55 x	$18,637.98
Saving		$ 4,255.57

The saving on this 125 mile sub-division was not due to any change in the physical characteristics of the road nor to the use of more powerful locomotives, but merely to a better loading of trains and during the month the saving amounted to $4,255.57, as above.

It will be observed that, although the average weight of train per mile during Period "B" was 396 tons more than during "A," the amount of coal consumed per train mile was approximately the same. This will not always follow, but the statement demonstrates clearly that if an engine is not overloaded, it will burn almost as much coal per mile when hauling 75 or 80 per cent. of its full tonnage as when it is loaded to its capacity. The same is true of wages and other engine and train supplies.

It is surprising the effect upon almost every operating item a small increase in the average load per loaded car would have. During 1913 the average weight of contents in loaded cars on all the Canadian railways was 19 tons—a very small load when it is considered that the average carrying capacity was 32.14 tons. An increase in the average contents would result in a decrease in the number of cars required to carry the same volume of traffic, and fewer cars would lessen the cost of locomotives, train, yard and roundhouse service, as well as some other incidental expenses.

There is now a campaign on to increase the average weight of contents of loaded cars on the Eastern lines of the Canadian Pacific in 1915, the increase aimed at being 3 tons per car. Based upon the traffic handled in 1913, when the average weight of the contents of loaded cars was 20.15 tons, it is estimated that the increased average load would represent a saving in three items alone of no less a sum than $800,000.

This sum can be saved in several ways.

(a) Select cars of large capacity for heavy freight.

If 80,000 lb. capacity cars were used to haul 100,000 bushels of wheat, the cars would be loaded up to 88,000 lb., and the whole shipment would be carried in 68 cars. To make the shipment in 60,000 lb. capacity cars the cars would carry only 66,000 lb. each and 91 cars would be used. In the former case the average weight of contents would be 44 tons, and in the latter only 33 tons. By using large cars the figures would be:

Contents	3,000 tons
Tare	1,274 tons
Total	4,274 tons

By using small cars:

Contents	3,000 tons
Tare	1,558 tons
Total	4,558 tons

Therefore, under the second plan, in addition to supplying grain doors, switching, inspecting and hauling 23 extra cars, the engines would have to haul 284 additional tons of dead weight from the point of shipment to destination and back again.

(b) Select smaller capacity cars for light and bulky freight. As the smaller capacity cars are approximately the same dimensions as the larger and weigh two tons less, they are just as suitable for hay, furniture, oats, etc., and for such commodities it is profitable to use them.

(c) Consignees who need but one car of freight at a time usually order the minimum carload, as per the freight classification. If the matter were properly represented to them, they might be induced to order in larger units.

(d) When a shipper holds an order for several carloads of freight for the same consignee and destination, it should not be a difficult matter to persuade him to load the full order in the minimum number of cars.

(e) Shippers and consignees who have suffered through car shortages in the past can be shown that the simplest way to prevent a recurrence of such a condition is by loading all cars to their full capacity. Not only will this plan avoid car shortages for a number of years to come, but it will prevent the congesting of terminals, which has also been the cause of a great deal of trouble to shippers and consignees in past years.

Another way to secure the maximum freight tonnage to the minimum tare and in the minimum number of cars is by avoiding the unnecessary movement of empty cars.

When the settlement for the use of foreign cars was on a mileage instead of a per diem basis, the principle that empties should be run in only one direction, and that opposite to the direction of the preponderance of traffic, was pretty generally adhered to. A cross movement of empties was then looked upon as exceedingly bad transportation. Since the change in the system, the penalty for holding foreign cars has been so heavy that under most circumstances it pays to send foreign cars home empty, even when to do so they must travel in the direction of traffic.

The necessity of moving foreign empties homeward promptly has probably had a tendency to weaken the hold which the transportation officer had upon the principle of moving empties in one direction only a few years ago. The principle, however, is as sound today as ever it was, but it

is conceded that, under the changed conditions, it must often be departed from.

The direction in which empties should move is naturally that opposite to the movement of the preponderance of traffic. The cost in that direction is comparatively small because the locomotives returning for loads are light enough to handle them and no additional locomotive mileage is necessary. When, however, empties are moved in the same direction as the balance of traffic, additional locomotive mileage is involved—not only so, but the empties are being sent out of a territory where they are in demand, and for every such movement, an empty must be hauled in the opposite direction to take its place, except for cars of special classes and for which there is no suitable commodity. A conservative estimate of the cost of hauling empty cars is 1½ cents per car mile. If, therefore, an empty car suitable for traffic is sent in the direction of the balance of tonnage, a distance of 300 miles, the total additional mileage involved is 600 miles at a cost of $9—a sum well worth trying to save.

During last year 24 per cent of the car mileage on Canadian railways was empty. If by some means this percentage could be reduced to say 20 per cent it would represent a large increase in the net earnings of our railways.

THE STANDARD BOX CAR—A NEGATIVE VIEWPOINT

By R. W. Burnett

General Master Car Builder, Canadian Pacific, Montreal, Que.

From time to time we read stirring articles from high railway officers on the desirability of a standard box car; these frequently take the form of a demand, a call to arms to rise and overthrow the mechanical man who, it would seem from these articles, has for many years obstructed progress and caused untold millions of expense by a failure to attain the desired end. Such articles are usually favorably commented on in the railway magazines, the impression seeming to be that the writers must of necessity be right, and the weakness of the mechanical man is sometimes apologized for with suggestions that in time he may come to see the matter in the same broad way as the higher officer.

If the box car situation is analyzed it will be found that the traffic officers and the officers who control the policies of the railroads are responsible for the diversity of box car dimensions, and that no one would be more pleased than the mechanical man if a more limited number of designs were decided on. Cars of varying or unusual dimensions, such as those of more than usual length, height or width of side door, or having large end doors or otherwise fitted for special service or use in a restricted territory; or for service which may be peculiar to the entire territory reached by the home road, are being demanded by the traffic department. It is not for the mechanical man to say that these cars, which may make 90 per cent of their mileage on the home road shall be built to the standard dimensions said by the traffic department to be unsuitable for the home service, in order that the cars may be standard for the 10 per cent of their mileage which may be made on foreign lines.

These matters can only be settled by the traffic department and others who decide on matters of policy, which affect almost entirely their own department. If persons who are at all worried about the box car situation will take the trouble to investigate, they will find that the box cars built in the last few years, especially those with steel superstructure, are costing very little for repairs. Barring wrecks, the repairs are confined almost exclusively to couplers, wheels, trucks and other parts which are all standard. If any large part of these repairs is due to a weakness in the standard the doctrine of adopting a standard box car is then proved unsound, as the standards were usually amply strong to meet the demands of service of the period for which they were designed; if weak, the design has been outgrown in the rapid development of the railways, which is the case with the car itself and which to some extent will be the case with any car that might be adopted at this or any other time.

From the large percentage of steel frame box cars built during the last few years the indications are that this design will be very largely used in the future. These cars are largely constructed of rolled shapes which seldom need renewal, even when a car is wrecked, as they can easily be straightened or reformed to the original shape at any car repair point. It has been found unnecessary to carry rolled shapes in stock for repairs, and as the parts of the cars which fail are the parts which are already standard, it is only necessary to carry in stock lining and decking, which are being standardized. The cars which are giving trouble now, and which are largely causing the uneasiness that brings forth the letters and articles referred to, are the cars which were built from ten to twenty years ago and represent the best state of the art at that time. If the best of them had been adopted as standard and had so continued to the present day, there is no doubt that the present repair bills would be about double what they are, and this to a degree is what it would mean in the way of expense ten or twenty years hence should a standard box car be adopted now.

It is true that we sometimes see appliances on cars, the value of which may be very much questioned, but it is probable that the net result of the use of these questionable devices may be on the credit side of the ledger for the railroads as a whole, as they are for the most part being developed towards some desired end with the final result that a simple and effective device is secured. It is also true that occasionally a designer makes an unfortunate mistake in some vital part of the car which results in bad failures on a certain series of cars, but these cars are usually so thoroughly advertised by the embargo placed on them by other roads that the railroads are benefited because the same mistake is not likely to be repeated.

If a box car with wooden underframe and superstructure were to be continued it would probably be advisable to go very much more into the standardizing of the parts than has been done, as the wooden car differs from the steel car in that the amount of material carried for repairs increases with the life of the car, whereas the corresponding parts do not have to be carried at all for steel underframe and steel superstructure cars, since more than enough parts are saved from fires and cars demolished in wrecks to take care of the few renewals that are required. At the Angus shops of the Canadian Pacific, where we have been ordering small lots of 250 box cars at a time to keep the shop going in a small way during the depression, every lot of cars is built slightly different; this in no way affects the desired interchangeability and will reduce the cost of maintenance. These changes are made principally for the following reasons: To protect the lading from the elements; to increase the strength; to reduce the weight, and to reduce the cost of maintenance. Examples are given below of how the conclusions are arrived at governing these changes.

Protecting the Lading from the Elements.—We have a sprinkler arranged to test a sufficient number of cars coming out of the shops to determine any possibility of leakage through the roofs, sides and ends. This is not the impractical fire hose test, but is made to approximate the worst storm conditions, and we do not stop when any weakness is found, until we find a substantial way of remedying the trouble. This is not usually done by car builders and is obviously much better than waiting for the claims department to report trouble, and the writer considers it unfair for shippers to be forced to use a car designed in all small details by persons who have not had the opportunity to make all of these investigations.

To Increase the Strength.—Minimum weight being a very important factor in the designing and building of cars in the effort to reduce weight, we occasionally turn out a finished design that may require slight strengthening in some of the parts. The necessity of increasing strength is usually confined to the

superstructure as we have from experience largely overcome the weaknesses that were common to the underframe.

To Reduce Weight.—While not so necessary as increasing strength, yet it is important to reduce weight where it is possible to do so with safety. Many opportunities are afforded with the variety of rolled shapes available, to accomplish this without extra cost, and often with a reduction in cost.

To Reduce Cost of Maintenance.—While the cost of maintenance is carefully considered by the designer, yet the cars in actual service when carefully observed bring to notice certain items of expense that can be remedied, and in some cases entirely eliminated. The use of rivets in place of bolts is probably one of the most important items to be considered in repair work. Bolts were used in the past for securing parts that would require frequent renewals, but as the failures to these parts have been reduced the bolt, which is expensive in maintenance, has been replaced by the rivet. Cast steel and pressed shapes in place of malleable iron have also to be considered here.

The comparatively low average cost of maintenance of the present day, considering the large amount of old wooden equipment still in service, is entirely due to the present design of car which confines the repair expense almost exclusively to the wearing parts, outside of a few unfortunate mistakes in design, as previously mentioned. It must also be borne in mind that the car of the present cannot show the lowest cost of repairs, while relieving the high cost of repairs to the old wooden car.

To sum the matter up, the parts that are movable and need to be renewed should be and are standardized. The use of rolled sections gives us a car which is otherwise a car of standard parts. We also have minimum requirements for the center sill construction which would seem, for the reasons given above, to be about as far as we should go at present in standardizing the box car, except that limiting outside and inside dimensions should be arranged for; this should be attended to by the traffic department. One of these dimensions, the height of running boards, it would seem very essential to decide on in order that the roads will not keep on increasing the height of their cars until the government concludes that there is not sufficient room for the trainmen on top of the cars and issues an order that bridges, tunnels, etc., must be raised to give sufficient clearance, which would be very expensive.

As small changes in the development of the car do not increase the amount of material to be carried in stock, or the cost of maintenance, why should a complete standard car be adopted, which, if followed, will shut off the improvement of details which is necessary if we are to progress?

A WAY TO STOP TRESPASSING

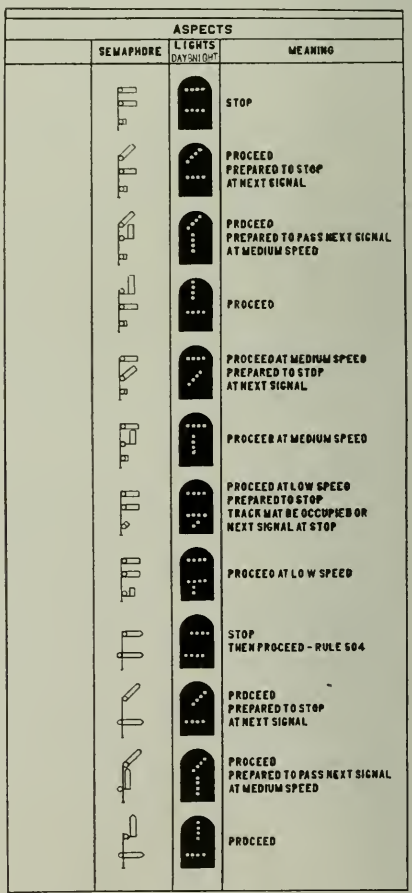
R. C. Richards, chairman of the Central Safety Committee of the Chicago & North Western, is distributing cards on which is printed a diagram showing the number of persons killed and injured during the 25 years ending with 1914 while trespassing on railway tracks or cars, below which is the following note: "Why not enact and enforce a law similar to that recommended by the National Association of Railway Commissioners, a copy of which is shown on the reverse side of this card, to prevent this slaughter."

The proposed bill referred to provides that "it shall be unlawful for any unauthorized person to walk, ride or drive upon or along the tracks, or within the right of way of any railroad company, or to cross such tracks or right of way at any place other than at a public or private crossing." An exception is provided for employees of a railroad engaged in the performance of their duties, persons going upon the property to save human life or to protect property, and persons going upon such property for the purpose of transacting business with the company or as passengers. It is further provided that station agents or section foremen shall have the same power, and shall be charged with the same duties in the enforcement of the act as are given to deputy sheriffs by the general laws of the state. The proposed bill also provides that any person wilfully violating the act shall be deemed guilty of a misdemeanor and liable to a fine of not more than $100, or to imprisonment in the county jail for not more than 90 days, or both.

The diagram shows that 113,570 persons have been killed and 123,611 injured, a total of 237,181, while trespassing, during the last 25 years, and that 66 per cent were citizens of the locality in which the accident occurred, mostly wage earners; 14 per cent were children under 18 years and 20 per cent tramps or "hoboes."

BEAM LIGHT SIGNALS ON THE PENNSYLVANIA

The light signals used on the Pennsylvania Railroad in place of semaphores for both night and day indications have been described in the *Railway Age Gazette* of January 8, page 61, and February 26, page 366. In addition to the high-speed and medium-speed indications described in the articles referred to, provision has been made at interlockings to give low speed indications also; and we give herewith the complete code of twelve aspects as printed for the use of enginemen. These signals are in use from Fifty-ninth street, Philadelphia, to Bryn Mawr; and this section includes two interlockings, OB and WH.



Semiphores and Their Equivalents in Light Signals

Fuel and Tonnage Performance on the Seaboard

A Study of Records Which Show Comparative Results for the System and the Various Operating Divisions

By L. G. Plant
Fuel Engineer, Seaboard Air Line, Portsmouth, Va.

The average weight and speed of freight trains has so important a bearing upon fuel consumption per ton-mile that any comparison between fuel consumption on two or more operating divisions, or the relative efficiency of different types of locomotives, should be based upon these operating conditions. Fuel records are of little value unless the particular conditions under which the records were made are also shown.

For this reason a locomotive performance report is issued monthly on the Seaboard Air Line showing not only the average fuel record of every locomotive in regular service, but the average time on the road, the speed, the miles run and tonnage hauled per trip. This report was designed originally for use in connection with an engineer's individual fuel record as a means of locating excessive fuel consumption upon various engines; but it has since proved a valuable source of data concerning the relative economy of the various types of engines in service and the comparative fuel efficiency of each operating division. The report includes locomotives in both freight and passenger service, although each class is shown on a separate sheet and reported by divisions.

Two copies of the Locomotive Performance Report for the North Carolina division are shown. The report of the January record of locomotives in through passenger service between Raleigh, N. C., and Columbia, S. C., includes a Pacific type of the conventional design and a newly designed Mountain type, several of which have recently been placed in service on these runs. While this report shows that the average number of cars hauled did not exceed 10, these engines have hauled 13 cars satisfactorily over a portion of this division having 1 per cent ruling grades. The report also shows that the Mountain type locomotive is more economical in coal consumption than the Pacific type, except on trains 9 and 10, which are faster and not so heavy as trains 1, 2, 3 and 4. The accompanying table gives the leading data for the Mountain, Mikado and Pacific type engines.

General Data

	4-8-2	2-8-2	4-6-2
Gage	4 ft. 8½ in.	4 ft. 8½ in.	4 ft. 8½ in.
Fuel	Soft coal	Soft coal	Soft coal
Tractive effort	47,800 lb.	50,200 lb.	36,000 lb.
Weight in working order	316,000 lb.	282,000 lb.	222,500 lb.
Weight on drivers	210,500 lb.	207,500 lb.	141,000 lb.
Weight on leading truck	53,000 lb.	26,500 lb.	43,000 lb.
Weight on trailing truck	52,500 lb.	48,000 lb.	38,500 lb.
Weight of engine and tender in working order	499,000 lb.	465,000 lb.	396,800 lb.
Wheel base, driving	18 ft.	16 ft. 6 in.	12 ft. 6 in.
Wheel base, total	38 ft. 11 in.	34 ft. 9 in.	32 ft. 9 in.
Wheel base, engine and tender	76 ft. 8½ in.	72 ft. 6½ in.	66 ft. 3 in.
Cylinders			
Kind	Simple	Simple	Simple
Diameter and stroke	27 in. x 28 in.	27 in. x 30 in.	23 in. x 28 in.
Wheels			
Driving, diameter over tires	69 in.	63 in.	63 in.
Boiler			
Working pressure	190 lb. per sq. in.	170 lb. per sq. in.	180 lb. per sq. in.
Outside diameter of first ring	76½ in.	73 15/16 in.	66 15/16 in.
Firebox, length and width	114⅛ in. x 84½ in.	108 in. x 84¼ in.	106⅜ in. x 71¾ in.

Mountain Type Locomotive Recently Placed in Service on the Seaboard Air Line

Seaboard Air Line Mikado Type Locomotive

BOILER—(Continued.)

Tubes, number and outside diameter	193—2¼ in.	230—2 in.	199—2 in.
Flues, number and outside diameter	34—5½ in.	32—5⅜ in.	24—5¾ in.
Tubes and flues, length	21 ft.	20 ft.	19 ft.
Heating surface, tubes and flues	3,396 sq. ft.	3,290 sq. ft.	2,609 sq. ft.
Heating surface, arch tubes	26 sq. ft.	26 sq. ft.	26 sq. ft.
Heating surface, firebox	293 sq. ft.	221 sq. ft.	183 sq. ft.
Heating surface, total	3,715 sq. ft.	3,537 sq. ft.	2,818 sq. ft.
Superheater heating surface	865 sq. ft.	759 sq. ft.	540 sq. ft.
Equivalent heating surface*	5,012.5 sq. ft.	4,675.5 sq. ft.	3,628 sq. ft.

SEABOARD AIR LINE RAILWAY

REPORT OF LOCOMOTIVE PERFORMANCE

Form 1700.

NORTH CAROLINA Division Month of JANUARY 1915

Between RALEIGH and COLUMBIA

Loco. No.	AVERAGE PER TRIP: Hrs. In Service	M. P. H.	TONNAGE (Freight Service)	CARS (Passenger Service)	POUNDS COAL CONSUMED: Per 1000 Ton Miles (Freight Service)	Per Car Mile (Passenger Service)	Per Mile (Switching Service)	REMARKS
			TRAINS	1 - 2 - 3 - 4				
200	6-45	30.2		9.9		10.9		MOUNTAIN TYPE
201	6-55	29.5		9.6		10.8		ENGINES
202	7-00	29.1		9.2		10.0		" "
203	6-40	30.6		9.2		11.4		" "
204	6-35	31.0		9.1		10.7		" "
209	7-10	28.5		9.1		11.3		" "
103	7-05	28.8		9.0		12.0		PACIFIC TYPE
			TRAINS	9 & 10				
100	5-45	35.7		8.0		10.6		PACIFIC TYPE
104	5-50	35.6		8.2		11.2		ENGINES
Averages								

A Locomotive Performance Sheet for the North Carolina Division for January, 1915

Grate area	66.7 sq. ft.	63.2 sq. ft.	53.2 sq. ft.
	Tender		
Water capacity	9,000 gal.	9,000 gal.	9,000 gal.
Coal capacity	17 tons	17 tons	15 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

The report of the November performance of all locomotives in through freight service on the North Carolina division illustrates the wide range in average speed, tonnage hauled and fuel consumption per ton-mile to be found on almost any operating division where several different types of locomotives are in service. Mikado, Pacific and Consolidation type engines are included in this statement. The Mikados have been in service only a few

SEABOARD AIR LINE RAILWAY

REPORT OF LOCOMOTIVE PERFORMANCE

Form 1700

NORTH CAROLINA Division Month of NOVEMBER 1914

Between RALEIGH and HALIFAX, MONROE and CAYCE

Loco. No.	AVERAGE PER TRIP: Hrs. In Service	M. P. H.	TONNAGE (Freight Service)	CARS (Passenger Service)	POUNDS COAL CONSUMED: Per 1000 Ton Miles (Freight Service)	Per Car Mile (Passenger Service)	Per Mile (Switching Service)	REMARKS
			THROUGH	FREIGHT				
MIKADO								
300	7:25	13	1361		130			
301	7:05	16	1260		139			
302	7:55	10	1350		135			
303	7:15	14	1180		166			
304	11:50	12	1458		114			
305	11:20	12	1489		114			
306	10:50	14	1504		125			
307	11:45	13	1435		119			
308	12:25	12	1461		125			
309	12:20	12	1481		133			
PACIFIC								
815	7:45	15	1038		154			
816	9:15	12	1072		172			
823	9:30	11	826		187			
824	9:50	11	948		162			
825	6:40	7	907		173			
CONSOLIDATION								
910	12:00	9	1210		165			
919	9:45	11	1225		148			
Averages								
MIKADO		13	1397		129			
PACIFIC		11	958		174			
CONSOLIDATION		10	1217		156			

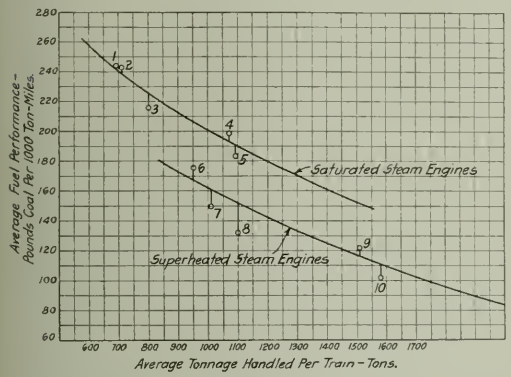
A Locomotive Performance Sheet for the North Carolina Division for November, 1914

weeks, and those of the Pacific type a little over a year; both are equipped with superheaters and brick arches. Some preference in the character of trains hauled may have been given the Mikados, but the greater capacity and economy of this type in comparison with the other locomotives is remarkable. In this instance the Pacific type engines appear to be rather an extravagant type for freight service, as they not only burn considerably more coal per ton-mile than the Mikados, but their average speed is lower. Both of these types are operated under the same maximum speed limit, hence the Pacific type is at a disadvantage on ascending grades and in accelerating trains. The two Consolidation engines reported at the foot of this statement are somewhat older than the others; No. 919 is equipped with a

Pacific Type Locomotive in Service on the Seaboard Air Line

superheater, while No. 910 uses saturated steam. In other respects the engines are identical and their records offer an interesting comparison bearing upon the efficiency of the superheater in every-day service.

The important question in regard to the superheater or any other device which makes for economy, is not what efficiency can be shown under *test* conditions; but what economy or increased capacity is being demonstrated daily under a variety of operating conditions. The real value of the superheater is often



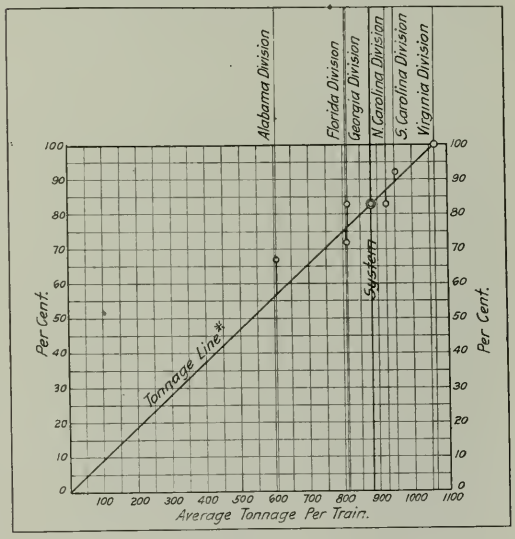
1—Ten-wheel Locomotives, Virginia Division
2—Ten-wheel Locomotives, North Carolina Division.
3—Ten-wheel Locomotives, Georgia Division
4—Consolidation Locomotives, North Carolina Division
5—Consolidation Locomotives, Virginia Division
6—Pacific Type Locomotives, North Carolina Division
7—Pacific Type Locomotives, Georgia Division
8—Pacific Type Locomotives, Virginia Division
9—Mikado Type Locomotives, North Carolina Division
10—Mikado Type Locomotives, Virginia Division

Chart I—Comparative Performance of Freight Locomotives on Divisions with Ruling Grades of 1-2 per cent

either obscured or exaggerated when the comparison is made between superheated and saturated steam locomotives of different sizes and types and operating under dissimilar conditions. Chart 1 is intended to show the actual comparative results obtained from operating a large number of superheated and saturated steam locomotives on divisions having the same maximum grades. Locomotives of the Ten-wheel, Consolidation, Pacific and Mikado types have been taken for comparison, and their fuel and tonnage records on the Virginia, North Carolina and Georgia divisions are shown on this chart. The height from the base line represents the fuel consumption per ton-mile, while the distance to the right represents the average tonnage per train hauled by each group of engines. For instance, the average fuel consumption of the Ten-wheel engines, Virginia division (point 1) is 244 lb. per thousand ton-miles, and the average weight of train hauled is 690 tons. The Mikado type engines on the same division (point 10) averaged 102 lb. of coal per thousand ton-miles and 1,580 tons hauled per train.

The points representing the performance of each group of saturated steam locomotives lie approximately upon one curve, while the points representing the performance of the superheater locomotive lie upon another curve somewhat lower than the first. The distance between these two curves represents approximately the saving in fuel per ton-mile effected through the use of superheated steam on engines of various sizes and types. The data for this graphical comparison was taken from the locomotive performance report for October, 1914. If the averages shown on this form for the November, 1914, performance of freight engines on the North Carolina division were also plotted on this chart, the records for the Mikado and Pacific type locomotives would lie adjacent to the superheater curve. A point representing the performance of engine 919 (superheater) would also lie near this curve, while a point representing the performance of engine 910 (saturated steam) would lie near the saturated steam curve.

Chart II is designed to show the relative fuel and tonnage efficiency of six operating divisions and the system as a whole. The average tonnage hauled per train on the Virginia division being the heaviest (1,066 tons), the tonnage efficiency of this division is assumed to be 100 per cent. The fuel consumption on the same division is the lowest (182 lb. of coal per thousand ton-miles); hence its fuel efficiency is also assumed to be 100 per cent. The tabulated figures for tonnage and fuel efficiency closely approximate each other; that is, fuel consumption per ton-mile increases in about the same proportion that the average tonnage hauled per train decreases. For instance: the average weight of trains hauled on the Florida division was 810 tons, or 76 per cent of the average tonnage on the Virginia division; the average fuel consumption was 253 lb. per thousand ton-miles, indicating an *actual* fuel efficiency 28 per cent lower than on the Virginia division, or 72 per cent. In this instance, the *relative* fuel efficiency on the Florida division may be considered as 4 per cent less than on the Virginia division, tonnage considered. Similarly, the relative fuel efficiency on the North Carolina division is 4 per cent



Division	Average weight of trains: Tons	Average weight of trains: Relative per cent	Average fuel performance: Lb. coal per 1,000 ton-miles	Average fuel performance: Relative per cent
Virginia	1,066	100	182	100
South Carolina	950	89	197	92
North Carolina	927	87	219	83
Georgia	811	76	219	83
Florida	810	76	253	72
Alabama	607	57	270	67
System	880	83	218	83

Note.—The distance of the circle above or below the Tonnage Line* indicates the greater or lesser relative fuel efficiency on each division.

Chart II—Relative Fuel and Tonnage Efficiency on Six Operating Divisions

less than on the Virginia division; while the South Carolina, Georgia and Alabama divisions show relative efficiencies respectively 3 per cent, 7 per cent and 10 per cent above the Virginia division and the system as a whole.

Where the relationship between fuel and tonnage efficiency is so close, fuel consumption per *train-mile* is not an unfair unit for gaging the relative efficiency of several operating divisions.

Credit for a great many reductions in fuel consumption per ton-mile can be given to an improvement in train loading. A

study of the tabulated figures shown on chart II indicates that if, for instance, the average tonnage on the Florida division (810 tons) could be increased so as to equal the tonnage hauled on the South Carolina division (950 tons), the fuel consumption could presumably be reduced from 253 lb. per thousand ton-miles to approximately 200 lb. Fuel and tonnage efficiency are so interdependent that any systematic effort to reduce the consumption of fuel per ton-mile should be supplemented with a campaign for the maintenance of a full, but not excessive, uniform train load.

TRAFFIC CLUB OF CHICAGO

The eighth annual banquet of the Traffic Club of Chicago was held at the Hotel LaSalle, Chicago, on February 25, with nearly 700 in attendance. President J. Charles Maddison presided and B. D. Caldwell, president of Wells, Fargo & Co., acted as toastmaster. The speakers were William Sproule, president of the Southern Pacific Company, and Col. H. P. Bope, vice-president of the Carnegie Steel Company. James J. Hill, who had been invited to speak, but was unable to be present, sent a paper which was read by President Maddison. Mr. Hill's paper, as well as the addresses of the two speakers, dwelt mainly on the causes for the depressed condition of business, and all agreed in ascribing the cause to a surplus of uninformed and unnecessary legislation against business.

"What productive activity needs most," said Mr. Hill, "is simply a period of freedom from uncertainty resulting from constant political attacks. Business needs a rest cure. Uncertainties from tariff revisions and banking legislation are profound. The trade commission law asserts the right of a federal government to control and regulate business as a whole, not merely that affected with some public use or that which offends in some way against the law, but the peaceful and legitimate conduct of ordinary affairs. No more money, or more credit, or foreign markets, or a merchant marine or any other accessory advocated is so necessary to the country at this time as a period of rest from legislative interference with, and arbitrary control of, the country's business. Even if this be granted revival must be slow in halting. The whole country wants prosperity. The main conditions favorable to a happy change exist. It calls only for understanding, cooperation and harmony between all those elements which unite to make it both economically and politically one."

Mr. Sproule said in part: "The public interest in transportation is as keen as it is misinformed. The public interest in transportation really rests in the one word 'service.' One of our difficulties is that the subject when thus regarded looms so large as to extend far beyond the horizon in most lines. The fact is, the public interest in transportation is different from the interest the public takes in transportation questions in these times.

"Wherever civilization exists the go-ahead spirit of the American people is proverbial. Like every other proverb this one has its exception. That exception is transportation. American transportation has lost its momentum. Today railroad construction in the United States has ceased except to finish a few odds and ends. The railroads are under the heavy hand of repression. The public attitude with respect to them has very little to do with the public interest. The kind of interest on the part of the public which is aroused by the platitudes and prejudices voiced from 10,000 political platforms is at variance with what is really to the public interest. These harangues prate about a very few phases of the transportation question, and minor topics are magnified for the popular eye to look like big things.

"The railroads are accused of influencing politics. It is strange, indeed, that by popular will the railroads are denied access to the forum which makes their laws, determines their tribunals, fixes the basis for their taxes and designates by enactment many operating matters and expenditures that belong to the domain of management. Methods for presenting the case of the transportation companies in the seats of legislation may in various ways, and at various times have been defective, but not more so than the proposals and methods which the transportation companies believe it to be their right and duty to combat.

"Following upon all this misrepresentation and play upon prejudice has come a considerable period of public distrust with consequent withdrawal of confidence in the greatest industry in this country. This lack of confidence was in turn followed by general business depression, for all business is based upon credit and credit has its foundation in confidence. It is in consequence of these conditions that we are going through a period of unemployment and distress, the like of which this nation has never known. It is the employer who is first out of employment. As a natural sequence he is followed by the employee, who next finds himself out of work. Unemployment begins only when the employer himself begins to be unemployed. We have this period of unemployment because all business is bewildered and uncertain. It does not know whether it may proceed in safety. This condition began with transportation and now extends to all business. The greatest trouble with this country today is that every business which has been developed by the genius of the American people has become the object of unforeseen attacks from some quarter, or feels the threat or danger of attacks."

Colonel Bope spoke on the future relations of manufacture to transportation. In discussing legislation he said that in the past five years over 62,000 laws have been passed in this country, 2,000 by the federal congress and 60,000 by the state legislature. "We have apparently gone legislation mad," he said. "In the Sixty-Third Congress there have been introduced in the Senate over 7,000 bills and resolutions and in the House over 23,000, of which about 400 have been passed. The railroads have had more than their share of these enactments. For one, I do not feel that the expansion of trade in this country, so much of which is due to the railroads, could or would have been possible had the Interstate Commerce Commission been in existence during that period when railroad building was so active and when faith in the future was so large an element in the development of the country."

After discussing the needs of the railroads he said:

"On the other hand, there is something due the manufacturer from the railroads. A study of past conditions shows that when the railroads have been buying the most freely there has been the greatest prosperity and conversely the greatest depression. Is it not possible to obtain a more equal division of railway purchases so that they may not all largely come in a short period, creating demands which overtax every facility of manufacturing, causing dissatisfaction, delays and loss, to be followed by little or no buying when the changed conditions mean reduction of values, output and employment. There is a certain steady depreciation each year due to use. Let these demands come with regularity; not always to the highest point, that would be too much to expect, but with some percentage in a fixed range. This would mean steadier operation, more stable values and a larger measure of return for both producer and transporter."

An Argument for Power Interlocking.—Where state laws governing liability for personal injuries to employees from obstructions on the right of way are very severe, and are strictly enforced, as in Texas, power plants are the only suitable interlocking in places where there is much walking beside the track, as in switching. The power switch movements can be placed below the level of the ties and the wires conducted underground, which cannot be profitably done with mechanical connections. In such cases, care should be taken to provide proper drainage, or the bills for repairs are liable to be greater than personal injury claims.—*W. H. Arkenburgh.*

Arbitration of Engineers' and Firemen's Demands

Continuation of Testimony and Cross-Examination of A. W. Trenholm on Effect of Demands on Operation

A. W. Trenholm, general manager of the Chicago, St. Paul, Minneapolis & Omaha, and chairman of the Conference Committee of Managers, representing the Western railways, occupied the witness stand throughout last week at the hearing in Chicago before the board of arbitration on the demands of the engineers and firemen. He completed his direct testimony on the effect on operating conditions of the enginemen's demands on Tuesday, February 23, after having been on the stand since February 16, and cross-examination was taken up by Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers.

Mr. Stone asked if it was not common practice after a committee representing the men and the officers of the company had entered into an agreement and both understood it alike, for the company to allow some timekeeper to say that it meant something else? Mr. Trenholm thought that such cases were very rare. Mr. Stone said a number of roads have traveling or chief timekeepers, who make trips over the road and that one trip of this kind usually means business for the brotherhood committees for the next 10 months. He asked if there was not an incentive for an ambitious young official to attempt to operate his department as economically as possible, and therefore to construe schedules in favor of the road as often as possible.

"No, I think there is not," said Mr. Trenholm, "because one of the qualifications that it is necessary for an ambitious young superintendent to have to advance in the railroad business is to do things right, and if he hasn't got judgment enough to interpret and apply a contract between his superior officer and the men he is not likely to get very far in the railroad business."

"Is it not a fact that the operating official knows the men will not strike for a few cents or a few dollars?" asked Mr. Stone, "and that he is perfectly safe in clipping off a little here and there by any ruling he may make?"

"Absolutely no," said Mr. Trenholm. "I don't believe that any officer would so belittle himself as to do anything of that kind, and I think if he did on any properly officered railroad the man who did it would be censured very severely."

"On some railroads the man who did it would be promoted," said Mr. Stone.

In discussing the demand of the men for rates of pay based on the weight on drivers, Mr. Trenholm said he would not oppose that as against the cylinder classification, that both involved technical inconsistencies, but that he objected to the enormous increase in wages involved in the proposed re-classification on the weight basis. "I see no objection," he said, "if the transfer is made and made properly, so that everything is equalized when you do away with the present basis. Then adjust the wages if there is any adjustment necessary." Mr. Stone said that if the men had retained the cylinder basis in their demands they probably would have asked for a greater increase in pay for each type of engine.

This led to an argument as to the proper return on capital in which Mr. Trenholm said that labor is entitled to fair and reasonable compensation and capital to a fair and reasonable return on its investment, which he thought would be 6 or 7 per cent.

MR. STONE'S DEFINITION OF CAPITAL

Mr. Stone gave as a definition of capital: "Capital is nothing in the world," he said, "but labor saved and materialized. The man who has capital holds it because the great mass of workers are willing he should hold it and the law gives him possession of it and makes it possible for him to hand it down from generation to generation, with the result that 72 per cent of our so-called American citizens are workers, and contribute a certain percentage of their daily labor to a very few of the idle rich, who, in turn, control not only our railroads, but all the rest of the big businesses." Mr. Stone added that he was "neither an anarchist nor a socialist."

Charles Nagel, formerly Secretary of Commerce and Labor, and one of the arbitrators, asked Mr. Trenholm a number of questions on the subject of government regulation. Mr. Trenholm admitted the need for regulation because of the results of competition among the railroads in former years.

"The question today," said Mr. Nagel, "is whether we have not learned to place our sole reliance upon regulation and to place too much confidence in the mere making of rules, instead of counting somewhat upon the enterprise itself. Is there not some question whether the railroads are not suffering from a multitude of authorities that are undertaking to regulate at one end, and powerful labor organizations working on the other end, and the same organizations in your legislatures, advocating adverse legislation?"

"I think there is no doubt about that," replied Mr. Trenholm.

Referring to a statement of Mr. Trenholm's, that the men on the Omaha were willing to give an honest day's work for an honest day's pay, Mr. Stone said they had given about a 99 per cent strike vote. "Well, I wouldn't blame them," said Mr. Trenholm. "A number of men asked me how they should vote and I told them the way it was put up to them they could not do any other way and do justice to their organization."

Mr. Stone said he believed Mr. Trenholm had said that he did not believe "we had reached the limit of human endurance yet."

DOES AN ENGINEER WORK HARD?

"I never heard the men talk about the limit of human endurance," replied Mr. Trenholm. "I have never heard that except from some grand officers of labor organizations. I am very much opposed to overworking men in the transportation service."

At one point Mr. Trenholm remarked that some engineers he knew "live pretty well" and that the life of an engineer is "a good, healthy life."

"You don't see these fellows who are worn out and thrown on the scrap pile," said Mr. Stone.

"I have not seen any very extensive scrap heap around where I am. I presume, with the very large number of men you represent and over so vast a territory, there are bound to be a great many failures. There are a great many failures in any line of life. General managers, even, are dropping off pretty rapidly these days," says Mr. Trenholm.

"Is there any hard work about an engineer's duties at all, from your standpoint?" asked Mr. Stone.

"Why, there are sometimes long hours," replied the witness. "There is always the responsibility of the engineer. He has got to be on the alert at all times. But speaking of his ordinary day's work, there is not anything in an engineer's life, I think, that is very laborious work. An engineer has been relieved of everything he could consistently be relieved of. Engineers used to come around before they went out and look their engines over pretty carefully, used to do some work on their engines themselves. It is an exception for an engineer to do that nowadays."

"At the same time they are asking to be relieved of putting their tools on locomotives and such other necessary details, they are demanding an arbitrary payment for 30 minutes' 'preparatory time.' It is inconsistent to ask relief from the final vestige of preparatory duties and demand at the same time additional pay for doing the very work from which they are asking to be relieved. There is no reason why engineers and firemen should not do such work. They are the most capable to do it and are made of no finer clay than the rest of us. We all have to work."

"If a crew has made much less than 100 miles and worked less

than 10 hours, yet under the guaranteed minimum day is paid for 100 miles or 10 hours," said James M. Sheean, counsel for the railways, "you think it is perfectly proper they should be asked to do these incidental duties?".

"Yes," replied the witness, "I never heard an engineer object to it. A good engineer wants to do it himself to be sure it is properly done."

Speaking of the rule requiring payment for preparatory time, Mr. Trenholm said if a man is paid on an hourly basis he should be paid for every minute of his time.

"But 79 per cent of the freight engineers are paid by the mile," said Mr. Stone.

"All right," said Mr. Trenholm, "then he is paid for it. An engineer does not make miles. His ability to make miles depends very largely on the facilities he is given by the railroad."

"If a man ran 100 miles in three hours he would be paid for 100 miles. Would he owe the company anything then?" asked Mr. Stone.

"That would depend, in my judgment, on the circumstances."

"Hasn't he given you a full day's work of 100 miles or 100 pieces."

"No pieces about it. He don't make miles. He has nothing to do with making miles. He cannot control a mile. He starts out on a run of 125 miles, and he may do it quickly if all the conditions are favorable, but on the other hand, he may be delayed and be out more hours than the miles would cover. When his miles exceed his hours when divided by 10, he is paid in miles, and when his hours are greater he takes the hours. He is guaranteed a day in both cases."

"You are not willing to concede," said Mr. Stone, "that when a man runs 100 miles he has given you the equivalent of a day's work and owes nothing."

"I concede it under the ordinary conditions of railroading," said Mr. Trenholm, "and I don't claim the right to put him in another class of service, or work him 10 hours to equal his hundred miles. But if he got into a terminal and there was an emergency, and I should want him to go out and do something and I used him for an hour or two hours, I claim I don't owe him anything for the hour or two on this emergency engine. If he runs 150 miles he is paid 15 hours for four or five hours' work, 364 days in the year, and if I happened to need him for the other day on a little bit of a job I would not feel like paying him extra for it."

Mr. Stone asked if he thought the men ought to throw it in for good measure. Mr. Trenholm thought he was not asking them to throw it in, but that the road had paid for it. Mr. Stone insisted that the railroad had earned its revenue by miles, but is not willing to share it with the engineer on that basis.

"The engineer has always got his full share of the earnings of the railroads, as compared with any other labor on the railroad," was the reply.

In questioning on the automatic release proposal, Mr. Stone asked if the roads could not change their schedules so as to avoid the effects of the automatic release. "Very little change could be made," replied Mr. Trenholm. "Certainly the railways cannot run their trains to suit the engineer and fireman. They must run them to suit the public. The engineer adopted his profession fully realizing the conditions, and there is no condition which warrants guaranteed pay, a five-hour day, an arbitrary payment before the day's work, another after and others in between. I don't believe there is any demand in the commercial world today for a rule that says five hours or less is a day. They don't even guarantee that. They simply guarantee to come out when called and work a little bit and then they demand arbitraries."

"PRODUCTIVE EFFICIENCY"

Mr. Stone tried to show that increased train loads increase the earnings of the railways, and the so-called "productive efficiency" of the men. Mr. Trenholm maintained the only result was a saving in the handling of the business at hand.

"In this western country," said he, "if it had not been for the money put into railways for reduction of grades, elimination of curves, increasing car capacity, and larger engines able to handle greater tonnage, I think 75 per cent of the western roads would have been bankrupt. The roads could not live under conditions of 15 or 20 years ago. The little engine, little car and little trainload could not exist. Under the pressure that has been on the railways to reduce rates and make improvements required by state and federal laws, if it had not been for the resourcefulness of railroad men, bringing to bear every possible means of curtailing expenses, I think I am safe in saying 75 or 80 per cent of the roads today would be bankrupt. There never was a time when railway operation was more closely watched to reduce expenses than it is today."

Mr. Nagel asked whether the time and a half for overtime rule, in his opinion, would afford any stronger inducement to a railroad to avoid overtime than present conditions. "No," replied the witness, "and I believe the only thing that could be done to avoid that extreme penalty would be to change your terminals and revolutionize train operations."

Mr. Stone asked Mr. Trenholm if the engineer was not the most responsible man on a railroad.

"No, I don't think so," replied Mr. Trenholm. "There are lots of men on the railroad who are more responsible than he is, the road masters and train masters, train despatchers, superintendents and assistant superintendents. All the minor officials on a railroad work twice the hours he works. There is no time in the 24 hours they are not subject to call."

Mr. Stone said: "You could give the whole class named a holiday for a week and the railroad would run right ahead if the engineers kept working."

"No, it won't," said Mr. Trenholm, "the engineer would not run very far without the train despatcher."

In discussing the amount of time a man should work during a day, Mr. Trenholm said that he put an order in effect on his road years before the hours of service law went into effect, limiting men to 16 hours, and that he has been considering very seriously for two years putting in another order limiting them to 14 hours.

ACTUAL EARNINGS OF TYPICAL MEN FOR ONE YEAR

After the cross-examination on his earlier testimony Mr. Trenholm introduced an exhibit giving payroll figures for 9,030 men for the year ending June 30, 1914. "To get a true picture of the actual results under present conditions," he said, "each railway was asked to give the earnings for the year of one man in each pool or group in which the men divide among themselves in turns the work on one run. For each is shown the number of men, whether 2, 3, 5, 10 or 20, of which he is thus representative. If one man earns the amount shown each of the others in that pool could have earned the same by working his assigned time." The exhibit showed the yearly earnings of 3,230 engineers and 5,800 firemen, together with the name, location, number of miles made and time worked. As only a partial list Mr. Trenholm pointed out by name 11 engineers who are earning over $3,000 per year, with a maximum of $3,725.20, and a partial list of six firemen who are making from $1,800 to $2,061 a year. There were many more men in the same pools, said Mr. Trenholm, who had the opportunity to earn as much, or more than these men.

President Carter of the Firemen's organization objected to the introduction of the exhibit, on the ground that the earnings shown were not representative. "We realize our case is lost if we take the exhibits of the railroads too seriously," he said. "They do not represent what they purport to." For a time it appeared that the payrolls for all of the roads would have to be shipped to Chicago to satisfy him, but Mr. Trenholm showed that the figures given for each man were typical of the others in the same service.

Mr. Trenholm concluded his direct testimony on Monday, March 1, by presenting a summary of the previous exhibit. The summary showed for the 9,030 men the number of months the men worked in each assignment, the total number of trips, the total miles, hours on duty, hours per trip, lost time, total wages of the assignment, wages per hour, wages earned outside of the assignment and the total wages. The average miles, hours and wages for each class of service are shown in the following table:

	Average miles per trip	Average hours per trip	Average wages per hour
Engineers—			
Passenger	133	5.5	$1.13
Through freight	117	9.5	.70
Local or way freight	93	11.6	.59
Pool or chain gang	110	9.5	.70
Branch passenger	85	4.7	.86
Branch freight	74	9.5	.61
Mixed	47	5.5	.61
Suburban	28	2.4	.72
All engineers	96	7.2	.76
Firemen—			
Passenger	132	5.4	$0.72
Through freight	116	9.4	.46
Local or way freight	91	11.4	.38
Pool or chain gang	110	9.6	.46
Branch passenger	82	4.6	.52
Branch freight	69	9.2	.39
Mixed	45	5.3	.38
Suburban	31	2.3	.46
All firemen	93	7.0	.48

This concluded the direct testimony of the railways and rebuttal testimony on behalf of the two brotherhoods was begun by W. J. Lauck, statistician for the two brotherhoods.

RETAINING WALLS ON SOFT FOUNDATIONS*

By W. S. Lacher

Office Engineer, Chicago, Milwaukee & St. Paul, Chicago.

The Chicago, Milwaukee & St. Paul is now engaged in elevating its tracks in the city of Milwaukee between the Kinnickinnic and the Menominee rivers, a distance of about 1½ miles. When this portion of the road was built in 1871, about two-thirds of it was placed on a pile bridge because the ground surface at that time was but little above the level of Lake Michigan and was virtually a marsh. Since that time, this trestle has been entirely filled in, as has also the surrounding property, much of which has been improved with buildings of various kinds. The tracks have settled greatly since the filling was done, but as settlement has occurred, additional material has been placed under the tracks so that the original elevation has been maintained. Many of the buildings in the vicinity, however, show evidence of unusual settlement.

Because of the uncertain conditions, foundation investigations were made; test piles being driven to a depth of 80 ft. and test borings carried to a depth of over 100 ft. These investigations showed a deposit of filled material from 10 to 15 ft. deep immediately below the surface, consisting of gravel and sand under the main tracks and refuse of various kinds under side tracks and unoccupied portions of the right of way. Below this, to a depth approaching 80 ft. there are numerous though rather poorly defined strata of wet, slimy clay and fine sand, below which is a bed of coarse sand and gravel to an unknown depth. The tests showed beyond question that piles would have to be driven into this gravelly material to be at all reliable. Owing to a lack of sufficient number of drivers with leads long enough to handle 75 and 80-ft. piles, it was evident that many piles would have to be driven in two sections and connected by splices. Taking into consideration the results of pile tests, the great length of piles and the necessity for splices it was concluded to limit the load per pile to 15 tons.

A mass concrete retaining wall on a pile foundation such as shown at "a" in Fig. 1, would prove very expensive under such conditions. This naturally led to speculation as to the possible use of walls on natural foundations under such unfavorable conditions. Many types of walls in mass and reinforced concrete were investigated, but most of them were eliminated either because they gave too great a variation in the toe and heel pressure under the various cases of loading or else they were not capable of withstanding the large settlement anticipated without possibility of serious damage. The only common design that seemed to approach the solution was the mass wall marked "b," or its equivalent "c" in Fig. 1, of reinforced concrete. The advantage in cost is apparently with the former. As the possible source of a solution it was suggested by C. F. Loweth, chief engineer, that studies be made to ascertain the feasibility of adapting either the timber crib or the dry stone wall to plain or reinforced concrete.

The dry wall was the first to be studied. A dry wall is inclined at such a slope that the resistance line will fall at the center line of the wall or behind it at all points in its height. The most primitive form for such a wall is shown at "d," Fig. 1. This has the joint placed very nearly at right angles to the resistance line but it obviously involves difficulties in construction which would make it prohibitive. A modification of this design is shown at "e," which is simply a slab of concrete leaning against the embankment. This slab could be built in place or cast in short sections and erected at a convenient time. In either event it would be necessary to provide struts of timber or concrete to support the wall until the embankment could be placed.

In the design marked "f," Fig. 1, is shown a form intended primarily to get a cheap construction. It consists of a tier of blocks with horizontal beds stepped back to give the desired slope. To avoid the necessity for erecting these walls in short sections during the placing of the embankment they can be provided with ribs extending back into the fill at intervals of about 9 ft. This portion of the wall serves simply as a support until the embankment has been placed and is not intended to add to the stability of the wall against lateral pressure. The weakness of this design is that the resultant pressure at each joint is inclined at rather an oblique angle with the horizontal, approaching much too close to the angle of friction of concrete upon concrete. This naturally suggests the use of a mechanical lock or bond between the blocks, such as would be secured, for example, by corrugating the surfaces of the blocks by casting them in forms lined with corrugated iron or by casting a lug on the bottom of each block as shown in "g," Fig. 1. The scheme illustrated at "h" is a combination of "d" and "g" in that part of the joint is horizontal, while the forward portion is inclined at an angle even greater than the perpendicular to the resistance line. By this means the desired resistance to sliding is obtained without sacrificing anything in the ease of erection. The forms

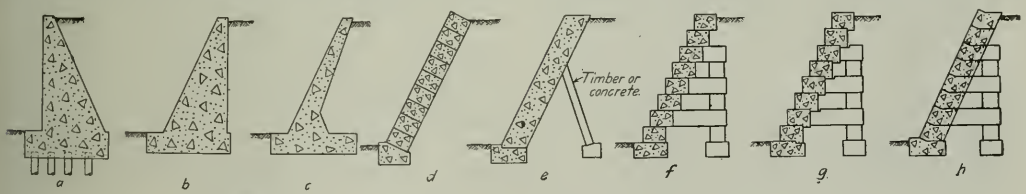


Fig. 1 Various Types of Retaining Walls Considered for Use on Soft Foundations

*Abstract of paper presented before the Western Society of Engineers on February 8, 1915.

are somewhat more complicated, but this is not of great importance if any considerable number of the blocks are to be cast.

The equivalent of a timber crib in reinforced concrete is not, as it might seem at first thought, a combination of various shaped concrete sticks dovetailed or doweled together, but it is a box or series of boxes of reinforced concrete built with not less than one cell complete in one piece. The walls are of such a thickness as to compromise considerations of strength, economy and ease of construction. Concrete cribs have been used for some time by the war department in the construction of breakwaters on the Great Lakes, but in this adaptation they do not act as retaining walls, but as receptacles for stone. Two forms of concrete cribs are shown in Fig. 2. The first is simply a bottomless box which depends for its stability upon its own weight and the weight of the embankment superimposed on the portions buried in the fill. This type of wall has a large factor of safety in the passive resistance of the earth on the inside face of the rear wall, which becomes effective as soon as the wall starts to move forward. The wall also affords great frictional resistance to overturning. Neither of these elements ought to be considered in making an analysis for design, however. For a narrow right of way a natural modification from this crib wall is shown at the right in Fig. 2. This is in reality an application of the reinforced concrete filled "u" abutment. The lateral forces are taken care of entirely within the structure and only the vertical loads are transmitted to the foundation.

As a necessary preliminary to the analysis of the types of walls described, the applicability of the theory and constants commonly used in dealing with the lateral pressure of earth was investigated. As the use of common factors in the analysis of trial designs of the block wall proved that small variations in the factors resulted in great variations in the position of the resistance lines, authority was obtained to build and test a model wall of the concrete block type. This wall was one-fourth as

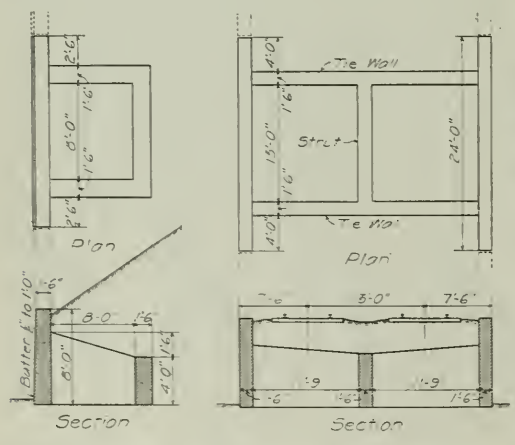


Fig. 2—Unsymmetrical and Symmetrical Cellular Retaining Walls

high as a full-sized wall for a 17-ft. embankment and was 12 ft. long between bulkheads. It was backed with a sand embankment and tested with a live load of pig iron piled on wooden cross-ties 2 ft. long. The tests indicated that the live load spread is much greater than had been supposed, and further pointed out a fertile field for extensive investigation. As to the design of a block wall, the tests proved clearly that horizontal beds without bond or lock give the wall a low efficiency, as failure by sliding will take place at loads much below those required to cause overturning. With a properly designed joint, such as that shown in "h," Fig. 1, the block wall presents advantages under certain circumstances that justify its serious consideration.

Fig. 3 shows diagrammatically the relative cost of the mass wall with a heavy front batter on natural foundations, the block wall, the cellular wall and the mass wall on piles. This comparison is based on the assumption of very expensive piles, such as are required on the work at Milwaukee. The relative economy of the types, excluding all other considerations, is directly in the order named above. A consideration of these types, however, shows the following advantages and disadvantages:

The block wall in addition to its economy can settle in an irregular manner without making it conspicuous, it can be constructed in several stages and it does not occupy much space before filling. On the other hand the heavy front batter causes a waste of property which will encourage encroachment and unless built with a smooth batter will encourage trespass-

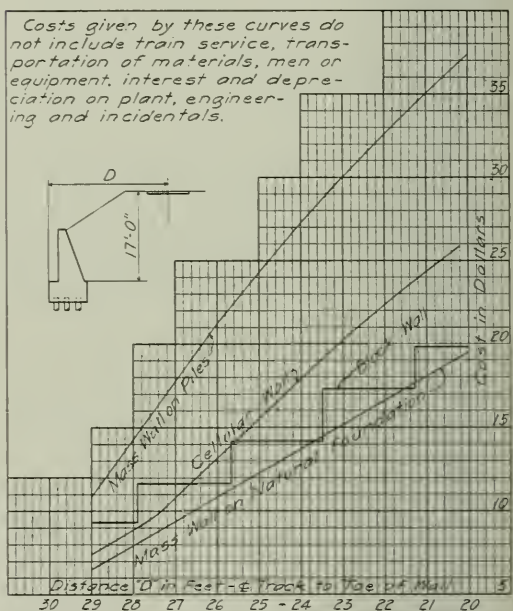


Fig. 3—Comparative Costs of Four Types of Retaining Walls on Soft Foundations

ing. Because of its loose-jointed nature the block wall does not possess as much of a potential factor of safety against unforeseen contingencies under some circumstances as a monolithic structure.

The heavy batter mass wall is economical, but will cause criticism if it settles or tips appreciably, and is subject to the same objections as the block wall on account of the heavy front batter. The cellular wall affords little opportunity for encroachment; it may settle considerably but offers great resistance to overturning or sliding, and it permits of ready driving of piles for a trestle directly over it. It possesses the disadvantages of occupying considerable space before filling, which may interfere with the use of the tracks and settlement may also give it an unpleasing appearance. The mass wall on piles gives maximum security, but is expensive and may lead to difficulties through possible damage to adjacent buildings on insecure foundations as a result of pile driving. This consideration was given much weight in the search for a substitute for the structure on piles.

Up to the present time one block wall with corrugated horizontal beds and two cellular walls have been built at Milwaukee. Plans have been prepared for the use of a cellular wall at a number of other places on this work. This type of wall has

been favored on account of the fuller utilization of the right of way and also in a number of instances because of the necessity for driving pile trestles for adjacent industry tracks directly over the wall.

THE PANAMA RAILROAD STEAMSHIP LINE

In the review of the annual report of the Panama Railroad Company given in the editorial columns of this paper in the issue of February 26, something was said relative to the earnings of the company's steamship line. The following comments taken from a letter written to Senator Root in connection with the debate on the Ship Purchase Bill by Edgar F. Luckenbach, a prominent ship owner, will perhaps also be of interest. The letter points out that the annual reports of the Panama Railroad Company for 1911, 1912, 1913 and 1914 give the following earnings for the steamship line:

Year	Profit	Year	Profit
1911	*$77,187.97	1913	$221,489.92
1912	†305,742.85	1914	314,296.36
		Total	$612,974.25

*1912 report. †Loss.

"The steamship company owns the steamers Allianca, with a book value of $518,865.87, and the Advance, book value $221,186.30, or a total of $740,052.17. They also operate the steamers Ancon, Cristobal, Panama and Colon, which are worth about $600,000 each.

"These last four named vessels are loaned to the Panama Steamship Company by the Panama Canal Commission free of charter hire, insurance, depreciation or interest charges, and no one could operate these vessels unless they paid at least the following charges (investment of $2,400,000 for four years): Interest at 6 per cent, $576,000; insurance at 6 per cent, $576,000; depreciation at 6 per cent (which is the rate allowed by the Panama Steamship Company on other vessel property they own), $576,000; insurance on freight moneys, $22,439.28, and insurance against loss and damage to cargo (known as protection and indemnity), $6,000, making a total of $1,756,439.28.

"You will find in the annual report for 1914, page 47, no insurance charges are made on the steamers Allianca and Advance, which are valued at $740,052.17. Added to above: Hull insurance at 6 per cent, $177,612.52; cargo insurance, $2,000; interest at 6 per cent, $177,612.52; total $2,113,664.32.

"If any one else were operating these vessels to protect themselves properly they would have to pay the above enumerated charges, showing a loss for four years of $1,806,432.92.

"Ordinarily the above named steamers would be worth, on time charter basis, about $10,000 per month. (If I could get them today I would be willing to pay $20,000 per month.) Figured on the basis of $10,000 per month for each steamer for four years, the loss would be much larger than the figures given above, or on this basis the loss would be $1,920,000."

FLASH LIGHT SIGNALS ON THE BOSTON & MAINE

The Boston & Maine, which has used flashing acetylene lamps on signals experimentally for nearly two years, now has these lamps in use on about ten miles of its line, from Parkway Bridge, Mass., to Reading Highlands, on the Portland division. This is a double track line and there are thirty-six block sections, a home and a distant arm on each post. Both arms have the flash lights, and they flash from 58 to 62 times a minute. The signals at interlockings have ordinary steady lights, so that enginemen are able quickly to distinguish automatic from non-automatic signals.

The flash lights are furnished by the Commercial Acetylene Railway Light & Signal Company, New York City. By an automatic regulator in the pipe supplying gas to the lamp, the gas is made to flow only one-tenth of the time, making each lamp glow, for example, one-tenth of a second and then remaining dark nine-tenths of a second.

The night signals on the Boston & Maine show white for proceed, red for stop and green for caution.

Steady acetylene lamps have been used on several hundred block signals on the Boston & Maine for several years past.

The Norfolk & Western has had one of the flash lights in use on an automatic signal for the past eight months and reports the lamp as not only very reliable, but as costing much less than an oil lamp for the same service. On both this road and the Boston & Maine the enginemen are reported as much pleased with the flash light.

THE LOUISVILLE & NASHVILLE INVESTIGATION

The Interstate Commerce Commission on February 25 sent to the Senate its report on the investigation of the finances, rates and practices of the Louisville & Nashville. This investigation, authorized last spring by a resolution introduced by Senator Lea, of Tennessee, was directed mainly to discover whether the Louisville & Nashville, through control of the Nashville, Chattanooga & St. Louis and smaller lines, had restrained competition in the territory served by those roads, whether the control of the Louisville & Nashville by the Atlantic Coast Line, operated to the same end, and what amounts of money the Louisville & Nashville has contributed to political activities and other efforts to fight competition.

The report says that the Louisville & Nashville acquired competing lines and for years carried on an elaborate political and publicity campaign to eliminate competition and influence public opinion at enormous expense. The commission, however, qualifies its general charges of extravagance and of wrongful expenditures by the statement that the road had to meet much strong competition.

The commission from its investigation concludes that at least $16,000,000 shown in the Louisville & Nashville's cost of road accounts covers items which should not be charged to them. These charges are as follows:

Charges Included in Cost of Road Accounts but Not Expended for Actual Construction

Discount on stock		$1,440,018
Other expenses in connection with the sale of stock		32,671
Discount on bonds		2,192,143
Other expenses in connection with the sale of bonds		8,538
Interest and dividends		1,917,535
Amounts credited to profit and loss:		
For reasons not stated	$2,640,000	
To provide a surplus in order that a stock dividend of 100 per cent might be paid	6,300,000	
To raise book value of stock above the actual cost of acquirement	1,422,784	
To adjust difference between advances made for construction and par value of bonds received in settlement therefor	78,448	
		10,441,232
		$16,032,137

The commission says: "The above statement is illustrative of the character of charges which the carrier has included in its cost of road account. A full examination of the carrier's accounts might disclose conditions under which some of the above amounts could properly be charged to cost of road account, but it is also possible that other improper items would be found which would greatly augment the amount shown."

The Louisville & Nashville now owns 71.77 per cent of the capital stock of the Nashville, Chattanooga & St. Louis, and it appears that this control was obtained primarily for the purpose of restraining competition. This opinion is thought to be borne out by statements taken from the annual reports of the Nashville, Chattanooga & St. Louis for 1872 and 1880, respectively. It is also thought that the geographical relations of the two systems are such that were they separately controlled competition between them would be the inevitable result. The two roads further have made traffic agreements which result in restraining competition.

The Louisville & Nashville, chiefly since 1880, has acquired a controlling interest in over 100 other railroads. While one of the purposes of the Louisville & Nashville has obviously been to

restrain competition in the territory which it serves, there is no doubt that several of its subsidiary lines were acquired not so much to restrain competition as to meet competition. Although the Louisville & Nashville has to a large extent a monopoly of local business in its territory, on through business it is in active competition with the Southern, the Illinois Central, and other large systems. These rival systems have, since about 1880, been aiming, by securing control over branch and connecting lines, to expand and perfect their control over their respective spheres of influence. Among the roads of which the Louisville & Nashville has acquired control are the Nashville & Decatur, the Tennessee Midland, the Paducah, Tennessee & Alabama, the Chesapeake, Ohio & Southwestern, the Georgia Railroad, the Atlanta & West Point, the Western of Alabama, the New Orleans, Mobile & Chicago, the Kentucky Central and the St. Louis & Southeastern.

The report also attempts to show that the Louisville & Nashville has tried to restrain competition on the Cumberland and Tennessee rivers by means of its control of terminal facilities at Nashville, Knoxville and Clarksville. It has also tried to restrain competition in various ways on the Alabama, Green and Barren rivers.

The Louisville & Nashville, although serving New Orleans and Mobile, has been primarily interested in Pensacola, and has a fixed policy of attempting to prevent traffic movement through the other ports. It, for example, has not tried to develop its terminals at New Orleans. It has tried to hinder the movement of traffic through Mobile by restricting the issuance of through bills of lading on export cotton for Mobile. On the other hand, in conjunction with the Gulf Transit Company it has solicited traffic through Pensacola, although its terminals at that port are not good. The commission states its intention of taking this up further in its investigation of conditions at these ports in connection with the Panama canal act.

The Atlantic Coast Line Company, a holding company, owns no stock in the Louisville & Nashville. The Atlantic Coast Line Railroad Company, however, owns $36,720,000, or 51 per cent, of the $71,917,920, par value, of capital stock of the Louisville & Nashville outstanding on June 30, 1914. Prior to March 10, 1914, the Atlantic Coast Line Company, through ownership of a controlling interest in the capital stock of the Atlantic Coast Line Railroad Company, did indirectly control the Louisville & Nashville. Control of this holding company over the Louisville & Nashville was relinquished just after this investigation was begun, and presumably as a result of it. The same interests, however, appear still to control both the Louisville & Nashville and the Atlantic Coast Line railroad companies. Henry Walters, Michael Jenkins and Waldo Newcomer held or controlled 115,658 shares of the Atlantic Coast Line Railroad Company's common stock, and practically controlled the Atlantic Coast Line and the roads controlled by it, including the Louisville & Nashville. The commission's investigation did not disclose any arrangement to control traffic, however.

In connection with the Tennessee Railroad Association, formed by carriers in 1884 to combat adverse legislation in that state, the report says:

"The various payments made on account of the Tennessee Railroad Association by the Nashville, Chattanooga & St. Louis and the Louisville & Nashville were to a large extent made to state officers and legislators of Tennessee, municipal officers of Nashville, politicians, lobbyists and attorneys. Investigation showed that payments made by the Nashville, Chattanooga & St. Louis in this connection, aggregating over $20,000, could be definitely assigned to persons formerly or at present holding public office, but the total amount paid to such persons was no doubt much in excess of this sum."

The report also includes the following statements:

Payments aggregating $82,596 for purposes mentioned in the resolution were made by the Louisville & Nashville between September 1, 1906, and July 1, 1914, and there were expenditures in the same period for maintaining political and legislative agents and associations of $23,274.

For creating public sentiment in favor of the plans of the Louisville & Nashville in the same period $59,322 was spent, of which $53,000 was used in a publicity campaign in Alabama to mold public opinion through the press, and part of the balance contributed to a fund made up by carriers to finance a campaign in Louisiana to prevent the change of tax laws. In this connection, says the report, "to preserve an outward apeparance of indifference the funds were placed in the hands of a bank to be disbursed by it as if in furtherance of banking interests."

The Louisville & Nashville paid to the Nashville, Chattanooga & St. Louis $120,198 for the use of the Tennessee Railroad Association, in addition to other "large expenditures in connection with that association."

A large number of vouchers were issued by the Louisville & Nashville between 1906 and 1914 to various persons, concerning which the accounts gave no information other than that the expenditures were for "special" services. They amounted to about $295,000. A request for files in the general manager's office bearing on these vouchers was denied, and other vouchers aggregating $67,722 from 1906 to 1911 were issued under the direction of the legal or executive departments of the road without the purpose being stated. One of these vouchers was for more than $20,000, and all were in excess of $1,000 Whether such sums were spent for the purposes referred to by Congress, the commission could not determine.

An account was opened in the name of the Immigration and Industrial Association of Alabama in 1907. This records a cash advance to George W. Jones, assistant district attorney in Montgomery, Ala., made under authority of the first vice-president; $13,069 was charged to this account; $7,869 was recollected from other carriers who were parties to this association and credited to this account. The balance of $5,200 remaining was charged to operating expenses by authority of the first vice-president. The nature of this account is indicated by notations on the treasurer's statements of cash receipts entered therein, such as "proportion of expenses, account adjourned session of the Alabama legislature."

A "suspense" account in the name of the National Bank of Commerce of Louisville was opened in June, 1911, to record the amounts of checks issued under authority of President Milton H. Smith, in favor of the bank, between June 7 and October 5, 1912. Amounts aggregating $249,994 were paid to the bank in the form of such checks. No information could be obtained in regard to the purpose for which these payments were made. The report says that "under the accounting rules prescribed by the commission the keeping of such vague accounts at the present time would subject the carrier to prosecution."

"It could not be determined what the purpose of all these large unexplained expenditures was. It seems clear, however, that for some reason the officials who were responsible for these entries deemed it expedient to conceal not only in the original entry, but from those engaged in this investigation the real purpose for which these expenditures were made."

The accounts of the Nashville, Chattanooga & St. Louis disclose expenditures of $13,137 from 1867 to 1914 in maintaining political or legislative agents and $856 to create public sentiment. In addition to these items explained in the accounts the commission said it discovered other disbursements aggregating $599,668, the purposes of which are concealed. Of this amount about $233,000 was collected from other railroads.

From 1884 to 1907 carriers expended about $560,000 in connection with the Tennessee Railroad Association, of which the net contribution of the Nashville, Chattanooga & St. Louis appears to have been about $367,000. Entries in this account give little detail, but there are specific items for campaign subscriptions, special trains transporting legislative bodies over foreign lines, items for "legislative services" and large ones for "special expenses." These aggregate over $300,000.

The commission also announces its intention of making a further investigation into the correspondence files of the carriers, but states that its "future action must depend on additional legislation affecting our powers." (33 I. C. C., 168.)

General News Department

By permission of the court, the Receiver of the Buffalo & Susquehanna is to continue the operation of that road until April 1. This is the fifth extension of time since the bondholders first asked for delay last autumn.

The Cummins bill, requiring common carriers (including express companies) to pay full value for losses of or damages to freight for which they are responsible (making illegal all contracts to limit liability) has passed both Houses of Congress.

Members of the legislature of British Columbia in numbers sufficient to fill a special train, made an inspection trip over the Canadian Northern Pacific on February 12 from New Westminster to Cisco, 140 miles and back. T. H. White, chief engineer, acted as host.

A. W. Thompson, vice-president of the Baltimore & Ohio, was awarded a gold medal by the Engineers' Society of Western Pennsylvania at the annual meeting of the society on Monday evening, February 8, for the general excellence of his paper on the Magnolia cut-off, presented before that society recently.

The Southern Railway has just put in service 57 steel passenger cars, all electric-lighted. These cars have been assigned to eight of the most important through trains; and steel-frame cars heretofore used on these trains have been assigned to other through trains; and this in turn has released steel underframe cars for use in local trains. Seven steel dining cars have recently been put in service.

Aiming to protect its employees against permanent injury to the eye, the Baltimore & Ohio urges, in a circular issued recently, that in case of eye injury, or of foreign particles lodging in the eye, to secure the service of a company physician whenever possible. Railroad experience cites many cases of permanent injury to the eye or loss of sight as a result of inexperienced persons attempting to act in the capacity of surgeons.

Under the consolidated organization of the New York Central the clearing house at Buffalo is to be moved to Cleveland, taking over 200 employees away from Buffalo; but on the other hand the freight claim departments of the New York Central, at New York City, and of the Lake Shore, at Cleveland, are to be moved to Buffalo and consolidated. The number of new employees in Buffalo, therefore, will be about equal those who go away. The claims department will use about twice as much room as has been used by the clearing house.

The testing laboratory of the New York, New Haven & Hartford at New Haven, Conn., during the past year has made about 10,000 tests, the articles tested ranging all the way from pencils to piston rods and from milk to paint. Special attention has been given to sanitation on passenger trains, and the milk and cream for the dining cars have been kept at the highest standard. The physicists of the laboratory have made a large number of tests of air in passenger cars on trains, and a thorough system of sterilizing drinking water receptacles on trains has been established. The chemists have analyzed the water from each one of the wells on the company's premises.

A special engineering corps of 500 Canadian engineers is to be organized for service in the European war. A request was received some days ago from the War Office in England for the formation of such a body, whose duties it will be to rebuild bridges and tracks, and perform other work of this kind. Vice-President George Bury of the Canadian Pacific has, it is said, agreed to undertake the work of organization, as the railway is naturally in a better position to secure the right kind of men than the government would be. The heavier equipment for this corps will be supplied by the British War Office, but the smaller and lighter equipment will be provided in Canada and transported with the men.

Alfred Craven, chief engineer of the New York Public Service Commission, First district, has reported to the commission that with additional reinforcement, which will not cost more than $200,000, the Second Avenue elevated railroad in Manhattan will be strong enough for the operation of trains composed of the composite cars now used in the subway, which the Interborough Rapid Transit Company proposes to transfer to lighter trucks and to run on the elevated railroads. He is also of the opinion that the Third Avenue elevated railroad will be strong enough for these cars after the third-tracking work is completed, but suggests that he be allowed six months in which to complete his investigation and decide finally as to the Third Avenue structure.

W. T. Lechlider, superintendent of the Cleveland division of the Baltimore & Ohio, has issued a bulletin giving the names of about 100 employees who, during the last nine months, have participated in the "efficiency movement," started by Mr. Lechlider, designed particularly to show economy by gathering abandoned material along the roadway and sending it to storehouses. The results of this work have been noted from time to time in the *Railway Age Gazette*. The summary now issued shows four enginemen who picked up more than a hundred dollars' worth of material each, the man at the top of the list having been credited with $313. At one station the office force secured a credit of $52; from these larger amounts the list runs down to items of twenty-five cents each.

The safety department of the Delaware, Lackawanna & Western has issued Safety First Bulletin No. 10, giving a summary of accidents to Lackawanna employees for the years 1911, 1912, 1913 and 1914. The number of employees killed in 1911 was 70, and in 1912, 46; 1913, 45, and in 1914, only 26. The number of employees injured in 1911 was 2,319; in 1912, 2,318; in 1913, 2,092, and in 1914, 1,875. There has thus been a steady decrease year by year. Comparing 1914 with 1911, the decrease in the number of employees killed was 63 per cent, while the injured decreased 19 per cent. It has been decided to award a Safety First flag to the division making the best safety record in 1914, and subsequent years, and also one to the shop making the best record. For the year 1914, the Morris & Essex division was awarded the division flag and the Scranton-Keyser Valley shops were awarded the shop flag.

M. A. Dow, general safety agent of the New York Central Lines, is sending out to manufacturers owning plants adjacent to the company's property small printed slips on safety first to be put into the pay envelopes of employees. The statement begins by saying that the railroad company has called the manufacturers' attention to the risk incurred by the employees of the factory who walk on the tracks; and, after briefly explaining the general situation, it ends with the injunction that "the practice of walking the railroad tracks by our employees must be stopped at once. The interests of personal safety require that strict observance of this rule must be enforced." Mr. Dow furnishes the slips printed in English, and also in other languages, as may be needed. Within a reasonable time after the notices have been supplied to a given factory, the inspectors of the railroad company make observations to see how well the advice has been carried out; and if track walking continues officers are sent to make some arrests.

Confidential Letters Called For

George Bury, vice-president of the Canadian Pacific, has sent to all the employees of the company the following letter:

"By the president's direction you are invited to send at any time to C. H. Buell, secretary of the Pension Department, suggestions looking to continued amicable relations with the public; improving the conditions of employment, and increased efficiency of our operations. It is believed that there is much talent in such a vast organization as ours that never has had an opportunity of coming to the front. . . . Letters will be treated as confidential and will be passed upon periodically by a committee, so that anything of worth may be fully recognized. The object is to obtain the benefit of the ideas of those working

with us, and not a means for airing grievances, which, if they exist, should go through the usual channels. . . ."

Increased Cost of Passenger Trains

In connection with the campaign of the Illinois railroads for an increase in passenger fares in the state from 2 to 2½ cents a mile the railroads have given out a statement by an operating officer of the Illinois Central, showing the increased cost of operating passenger trains, in which the actual cost of the cars and engines of one of the Illinois Central's best trains today as compared with its cost 12 years ago is itemized as follows:

Actual cost	1903	1915
Locomotive	$16,638	$23,135
Chair car	9,393	11,580
Parlor car	14,343	17,019
Dining car	14,550	20,227
Coach	9,195	12,369
Baggage car	5,048	11,165
Mail car	7,729	16,901
Cafe car	11,000	18,381
Total	$87,895	$130,797

"But $130,000 doesn't represent even half of the cost of our 'Daylight Special' trains," continued the statement. "One train leaves Chicago about the time its counterpart leaves St. Louis, so we have to have two complete trains, except as to engines, of which four are required.

"The total cost of the equipment alone of our 'Daylight Special' is therefore $307,864."

Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for the month of December, 1914. No reports are included for railroads whose operating revenues for the year ended June 30, 1914, did not reach $1,000,000.

The figures are compiled as rendered and should not be considered final, inasmuch as scrutiny of the reports may lead to their modification before acceptance.

For the Month of December

Item	United States			Eastern District			Southern District			Western District		
	Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated	
	1914	1914	1913	1914	1914	1913	1914	1914	1913	1914	1914	1913
Average number of miles operated	228,604.15	...	...	58,788.27	...	...	42,317.60	...	...	127,498.22	...	...
Revenues:												
Freight	$154,497,821	$676	$753	$65,554,165	$1,115	$1,276	$24,759,713	$585	$707	$64,183,943	$503	$523
Passenger	49,858,799	218	257	21,389,576	364	404	7,402,799	175	228	21,066,424	165	198
Mail	4,778,518	21	20	1,731,171	29	29	627,147	15	15	2,420,200	19	17
Express	6,168,113	27	32	2,719,832	46	55	1,035,209	24	30	2,413,072	19	22
All other transportation	6,224,741	27	30	3,468,906	59	62	494,570	12	14	2,261,265	18	20
Incidental	4,631,659	20	21	2,441,131	42	42	617,754	15	16	1,572,774	12	14
Joint Facility—Cr.	257,551	1	1	113,839	2	2	55,161	1	1	88,551	1	1
Joint Facility—Dr.	*98,463*	...	...	*60,525*	*1*	*1*	*11,727*	...	...	*26,211*	...	...
Railway operating revenues	$226,318,739	$990	*$1,116	$97,358,095	$1,656	‡$1,878	$34,980,626	$827	$1,011	$93,980,018	$737	$795
Expenses:												
Maint. of way and structures	$25,442,409	$111	$134	$11,403,481	$194	$227	$4,097,949	$97	$119	$9,940,979	$78	$95
Maintenance of equipment	40,452,117	177	197	19,455,571	331	372	6,299,876	149	178	14,696,670	115	122
Traffic	4,944,760	22	23	1,896,926	32	36	940,670	22	22	2,107,164	17	18
Transportation	87,872,802	385	427	40,764,318	694	779	12,469,165	295	344	34,639,319	271	290
Miscellaneous operations	1,815,854	8	10	878,017	15	16	175,850	4	5	761,987	6	8
General	6,452,940	28	30	2,832,723	48	49	1,015,503	24	26	2,604,714	20	22
Transportat'n for Investm't—Cr.	*496,166*	*2*	*1*	*62,635*	*1*	...	*133,289*	*3*	...	*300,242*	*2*	*1*
Railway operating expenses	$166,484,716	$729	†$821	$77,168,401	$1,313	§$1,483	$24,865,724	$588	$694	$64,450,591	$505	$554
Net revenue from railway operations	$59,834,023	$261	$295	$20,189,694	$343	$395	$10,114,902	$239	$317	$29,529,427	$232	$241
Railway tax accruals	$10,090,035	$44	$50	$3,895,764	$66	$77	$1,500,394	$36	$39	$4,693,877	$37	$41
Uncollectible railway revenues	46,884	...	...	16,218	...	...	6,544	...	...	24,122	...	...
Railway operating income	$49,697,104	$217	$245	$16,277,712	$277	$318	$8,607,964	$203	$278	$24,811,428	$195	$200

* Includes $2 unclassified. † Includes $1 unclassified. ‡ Includes $9 unclassified. § Includes $4 unclassified.

For the Six Months Ending with December

	1914	1914	1913	1914	1914	1913	1914	1914	1913	1914	1914	1913
Average number of miles operated	228,223.48	...	...	58,751.01	...	...	42,276.42	...	...	127,196.05	...	...
Revenues:												
Freight	$1,037,721,176	$4,547	$4,954	$447,298,470	$7,613	$8,378	$153,692,772	$3,635	$4,097	$436,729,934	$3,434	$3,638
Passenger	343,709,492	1,506	1,650	151,915,735	2,586	2,807	46,050,879	1,089	1,250	145,742,878	1,146	1,297
Mail	28,563,355	125	119	10,394,193	177	174	3,762,534	89	88	14,406,628	113	103
Express	35,183,628	154	175	15,776,156	268	310	5,246,594	124	137	14,160,878	111	125
All other transportation	43,089,972	189	202	24,075,788	410	421	3,388,870	80	92	15,625,314	123	135
Incidental	30,266,092	133	141	15,837,456	270	277	3,532,367	84	94	10,896,269	85	95
Joint Facility—Cr.	1,819,218	8	8	825,413	14	13	349,647	8	8	644,158	5	6
Joint Facility—Dr.	*642,820*	*3*	*3*	*409,535*	*7*	*6*	*76,209*	*1*	*1*	*157,076*	*1*	*1*
Railway operating revenues	$1,519,710,113	$6,659	*$7,288	$665,713,676	$11,331	‡$12,417	$215,947,454	$5,108	$5,765	$638,048,983	$5,016	$5,398
Expenses:												
Maint. of way and structures	$192,792,096	$845	$972	$80,990,433	$1,379	$1,651	$30,114,211	$712	$778	$81,687,452	$642	$718
Maintenance of equipment	357,010,142	1,126	1,229	119,924,293	2,041	2,282	42,372,690	1,002	1,074	94,713,159	745	789
Traffic	29,664,889	130	144	11,273,573	192	223	5,632,441	133	132	12,758,875	100	110
Transportation	524,684,080	2,299	2,530	243,962,596	4,152	4,620	75,120,381	1,777	1,952	205,601,108	1,616	1,746
Miscellaneous operations	11,872,666	52	59	5,579,241	95	99	1,079,251	26	28	5,214,074	41	50
General	36,884,718	162	165	15,625,286	266	265	5,977,653	141	144	15,281,779	120	125
Transportat'n for Investm't—Cr.	*3,630,953*	*16*	*9*	*347,596*	*6*	...	*689,441*	*16*	*2*	*2,593,916*	*20*	*14*
Railway operating expenses	$1,049,277,638	$4,598	†$5,097	$477,007,826	$8,119	§$9,163	$159,607,286	$3,775	$4,106	$412,662,526	$3,244	$3,524
Net revenue from railway operations	$470,432,475	$2,061	$2,191	$188,705,850	$3,212	$3,249	$56,340,168	$1,333	$1,659	$225,386,457	$1,772	$1,874
Railway tax accruals	$66,869,577	$293	$300	$27,336,705	$465	$481	$9,295,143	$220	$222	$30,237,729	$238	$242
Uncollectible railway revenues	249,351	1	...	96,414	2	...	38,882	1	...	114,055	1	...
Railway operating income	$403,313,547	$1,767	$1,891	$161,272,731	$2,745	$2,768	$47,006,143	$1,112	$1,437	$195,034,673	$1,533	$1,632

* Includes $12 unclassified. † Includes $7 unclassified. ‡ Includes $43 unclassified. § Includes $28 unclassified.

The Pennsylvania's Safety Record

The passenger record of the Pennsylvania Railroad for the year ending December 31 last, in which the trains of the company carried 189,000,000 passengers, with none killed in a train accident, which already has been noticed in the *Railway Age Gazette*, is the subject of a sixteen-page leaflet recently issued by Vice-President W. W. Atterbury and General Manager S. C. Long, congratulating the subordinate officers and the employees on this excellent record, and commending them for their part in producing it. The leaflet is filled mainly with reprints of editorial notices which have been clipped from newspapers in all parts of the country. Mr. Atterbury, in his letter, says: "Every man in the service had an important part in making 1914 a year free from accidents to passengers, and I want each one to know just what the public thinks of his work. It is only by pleasing the public that we can gain its friendship. Unless that part of the public that is dependent upon the Pennsylvania Railroad feels that our officers and employees are exerting all their efforts toward rendering the best and safest service the art of railroading makes possible, we cannot hope for the public's support in working out the many problems with which we are continually confronted."

Proposed Railway Legislation

A bill to increase the legal passenger fare in Ohio from 2 to 2½ cents a mile has been introduced in the lower House of the Ohio legislature.

A committee of employees of the St. Louis & San Francisco, in Oklahoma, are said to have secured over 25,000 signatures to a petition to the legislature, asking for a restoration of the three-cent passenger fare.

Senator Newlands has introduced in Congress a bill to empower the Interstate Commerce Commission to examine all papers of a common carrier, including correspondence. The object of the bill is to change that provision of the Interstate Commerce law which was the subject of the recent decision of the Supreme Court in the Louisville & Nashville case.

The House of the Texas legislature has killed the bill to place all railroad hospitals in the state under the control of a board of seven men, five to be elected by employees and two by the roads. The committee on common carriers, in reporting the bill adversely, said that petitions had been received from more than 20,000 unorganized railroad employees and several thousand union employees protesting against the passage of the bill.

Among the bills before the Texas legislature is one requiring the abolition of highway grade crossings in all cities and towns of more than 5,000 population; and the committee of the House, which is investigating the subject, has been told by six of the leading roads of the state that to carry out the provisions of the bill will cost them two hundred and fifty millions. The Santa Fe, for example, runs through 76 counties in Texas, and to build one bridge each year in each county will cost $2,250,000.

MISSOURI

A delegation of members of the Business Men's League of St. Louis is planning to appear before the Missouri Public Service Commission and the Missouri legislature to urge an increase in the state passenger fare from 2 to 2½ cents a mile.

The bill to increase the passenger fare in the state to three cents a mile was made a special order in the lower House for Wednesday, March 3, and the railroad committees of both the House and the Senate have reported the bill favorably. The House bill would empower the state public service commission to fix a maximum rate of three cents a mile, and immediately to establish a 2½ cent rate. A committee of railroad employees, headed by four general chairmen of the conductors', trainmen's, engineers' and firemen's organizations, appeared before Governor Major of Missouri on February 23, to present arguments for increases in freight and passenger rates in the state.

Attorney General Barker of Missouri, at the request of the Senate of the Missouri legislature, has given an opinion that the Missouri Public Service Commission has the power to fix freight and passenger rates in the state, regardless of the statutory rate. The opinion was based on a decision of the Supreme Court of Missouri in the case of the Missouri Southern, in which it was held that the act creating the commission, repealed the earlier law fixing passenger rates at two cents a mile and fixing maximum freight rates. The Attorney General said in his opinion: "I think it quite clear from the opinion, which was concurred in by the entire court, that the Public Service Commission has the power to increase the freight or passenger rates in excess of the maximum now provided by statute, if in the opinion of the commission such increase is necessary in order to furnish a fair return to the carrier."

INDIANA

The Indiana Committee on Relations of Railway Operation to Legislation has given out a statement that bills introduced in the Indiana legislature, if enacted, would add about $2,500,000 a year to the expense of the companies, while hampering transportation service. The bills against which the carriers are directing their opposition particularly are those to limit the length of freight trains to one-half mile and to require the railroads to employ telegraphers exclusively to handle train orders. The railroads say that the bill to limit the length of trains would burden them with an additional expense of at least $2,000,000 a year, and would mean the slowing up of transportation service as the result of congestion. Industries requiring large supplies of cars would be hampered if the roads were prohibited by law handling a full quota to a plant in one train.

It is further pointed out that the roads would experience a heavy economic loss, as they would be prevented from deriving the benefit of improvements and betterments which have been made at a cost of $150,000,000 to reduce grades and eliminate curves, and purchase larger engines.

It is also stated that it would cost the railroads of Indiana $250,000 a year to comply with the provisions of the bill to compel the employment of telegraphers exclusively, to handle train orders. Advocates of the bill disclosed its principal purpose in a communication which has been distributed containing the caution that "under no consideration should any reference be made to the fact that the bill will provide more positions for telegraphers."

Charles B. Riley, secretary of the Indiana Grain Dealers' Association and the Indiana Millers' Association, has given out a statement on behalf of 600 firms, protesting against the bill to compel the railroads to limit the length of freight trains to one-half mile, on the ground that such a law would interfere seriously with the marketing of grain produced in the state. Having learned that members of the house of representatives prior to the passage of the measure by that body were given to understand that the shipping public favored the measure, Mr. Riley said, "it is a fact that few shippers could have entertained that view. Shippers more than any other class of railroad patrons benefit by the practices resulting in increased efficiency of equipment and prompt movement of tonnage. The grain dealers and millers of the state, with whom I am connected, and from whom I received instructions to enter a protest against this bill, are strongly opposed to it. It is the belief of the interests I represent that the railroads should be permitted, if not actually required, to haul in each train the largest possible number of cars, thus better utilizing their equipment in the service of the public."

Governor Ralston has sent a message to the legislature, recommending that the state public service commission be given authority to increase railroad passenger fares, if on investigation it finds the railroads entitled to the increase; and a bill has been introduced to carry out the recommendation.

Profits in Pants

The Frisco Railroad is engaged in a campaign to psychologically popularize upper berths in the Pullmans. The agents will cease assuming that every passenger is going to insist on a lower, and will recommend the low price, the spring mattress, the roominess, the conveniences for hanging clothes and the other advantages to be had by buying an upper; and then the prospective passenger will imagine himself swayed to sleep on a spring mattress in an ideal temperature, and with his pants hanging safely on the conveniences provided, and containing the 20 per cent difference in cost between the upper and the lower berth.—*St. Louis Republic.*

Railway Signal Association

C. C. Rosenberg, secretary of the Railway Signal Association, reports that all of the questions submitted to the members by letter ballot following the action of the last annual meeting have been decided affirmatively, except the proposed standard code of operated units which had been prepared for use in dividing the cost of joint mechanical interlocking plants; this was lost by a vote of 147 to 545.

The program for the discussions at the meeting in Chicago, March 15, includes reports from committees, 2, 3, 4, 6, 8 and 10, and the special committees on lightning protection and contracts. Committee No. 2 presents for discussion a code of specifications for electro-mechanical interlockings, filling 44 pages.

Committee No. 8, on electric railway and alternating current signaling, reports that it is bringing up to date the descriptions of alternating current signal installations which have been a feature of the proceedings of the association for two or three years past. Installations of this kind are increasing in number, and the committee expects to present a large amount of interesting matter at the next annual meeting.

Committee No. 10 presents a code of specifications, filling seven pages, for portable storage battery.

Committee No. 4 presents revised specifications for wood trunking and a revised code of circuit requisites for automatic block signaling on single track. These latter are a revision of those presented in the minority last September.

Committee No. 6 presents thirteen proposed standard drawings; and the special committee on lightning protection presents requisites for lightning arresters and choke coils.

The special committee on contracts, J. B. Latimer (C. B. & Q.) chairman, presents a simplified form of the table for operated units which was presented in September, but which failed to receive a favorable vote when put before the members in a letter ballot.

Program of the American Railway Engineering Association Convention

The sixteenth annual convention of the American Railway Engineering Association will be held at the Congress Hotel, Chicago, March 16-19. Sessions will be held in the morning at 9 o'clock, and in the afternoon at 2 o'clock. The following is the program:

Tuesday, March 16—
- President's address.
- Reports of secretary and treasurer.
- Reports of the following standing and special committees.
- Committee No. 12—Rules and organization.
- Committee No. 10—Signals and interlocking.
- Special committee—Uniform general contract forms.
- Committee No. 9—Signs, fences and crossings.
- Committee No. 16—Economics of railway location.
- Committee No. 1—Roadway.
- Committee No. 11—Records and accounts.

Wednesday, March 17—
- Committee No. 3—Ties.
- Committee No. 15—Iron and steel structures.
- Committee No. 13—Water service.
- Committee No. 5—Track.
- Committee No. 6—Buildings.
- Committee No. 17—Wood preservation.
- Committee No. 19—Conservation of natural resources.
- Special committee—Stresses in railroad track.
- Annual dinner at 7 p. m.

Thursday, March 18—
- Committee No. 8—Masonry.
- Committee No. 7—Wooden bridges and trestles.
- Special committee—Grading of lumber.
- Committee No. 18—Electricity.
- Committee No. 14—Yards and terminals.
- Committee No. 2—Ballast.
- Committee No. 4—Rail.
- Election of officers.
- Adjournment.

Friday, March 19—
- Visit to the exhibit of the National Railway Appliances Association at the Coliseum.

The Transportation Club of Louisville

At the regular annual meeting and election of the Transportation Club of Louisville held on February 9, 1915, the following officers were elected: President, F. G. Maus, division freight agent of the Pittsburgh, Cincinnati, Chicago & St. Louis; vice-presidents, F. N. Hartwell, H. Verhoeff & Co.; C. B. Phelps, general superintendent of transportation, Louisville & Nashville; Charles Van Overbeke, traffic manager, Standard Oil Company; secretary, S. J. McBridge, agent, Blue Ridge Despatch, and treasurer; W. T. Vandenburgh, commercial agent, Seaboard Air Line.

The American Society of Mechanical Engineers

The regular monthly meeting of the American Society of Mechanical Engineers will be held on Tuesday, March 9, in the Engineering Societies' building at 29 West Thirty-ninth street, New York. Dr. Hollis Godfrey, president of the Drexel Institute will present a paper on "The Application of Engineering Methods to the Problems of the Executive, Director and Trustee."

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, Jefferson Hotel, Richmond, Va.

American Association of Dining Car Superintendents.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 21-24, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Association of Railroad Superintendents.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

American Electric Railway Association.—E. B. Burritt, 29 W. 39th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

American Electric Railway Manufacturers' Association.—H. G. McConaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

American Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, Chicago.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, Atlantic City, N. J.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Railway Safety Association.—L. F. Shedd, C. R. I. & P., Chicago.

American Railway Tool Foremen's Association.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next meeting, June, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

American Wood Preservers' Association.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Manufacturers of Chilled Car Wheels.—George W. Lyndon, 1214 McCormick Bldg., Chicago.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Next meeting, June 23-25, Niagara Falls, N. Y.

Bridge and Building Supply Men's Association.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

International Railway General Foremen's Association.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 14-17, 1915, Sherman House, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

Maintenance of Way and Master Painters' Association of the United States and Canada.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 26 to 28, 1915, Chicago, Ill.

Master Car and Locomotive Painters' Association of the United States and Canada.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-17, 1915, Detroit, Mich.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

Railway Business Association.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Fire Protection Association.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Society of Railway Financial Officers.—Carl Nyquist, C. R. I. & P., La Salle St. Sta., Chicago. Annual meeting, September, 1915.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Annual meeting, January, 1916.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meeting last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Despatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Traveling Engineers' Association. W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September, 1915, Chicago.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

Traffic officers of the transcontinental railways began a meeting in Chicago on Monday to arrange for putting into effect the latest decision of the Interstate Commerce Commission in the intermountain rate case, which gave relief from the fourth section on a large number of commodities, permitting the railroads to make lower rates to the Pacific coast terminals from eastern points than to intermediate points, in order to meet competition of vessels sailing through the Panama Canal.

Traffic Club of Chicago

The nominating committee of the Traffic Club of Chicago has selected the following as the regular ticket of officers for the ensuing year: President, Fred Zimmerman, vice-president, Chicago, Indianapolis & Louisville; first vice-president, F. L. Bateman, president, Transcontinental Freight Company; second vice-president, W. O. Davis, division freight agent, American Steel & Wire Company; third vice-president, W. J. Leahy, general passenger agent, Chicago, Rock Island & Pacific; secretary, W. H. Wharton, commercial agent, Nashville, Chattanooga & St. Louis; treasurer, Charles B. Hopper, general freight agent, Goodrich Transit Company. Directors for two years: J. Charles Maddison, secretary, Montgomery Ward & Company; J. G. McAuliffe, traffic manager, Butler Brothers; C. W. Pitts, general agent passenger department, Great Northern; E. W. Skipworth, assistant general traffic manager, Sulzberger & Sons Company. The annual meeting and election will be held on March 30.

River Traffic in the United States

The United States Department of Agriculture has issued bulletin 74 on Inland Boat Service, dealing with freight rates, time of transit and length of routes. Long passenger runs are a thing of the past. A few hundred miles, the investigator found, is usually the maximum run for any steamboat. On only 25 of the 102 routes for which this information was available, was the average rate of speed over 10 miles an hour and on 37 it was less than 6.

In the east the principal routes of steamboat lines, include those of the Hudson river and the Chesapeake bay. On the Hudson there is considerable variety of traffic, through service between New York City and Albany, a number of shorter routes between various cities along this line, and thirdly the through traffic of canal boats carrying cargoes from the Erie canal to tidewater. In Chesapeake bay traffic radiates principally from the cities of Baltimore, Washington and Norfolk.

The longest routes are to be found in the Mississippi Valley. From Cincinnati regular lines run down the Ohio and Mississippi rivers as far as Memphis, 749 miles. From St. Louis regular boats run to St. Paul and to Memphis. Other lines reach Kansas City and Peoria, and one goes up the Tennessee river as far as Waterloo, Alabama. From Memphis boats run to Vicksburg, where they connect with boats for New Orleans. From New Orleans there is a line up the Red and Black rivers to Harrisonburg, La., and other routes traverse the network of rivers, bayous and canals in southern Louisiana as far west as Bayou Teche, and as far north as the Red river. There is also considerable traffic on Lake Pontchartrain.

On the Pacific coast an important system of waterways consists of the rivers emptying into San Francisco bay, and here there is a rich truck region which is not conveniently reached by rail, but is comparatively easy of access by boat. San Francisco, Sacramento and Stockton are the principal centers for this traffic. A second coast system consists of the Columbia river and its tributaries. From Portland steamers run down the Columbia to Astoria and up as far as Celilo Falls. Above the Celilo Falls other boats reach points on the upper Columbia and Snake rivers.

An English Railway's Big Business.—The Great Northern Railway has recently handled more cars at its London end than at any previous time in the history of the line.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

At a hearing before Examiner Kelly of the Interstate Commerce Commission at Chicago last week the eastern railroads voluntarily withdrew tariffs increasing the rates on meat and packing house products, which had been suspended by the commission, to file new tariffs advancing the rates by only 5 per cent.

Rates on Farm Wagons from Toledo

Milburn Wagon Company v. Ann Arbor, et al. Opinion by Commissioner Harlan:

The adjustment of rates from Toledo, on horse-drawn freight vehicles, farm wagons, carts and dump wagons to Illinois, Wisconsin, Minnesota, to points west of the Mississippi river and to Mexico is alleged to be inherently unreasonable, in part by reason of unreasonable official classification ratings, and on a relatively higher basis than from Chicago, Milwaukee, Racine, etc., to the undue preference of these places. The commission adheres to its decision in the *Commercial Club of Terre Haute v. Vandalia*, 29 I. C. C., 383, and holds that the other cities are not similarly circumstanced and that the adjustment of rates from Toledo is not unreasonable. (32 I. C. C., 582.)

Rates on Fruits from Points in Florida to Montana

Lindsay & Company, Ltd., et al. v. Northern Pacific et al. Opinion by Commissioner McChord:

The commission finds that the carrier's rates of $1.62½ per 100 lb. on grapefruit in carloads and $1.60 on fresh tomatoes in carloads from Jacksonville and other basing points in Florida, when from beyond, to Helena, Great Falls, Butte and Billings, Mont., are not unreasonable. It is held, however, that the present rate of $1.76 on oranges in carloads and grape-fruit and oranges in mixed carloads from the same points to the same destinations is unreasonable to the extent that it exceeds $1.62½.

The present minimum weight of 26,000 lb. on grapefruit and oranges in straight or mixed carloads is found unreasonable to the extent that it exceeds 24,000 lb. (33 I. C. C., 150.)

Rates on Lumber from Points in Virginia

Massie & Pierce Lumber Company et al. v. Norfolk & Western et al. Opinion by the commission:

Complainants, shipping lumber from points on the Durham division of the Norfolk & Western, between Lynchburg and the North Carolina state line; from Dillard, on a branch of the Norfolk & Western, extending south from Blackstone; from certain points on the Southern, between Richmond and Burkeville, and from a number of points on the Virginian, between Altavista and Suffolk, all of which points are east of Roanoke and south of the James river, ask that these points be given Virginia city rates on lumber to points in Buffalo-Pittsburgh and central freight association territories. The commission finds that such rates should not be granted. The common point rate adjustment at the Virginia cities is a result of the competition of carriers and is of long standing. It applies to traffic in general, and if it were overthrown, as would be the case if complainants' request were granted, the resulting permanent realinement of rates would be very far-reaching. The commission is not prepared to condemn the Virginia cities rate adjustment on a record which involves but one commodity, and which excludes questions under the long-and-short-haul rule. (33 I. C. C., 14.)

Lumber Rates from Points on the Pacific & Idaho Northern

Boise Lumber Company, Ltd., v. Pacific & Idaho Northern et al. Opinion by Commissioner Clark:

The commission finds that the joint rate of nine cents per 100 lb., charged by the Pacific & Idaho Northern and the Oregon Short Line, on saw logs from New Meadows, Tamarack and other so-called group A points on the Pacific & Idaho Northern in Idaho via Ontario, Ore., to Boise, is unreasonable and should not exceed seven cents per 100 lb.; minimum weight, 40,000 lb. The complainants requested a rate of 3.1 cents. The commission states, "Every shipper is entitled to a reasonable rate; but if the nature or value of a commodity offered for transportation is such as to demand an unreasonably low rate, there is no lawful obligation upon the carrier to meet this demand.

The United States government and the state of Idaho own, respectively, 175,877,000 ft. and 55,000,000 ft. of merchantable timber tributary to the Pacific & Idaho Northern which must move via rail. It is stated that this timber is subject to deterioration if allowed to stand longer and that efforts to dispose of it have been unavailing, the controlling obstacle being the freight rate to Boise. The development of these timber tracts is alleged to be of paramount importance, but the commission, following the decision in *Railroad Commissioners of Montana v. Butte, Anaconda & Pacific* (31 I. C. C., 641), states that "the national or public aspect of this matter is one of general governmental policy and not one which the law intrusts to the commission to determine." (33 I. C. C., 109.)

Regulations Restricting the Shape of Baggage

Opinion by Commissioner Hall:

The commission in Regulations Restricting the Dimensions of Baggage (26 I. C. C., 292) said that

> Upon notice of not less than one year carriers may provide that trunks or other rigid containers with more than two bulging sides, or with two bulging sides that are not opposite to each other, will not be accepted for checking as baggage.

The following rule was adopted by the carriers in accordance therewith:

> Trunks or cases constructed in the form of a trunk, or other rigid containers which are not square or rectangular, will not be accepted for transportation in regular baggage service, except that such trunks, cases, or other rigid containers will be accepted for transportation provided that they have not to exceed two bulging sides and the bulging sides are opposite to each other.

The commission finds that this rule must be canceled because it is arbitrary and unreasonable in so far as it is intended to exclude from the regular baggage service the so-called "pentagonal trunks" used by the salesmen of protestants, the National Cash Register Company and the Toledo Scale Company. Each salesman takes with him when he is on the road one of these trunks, containing one complete cash register or scale. The trunks weigh from 200 to 250 lb. Although they must rest on their bases they are small and compact and are handled better than many other articles carried in the regular baggage service. The salesmen travel as a rule on local trains on which the available baggage space is rarely crowded. It was shown that the rule would seriously interfere with protestants' business, and that there would be no corresponding benefit for the carriers. (33 I. C. C., 266.)

The Nashville Terminal Case

City of Nashville et al. v. Louisville & Nashville, et al. Opinion by Commissioner Meyer:

The Louisville & Nashville and the Nashville, Chattanooga & St. Louis own separate terminals at Nashville, but operate them jointly as the "Nashville terminals," the total expense of maintenance and operation being apportioned on the basis of the number of cars and locomotives handled. Both roads thus serve the industries on each other's tracks in addition to the industries on their own, without charge to shippers. The two roads since 1907 have interchanged with the Tennessee Central all noncompetitive traffic, except coal, at $3 a car, coal being switched only at 60 cents a ton. In *Traffic Bureau of Nashville v. Louisville & Nashville* (28 I. C. C., 533), affirmed in *Louisville & Nashville v. United States* 216 *Fed.* 672, it was held that this constituted discrimination and the roads were ordered to follow the same practice in switching of coal from and to the Tennessee Central, as they maintained with respect to shipments from and to their own tracks. The carriers construed this order to relate exclusively to noncompetitive coal, but have continued their former practice as to competitive coal. Competitive traffic of all kinds is interchanged at local rates amounting to from $5 to $36 per car.

Complainants ask that the roads be required to interchange with the Tennessee Central at a uniform charge not to exceed $2 a car.

The commission finds that a charge of $3 for switching Tennessee Central noncompetitive traffic is not unreasonable.

The commission also believes that the defendants have inter-

preted too narrowly the decision in *Traffic Bureau of Nashville v. Louisville & Nashville,* because, although that case related exclusively to coal, the decision and order related to competitive as well as noncompetitive coal.

The commission also finds that defendants' refusal to switch competitive traffic to and from the Tennessee Central on the same terms as noncompetitive traffic while interchanging both kinds of traffic on the same terms with each other is discriminatory. As long as defendants switch both competitive and noncompetitive traffic for each other at a charge equal to the cost of service, exclusive of fixed charges, the charges imposed for switching Tennessee Central traffic should not exceed the cost of the service, which, as had been shown, is approximately $3 per car.

The commission believes that since defendants interchange traffic with each other they cannot refuse to interchange traffic upon substantially the same terms with the Tennessee Central, provided the circumstances and conditions are substantially the same, and defendants are not required "to give the use of their tracks or terminal facilities" to the Tennessee Central within the meaning of section 3. The commission does not agree with defendants' contention that they cannot be compelled to "short haul" their own lines in favor of the Tennessee Central, because each line is already "short hauling" itself in favor of the other. The commission also gives weight to the contention that defendants' terminals are admittedly open to noncompetitive Tennessee Central traffic, even though at prohibitive rates. (33 I. C. C., 76.)

Rates on Tomatoes from Jacksonville to Kansas City

In re rates on tomatoes from Jacksonville, Fla., to Kansas City, Mo., and other points. Opinion by Commissioner Clements:

Rates from Jacksonville and other Florida base points to points west of the Mississippi river, applicable on tomatoes originating in Florida, are made by combination of proportional rates to the Ohio and Mississippi river crossings and class rates beyond, the lowest combination in each case fixing the amount of the rate via all routes. Following a change in the rating of tomatoes in western classification from class C, minimum 24,000 lb., to fifth class, minimum 20,000 lb., and a consequent increase in the rates to points west of the Mississippi river from the Ohio and Mississippi river crossings, it is now proposed to increase to the same extent rates on tomatoes originating in Florida, the increase to accrue entirely to the lines west of the crossings. With the increase would go a reduction of 4,000 lb. in the carload minimum weight. The commission finds that these charges would be justified. (33 I. C. C., 145.)

Reparation Arising from Failure to Furnish Cars

Vulcan Coal & Mining Company v. Illinois Central. Opinion by Commissioner Meyer:

Complainants, operating mines at Belleville and Coulterville, Ill., on the Illinois Central, allege that during certain periods of 1911, 1912 and 1913 defendants failed to furnish a reasonably adequate supply of cars. The commission is asked to award reparation equal to the loss of profit on interstate shipments, which would have been made had the car supply been reasonable, plus the greater cost of mining due to restricted output. The commission, in this report, does not attempt to determine whether or not the car supply was legally adequate, nor to determine the amount of damages, both of these questions being left for a subsequent hearing; and the report is mainly devoted to a discussion of the commission's jurisdiction, the defendants having argued that this is a question for determination by the courts.

The commission, following the decision of the United States Supreme Court in *Texas & Pacific v. Abilene Cotton Oil Company* (204 U. S., 426), contends that the question as to the extent to which defendant failed to comply with the duty it owed complainant is an administrative one, of which the commission alone can take original jurisdiction. In the Supreme Court case suit was brought to recover damages resulting from the exaction of an alleged unreasonable rate. This rate was stated in a schedule duly filed and published, but the commission had never passed on its legality. The court refused to construe the act as conferring any right to recover damages for unreasonable charges prior to a finding by the commission. This case was followed by a number of other important cases.

As concerns a reasonable rate, these cases in general hold that the commission is given jurisdiction to determine what is a reasonable rate, but that the courts have jurisdiction in case a carrier collects a rate which has already been determined by the commission to be unreasonable. It is not wise for the courts to determine what is a reasonable rate, because various decisions might not agree on the same rate.

As to the carrier's duty to furnish cars, the commission believes that its contention above must be correct unless it be the carrier's absolute duty to furnish cars to the full extent of the shipper's demand, which, of course, is manifestly impossible. It is the carrier's duty to maintain a reasonably adequate car supply, and the question of what is a reasonably adequate car supply is just as much an administrative one as the question of what is a reasonable rate. The legal sufficiency of defendant's car supply cannot be definitely fixed by statute. It does not necessarily follow, however, that every case involving car supply must first come before this commission. It is obvious that if a carrier should absolutely refuse to furnish any cars, the courts could take primary jurisdiction.

The commission also holds that the assumption of jurisdiction in the present case is not inconsistent with the mandamus provisions of section 23 of the act. It is not believed that defendant is deprived of its right under the seventh amendment of the constitution, or that considerations of expediency should have weight in deciding whether or not the commission should assume jurisdiction.

As stated above, the commission at this time does not attempt to decide whether defendant's supply of cars was legally sufficient. The defendant contends that its car supply during the period set forth was such and draws attention to the purchases of rolling stock and of extensions of terminal facilities which have been made since 1911. The commission agrees that a carrier cannot be expected to maintain a car supply which will meet all demands of the operators under all conditions, for if the carriers were to equip themselves to meet at any moment the maximum demands, the public would be obliged to pay interest upon the additional investment and for the maintenance of the facilities. It is stated, however, that "although a full car supply cannot be expected all the time, carriers must do more than to provide themselves with sufficient equipment for the slack period of coal production."

Commissioner Clark, in a dissenting opinion in which Commissioners Harlan and Clements concur, notes that the commission has never been understood to possess the power to require a carrier to enlarge its facilities or service or to award damages against a carrier for failure so to do. Indeed, if the carrier must respond in damages because of its inability to furnish cars at a time of unusual demand, it seems that the right of that carrier to confine its equipment to its own rails must be recognized, but that right has been specifically denied in *Missouri & Illinois Coal Company v. Illinois Central* (22 I. C. C., 39). The dissenting opinion states:

"For all of these reasons, together with the fact that the commission's orders for the payment of money are only *prima facie* evidence in the courts, in connection with which the court may receive additional testimony which has not been presented to the commission, I think that the question of requiring a carrier to provide itself with additional facilities or respond in damages for failure so to do is essentially a judicial question, jurisdiction of which reposes in the courts, which have authority to create and direct the conduct of receiverships, and not in the commission, which has been created to exercise certain delegated powers legislative in character." (33 I. C. C., 52.)

STATE COMMISSIONS

The Massachusetts Public Service Commission has reported on the requests of the Boston & Maine, the Boston & Albany and the New York, New Haven & Hartford, presented several months ago, for authority to advance passenger fares. The New Haven will be permitted to increase one-way single fare rates outside the Boston suburban zone from 2¼ to 2½ cents a mile basis. The petitions of the other two roads are disallowed, because the form of the proposed tariffs is unsatisfactory. The board suggests that these roads file applications for increases on a basis similar to that used in the New Haven tariffs. The commission seems disposed to authorize a rate of 2½ cents a mile, except for the travel within 15 miles of Boston, but presents a mass of criticisms of the season and other reduced-rate tickets of the Boston & Maine and the Boston & Albany.

COURT NEWS

The Court of Appeals of New York last week handed down decisions in the Heim and Crane cases, upholding the constitutionality of the labor law of that State in respect to the provision which forbids the employment of any but citizens of the United States on contracts for public work. This decision affects all of the contracts on the new subways which the city now has outstanding, and which aggregate about $142,000,000. There are thirty separate contracting firms engaged in the work, and they employ about 16,000 men. Two days after the decision was published one of the contractors had suspended work and others were proceeding with reduced forces. It is the contention of the contractors that it is next to impossible to procure American citizens to do the kind of work which hitherto has been done by foreigners. The contractors, however, have announced that they will obey the law. Unless the law can be repealed or modified large numbers of aliens must be dismissed. This law has been on the statute books many years, but was a dead letter, as regards aliens, until the labor unions a few months ago started these suits.

Limitation of Liability—Shipment to Foreign Country

A bill of lading provided that the carrier agreed to transport only over its own line and act as agent as to the balance of the route, and should not be liable for loss or injury to the goods not occurring on its own road, except as liability might be imposed by law. The railroad company took from the shipper a release, releasing the company and all other transportation companies from liability from leakage, shrinkage, etc., except such as might occur from negligence. The Wisconsin Supreme Court holds that under these contracts the liability of the initial carrier was limited to its own line. It was contended that the Carmack amendment to the Interstate Commerce act made the initial carrier liable, but the court held that it did not apply to the case, because the shipment here was not from "a point in one state to a point in another state," but from a point in one state to a foreign country (Wisconsin to Manitoba). Best v. Great Northern (Wis.), 150 N. W. 484.

Abolition of Grade Crossing—Liability to Property Owner

New York Railroad Law, Section 91, provides that any railroad which crosses or is crossed by a street at grade may petition for an alteration in the character of such crossing, or, if not practicable to change it from grade, for its discontinuance, and the opening of another crossing. Section 21 provides that the road shall restore intersecting streets to their former condition. On petition of a road showing that public safety required the elimination of a grade crossing at a street, the Public Service Commission made an order directing that such street be carried under the railroad at a different point, so that the old grade crossing was abolished and the lines of both the railroad and the street changed. The new railroad line crossed the old street at a new point on an embankment, thus closing the old street at the new point of intersection. This left an owner's property at the end of a cul-de-sac, and made it necessary for him to travel further to reach the street. It was held by the New York Court of Appeals, in an action by the owner against the railroad, that the statute justified the change of grade and relieved the road from liability to the plaintiff.—Danner v. New York & H., 106 N. E. 1,029.

Right to Free Pass—Right to Eject Passenger—Company's Rule

In an action for wrongful ejection it appeared that a joint pass had been issued to one Bass and four other unnamed persons, of whom the plaintiff was one. After they boarded the train the conductor accepted the pass, punched it and returned it to Bass. Bass and others of the party, not including the defendant, however, having indulged too freely in liquor, became so disorderly as to justify and necessitate their ejection at an intermediate station. There was a rule of the defendant company, of which the defendant alleged the plaintiff had knowledge, that, when the person whose name appeared in the face of the pass was ejected from or left the train before arriving at the place to which he was entitled to go, the other person or persons for whom the pass was intended, but who were not named therein, would also, unless they paid fare, have to leave the train with the person named in the pass. The plaintiff, upon the ejection of Bass, neither tendered nor paid fare, and was consequently ejected, but the conductor used no more force than was reasonably necessary.

In reversing judgment for the plaintiff because of certain erroneous rulings of the trial court, it was held that a person riding on a pass is not a trespasser, and even when the pass is withdrawn (assuming, which is not ordinarily the case, that a conductor is clothed with authority to withdraw a pass or license that has been lawfully issued by the authorized agent of a railroad company), the holder should be given an opportunity to pay fare before he is ejected. The court held that if, as alleged, the plaintiff was an employee of a contractor for the rebuilding or repair of one of the defendant's buildings, and the defendant, as part consideration of the contract, had agreed to furnish free transportation for the contractor's men, he was a person to whom a pass might be issued under the Alabama statute. Assuming the pass was valid, if Bass was lawfully ejected, so was the plaintiff by operation of the company's rule, if he knew or was informed of it. The price paid by the plaintiff for a meal for one of the party at the place of ejection was not an element of damage, nor was the price paid for a meal for himself except to the extent that the cost exceeded what the plaintiff would have had to pay if permitted to ride. L. & N. v. Dawson, Alabama Court of Appeals, 66 So. 905.

Scope of Employment—Duty to Guard Dangerous Appliances

While the men in the boiler department of a railroad shop were resting at midnight, eating their luncheons, an employer playfully turned a compressed air hose upon a fellow servant, and killed him. In an action against the railroad company, the court held that it was not liable. The employees at the time were not engaged in the master's business, and the accident was not due to any violation of duty by the master. The compressed air hose was held not to be such a dangerous agency as to require the master to guard it to prevent its being used by unfit employees. The court likened the case to that of Ballard v. L. & N., 128 Ky., 826, 110 S. W. 296, 16 L. R. A. (N. S.) 1052. There the following propositions were decided: (a) "That a servant competent for the work for which he is employed is careless, reckless, stupid, and unfit to handle other appliances in the shop does not render the master liable for the use of a compressed air hose which it is not his duty to handle, but his handling of which by way of prank has not been stopped, in such a way that the air enters the body of a co-servant and kills him. (b) A compressed air hose is not a dangerous agency requiring a master to guard it so that ignorant or reckless persons cannot use it to the injury of others." In that case the person killed was an apprentice, and was engaged in the master's service when a fellow servant slipped up behind him and turned the hose on him, killing him. It was alleged that the co-servant who did the wrongful act was a careless, reckless, and stupid boy, and unfit for the employment, and that all this was known to the master, or to his superintendent, and such negligent servant was retained after such knowledge; that the superintendent knew that the boy at fault had been using the hose on the deceased on prior occasions, and knew it was dangerous; yet he had never warned the deceased or the negligent servant, both of whom were minors. Notwithstanding all these facts being alleged, making it a much stronger case than the present, the Kentucky court held that the complaint stated no cause of action.

The court also referred to the case of Western Railway of Alabama v. Milligan, 135 Ala. 205, 33 So. 438. In that case the plaintiff was very ticklish, or what is called "goosey," and, when punched, he jumped frantically and made ridiculous gyrations. The superintendent of the defendant railway company ordered him to brush off a table on which knives were revolving, and as he was about to brush the table, or in the act of doing so, the superintendent "goosed" him. He jumped frantically, as usual, throwing his hands under the knives, and was badly cut. The court held that the act of the superintendent was not an act of superintendence, for the consequences of which, under the Employer's Liability Act, the company could be held liable. It bore no sort of relation to the work the superintendent had directed the plaintiff to do. Kirby v. L. & N., Alabama Supreme Court, 65 So. 358.

Railway Officers

Executive, Financial, Legal and Accounting

Frank G. Drum, San Francisco, Cal., and Warren Olney, Jr., general counsel of the Western Pacific, at San Francisco, have been appointed receivers of the Western Pacific.

Arthur E. Haid has been appointed assistant general attorney of the St. Louis & San Francisco, with headquarters at St. Louis, Mo.

E. M. Bagley has resigned as claims attorney for the Oregon Short Line to engage in the general practice of law at Salt Lake City, Utah.

Clayton Snyder, assistant secretary of the National Railways of Mexico, with office at New York, has resigned, to become assistant treasurer of the Pittsburgh Steel Company, Pittsburgh, Pa., and E. E. Bashford, who was assistant secretary at New York in 1910, is now acting assistant secretary.

Robert R. Hulme, assistant auditor of merchandise traffic of the Philadelphia & Reading and subsidiary companies at Philadelphia, Pa., has been appointed auditor of merchandise traffic with office at Philadelphia, succeeding William B. Scott, retired from service, and Henry Forster succeeds Mr. Hulme.

J. S. Joyce has been elected president of the Tremont & Gulf with headquarters at Chicago, succeeding R. B. Fowler, who was elected vice-president and appointed general manager, with headquarters at Winnfield, La. Mr. Joyce has been elected president also of the Groveton, Lufkin & Northern, succeeding Mr. Fowler, who was appointed general manager of that road.

H. H. Larimore, district claim agent for the Missouri Pacific-Iron Mountain System at Kansas City, Mo., has been appointed assistant attorney for the system, with office at St. Louis, Mo., succeeding W. Scott Hancock, who has resigned to engage in the general practice of law. C. D. Jeffers, district claim agent at Poplar Bluff, Mo., succeeds Mr. Larimore, and J. B. Collins, claim agent at Atchison, Kan., succeeds Mr. Jeffers.

Edward Francis Kearney, whose election as president of the Wabash, with headquarters at St. Louis, Mo., has already been announced in these columns, was born March 27, 1865, and began railway work in 1882 as telegraph operator for the Pennsylvania Lines. He remained with that road until February, 1903, being employed successively as freight clerk, chief operator in superintendent's office, train despatcher, trainmaster's clerk, chief clerk to superintendent and trainmaster. The following year he was superintendent of the Terminal Railroad Association of St. Louis and the St. Louis Merchants' Bridge Terminal Railway, going to the Chicago, Rock Island & Pacific in February, 1904, as supervisor of mails. From April to October of that year he was superintendent of transportation of the St. Louis & San Francisco. In April, 1905, he was appointed superintendent of terminals of the Missouri Pacific at St. Louis and in February, 1908, was promoted to superintendent of transportation of that road and the St. Louis, Iron Mountain & Southern. He was made general superintendent of transportation in January, 1913, and three months later was elected first vice-president of the Texas & Pacific, with headquarters at New Orleans, La. Mr. Kearney held the latter office when he was appointed receiver of the Wabash a few weeks ago, and last week he was elected president of that road, as above noted.

E. F. Kearney

Verne M. Alexander has been appointed assistant to the president of the Chicago & Alton, with office at Chicago, Ill. He was born at Niagara Falls, Ontario, on November 19, 1887, and was educated in public and high schools at Lisbon and Cleveland, Ohio. He began railway work as messenger for the Western Union Telegraph Company and the Erie Railroad at Lisbon, Ohio, in June, 1901, and was successively yard clerk, freight received clerk and cashier at the same place until February, 1903; from February, 1903, to June, 1905, he was secretary to division freight agent and traveling freight agent for the same road at Youngstown, Ohio; June, 1905, to October, 1905, secretary to assistant general freight agent of the New York, Chicago & St. Louis, Cleveland, Ohio; October, 1905, to June, 1906, he took an advanced educational course at Central High School; June, 1906, to August, 1909, secretary and cashier of F. L. Fuller & Co., bankers and dealers in municipal and corporation securities, Cleveland, Ohio. During the last four months of 1908 he was associated with Tom L. Johnson (then mayor of Cleveland) in adjusting financial affairs of various companies at Lorain, Ohio. From September, 1909, to June, 1912, he was statistician to B. A. Worthington, first vice-president, general manager and receiver of the Wheeling & Lake Erie; and from July, 1912, to February, 1915, on staff of the president, Chicago & Alton at Chicago. On March 1, he was appointed assistant to president of the same road.

V. M. Alexander

Operating

John T. McShane, chief despatcher for the Chicago, Burlington & Quincy at Omaha, Neb., has been appointed trainmaster at McCook, Neb., and J. E. McManus succeeds Mr. McShane.

B. C. Byers, superintendent of the Indianapolis Terminal division of the Cleveland, Cincinnati, Chicago & St. Louis, at Indianapolis, Ind., has been appointed superintendent of the St. Louis division, with office at Mattoon, Ill., vice Hadley Baldwin, promoted, and F. N. Reynolds succeeds Mr. Byers.

W. R. Cahill, superintendent of the Nebraska division of the Union Pacific, with headquarters at Omaha, Neb., has been retired under the pension rules of that company. W. B. Jeffers, superintendent of the Wyoming division at Cheyenne, Wyo., succeeds Mr. Cahill, and George Brophy, trainmaster at Ogden, Utah, succeeds Mr. Jeffers.

Andrew Alfred Woods, whose appointment as superintendent of the New Orleans & Northeastern, with headquarters at New Orleans, La., has already been announced in these columns, was born on March 2, 1876, at New Orleans. He graduated from the School of Engineering at Tulane University and subsequently took a post-graduate course in engineering at the same university. His first railway work was as a rodman on the New Orleans & Western, now a part of the New Orleans Terminal Company. From June, 1896, to July, of the following year, he was a draftsman in the maintenance of way department on the New Orleans & Northeastern, and then for six months was draftsman in the mechanical department of the same road. He then served as draftsman and inspector on bridge pier construction on the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, until September, 1899, when he was appointed assistant engineer in the maintenance of way department of the New Orleans & Northeastern. From November, 1901, to July, 1913, he was resident engineer in charge of maintenance of way on the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific. He was appointed resident engineer in charge of maintenance of

way, on the New Orleans & Northeastern in July, 1913, which position he held at the time of his recent appointment as superintendent of the same road as above noted.

Traffic

D. L. Ogg has been appointed commercial agent of the Cincinnati, Hamilton & Dayton at Ironton, Ohio.

A. A. McKowen has been appointed division freight and passenger agent of the Wabash, with headquarters at Des Moines, Iowa, succeeding William Clapper, resigned.

J. E. Johanson, assistant general freight agent of the Rock Island Lines at Little Rock, Ark., has been appointed general freight agent, with headquarters at that point.

A. C. Tumy, assistant general freight agent of the Chicago, Indianapolis & Louisville, has been appointed general freight agent, with office at Chicago, succeeding W. T. Webster, resigned. R. B. Robertson, division freight agent, has been appointed assistant general freight agent to succeed Mr. Tumy.

The following changes are announced in a joint circular issued by the St. Louis & San Francisco and the Chicago & Eastern Illinois: Charles A. Forrest, commercial agent at Atlanta, Ga., has been appointed general agent at that point and the former office has been abolished; C. S. Hall, commercial agent at Cincinnati, Ohio, has been transferred to Cleveland, Ohio, in a similar capacity, and F. A. Edmondson succeeds Mr. Hall.

Engineering and Rolling Stock

H. M. Church, division engineer of the Baltimore & Ohio at Philadelphia, Pa., has been appointed division engineer of the Baltimore division, with headquarters at Baltimore, Md., succeeding W. I. Trench, deceased.

George P. Smith, chief engineer of the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria & Eastern, has been appointed consulting engineer, with headquarters at Cincinnati, Ohio. C. A. Paquette, chief engineer maintenance of way, succeeds Mr. Smith, with office at Cincinnati, and will be in charge of construction and maintenance. The office of chief engineer maintenance of way is abolished. Hadley Baldwin, division superintendent at Mattoon, Ill., has been appointed assistant chief engineer, with office at Cincinnati. Effective March 1.

Joseph Thomas Richards, consulting engineer of maintenance of way, of the Pennsylvania Railroad, with office at Philadelphia, Pa., retired under the pension rules of the company on March 1. He was born near Rising Sun, Cecil county, Md., on February 12, 1845, and was educated at West Nottingham Academy. He entered the service of the Pennsylvania Railroad in August, 1869, as rodman and transitman at Altoona, Pa. In June of the following year he was appointed supervisor main line, Harrisburg to Newport, and from October, 1871, to March, 1873, was chief engineer of construction and superintendent of various minor railroads in Maryland. He was then chief of locating engineers, making several surveys over the Allegheny mountains for an outlet for the Bedford & Bridgeport. In May, 1874, he became mining engineer in the service of the Cambria Iron Company, Johnstown, and returned to the service of the Pennsylvania Railroad in March, 1875, as supervisor on the main line from Newport to Granville. About a month later, he was promoted to assistant engineer, maintenance of way, and from June, 1877, to March, 1883, was principal assistant engineer of the United Railroads of New Jersey division, and then, for over two years, was assistant to the chief engineer, becoming assistant chief engineer of the Pennsylvania Railroad on June 24, 1885. When a change was made in the organization in March, 1893, he became engineer of maintenance of way; in June, 1903, he was appointed chief engineer of maintenance of way, and since June, 1913, was consulting engineer, maintenance of way, of the same road. Mr. Richards also was chairman of several committees for working out the plans for the New York and Washington stations and yards.

J. T. Richards

Purchasing

The office of William Wibel, assistant purchasing agent of the National Railways of Mexico at New York, has been closed on instructions received from Mexico.

OBITUARY

H. H. Brand, commercial agent of the Atlantic Coast Line, died on February 27, at Sumter, S. C.

J. J. Hughes, roadmaster of the St. Louis Southwestern at Mount Pleasant, Tex., died suddenly on February 26.

Nathan Hopkins Heft, formerly electrical engineering adviser of the New York, New Haven & Hartford, died on February 25, at Bridgeport, Conn.

W. D. Herring, general claim agent of the Sunset-Central Lines, with headquarters at Houston, Tex., died suddenly on February 22, aged 57 years.

M. L. Robbins, formerly from 1892 to 1908, general passenger agent of the Houston & Texas Central, died in Houston, Tex., on March 3, at the age of 64.

Tracy W. Niles, formerly superintendent of the Detroit division of the Lake Shore & Michigan Southern, at Detroit, Mich., died on February 25, after a long illness, at his home in Buffalo, N. Y., at the age of 64.

G. S. James, trainmaster of the Seaboard Air Line, at Tampa, Fla., while riding on the footboard of a switching engine in the yards at Tampa on February 25, was thrown off the engine and fell on the track, receiving injuries from which he died. The footboard struck a guard rail at the entrance of a bridge.

Thomas Swinyard, president of the Dominion Telegraph Company, died on February 25, in New York City, at the age of 83. He was born in England, and for a time served on the London & North Western. In 1862 he went to Canada as general manager of the Great Western Railway, and subsequently was active president of the Detroit & Milwaukee, both now included in the Grand Trunk system. He also served as the Dominion government commissioner for organizing the Prince Edward Island Railway and for a time was vice-president of the New York, Ontario & Western. In 1897 he represented the Dominion government in the arbitration suit with the Canadian Pacific.

John W. Addis, formerly for 19 years superintendent of motive power of the Texas & Pacific, died at Marshall, Texas, on February 25. He was born on March 13, 1851, at East Liberty, Pa., and after learning the trade of machinist entered the shops of the International & Great Northern, at Palestine, Tex. In 1882 he went to the Marshall shops of the Texas & Pacific, and left that road to become general foreman at the Tyler shops of the St. Louis Southwestern. He was transferred later to the Pine Bluff shops, of which he had charge, and was then for about four years master mechanic at the Gouldsboro shops of the Texas & Pacific. About 1892 Mr. Addis succeeded A. G. Douglass as superintendent of motive power and rolling stock of the Texas & Pacific at Marshall, and remained in the service of that road until June, 1911.

W. W. Borst, formerly receiver for the Denver, Lakewood & Golden, died at his home in Denver, Col., on February 22, aged 76 years. Mr. Borst entered railway service in April, 1867, with the Union Pacific. From September, 1871, to September, 1879, he was superintendent of the Denver & Rio Grande, and was then consecutively general agent of the Atchison, Topeka & Santa Fe and superintendent of the Western division, returning to the Denver & Rio Grande in November, 1883, as superintendent of the First division. He remained with the Rio Grande until December, 1888, as superintendent and assistant general superintendent. In November, 1889, he became superintendent of the Denver Consolidated Electric Company, and from August, 1896, to 1905, was receiver for the Denver, Lakewood & Golden, retiring from active railway service on the latter date.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Chicago, Milwaukee & St. Paul has ordered nine 260-ton electric locomotives from the General Electric Company, for operation on the second engine division of the new electrical line from Three Forks, Mont., to Harlowton.

CAR BUILDING

The New York, Westchester & Boston is in the market for 15 passenger cars.

Spang, Chalfant & Company, Pittsburgh, Pa., have ordered 6 hopper and 10 flat cars from the Pressed Steel Car Company.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered six postal cars from the American Car & Foundry Company.

The Carolina, Clinchfield & Ohio recently purchased a 40-ft., 200 hp. concrete mixing car for lining tunnels, from the McKeen Motor Car Company, Omaha, Neb.

The Chicago, Waukegan & Fox Lake Traction Company has ordered one 55-ft., 200 hp. combined passenger-baggage motor car from the McKeen Motor Car Company, Omaha, Neb.

The Irish Railways in Wartime.—The Irish railway companies are not under the government control, and hence all movements that are made for the naval and military authorities are paid for. From August 5 to 21 the Great Southern & Western operated 172 special trains, which carried 60,000 men, 10,000 horses, 200 baggage cars and 1,100 cars of guns.

New Norwegian Electrification.—The electrification of the railway between Kiruna and the Riksgränsen station on the Norwegian frontier has now been completed, and operation was begun on January 19. Loaded trains of forty cars are run at a speed of 36 miles an hour; previously the highest speed allowed was only 18. The work has been successfully carried out, although accompanied by some mishaps, among which may be mentioned that the telegraph line from Sweden to Narvik has been put out of service altogether, due to induction effects. Steps have now been taken to lay a double telegraph line. The telephone line is a double line supplied with discharging poles and transformers, and the induction on this is very small.

Australian Railways.—According to a report issued by the high commissioner for Australia good progress is being made in the construction of the Transcontinental Railway, which is to link up the railways of Western Australia with those of the eastern states. During the four weeks ended December 19, 34¼ miles of plate-laying was accomplished. This is a record for this line, and, so far as is known here, for railways in Australia. It is anticipated that still further progress will be made in the current year. At the West Australia end the head of the road now stands at 152 miles; the earthworks have been completed to the 157th mile, and the telegraph line to 148 miles, 18 miles having been erected during the month. In the South Australian section the head of the road has reached 156 miles. The earthworks extend to about 160 miles, and the telegraph line to 149 miles, 16 miles having been erected during the month. At the western end there are some 638 men employed, and at the eastern end 1,432 men. The total number of miles of line laid is 308. This is exclusive of a considerable mileage of sidings, yards, etc. Good water has been struck in wells between 158 and 185, in the South Australian section, and boring for water is being continued at both ends in advance of construction. One large reservoir dam is almost finished in the eastern section, and two others are under construction, and also one in the western section. The news of the Pine Creek-Katherine River Railway, in the northern territory, is that the clearing has been completed for about 35 miles, the earthworks for 9 miles, and the waterways for 11 miles, some 228 men being employed. Rails and other material are now being landed at Port Darwin.—*Engineering.*

Supply Trade News

The Superior Car Metal Roofing Company, Chicago, Ill., has recently been incorporated for $25,000 for the purpose of manufacturing and selling car roofs, doors, locks, etc. The incorporators are William H. Slatten, William F. Nolan and E. A. Albright.

The Greenfield Tap & Die Corporation, Greenfield, Mass., composed of the Wells Brothers Company, the Wiley & Russell Manufacturing Company and the A. J. Smart Manufacturing Company has discontinued the Wells Brothers Company store in New York, at 107 Lafayette street, and now maintains one store at 28 Warren street, the former Wiley & Russell store. The Wiley & Russell Manufacturing Company's store in Chicago at 545 West Washington Boulevard has also been discontinued and the stores consolidated at 13 South Clinton street, the former Wells Brothers store. The consolidation of the stores in this manner is expected to bring about a decided improvement in the service offered by the several companies.

Wellington B. Lee, whose appointment to the position of vice-president of the Track Specialties Company, Inc., New York, was announced in the *Railway Age Gazette* of last week, was formerly with the Ramapo Iron Works, Hillburn, N. Y., and was with that company 24 years. Mr. Lee was born January 29, 1867, at Wilmington, Del. He was educated in the public schools of that city, and received a degree of civil engineer in 1885 at the Polytechnic College of the State of Pennsylvania, from which, after serving an apprenticeship of one year with a local surveyor, he became a clerk to the chief engineer of the Wilmington & Northern. One year later he obtained a position in the maintenance of way department of the Pennsylvania Railroad at Wilmington, Del., and served on that railroad for three years. He then entered the service of the Ramapo Iron Works and served as chief draftsman of that company for 12 years, after which he was an engineering salesman for 12 years more. He is a member of the American Society of Civil Engineers, and also of the Engineers' Club of New York.

W. B. Lee

Two suits by the Safety Car Heating & Lighting Company, New York, against the United States Light & Heating Company, Niagara Falls, N. Y., have recently been decided in favor of the defendant by Judge Hazel in the Western District of New York. These suits were on the W. I. Thompson Patent No. 881,743, March 10, 1908, on a dynamo suspension for car lighting, and W. I. Thompson Patent No. 926,518, June 29, 1909, on a lighting system, commonly referred to as the carbon disk regulator. In each case the patent was held invalid and the bill of complaint dismissed. The court held that the predecessors of the United States Light & Heating Company had installed dynamo suspensions and the carbon disk regulator substantially as described and claimed in the patents, on their own apparatus on the New York Central prior to the dates of the patents.

William Wharton, Jr., & Co., a subsidiary of the Taylor-Wharton Iron & Steel Company, announce that remarkable progress has been made in the erection of the new plant at Easton, Pa., and that they expect to move into new quarters during the present year. The tract on which the plant is located comprises about 50 acres just outside the city limits of Easton, and when

all the buildings will have been completed about 10 acres will be under roof. The main shop is over 450 ft. square and will be used exclusively for the manufacture of special track work for electric and steam railways. Other buildings are: Power house, foundry, pattern shop, forge shop and the office building. The plant has been designed to take care of the manufacturing now carried on at the two plants of the Wharton company located at Philadelphia, Pa., and Jenkintown; also the forging business of the Tioga Steel & Iron Company, which is also a subsidiary of the Taylor-Wharton Iron & Steel Company.

In the *Railway Age Gazette* of last week it was announced that Jed O. Gould, general superintendent and works manager of the Gould Coupler Company at Depew, N. Y., had died on Friday, February 19, in the German Deaconess hospital at Buffalo. Mr. Gould was a brother of Charles A. Gould, the present president of the Gould Coupler Company, and had served as general superintendent and works manager for many years. He was born in Batavia, N. Y., on August 13, 1857. As a young man he moved to Buffalo where for several years he was superintendent of the money order department at the Buffalo post office. He resigned from that position, however, when the Gould forge was established at Black Rock some thirty years ago to take an active interest in that plant. When the plant was moved to Depew, he became general superintendent and works manager, which position he held until the time of his death. Mr. Gould is survived by his wife, Jane C. Gould and by three sons, James, Raymond and Chester, all of Buffalo.

J. O. Gould

In this column last week there was announced the death of William F. Gurley, president of W. & L. E. Gurley, Troy, N. Y., at Atlantic City on Wednesday, February 17. Mr. Gurley was one of the most highly esteemed residents of the city of Troy. He was born at that place on June 11, 1860. He received his early education there and graduated from Williams College in 1882. He immediately entered the Gurley works and obtained a practical knowledge of the business. When William Gurley, his uncle, died, William F. Gurley advanced to a leading position in the firm, and on its incorporation became its president, a position which he held until his death. Mr. Gurley was prominent in the public life of Troy. He was the first president of the Troy Chamber of Commerce, and was an ex-officio member of the board of directors of that organization. He was one of the three commissioners of education of the city and took a great interest in the welfare of the public schools. He was president of the board of trustees of the Emma Willard school, one of the leading educational institutions for women, and president of the board of trustees of the Troy Orphan Asylum; he was also prominent in church work and was a trustee in a number of church and charitable institutions.

Baldwin Locomotive Works

The recently issued annual report for the Baldwin Locomotive Works for the year ended December 31, 1914, shows decidedly what an exceedingly poor year 1914 was for the railway supply companies. The gross sales of the company for the year were $13,616,163, as compared with $37,630,969 in 1913, or almost two-thirds less. The manufacturing and administrative expenses, depreciation, etc., were $13,295,554, as against $33,744,494 in 1913, so that the manufacturing profit was only $320,609 as compared with $3,886,484 in 1913. There was other income of $661,144, however, including the dividends of the Standard Steel Works, so that the total income was $981,753. Interest was paid on bonds, etc., of $631,523, and the net profit was $350,229, as against $4,017,800 in 1913. The company, nevertheless, paid the usual dividends of $1,400,000, or 7 per cent, on its preferred stock and $400,000, or 2 per cent, on its common stock, the result being that the surplus carried forward was but $3,438,021 as compared with $4,887,791 on December 31, 1913. The surplus on December 31, 1912, however, was $2,669,990. The report contains the following comment: "During the latter part of 1913 and the first half of 1914 the falling off of railroad revenues, due to the unfavorable attitude of the Interstate Commerce Commission, caused a general cessation of purchases of railroad equipment, and this condition was made more acute by the reduction of railroad revenues resulting from the slowing down of business, due largely to the adoption of lower tariff rates. During the last half of the year 1914 these unfavorable conditions were further affected by the paralysis of finances and of business which followed the breaking out of the war in Europe. The stress of competition forced the prices of orders obtained close to the cost of production. It is obvious that under these conditions only extreme economies made it possible to carry the overhead expenses and pay interest on the bonded indebtedness."

American Steel Foundries

The annual report for the American Steel Foundries for the year ended December 31, 1914, contains the following statements:

"Perhaps the most comforting statement that can be made concerning the operations of the company for the year is that after spending $913,085 for repairs and maintenance, charging $231,456 to depreciation, and paying out $343,680 in dividends, we ended the year with net assets practically the same as they were at the beginning, the actual decrease being less than $8,000. The balance sheet will show, however, a decrease in surplus of $575,162, and while $567,263 of this is offset by a reduction in our bond and debenture indebtedness, or provision therefor, the fact remains that our surplus has been reduced from $1,243,149 to $667,987, and this is the figure that must be kept in mind."

The company's gross sales in 1914 were $11,125,091 as against $17,425,942 in 1913. The operations for the year were at a rate of approximately 50 per cent of the rated capacity of the plants, as against 80 per cent for 1913. The profits, after deducting general, selling and administrative expenses, were $637,503 as compared with $2,031,272 for the preceding year. After deducting $231,456 for depreciation, and adding miscellaneous income of $87,159 the earnings were $493,206. Deducting from this, interest on bonds and debentures outstanding, and providing for bond redemption and debenture retirement, there was a net loss of $231,482.

The company's balance sheet for December 31 shows capital assets of $20,601,908, inventories of $2,034,953, accounts and bills receivable of $1,675,785, and cash $1,547,811. The company's capital stock is now $17,184,000, and there are bonds outstanding of $4,819,100. Accounts payable on December 31 totaled $689,017. The reserve, as noted above, was $667,987. President Lamont states in the report: "It is difficult to say much as to the present year; one guess is as good as another. We are showing small gains in tonnage at some of the plants, and there is more business in prospect now than there has been at any time since the outbreak of the war, but actual orders materialize very slowly. If the crop situation develops favorably we may be operating on a satisfactory basis during the second six months of the year."

TRADE PUBLICATIONS

Tile Roofing.—"The Indestructible Roof" is the title of a 68-page booklet issued by the Federal Cement Tile Company, Chicago, Ill. It illustrates and describes the detail construction of standard roof tile, and shows clearly the process of erection. It also illustrates numerous installations using this product.

Concrete Work.—"The First Lessons in Concrete Work" is the title of a 40-page booklet just issued by the T. L. Smith Company, Milwaukee, Wis. This book defines concrete, gives the proportion of ingredients in the various mixtures used, and explains how the percentage of voids in any material may be found. The design and construction of forms for foundations, walls, etc., are also explained, and the placing of concrete in cold weather, the methods of rendering it waterproof, the cost of placing, etc., are discussed. It also describes and illustrates the various Smith mixers, giving the horse power required to operate a machine of any particular size, etc.

Railway Construction

Buffalo, Rochester & Pittsburgh.—An officer writes that the proposed improvements to be carried out near Silver Springs, N. Y., calls for the construction of a new section of road about 1,000 ft. long which will permit the elimination of a timber structure over the present highway.

Canadian Northern.—See Canadian Pacific.

Canadian Pacific.—The committee of the Canadian parliament has under consideration a bill which provides for the ratification of an agreement between the Canadian Pacific and the Canadian Northern for the joint use and ownership of the lines and improvements now existing or to be built in North Toronto, Ont., on the present right-of-way of the Canadian Pacific, from Dufferin street in the west to the eastern end of the bridge across the west Don at Eglinton avenue and Leslie street, over 4.5 miles. In addition to the plans for the elevation of tracks, from Dufferin street to Summerhill avenue at Reservoir Park, east of Yonge street and the construction of a station at Yonge street, the agreement calls for increased trackage, common and joint, east of Summerhill avenue and over to the west Don about two miles. The Canadian Northern is to have its freight yards at Yonge street, east of the street and north of the Canadian Pacific, and its division yard at Leaside; the agreement is being made to permit the Canadian Northern to reach these yards and the new union station.

Fort Myers, Marco Bay & Miami.—Contracts will be let as soon as a complete survey is made to build from Ft. Myers, Fla., south along the west coast of Florida via Naples, and Marco bay to Everglade, thence east across the southern part of Florida to the east coast at Miami, about 150 miles. Preliminary surveys were started last year, and engineers will begin work from Ft. Myers this month to make a complete survey for the proposed line. There will be about 15 miles of trestle work which later is to be filled in. The plans also call for constructing docks for handling coal and lumber at Marco bay, where there is a depth of from 18 to 32 ft. of water. The company expects to develop a traffic in lumber, fruit, vegetables, fish and passengers. The West Coast Construction & Development Company is to be organized to build the line. W. J. Hilands is trustee, Ocala, Fla., and W. B. Clay, chief engineer, Arcadia. (See Florida Roads, January 29, p. 211.)

Jacksonville-Middleburg (Electric).—Right of way has been secured, it is said, for the electric line from Jacksonville, Fla., southwest to Middleburg, about 25 miles, and grading work is now under way on the section from Jacksonville Heights to Jacksonville. When this section is finished work will be started on the Middleburg end. Financial arrangements have been made to build the first ten miles, and application will soon be made for a charter. A. W. Mackinlay, general manager and chief engineer, Jacksonville, Fla. (See Florida Roads, January 29, p. 211.)

McConnellsburg & Ft. Loudon (Electric).—A charter has been granted to this company in Pennsylvania with $60,000 capital. The plans call for building an electric line from McConnellsburg, Pa., east to Ft. Loudon, about ten miles. E. J. Post, president, Washington, D. C., and G. A. Harris, B. C. Lamberson, J. L. Patterson, McConnellsburg; H. A. Duffy and D. H. Patterson, Webster Mills, are the incorporators. (February 19, p. 350.)

Ogden, Logan & Idaho (Electric).—The construction work on the extension from Lewiston, Utah, to Preston, Idaho, will be completed about March 15, 1915. This company also expects to construct a line from Wellsville, Utah, to Brigham City, some time during this year. This road will connect the company's north and south properties.

Oklahoma Roads.—A charter has been granted the Alva, Buffalo & Colorado for the purpose of building a line from Rosston, Okla., to Buffalo, a distance of 20 miles. Efforts are now being made to secure subscriptions.

Pennsylvania Railroad.—The report of this company for the year ended December 31, 1914, shows that the work on the improvement of the passenger facilities in and around Philadelphia, Pa., was continued. The five-track reinforced concrete and stone arch bridge of the Connecting Railway over the Schuylkill river at the Girard avenue entrance to Fairmount Park has been completed and placed in operation and the old double track bridge removed; the work at North Philadelphia has been finished with the exception of remodeling the passenger station. The electrification of the main line from Broad street station, Philadelphia, to Paoli, is progressing rapidly, and the work from Paoli to West Philadelphia is almost completed, including the sub-stations. The pier properties on the Delaware river south of Washington avenue and at Walnut street, Philadelphia, were improved during the year by the erection of new sheds and the enlargement of other facilities. The reconstruction of a number of bridges at Ernest; over North Broad street, North Philadelphia; at Highspire; Auburn and Norristown, and at Dornock Point was also carried out, and the masonry work for the double track steel bridge over the Allegheny river between Kiskiminetas Junction and Freeport has been completed, and the superstructure is being erected. The bridge at Phoenixville is being rebuilt and will be completed in 1915. On the new six-track section of the New York division, between Colonia and Bay Way, just west of Elizabeth, N. J., work was continued during the year, this consisted principally of the elevation of the four original running tracks. The greater part of this work has been completed and placed in operation, and it is expected that the remaining sections will be finished in the spring of 1915. New freight stations were placed under construction at Harrisburg, Pa., and Allegheny, which will be completed in 1915. The passenger and freight facilities at Elizabethtown, Altoona and Brookville are also being enlarged to handle increased traffic. The Sugar Camp branch, Tyrone division, the Shade Creek branch, Pittsburgh division and the Homer & Cherry Tree branch, Conemaugh division were extended to reach new coal openings. Work was finished on the Yukon branch extension from Bells Mills to Cowansburg, Pittsburgh division, and a branch is being built from Gilberton to Mahanoy Plane, Schuylkill division, to develop additional coal traffic. Work was continued on the elimination of grade crossings at Homewood avenue, Pittsburgh, and in the borough of Wilkinsburg, Pittsburgh, at the latter place a new passenger station is being constructed; it is expected that this work will be finished in 1915. The elimination of grade crossings, change of grade and the erection of a new passenger station in the city of Johnstown is under way, but will not be completed before 1916. The change of line and grade on the Renovo division at Cameron and Horn, and the construction of a second track between Corry and Lovell, have been completed. Surveys and many of the plans have been completed for the new line and the elimination of grade crossings in South Philadelphia to be carried out jointly by the Pennsylvania Railroad, the Philadelphia, Baltimore & Washington, the Baltimore & Ohio and the city of Philadelphia. Work was continued on the New York Connecting Railroad; the foundations and masonry of the East river four-track arch bridge have been completed to the track level, and work is now under way on the erection of the steel arch over the river. The viaducts and approaches on Long Island and on Ward's and Randall's islands are about finished, and progress has been made on the remaining sections of the line. The erection of the double track steel bridge over the Delaware river south of Trenton is proceeding. This bridge is part of the proposed New York division double-track relief line known as the Pennsylvania & Newark which will extend from the yard at Morrisville, Pa., to Colonia, N. J., about 40 miles, where a connection is to be made with the six-track system on that division, and there will also be branches connecting with the Trenton and New York divisions near Trenton, N. J. The revision of the grades and alinement and the construction of additional tracks and passing sidings on the Western New York & Pennsylvania between Oil City and Buffalo via Chautauqua was continued during the year and will shortly be completed.

Sulphur Springs, Quitman & Great Northern.—Plans are being made to build a railway, it is said, from Quitman, Tex., northwest to Sulphur Springs, about 30 miles. Large bonuses have been raised in aid of the project by residents of both Quitman and Sulphur Springs.

RAILWAY STRUCTURES

Coleman, Tex.—(See Pampa, Tex.)

Decatur, Ala.—A bill to authorize the North Alabama Traction Company, a corporation organized in Alabama, to build a combined railroad and highway bridge over the Tennessee river at Decatur, has been passed by the lower house of Congress, and is reported in the Senate.

Freeport, Tex.—The Houston & Brazos Valley is interested in the building of a combination railroad and roadway bridge that is now being constructed at this point.

Huntington, W. Va.—Plans are being made for an office building to be built at Eighth street and Fourth avenue in Huntington for the Ohio Valley Electric Railway. The cost of the structure will be about $25,000.

Macon, Ga.—An agreement has been reached between the Central of Georgia and the city of Macon, whereby the railroad company will erect a new depot at that point. The city in turn will make certain concessions to accommodate rearrangements of tracks. Only tentative plans have been prepared and no time has been set for construction work to begin.

New York.—The New York Public Service Commission, First district, has approved the proposed award by the New York Municipal Railway Corporation for the construction of nine stations on the Sea Beach line, to Post & McCord, Inc., the lowest bidders, who offered to do the work for $331,163. The Sea Beach line is a reconstructed four-track railroad, from a junction with the Fourth avenue subway at Sixty-fifth street, in the borough of Brooklyn, to Coney Island.

Pampa, Tex.—The Atchison, Topeka & Santa Fe has prepared plans and is about to award contracts for the construction of a small brick passenger station. The estimated cost is $10,000. This company will build a similar structure at Coleman, Tex.

Philadelphia, Pa.—The Arthur McMullin Company, New York City, submitted the lowest bid to build the reinforced concrete bridge to carry Broad street over the tracks of the Pennsylvania Railroad, the Baltimore & Ohio and the Philadelphia Belt Line. This firm offered to do the work for $237,600. This work is part of the improvements to be carried out jointly by the city of Philadelphia and the railroads for the elimination of grade crossings in South Philadelphia. (February 26, p. 390.)

Saratoga Springs, N. Y.—Bids will be asked for about April 1, by Ludlow & Peabody, New York, for building a one-story terminal station at Saratoga Springs for the Hudson Valley Railway. The proposed structure is to be of brick and stucco construction and will cost about $30,000.

Sharon, Pa.—Plans are being made by Mercer county commissioners to build a bridge over the Shenango river at State street in Sharon. The bridge will carry tracks for the operation of street railway cars.

London Traffic Figures.—In the recently issued report by the London Traffic Branch of the Board of Trade, there is a table showing approximately the number of passengers carried in the area of Greater London by local railways, tramways and omnibuses in the last 10 years. For 1913 the numbers were, by local railways, 462,019,537; tramways (approximate), 811,397,317; omnibus, 733,931,201. The corresponding figures for 1909 were 410,744,610 by railways, 687,138,908 by tramway, and 311,000,000 by omnibus. How much the traffic by road is growing at the expense of traffic by rail may be judged from the fact that in 1909, 60 per cent went by road and 40 per cent by rail, while in 1913 some 68 per cent went by road and only 32 per cent by rail. The increase is mainly due to motor 'busses, of which 3,522 were licensed in 1913, as against 1,180 in 1909. Long-distance running by these vehicles is increasing, as is shown by the week-day services operating on seven routes of over 15 miles in length, ranging from the 15.9 miles (Golders Green and St. Albans) to the 19.41 miles (Stockwell and Reigate). During the same period the tramcar licenses have risen only from 2,198 to 2,786, and the mileage of new tramways (in single track) in Greater London, from 601.31 miles to 655.94 miles. Since 1907 the route-mileage of railways open for passenger traffic in Greater London has advanced only from 667.4 to 669.2 miles.

Railway Financial News

Boston & Maine.—The holders of the notes which were due on March 2 have consented to the extension to September 2, 1915. Note holders had the option of extending all of their notes or of extending part of the notes and taking 35 per cent in Maine Railways notes. Of the $22,626,000 notes due, holders of $22,085,000 agreed to an extension, and of these, holders of $14,515,000 notes elected to take the Maine Railways' notes.

Canadian Pacific.—In explaining the bill now before the Canadian Parliament for the creation of the Canadian Pacific Ocean Services, Ltd., Sir Thomas Shaughnessy is quoted as saying:

"The company is operating fleets of steamships on the Atlantic and Pacific oceans, and on the Pacific coast, as well as on the Great Lakes and other inland waterways of Canada. These latter are connecting links between different sections of the railway line, and are, therefore, essentially a portion of the railway transportation system, and it is not proposed to change their status. The ocean fleets are, however, in a different class, engaged in competition with outside fleets, plying between Canada and other portions of the world. The company proposes to transfer these ships to a steamship company, with which the business relations will be the same as they are with outside steamship lines that exchange traffic with the railway company.

"Heretofore, all expenditures for the acquisition and construction of these ocean steamships were made by the railway company and included among the liabilities in its balance sheet. Hereafter, it is proposed that the steamship company shall itself secure the requisite money for these purposes by the issue of its own securities.

"The ownership and control of the steamship company will remain with the Canadian Pacific Railway Company, but the management and operation of the steamship lines will be vested in the board of directors of the Canadian Pacific Ocean Services, Ltd.

"It is only another step in the direction of eliminating from the direct operations of the railway company items that do not relate to the railway property itself."

Denver & Salt Lake.—Holders of notes of the Denver & Salt Lake to the extent of $163,962 have agreed to take first mortgage treasury bonds at 75 in payment. An issue of $300,000 two year, 6 per cent notes secured by the deposit of $600,000 first mortgage bonds, are to be sold to provide current funds.

Missouri Pacific.—The proxy committee representing Kuhn, Loeb & Company and associates have announced that they have received proxies for the annual meeting of March 9 from more than a majority of the stock, and that they will vote for the following as directors: N. F. Brady, B. F. Bush, Newcomb Carlton, Edward A. Faust, A. J. Hemphill, William H. Lee, Edgar L. Marston, E. J. Merrill, Finley J. Shepard, Cornelius Vanderbilt, R. Lancaster Williams, W. H. Williams and C. Minot Weld.

New York, New Haven & Hartford.—The railroad committee of the Connecticut General Assembly has reported favorably on the bill which authorized the New Haven to sell or pledge stock of the Boston & Providence and the Old Colony Railroad. This stock is now held in the New Haven treasury.

Western Pacific.—The Equitable Trust Company, New York, has asked for the appointment of a receiver, the Western Pacific having decided not to pay the interest due March 1 on the $50,000,000 first mortgage bonds. Warren Olney, Jr., chief counsel for the road has been named receiver.

Railway Over the Desert.—Large numbers of Syrian refugees who recently arrived at Alexandria report that the Germans are removing the rails between Lydda and Jaffa for the construction of a line on the route Sebastieh, Toulharem, Lydda and Gaza, and thousands of workmen are being employed on the work.

[ADVERTISEMENT.]

ANNUAL REPORT

THE PENNSYLVANIA RAILROAD COMPANY

GENERAL OFFICE, BROAD STREET STATION, PHILADELPHIA, PA.,
February 24th, 1915.

The Board of Directors herewith submit to the Stockholders of The Pennsylvania Railroad Company a synopsis of their Annual Report for the year 1914:—

CONDENSED INCOME STATEMENT.

Railway operating revenues		$181,184,822.32
Railway operating expenses		138,616,672.07
Net revenue from railway operations		$42,568,150.25
Railway tax accruals	$7,461,892.52	
Uncollectible railway revenues	11,313.24	
		7,473,205.76
Railway operating income		$35,094,944.49
Non-operating income:		
Income from securities, accounts and sinking and other reserve funds	$14,341,800.65	
Rent income, etc.	2,355,478.28	
		16,697,278.93
Gross income		$51,792,223.42
Deductions from gross income		17,701,458.60
Net income		$34,090,764.82
Disposition of net income:		
Income applied to sinking and other reserve funds	$1,785,242.65	
Dividend of six per cent.	29,952,186.00	
Income appropriated for road and equipment, improvements, etc.	2,230,335.64	
		$33,967,764.29
Balance transferred to credit of Profit and Loss		$123,000.53

Operating results of Pennsylvania Railroad Company and Northern Central Railway Company for the year ended December 31st, 1914, compared with the year 1913.

The lease of the Northern Central Railway having become effective, the revenues and expenses from the operation of its lines are included in the above Income Statement from July 1st, 1914.

For the purpose of proper comparison, the statement below shows the combined operations of your lines and of the Northern Central Railway lines for the entire year 1914 compared with similar operations for 1913.

	1914.	Comparison with 1913— Increase.	Decrease.
Railway operating revenues	$187,251,851.22		$17,828,261.23
Railway operating expenses	144,293,242.91		13,705,175.10
Net revenue from railway operations	$42,959,608.31		$4,123,086.13
Railway tax accruals	$7,689,523.47		$151,330.42
Uncollectible railway revenues	11,313.24	$11,313.24	
	$7,700,836.71		$140,017.18
Railway operating income	$35,258,771.60		$3,983,068.95

CONDENSED GENERAL BALANCE SHEET.

DECEMBER 31ST, 1914.

ASSETS.	
Investments:	
Investment in road and equipment	$481,553,513.69
Improvements on leased railway property since June 30th, 1907	16,294,103.39
Sinking funds	2,309,427.30
Miscellaneous physical property	2,026,833.23
Securities owned and advances to affiliated companies	350,493,097.97
Current assets	67,599,784.56
Deferred assets including insurance and other funds	28,962,923.19
Unadjusted debits	2,223,373.63
	$951,463,056.96

LIABILITIES.	
Capital Stock	$499,203,600.00
Premium realized on Capital Stock from January 1st, 1909	7,254,247.63
Bonded debt and other obligations	236,951,642.73
Current liabilities	35,743,697.79
Deferred liabilities	187,774.13
Unadjusted credits including accrued taxes and depreciation reserves	29,221,093.63
Corporate surplus:	
Additions to property through income and surplus since June 30th, 1907	73,184,541.87
Miscellaneous fund reserves	32,426,820.49
Sinking fund reserves, etc.	5,412,283.22
Profit and Loss	31,877,355.47
	$951,463,056.96

The number of tons of freight moved on the five general divisions east of Pittsburgh and Erie in 1914 was 135,296,035, a decrease of 19,912,743, or 12.83 per cent.; the number of passengers was 80,873,281, a decrease of 1,903,951, or 2.30 per cent.

The operating revenue of all lines east and west of Pittsburgh for the year 1914 was $354,412,996.34, operating expenses $288,803,807.84, and operating income, $65,609,188.50, a decrease in operating revenue, compared with 1913, of $38,022,947.71, and a decrease in operating income of $5,373,852.58. There were 313,983,414 tons of freight moved on the entire system, being a decrease of 58,039,716 tons, and 183,031,295 passengers carried, a decrease of 4,463,150.

GENERAL REMARKS.

MILEAGE.

The increase in the mileage of the lines directly operated was due chiefly to the lease of the Northern Central Railway.

INCOME STATEMENT.

Business conditions on your lines, as well as on other railroads, were unsatisfactory in the year 1914. The total operating revenues show a decrease of 8.69 per cent., compared with 1913, chiefly in the freight and passenger traffic, arising from unfavorable commercial and financial conditions, which in the last five months of the year were accentuated by the European War. The gross revenues and expenses include, since July 1, 1914, the operations of the Northern Central Lines under the lease to your Company, and they also include, in accordance with the revised Classification of Operating Revenues and Expenses of the Interstate Commerce Commission, effective since July 1, 1914, the results from Auxiliary Operations, for which separate accounting was previously required.

Express Revenue shows a decrease due to a reduction in express rates, and by reason of the operation of the Parcel Post. This will require some equitable adjustment of the contract with the Express Company, and offsets to some extent the increase in Mail Revenue.

Mail Revenue increased as a result of the quadrennial weighing, effective July 1, 1913. The manifest unfairness of weighing the mails, including the growing parcel post, only once in four years deprives the Company of revenue for the increased weights carried each year, and should be remedied by an annual weighing and an annual adjustment of pay.

The total Operating Expenses decreased 8.67 per cent., chiefly through enforced economies required by the loss of revenue and traffic. These were effected by a reduction in the use of materials and supplies, in the working forces of all departments, and in train and car mileage, and by deferring other expenses, but having in view at all times the preservation of the safety of your tracks, equipment and facilities. The increases in wages of enginemen, firemen, conductors, and trainmen, under the Wage Arbitration awards, and other consequent wage adjustments, and the expense of complying with legislative enactments, prevented still further savings in expenses.

Railway Operating Income shows a decrease of $3,087,538.68 compared with the results of the lines operated by your Company in 1913, but if the figures for 1913 used in comparison had also included the operations of the Northern Central Railway for that year, the Railway Operating Income for both Companies would have shown an aggregate decrease of $3,983,068.95.

The Net Income for 1914 was $34,090,764.82, a decrease of $7,830,067.97, compared with the previous year; from which appropriations were made to Sinking and Other Reserve Funds; certain necessary additions and betterments were provided; cash dividends amounting to six per cent. were paid on your Capital Stock; and $123,000.53 was credited to Profit and Loss account. The latter account has also been credited with $5,669,379, the par value of the Northern Central Railway Company stock received as a 40% dividend and the cash dividends accrued thereon since January 1st, 1911; the extra cash dividend of 10% amounting to $1,057,720 received on your stock holdings in that Company; also the proceeds received from the Manor Real Estate & Trust Company, which is owned by your Company, resulting from the sale, to the Susquehanna Coal Company of coal lands formerly leased to the Mineral Railroad & Mining Company, amounting to $670,368.98 and with profits from sales of securities and sundry credits. Against this account has been charged $3,186,031.38, representing construction and real estate expenditures on long term leased lines, especially the United New Jersey Railroad & Canal Company and Harrisburg, Portsmouth, Mt. Joy & Lancaster Railroad Company, the net income of your Company not being sufficient to provide the same; advances to Branch Lines for similar purposes, which were unable to meet the same out of their own resources, and advances for interest on, and retirement of, water trust certificates and expenditures on your water supply system; also the rental and leasehold settlement of the Northern Central Railway Company in the adjustment of the accounts under the lease from January 1st, 1911, involving a charge of $1,343,510.83, so that the net amount credited to Profit and Loss account during the year was $2,850,174.81.

LEGISLATION.

The increased scope and great burden of the duties and responsibilities imposed upon the Interstate Commerce Commission should now be followed by the amendment of the Federal laws from which its authority is derived. The Commission should be definitely empowered by specific provisions in these laws to strengthen the railroads, upon which the welfare of the Country so largely depends, so as to encourage the investment of private capital for the expansion of their facilities and services, and the preservation of their credit by means of reasonable rates which will accord with the higher costs and burdens placed on them in complying with statutory requirements and governmental awards and regulations. The Commission should be enlarged and so organized as to be able to deal promptly with the important railroad questions which under the existing scheme of Governmental regulation, must be considered by it. The position of a Commissioner should be placed beyond political influence by a long tenure of office, and the compensation should be sufficient to attract and retain men of the widest experience and greatest ability. The regulatory power of the Commission should be clearly extended to the supervision and control of all rates and practices which directly or remotely affect interstate transportation or commerce, and should include power to maintain a rate structure approved by or satisfactory to it, even though to accomplish this it should be necessary to prevent reductions of rates or to compel advances of rates found by the Commission to be unreasonably low. An unreasonably low rate may be beneficial to some one or more shippers, but the rates of some other shippers are sure to be disadvantageously affected thereby. The services of the Commission should be made available to remedy the concededly inadequate revenues of the railroads for the transportation of mails and Parcel Post, and the power of Commissions, State and Federal, to suspend increases in rates should be limited, so as to prevent loss of revenue to the railroads during the suspension of rates subsequently determined to be reasonable. Increases in wages and other burdens which seriously enlarge railroad expenses should not be imposed by legislation, or through awards of Governmental bodies, unless the ability of the railroads to pay the same under the rate schedules then in effect is clearly apparent, or unless the Interstate Commerce Commission is prepared to approve of increases in the rate schedules that will enable the railroads to meet the same without impairment of their credit or efficiency.

Weak railroads are among the greatest obstacles to business enterprise and commerce, and the country will have too many weak railroads unless a constructive and equitable policy of public regulation is practiced, not as a palliative, but as a permanent public and business necessity.

The railroads are still burdened with the needless expenditure required to comply with the so-called Full Crew Laws, which are actually Extra Crew

Laws. The principal requirements of these laws, which vary somewhat in the different States, are in substance that every freight train of more than thirty cars must have a second brakeman in addition to the regular crew of engineman, fireman, conductor, one regular brakeman and a flagman; every passenger train having four or more coaches—this term covering Pullman and dining cars as well—and one baggage car, must have an extra brakeman in addition to the regular full crew consisting of engineman, fireman, conductor, baggageman and brakeman, this not to include train porters and Pullman employes; every train composed of four or more passenger, mail, or express cars, empty or loaded, must have a crew of engineman, fireman, conductor and two brakemen, even though no passengers are carried.

It is estimated that this law has added over $1,000,000 per annum to the Operating Expenses of the Pennsylvania System East and West of Pittsburgh, and this enforced expenditure is a pure economic waste, because it does not increase the safety or efficiency of operations. This amount could have been spent to far greater advantage in the improvement of roadway and equipment, and in giving increased employment, from which the public and employes would have received real benefits. Arbitrary laws requiring additional men on trains without regard to the necessity for their services, impose a direct and unnecessary burden on the public and the Company. Such laws tend to weaken the working discipline, and from the standpoint of the employes not only impair the ability of the Company to continue to pay the present rates of wages to that great body of employes whose activities are needed, but also to delay promotion.

Your Company has, therefore, joined with other railroads in appealing to the public for their co-operation in securing the repeal of this unwise and wasteful legislation. The Management request the stock and bondholders and the employes, in their own interest, to support this movement.

Traffic.

The tonnage decreased 12.83 per cent. and the tonnage mileage decreased 11.67 per cent., due to the general restriction of business, but freight train mileage was also reduced 13.87 per cent. The reduction in passenger business is reflected in the decrease of 2.30 per cent. in the number of passengers, 4.31 per cent. in passenger mileage, but passenger train mileage was also reduced 4.73 per cent. The net revenue per ton mile shows a slight increase, but the net revenue per passenger mile shows a large decrease.

Capital Stock and Funded Debt.

The capital stock was increased $31,850, through the conversion of that amount of receipts issued under the stock allotment of 1913.

The Funded Debt and Equipment Trust obligations show a net decrease of $7,080,879.35.

It will be recalled that at the last annual meeting the stockholders approved of the creation by the Board of Directors of a General Mortgage so that the Company might have a broad basis for future financing. This mortgage has not yet been recorded, and no bonds can be issued for any purpose thereunder without the prior consent of the stockholders, which has not so far been requested. The Company will refund $86,827,000 of Convertible Bonds maturing October 1st, 1915, and other maturing obligations, and it must also provide for other necessary corporate purposes such as additions and betterments to its railroad and equipment. Since the close of the year it therefore sold $49,000,000. Consolidated Mortgage 4½% Bonds, bearing date February 1st, 1915, realizing a price slightly in excess of par, a satisfactory result under existing conditions. Including the issue recently made, the total amount of bonds outstanding under the Consolidated Mortgage is almost $100,000,000., which is the maximum amount that can at any one time be issued and outstanding. In view of the creation of the new General Mortgage, it is deemed advisable that hereafter the Consolidated Mortgage should be closed, and no further issues of bonds made thereunder.

This issue of Consolidated Mortgage Bonds was made under the authority conferred by the stockholders in March, 1909, when an increase of the bonded indebtedness was authorized to the aggregate amount of $800,000,000. for the purpose of meeting the Company's requirements in 1909 and 1910. As such requirements were met through an issue of Capital Stock, only $49,000,000. of the authorization then made has been utilized, so that the Company is still possessed of authority to increase the indebtedness to the extent of $31,000,000. The latter amount will not be sufficient to meet the balance of the refunding and other requirements for 1915, as above stated, and the stockholders, pursuant to notice duly given, will at the forthcoming annual meeting be requested to consent to an increase in the indebtedness to the extent of $40,000,000., so that with the pre-existing authorization the Company may be possessed of authority to increase its indebtedness to the extent of $71,000,000., and the Board of Directors desire authority to make such increase through the issue of bonds secured either by the new General Mortgage or otherwise, or by the issue of other obligations of the Company in such form, at such times, and on such terms and conditions as shall be deemed to be most advantageous, but not in excess of $71,000,000.

Road and Equipment.

The following statement of improvement work carried on by your Company during the past year of unfavorable commercial and financial conditions is an evidence that, while every effort was made to enforce economies in the operations of your lines, because of the reduced volume of business, your Company, desiring to stimulate traffic, to encourage business activity and take advantage of lower prices, continued a fairly active improvement program throughout the year.

The work on the improvement of the passenger facilities in and around Philadelphia was continued. As a result, the five-track reinforced concrete and stone arch bridge of the Connecting Railway over the Schuylkill River at the Girard Avenue entrance to Fairmount Park has been completed and placed in operation and the old double track bridge removed; the work at North Philadelphia has been finished with the exception of remodeling the passenger station. For the expenditure made for this and other work along the Connecting Railway, your Company will be repaid through the issue of securities of the Connecting Railway Company.

The electrification of the Main Line from Broad Street Station, Philadelphia, to Paoli, is progressing rapidly, and without seriously interrupting the traffic. The work from Paoli to West Philadelphia is almost completed, including the sub-stations, and the remaining section of the electrification into Broad Street Station is being actively prosecuted. The new beam-light signals are in operation between Overbrook and Paoli. Satisfactory progress has also been made in equipping the steel cars, many of which are now in the present steam service, with electric motors and apparatus, for which these cars were originally designed. It is, therefore, expected to operate the main line suburban passenger trains by electricity about June 1st, 1915.

It is hoped that in 1915 financial conditions will permit the extension of electrification to North Philadelphia and the Chestnut Hill Branch, and also the elimination of certain grade crossings on that Branch. This would relieve the track and yard congestion at Broad Street Station, by transferring to the electric service over 60 trains on the daily schedule now operated by steam.

Your pier properties on the Delaware River south of Washington Avenue and at Walnut Street, Philadelphia, were improved during the year by the erection of new sheds and the enlargement of office facilities.

The reconstruction of the bridges at Earnest, Trenton Branch; over North Broad Street at North Philadelphia; Highspire, Philadelphia Division; Auburn and Norristown, Schuylkill Division, and at Dornock Point, Pittsburgh Division, was completed during the year, and the bridges placed in service.

The masonry work for the double track steel bridge over the Allegheny River between Kiskiminetas Junction and Freeport has been completed, and the superstructure is being erected; the bridge at Phœnixville, Schuylkill Division, is being rebuilt, and will be completed in 1915.

On the new six-track section of the New York Division, between Colonia and Bay Way, just west of Elizabeth, N. J., work was continued during the year, consisting principally of the elevation of the four original running tracks. The greater part of this work has been completed, and placed in operation, and it is expected that the remaining portions will be finished in the Spring of 1915.

Considerable progress was made during the year in placing the telephone and telegraph wires underground, the section from Broad Street Station, Philadelphia, to Paoli, and from Jersey City to Rahway, having been completed. The purpose of this work is to prevent delays in train movements and in the transaction of the Company's business by reason of the destruction of overhead wires by sleet and other storms, and also to avoid interference by electric transmission lines, and other wires.

During the year the final link in the automatic block signal system on your Main Line between New York and Pittsburgh was completed. The installation of this modern signal system will add to the safety of operations and materially aid in expediting train movements.

New freight stations were placed under construction at Harrisburg and Allegheny, which will be completed in 1915. The passenger and freight facilities at Elizabethtown, Altoona and Brookville are also being enlarged to handle an increased traffic.

The Sugar Camp Branch, Tyrone Division, the Shade Creek Branch, Pittsburgh Division, and the Homer & Cherry Tree Branch, Conemaugh Division, were extended to reach new coal openings; the Yukon Branch extension from Bells Mills to Cowansburg, Pittsburgh Division, was completed, and a branch is being constructed from Gilberton to Mahanoy Plane, Schuylkill Division, to develop additional coal traffic.

Work was continued on the elimination of grade crossings at Homewood Avenue, Pittsburgh, and in the Borough of Wilkinsburg, Pittsburgh, at which latter point a new passenger station is being constructed. It is expected that this work will be completed in 1915.

The elimination of grade crossings, change of grade and the erection of a new passenger station in the City of Johnstown is proceeding, but will not be completed before 1916.

The change of line and grade on the Renovo Division at Cameron and Horn, and the construction of a second track between Corry and Lovell, have been completed.

Surveys and many of the plans have been completed for the new line and the elimination of grade crossings in South Philadelphia; to be carried out jointly by your Company, the Philadelphia, Baltimore & Washington Railroad Company, the Baltimore & Ohio Railroad Company, and the City of Philadelphia.

Further consideration was given to plans for the future electrification of your main line crossing the Allegheny Mountains, from Altoona, the foot of the eastern slope, to Conemaugh, on the western slope, by which it is believed large operating economies can be effected, and the heavy passenger and freight train movements facilitated.

The aggregate expenditure for Construction and Equipment upon the owned and leased lines was $14,485,898.55, of which $8,076,086.80 was charged to Capital Account and the balance to Income, Profit and Loss and the Reserve for Additions and Betterments.

Road and Equipment—Affiliated Companies.

The construction of the New York Connecting Railroad was continued. The foundations and masonry of the East River four-track arch bridge have been completed to the track level, and the erection of the steel arch over that river is proceeding. Its viaducts and approaches on Long Island and on Ward's and Randall's Islands are also substantially completed, and favorable progress has been made on the remaining sections of the line. The funds for these expenditures were provided by the sale of the New York Connecting Railroad Company's First Mortgage 4½ per cent. bonds guaranteed by your Company and the New York, New Haven & Hartford Railroad Company, owners of all the stock of that Company.

The erection of the double track steel bridge over the Delaware River south of Trenton, is proceeding. This bridge is part of the proposed New York Division double-track relief line known as the Pennsylvania & Newark Railroad, which will extend from the Yard at Morrisville, Pa., to Colonia, N. J., a distance of about 40 miles, there connecting with the six-track system on that Division, and will also have branches connecting with the Trenton and New York Divisions near Trenton, N. J.

The revision of the grades and alignment and the construction of additional tracks and passing sidings on the Western New York & Pennsylvania Railway between Oil City and Buffalo, via Chautauqua, was continued during the year, and will shortly be completed. This work in connection with the improvements on the Allegheny Division, will, when fully completed, furnish a route on lower grades and with improved alignment between Pittsburgh and Buffalo, over 58 miles shorter than the present route via Salamanca Branch and Olean.

Coal Companies' Securities.

The properties of the various anthracite Coal Companies served by your lines, in the securities of which your Company and the Northern Central Railway Company were interested, were purchased by the Susquehanna Coal Company, and a complete examination of the coal lands, collieries, plants and facilities of the latter Company and their operating results, is being made by an experienced mining engineer and by certified public accountants, so that your Company will have the benefit of this independent survey and report of the properties to assist in determining the proper price that should be received for the securities of the Susquehanna Coal Company in the event of a purchaser being found therefor.

Securities Owned.

Your Company received as its pro rata share of the stock dividend of 40 per cent. of the Northern Central Railway Company, $4,230,880. at par, of the Capital Stock of that Company. This stock issue was approved by the Public Service Commissions of Maryland and Pennsylvania, and represents part of the cost of capital expenditures made in previous years for additions and betterments to its railroad and equipment.

Cleveland & Pittsburgh Railroad Company Special Guaranteed Betterment Stock amounting at par to $3,729,100, was sold, and additional Norfolk and Western Railway Company Common and Preferred Stock, amounting at par to $1,800,000. and $1,726,000. of Susquehanna Coal Company Bonds were purchased from the Northern Central Railway Company.

By order of the Board,

SAMUEL REA,
President.

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WE GUARANTEE, that of this issue (the monthly Engineering & Maintenance Edition) 11,100 copies were printed; that of those 11,100 copies 7,391 were mailed to regular paid subscribers to the weekly edition, 1,836 to subscribers who get the Engineering & Maintenance Edition only, 250 were provided for counter and news companies' sales, 1,066 were mailed to advertisers, exchanges and correspondents, and 557 were provided for samples and office use; that the total copies printed this year were 103,200, an average of 9,382 copies a week.

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Contents

*Illustrated.

Elsewhere in this issue is published the substance of the amendment to the Locomotive Boiler Inspection Act which has been passed and is now a law—Public Statute No. 318. The change made by this amendment is the insertion of "Locomotives and Tenders" where "Locomotive Boilers" appears in the original act. In other words, the Bureau of Locomotive Boiler Inspection has been given authority over the entire locomotive and tender. Some of the effects this amendment may have on the railways were mentioned in an editorial published in the *Railway Age Gazette* of February 19, on page 293. Now that it has become a law it is very necessary that the railways immediately formulate rules, in conjunction with the federal authorities, to govern this inspection. It is expected that the time allowed for this tremendous task will be only three months, and no time should be lost in replying to the circular of the Special Committee on Relations of Railway Operation to Legislation, which has just been issued in regard to this amendment.

Amendment to the Boiler Inspection Act

The United States Supreme Court has held the West Virginia two-cent fare law unconstitutional, as applied to the Norfolk & Western, because its operation would not permit a fair return on the value of the property used in passenger service. The Norfolk & Western made its appeal on this ground, and separated its freight and passenger expenses as best it could, and the Supreme Court has upheld the appeal. In 1913 the Supreme Court decided against the Chesapeake & Ohio in that company's appeal from this same West Virginia law. In that case the grounds of appeal by the railroad were: (1) that the penalties for violation of the law ($50 to $500 for each offense) were excessive; (2) that in limiting the application of the law to companies operating 50 miles or more there was an unreasonable and arbitrary discrimination; and (3) that the law constituted an interference with interstate commerce. The court held that: (1) the penalties could not be applicable until the litigation had ceased and that therefore the company could not appeal against penalties which had not yet been incurred; (2) that the limitation as to length of road was not unreasonable or arbitrary; and (3) that the law must be regarded as applying only to intrastate business and was not, therefore, an interference with interstate commerce. The Chesapeake & Ohio's passenger receipts per train-mile are approximately $1.40, as against the Norfolk & Western's $1.36, and the Chesapeake & Ohio's costs are probably more than correspondingly higher than the Norfolk & Western's because of the terminal expenses at Washington, into which the Norfolk & Western does not run, and at Cincinnati, where the Norfolk & Western probably has a much less expensive entrance than the Chesapeake & Ohio. The Supreme Court has apparently set its seal of approval on the theory which was advanced by the Interstate Commerce Commission, and by its counsel, Mr. Brandeis, in the rate advance case that each class of traffic should be sufficiently remunerative to bear its burden of interest and overhead charges. The Chesapeake & Ohio did not, however, base its appeal on this ground in the West Virginia case.

The West Virginia Cases

One of the best things that have been said regarding the business situation in the United States was said by President William Sproule of the Southern Pacific in his recent address at the annual dinner of the Traffic Club of Chicago. He remarked that the industrial depression through which we are passing is chiefly due to lack of confidence produced by indiscriminate attacks on business men and business concerns. He added: "It is the employer who is first out of employment. As a natural sequence he is followed by the employee who next finds himself out of work.

The Unemployment of the Employer

Unemployment begins only when the employer himself begins to be unemployed." The gist of the whole matter is in the last sentence. Labor becomes unemployed only when the employer becomes unemployed, and it becomes unemployed only in proportion as the employer becomes unemployed. On the other hand, when the employer is fully employed labor is also. Bearing these facts in mind, the remedy for present conditions becomes obvious. It is to give employment to the employer. Who is the employer? He is the man with capital to invest. Therefore, to get him employed it is necessary to furnish him good opportunities for the investment of his capital. There is no want of idle capital. There is a glut of it. Why is it not being invested? Because there is hardly a large branch of industry left in which capital can be invested with any assurance that it will not be subjected to unfair and destructive attacks by the state and national governments. President Wilson recently appealed to business men to help the administration restore prosperity. Prosperity can be restored and maintained only by the activity of business men. The government may help or hinder them in doing so, but it can only help and hinder, and it is a crowning absurdity to suggest that business men come to the help of the government to restore prosperity. It is quite rational, on the other hand, to suggest that the government come to the assistance of the business men. We have been acting on the foolish assumption that government activity makes prosperity; and that is the main reason why the employer, and along with him the employee, have been so long unemployed.

AN IMPORTANT RAIL ORDER

NO recent event in the steel rail industry equals in importance the placing of an order for 35,000 tons of 90-lb. open hearth rails by the Illinois Central with the Algoma Steel Company last week. This order is especially significant for three reasons, the price of $27 per ton delivered at Chicago, the giving of the order to a Canadian mill, and the acceptance by the mill of the condition that the rails shall be rolled under the American Railway Engineering Association's specifications, with the inclusion of the nick-and-break test for every ingot.

The acceptance of the nick-and-break test by the manufacturer marks a great step in advance for the railways which has been contended for by various roads for the last few years without success. Even within the past month one large road failed, after making a special effort, to secure the insertion of this clause when placing a large order with an American mill. The manufacturers have opposed this test, claiming that its adoption will decrease the output of the mills, increase the cost of manufacture, etc. The Algoma Steel Company has rolled rails under these specifications for a Canadian road very recently without finding these objections serious. In fact, the number of rails rejected was materially less than the number which would have been rejected under the ordinary specifications because of the reduction of the unit of inspection and thereby of rejection from the heat to the ingot, while at the same time this test resulted in the detection of a considerable number of piped rails that would have been accepted under other specifications. The limited trial has, therefore, resulted in a saving to the mill as well as in a greater security to the purchaser.

The reduction in price is over $3 per ton as compared with those quoted on ordinary open hearth rails by the mills in this country. While the mills have stated that they would have to add a considerable premium to comply with the nick-and-break test, no road has secured a definite quotation. However, it is estimated that the price made to the Illinois Central is at least $5 per ton below the figure any American mill would have quoted with the inclusion of this specification. While any railroad officer would naturally favor a home manufacturer, and especially one located on his lines, other things being equal, it would have been difficult for the officers of the Illinois Central to have justified an increased expenditure of $175,000 for this reason alone. It is undoubtedly true that if the American mills had met this price they would have received the order. The railways have been criticized severely at times for allowing traffic conditions to influence unduly the purchase of materials. The action of the Illinois Central shows that this attitude is not universal. It is well known that in spite of variations in business conditions and fluctuations in the prices of other steel products, the price of steel rails, comprising one of the largest steel tonnages, has remained constant at the basic price of $28 for Bessemer steel ever since the formation of the United States Steel Corporation in 1901.

The Canadian mill has been criticized for quoting a low price in order to dump its surplus product in this country. But the steel companies of this country have followed the same practice, and their officers have publicly justified their action on the same grounds on which the Canadian mill is now acting. With business conditions as they now are the railways have the means in their own hands of defeating the arbitrary attitude assumed by the manufacturers regarding prices and the revision of specifications.

THE STATE COMMISSIONS AND THE WESTERN RATE CASE

OUR contemporary, the Traffic World, is not in any sense a "railway organ," as the *Railway Age Gazette* is often accused of being. It is devoted to the interests of both the railways and the shippers. Therefore, it is significant that it has been denouncing the part being taken in the western rate advance case by a number of western state railroad commissions, and especially by Clifford Thorne, of the Iowa commission.

Sixteen state commissions, without any investigation of the merits of the proposed advances in interstate rates, organized to oppose them. They are using for this purpose taxes raised from the public, a large part of which has been collected from the railways. They are also accepting voluntary contributions in support of their work from interested shippers. Among the advances proposed are some in the rates on packing house products; and the embattled commissions, it is announced in the newspapers, have received and accepted a contribution of $5,000 from the western meat packers. Mr. Thorne is appearing in the dual role of attorney for the state commissions, in which capacity he claims to represent the public, and of attorney for the packers and other shippers, in which capacity he represents private interests.

The Traffic World has questioned not only the propriety, but also the legality of the conduct of the state commissions, and especially of Mr. Thorne. It maintains that the Iowa law does not authorize the state commission to attack proposed advances in interstate rates, but only interstate rates already in effect. Furthermore, it does not authorize the chairman of the state commission, but only the state commerce counsel, to appear for the state in cases involving interstate rates. Finally, even if the chairman may usurp the functions of the commerce counsel, as Mr. Thorne is doing, there is, our contemporary maintains, a provision of the law which prohibits the commerce counsel from appearing as attorney in interstate rate cases for special interests at the same time he is appearing for the state. This provision is as follows: "No person . . . who has in any way or manner pecuniary interest in any corporation or business subject to the jurisdiction of the state board of railroad commissioners or Interstate Commerce Commission shall be eligible to said office (of commerce counsel) and the entering into the employ of or acquiring of any stock or other interest in any such corporation or business by such attorney after his election or appointment shall disqualify him from holding such or performing the duties thereof." "We think," says the Traffic World, "this sufficiently bars Mr. Thorne from acting under the privileges of commerce counsel even if otherwise it would be proper."

To the question of the propriety of the appearance of state commissions in interstate rate cases there can be only one

answer. In a letter to the Traffic World Mr. Thorne defends his course, and says state commissions have two principal functions; first, that of hearing state rate cases, and, second, that of appearing as parties in interstate rate cases. It is obvious that in hearing state rate cases the state commissions should be fair; and it is equally plain that it is physically impossible for them to be fair in deciding state rate cases if they are constantly appearing as parties and attorneys against the railways in interstate rate cases. The two functions are incompatible. Mr. Thorne himself is the best proof of this. In appearing in interstate rate cases he is always more narrow, unreasoning and bitter against the railways than any other attorney for the shippers; and in his capacity as a judge in state rate cases his attitude is the same as is his attitude as an attorney in interstate cases. Probably there is not in the United States another man so perfectly unfitted by his prepossessions and attitude to sit in judgment on railways as is Mr. Thorne; and yet, as chairman of the Iowa commission, he constantly sits in judgment without any apparent consciousness of his unfitness and the reasons for it.

No commission with any sense of fairness or propriety would voluntarily appear as a party in a case involving the unreasonableness of interstate rates, knowing that the reasonableness of practically the same rates on state business probably would soon come before it to pass on in its quasi-judicial capacity; and no law should require or permit it to do so. And it is exactly as great a breach of propriety for a state commissioner to appear as an attorney for anybody to oppose advances in rates as it would be for him to appear as an attorney for the railroads to advocate advances in rates. If the states are to intervene in such cases they should intervene through the office of the attorney-general or some similar office.

But, then, everybody long has known what to expect from most of the western state commissions. With a few exceptions they always have been composed chiefly of cross-roads demagogues. Never has there been constituted any equal number of public bodies which united so much power to so little capacity for properly exercising it. Inspired by petty political motives, devoid of expert knowledge or training, reckless as to the economic results of their acts and incapable of foreseeing what they would be, or of understanding what they have been, such state commissions as those appearing in the western rate case have done almost nothing but harm, both to the railways and the public.

Unfortunately, the public does not yet realize this. But it will in time. It cannot be fooled forever. Already the public is beginning to awaken to the fact that there are vast areas in the West which have insufficient railway facilities or none at all, and that railway development in that section has almost stopped. The public is beginning to ask the reasons for this situation. In due time it will learn them. And then the type of railroad commissioner now prevalent in the West will rapidly lose his popularity. For the transportation and business conditions now prevailing in the West, in spite of its big crops, are very largely due to the kind of men it has been putting on its railroad commissions and in other public offices. In time the public will find this out.

And the wait until the public awakens to the true situation may not be long. For the state commissions are co-operating ably with their critics in demonstrating their true characters. What could be better adapted to destroy public confidence in them than the fact and the manner of their appearance in the western rate case? They are there nominally as representatives of the public; and yet their attorney appears also as attorney for private interests, among whom are the meat packers, who have contributed $5,000! Knowing the solicitude which the packers have always manifested both for the farmers from whom they buy live stock and for the consumers to whom they sell meat; knowing, also, the pious zeal which the packers have ever displayed in obeying the anti-trust act and the anti-rebating laws, the public is apt to question the undivided and undying fealty to its interests of persons who are receiving and spending the public's money and that of the packers at the same time and for the same purpose!

NEW BOOKS

Proceedings of the Master Car Builders' Association. Compiled and published by Joseph W. Taylor, secretary of the association, Chicago, Ill. 968 pages, 6 in. by 9 in. Two volumes. Bound in cloth. Price, $5 per volume.

These volumes cover the official proceedings of the forty-eighth annual meeting of the Master Car Builders' Association, which was held in Atlantic City, N. J., in June, 1914. Volume I contains a full report of the convention and Volume II contains the complete rules of interchange brought up to date and all of the standard and recommended practices of the association, with drawings, together with the results of letter ballots sent out during the year. Pre-eminent in the proceedings is the report of the committee on Coupler and Draft Equipment. This report, together with its discussions, occupies 76 pages. Changes in the rules of interchange are contained in the report of the arbitration committee. Volume I also contains a list of members, with the number of cars they represent, and the constitution and by-laws of the association.

Universal Safety Standards, Machine Shop and Foundry. By Carl M. Hansen, consulting safety engineer. Illustrated and indexed. 312 pages, 5 in. by 7½ in. Bound in leather. Published by the Universal Safety Standards Publishing Company, 12th and Race streets, Philadelphia, Pa. Price $3.

This is the second edition of this book and it has been revised and enlarged. It is intended as a reference book of rules, drawings, tables, formulas, data and suggestions on safety devices and protection for machines in the machine shop and the foundry and was compiled under the direction of and approved by the New York Workmen's Compensation Service Bureau. The book is classified into four parts, general, machine shop, foundry and rules and practices; each division touches on a majority of the cases that arise under that classification. It gives a collection of conditions ordinarily found in machine shops and foundries, and indicates the proper safeguards to apply, treating the conditions with clearly worded, brief specifications and employing numerous illustrations. The book takes up conditions in the construction of the plant, and also follows the product from the receiving department to the shipping room and shows how in each instance safety measures may be applied. The illustrations are particularly good, the machines and buildings being printed in black, while the safety devices are printed in color, making them stand out very clearly.

Rate Construction Guide. Compiled and published by F. W. Fairbairn, commercial agent, Cincinnati, New Orleans & Texas Pacific Railway, Cleveland, Ohio. Bound in flexible leather. Price $5.

This is the 1915 edition of a freight rate guide published for the purpose of assisting in the location of the various tariffs for ascertaining the lowest prevailing freight rate on shipments from Central Freight Association, Eastern Trunk Line Association and New England Freight Association territories to all points in the United States. The purpose is to assist in making calculations of freight rates by indicating in what tariffs the various combinations are to be found, and in addition to its usefulness in a tariff reference file provides a means for equipping an office with a file of such of the tariffs as are necessary, thereby presenting indiscriminate requisitions for others which would not be of interest. While of particular benefit to shippers, it has also been adopted by a number of railroads for their rate clerks at principal stations.

Letters to the Editor

THE ALL-AROUND SUPERINTENDENT

Kansas City, Mo.

To the Editor of the Railway Age Gazette:

The editorial comment on "Why Do Not Chief Despatchers Receive More Recognition?" in your issue of January 15, opens the way for a few more remarks on the subject. The editor says that little or nothing was brought out concerning other qualifications than experience, and that a superintendent is liable to make a bad mistake by continuing to live in the department from which he came. Inasmuch as transportation is the only thing a railroad has for sale, he would not make a very large mistake by living a while in that department.

Who is the man on the job who has had an opportunity to thoroughly educate himself along that line? It requires extraordinary experience in the study of human nature in order that a superintendent may surround himself with subordinates that will make his position a success. He cannot do it alone, and must rely on men who are experts in their respective departments and whom he can trust to the last letter. Therefore, a superintendent who can effect such an organization is bound to have success. Without a thorough organization he will be at sea. The chief despatcher, in his long experience, has had an opportunity to acquaint himself with the fundamental principles of the various departments. If it is not necessary for a master mechanic to have knowledge of telegraphy and train despatching to be a superintendent; why would it be necessary for a chief despatcher to have served an apprenticeship as a machinist to fill the position of superintendent? What amount of expert figuring has the master mechanic to do in connection with his position? To keep within his allowance and see that the power and equipment is turned out in good shape. The chief despatcher has to figure where and how the company will derive the most revenue out of it, and at the same time manipulate it with the least expense.

If, as the editor says, the superintendent would no doubt do a good turn at the farmer's house, ten miles away, who would be the better fitted to go there and settle a claim, or look into the matter of securing additional right of way, the chief despatcher or the bridge carpenter? How would the civil engineer compete with the chief despatcher in obtaining the maximum ton-miles per train and at the same time keep up the standard of service and avoid overtime? Again, as to the matter of the chief despatcher feeling the importance of his promotion; I do not believe this weakness would be any more conspicuous than in the case of any other employee, and in some cases not so apparent. If the chief despatcher so handles the engines, cars and men, that the superintendent is not criticized by his superiors, he has made that superintendent's success. The superintendent may have washouts, fires, engine failures and derailments which may be chargeable to the other departments, but these do not come every day. But keeping the passenger trains, locals and red ball freights on time; keeping the line cleaned up, the overtime down, stock trains moved without damage claims, are things that come up every day and every night; and who is the man that makes the showing for the superintendent in this direction? It is not the roadmaster or the chief clerk; it is the despatcher, who is on the job all the time, working for the success of the chief despatcher and he for the superintendent. It has been said that a chief despatcher can either break or make a superintendent and there is in that idea more truth than poetry.

If, as Mr. Hobbs says, 75 per cent of the presidents, general managers, etc., were once chief despatchers, this is a credit to the despatchers; but it does not seem that the percentage in the last few years is being maintained. However, I venture to say that nine-tenths, at least, of the officers named in connection with Mr. Hobbs' remarks will say, if questioned, that their success as superintendents and general superintendents was due to the work of their chief despatchers more than to any other one department.

It is quite natural for men promoted from the different departments to pick lieutenants from the department from which they came, and no doubt at times there are good reasons for it; but I believe I am safe in still standing up for the chief despatchers, for they are justly deserving. C. L. J.

MODIFY THE VALUATION LAW

New York, N. Y.

To the Editor of the Railway Age Gazette:

The recent editorial on the subject of valuation is of not a little interest to the writer, who has felt for some time that he was rather in the minority, at least among those generally inclined to favor the railroad side, or their point of view, in believing that there were many benefits to be derived from a *properly made* valuation, and possibly also that these benefits might be worth the cost.

In the discussion of a paper presented to the American Society of Civil Engineers in January, 1911, the writer stated: "That valuations properly made may be the means whereby confidence may be restored, not only in the mind of the general public, but in that of the investor; but, in order to obtain this result, the railroads should urge, with all the power they possess, the necessity of having such valuations made by a body of men, some of whom, at least should be engineers big enough to entitle their opinions to the respect of both sides, and thoroughly qualified by training and experience for the work."

It was further pointed out, and this is a point which many railroad men ignore, either deliberately or unconsciously, that "There need not necessarily be any relation between rate regulation and rate-making. Rate regulation can well be confined to rates in the aggregate; rate-making applies to the adjustment of individual rates, and must necessarily be the work of men well versed in all the varied elements which control it and the particular conditions affecting the business of each particular road."

Your suggestion that the railways be taken a group at a time is an excellent one. If the energies of the commission could be concentrated say, for instance, on the New England group, or on the New York-Chicago trunk lines (leaving out lateral offshoots), some definite results could be obtained within a reasonable time.

There can be little doubt that properly made valuations will not only show that the railroads are not, on the whole, over capitalized, but will show the financial side in a favorable light, and if the general public once gets this idea firmly fixed in its mind, as it will if it be established by a thoroughly competent commission, it will be of more benefit to the railroads than the cost of getting the information. It is also not an unmixed evil for the railroads to be compelled to have their maps, records, etc., in good shape, as there have been not a few dollars expended for improvements, which might have been spent to better advantage had there been available, adequate information for a broad-minded view of the whole situation, rather than a restricted view of some particular detail.

It has seemed to the writer, in view of the knowledge now acquired by the Interstate Commerce Commission and by the various official railway committees having the subject of valuation in charge, that Congress might be requested to modify the law containing the instructions under which the valuation is now being conducted, and among other things to include your suggestion to complete the valuation by sections instead of scattering its energies all over the country, even though this will not appeal to the pork barrel statesman, and possibly also to make the determination of the value wholly on the basis of the cost of reproduction new.

F. Lavis,
Consulting Engineer.

Hearings on Western Freight Rate Advances

Testimony on Financial Condition of 41 Roads Operating 98,000 Miles. Earnings, 7 Per Cent on $28,000 Per Mile

Statistical and general testimony as to the financial condition and necessities of 41 western railroad systems occupied the first four days of the hearing before Commissioner Daniels of the Interstate Commerce Commission, on the application of the roads for advances in a number of commodity rates, which began at Chicago on March 4. Four days were allotted for railroad evidence supporting the claim that increases in earnings are needed, which was followed on Tuesday, Wednesday and Thursday of this week by testimony bearing especially on the advance on grain and grain products. Other days have been set aside for similar testimony as to other commodities, and four days, March 30 to April 2, will be allowed for evidence of protestants and interveners in rebuttal of the evidence of the carriers.

Edgar Watkins, examiner-attorney for the commission, sat with Commissioner Daniels, and the commission was also represented by M. O. Lorenz, statistician. Those who appeared in opposition to the proposed rate advances, included Clifford Thorne, chairman of the Iowa Railroad Commission and of a committee representing 16 western state commissions. He said he also represented several large organizations of shippers. Luther M. Walter and W. E. McCormack, appeared for Chicago packers.

Members of this committee were present from the state commissions of Kansas, Nebraska, South Dakota, Iowa, Louisiana and North Dakota. Appearances were also entered for a number of large companies and organizations of shippers, including the Chicago packing companies and the coal and grain interests.

Their representatives who took part in the cross-examination were Luther M. Walter, W. E. McCormick and W. E. Lamb, representing the packers

OPENING STATEMENT BY C. C. WRIGHT

The scope of the case was outlined by C. C. Wright, general solicitor of the Chicago & North Western, who is chairman of the railroad committee in charge of the case. The other members are T. J. Norton, general attorney of the Santa Fe; W. F. Dickinson, general attorney of the Rock Island; A. P. Humburg, commerce attorney of the Illinois Central; C. S. Berg, assistant general counsel of the Missouri, Kansas & Texas, and R. B. Scott, general attorney of the Chicago, Burlington & Quincy.

Although this has been called a general rate advance, Mr. Wright explained, it is general only in the sense that the advance covers rates over a broad territory, and that the advances were brought about, in a measure, and are to be in a measure justified, by the needs of the carriers for additional revenue.

The principal products upon which the advance is sought are grain and grain products, livestock, fresh meats and packing-house products, coal, hay, fruits and vegetables and cotton piece goods. The hearing also involves the propriety of the elimination of certain privileges which have prevailed in parts of the territory involved, in relation to stoppage in transit, storage and concentration.

The territory involved includes the Western Trunk Line territory (from Chicago west to the Missouri river), the Southwestern Tariff Committee territory (west of the Missouri river and south of Kansas and Missouri), and part of the Trans-Missouri territory (Nebraska, Kansas and eastern Colorado).

The advance is not the same on each commodity; nor does the advance on each cover the same territory. Each has been treated separately with a view to establishing a more equitable relation of rates by advancing those which were too low. Mr. Wright described briefly the application of the advances, saying they would be taken up later by witnesses at the separate hearings devoted to those commodities.

"The amount of the increase in revenues," said Mr. Wright, "is by no means as great as has been stated in public print; nor is it anticipated that it will meet the necessities of the carriers for additional revenue. It is impossible at this time to state definitely, but it is believed that it will not amount to more than $10,000,000 to the 41 roads principally interested in this advance, which have a combined mileage of over 98,000 miles. In other words, it will amount to but little over $100 per mile.

"It is the purpose of the carriers to further limit the privileges which have been granted in connection with certain rates and to publish advances on various miscellaneous commodities, which need not now be particularly considered. The tariffs for some of these advances have already been filed. A statement will be furnished to the commission, at the hearing as to each commodity, of the amount of increased revenue to be derived by reason of the advanced rates.

"Tariffs advancing interstate passenger rates to substantially 2½ cents a mile have been filed, and it is hoped that a like advance can be made in the intrastate passenger rates. That matter is not before the commission upon this hearing, but we desire that some of the general evidence introduced in this case be considered in that case.

"Owing to the fact that an advance has been made at about the same time on a number of commodities covering a large territory, it has been deemed proper to present to the commission at this time, a showing of the financial conditions of the various carriers operating in the territory covered by the advances. It is confidently believed that this will demonstrate that the carriers are in need of additional revenue in order to maintain the proper, efficient and safe service demanded by the public, and at the same time enable the carriers to receive such fair return upon the value of their properties as shall sustain their credit and enable them to meet the public's demands.

"The evidence in relation to the specific rates will show that the advances have been made upon rates which were both actually and relatively too low. In other words, the increased revenue is sought by means of a better adjustment in relation of rates, having in mind the suggestions heretofore made by the commission as to the equalization of rates and the removal of discriminatory practices.

"This case will not be presented as the application of any single road. It will be presented, substantially as if the roads were owned and operated as one system. The fact that one road of this system may be making a considerable return, and others of them be in the hands of receivers, is not thought to be the controlling feature, any more than it would be proper to estimate the needs of a single line by the separate returns from different branches of such line. It is the contention of the carriers that taking the railroads together in the territory in question, their revenue is not sufficient. Conditions are such in the west that we do not believe it possible to select any small number of roads which could be said to be representative or controlling.

"For the purposes of comparison of the situation west of Chicago, with the condition in the eastern district, we shall present to the commission data in relation to the earnings, expenses and net returns, covering practically all of the lines operating west of Chicago. However, many of the so-called strongest roads in the western district, such as the Great Northern, Northern Pacific and the Union Pacific, have practically no interest in the advances under investigation.

"Therefore, in order to present to the commission the situ-

ation in relation to the roads that are materially interested in this proceeding, and whose revenues will be affected; that is, those whose principal interests are in the Western Trunk Line territory and Southwestern territory, and that part of the Trans-Missouri territory in which advances are made, we have selected all of the principal lines (treating them as systems), which operate in Western Trunk Line territory, and Southwest territory, and will present the combined results of their operating revenues, their expenses and net returns. They will be presented in a consolidated group.

"In order that the commission may be better informed as to the situation as between the Western Trunk Line territory and the southwestern territory, the carriers will present the combined statement of 10 of the leading systems operating in the Western Trunk Line territory. As representing the southwestern territory, an equal number of the principal systems have been selected, and the results of their operations have been combined in another group. These grouped figures will be supplemented by the combined showing of two other groups of roads in which are included all of the lines having 1,000 miles or more, which operate exclusively in either the Western Trunk Line or Southwestern Tariff Committee territory.

"This grouping, or division of the roads into groups, has been selected as in our judgment best portraying the true situation, and for the purpose of eliminating as far as possible the influences of the rates and transportation conditions upon those roads that serve trans-continental territory, and that portion of the Western Trunk Line territory in which the rates are not advanced.

"The comparison of revenues and expenses will be made, covering two periods, one, the seven years, 1901 to 1907, inclusive, and the other the period from 1908 to 1914, inclusive. The latter period commences with the revised, uniform system of railroad accounts as prescribed by the Interstate Commerce Commission, and covers substantially the period during which the commission has had the power to authoritatively fix maximum rates. The results of the operation of each year will be given separately, and the general comparison will indicate a decreasing ratio of return upon investment in road and equipment, not only as between the two periods compared, but as between comparable years in the latter period. It will show that the operation ratio is increasing, and that there has been a very large addition to the properties of the carriers.

"This compilation will show that the net operating income of the carriers interested in this proceeding, for the average of the last seven years, has not been what the courts have held to be a fair rate of return upon their properties, when considering the question of confiscation of property, on an amount to exceed $28,000 per mile of road operated.

"The records of the Interstate Commerce Commission show that the carriers in the territory involved, have been called upon to invest in their properties, by way of additions and betterments, more than $100,000,000 a year during the last seven years, and yet their net revenues are but slightly higher than they were during the prior seven years. In other words, that there is no substantial return upon the new investment which has been made during the last seven years. It will also be demonstrated that the additional investment in road and equipment is being taken care of by bond issue; that is by borrowing, rather than by taking in new partners by the sale of stock."

OPENING STATEMENT BY CLIFFORD THORNE

Mr. Thorne also made an opening statement, saying that the time allowed for investigation prior to the hearing had been entirely inadequate and that formal application would be made for the additional time provided by the statute and deemed necessary in order to complete the investigation.

"These advances under consideration," he said, "are only a part of a general movement that has been in progress for over a year, and these increases are only a fractional part of the total advance which these railroads are trying to put through. The advances permitted during the past year by this commission, added to those involved in the original suspension order in this case, added to those involved in the 16 supplementary orders issued by the commission, added to those now being filed, make a total which we believe, from what investigations we have made, can be conservatively estimated will cause a 10 per cent increase in the freight revenues of these railway companies.

"Estimating that two-fifths of the passenger travel will be on mileage books, the average increase in passenger revenues will amount to approximately 20 per cent.

"The magnitude of the sums involved in a 10 per cent increase in freight rates, and a 20 per cent increase in passenger rates, may be appreciated when you consider that the total freight revenues of the 37 railroads embraced in your original suspension order, aggregated last year $700,000,000, and their passenger revenues amounted to approximately $195,000,000.

"Though our investigation has not been completed, that which we have to offer will show conclusively as to representative railroad companies in this territory:

"That the credit of these western railway companies is better than that of representative companies in any other line of business in the United States. That the depression of the past year was not due to freight or passenger rates, was not peculiar to the railroad industry, but applied to business generally throughout the world. That, disregarding extremely prosperous and extremely lean years which come to all business, these western railway companies during recent ordinary normal years have earned more, both gross and net, per mile of line and per train mile than ever before in their history. That these companies have been able to maintain their properties during recent years at a higher standard than ever before in their history; and they have also set aside large sums of money out of earnings for betterments and improvements and outside investments, which should have been made from capital."

TESTIMONY

The foundation of the railroads' case was laid by C. E. Schaff, president of the Missouri, Kansas & Texas, who read a statement as to the need for increased revenues, in addition to a discussion of the special needs of the roads in the southwest. He was followed by S. M. Felton, president of the Chicago Great Western, and B. F. Bush, president of the Missouri Pacific, who discussed the condition of the roads in Western Trunk Line and southwestern territory with illustrations from the experiences of their own roads. The three presidents took the position that western railroads should be allowed to earn 7 per cent on the investment, that the situation should only be considered with reference to the condition of all the roads in the territory, and showed that the roads involved in the case during the past seven years had earned 7 per cent only on a very low sum per mile of line, a large part of the investment receiving no return. They also discussed the increasing difficulty of financing railroads. The financial condition of the roads from the bankers' and investors' standpoint was discussed by Festus J. Wade, president of the Mercantile Trust Company of St. Louis, and James W. Lusk, one of the receivers of the St. Louis & San Francisco, took the stand, as a man who had had no previous connection with railroad operation, to explain the difficulty of "paying the honest debts of a railroad" under present conditions. This general testimony was supported by the presentation of elaborate statistical exhibits comparing the results of operation in the periods 1901-1907 and 1908-1914.

OUTLINE OF RAILWAYS' CASE BY C. E. SCHAFF

Mr. Schaff said in part:

"The operating results of the carriers in the western district have been growing more and more unsatisfactory year by year, and their need of increased net income has grown more pressing. We feel that the time mentioned by the commission in the 1910

western rate advance case to make application to this commission for an increase of rates has come. It is imperative that the western carriers increase their net income quickly. Three ways have been suggested by which such an increase may be accomplished.

"First, through increased operating revenues following the natural growth in population and industrial development with a resultant expansion of traffic. Admitting the possibilities in this direction, the probable results are far too slow and uncertain to meet the immediate necessities of the carriers. As the present standard of operations cannot be lowered, and as the investment in betterments, equipment and extension of facilities must increase from year to year commensurately with the increase in population and commerce of the community served, it cannot be expected that the future will show any higher returns than the past from increased operating revenues on the present basis of rates.

"Second, through economies in operation. The carriers, however, have found that their efforts to economize, even to the extent of deferring maintenance, have been without avail. The carriers will continue, as in the past, to effect operating economies wherever possible, but I see no hope for substantial relief or help from that source.

"Third, by an increase in rates. We believe that the problem can only be solved by an increase of rates, and that the experience of the past as exhibited by the statistical data to be presented here leads inevitably to that conclusion. In determining where the advances should be made, the lines have not followed the lead of the eastern lines and have not aimed at a horizontal increase of 5 per cent or any other arbitrary amount, but they have endeavored to adopt the suggestion of the Interstate Commerce Commission, and have sought to eliminate certain privileges and abuses which have been condemned or criticized by the commission, and to make such advances as would increase revenues, and at the same time more equitably distribute the benefits and burdens of the service.

"The increases asked for will not afford us all the relief necessary, or to which we believe we are entitled. As nearly as we can determine, the increases asked for, if applied to the business of the Missouri, Kansas & Texas Lines for one year, would not add to exceed $450,000 to their gross freight revenues an increase of about 2 per cent. However, following another suggestion of this commission, we are active in trying to have our rates raised on state, as well as on interstate, business, so that the needed increase will, so far as practicable, be fairly distributed—state and interstate—both passenger and freight.

"The statistical data and tables offered as evidence will show an inadequate return on the cost of property, or on any approximate or reasonably assumed value of the properties, or on any other basis upon which that return may be calculated. They will show that the book value of road and equipment of the carriers involved in this proceeding averaged $51,584 per mile operated on June 30, 1914, while the income in that year available for return on the investment, if capitalized at 7 per cent, represented a value of only $28,048 per mile operated, or little more than one-half of the book cost of the property. It must be apparent, even to those with the most superficial knowledge of railroad construction cost, that these western lines could not be reproduced for any such sum.

"The tables will show that the operated mileage has increased 12,577 miles during the past seven years, and that the property investment has increased $1,236,000,000. The lines have expended an average of $105,000,000 per year for additions and betterments, including equipment, an average of $1,970 per mile per year. The bonds and notes outstanding in the hands of the public have increased $959,000,000 in seven years. The ratio of interest-bearing obligations to the total capitalization has increased from 58.35 per cent to 62.26 per cent. The expenditure per mile for maintenance of road and equipment rose from $2,266 to $2,831 in seven years.

"The average net cost of road and equipment of the 41 western roads, or systems, divided into two periods of seven years each, 1901 to 1907 and 1908 to 1914, were: First period, 1901 to 1907, $3,430,000,000, and for the second period, 1908 to 1914, $4,570,-

Combined Results of Operation of 41 Western Railroad Systems, Comparing the Period 1901-1907 with the Period 1908-1914

Years	Net cost of road and equipment	Average miles operated	Net operating income	Per cent return on cost of road and equipment	Value on which net oper. inc. is equiv. to 7 per cent	Balance of value earning no return	Net oper. income per mile operated	Equiv. to 7 per cent on value per mile
1901	$3,005,040,261	67,054.86	$143,281,943.04	4.77	$2,046,884,900	$958,155,361	$2,136.76	$30,525
1902	3,121,687,909	70,467.81	154,652,853.13	4.95	2,209,326,473	912,361,436	2,194.65	31,352
1903	3,336,109,179	75,591.67	163,218,476.47	4.89	2,331,692,521	1,004,416,658	2,159.21	30,846
1904	3,487,539,658	79,378.50	158,715,558.40	4.55	2,267,365,120	1,220,174,538	1,999.48	28,564
1905	3,561,291,400	81,724.85	166,081,014.50	4.66	2,372,585,921	1,188,705,479	2,032.19	29,031
1906	3,712,190,412	83,118.00	191,397,541.30	5.16	2,734,250,590	977,939,822	2,302.72	32,896
1907	3,842,316,511	85,872.00	216,885,898.39	5.64	3,098,369,977	743,946,534	2,525.69	36,081
Total 1901 to 1907 inclusive	$24,066,175,330	543,207.69	$1,194,233,285.23	4.96	$17,060,475,502	$7,005,699,828	$2,198.48	$31,407
1908	$3,957,331,754	87,580.64	$169,579,067.29	4.29	$2,422,558,104	$1,534,773,650	$1,936.26	$27,661
1909	4,079,982,221	88,635.71	188,035,808.83	4.61	2,686,225,840	1,393,756,381	2,121.44	30,306
1910	4,504,033,244	92,788.41	198,940,381.74	4.42	2,842,005,453	1,662,027,791	2,144.02	30,629
1911	4,674,459,267	95,139.98	197,179,697.73	4.22	2,816,852,825	1,857,606,442	2,072.52	29,607
1912	4,796,540,973	96,207.76	176,979,543.08	3.68	2,528,279,187	2,268,261,786	1,839.55	26,279
1913	4,907,912,434	97,237.16	217,816,890.19	4.44	3,111,669,860	1,796,242,574	2,240.06	32,001
1914	5,078,293,153	98,446.59	193,286,463.22	3.81	2,761,235,189	2,317,057,964	1,963.36	28,048
Total 1908 to 1914 inclusive	$31,998,553,046	656,036.25	$1,341,817,852.08	4.19	$19,168,826,458	$12,829,726,588	$2,045.34	$29,219
Total 1901 to 1914 inclusive	$56,064,728,376	1,199,243.94	$2,536,051,137.31	4.52	$36,229,301,960	$19,835,426,416	$2,114.71	$30,210
Totals and average 1901-1907 inclusive.	$24,066,175,330	543,207.69	$1,194,233,285.23	4.96	$17,060,475,502	$7,005,699,828	$2,198.48	$31,407
Totals and average 1908-1914 inclusive.	31,998,553,046	656,036.25	1,341,817,852.08	4.19	19,168,826,458	12,829,726,588	2,045.34	29,219

Comparison of operating results per mile operated:	Operating revenues	Operating expenses, hire of equipment, joint facilities, etc.	Taxes	Rentals—Net lease of roads	Net operating income
1901-1907	$7,466.85	$4,948.59	$231.64	$88.14	$2,198.40
1908-1914	8,815.27	6,355.93	346.81	67.19	2,045.34
Increase or decrease	Inc. $1,348.42	Inc. $1,407.34	Inc. $115.17	Dec. $20.95	Dec. $153.14
Comparison of operating results for each dollar of road and equipment cost:					
1901-1907	16.85 cents	11.17 cents	0.52 cents	0.20 cents	4.96 cents
1908-1914	18.07 cents	13.03 cents	0.71 cents	0.14 cents	4.19 cents
Increase or decrease	Inc. 1.22 cents	Inc. 1.86 cents	Inc. 0.19 cents	Dec. 0.06 cents	Dec. 0.77 cents
Percentages	7.29 per cent	16.65 per cent	36.54 per cent	30.00 per cent	15.52 per cent

000,000, or an average yearly increase in net cost of road and equipment for the second period of $1,140,000,000. The average annual net operating income for the same systems for the first period was $170,000,000, and for the second period $191,000,000. The per cent of return for the first period averaged 4.96, and for the second 4.19. So that the increase in net operating income did not, by any means, keep pace with the increase in cost of road and equipment.

"Assuming that these lines were entitled to earn 7 per cent, and capitalizing their net operating income, it will be found that the net operating income for the first period was equivalent to 7 per cent on an average valuation of $2,430,000,000, and for the second period the net operating income was equivalent to an average earning of 7 per cent on something over $2,700,000,000, which means that for the first period an average of over $1,000,000,000 investment earned no return whatever, and for the second period an average of over $1,800,000,000 earned no return whatever.

"The net operating income per mile of road for the first period averaged $2,198, and for the second period $2,045, which, capitalized on a 7 per cent basis, was equivalent to earnings on a value per mile of road of $31,400 for the first period, and for the second period of $29,200. Notwithstanding the great increase in investment, the net operating income was materially reduced for the second period.

"The average operating revenue per mile of road operated for the first period was $7,466 per mile, and operating expenses were $4,948 per mile; taxes $231 per mile, and rentals $88 per mile, leaving $2,198 net operating income per mile for the first period.

"For the second period the operating revenues were $8,815 per mile, an increase over the first period of $1,348; operating expenses were $6,355 per mile, an increase of $1,407, which more than absorbed the increase in gross operating revenue. Taxes in the second period were $347 per mile, or an average increase of $115. Rentals for lease of road decreased $21 per mile, leaving the net operating income for the second period, average, $2,045, or a decrease of $145, as compared with the first period.

"For the year 1901 the 41 systems paid out only $14,000,000 in taxes, whereas for the year 1914 they paid out $42,000,000 in taxes, or three times as much as in the year 1901. For the entire period, 1901 to 1914, 14 years, they paid out $315,000,000 for taxes.

"In the face of a declining credit, the western carriers during the three calendar years 1915, 1916 and 1917 must refund maturing obligations aggregating $203,000,000. It should be borne in mind that they must also procure not less than $3,000 per mile, or $295,000,000, of new capital, during these three years to pay for the ordinary necessary betterments and equipment required by the normal growth of traffic and demanded by the public.

"In considering the increased operating costs of the carriers, it should be remembered, among other things, that federal and state laws and regulations of recent years have contributed materially. Freight, passenger and express rates have been reduced by commissions and legislation. The government has required increased postal facilities without commensurate addition to revenue; express earnings have been curtailed by reason of the extension of the parcel post, for which the railroads are not compensated.

"The increased cost of labor is familiar to every one who has the slightest information regarding the railroad situation. Rates of pay on railroads in the west have been and now are substantially higher than in the east, and further demands are now being arbitrated in this city. The average rate of pay per day for railway employees, excluding general officers, was $2.20 in 1907, and $2.48 in 1914. If the same rate had been paid in 1914 as in 1907 by the 41 roads concerned in this hearing, their operating expenses would have been $44,800,000 less in 1914, and the net income for that year would have been correspondingly increased. The saving would have amounted to about 1 per cent on the net cost of road and equipment. The operating ratio would have been 2.76 per cent less.

"The increased cost of money to railroads is well known. In 1905 and 1906, the roads generally were able to obtain money on a 3½ per cent to 5 per cent basis. From that time, the rate has been steadily advancing and today many of the roads are paying 7 per cent and more for such small amounts as they are able to obtain. While this is partly due to the higher rate of interest generally, it is aggravated in the case of most western and southwestern railroads by the lack of a margin of safety.

"Operating economies have been innumerable. The managers have constantly endeavored to save in every detail of expenditure, and to increase the efficiency of the plant and its working organization, and have instituted numerous and varied cost-reducing schemes and devices. Much has been accomplished, and more will be accomplished, but it is a lamentable fact that reduced rates and increased expenses beyond the power of the managers to control have more than offset the lower costs which have obtained through more efficient and economical methods. Many millions of dollars have been invested in permanent improvements designed to reduce the cost of maintenance and operation.

"During the seven fiscal years beginning July 1, 1907, and ending June 30, 1914, the 41 western carriers expended for new equipment $306,000,000. The new engines acquired are larger and more powerful and are designed to draw heavier loads. Their use has enabled the average revenue trainload to be increased from 284.05 tons in 1908 to 364.07 tons in 1914, an increase of 80.02 tons, or 28.17 per cent. Increasing the number of tons and cars handled in one train is the best medium known to us for reducing transportation costs.

"The tons moved one mile in 1914 were 18,783,291,755 more than in 1908, an increase of 33.4 per cent. By the use of heavier power and the resultant increased trainload, the freight train miles, including mixed, increased only 8,068,380 miles, or 4.07 per cent.. Yet the ratio of conducting transportation expenses to revenue was practically the same in 1914 as in 1908. The new freight and passenger equipment was more strongly and permanently constructed, yet the ratio of expenses for maintenance of equipment to gross revenue increased from 14.23 per cent in 1908 to 16.58 per cent in 1914. The new freight equipment purchased during the period is also of greater capacity, but nevertheless the average revenue tons per car mile only increased from 11.11 in 1908 to 11.93 in 1914, indicating a larger proportion of less-than-carload freight and bulky and light loading traffic.

"During the seven fiscal years under discussion, the western carriers expended $433,507,867 for additions and betterments, excluding equipment. The purpose of these expenditures was either to furnish additional facilities to handle the business and relieve congestion; or to procure additional traffic; or to lay heavier rail, provide ballast, widen banks, build bridges and otherwise to strengthen and make permanent the roadway and structures in order to provide a safe roadway to sustain the heavier loads and to reduce maintenance and transportation costs; or to reduce grades to enable the trainload to be increased; or to pave streets and build stations and provide betterments required by police regulations of governmental bodies. We believe that the expenditure of most of this money was wise and profitable and a very large part of it was absolutely vital to the operation of the roads, and as much of a necessity as an operating expense.

"The ratio of total operating expenses to revenue in 1908 was 69.97 and in 1914 72.12. Comment has been made upon the fact that the operating ratio does not vary materially from year to year and that it has not actually declined as a result of the strenuous efforts to economize. This is, of course, due to those unfortunate conditions which I have referred to, beyond the control of the managements, such as wage increases, rate reductions and police regulations. Compulsory rate reductions, which have occurred in greater or less degree for many years,

are an important factor in preventing a reduction in the operating ratio.

"To illustrate: The M. K. & T. Lines for the year ending June 30, 1914, lost $676,500 by the enforcement of the two cents per mile passenger rate and $165,000 by freight rate reductions, a total of $841,500, in the states of Missouri and Oklahoma, which reduced the net earnings correspondingly. The service rendered was exactly the same for the lower rates as it would have been for the higher. Adding the $841,500 to the actual operating revenues for 1914 would have made them $32,362,688. Operating expenses would have been the same, $22,722,119. The operating ratio would have been 70.21 per cent instead of 72.09 per cent, or 1.88 per cent less than it actually was.

"The major part of the large expenditures in the improvement of the railroads is for the public safety and the despatch of business, and while some of them add somewhat to the economies of transportation, most of them are additional burdens. The *value* of the service to the public has not only been largely increased, but the *cost* of the service has been increased to the carriers."

CONDITION OF THE SOUTHWESTERN ROADS

Mr. Schaff then took up the roads in the Southwest, making comparisons with the statistics presented in the eastern case for the Central Freight Association roads. He omitted from consideration the Atchison, Topeka & Santa Fe and the Chicago, Rock Island & Pacific, because, he said, the major part of their lines are located in other states and are operated under dissimilar conditions. For the group of 22,032 miles, including the Kansas City Southern, Missouri, Kansas & Texas, Missouri Pacific, St. Louis, Iron Mountain & Southern, Texas & Pacific, International & Great Northern, St. Louis Southwestern and St. Louis & San Francisco, he showed that the results of operations in 1914 were more disappointing than in the panic year of 1908. In the period 1908 to 1914, per mile of line owned, operating revenues increased about 32 per cent, while operating expenses increased 33 per cent, taxes increased 78 per cent, the operating ratio rose from 72.66 to 73.25, the ratio of funded debt to total capital rose from 63.69 to 70.51 and 59 per cent of the accumulated surplus was lost. The income available for return on the investment in 1914 was $1,958 per mile, equal to 7 per cent on a value of only $27,960 per mile. Seven per cent on the book cost would have been $4,047 per mile.

"Special consideration should be given to the necessities of the carriers in the Southwest," said Mr. Schaff. "There are special difficulties attached to railway operation in Missouri, Kansas, Arkansas, Oklahoma and Texas, which, perhaps, are not encountered in other sections of the country. In the Southwest we have no margin of safety. With us it has not been and is not a question of what is a reasonable dividend or a reasonable return on the capital invested, or what is a reasonable surplus over and above such reasonable return for the purpose of tiding the company through periods of depression and preserving the company's credit. With few and unimportant exceptions, the railroad companies in the Southwest have paid no dividends at all on their capital stock and have had no surplus funds. It has been and is a struggle for existence to pay operating expenses, taxes and interest on bonds and a little something more. Stockholders of the lines, both common and preferred, have during a long series of years received no returns from their investments, and earnings to which they were justly entitled were put back into the property, and nothing really has ever been earned on this new capital.

"Railroads operating in one or more of the five states which I have mentioned, having a total mileage of 11,079 miles, which includes the Wabash and the Frisco mileage east of the Mississippi river, and having a total capitalization of $624,000,000, were in receivers' hands on January 1, 1915. Of these receivership roads 8,641 miles were wholly within the five states, and approximately 20 per cent of the total railroad mileage in those states is now operated by the courts. And the lines of this group must pay or refund securities which mature during 1915, 1916 and 1917, aggregating $117,000,000. Construction of new lines of road in the Southwest has practically ceased and expenditures for additions and betterments, new equipment and facilities have been reduced to a minimum."

On cross-examination Mr. Thorne asked Mr. Schaff if he thought the public should pay 7 per cent on the investment represented by bonds as well as on the stock. Mr. Schaff said he thought 7 per cent ought to be earned on a fair valuation of the property used, even if it would give a much larger return on the stock, in order that a surplus could be accumulated in prosperous years to tide over the poor years. Mr. Thorne asked if the roads would be satisfied with increases in the rates involved in this hearing. "If it develops that the increase is not enough we ought to have further increases," said Mr. Schaff.

Luther M. Walter, attorney for Morris & Co., asked Mr. Schaff what directions he had given to his traffic department in regard to the increasing of rates. "I told them to secure an increase of rates wherever it was possible to do so," said Mr. Schaff, but he said that he had nothing to do with the selection of the commodities or the amount of the advance.

TESTIMONY OF S. M. FELTON

Mr. Felton said the western roads need an advance in revenue in order to be able to give proper service to the public and a fair return to investors and that the present net revenues have averaged during the last seven years only 7 per cent on less than $29,219 per mile. "It does not take a physical valuation to convince even a layman that this sum is far below not only the cost of reproducing the lines but below their value," he said. He believed that 7 per cent on the investment was only a reasonable return, because without any guarantee by the government, the returns should be considered on the basis that railroads are private companies. With the increased cost of operation and the increased cost of money, western roads have not been able to sell their stock or bonds at anything like the rates prevailing in former years, while the rates for their service have generally shown a decline. The trouble is not with gross earnings but with net, he said, and he believed the carriers have about exhausted the possibilities of economies in operation, at least such as could be effected without a very large investment.

"A good illustration of the expense of conducting our passenger business," said Mr. Felton, "is seen in the cost of the new terminal at Kansas City. There was a strong demand there for a new passenger station and one was needed. One could have been built on the old location for possibly two or three million dollars, but that would not have provided facilities far enough in the future and a better location must be had. The first estimates ran to about $15,000,000, but with the construction of the station came additional requirements for viaducts, subways, etc., and soon the estimate was $25,000,000. The final cost, I believe, will be close to $50,000,000. So far the interest, taxes and operating expenses will run from $1 to $2 per passenger handled in and out of the station for some of the smaller roads. The passenger business cannot stand these burdens without relief.

"What I have particularly tried to convey to the commission is the fact that general conditions in this territory are such that we must have not only the additional revenues which are provided by these advances but in some way still greater revenue must be received. Just what other commodities may be advanced I am not ready now to say and would not care to express an opinion. I know that for the roads which operate in the section of country where I am directly interested and that depend upon the rates in that territory for their earnings, there is an absolute necessity for more revenue, both from passenger and freight."

Mr. Felton said that it had been carefully estimated that the rates involved in this case would increase the revenues of the Great Western by about $325,000 a year. As an example of the difficulty of financing railroads at present, he said the bonds of the Kansas City Terminal Railway were guaranteed, both

principal and interest, by 12 roads, and at the last effort to issue bonds they could not be sold, but an offer was secured for one-year notes on a 7½ per cent basis. While the roads were considering this offer the rate was changed to 8 per cent last fall, and the money was finally raised by getting the roads interested in the terminal to advance it. Under the Illinois law, he said, the Great Western must get the permission of the Illinois Public Utilities Commission to issue bonds for improvements in Iowa and the commission fixes the price. He wanted to get some bonds into the treasury for future purposes and the company's 4 per cent bonds were selling at about 69. The commission consented to the roads taking them down from the trustee but fixed a minimum price of 73. The market is now at about 70 for these bonds, although the road is bonded for less than $25,000 a mile. The Great Western, he said, in five years has earned 7 per cent only on $23,050 per mile. In the best year of this period it earned 7 per cent on $29,096 and in the worst year on $18,352 per mile, and during that time over $17.-000,000 has been expended on the property in cash. The new company since the reorganization has never paid a dividend and the stock and debenture holders of the old company, from whom the road was bought and who were required to put in $10,000,000, have never been given a cent of return.

Mr. Thorne cross-examined Mr. Felton in the effort to show that the credit of railroads was no worse than that of industrial concerns and public utility companies. Mr. Felton insisted that good securities of such companies could be placed on a much more favorable basis than those of the average railroad. Mr. Walter asked about meetings of the executive officers of the roads to discuss the rate advances and whether there had been any divergence of opinion as to the amount. Mr. Felton insisted that there had been no special meeting of the presidents on the matter; that the conferences were held by the traffic officers; he said he had talked the matter over with other executives since 1910 whenever he happened to meet them. Mr. Walter said that he had information which he wished to verify, that the railroads were not agreed as to the amount of the advance to be asked and decided to file maximum advances in order to "pass the buck to the commissioners." Mr. Felton said he knew of nothing of the kind, but that he personally thought that the advances were not enough, although some others did not agree with him.

TESTIMONY OF FESTUS J. WADE

Mr. Wade took the stand on Friday and said that no classes of securities have depreciated so much or are harder to sell than are railroad securities in the United States today. For the last two years bankers and investors have been obliged to turn elsewhere on account of the uncertainty and unreliability of the securities either as an investment or to buy for sale again to others. The present business depression, he said, was caused more by the "constant tirade" against the railways of the country, than anything else. Years ago, he said, it was common for bankers to put their subsidiary reserves in railroad securities.

Mr. Wade said that the commission had three distinct things to consider: First, that safety of life and limb and property shall be conserved; second, that labor shall be properly protected and paid, and third and equally important, that the financial interests and money invested in railways shall receive the same care and consideration as the others. Any attempt to decrease the value of money invested not only injures the railroads, the employees and the traveling public, but injures the republic as a whole.

It is practically impossible to finance a new railroad, he said. The decrease in market value of railroad securities from 1906 to 1914 was 20 per cent, equal to $3,000,000,000 or 75 per cent of the combined capital of all the banks and trust companies, state and national, in the United States. Mr. Wade presented a map of the West, showing in red the lines which already are in receivership, saying that from his own knowledge there would be more railways showing red lines in 1915 unless an increase in rates is secured. He said he knew personally that the Rock Island, Missouri Pacific, Missouri, Kansas & Texas and Missouri & North Arkansas, barely escaped receivership last year, even before the war, and he gave his experiences in the matter of financing a number of southwestern roads and the narrow margins by which several of them escaped bankruptcy by the decision of bankers to take the risk to tide them over. The holders of Wabash receivers' certificates, he said, were ordered by the court to renew them, and as the bankers saw no way to avoid it they did renew them at 7 per cent. The Frisco receivership certificates were renewed under practically the same conditions.

"We have bought railroad securities that ever since railroads were built were regarded as gilt-edged, and find that the public won't take them," he said. "When we buy securities for a year and find that we have to renew them at the order of a court we won't buy any more. They are not only shelf goods, but when the bank examiner comes around we have to mark off the depreciation, charging it to profit and loss."

Asked by Mr. Wright as to the comparative rates paid for money by railroads and other concerns, he said that never in the history of the nation has there been so much idle money as there is today. Large industries whose credit is good are being besieged to borrow for six to eight months at 4 per cent. In three months the federal reserve banks have not been able to lend enough money to pay their operating expenses, but with the exception of a few strong roads, railroad short-term paper cannot be marketed at anything like this rate. The market for railroad securities is "almost nil," he said, as far as the small investor is concerned, because he is scared. Banks have lost in nine years more than $125,000,000 by depreciation in railroad securities, and life and fire insurance companies have charged off more than $100,000,000 for this reason. For the same class of securities, he said, railroads have to pay from 50 to 75 per cent higher rates for money. When Mr. Wade referred to the activity of commissions as responsible for the poor credit of railways, Commissioner Daniels interrupted him sharply:

"Do you know that the commissions are responsible?" he asked. "Very largely so," replied the witness. "Then qualify your answer," said Mr. Daniels. Mr. Wade then excepted the Interstate Commerce Commission, and said that he believed railway regulation should be in the hands of one commission instead of the many state commissions.

Everett Jennings, counsel for the Illinois Public Utilities Commission, asked if the "avarice of stock and bondholders and manipulators in capitalizing blue sky and water" was not more responsible than the commissions for the conditions of the railways.

"It is just such wild statements as you have made just now that have hurt the credit of the roads," retorted Mr. Wade.

Some of the state commissioners tried to get Mr. Wade to say that the commissions have also done something to help the roads, and that the acts of railroad men were more responsible for their poor credit than those of the commissions. "It has never come to my attention that a legislature or state commission in this western country has ever voluntarily done anything to help the credit of a railroad," he said, "but they have often done things to impair it. I have seen no mismanagement in the Missouri, Kansas & Texas or the Missouri Pacific, yet I have seen their securities drop 5, 10, 15 and even 25 per cent." Asked if it was more profitable for a banker to do business with a weak railroad than with a strong road, he said the condition was just the reverse, that he had done business with some of these roads because they did business with him and because they were trying to develop the territory he was doing business in.

"Will it help the return of prosperity to tax shippers for the benefit of the railroads?" asked Mr. Walter. "Unquestionably," replied the witness. "As soon as railroads are accorded as fair treatment as banks and other business we will get prosperity and not before."

When some of the lawyers tried to show that the disclosures of mismanagement on some roads had been responsible for the

poor credit of railroads, Mr. Wade said that the disclosures of bad management on the part of roads that had been badly managed were a good thing, but that exaggerated and sensational statements given to newspapers had done harm.

Clifford Thorne led the witness into a long discussion of railroad credit, bankers' commissions, etc., and tried to show that some of the strong roads enjoyed better credit than industrials or utilities. Mr. Thorne referred to a list of seven roads. "You have picked out a galaxy of the strongest roads in the West," said Mr. Wade, "7 out of 41. There are other securities selling as favorably as those of the Burlington and the Atchison, but, like the Burlington and the Atchison, there are mighty few of them." Mr. Thorne several times insisted on "yes" or "no" answers. "But I don't wish to mislead you and the commission," said Mr. Wade. "You would have to understand the railroad bond business better to get it clear, and I see you don't." "How do you know I don't understand it?" said Mr. Thorne. "I can see by the way you talk," replied the witness. Mr. Wade said that isolated sales of securities, such as Mr. Thorne quoted from a newspaper, are no criterion of a railroad's credit, and that it is impossible to tell from advertisements of bond sales what the railroads get. Bankers' commissions, he said, depend on a number of conditions. "You can't sell a bond just by having it," he said. "You have to have men employed to sell it, and what you have to pay depends on a large number of conditions in each case."

TESTIMONY OF B. F. BUSH.

Mr. Bush testified in part as follows:

"A most grave situation confronts this country in its transportation affairs. The problem has ceased to be one, with many of the roads, as to how returns can be realized for the shareholders, as this has largely passed beyond redemption. It is one rather as to how the integrity of the security can be maintained, as to how the interest on the mortgage bonds can be met. We believe the bad economic conditions which have prevailed for the past 18 months with the attendant depression of general business, have been due more to the railroads not earning adequate revenues than to any other cause. Nine industries in St. Louis dependent on railroads have been obliged to curtail their forces some 10,000 men, and their payrolls on that account are $588,000 less per month than in times of normal business. The loss in wages of the employees of these nine St. Louis district industries would aggregate over $7,000,000 a year.

"The time has come when it is most vital not only to the carriers' interests but to the industrial and commercial welfare of the country that the desired advances should be allowed. I fail to see why the investor in railroads, which are all-important to every trade and industry, should not be allowed a return commensurate with that of the investor in other enterprises. Seven per cent should not be deemed an excessive amount for roads to earn on their value. Very few of them can now get money at less than that figure. The last census shows that the capital of manufacturers increased in 10 years over $9,000,000,000 and, notwithstanding this large increase, 105 per cent, the return to the owners was over 12 per cent.

"In the Southwest there was an aggregate for the past seven years of nearly $3,000,000,000 of railroad securities that received no return. The necessity of immediate help to these carriers is further emphasized by their depleted earnings for the first six months of this fiscal year.

"Tonnage and passengers carried and the revenue therefrom show substantial increase, but the gains are more than offset by the increased expenses which are largely beyond the power of the management to control. Federal, state and municipal enactments during the last 10 years have greatly increased railway expenses. The higher standards of service demanded by the public have necessitated a greater outlay of funds. Organized labor has made repeated demands for higher wages, sanctioned by arbitration boards.

"In the meantime the unit of compensation received for service has been lowered considerably, further increasing the railroads' burdens, so that were it not for the marked progress in greater efficiency of operating methods the railroads would have long since met with bankrupt disaster.

"When one considers the great forward steps in increasing the number of tons and passengers per train, one would think the railroads were progressing towards more and more prosperous conditions. But the facts are that the uncontrollable increase in expenses and taxes and the gradual reduction of rates have more than absorbed the gains derived from greater efficiency.

"Twenty-six of the carriers in this proceeding have over $100,000,000 securities maturing this year, and 24 have over $55,000,000 which mature next year. In the next seven years over $422,000,000 of obligations will have to be refinanced by 34 of the companies now before you. The most serious consequences are threatened to the railroad world by these maturing obligations unless something happens to change the present unfavorable conditions with which they are confronted."

Mr. Bush said that when the roads tried to sell bonds for the Memphis bridge across the Mississippi river, which were guaranteed by the Chicago, Rock Island & Pacific, St. Louis, Iron Mountain & Southern and St. Louis Southwestern, they couldn't get a bid for 6 per cent bonds and were finally compelled to sell short-term notes. Speaking of the increased cost of maintenance, he said that whenever these western roads spend less than $1,200 a mile for maintenance of way and structures they are borrowing from the future, and until the old equipment which prevails on a number of western roads is used up they can't show much saving in maintenance of equipment and must probably look for an increase.

TESTIMONY OF J. W. LUSK

Mr. Lusk testified on Saturday. He said he had been a lawyer and a banker all his life and had no interest in any of these railroads, but had become one of the receivers of the St. Louis & San Francisco at the request of Judge Sanborn after he had retired from active business. He found the Frisco with "no money to speak of" and $2,500,000 of preferred claims. The court had authorized the issuance of $3,000,000 receivers' certificates to meet these claims and to pay equipment notes, and they were placed at 6 per cent and 1 per cent commission. The court declined to authorize certificates, however, to meet interest payments on $143,767,266 of bonds and notes, and they were defaulted for lack of earnings and because there was no prospect of getting money out of operation to pay with. Up to date he had been able to pay out of earnings after operating expenses and taxes only the interest on the balance of $92,557,500 of bonds, out of a total of $236,000,000. The total represents only the bonds of the Frisco proper, he said, concerning which no question had ever been raised. The interest paid on $92,557,500 of underlying securities amounts to $4,307,045, and the interest not paid amounts to $6,560,000. "All we can pay on with our earnings after operating expenses and taxes," he said, "represents a little less than one-half of what the railroad is assessed for and is equal to only 1.7 per cent on $50,000 a mile, the lowest estimate of the value of the Frisco, which is a well located road in a fine territory.

The receivers' certificates were renewed, after a year with great difficulty, he said, on the promise that no more would be issued. The receivers had tried to spend enough on maintenance to keep the road safe, but they had not been able to make improvements. The equipment notes had been paid because they would lose the equipment otherwise.

On cross-examination by Mr. Thorne, Mr. Lusk said he had no knowledge of the financial operations before the receivership, whereupon Mr. Thorne asked that the record in the Interstate Commerce Commission's investigation of the road be made a part of the record in this case. Commissioner Daniels deferred ruling on this request.

Mr. Daniels asked if it would be possible to compile statistics fairly reflecting the comparative credit of railroads and industrial concerns or public utilities. "You can pick out good and bad ones on both sides," replied the witness. "You might be able

to get a fairly accurate comparison of averages, but every one knows the railroads are under the weather today. Everyone knows that, no matter how you say it came about or for what reason, it is a fact. The railroads, to use a slang expression, are 'in the soup.' You can lay it to the European war or anything else, but the railroads are down. And yet the country is full of good crops and high prices. It is a remarkable state of affairs."

Mr. Thorne asked if his opinion was based on investigation or was only an impression. "Of course anybody can see that a two-cent fare isn't right in the southwest," said Mr. Lusk. "Then you disagee with the Minnesota railroad commission and the Supreme Court?" "The Supreme Court never said two cents was enough," replied Mr. Lusk. "It said the railroads hadn't proved it was too low."

"Railroad regulation and control has come to stay. The man who don't know that is pretty blind. But that power ought to be handled with care not to strangle the railroads," he said, turning toward the table where sat the state commissioners. "I have known bankers who have gone wrong and they have been sent to jail. There have been colonies of them in the penitentiaries, but the banks were not attacked. I haven't heard of any railroad looters going to jail. You are not hurting them. You are hurting the railroads, and innocent stock and bondholders and employees and the business men who sell supplies to railroads.

"We have turned off 1,456 employees since July because we couldn't afford to keep them. That's why I think there hasn't been enough care on the part of the state commissions in cutting down rates. You ought to allow them enough to pay their honest debts."

"Does not the constant reiteration by railroad presidents that the roads are in bad shape tend to hurt their credit?" asked Attorney Walter.

"Well, now, I think that's where the railroad presidents have made a bad mistake," said Mr. Lusk. "I agree with you," interrupted Mr. Walter. "They haven't half told how bad it was," continued the witness. "They are always nervous about hurting their securities, and many of them are afraid to speak out."

STATISTICAL EXHIBITS

On Saturday the introduction of testimony was begun by Julius H. Parmalee, statistician of the Bureau of Railway Economics, who presented 16 exhibits compiled from the reports to the Interstate Commerce Commission, giving figures for all of the roads in the western district. He was followed by L. E. Wettling, accountant for the roads, who presented 80 exhibits, also based mainly on reports to the Interstate Commerce Commission, showing operations of the 41 railroad systems, operating 98,446 miles in Western Trunk Line and Southwestern territory, involved in this case, for the years from 1901 to 1914 inclusive, comparing the period 1901 to 1907 with that from 1908 to 1914. Figures were given for the combined operations of the 41 systems, representing 61 roads that report to the commission, and for the separate groups as outlined by Mr. Wright. Mr. Wettling said that the periods and groupings had been selected before any compilations were made and that all of the basic figures were given for each road so that they could be grouped in any manner desired or for any period. Some of the principal comparative figures were outlined in Mr. Schaff's testimony.

An interesting summary of the comparative results in the two periods was given in two exhibits, reproduced herewith, showing that net operating income per mile operated of the 41 systems was $153.14 less for the seven years 1908-1914 than for the preceding seven-year period and for each dollar of road and equipment cost the net operating income had decreased .77 cent, or 15.52 per cent, while the total operating revenues per dollar increased 7.29 per cent. For Group 1, including 10 of the leading systems in Western Trunk Line territory, net operating income decreased $105.70 per mile for the second period as compared with the first, and per dollar of road and equipment cost decreased .95 cent, or 16.35 per cent. For Group 2, including the six roads operating over 1,000 miles exclusively in Western Trunk Line territory, the decrease in net operating income per mile was $421.27 and for each dollar of road and equipment cost was 1.08 cents, or 27.14 per cent. For Group 3, including 10 of the leading systems in Southwestern territory, the decrease per mile was $94.19 and per dollar of road and equipment cost was .46 cent, or 9.87 per cent, while for Group 4, including the seven roads operating over 1,000 miles exclusively in that territory, the decrease per mile was $240.27 and per dollar of road and equipment cost was .56 cent, or 14.32 per cent.

From 1901 to 1914, the exhibits showed, the net cost of road and equipment for the 41 systems increased 68.99 per cent, while operating revenues increased from $449,665,388 to $912,300,041, or 102.88 per cent, the ratio of operating revenues to cost of road and equipment from 14.96 per cent to 17.96 per cent, operating expenses from $306,383,445 to $710,013,578, or 134.68 per cent, the operating ratio from 68.14 to 78.81 per cent, while net operating income from $143,281,943 to $193,286,463, or 34.9 per cent.

The ton-miles per mile of road for the first period averaged 613,059 per year, an increase of 10.31 per cent over 1901, while for the second period the average was 709,889, an increase of 27.74 per cent over 1901. Passenger miles per mile of road for the first period averaged 78,076, an increase of 20.30 per cent over 1901, and for the second period the average was 103,959, an increase of 60.18 per cent over 1901. The average freight rate per ton-mile declined from 8.64 mills in 1901 to 8.27 in 1914. For the first period it averaged 8.55 and for the second period 8.46. The average revenue per passenger mile decreased from 2.16 cents in 1901 and an average of 2.12 for the first period, to 2.05 in 1914 and 2.03 for the second period, an average of 2.06 for the 14 years. The average tons per train mile for the first period was 266.78 and for the second 316.54, while the average tons per car mile increased from 10.84 to 11.51. The average number of passengers per train mile increased from 42.37 to 51.37 and per car mile from 8.44 to 9.69. From 1901 to 1914 the average freight train load increased from 229 to 364 tons.

Exhibits 15, 16 and 17, devoted to increased labor costs, showed a steady increase in the average daily compensation, including general officers, from $1.99 in 1900 to $2.51 in 1914, which was an increase of 26.1 per cent, the average for the first period being $2.11 and for the second $2.39. Excluding general officers, the increase was from $1.95 in 1900 to $2.48 in 1914, or 27.2 per cent, the average for the first period being $2.07 and for the second $2.36. The average for the period 1908 to 1914 was 13.3 per cent greater than for the preceding period including officers, and 14 per cent greater excluding them. Between 1900 and 1914, on the basis of the 1900 scale of wages, these carriers paid out, exclusive of general officers' salaries, $526,355,000 more for labor than they would have paid had the 1900 scale of wages been maintained. For 1914 alone this increase amounted to $85,167,085.

Of each dollar of revenue 38.25 cents was paid for labor in 1901 and 44.28 in 1914, while taxes consumed 3.20 cents out of each dollar in 1901 and 4.60 in 1914. For both labor and taxes the increase from 1901 to 1914 was 18.16 per cent. One table showed that if taxes had been paid in 1914 at the 1901 rate the roads would have saved in that year $17,628,142, or $179 per mile, and if labor had been paid at the 1900 rate they would have saved $865.11 per mile. The combined increase in labor and taxes on this basis was $102,695,000, or $1,044 per mile, 2.02 per cent of the net cost of road and equipment in 1914.

Another exhibit showed that while the cost of road and equipment per dollar of revenue decreased from $5.93 to $5.53 in the two periods and the capital stock per dollar of revenue decreased from $2.71 to $2.34, the interest paid per dollar of revenue increased from 14.69 cents to 15.01 cents, the balance available for dividends and surplus decreased from 14.76 cents to 8.19 cents and the percentage of dividends and surplus combined to stock decrease from 5.45 per cent to 3.50 per cent; and was 2.73 per cent in 1914. The percentage of total maintenance expenses to operating revenue increased from 26.69 to 29.24 in the two periods, and the percentage to cost of road and equipment increased from

4.50 to 5.29, while the average per track mile increased from $1,521 to $1,886. The increase for maintenance of way and structures was from $807.36 to $898.77 and for maintenance of equipment from $714 to $987 per mile operated.

The net cost of road and equipment per mile of line operated increased in the two periods from $44,304 to $48,775 and for 1914 was $51,584.

Exhibit 27 showed the expenditures for additions and betterments for seven years by 41 systems, classified by roads and by Interstate Commerce Commission accounts, making a total of $433,507,867 for road and general expense and $306,181,596 for equipment, $739,689,463 in all.

The total capitalization of the 41 roads in 1914 was $5,366,390,231. This compares with $5,078,293,153 for the net cost of road and equipment. The increase of capitalization over 1901 was $2,250,570,854. Of the total, 62.26 per cent was funded and other debt and 37.74 per cent stock in 1914 as compared with 53.67 and 46.33 per cent in 1901.

Exhibit 29 showed the requirements in the next seven years for refunding or financing maturing obligations now outstanding for 34 operating systems, a total of $422,822,251, of which $100,748,897 represents maturities in 1915.

DIVISION OF OPERATING EXPENSES

Exhibits 30a and 30b gave a division of operating expenses as between freight and passenger service for the 41 roads for the year 1914, compiled on six different bases, showing the percentage of net operating income in each class of service to the cost of road and equipment, dividing the operating income and the cost of road and equipment on the basis of the division of expenses. While the total percentage of return was 3.81, the percentage of operating expenses assigned to freight according to the different bases ranged from 67.06 to 68.70, while that assigned to passenger service ranged from 31.20 to 32.94. Of the operating revenues 70.33 per cent was from freight service and 29.67 from passenger service. The ratio of expense to revenue, which was 78.81 for the total, ranged from 75.14 to 76.98 for freight and from 83.17 to 87.52 for passenger service.

Statistics similar to those given in the exhibits for the 41 roads were also given for the four groups previously mentioned.

STATISTICS FOR ALL WESTERN ROADS

The exhibits compiled by the Bureau of Railway Economics and presented by Mr. Parmalee covered the operations of roads operating 130,889 miles in 1914. Exhibit 1 showed that comparing 1914 with 1908 the mileage had increased 11.88 per cent and operating revenues 12.48 per cent per mile, operating expenses had increased 14.41 per cent, net operating revenue 8.43 per cent, taxes increased 58.69 per cent, and operating income only 1.54 per cent. Interest on funded debt increased 19.63 per cent, net income decreased 28.66 per cent, and dividends declared out of income decreased 72.48 per cent on preferred stock and 25.23 on common stock. Appropriations out of income for additions and betterments increased 38.95 per cent, dividends declared out of surplus increased 22.9 per cent and the surplus for the year decreased 5.57 per cent. The ratio of operating income to net property investment in the seven years 1908 to 1914 was 4.88, 5.33, 5.22, 4.86, 4.35, 5.02 and 4.39.

Mr. Wettling was cross-examined on his exhibits by Mr. Thorne, Mr. Walter, Mr. Helm and Mr. Lamb. Mr. Thorne demanded that Mr. Wettling furnish the working sheets from which the exhibits were compiled in order that he might get certain information as to cost of road and equipment and capitalization, which he said the witness had not included for some of the roads in the group statistics. Mr. Wright at once offered to allow Mr. Thorne's assistants to copy any or all of the sheets desired. Mr. Thorne also asked for a compilation of additions and betterments charged to operating expenses, saying he thought that would result in one of the most important parts of the investigation.

E. B. Boyd, chairman of the Western Trunk Line Committee, took the stand on Tuesday and testified regarding the advances in the rates on grain and grain products.

VALUATION CIRCULARS

Secretary Thomas W. Hulme, of the Presidents' Conference Committee for the Federal Valuation of Railways, has issued two circulars dated March 1, one being a general statement of the development in the valuation work during January and February, and the other a communication with reference to the commission's order No. 7 relative to land appraisal.

In the general statement the attention of the railroads is called to the fact that the commission has adopted sample forms for reporting extensions and additions and betterments, for use in reporting improvements made after the federal forces have started their valuations. The valuation department does not, however, desire the roads to fill out such reports until their properties are under valuation.

The commission now has under consideration the issuance of orders requiring the carriers to report.

(a) Certain classes of leases;

(b) A vast amount of detail information as to prices of labor and material;

(c) Information in connection with land grants, aids, gifts, donations and concessions as required by the fifth section of the valuation act;

(d) A schedule of industrial side tracks;

(e) Inventory of records, such as minute books, treasurer's books, account books, etc.;

(f) Preparation of inventories by the carriers when so directed by the director of valuation.*

The attention of the carriers is also called to the fact that valuation order No. 9, referring to a special rate for the transportation of the cars used to house and maintain the government engineers, applies only to the movement of those cars on the lines of a carrier under valuation and then only for short distances while actually engaged in making the surveys.

To facilitate the progress of the bridge, telegraph and telephone and other federal parties, the carriers are urged to furnish motor car service where the safety of operation will permit, for which the government is willing to pay a reasonable compensation. This is already being done on a number of roads now under valuation.

The following roads have advised that they have received notice that their properties will be valued as of the dates indicated:

Ann Arbor	June 30, 1915
Atchison, Topeka & Santa Fe (Grand Canyon Line in Arizona)	during winter of 1914-15
Cincinnati, Hamilton & Dayton	date not fixed
Georgia, Southern & Florida	June 30, 1915
Maine Central	June 30, 1916
Nashville, Chattanooga & St. Louis	July 1, 1916
New York, New Haven & Hartford	June 30, 1915
Pennsylvania Railroad—	
Lines South of Philadelphia	June 30, 1915
Lines in state of New Jersey	June 30, 1916
Northern Central Ry. and subsidiaries	June 30, 1916
St. Louis Southwestern	June 30, 1915
Savannah & Northwestern	June 30, 1915
Southern	June 30, 1916

A conference will be held on March 22, between the representatives of the division of valuation, the state commissioners and the railroad companies for the consideration of a number of fundamental questions which it is now necessary to settle, as the preliminary reports are practically ready for submission to the commission on the valuation of the Atlanta, Birmingham & Atlantic; the Norfolk Southern, the Texas Midland, the New Orleans, Texas & New Mexico, and portions if not all of the lines of the San Pedro, Los Angeles & Salt Lake. Among the important questions which will be considered are the following: The form and manner in which the reports shall be presented to the commission and to Congress and the detail to be included; to what extent in determining "cost of reproduction new" reference shall be had to conditions as they existed at the time of the original construction with reference to clearing and grubbing, improvements on the property, the existence of present transportation facilities, etc.; what overhead charges shall be allowed and in what amount; the allowance to be made for appreciation; how depreciation is to be determined; how unit prices

*See Order No. 13 reprinted in our news columns.

shall be determined; how "the present value" of land used for transportation purposes is to be determined; whether or not, when the original cost cannot be shown from the books of the railroad, an estimate shall be made; whether the commission shall distribute the value of equipment between several states, and if so upon what basis; whether the value of an important terminal like the Pennsylvania station in New York shall be distributed, and if so upon what basis; what "other value and elements of value" shall be allowed for, and whether allowance shall be made for "going values," franchises, favorable locations, earning capacity, etc.

The second circular discusses the purposes of valuation order No. 7, requiring the scheduling of the lands of the different railroads and the director's instructions to the supervisor of land appraisals. It calls attention to the distinctions between land in use, land held for future use and land not held for future use, with a discussion of the manner in which each class should be handled for the purposes of valuation.

ANTI-FULL-CREW LAW CAMPAIGN

R. L. O'Donnel, chairman of the Executive Committee of the Associated Railroads of Pennsylvania and New Jersey, says that the farmers in the southern corners of Chester and Lancaster counties, Pennsylvania, are up in arms against the excess man crew law. They see the absurdity of the workings of this law. About six months ago some forty of the richer farmers of this section bought the Lancaster, Oxford & Southern Railway for $40,000. This is a little railroad with 28 miles of line. It provides the only transportation service through a country with about 2,500 population. There is not much traffic on the road; only two or three trains a day, each of which carries one passenger coach and two to five cars of freight. Under the law each train, even if made up of only two cars, must have a crew of five men; an unwarranted expense for so poor a road.

Mr. O'Donnel calls attention to the fact that the $2,000,000 a year now paid in wages to superfluous brakemen by the railroads of Pennsylvania and New Jersey, if used in purchase of 80 locomotives, would give employment for a year to 1,745 men. Of these, 894 would be in the locomotive shops. The other 851 would get employment in steel mills, at iron furnaces and brass foundries, in mining coal and manufacturing coke, in mining iron and in other lines of activity.

Should the $2,000,000 be expended in purchase of 2,000 freight cars, employment for a year would be furnished to 1,489 men; or to purchase 200 steel passenger cars, a year's work for 1,708 men.

Possibly the strongest argument that is being put forth by the railroads is that if they undermanned their trains they would be the heaviest sufferers. A freight train of one locomotive at $25,000 and 75 cars at $1,000 each would represent $100,000 in rolling stock. Is it reasonable to assume that a railroad would jeopardize the safety of that great capital investment to save $2.75, the wage of an extra brakeman?

Mr. O'Donnel calls attention to the fact that in the passenger service as many as twenty men, including the dining car crews, are on some trains. These dining car men could be requisitioned into outside service in emergency. On the Pennsylvania Railroad's "St. Louis Express," comprising eight cars, there are six railroad trainmen and a Pullman crew of six, making twelve. The "Lackawanna Limited" of eight cars carries six railroad trainmen and five Pullman men. The "Royal Limited," operated by the Baltimore & Ohio and the Reading with six cars, is crewed with six railroad and four Pullman men.

The railroad contention is that four men outside of the engine are not required to safely and efficiently operate such trains as the following: The Reading coal train running through without stops, except for water, from Bridgeport to Port Reading, on New York harbor; the Pennsylvania Railroad fast freight running on schedule from Harrisburg to Philadelphia, and the New Jersey Central fast freight from Jersey City to Allentown. These trains average about thirty-five cars. The point is made that the work to be done in connection with the operation of these trains is virtually nothing during their runs. These trains run entirely under control of block signals and interlocked switches.

Public sentiment as expressed by the newspapers overwhelmingly favors repeal of the "excess man crew" laws. Editorials to the number of 199 have so far come to the attention of the committee. They group the newspapers on the proposition as follows:

For repeal	162
Against repeal	10
Neutral	27

From Harrisburg it is reported that members of the legislature have received literally thousands of letters, aside from petitions signed by great numbers of people, urging them to take quick action for repeal of this law.

The Westinghouse Air Brake Company has made a statement in reply to assertions of trainmen's representatives at Harrisburg that the excess man on freight trains is necessary because long trains cannot be successfully and safely handled by air brakes, calling attention to the fact that traffic is handled successfully every day in all parts of this country in train units of 100 cars and more. Some senators and representatives, seeking to be intelligently informed, have had the workings of air brakes demonstrated to them.

Figures have been prepared which show what it costs to carry an unnecessary man on a train. For example, the excess man on the Broadway Limited, the fastest train over the Pennsylvania between New York and Chicago, makes an added operating cost of $2.566 a year for that part of its run between New York and Pittsburgh. That amount is the wages at $7.03 for each trip. At no time does this high speed, virtually no-stop train, have less than nine men on it, not counting the engineer and fireman. Between New York and Pittsburgh it makes only three stops. Very rarely does any member of the train crew have to leave one of these through trains except at the regular stops, and there, with assistance of the Pullman men, only to see passengers get on and off in comfort. Since the laws became effective in Pennsylvania a total of $4,842,801 has been paid for the superfluous men, and in New Jersey, where the law became effective May 1, 1913, $642,676 has been paid, making a total in the two states of $5,485,477.

In Pennsylvania resolutions for repeal have been adopted by the Philadelphia Bourse, the Pittsburgh Chamber of Commerce, the Commercial Club of that city, which has a membership of 1,100; the Philadelphia Milk Exchange and by farmers' organizations of Union county and other parts of the state. A referendum vote on the proposition being taken by the Williamsport Board of Trade has so far resulted 155 to 6 in favor of repeal.

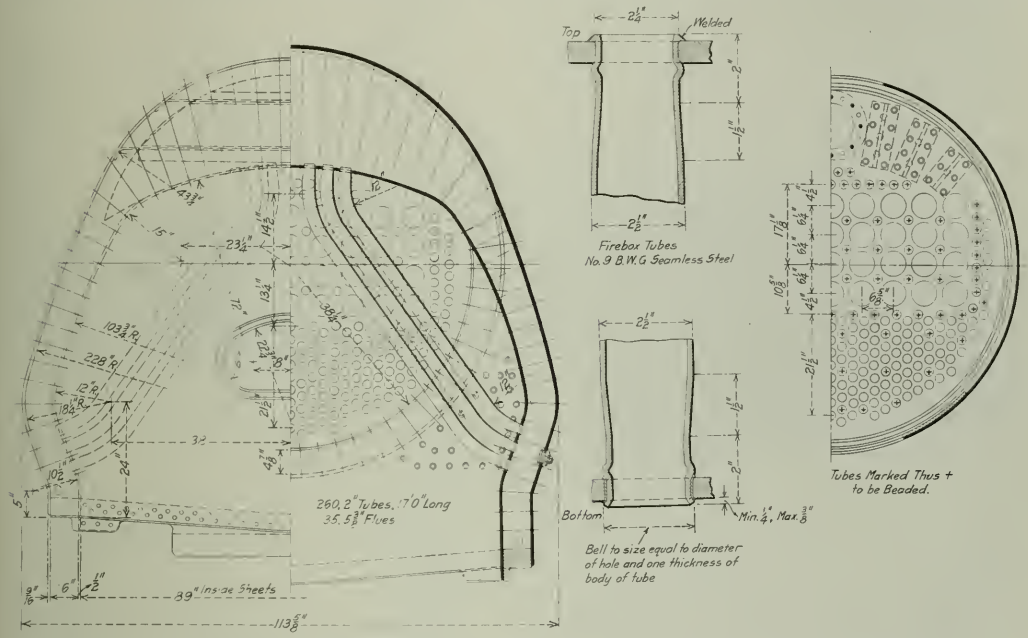
In New Jersey emphatic action has been taken for repeal by resolutions passed by boards of trade and chambers of commerce in such chief cities as Newark, Paterson, Passaic, Jersey City and Trenton; and the committee announces that, with the active support of chambers of commerce, the railroads have caused to be introduced at Trenton a bill to repeal the New Jersey law. This bill contains a proviso giving the State Public Utilities commissioners full power to determine the number of trainmen or other men to be hired to operate passenger trains composed of more than three cars and freight trains composed of more than six cars.

The presidents of the ten principal railroads in the state of New York have presented to the legislature a protest against the full crew law of the state, and asking the legislators to support Senator Conkling's bill, now under discussion, to repeal the present statute. The railroads declare that the burden imposed on them by the full crew law in New York has amounted to $1,170,000 a year.

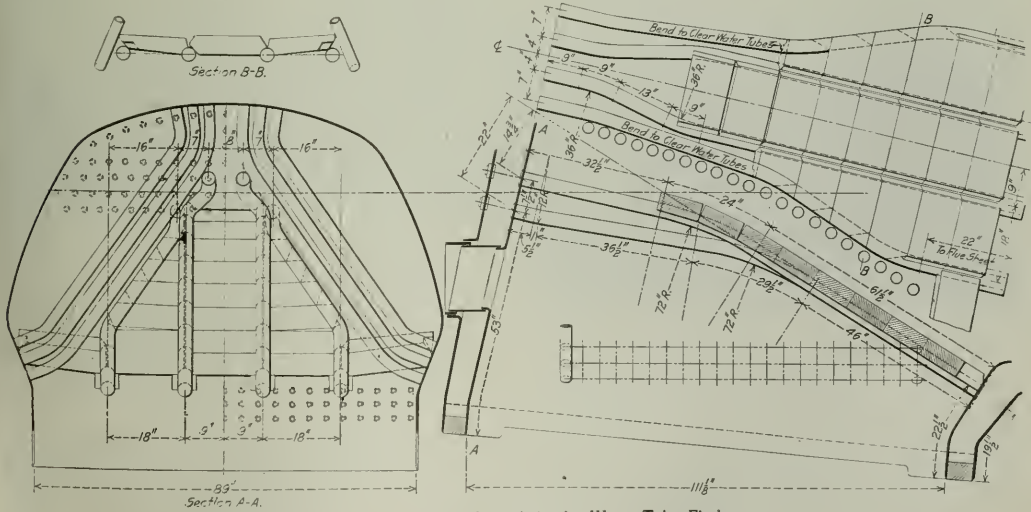
LACKAWANNA LOCOMOTIVE WITH WATER TUBE FIREBOX

In December last the Delaware, Lackawanna & Western received from the Lima Locomotive Corporation a Pacific type locomotive similar to those described on page 657 of the *Railway Age Gazette* for October 9, 1914, but equipped with a special type of firebox, patented by S. S. Riegel, mechanical engineer of the Lackawanna.

Reference to the drawings will show the construction in detail. As will be seen there are two nests of water tubes with 66 2½ in. outside diameter tubes in each. The cross section of the firebox shows the shape to which the side sheet is bent in order to permit a satisfactory connection between it and the lower ends of these water tubes, the bottom row of which is about 15 in. above the mud ring at the front end. The tubes are spaced at 4 in. centers and swing upward across the firebox space to the crown sheet, in which the ends are inserted. Plugs for cleaning purposes are placed opposite the ends of the tubes in the outer shell sheets, both top and bottom. The method of securing a tight



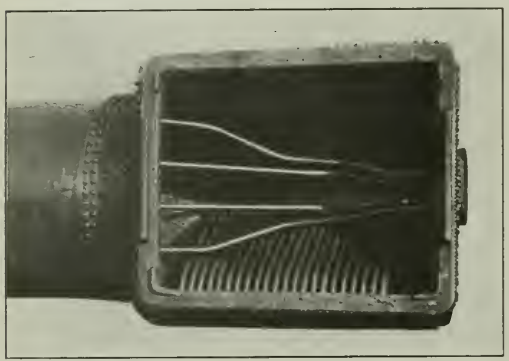
Cross Section Showing the Arrangement of the Tubes in the Firebox; in This Engine the Tubes Are Not Welded as Indicated



Arrangement of the Brick Arch in the Water Tube Firebox

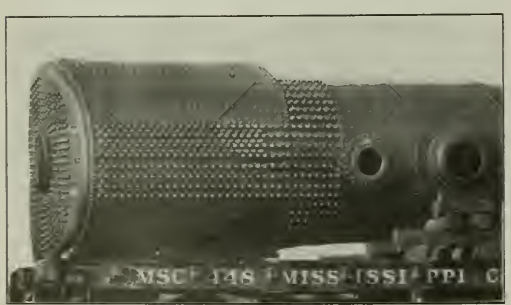
joint in the two sheets is shown in the drawing of the boiler cross sections, but in this instance the water tubes are not welded in as shown on the drawing. Instead they are prossered, belled and beaded and set without ferrules in the top sheet, while the bottom ends are set with a ferrule, prossered, expanded and belled. These tubes are made of seamless soft steel, tested to 2,000 lb. per sq. in. hydraulic pressure before application.

These water tubes give a heating surface of 471 sq. ft., the total heating surface of the boiler being 494 sq. ft. greater than that of other locomotives of the same class. The total heating surface for the engine with the experimental boiler is 3,960 sq. ft., while that of the sister locomotives is 3,466 sq. ft.; this does not include the superheater surface of 740 sq. ft. In the experimental engine the heating surface of the firebox and combustion chamber is 288 sq. ft., while that of the engines of the same class is 267 sq. ft.; the tube heating surface for the experimental engine is 3,177 sq. ft., the same as that of the sister engines. A special application of the Security brick arch was made to the water tube firebox.

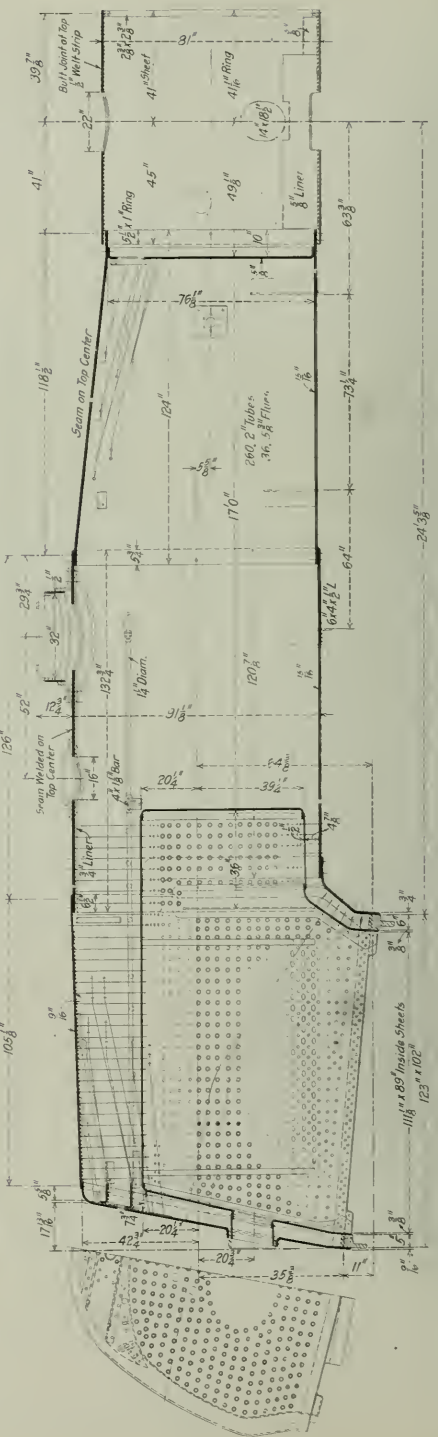


Interior of the Firebox Showing the Water Tubes and Arch Tubes

The object of the water tube construction was to obtain an improved circulation by providing definite cycles of circulation through these tubes in the zones of greatest heat intensity as well as to locate the heating surfaces to greatest advantage. While the locomotive has not so far been in service long enough to permit of any definite results being obtained, the performance has been so satisfactory with both bituminous and anthracite coal that the Lackawanna is ordering another engine fitted with this boiler, for use exclusively in fast passenger service. Considerable valuable information has been obtained showing its performance in comparison with the sister engines, and it is be-



Firebox Showing the Plugs in the Roof Sheet Opposite the Upper Ends of the Water Tubes

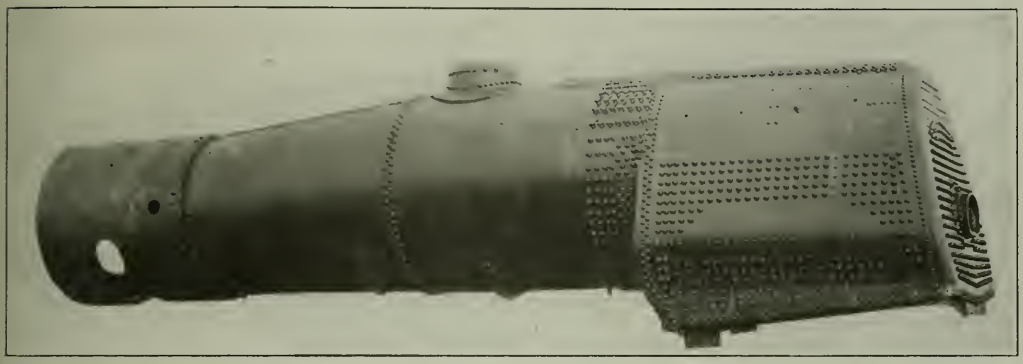


Water Tube Boiler of the Lackawanna Pacific Type Locomotive

lieved that this type of boiler will be an entire success. Further tests are being conducted, and it is expected at a later date that interesting performance data will be available. While some of the data given in this article may differ from other published accounts, it is official and authentic.

A few of the principal dimensions are given in the following table:

Class	4-6-2
Gage	4 ft. 8½ in.
Diameter of driving wheels	69 in.
Tractive effort	43,200 lb.



The Water Tube Boiler of the Lackawanna Pacific Type Locomotive

Cylinders	25 in. by 28 in.
Weight on leading truck	50,000 lb.
Weight on drivers	189,600 lb.
Weight on trailing truck	58,000 lb.
Total weight of engine in working order	297,600 lb.
Coal capacity of tender	10 tons
Water capacity of tender	9,000 gal.
Total weight of tender loaded	165,500 lb.
Total weight of engine and tender	463,000 lb.
Rigid wheel base	13 ft.
Wheel base of engine	33 ft. 10 in.
Wheel base, engine and tender	66 ft. 4 in.
Boiler pressure	200 lb.
Grate area	69 sq. ft.
Diameter of boiler	78 in.
Firebox	89 in. by 111 in.

Pacific Type Locomotive on the Lackawanna, Fitted with a Boiler Which Has a Water Tube Firebox

Factor of adhesion	4.39
Water tubes, diam., gage and length, 2½ in., O. D.; seamless steel; No. 9; 6 ft. average	
Heating surface, firebox and combustion chamber	288 sq. ft.
Heating surface, water tubes	471 sq. ft.
Heating surface, fire tubes	3,177 sq. ft.
Heating surface, arch tubes	24 sq. ft.
Total heating surface of firebox	783 sq. ft.
Total heating surface	3,960 sq. ft.
Superheater heating surface	740 sq. ft.

Excavating on the Panama Canal.—During January a total of 1,163,255 cu. yd. of excavating was done on the Panama canal—15,922 yd. by dry excavation and 1,147,333 yd. by wet excavation. To February 1, 1915, the total canal excavation by Americans was 230,262,028 cu. yd.

WAR BONUS FOR ENGLISH RAILWAYMEN

A large proportion of the conciliation board settlements between the English railways and their "wage-earning employees engaged in the manipulation of traffic," would have terminated on or about January 1. The National Union of Railwaymen and the Associated Societies of Locomotive Engineers and Firemen had already drafted new demands and asked principally an advance in wages of 5s. ($1.25) a week. The war stopped negotiations, but other negotiations between the men and a committee of general managers were completed on February 19 and 20, which call for large increases in the form of a war bonus.

A bonus of 3s. (75 cents) a week is paid to all employees 18 years of age and upwards, embraced in the conciliation scheme, whose standard rate of wages is under 30s. ($7.50), and 2s. (50 cents) to employees whose standard rate of wages is 30s. or more; the first payment was made in the week commencing February 15. The arrangement is to remain in force during the continuance of the present agreement between the government and the railways, but is subject to review at the end of three months. When notice is given by the government to terminate its control of the railways the latter are to give not less than two weeks' notice to the railway men to discontinue the bonus.

There will be an extension of the basis on which men in the various services will be admitted to the conciliation scheme, so that increases will also be made to the engine terminal forces and the signal and maintenance of way employees.

It is also expected that the Scottish railways and certain of the English lines not included in the conciliation scheme will make similar increases, and it is not unlikely that something will be done for the shop men, clerks, etc. The Railway Gazette (London) has estimated that if these services be included the total advances in wages will aggregate not less than $16,000,000.

ARBITRATION OF ENGINEERS' AND FIREMEN'S DEMANDS

Rebuttal testimony on behalf of the engineers and firemen was begun before the board of arbitration at the hearing at Chicago on March 2 by W. J. Lauck, statistician for the brotherhoods. Mr. Lauck introduced as exhibits voluminous pamphlets on the past financial management of the railroads, intercorporate relations, interlocking directorates and concentration of financial control, including a large number of extracts from the reports of the Pujo commission. Mr. Lauck also brought in the land grants to western railways by the government. He said that the decline in railroad credit was due largely to the fact that their managers had been talking hard times. Arbitrator Nagel asked the witness if he thought business was in a sound condition. "No," replied the witness. "Then," said Mr. Nagel, "the railroads are justified in saying that business is bad, and to that extent you would have to revise your statement."

One exhibit reported to be a recapitulation of the physical operations of 10 of the most important western roads from 1900 to 1910, consisted mainly of extracts from reports of investigations. Mr. Lauck claimed that the aggregate bonuses to stockholders of these roads in 10 years amounted to $250,000,000, and said that this system of financing imposes an unwarranted burden on the productive efficiency of the roads. A large number of the witnesses' statements were qualified after questions by Mr. Nagel and by W. L. Park and H. E. Byram, the railroad representatives on the board. "My chief contention," said Mr. Lauck, "is that the tendency to increase capitalization against the future earning power of the railroads is a tax upon its productive efficiency and tends to prevent proper participation by labor in the profits." "Don't labor's claims come first?" asked Mr. Byram. "You have to pay your operating expenses first, of course," admitted the witness.

On March 4 Mr. Lauck introduced records of investigations of the St. Louis & San Francisco and the Rock Island. Grand Chief Stone, of the Brotherhood of Locomotive Engineers, explained that these were not selected because of any grudge against them, but because the data were at hand.

"Personally, I wish you had taken some other roads," said Mr. Nagel, "because I have heard these records so often they have lost their novelty." Mr. Lauck spoke of the unwise acquisitions of subsidiary companies by the Frisco, many of which, he said, were unprofitable.

After Mr. Lauck had said the employees did not reap any of the profits of the Frisco financial deals, Mr. Nagel said neither did they share any of the losses.

"I know that a lot of this stuff is an old story to most of us here," said Mr. Stone, "but there are 65,000 men running engines in the West who will be very much interested in reading it. It will prove to them that an honest effort was made to do everything that could be done to win their case. Of course the railroads want to shut out the effect of financial mismanagement."

"As the representative of 98 railroads I here and now request that this board will not shut out anything Mr. Stone thinks is of the slightest interest to the members of his organization nor which he may think has the least value," said James M. Sheean, counsel for the railroads. "We have not made any objection whatever to anything you have offered. We have contended from the first that the wealth or poverty of a railroad does not affect the question as to what constitutes a fair wage for employees."

"We have let so much of this stuff in that I suppose we will have to continue it," said Mr. Nagel, "but an immense amount of testimony has been presented in this case which should have been eliminated."

Mr. Lauck said he did not believe shippers would oppose an increase in freight rates to pay higher wages to engineers and firemen. Mr. Sheean promptly asked him: "How do you reconcile your statement with the fact that in this city right now before the Interstate Commerce Commission organizations of shippers are opposing the application of the railroads for an increase in freight rates aggregating only about $10,000,000, while before this board of arbitration the same railroads are opposing your demands for an increase in wages of $41,000,000 for the engineers and firemen alone; that is four times the amount of the proposed freight rates increase?"

RATIONAL GOVERNMENTAL REGULATION*

By Hon. Oscar W. Underwood
United States Senator from Alabama

The money invested in American railroads exceeds the public debt of the greatest four nations in the world; and the wages paid to employees is nearly as large as the pay of the armies fighting in Europe, and the public in the end must pay every dollar required for the maintenance and operation of the railroads. The prosperity of the country must languish if the railroads fail to perform their functions successfully.

We have undertaken the problem of governmental regulation, and the government will not turn back. Regulation of practices and rates is here to stay. But let us stand for wise and just regulation. Revolutions never move backward. If governmental regulation is unable to solve the vexed problems that confront us the people will accept government ownership as the next step ahead. It is therefore a matter of great importance that we should endeavor to reach a fair and reasonable solution of the problem of regulation at as early a day as possible.

It is of the highest importance that no unnecessary roads be built in future and that only those be extended and developed which are best adapted for their function. Low rates and adequate facilities are demanded by the public, but the granting of one is often the denial of the other. If a corporation earns more than an adequate income, the rates may be regulated, but if the revenue is not a fair return on the invested capital, the government is powerless to act. The matter of dividends is today a very small part of the question; the public must be interested in the items that make up the operating expenses of the railroads if it desires both adequate facilities and reasonable rates.

Public control has reduced rates and abolished unjust discriminations, but the greater problem remains unsolved. Can the money be provided to expand and develop these great public works in a manner commensurate with the expanding needs of our commerce under the present system of government control? We must give all credit to the present system of regulation for the accomplishment of much good in the service of the public; but those who are studying railroad problems must admit that it is breaking down in so far as it has supervised the finances of our railroad system so that credit may be maintained.

If railway investments cannot be made attractive to capital, is not the nation threatened with an inevitable breakdown of its transportation system? There is no more difficult problem ahead of us than the transportation problem, and no more inviting field for the exercise of true statesmanship.

Let us inspire courage and give aid to those leaders who, not by chance, but through merit, direct our industry, control our trade, and manage our finance. It is not enough for our government to permit them to rise from the prostration that has overtaken them and their affairs; it must occasionally assist them. We have reached the point where sound progressivism must recognize that the proper regulation of business requires that it must be sometimes helped and not always hindered, that we must occasionally say "You may," and not always "You shall not." We need only to permit railways, traders, and bankers that economic freedom which is consistent with a wise and helpful regulation of all affairs and to give every citizen the national protection to which he is entitled wherever he may rightfully be, at home or abroad, for our trade to gain its lost position and our flag to be seen on every sea.

*Extracts from an address before the Sphinx Club, New York, March 9.

Factors Influencing Fuel Economy in Locomotives*

Effect of Design, Maintenance, Handling at Engine Houses, the Operating Department, Quality of Fuel, etc.

By M. C. M. Hatch
Superintendent Fuel Service, Delaware, Lackawanna & Western

During the year ending June 30, 1913, there was expended for fuel supply on American railroads the sum of $241,598,314, this amount being 11.4 per cent of the total operating expense. The tonnage equivalent was, approximately, 130,000,000 tons. A generally accepted figure of 20 per cent is allowed for stand-by losses on the road, in the engine house, en route from cars and tenders, waste at pops, etc. Assuming that this is correct, we have then 80 per cent of the total amounting in value to $193,000,000 being put through our locomotives yearly, while doing useful work. The thermal efficiency of the modern locomotive is in the vicinity of 5.5 per cent so that, if fully utilized the cost of fuel for doing the work calling for nearly two hundred millions would be about $11,000,000, the tremendous difference being made up of wastes, both avoidable and unavoidable, which do not, actively, move a ton of freight or a passenger. A heat balance will show about where these losses, so far as the boiler is concerned, occur and from analyses of recent tests on modern power, the following balance has been made:

Loss	Per cent
Combustible present in ash	6.00
C O	1.20
Sparks and cinders	6.30
Heat rejected at stack	†3.00
Radiation and unaccounted for	†1.00
Total loss	37.50
Utilized by boiler and superheater	62.50

Between the boiler and the application of the power at the rail, there are other losses of great magnitude, which reduce the over-all performance to the comparativcly small figure of 5.5 per cent. Of these losses the most important, as well as the most difficult of reduction is the heat rejected from the engine cylinders at the exhaust. With all steam engines, but especially with those of single expansion, non-condensing design, this thermal waste occurs and hardly appears to be susceptible of much reduction.

We may state, under seven general heads, the factors which exercise control over the fuel consumption of locomotives. These are: (A) Design; (B) maintenance; (C) engine house attention; (D) fuel; (E) operating department; (F) engineers, and (G) firemen.

(*A*) *Design.*—In attacking the design of a locomotive there are certain known factors, such as limiting wheel loads, right-of-way clearances, topography of road, class of service, power to be developed at the drawbar, etc., upon which to build, as a foundation. In the first survey of the problem we will be able to determine wheel and cylinder size and boiler pressure. From these the maximum horsepower output to be expected of the engine becomes known. The boiler should supply steam sufficient to hold the engines up to this horsepower delivery, if most satisfactory results are to be obtained. Boilers of 100 per cent capacity, and even considerably more powerful, are now the rule. The use of combustion chambers in large power boilers would seem to be advantageous, increasing firebox heating surface and volume, and shortening what might otherwise be excessive tube length. A ratio of tube length divided by inside diameter of 110 to 1 would, from present information, seem to be as far as we should go and a reduction to 100 to 1 may prove, in service, to be more satisfactory.

The design of the cylinder as regards clearance volume and ratio of stroke to bore will affect the water rate and, hence, the coal pile. Piston speed should not exceed 1,500 ft. per minute at the calculated maximum speed, equivalent to diameter of wheel in inches. The piston valve may be of small diameter, especially with superheated steam. One road is now using a 12-in. valve in all classes of power and this, if trouble is not experienced with the valve rings, would seem to be a step in the right direction. A small valve means a light valve and a light valve means much reduced stress on the valve motion, especially at high speed.

The front-end should develop the needed vacuum at the front tube sheet with the least possible back pressure on the engine pistons. To arrive at this result, the gas friction within the front-end itself must be reduced to a minimum by providing ample netting areas, unrestricted gas passages and by eliminating, so far as possible, abrupt changes in direction of gas flow.

The grates should have as large percentage of air openings as can be obtained without loss of fuel through them. They should be well fitted to their bearers, and these again to the sheets to preclude the loss of fuel at these points. Dump grates when employed should be placed at the back of the box to make impossible an influx of cold air against the flue sheet, when used on the road.

Ample air inlet openings under the fire are a prime necessity. Tests, however, show that if, with the ordinary pan, 14 per cent of the grate area be allowed for air inlet area with bituminous coal and 8 per cent with anthracite, further increases of area, within reasonable limits, will have very little effect on the ash-pan draft. With bituminous burning switching engines it may be best to reduce the 14 per cent allowance somewhat, in order to prevent too much waste of steam through the safety valves, but in general the figures given will be found satisfactory.

The efficient locomotive should have a high-degree superheater, a brick arch, a power operated firedoor to relieve the fireman of unnecessary work and to encourage him in light and frequent firing, some means of handling the valve motion other than the time honored lever, so that the engineer may work his engine to the best advantage without fear of his life and good injectors so that the man is not tempted to carry too much water in the boiler for insurance against injector trouble. Cab decks and aprons should be designed with a view towards eliminating fuel losses from the engine when in service. A cab arrangement, convenient and safe for the crew, will also influence the operation of the locomotive for the better.

(*B*) *Maintenance.*—The well designed locomotive is capable of giving the best operating results only so long as maintenance is followed up. This means proper back-shop and engine-house facilities, the latter being very important. The road which has a first-class main shop, but is deficient in means for taking care of the necessary running repairs at its engine houses will find its unit locomotive repair cost higher as the engines go through for general repairs than will one whose main shop is perhaps not so elaborate but which is better organized at engine division points to keep up the day-to-day repairs. The importance of proper reports from enginemen is great. The bald statement on the work book that the engine is blowing is no great encouragement to the overworked engine house foreman to start on a tour of exploration through cylinders, main valves and by-pass valves. The report should state, fully and definitely, what is wrong and should be made out immediately on reaching the house. One of the most satisfactory ways of handling this matter is to have a clerk to whom the engineer as soon as he has registered in, dictates his list of troubles, which are reread to him, or by him, and signed. Every endeavor should be made

*Abstract of a paper read before the New England Railroad Club, February 9, 1915.

to make the repairs before the engines again go out, the spirit of "Well, I guess she'll hold together for another trip," being an expensive one and productive of engine failures. The tendency, when an engine is turned in as "not steaming," is at once to reduce the nozzle size. This should be the last resort, especially if steam has been made satisfactorily with the original nozzle, as we are at once imposing additional work on the engines when the exhaust area is reduced.

(*C*) *Engine House Attention.*—The treatment of locomotives at terminals, aside from repairs is important. When fires are cleaned the men must be taught to waste as little live fire as possible to the ashpit, the blower must not be used harder than is necessary to keep the smoke and gas out of the men's faces and the pump should be shut off to keep the ashes and dust out of the air end and also to save the flues from cold air, which the pump exhaust will draw through them. If the engine is to stand in the house for a period of 36 hours or more it will generally be cheaper to dump the fire on its arrival. If engines are kept under steam the fires should be bright and alive next the tube sheet but with the back end pushed ahead and the back section of grates bare. With this method the fire doors may be kept shut, not allowing smoke to fill the cab, and the engines will stand for a long time without attention, never gaining steam enough to open the pop, but holding plenty to work the injectors, move the engine at short notice or for any other practical purpose. Another good feature of this method is that, when the fire is being prepared for service, the back half is practically clean, as coked coal from the front of the grate is merely pulled back to cover the grates which have been bare. A saving can often be effected in fire building if a careful analysis of the situation is made. Flue blowing must be followed up and pains taken to see that the work is done properly, and tanks must not be overloaded at coal chutes.

(*D*) *Fuel.*—The New England roads must import their entire supply and the matter of transportation rates influences largely the locality and hence the kind of coal purchased. Other roads, differently situated, may have little or no concern with this phase of the problem; for instance, the Lackawanna gets its entire passenger engine supply from a point on its main line of fairly central location. This fuel, anthracite, would be prohibitive in cost on a New England road.

Bituminous coal, no matter where obtained, should be required to run of uniform quality; it should be low in ash and sulphur, of a medium volatile content and, when run-of-mine, as is generally the case, not over 50 per cent in slack. It may pay, under some conditions, to buy screened coal, but generally run-of-mine will be satisfactory. It would seem that the ideal way to purchase coal would be under specifications, but few, if any, roads follow this practice. A run-of-mine specification could, however, be drawn up on an ash, sulphur and slack basis which would not be oppressive to the operator and yet would safeguard the consumer's interest satisfactorily. We buy about everything from corn brooms to locomotives on specifications, rigid and unchangeable, but our coal, so long as it is black, generally goes unchallenged for we have nothing definite to challenge on. The department making the purchase should consult with the mechanical department to determine the most suitable fuel which it is consistent to procure. One further point in this connection is that of check-weighing the coal as received, comparing actual scale weights with the bill weights, from which they will be found sometimes to differ materially.

(*E*) *Operating Department.*—The train operation of a railroad influences the coal consumption very materially. To merely mention certain points, overloaded trains requiring an excessive length of time between terminals and unreasonable working of the engine; poorly made meeting points necessitating long delays en route; failing to give inferior trains all possible time ahead of delayed superior trains; failing to pay due respect to the topography of the road when laying out regular train schedules; failing to lay out meeting points to bring them at the most advantageous points regarding profile; stopping trains unnecessarily for orders or any other reason; calling engines unreasonably long before they will be needed; calling helper engines when not needed and neglecting to call them when they should be used; locating water plugs without due regard to road conditions; all these and more eat into the coal pile and can generally be classed as unnecessary wastes. The practice of having despatchers put in a trip or two monthly over the road, riding drag freights and other trains which are apt to be unduly long en route would seem to be a very good one, as in no other way can such a clear idea of actual conditions be brought home to these men, whose business is to keep the cars moving. The operating department is a fertile but little cultivated field in which much can be done to increase fuel economy.

(*F*) *Engineers.*—The right side of the cab is no mean factor in this discussion. A careless or ignorant engineer can just about nullify all the efforts of the designer, shop and engine house forces, fuel agent, operating department and fireman. He will work his engine with light throttle and long cut-off when it will do better with the throttle open and the lever back a few notches, and vice-versa. He will start with a spasm of slipping which will turn the well prepared fire bottom side up. He will pump his boiler full and then shut off the injector and run away two gages before putting it on again. He may do many more things which should not be done and leave undone many which should be done, the net result being wasted coal. Our good engineers, of whom we must thank our stars we have so many, are coal and money savers for the company, and must have their just recognition as such.

(*G*) *Firemen.*—There is too much tendency to tell a fireman going out on some engine whose boiler is in poor condition and with an engineer who uses only the lowest notch on the quadrant and who believes he should have a full glass all the time, to fire light and often, and then to proclaim that strenuous efforts are being made to effect fuel economy. I believe that of the enormous total savings which can be made in the fuel bills of the railroads of this country, the firemen can not effect more than 20 per cent of the aggregate at the outside. If we will educate these men, as we must the engineers, and then do our share by paying all possible attention to the points elaborated under the foregoing heads, the firemen will take care of themselves. No man will shovel a scoop more of coal than he has to because of circumstances over which he has no control, assuming that he is properly instructed. This is not to be interpreted as meaning that all firemen are doing their best, for such is not the case. It does mean, however, that in the writer's opinion, this part of our problem would be very easy of solution were the others solved satisfactorily and permanently.

Now to what does the foregoing lead us? It is hoped that by its study we will be able to analyze the individual losses we must combat, indicate the responsibility for each, and so be able to make an intelligent attack upon the whole problem. Such an analysis is given below, the factors responsible for each loss being referred to by letter.

Combustible in Ash

A—Faulty grate-work design.
B—Improper grate maintenance.
C—Improper fire cleaning.
D—Coal which clinkers instead of burning down to ash.
E—Engines called for service and not used.
G—Fires brought in not burned down sufficiently.

Carbon Monoxide

G—This loss is generally up to the fireman, a fire too heavy increasing the *CO* percentage. Usually the total loss in this regard is small, many analyses of smoke-box gases showing but a trace of this gas. Proper firing will entirely take care of this. Insufficient air admitted under the fire will, however, militate against the best performance.

Sparks and Cinders

A—Restricted grate area or anything in the design which will run the fuel rate too high. Brick arch not used.
D—Fuel too friable or too high in slack.
E—Schedules arranged or trains loaded so that engines must be worked unreasonably.
F—Working engine harder than necessary. Slipping.

G—Too heavy fire. Carelessness in placing coal in firebox. Firing fine soft coal, dry.

Heat Rejected at Stack

A—Boilers so designed that heating surfaces are insufficient or inefficient to absorb all heat possible. Insufficient air admitted to the fire.

C—Principally through failure to keep heating surface clean, scale and soot being excellent insulators.

Radiation and Unaccounted For

A and B—The radiation losses are probably small and can be reduced to a minimum by proper use and maintenance of covering materials.

G—Probably the greatest loss of those unaccounted for is that of unconsumed hydro-carbon gases, such as methane or marsh gas and ethylene or olefiant gas passing out of the stack. This loss is occasioned by improper firing, generally too heavy, liberating greater volumes of gas than can be properly mixed and burned in the firebox. A brick arch will remedy this, acting as a very effective mixer. Smoke is an indication of this condition (although the loss may be present without smoke) as the carbon thus made visible is evolved from the hydro-carbons volatized in the firebox, but not properly burned.

The above items take care, in a general way, of boiler losses and from this we come to the engines. As has been said, the greatest loss here is by heat rejected at the exhaust and this, with a simple engine, cannot be much reduced. Compounding will, however, reduce this loss materially and the writer believes that it will ultimately return to favor.

Stand-by and general losses can be reduced by proper loading of coal on cars at the mines and on tenders, by elimination of water and steam leaks, by keeping the pops closed, by getting trains over the road as expeditiously as possible, etc.

It will be seen that the subject of fuel economy is influenced by and influences every phase of railroading. It is larger than any man or group of men. The labor of every man who, *in any way* has to do with getting trains ready for the road or over the road is reflected in the fuel bill.

DISCUSSION

R. D. Smith, superintendent motive power and rolling stock, Boston & Albany, suggested that some means was needed of letting the engine crews and fire tenders at roundhouses know at the time just what they were doing. The results of weighing coal as it is delivered to the tenders are from 40 to 60 days late, while with some device for counting the scoops of coal put into the firebox the amount of coal used could be very closely arrived at by computation at the end of each trip.

H. C. Oviatt, assistant mechanical superintendent, New York, New Haven & Hartford, said that much good would result if a fuel efficiency committee were organized on each division, according to the plan generally followed in promoting safety.

It was also brought out that considerable improvement might be effected by more systematic and careful attention to the early education of the fireman, in order that he might form correct habits at the outset.

FEDERAL INSPECTION OF LOCOMOTIVES AND TENDERS

The bill, H. R. 17,894, amending the Boiler Inspection act of February 17, 1911, so as to give the Bureau of Locomotive Boiler Inspection the same powers and duties in relation to the entire locomotive and tender that it now has in relation to the locomotive boiler, has been passed by Congress and approved by the President, and goes into effect September 4, 1915. The second section of the act requires that all inspectors and applicants for the position of inspector shall be examined at once touching their qualifications and fitness with respect to the additional duties now imposed. Section 3 provides that this act shall not be held to alter, amend, change, repeal or modify any other law or any order of the Interstate Commerce Commission issued under the safety appliance acts.

In the case of the Boiler Inspection act it was required that rules governing inspection be filed by the railways three months after the passage of the law, and it is understood that the chief inspector will set a similar limit now, that is, on or before June 4 next. The Special Committee on Relations of Railway Operation to Legislation has issued Circular No. 69 to the railways calling attention to the passage of the act, which says in part:

"Inasmuch as the time within which the rules and regulations for the inspection of locomotives and tenders must be filed by the chief inspector of locomotive boilers is very short, it is deemed advisable immediately to call your attention to the alternative courses possible under the act. The important matters are: First, character of the rules and regulations themselves. Second, question as to whether uniform rules and regulations are necessary and advisable.

"When the Boiler Inspection Law was enacted in 1911, its terms were a matter of mutual agreement as between the railways and employees. For this reason, when the formulation of rules and instructions was under discussion, the utmost degree of co-operation was shown by all concerned, and the rules and regulations which were presented to the Interstate Commerce Commission jointly by the chief inspector of locomotive boilers, representatives of the employees and representatives of the railways, possibly went beyond the action necessary under the law, in that these rules and regulations not only covered the matter of inspection, but also dealt with certain standards of construction and workmanship, a deviation from which, it was agreed, caused the boiler to come within the prohibition of the second section of the Act as technically unsafe.

"In view of the extension of the boiler inspection act to all parts of the locomotive and tender, involving an enormous number of parts, and inevitably presenting a great number of controversial questions, it is of immediate importance that the railways consider whether, under the law, it is possible to confine the rules and regulations to the subject of inspection alone; and, if not, the extent to which it will be necessary to go in setting up standards of safety under the varying conditions of the service.

"As to the second question—the filing of the rules and regulations themselves—three courses of action are open: First: For the individual roads to file their rules, which do not become obligatory until they have been approved by the Interstate Commerce Commission after hearing. Second: For the roads to agree among themselves, and file one set of rules, expressing their own views. Third: For the roads to go into conference with the chief inspector of locomotive boilers, and agree, if possible, with the government on a standard set of rules, as was done in the case of the Locomotive Boiler Inspection Law."

UNDERGROUND WIRES ON THE PANAMA RAILROAD

The Panama Railroad, at an expense of about $450,000, has put its telegraph, telephone and signal wires underground throughout the length of the road (47 miles); and W. H. Fenley, superintendent of telephone and signals, has sent us an interesting account of the laying of the vitrified clay duct for the wires, from which we take the following paragraphs:

A committee was appointed in December, 1912, to review the plans for the proposed transmission line across the isthmus, and among other duties, it was to formulate a report on transportation and electrical problems as affected by the presence of the track span bridges, carrying the 44,000-volt, three-phase, 25-cycle transmission circuit, which conveys the power for working the locks of the Panama Canal. The telegraph and telephone circuits were formerly carried on 20 open wires supported on iron poles. Physical interference was offered to the transmission line by the telephone-telegraph circuit. Electrical interference to the telephone-telegraph system was a known factor, as an unbalanced condition on the non-transposed, 44,000-volt line, with its apparent load of 50.5 amperes per wire, would theoretically set up inductive disturbances that would undoubtedly destroy telephone communication. In addition, there was a hazard to employees, due to the static stresses, in the event of a break in the

high-voltage wires, or a cross between the two leads, due to an aerial ground wire breaking.

It was impossible to remove the telephone-telegraph wires a sufficient distance from the high-tension transmission line to prevent inductive disturbance, so cables were considered. The signal circuits had to be tapped so often that it was not feasible to have them in the same cable with the telephone-telegraph line, so it was decided to use two cables. On account of the long span between the track bridges, their use as supports for the cables would have been very expensive. Armored cables buried in the ground are difficult to splice and tap; they are also subject to mechanical damage and to possible chemical soil reaction, so this type of construction was also discarded.

By a process of elimination, therefore, it was decided to use multiple-clay duct, and to draw the cables into it. Fibre duct was not used, because of the possibility of distortion on account of moisture; and the fact that the extreme heat might cause

Wire Duct, Panama Railroad

the impregnating compound to ooze out before the duct was placed in the excavation. In deciding on the size of the duct, the situation was canvassed to see if any outside parties desired to lease a duct across the isthmus, and as one such party was found, the installation was made sufficiently large to provide the necessary capacity. The multiple duct, of which 1,064,000 duct feet were used, was delivered in two shiploads, March 18 and May 28, 1914.

The length of cable sections between load coils was responsible for the spacing of the manholes, as at least seven cuts were required between loading points for the purpose of testing and balancing the cable between any two loading coils. The manholes were spaced 776.83 ft. apart, with intermediate manholes, where tracks were crossed, and to prevent crossing the drainage ditches and on curves. Intermediate manholes were also provided at track relays, indicators and signal locations.

The manholes were designed so that the entire cover can be removed. Where signal wires or secondary telephone-telegraph cable will enter a manhole, a piece of single-duct was let in the side wall when the forms for the concrete were built. An 18-in. by 36-in. hole was left in the bottom and filled with loose stones to drain the water out. The locations are given by stenciling on the pedestal of the nearest track bridge, giving the number of feet and the direction to the manhole, and one of the letters L, R, I, or S, which indicate "loading point," "regular," "intermediate," or "signal" manhole.

It was deemed advisable to construct the duct line continuously and not in sections. The wisdom of this policy was proved by the many changes which had to be made in alinement, due to physical obstructions encountered. Work was started from the Chagres river bridge, one gang working southward and one gang working northward. The curvature on the Panama railroad amounts to 43.44 per cent of the line, which of course made the construction more difficult, especially on account of the rough contour of the adjacent ground, which necessitated that the chords on which the duct line was located should come close to the track. The use of dynamite was prohibited on account of the proximity of the aerial wires, so where rock was encountered the excavation was made very shallow and earth was ridged up over the top of the concrete after completion. Where possible, the concrete was placed below subgrade when it came within 5 ft. of the track.

Each organization was distributed daily over about 15,000 ft. of trench and the work prosecuted in the following sequence: (1) The survey party chained up for the manhole ran in the alinement and set grade stakes, using both transit and level. Test holes were dug when in doubt as to pipes, cables or other underground obstructions. Inverted "T" stakes were then pegged to the ground so as to span the trench at each 50-ft. station, and manholes were indicated by two such stakes, on which all data concerning the individual manhole was marked in blue crayon. Accurate field notes were kept and the alinement and manholes afterward plotted on the standard sectional map of the railroad. (2) The excavation force excavated for both duct beam and manholes according to grade stakes and the indicated alinement. (3) The base concrete force laid in from 4 to 10 in. of concrete, checking the grade after this was in place. These gangs also set all manhole forms and built in forms where the reinforced duct beam had to cross a drainage ditch or a ravine. (4) The duct-laying force inserted the dowel pins, wrapped each end of the duct with a piece of rejected cement sack soaked in a neat cement mixture, and trowelled in enough concrete plaster on either side of the duct to hold it in true alinement when the concrete back fill was later placed around the duct. No duct was laid until the base concrete was practically set. (5) The concrete back fill force placed approximately 3 in. of concrete on the sides and top of the duct. Old boiler plate, sections of corrugated roofing, and lumber were used for side forms where necessary. (6) The back fill force placed an earth back fill on the concrete duct beam, restored drainage ditches, and cleaned up the road bed.

Small forces under a colored foreman removed manhole forms and moved parts of them forward with push cars, although most of the plant was moved from the rear to the front by the work train. Gravel was unloaded from 15-cu. yd. Western dump cars at 200-ft. intervals. A cement shed was then erected at each gravel pile, consisting of a platform 6 ft. by 6 ft., supported by 3-in. by 6-in. joists, and an inverted "V"-shaped roof made of old corrugated siding. Water barrels were also placed at each mixing board and water distributed from a tank car in the work train. Concrete was mixed on about 50 cement boards a day for each organization, carried in wheelbarrows, in either direction, from the board and dumped directly into the trench. A portable blacksmith's shop was carried with each excavation force for sharpening picks and drills. Each organization had its headquarters tent for the timekeepers and cost accountant, and each tent was equipped with a special telephone that not only placed all the tents in communication with each other, but allowed all of them a connection to the nearest telephone exchange.

The cost account sheets show the following tabulated costs for labor and material on 962,360 duct ft. of four-way multiple line:

	Labor.	Material.	Total.
Excavation, per cu yd.	$0.75	....	$0.75
Concrete base in place, per cu. yd.	2.00	$2.70	4.70
Laying 4-way duct, per lin. ft.	.02	.23	.25
Concrete back fill (including placing of forms), per cu. yd.	2.80	3.00	5.80
Earth back fill, per cu. yd.	.40	....	.40
Manholes, small, complete	6.33	2.17	8.50
Manholes, large, complete	7.68	3.82	11.50
Average cost per trench foot	.30	.45	.75

When both organizations were producing maximum results, there were about 900 men in the field. Organization No. 1 started April 14, and No. 2, July 6, 1914, and by October 20, 1914, 255,589 trench ft., and 1,100,226 duct ft. were completed, the average being 1,750 trench ft. per nine-hour day. The success of the entire scheme consisted in the manner in which the forces were organized, and the fact that all experimental work and all plans were completed before actual construction was commenced, and was also partly due to the friendly rivalry which was promoted between the northern and southern organizations. The work was supervised by one supervisor and two general foremen, one in charge of each district. Under these men there were 13 foremen and two work-train crews.

The Western Electric Company furnished 258,060 ft. of duplex telephone-telegraph cable and accessories. The award for signal cable was placed with the Kerite Insulated Wire & Cable Company, after an investigation. The contract called for 210,420 ft. of 13-conductor and 46,769 ft. of 9-conductor cable, and two pieces of armored submarine cable, one 460 ft. long and one 2,300 ft. long. Linaduct with slip collars was used for all conduit runs between manholes and signal apparatus.

WATCH YOUR CARS AND STOP CARLOAD TRACING

By F. P. Barr

Superintendent of Transportation, Wheeling & Lake Erie

Traffic and transportation departments of railroads, particularly of the lines serving large tonnage producing centers where competition is strong, have for the past years been flooded with requests from shippers and receivers of freight to trace carload shipments. Many of these requests are made by wire, while others are made through the mails or by telephone.

Some shippers have insisted on all their carload business being traced, and in order to hold the traffic the railroads most invariably comply with such requests. Other shippers or consignees, fearing that their shipments might meet with delay, start tracing in many instances before the cars have had time to get to destination or to the junction point with the next line shown in the routing. It is not an uncommon occurrence for tracers to be started on the same date the bills-of-lading are signed. Cases have been known where shippers started to trace before the loading had been completed.

All of this has resulted in confusion and unnecessary expense to both the shipping public and the railroads, and the tracing proves of little value. It has also resulted in practically every department of the railroad doing more or less tracing, and in many instances two or more departments are found tracing the same cars.

The principle of carload tracing when properly applied is bound to have the desired effect, but this has been badly misused by both the shippers and the railroads. The railroad responsibility for this state of affairs is explained in that they permit cars of expedite freight to be unreasonably delayed in transit, cars being moved at the convenience of the various departments. Loaded cars found to be in need of repairs are not given the proper attention and are often held unreasonably and then, on account of being in need of extensive repairs, are transferred. Traffic representatives in soliciting business have encouraged unnecessary tracing.

A number of roads have been endeavoring to overcome these inexcusable delays and thereby cause their patrons to have more confidence in their ability to move traffic with reasonable promptness and have them cease tracing to a large extent. To to this the roads have realized that they must get away from the old-established custom of doing certain things at certain times each day of the month or year and have adjusted their operations in such manner to meet almost any condition that might arise. They have arranged for the reporting by telephone or telegraph of the movements of cars containing shipments of expedite freight in such a manner that the transportation departments are able to keep a constant watch to prevent any delay which can possibly be avoided.

The Wheeling & Lake Erie recently put into effect a plan of handling expedite freight. This plan cannot be properly termed a tracing system, as in tracing it is a case of following up something that has been done. The plan the Wheeling & Lake Erie has put into use is in a large sense an advance record and results in heading off the tracers. The transportation office in most instances has the cars charged

FORM 1010 L. SM 7-14

THE WHEELING & LAKE ERIE RAILROAD COMPANY

W. M. DUNCAN, Receiver.

REPORT No._____

_____ STATION OR YARD DATE_____ 191__

DAILY REPORT OF CAR LOAD SYMBOL FREIGHT ORIGINATED OR RECEIVED FROM CONNECTING LINES AND REPORT OF FORWARDING BY TRAINS.

DATE BILLED	SYMBOL	CAR INITIAL	CAR NUMBER	CONTENTS	ORIGINATING POINT	SHIPPER	DESTINATION	CONSIGNEE	ROUTING	RECD FROM CONNECTION	DATE	TIME	FORWARDED BY TRAIN	DATE	TIME
(A)	(B)	(C)	(D)	(F)	(G)	(H)	(I)	(J)	(K)	(M)			(N)		

Agent or Yard Master will use this report in reporting symbol freight billed, the receipt of symbol freight from connecting lines, and the forwarding by trains. Cars containing symbol freight received from connecting lines for switch movement to industries on our line or cars loaded by industries on our line for switch movement to connecting lines need not be reported, except cars on which we receive a pro-rate, which cars should be reported.

Cars containing symbol freight passing through your station or yard or delivered to connecting lines should be reported on Form No._____

This report must be promptly sent to the Superintendent of Transportation by either telegraph or telephone.

Fig. 1—Report of Car Loading

to the point of destination, or the train terminal far in advance of the actual arrival. The reports covering the interchange to connecting lines are made at different intervals throughout the day and in most cases within a few hours after the cars are delivered.

One of the most important features found in this plan is that the Wheeling has records covering all of the movements of carload expedite freight on its line in seven differ-

ent traffic offices located in as many large tonnage producing centers, namely: Cleveland, Pittsburgh, Chicago, Detroit, Toledo, Canton and Wheeling, in addition to the records maintained in the transportation office at Brewster, Ohio. A patron of the line can call upon any of these offices and get the movements of carload expedite freight within 24 hours after cars are moved. These records are maintained from reports made by the transportation office and place the traffic representatives in a position to keep patrons fully advised as to the movement of their shipments either inbound or outbound.

The records show that this plan has already caused a reduction of 75 to 80 per cent in carload tracing. This is the result obtained after the system had been in use but one and one-half months. All carload shipments of expedite freight are covered by this plan and as previously stated, they are constantly under eye of the transportation office, where close check is kept on each movement of a car.

Shipments of coal, coke, iron-ore, limestone and other like commodities are not included, as these commodities are handled in train or part train lots, and their location is reported and movements arranged for by other methods.

A general outline of the plan is as follows: Each station is given a series of numbers commencing with number (1) one, which, together with the telegraph call, compose what is termed, the symbol for that station. The first car billed is given the number 1, and if the call is CX the symbol is shown as CX-1, and these symbol numbers are inserted on the waybills in consecutive order as the cars are billed. These symbols are used to save time in telephoning or telegraphing when the agents or yardmasters report the movements through yards or delivery to the connecting lines.

The originating station or the station at which a carload of expedite freight is received, assigns the symbol and reports to the transportation office the following: Date billed, symbol, car initial, number, contents, originating point, shipper, destination, consignee, routing, date and time received from connection and the forwarding by train. When a car is picked up by another train or is placed in another train at a train terminal or end of a division the yardmaster or agent at that point reports only the symbol and the train in which it is forwarded, giving the date and time, and when the car reaches the junction point and is delivered to the connecting line, the delivery is reported by the symbol and the time of delivery is also shown.

If the car is destined to a local point, the arrival at destination is approximated from reports received from the chief train despatcher. Should a car be set out short of destination or short of the end of the train run, the conductor of the train makes a telegraphic report showing where the car was set off and where the billing was left, also stating the reason why he had to take the car out of his train. Upon receipt of this report the transportation office takes the necessary steps to have the repairs made, or does what is needed to get the car moving.

The movement of all cars of expedite freight is reported as the trains are ready to leave the stations or terminals, or immediately after their departure, and should any cars be held at a terminal or station beyond twelve hours, the yardmaster or agent must make a report showing why they are being held and what is being done to move them. Cars held must be reported each day until they have been forwarded. With this report the agent or yardmaster is in position to keep a very close check on his cars and prevent any unnecessary delays. This report also covers cars which are held for delivery to connecting lines.

The blank forms used in making reports in connection with the expedite movement of symbol freight are shown herewith. Fig. 1 is the report made by the agent showing the expedite freight originating at his station or received from connecting lines. After this report is telegraphed or telephoned to the transportation office it is placed on file by the agent. The telegraph operator or the telephone clerk in the transportation office receives this report and notes it down

THE WHEELING & LAKE ERIE RAILROAD COMPANY.

W. M. DUNCAN, Receiver.

RECORD OF MOVEMENTS OF CARS CONTAINING SYMBOL FREIGHT.

STATION _____ DAY'S YARD _____ MONTH OF _____ 191__

Date Billed (A)	Symbol (B)	Car Initial (C)	Car Number (D)	Contents (F)	Originating Point (G)	Shipper (H)	Destination (I)	Consignee (J)	Routing (K)	Rec'd From Connection (M)	Date	Time	FORWARDING FROM STATIONS (N)	Del'd to Connection	Date	Time

Fig. 2—Record of Car Movement

FORM 1009 L. 10M. 7-14. REPORT No._____

THE WHEELING & LAKE ERIE RAILROAD COMPANY

W. M. DUNCAN, Receiver

PASSING REPORT OF SYMBOL FREIGHT FORWARDED BY TRAINS AND DELIVERED CONNECTING LINES AND FREIGHT DELAYED

STATION OR YARD _____ DATE _____ TIME SENT _____

SYMBOL	FORWARDED BY TRAIN	DELIVERED TO CONNECTION	DATE	TIME	HELD OVER 12 HOURS	HOURS HELD	REMARKS
(BA)	(BB)	(BC)	(BD)	(BE)	(BH)	(BI)	(BK)

"IN COLUMN (BH) SHOW REASON FOR DELAY. IF CARS ARE HELD ACCOUNT OF INABILITY OF CONNECTING LINE TO ACCEPT AS OFFERED THEY SHOULD BE REPORTED ONLY ON THE FIRST DAY. THEY ARE HELD AND SHOWN AS BEING HELD.

IF CARS ARE HELD ACCOUNT OF AN EMBARGO PLACED BY ANY OTHER RAILROAD THEY SHOULD BE REPORTED DAILY AND SHOWN AS BEING HELD."

Fig. 3—Passing Report

FORM 1007 L. 5M. 8-14.

THE WHEELING & LAKE ERIE RAILROAD COMPANY

W. M. DUNCAN, Receiver.

REPORT No._____

REPORT OF SYMBOL FREIGHT ORIGINATED OR RECEIVED FROM CONNECTING LINES AND REPORT OF FORWARDING BY TRAINS. DATE _____

DATE BILLED (A)	SYMBOL (B)	CAR INITIAL (C)	CAR NUMBER (D)	CONTENTS (F)	ORIGINATING POINT (G)	SHIPPER (H)	DESTINATION (I)	CONSIGNEE (J)	ROUTING (K)	REC'D FROM CONNECTION (M)	DATE	TIME	LOCATION (N)	DATE	TIME	DEL'D TO CONNECTION	DATE	TIME	REMARKS

Fig. 4—Report of Freight Originated or Received

on Fig. 2. Fig. 2 is a record on which the movement of cars containing the expedite freight is followed. The sheet of which Fig. 2 shows the upper portion is placed in a loose leaf binder. Subsequent movements of the cars containing the expedite freight are entered on this report until the shipment reaches its destination or is delivered to a connecting carrier.

Fig. 3 shows the form of report made by yardmasters and also by agents in case the cars are not forwarded prior to the time that the report, as shown in Fig. 1, is sent. Fig. 4 is the form in which the information received and recorded on Fig. 2 is transcribed, and typewritten copies of this report are sent to the various traffic officers. Included in this report are also shipments for which the billing has been received but the car has not yet been delivered by the con-

REPORT No._____

THE WHEELING & LAKE ERIE RAILROAD COMPANY

W. M. DUNCAN, Receiver

REPORT OF SYMBOL FREIGHT. DATE _____

SYMBOL	ARRIVED HERE	DATE	TIME		DELIVERED TO CONNECTION	DATE	TIME	DELIVERED FREIGHT	CAUSE	REMARKS

Fig. 5—Traffic Department Report of Freight

necting line. In writing up this report an effort is made to give all the information on it in regard to shipments at the time the report is written. After the report shown in Fig. 4 is sent to the traffic officers, reports of all subsequent movements are sent to these officers on forms, a sample of which is shown in Fig. 5.

Way-bills of a special color have been furnished to agents to be used in billing expedite freight. A space has been provided wherein the symbol is shown. Rubber stamps have been supplied to the agents and are used by them in applying symbols to cars traveling under interline way-bills.

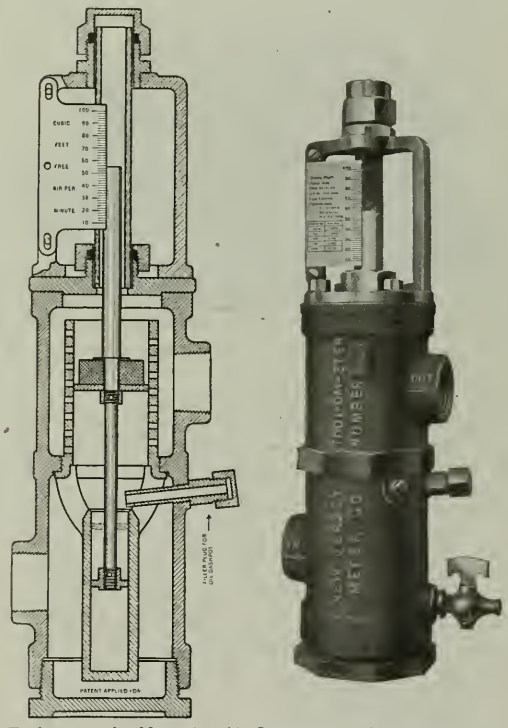
All reports made by the agents and yardmasters are sent by either telephone or telegraph to the transportation office, where they are assembled and the car movements recorded. These records are transcribed upon blanks which are mailed to the various traffic offices. A day and night force is maintained on this work. The work done by the night force is mailed early in the morning and the reports made by the day force are mailed at six o'clock p. m., which means that all seven traffic offices receive their report early the following day.

During the period that this plan has been in use the Wheeling has had on its line daily from 1,000 to 1,500 cars of expedite freight, and the work involved has been handled by five clerks, three working during the daytime and two at night. While this has caused an increase in the payroll of the transportation office, it has resulted in centralizing the handling and tracing of expedite freight, and when the work which was previously done by the various departments, including agents and yardmasters, is taken into consideration, it can be readily seen that the additional expense in the transportation office is more than offset by the saving made in the other offices. Further, it was not necessary to add any help to the agent's or yardmaster's office. In addition to this saving there is a saving in per diem due to better car movement, a big item that should not be overlooked. Furthermore, a shipper is going to give preference to the line which gives him the best service.

A careful check of the records disclosed the fact that the expedite freight is receiving, as a whole, better movement, and further that the movement of dead freight is showing a corresponding improvement for the reason that the yardmasters and agents, in their efforts to keep expedite freight moving promptly, fill out trains with the lower class of freight, and the result is that the traffic as a whole is receiving better movement.

COMPRESSED AIR METER

The illustrations show a device for measuring the quantity of compressed air used for small tools for the purpose of determining their efficiency in air consumption. It is called the Tool-om-eter. It operates on the principle that the volume of a definite compressed fluid or gas flowing under a small constant head through multiple orifice of the same shape and size, is directly proportional to the number of orifices exposed to the flow. By referring to the sectional drawing it will be seen that the air is admitted through the lower lefthand opening, passes upward to the main piston which operates in a cylinder perforated with accurately-drilled holes. As the demand for the air increases the difference in pressure between the outlet and inlet will cause the piston to be raised, thereby uncovering the holes in the cylinder to such a height that the total area of the uncovered perforations will permit an unrestricted flow of the air



Tool-om-eter for Measuring Air Consumption of Pneumatic Tools

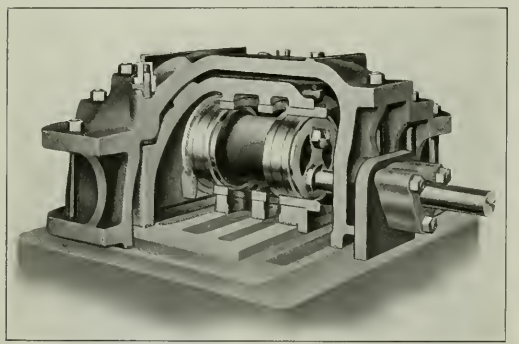
through the meter. A rod attached to the upper part of this piston indicates on the scale the amount of free air passing through the meter in cubic feet per minute. The difference of pressure caused by the weight of the piston between the inlet and the outlet of the meter is only a few ounces per square inch.

The cylinder at the bottom is filled with oil and serves as a dash pot to provide a more stable operation of the recording piston. It should be noted that this is not a velocity meter but a direct volume gage, and readings may be obtained to within one cubic foot per minute. The meter is of simple construction and contains no leather pockets, rubber or leather discs, bearings, gears, valves, or other parts, which can develop defects to change the accuracy. The use of bronze parts prevents corrosion or rusting. The meter shown herewith has a capacity of from 10 to 100 cu. ft., and is used for various small tools. Larger sizes of meters are also made. This meter is sold and manufactured by the New Jersey Meter Company, Plainfield, N. J.

APPLICATION OF PISTON VALVES TO SLIDE VALVE CYLINDERS

In modernizing existing locomotives, the application of superheaters to engines having slide valve cylinders has heretofore presented serious difficulties in view of the accepted fact that only piston valves can be used successfully with superheated steam. The cost of new piston valve cylinders with their accessories, together with the new front frame sections necessary to obtain a good design of cylinders; the changes necessary in the valve gear, etc., frequently entail so considerable an expenditure as to cause abandonment of the project.

The device here illustrated offers a solution of the problem by enabling a piston valve to be applied to the existing slide valve cylinders without any modification of the cylinders, valve gear



Universal Piston Valve Applied to Slide Valve Seat

or other details. It consists of an inner valve chamber to which a continuous bushing is applied in the ordinary manner. Enclosing this is a steam chest secured to the cylinder by the usual studs without alteration in their original arrangement. The valve chamber is secured to the valve seat by four studs, and six holding-down screws tapped through bosses on the top of the steam chest, in addition to the steam pressure, which is exerted over practically 70 per cent of the area of the seat.

Joint wires of the usual form are used between the steam chest and its seat and wires of the same size are employed between the valve chamber and valve seat. These latter wires are arranged in an ingenious manner to avoid the use of double wires on the bridges, where it is difficult to apply sufficient direct pressure to bed them into the irregularities of the faces. In this arrangement a joint wire surrounds each of the steam ports, and an outer wire surrounds the whole. Thus the double wires come only at the ends and sides of the valve seat where direct pressure can be applied.

A very short and light piston valve is used, with the center of its stem offset downward to conform to the location of the valve yoke stem of the original slide valve. The body of the valve is of oval section, thereby facilitating the passage of the exhaust steam downward to the exhaust port. The form of steam port in the valve chamber is such as to provide ample area for the ingress and egress of steam to the ports in the bushing, and eliminate all baffles which cause eddy currents.

The valve diameter is determined by the length of the ports in the valve seat, being such that its effective length (deducting bridges) is somewhat greater than the port length of the flat valve seat, which has been proved by actual test to be sufficient. This method gives valve sizes and weights as follows:

Port length	Valve diameter	Weight of valve
Up to and including 19 in.....	8 in.	58 lb.
20 in. to 22 in. inclusive.....	9 in.	65 lb.
23 in. and over.....	10 in.	73 lb.

By the use of these small, light piston valves, the wear and tear on the valve gear is reduced to a minimum. As the section of packing ring is the same as for the large valves commonly used, the result is a greatly diminished tendency to buckle and score the bushing while crossing over the ports when superheated steam is used, trouble from this source being practically eliminated. Diagonal bridges are employed in the valve bushing to obviate grooving of the rings.

A notable feature of this arrangement is that outside steam pipes may be used, thereby eliminating all live steam passages from the cylinder saddle, as has become the accepted practice with superheat. In this case a tight cover plate is bolted over the steam pipe boss in the smoke box, and the steam passages in the saddle filled with a rich concrete mixture. A short bent section of steam pipe is used immediately above the chest to facilitate its removal without disturbing the pipes in the smokebox.

This device was developed by the Economy Devices Corporation, 30 Church street, New York. A description of a series of tests of a Kansas City Southern Consolidation locomotive equipped with these valves was published in the *Railway Age Gazette*, February 26, 1915, page 371.

LACKAWANNA FIRST-AID CONTEST

The Delaware, Lackawanna & Western on February 25 held a first-aid contest at its Hoboken, N. J., terminal for the men on the Morris & Essex division.

The Lackawanna has been giving its men an opportunity to become proficient in first-aid work for seven years. The men in the neighborhood of the coal mines in particular have had especially good opportunities, because they have had access to the government's first-aid car stationed there. Those on the Morris &

Teams in Lackawanna First-Aid Contest Trying Methods of Artificial Respiration.

Essex division who have desired first-aid training have received their instruction from a course of six lectures given each year by Dr. W. J. Arlitz, who is in charge. Each spring a big contest is held at Scranton, open to all employees of the road, and all who qualify are given diplomas and medals.

The contest at Hoboken was the first at which the men competed for valuable prizes, these prizes having been donated by disinterested persons in Hoboken and Jersey City.

The contest covered such things as: applying a splint and dressing for a fracture of the forearm; artificial respiration; the application of splints for a fracture of the leg; and treating fractures of both thigh bones. The events were 12 in number.

Six teams, averaging six men each, and four individuals competed. Team No. 1 from the electrical department at Hoboken won the first team prize, the Patrick R. Griffin cup, and James Hughan, the captain, was the winner of the first "experienced individual" prize, a diamond locket presented by the Hudson Observer of Hoboken.

The illustration shows several of the teams trying the Schaefer and Sylvester methods of artificial respiration. Those in the foreground are members of the winning team.

Maintenance of Way Section

Accurate Map Records

On some roads station and right of way maps and profiles are kept up to date with great care and all changes in the property locations or in grades are noted on them as soon as made. On other roads because of lack of forces or indifference they have been allowed to lie unchanged until they are now out of date and will require a considerable expenditure for their revision, which appropriation is difficult to secure without showing a definite need. One of the indirect benefits now resulting from the federal valuation is the opportunity given to bring these maps up to date. After being revised, the cost of keeping them up is so small relatively, and they are of such definite value in an engineering office for reference purposes and in saving trips out on the line to secure information relative to minor improvements, that there should be no reason for allowing them to become obsolete again.

Records of Treated Ties

The treatment of timber with preservatives to protect it from decay is a development of the last 30 years. In the last decade the number of plants has trebled and the output quadrupled. Railways have been the pioneers in this work and are today the largest users of treated timber. At the same time, only about 25 per cent of the 140,000,000 ties normally required are treated and there still remains much to be done along this line. While the decision to use treated ties has been prompted in some instances by a desire to conserve the resources of our forests, the primary reason in general has been that of ultimate economy. Because this industry is still practically in its infancy, few authentic actual records of the life of treated as compared with untreated timber are available covering any large number of ties and the bases upon which authorizations for expenditures for the treatment of timber have been made have been largely estimates. Likewise, few roads have installed treated ties in sufficiently large quantities, and for a long enough term of years to show any actual decrease in the normal tie requirements. This at once shows the importance of the compilation of records of the life of treated and untreated ties under a wide variety of typical conditions. While such statistics are difficult to collect, and if not properly compiled are worse than useless, because of their misleading character, they are the only basis upon which the actual economies resulting from timber preservation can be definitely shown, although commonly recognized. The Santa Fe has been a pioneer in the treatment of timber, opening its first plant in 1885, and now operating two plants with a capacity practically equal to its normal requirements. Approximately 65 per cent of the ties now in its tracks are treated, probably a larger per centage than on any other road. It has also had a larger number of treated ties in track for a longer period than any other road in this country. The results which it is now securing are therefore highly instructive. Its normal requirements, for slightly over 11,000 miles of line are about 3,500,000 ties. During the five years ending with 1909 the average number of ties inserted per mile of track was 346, while during the last five years this average decreased to 316, or 9 per cent. For the past two years the normal requirements have shown a decrease of about 600,000 ties annually. As the standards of maintenance have been maintained, if not raised, during this latter period, this reduction in the tie requirements may be fairly attributed to the results of timber preservation. This is probably the first record of this nature on so large a scale in this country. Within a few years similar records will undoubtedly be secured on several other roads which have been treating ties actively for a number of years.

Rail Records

Few records are more difficult to compile and maintain accurately, or are in general more inaccurate, than those showing the amount of rail on hand and its location. There are so many opportunities for discrepancies to arise, nearly all of which are cumulative, that if the material is not checked thoroughly at regular intervals the records soon become of little value. The one redeeming feature of this condition is that while it may not be possible to locate this material in the records, most of it is not lost to the road so that the losses are largely only in accounting. However, if such records are worth keeping at all, and no one questions their value, they should be kept with sufficient accuracy to make them reliable for the purposes for which they are intended. The problem is to secure some method by which this desired degree of accuracy may be attained. Even the closest supervision frequently fails to secure accurate reports from the foremen, many of whom have a limited education. Most of these men naturally feel that their first important work is on the track and they see little or no necessity for the compilation of the records required of them other than the payrolls. It must be admitted that the tendency in this respect has been increased somewhat by the introduction of unnecessary reports in certain instances and by the continuance of other reports after the demand for their compilation has passed, tending to create indifference towards all reports. The plan of making a periodic check of all rail on hand recently adopted on the Albuquerque division of the Santa Fe and described in another column, is one method of securing the proper degree of accuracy. While at the first glance this thorough check of the material on hand would appear to take considerable time when extended over a system, if properly planned it need not require a great deal of time, for much of the information can be gathered in advance as opportunity offers. Furthermore, the fact that foremen realize that they will be required to account for all material turned over to them and to check the amount on hand at periodic intervals will impress them with its value and make them more careful in reporting it.

THE VALUE OF NEATNESS

THE savings resulting from a campaign for neatness about station grounds, tool houses and the right of way in general are commonly considered more or less imaginary, or at least intangible in character. While more attention is being given to this subject now than formerly, many believe that the only returns of any consequence are those resulting from a more favorable impression on the public. A few years ago if a foreman maintained good riding track, little attention was paid to the appearance of the right of way or many of the other details under his care. Today, while requiring the same or even higher standards of track maintenance, more stringent regulations are enforced regarding these other duties. Many of the older foremen and supervisors are not in sympathy with these later ideas and do not believe that they pay. For this reason it may be well to consider some of the reasons prompting this change in ideas and observe to what extent the results are real.

Undoubtedly the intangible result of creating a better impression in the minds of the public regarding the property is one

of considerable value. It is natural for a patron to expect good service from a road which gives the appearance of being prosperous and able and willing to keep its property in good condition. Well maintained property and good service are naturally associated together. There is another tangible result reflected in the morale of the employees. Neatly kept surroundings are certain to create in the employee habits of care and precision. The efficient foreman is seldom the one who is careless with the use of his material, for the same habits which create carelessness also tend toward inefficiency. In general, the section which is neatly maintained will also be found to be most efficiently handled.

There are, however, direct results which may be measured. The value of neatly kept and well policed grounds as an adjunct to the promotion of the safety of employees has been referred to so frequently that we will not discuss it here. Continued carelessness in the maintenance of property necessarily results in excessive and wasteful use of material. The habit of allowing new and scrap materials to accumulate ties up large sums of money unnecessarily when an entire system is considered. The comparisons of the two tool houses described on another page in this issue may be duplicated many times over throughout the country with similar savings in material. Undoubtedly the greatest advantage from a systematic effort to maintain orderly property is this detection of surplus material. This in turn results in a considerable decrease in stock as well as in the losses resulting from obsolete materials.

It is largely for this reason that great attention has been given to this subject during the past few years and the amount of material returned to service or for sale has been surprisingly large. Some of those supervisors and foremen who have been most active in their criticism of these methods will be surprised, if they make investigation, to know the amount of material which is held on their territories unnecessarily.

RENEWING BRIDGES UNDER TRAFFIC

IT is an axiom in every bridge maintenance organization that work must be so handled as to eliminate or at least to minimize interference to traffic. In the renewal of old bridges this may entail considerable difficulty, particularly on lines of dense traffic and without convenient detour routes. It is frequently important that the alinement existing over the old structure be maintained either on account of the economy possible through the use of the old substructure or because of limitations imposed by a lack of right of way or the proximity of important buildings or other improvements. In the case of double tracking a single track structure or in renewing a double track deck girder bridge it may be possible to replace one track at a time, shifting the traffic from track to track between operations, but for single-track bridges and truss spans some arrangement must ordinarily be worked out for making the actual change between trains or for diverting the traffic. Under the pressure of such requirements numerous plans have been devised for handling these problems, many of which are ingenious in their nature and effect considerable economy.

The possible method depends largely on the types of the new and the old structures. When girders replace girders it is preferable to handle each span as a unit either with a derrick car or by lateral movement. The latter method has been developed by some roads to a point where the time of making the actual movement is measured in minutes or even in seconds. When girders replace truss spans it is customary to remove only the floor system of the old structure before placing the new spans in operation.

The more usual problem at present, however, is to renew an old truss bridge with deck plate girder spans, the relative economy of short spans having increased considerably since structures now requiring replacement were built, as a result of the continued decrease in the cost of concrete for substructures. When the old piers are in good condition, as is frequently the case, it is common to replace each truss span with two girder spans, building new piers intermediate between the old ones. The work of renewal must then be divided into units equal to the new span length or half the old span. When derrick cars with a sufficient capacity are available the new girders can be brought up and placed consecutively from one end, the truss floor in each half span being removed immediately before placing the girders. This method as used on the Wheeling & Lake Erie, was described in the issue of February 19.

The span fully assembled may also be carried out to place on flat cars and supported there by a derrick car at one end and a gallows frame at the other, or by suspending from the old trusses by tackle until the old floor is removed. In other cases the assembled spans may be carried out to place suspended between derrick cars or from flat cars and held over the final location while the floor is removed. An economy in the dismantling of the old truss spans after the erection of the new girders was effected by the Pere Marquette by moving each old span out on the shore supported as a unit on flat cars, allowing the dismantling to be handled more quickly and easily. This work is described elsewhere in this issue.

When trusses replace trusses, the erection of the new bridge outside of the old may allow the work to be handled without interruption to traffic and without recourse to falsework in the stream. A striking example of this method is furnished by the Kenova bridge of the Norfolk & Western, which was replaced about two years ago by travelers operating on the upper chords of the old spans, receiving material from construction tracks laid on temporary brackets outside of the new trusses. When falsework can be used for the erection of the new structure alongside the old, the new bridge is frequently placed by lateral movement with slight interference to traffic. This possibility is well illustrated by the article in this issue describing the record performance of the Pennsylvania in moving three 240-ft. spans weighing 2,740 tons in an elapsed time of 10 minutes and 17 seconds.

The handling of movable bridges presents a special problem as the conditions which require such a bridge make impossible the methods adopted for fixed spans. The general practice at present for moving swing spans is to float them on scows. Several instances of the successful handling of heavy bridges in this manner have been described in these columns. With proper preparatory measures the river and rail traffic need not be interfered with unduly. The lift bridges which can be erected in the open position have special advantages in this regard, as it is often possible to complete the erection of such a bridge and put it in condition for operation before it has ever been lowered into its permanent position. The most recent example of a large structure handled in this manner is the vertical lift span of the Pennsylvania and the Chicago & Alton over the south branch of the Chicago river, which replaced a swing span and could not be lowered until the old bridge was cut in two and one-half floated away on scows.

NEW BOOKS

Structural Steel Drafting and Elementary Design. By Charles D. Conklin, Jr., in charge of structural design, Cooper Union Schools, New York City. Size 9 in. by 12 in., 154 pages, 149 illustrations. Bound in cloth. Published by John Wiley & Sons, New York City. Price $2.50.

As a large number of the graduates of engineering schools begin their practical experience as structural draftsmen, a book giving complete instructions as to methods of detailing and designing the ordinary structures should have a wide application. "Structural Steel Drafting and Elementary Design" is intended for use both in class room work in engineering schools and for reference by draftsmen. It covers in considerable detail the organization of a structural steel designing office, requisites for working drawings and the methods used in designing and detailing ordinary structures. The designs and details for a steel roof, a deck plate girder railway bridge, a country highway bridge, and a through-riveted railway span are included. The general specifications for steel railway bridges of the American Railway Engineering Association are published in an appendix. The illustrations include many full page plates illustrating the arrangement of working drawings and the method of showing details.

Letters to the Editor

A SPECIFICATION FOR ZINC CHLORIDE TREATMENT

Cleveland, Ohio.

To the Editor of the Railway Age Gazette:

There is apparently a wide divergence of opinion and much misunderstanding among users of chloride of zinc for the treatment of timber owing to the fact that some important features are left out in the consideration of this question. These are the individual variation in the absorption of the solution by various kinds of ties and different species of wood, and the temperature of the solution at which the percentage of strength is taken.

It has been the almost universal custom in this country to specify a certain quantity of dry salt per tie, or per cubic foot of timber, on the supposition that individual ties in the same charge absorb an equal quantity of solution. This is incorrect. It has been clearly demonstrated that the absorption of individual ties in the same charge varies greatly, depending upon many factors, such as the species and character of wood, the degree of dryness, the size of tie, etc. It has also been clearly demonstrated that the variation in absorption, when treated to refusal, ranges from 10 to 50 lb. per tie for oak, from 20 to 65 lb. for beech and from 30 to 90 lb. for loblolly or soft pine, when ties are seasoned in the open air and treated in the usual manner. Therefore the *average* absorption for oak would be 30 lb. per tie, for beech 42 lb. per tie and for pine 60 lb. If we treat these three kinds of ties with a solution 3 per cent strong—that is, 3 lb. of dry salt dissolved in 97 lb. of water—some will absorb as little as 0.3 lb. of salt, while others will absorb as much as 2.7 lb. per tie. Perhaps the *average* would figure 1.5 lb. per tie, but that is manifestly not the proper way of specifying the quantity and the strength of the chloride of zinc that should be injected into the timber.

Also the temperature of the solution must be taken into consideration when the readings are taken with a Beaumé hydrometer. In the heavier solutions, say, 30 to 60 per cent strong, the influence of temperature is small, so that no account need be made of it, but with those highly diluted it is necessary to define the effect of temperature very carefully to get a true measurement of strength. No more satisfactory means has been found for testing the strength of a chloride solution than Beaumé's hydrometer, using the coarse hydrometer, 1 to 60 deg., for the concentrated solutions, and the fine hydrometer, 1 to 6 deg., divided to 0.1 deg., for highly diluted solutions.

The degree of dilution recommended by William Burnett is 1 part by volume of the salt to 50 parts of water; that is to say, the strength should be 2 per cent. The late Samuel Rowe professed to have demonstrated that ¼ to ⅓ lb. of chloride of zinc salt per cu. ft. of timber, in the shape of 6 in. by 8 in. by 8 ft. pine ties, was sufficient to protect it from decay. European railways do not specify the quantity of salt per tie or per cu. ft. of timber treated, but they specify the degree of strength, according to Beaumé's hydrometer.

The percentage of strength of solution used by European railways is between 2½ and 3 per cent. The solution is injected to refusal and no variation is made in the strength of the solution for different species of wood; the same strength being employed for all woods, whether they be oak, beech or pine. That seems to be rational, as no one has as yet demonstrated, or even asserted, that the solution should be made stronger for one species of wood than for another.

The strength of the solution should be sufficient to prevent decay, and possibly a little more to make up for any salt that might leach out of the ties in the course of time. It should also be borne in mind that this can be overdone and there is danger of making the solution too strong and injuring the fibre of the wood. In 1863 the Philadelphia, Washington & Baltimore built a Burnettizing plant and treated several thousand beech ties with chloride of zinc. It was reported that the ties were as "brittle as a carrot," which was undoubtedly caused by using too strong a solution. The strength of the solution is not stated, but it is said to have been about 6 per cent, which on the basis of an average absorption of 42 lb. per tie would be equivalent to 2.52 lb. of dry salt per tie.

Many of the specifications in this country, covering the treatment of ties with chloride of zinc, call for an injection of a mean between these two extremes, namely, an *average* of 1½ lb. of dry salt per tie. In treating oak ties having an *average* absorption of 30 lb., the strength would be equivalent to 5 per cent; for beech with an *average* absorption of 42 lb., 3.5 per cent, and for pine with an *average* of 60 lb. per tie, 2.5 per cent strong. It has never been found possible, by any known process, to inject into each and every tie an equal quantity of preservative, therefore, the strength of the solution should be fixed and not the quantity of dry salt per tie, or per cu. ft. of timber. Some ties may absorb but little, and others a great deal, but the strength of the solution should be the same for all. The strength should be expressed in degrees Beaumé, at a certain temperature. Then, and not until then, shall we have a definite understanding as to the strength and quantity of chloride that should be used for treating ties and timbers.

I would suggest the following specification for the treatment of railroad ties of all kinds, with chloride of zinc, either singly or in combination with creosote oil:

"The zinc solution must have a strength of 3.5 deg. Beaumé, at a temperature of 70 deg. F. This is equivalent to 3 per cent strong. Ties of all kinds and sizes should be treated to refusal."

W. F. Goltra,
President, W. F. Goltra Tie Company.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since February 19, 1915:

The Mercury Freight House Tractor Truck.—A new tractor truck that has been performing satisfactory service in the freight houses of the Chicago Junction Railroad and the Chicago & Eastern Illinois at Chicago, was described in the issue of February 26, page 361.

A New Car Ferry with Adjustable Deck.—The ferry which is soon to be placed in operation carrying trains of the National Transcontinental Railway across the St. Lawrence river near Quebec, designed with a provision for adjusting the track deck a vertical distance of 18 ft. and special equipment for heavy ice-breaking service, was described in the issue of February 26, page 365.

Michigan Central Steam-Electric Wrecking Crane.—A new crane designed to operate either by steam or electricity, which was built recently for the use of the Michigan Central in and adjacent to the Detroit river tunnel by the Industrial Works, Bay City, Mich., was described in the issue of February 26, page 369.

Appraisal of the Pere Marquette Lines in Michigan.—An abstract of a report to the Michigan Railroad Commission by Professor M. E. Cooley on his valuation of the lines of the Pere Marquette as compared with previous valuations of that property, was published in the issue of February 26, page 376.

Viaduct Construction on the Kansas City Terminal.—A discussion of the conditions governing the design of the 21 viaducts and 12 subways which were built as a part of the grade reduction and grade elimination work in connection with the Kansas City terminal improvements, written by A. R. Eitzen, office engineer, Kansas City Terminal Railway, was published in the issue of March 5, page 397.

Retaining Walls on Soft Foundations.—An abstract of a paper by W. S. Lacher presented before a recent meeting of the Western Society of Engineers, outlining tests made by the Chicago, Milwaukee & St. Paul on block and other types of retaining walls at Milwaukee, Wis., and describing the successful use of block walls at that place was published in the issue of March 5, page 411.

An editorial commenting on the problem of designing an economical retaining wall, was published in the same issue, page 393.

Replacing a Large Truss Bridge by Lateral Movement*

Reconstruction of Three Double-Track Through Spans 240 ft. Long on Falsework 44 ft. 9 in. from Center Line

By J. C. Bland
Engineer of Bridges, and
John Miller
Assistant Engineer, Pennsylvania Lines West, Pittsburgh, Pa.

Of the 56 bridges on the Pennsylvania Lines West that were totally or partially destroyed in the flood of March, 1913, the structure crossing the Muskingum river about 4½ miles west of Coshocton, Ohio, was the most important and embodied in its reconstruction the most features of interest.

The old structure, built in 1900, consisted of four double-track through pin connected spans, each 152 ft. 2 in. long, and slightly skewed, supported on three piers and two abutments, the foundations of which were carried down only a short distance below the then bed of the stream.

In the flood, pier 3 was washed away, carrying with it spans Nos. 3 and 4, the latter being swept about 200 ft. downstream. Pier No. 2 settled 6 ft. on the upstream end, letting down the west end of span No. 2. Pier No. 1 and the abutments were undamaged. It was found possible to level up span No. 2 on cribbing, and to use this span as well as span No. 1, which was undamaged. A single-track pile trestle was driven across the opening and the second track was afterwards carried across on four 89-ft. deck plate girder spans, which were on hand for the renewal of another bridge. These girder spans were supported on cluster pile bents, leaving openings of about 60 ft. The pile trestle track was subsequently changed to similar deck girder spans to avoid blocking the waterway with piling. Double-track traffic was carried over these temporary spans till July 20, 1914.

New Bridge Completed on Falsework 44 ft. 9 in. from Permanent Location

It being decided that more waterway was required, the new bridge was designed for three double-track through riveted truss spans, each 240 ft. long, on new concrete masonry. Since, in all probability, the old piers failed from undermining, it was desirable to carry the new masonry below the influence of any future scour, and as borings, made at the new pier and abutment locations, and carried to a depth of 140 ft., failed to disclose anything but sand and gravel, it was decided to carry the pier foundations by pneumatic caissons to about 75 ft. below the base of the rail or 45 ft. below low water, this being about 38 ft. below the lowest point of the river bed.

It was originally intended to build the abutments in the open on concrete piling, but afterward, both to hasten the work and to be independent of weather conditions, the pneumatic process was adopted for the abutments also, and these were carried down to 31 ft. below low water. The grade line over the bridge was raised three feet.

The pier caissons were actually sunk to 73 ft. below base of rail or about 36 ft. below the lowest point of river bed, at which depth a good gravel about 4 in. in diameter was found. The average rate of sinking for the entire job was about 2 ft. per day, which was considerably more than was anticipated. The maximum air pressure used was 22 lb. per sq. in.

Moving in the New Bridge Showing Clock and Telltale for Indicating the Position of the Span and in the Distance One of the Two Derrick Cars Which Furnished the Power

A mixing plant and material bins were installed at each end of the bridge, the concrete for Pier No. 1 being trucked from the east end mixer on a trestle and that for Pier No. 2 from the west end on a track carried on outriggers secured to the girders of the temporary spans. The mixture used was 1:2:4 throughout, and no reinforcement was used. The total amount of concrete used was about 7,000 cu. yd.

The piers are rectangular, with a segmental cutwater on the upstream end. They are 46 ft. long and 8 ft. wide under the coping, and have a batter of 1 in 12.

While the masonry was being built the wrecked spans were removed from the river, the parts above water being burned apart with an oxy-acetylene flame, and hauled out by a 75-ton guy derrick. The submerged parts were dynamited and removed, a diver being employed in the under-water operations.

The new trusses are spaced 31 ft. apart and are 44 ft. high at the center and 35 ft. at the hips. The structure was designed for a live load of 5,500 lb. per lineal foot of track, and 66,000 lb. concentrated weight, with an addition of 50 per cent concentrated weight in proportioning the end connections, and in determining

*Abstract of a paper presented before Section D of the American Association for the Advancement of Science at the Philadelphia meeting, December 30-31, 1914.

the sections used in posts, diagonals, end posts and the two end panels of the bottom chord. The total shipped weight of the three spans was 2,740 tons.

Owing to the heavy traffic it was not desirable to erect the bridge on its permanent alinement and the following scheme was

Special Pile Driver Placing Falsework Bents 30 Feet Ahead of Last Bent Driven and Designed to Drive Six Piles at One Setting

adopted. Temporary extensions of the piers and abutments were built on the downstream side of such a nature as to be capable of carrying double-track traffic, and on these extensions the new bridge was erected on falsework at a distance of 44 ft. 9 in. from its permanent location. When the new spans were completed traffic was diverted over them as a run-around, the old spans were dismantled and the temporary spans removed. The new spans were then rolled into their permanent position.

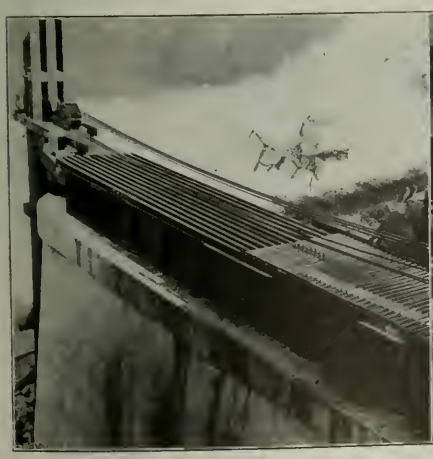
The temporary extension for Pier No. 2 consisted of 98 50-ft. piles, spaced about 2 ft. 6 in. center to center and cut off at ordinary water level. A crib of 4-in. sheeting tied and strutted by 12-in. x 12-in. timbers, and carried from about 4 ft. below the bed of the stream, enclosed the projecting ends of the piles and was filled with sand. The piling and sand were surmounted by a concrete mat 4 ft. thick reinforced longitudinally and transversely by old rails. This formed a temporary pier 42 ft. long by 18 ft. wide. The abutment extensions and that for Pier No. 1 consisted of a concrete mat similar to that described above, without any piling. These temporary supports were built at the same time as the masonry.

On the temporary supports were set 16 framed bents, parallel to the center line of the bridge and anchored to the concrete mat by anchor bolts placed when the concrete was poured. On the caps of these bents were placed 24-in. I-beams, three at the abutments and six at the piers, perpendicular to the line of the bridge, and on these beams were set 10-in. x 12-in. blocking close together; the top of this blocking being at the same elevation as the top of the permanent pier. This constituted the rolling falsework.

The erection falsework was of the ordinary type, a 12-pile bent at each panel point, driven as two independent 6-pile bents, one under each truss with 6 ft. 6 in. clearance between them, and afterwards braced together.

The pile driver was of a somewhat unusual type designed to drive bents spaced 30 ft. apart without using intermediate bents. It also permitted an entire 6-pile bent to be driven at one setting of the driver. It consisted of a platform about 30 ft. long and 20 ft. wide, with 8-in. x 20-in. side timbers and 12-in. x 12-in. cross timbers. This was mounted on four small flanged wheels under the side timbers, spaced 24 ft. front to rear, moving on rails laid on stringers on the bents already driven. Over the front wheels was set an "A" frame derrick with a 48-ft. boom and over the rear wheels was mounted a hoisting engine and boiler.

A 40-ft. projection was cantilevered in front of the platform by splicing 12-in. x 12-in. timbers to the side beams and trussing these vertically and horizontally to the rear of the platform. On this cantilever was carried a gallows frame at a distance of 32 ft. from the front wheels of the platform. The top of this frame was formed of two 10-in. I-beams spaced 22 in. apart to allow the pile driver leads to move transversely between them on rollers.



Top of New Pier 1 Showing "Deadman," Grillages and Roller Nest

Extension of Pier 1 on Which the New Structure Was Supported Before Moving into Place

The width of the gallows frame permitted the driving of six piles, and when the front wheels of the platform were over the bent last driven, the leads were in position for driving the next bent. The leads were warped across the gallows frame by lines to the winch heads of the engine, and the derrick handled the piling into the leads.

In view of the future moving in of the bridge, the following arrangement for supporting the spans on the rolling falsework was used: On the blocking were placed 85-lb. rails, flange down, 12 on each pier and 6 on each abutment supporting a nest of 201 rollers 2½ in. in diameter, and on the rollers were placed the same number of rails as below, with the flange up. These upper rails supported two sandjacks which carried the new spans by their end floor beams, a sandjack being located under the center line of each track.

The sandjacks used were built up of steel boxes open at bottom and top, measuring 6 ft. x 3 ft. inside at the abutment, and 6 ft. x 6 ft. at the piers where the jacks supported the adjacent ends of two spans. They were about 10 in. deep. A 4-in. cover and a 3-in. bottom of oak fitted closely inside the box which was filled with fine dry sand. The oak bottom rested on the upper rails mentioned above and the cover carried a small I-beam grillage which supported the end floor beams of the new spans. The boxes were thoroughly waterproofed, after being placed, to keep the sand dry.

The function of the sandjacks was to support the spans somewhat higher than their final elevation while being moved into place. This permitted the rails, rollers, etc., to be removed from beneath the trusses and the cast shoes to be set on the grillages. The trusses could then be lowered on to the shoes by allowing the sand to escape through openings in the sides of the box left for this purpose, and normally kept closed.

The new steelwork was handled and erected by a Mitchell 50-ton derrick car; the heaviest single piece, the center section of the bottom chord, weighing about 30 tons. Traffic was diverted over the new bridge in its temporary position on July 14, 1914, a slow order still being maintained over it, and the dismantling of the old bridge was proceeded with. This was completed by September 14, 1914.

The new bridge was moved into place on September 22, 1914, the three spans being moved simultaneously. The motive power was furnished by two derrick cars, located symmetrically about the center of the middle span, and securely anchored about 2 ft. apart.

From the cars four ¾-in. wire ropes were run, one to each pier and abutment, and these, turning downward and sideways around sheaves fastened to the end floor beams, were reeved through a four-sheave block attached to a "deadman" at the upstream end of the pier or abutment and a three-sheave block attached to the new spans, and were finally lashed to the upstream sandjack at their respective pier or abutment. This gave an 8-part line at each of the four points of pull, each line going to a separate drum of the hoisting engines.

Each "deadman" consisted of three 8-in. x 18-in. stringers bolted together, resting on the footing and projecting above the top of the pier or abutment. To this projecting end was fastened the four-sheave block. The lower end was tied on with a wire rope passing round the pier. The adjacent ends of the downstream trusses were fastened loosely together by ½-in. plates, allowing some differential motion in the spans but preserving their relative longitudinal positions.

To ensure uniformity of movement a "telltale" was provided which recorded on a graduated board near the hoisting engines the distance passed over at each point of support, thus making it possible to preserve control over the motion and keep the spans in good alinement as they moved in.

The operation of moving was carried out very successfully. Train No. 11 passed off the bridge in its temporary position at 2:45 p. m. and 10 minutes 17 seconds later the special train carrying B. McKeen, general manager, and his party entered it in its permanent position. The actual time of moving the spans was 6 minutes 50 seconds, during which time seven stops were made to correct the alinement. This left a margin of 4 minutes 27 seconds for track work. A structure of slightly greater length has been moved in this manner, but for weight, distance moved, and time of moving, this operation constituted a record.

The masonry was built by the Foundation Company of New York, under the supervision of the division engineer of the Pittsburgh division. The superstructure, manufactured by the American Bridge Company of New York, and erected by the Seaboard Construction Company, was designed by J. C. Bland, engineer of bridges, Pennsylvania Lines West, and erected under his supervision.

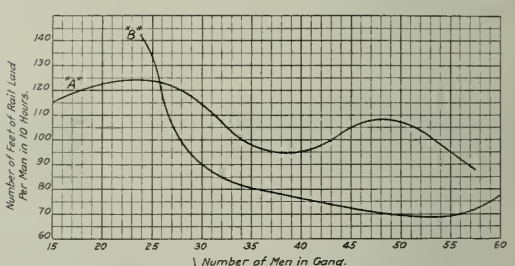
RAIL LAYING

By H. G. Olmstead
Missouri Pacific, Kansas City, Mo.

Rail laying should be started as early in the spring as possible, in order that it can be completed ahead of general track work. By doing this one of the big items going to make up track maintenance will be taken care of, general maintenance, such as tie renewals, ballasting, lining, surfacing, etc., can immediately follow and all track work will be completed early in the fall.

In the unloading of rail for relaying, particular attention must be paid to see that proper lengths are distributed with reference to the needs and to avoid all unnecessary trucking of rails, as this is expensive. Rails should be unloaded from cars with machines, of which there are now several types on the market. With the use of such equipment rail can be unloaded at a cost of 8 cents per rail, while where unloaded by hand the cost will run from 10 to 15 cents per rail. This cost includes work train service and depends somewhat upon the interference with work trains by passing trains. When rails are loaded in box or stock cars end rollers or end skids should be used. In no cases should rails be thrown off cars. A sufficient number of short lengths should be distributed at points where needed, such as curves, yards, street crossings, bridges, etc., as rail should be laid with broken joints, and joints should not be laid closer then 6 ft. from the ends of bridges or from switches.

Proper adzing is one of the most important items in connection with rail laying and should receive a great deal of care and



Relation Between Size of Rail Laying Gangs and Their Performance

supervision on the part of all concerned. Where possible, section forces should be able to do considerable adzing during the winter, which will be a material aid and time saver when rail laying operations are started. All ties should be so adzed that the new rail will have a level bearing on the full width of the tie. When tie plates are used, adzing should be so performed that the entire area of the tie plate will rest on the tie, thus permitting the rail to lay flat and avoid canting. Before laying the rail or applying the tie plates the ties should be swept clean and a coat of hot creosote or other preservative applied.

All joints should be fully bolted and the rail fully spiked. It is preferable to have a small gang following the steel gang so that this work can be kept up to the laying of rail. Then when

the day's work is done all joints are bolted and the rail is fully spiked. The regular section forces should follow and tighten all bolts from time to time.

When considering the size of rail gangs the following diagram shows actual performances. The curve marked "A" shows the amount of rail laid per man for various size gangs. The information was obtained from the daily reports and covers a period of about eight months' work in laying 85-lb. rail 33 ft. long, releasing 56-lb. rail; traffic was light on this line. On the curve marked "B" the traffic was heavier; this work covers about 16 miles of 90-lb. rail which released 75-lb. rail. From these curves it is seen that a gang of 25 men produces the best results.

These curves do not include the application of tie plates, nor lining, surfacing or tie spacing, but only the laying of rail proper. However, they include throwing out the released rail, and the laying of switches complete.

INCREASING THE SCOPE OF THE SECTION FOREMAN'S DUTIES

By E. R. Lewis

Assistant to General Manager, Duluth, South Shore & Atlantic, Duluth, Minn.

In its presentation of this subject last year the track committee of the American Railway Engineering Association stated that "the basic feature is an economic one and the result hoped for seems to be a reduction in maintenance expense by having section foremen do such things as emergency repairs to platforms, stock pens, track bonding, battery renewals, telegraph line repairs, etc., the general idea being to reduce, as far as possible, the expense occasioned by high-priced men moving over the road with great loss of time when only a small amount of work of a simple character is required."

The difficulties of maintaining structures long distances from each other and from bases of supply of labor and materials are recognized and respected by every business man of experience. When the distances become so great and the structures so numerous and so varied in character as the property of a steam railway, the matter of efficient maintenance becomes of much importance to the railway company.

An increase in efficiency in the maintenance of structures, appears to be the primary object of the American Railway Engineering Association in this investigation rather than more work for the section gang. It is argued in the affirmative that the section foreman is the company's representative in charge of a limited mileage of track, and that he is therefore always in position to perform the various duties described, with less delay and expenditure than high-priced men from other departments sent from and returning to division headquarters. This argument implies, as is generally correct, that the foreman artisan and his men are more highly paid than the section foreman and his men.

Arguments in the negative urge "safety first" as good reason for decreasing instead of increasing the scope of the section foreman's duties; for keeping him and his men working continuously together, maintaining the tracks; for on the constant vigilance and the "stitch in time" of the section force depends the safety of each moving wheel. It is further urged that there is serious doubt regarding the ability of track foremen and laborers to properly perform the duties of high-priced artisans even when the work is simple. There is the further difficulty of delegating authority to the section foreman by officers of other departments and the question of whose work should take precedence.

The preponderance of argument on the subject as stated, under present conditions of railway labor and organization, appears to indicate that the nays have it. But there is a possibility that the subject has not been stated fully, that the arguments are incomplete, and that present conditions admit of alterations for the better, and in favor of the increase in efficiency which should result from localized maintenance. American education has for more than three decades, and until the last few years, been increasingly along special lines. America is known among nations as the home of the specialist, the mecca of the inventor, the asylum of the enthusiast, be his monomania what it may. Any American who has taken abroad American enthusiasms, American methods, American arguments, jealously guarded for fear of infringement, has probably been shocked at the impenetrable frigidity with which his cherished ideas have been received. The specialist of America is an American specialty. His education is employed largely as a means to an immediate end, or as an agency to very early business opportunity. The personnel of railway staffs is largely composed of men who have gained their education, their knowledge of their work, and of life, wholly or in part through their own personal efforts, by spare time study and daily experience in the ranks of employees, who have risen as their qualifications allowed, step by step. That such close practical knowledge of details is the best information a railway foreman or officer can have, there seems no doubt. But special subject knowledge has perforce a restricted scope. If it could be preceded by liberal and thorough education over a broader course, the specialist who has risen through one certain department would be a better general foreman or officer. It is feasible to teach an employee of any department the details of the work of employees of the several departments, while keeping him steadily employed. It seems well worth the while of a railway company to so instruct men, in order that they may, as foremen of roadway, take up the broad responsibilities indicated as those which should be undertaken by foremen of the maintenance department.

The section foreman is skilled in track work only. His gang is composed of similarly skilled laborers. They are specialists in their own trade. If any doubt the statement, let him read the rule book, look over the foreman's bulletins, glance through the foreman's diary and follow the gang through the one day's work. I venture to say he will admit that he has had "a rather full day." Until it is generally understood by all concerned that the trackman is a skilled laborer, with all that such recognition implies, the problem of retaining track labor bids fair to remain in part unsolved. The signal maintainer, the bridge foreman, the building foreman, the telegraph lineman, are likewise all specialists. Education must precede the installation of foremen of roadway, if the creation of such foremanship is to be successful. It must not be too short a course, and candidates for entrance should be carefully selected and as carefully and patiently trained. It is said with truth that the problem is largely local with the individual road. The principle, however, is not local.

The basing of the specialist's education on the broad foundation of general knowledge is a nation-wide necessity. There seems danger in so presenting this subject that railway managements may take it up on the basis of expectation of immediate drastic reductions in labor costs. Time, attention and money are necessary to get the desired results. Inducements must be offered before candidates will be found to undertake the roadway foreman's work. A man capable of overseeing artisans, even when the work done is comparatively simple, is worthy of his hire. If he is to further oversee the track work of his section, his knowledge, responsibilities and emoluments should be extended. The writer is of the opinion that the foreman of roadway should be the direct superior of the section foreman; a trackman reporting to the roadmaster or assistant roadmaster; and that he should have supervision over the maintenance of a section of track, as well as over such items of maintenance of other structures on his section as may be delegated to him from time to time.

The evident intention of having the actual maintenance of

structures other than track performed by track laborers will at first meet with disapproval in most trials. The men as well as the foremen need educating. Tools are needed. Material is needed. It may be found feasible to keep a handyman or two in each section gang who may assist the roadway foreman when required. Taking a man or two from a section gang is by no means so serious as taking the foreman.

There seem fair grounds to consider, too, local purchase of both labor and materials, and for small contract work under the authority and supervision of a foreman of roadway. Labor cost is less than half the total cost of building repairs. The transportation of materials and tools from and to division headquarters is quite as serious a matter as the traveling time and personal expenses of artisans. Even the purchase of materials in small quantities at way stations at prices higher than those quoted by the purchasing department is often justified, when risk of damage, delay, cost of handling and the expense for transportation are considered.

Is there any more reason why a pane of glass and a small amount of putty should be shipped from division headquarters to a distant way station depot, than that a glazier should spend a night on a train in order to install the glass and take the next train back? Why not purchase the material locally, have the town glazier put it in and allow the company's local agent to pay the bill? Would not this be both cheaper and better than to have the section gang mark time while the foreman installs the glass?

But of course the purchasing agent and the auditor—quite so. But these matters may be put within the discretion of the foreman of roadway. The agent may be allowed to obtain for him wire authority for the material, labor and expenditure. The agent is the company's local treasurer and may be given authority to pay such bills promptly. If old methods must be altered and precedents established in order to increase efficiency, should not the old routine be eliminated and business done by the shortest, cheapest and best methods?

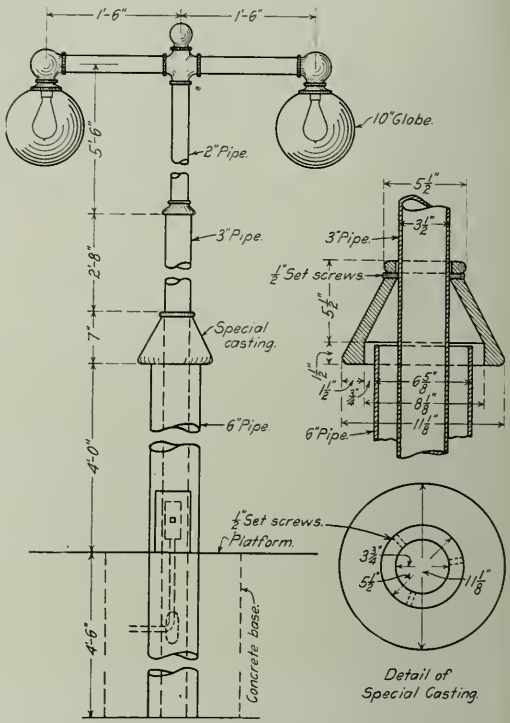
The proof of the pudding is in the eating. The best proof in this discussion is practical application. There are among the employees of every railway one or more men available who are capable of at once assuming the duties of foremen of roadway. The door is thus open for all to immediate small economy which may have far reaching results.

A SHOCK-ABSORBING CAST IRON LAMP POST

The Chicago, Milwaukee & St. Paul has used for a number of years a station platform lamp post made up of sections of standard sized, black cast iron pipe wherever electric power was available. These posts have proved fairly satisfactory, but in some cases the replacement of the globes and lights broken by the impact of baggage and express trucks striking the posts has been an item of considerable expense. This has been especially true on island platforms where the posts are set in the center and the trucking space on each side is limited.

After trying several schemes to eliminate this objectionable feature, it was found that when the lamp post proper is placed inside and entirely independent of a larger pipe extending some distance above the platform this outside pipe will absorb any shock received from trucks and will not transfer it to the lamp post, the lamps and globes therefore remaining unharmed. The improved post as used at a number of points recently is shown in the accompanying drawing, and the installation at Lewiston, Mont., where both side and island platform lights were required, is illustrated herewith. The 3-in. pipe which forms the lower section of the lamp post is set inside a 6-in. protective pipe and extends 4 ft. 1½ in. above the platform. Both pipes are embedded in concrete for a length of 4 ft. 6 in. below the platform level and the space between the two pipes is filled with cement mortar up to that level in order to give the larger pipe sufficient rigidity to enable it to act as a cantilever in absorbing shocks. In setting the posts it has been found desirable to place them before the platform is built, so that the joint at the platform line will be as solid as possible.

The top of the outer pipe is covered by a special casting, uniform in appearance with the standard reducing coupling used



Details of C. M. & St. P. Standard Lamp Post for Station Platform Lighting

between the 2-in. and 3-in. sections of pipe about half way up the post. This casting is slipped over the 3-in. pipe and held in place by three ½-in. set screws with its lower end covering the

A Recent Installation of a Shock Absorbing Lamp Post Design at Lewistown, Mont.

end of the 6-in. pipe. An annular space of ¾ in. is provided between the casting and the pipe to allow for free vibration when the outer pipe is struck. We are indebted for the information contained herein to C. F. Loweth, chief engineer.

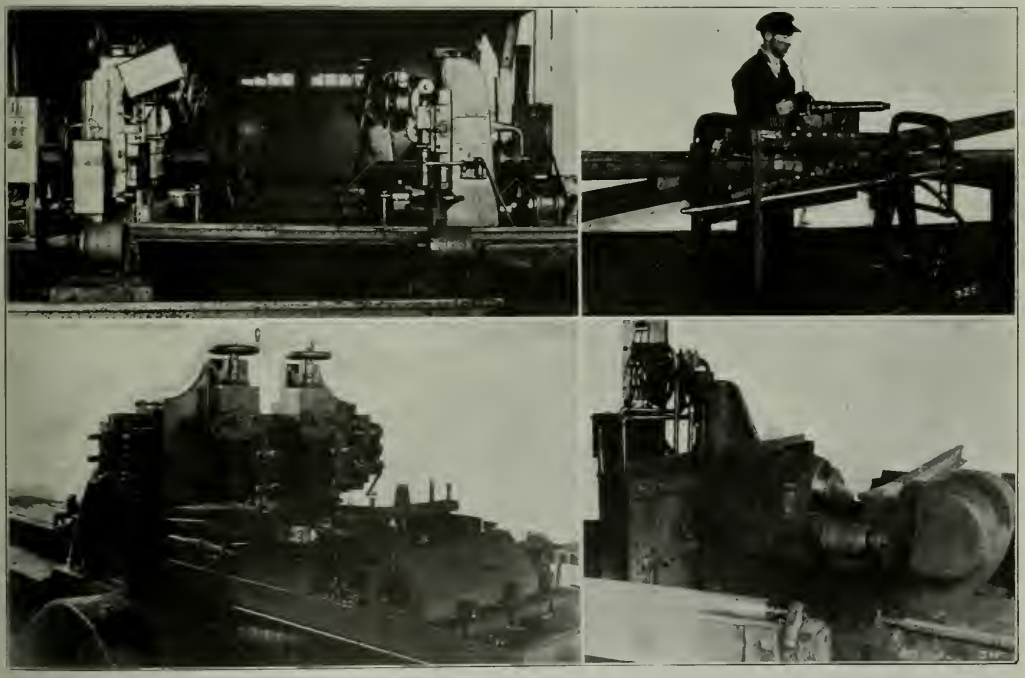
Norfolk & Western Frog and Switch Shop at Roanoke

Practically all Frogs, Crossings, Switches and Guard Rails Normally Required by the Road are Made at this Point

The Norfolk & Wetsern maintains a frog and switch shop at Roanoke, Va., at which are manufactured practically all of the frogs, crossings, switches and guard rails required on this road, and in addition repairs are made to motor cars, track jacks, drills and other track tools, switchstands, frogs, etc. The continuation and extension of the work handled at this plant is the best indication of its success, both as a means of reducing the cost of manufacture and repairs of the parts handled and of increasing the facility with which the maintenance work can be carried on by providing a supply of this material regulated closely to the demand. As an indication of the latter advantage, any standard frog or switch can be secured out of stock without any delay, and in general, a special frog or crossing can be finished in three days.

The frog and switch shop is a part of the road's general shops throughout the other shops where the equipment and material can best be assembled. The shop is in charge of a superintendent, H. J. Sauter, reporting to the superintendent of shops, and employs an average working force of 50 men. The monthly capacity in frogs, switches and guard rails is 150 each. The record for a year ending with a recent month showed that 677 rigid frogs, 702 spring frogs, 1,309 switches and 996 guard rails had been manufactured, while 50 motor cars, 18 hydraulic jacks, 193 track jacks, 12,654 track tools, 44 track drills, 337 switchstands and 20 frogs had been repaired.

The rail mill is operated by 15 men who handle the rail from storage over the skids to the shop where the ends are sawed and chipped and new holes drilled, after which it is classified in the yard and loaded on cars for delivery to relaying points or piled for storage. The average daily output of this plant is 450 85-lb.



Above—Two Three-Spindle Drill Presses for Redrilling Relaying Rails
Below—A Planer Working on Frog Tongue Rails

Above—Assembling and Riveting Together the Parts of a Frog
Below—An 80-Ton Hydraulic Rail Bender

at Roanoke which allows advantage to be taken of facilities in other departments and modifies to a certain extent the equipment necessary. The frog and switch shop building is 72 ft. by 192 ft. in size, with an ample area for the storage and classification of rail adjacent to the building, as shown in one of the accompanying illustrations. The main building is used for the manufacture of frogs, crossings, switches and guard rails, an addition next to the rail yard is used for the sawing and redrilling of rails taken from main tracks, and the repairs to motor cars, tools, switchstands, etc., as well as the reclaiming of angle bars, spikes, track bolts, etc., are handled at various other points

rails in eight hours. Rails are loaded and unloaded by a 20-ton locomotive crane with a magnet, having a capacity of approximately 900 tons per day of nine hours. The rails are sawed by a friction saw, which was manufactured at the Roanoke shops, driven by an 80-hp. motor at a speed of 2,700 r. p. m., and having a capacity of sawing 85-lb. rail (one cut) in 12 seconds. The rails are redrilled by two three-spindle, motor driven rail drill presses having a capacity each of 1,350 holes in eight hours. These drill presses are shown in one of the accompanying illustrations.

The rails, plates, filler blocks, etc., used in the manufacture of

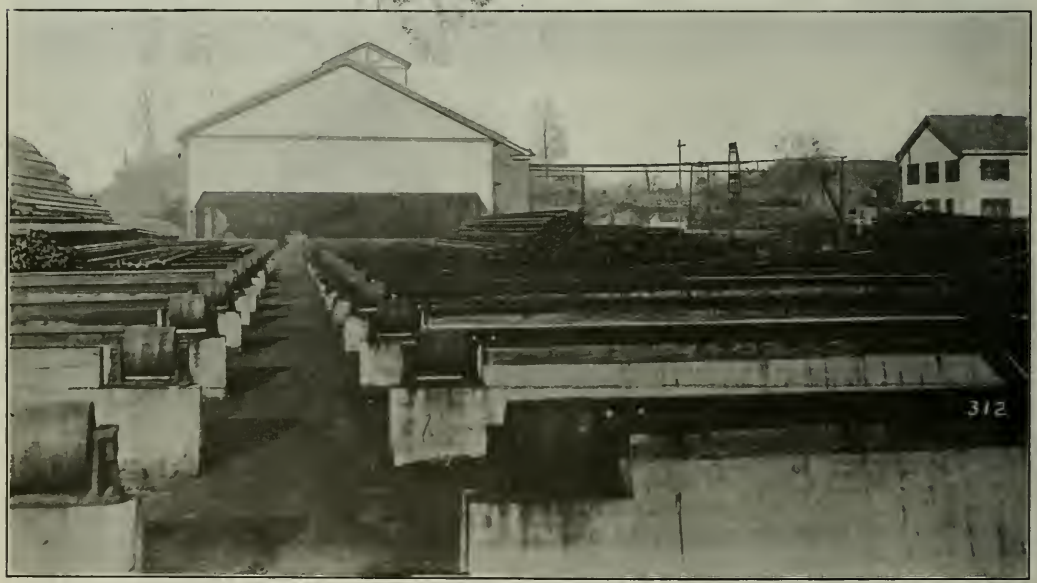
frogs, crossings, switches and guard rails are unloaded on the storage skids when received and taken into the main shop building as required. In this building are located all the machines needed for sawing, bending, shearing, drilling and planing the rails, and ample space is provided for assembling the frogs and crossings and riveting the parts together. A cold cut-off saw is used for making either straight or angle cuts of rails and a saw-

A Pile of Reclaimed Angle Bars Illustrating the Possible Saving from Scrap

sharpening machine is included in the equipment. The rails are bent in an 80-ton hydraulic machine illustrated herewith. This machine is operated by three men and requires 30 min. to bend the rails complete for an 85-lb. rigid frog, and 7 min. for an 85-lb. switch or a set of 85-lb. guard rails. The rail-base shearing machine is operated by two men, shearing the rails complete for a rigid frog or a set of guard rails in 5 min., and for a spring frog in 3 min. The rivet holes in rail bases and plates are drilled by a 36-in. drill press. The planing of rails is handled by a 48-in. draw cut shaper and three planers. One of the operations, for which the shaper is used, the shaping of planer tool clearance in frog tongue rails, requires 8 min. The planer shown in one of the accompanying illustrations requires 1 hr. and 48 min. to plane the four frog tongue rails on which it is working. One of the other planers can finish two 100-lb. 18-ft. switchpoints in 1 hr. and 54 min. Three holes in the web of a frog rail can be punched by a punch and shear in 3 min. A swinging grinder and pneu-

A Pile of Completed Frogs in Stock, Showing Typical Spring and Rigid Frogs of the Types Manulactured at Roanoke

matic chipping hammer is used for finishing switchpoints, this operation requiring 5 min. All frogs and switches are riveted in preference to bolting, the assembly of a frog being shown in one of the accompanying illustrations where 50 rivets are being applied, including the reaming of the holes, in 50 minutes by 2 men. The frog tongues can be riveted together by a yoke riveter in 5 min. Air hoists are provided throughout the shop for the handling of the heavy material and careful study is given to the sequence of operations to eliminate as much handling as possible.



Rail Classification and Storage Skids, Showing Frog and Switch Shop in Background

The reclaiming of angle bars is handled in the blacksmith shop where old bars sorted from the scrap received at the scrap wharf are heated in an oil furnace and swedged under a drop hammer. This work is done by two men with an average daily output in 8 hours of 170 85-lb. Bonzano bars or 290 85-lb. straight angle bars. The cost for the reclaiming is about $0.15 per pair. Old spikes and track bolts are also sorted from the scrap received, the spikes being straightened by hand on an anvil and the bolts stripped of the nuts and rethreaded. This plant is also handling the reclaiming of bar iron by rerolling to standard sizes the miscellaneous material sorted from the scrap. These scrap reclaiming rolls are operated by five men, turning out an average of 5 tons in 8 hours. A washer-making machine installed near the scrap wharf and operated by one man has a daily capacity of approximately 2,500 lb. of assorted size washers, the material for which is secured from the miscellaneous scrap. A rivet-making machine and furnace operated by two men has a capacity of 30,000 rivets in 8 hours.

In the repair of track drills all parts are ordered from the manufacturer, the drill being given a through overhauling and put back in service practically as good as new. In the repair of frogs, the old plates, spring boxes, reinforcing bars, etc., are used, thus saving a large amount of material from scrap and considerably reducing the cost. All old track tools are repaired that have the eyes left in them. All the parts needed in the repair of switchstands are made in the shop with the exception of the malleable and cast steel parts.

We are indebted to A. C. Needles, general manager, for the above information.

THE VALUE OF NEATNESS

By an Ex-Section Foreman

While the subject of economy in railroad operation has received wide discussion during recent years, very little attention seems to have been given in these discussions to everyday neatness. Neatness is a fundamental quality in all economical operations. The house-wife who is so overworked or harassed with other duties as to be unable to keep the home in orderly condition, or who for reasons of education and environment is lacking in knowledge of the essentials of neatness, is found to be

Fig. 1—Exterior of an Untidy Tool House

the one who is also wasteful and extravagant in the use of supplies. So it is with many railroad employees whose duties have to do with the use of materials and supplies, and who are kept so busy with their routine work that they never seem to find time to tidy up the premises. There are many others who lack the proper instructions and supervision necessary to enable them to make economical use of the company's property intrusted to their care.

One of the larger railroad systems operating out of Chicago, recently conducted a general campaign on neatness, the pleasing effect in improvement of station buildings and station grounds being at once very noticeable to the public. At the same time, a quantity of serviceable supplies, such as lamps, lanterns, oil cans and similar items were returned to the division storehouses as surplus collected from these stations. In connection with the

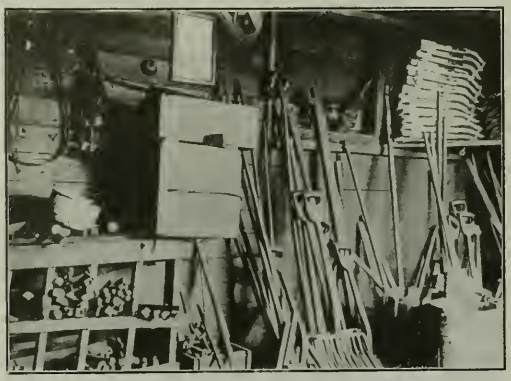


Fig. 2—Interior of the Same Untidy Tool House

same campaign which was extended to division offices, switching yards, and all other points on the system, the section tool houses were given a thorough straightening up.

Unfortunately the general idea seems to prevail that it is not necessary to keep a section tool house in neat condition. Frequently the tools are tossed in a heap on the floor at the close of the day's work and new material, when received, is shoved into a back corner until needed. It seems so easy and natural to allow the tool house to remain in a disorderly, untidy condition that material becomes damaged from long exposure to the weather, and tools and supplies are mislaid and cannot be found when wanted.

The railroad referred to above has a published list of equipment standard for each section tool house. It also operates sup-

Fig. 3—Exterior of a Neatly Kept Tool House

ply cars which are supposed to keep this matter checked up on each trip. Neatness, however, had been a secondary consideration, if thought of at all. There was therefore much work required to straighten up many of the tool houses and surrounding grounds and to remove the tools and material which was so evidently a surplus, once the stock was in neat, tidy condition.

The illustrations show in Figs. 1 and 2 the condition of a section tool house no worse than may be found on any large rail-

road system. When the order came out to "clean up" the following items were found in this house which were not required by the force employed:

24 new track shovels.	1 clamp for a rail drill.
7 old track shovels.	14 tamping picks.
5 ballast forks.	4 tamping bars.
1,000 new nutlocks.	7 lantern frames.
36 torpedoes.	5 kegs track spikes.
60 frog bolts.	4 switch head rods.
1½ kegs of track bolts.	240 tie plates.
5 track chisels.	5 compromise rail joints
3 spike mauls.	19,000 lb. of track scrap.

Credit amounting to $192.37 was allowed for this surplus when returned to the storehouse and the tool house was left in such condition as to be readily checked up by the roadmaster or supply car clerk.

On the same district, there is located the tool house shown in Figs. 3 and 4. This is an ordinary tool house, no expense having

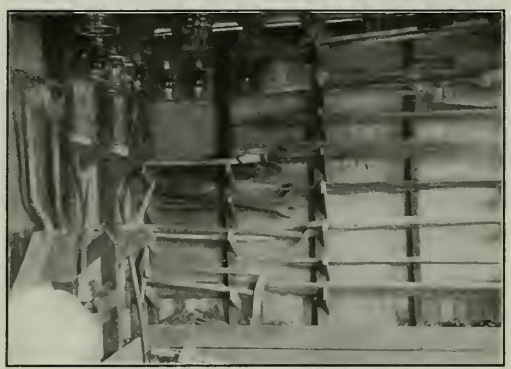


Fig. 4—Interior of the Neatly Kept Tool House

been incurred in fitting it up with the bins, racks or cupboards which are such a help in keeping a tool house in orderly condition. The section foreman, however, was naturally neat and careful, and the illustrations show the orderly manner in which his tools were kept. Only a few moments were required to check over the contents of this tool house and no surplus articles of any kind were found therein.

The lessons in neatness taught employees on the railroad system referred to, have proven the longest step in the direction of economy which this railroad has ever made. Where a place is kept in neat systematic order, surplus of any kind becomes at once noticeable, and by being properly disposed of, it becomes an asset in taking care of actual wants in other localities.

MAKING BRICK WITHOUT CLAY

A new process of making brick which is not dependent upon the presence of so-called natural brick clay has been invented by A. Malinovszky, a ceramic chemist, and a plant to manufacture brick according to this process is now being built at Lincoln, Ill. The process consists of combining chemically any coarse material containing silica with a binder of finely divided particles of alumina, silica, potassium or sodium in proportions varying with the different substances and which may be determined by chemical analyses for each supply of material. One of the purposes of this process is to obtain a low fusing point for the binder and a relatively high fusing point for the coarse material. The material is molded, preferably dry, under high pressure and is fired in a manner similar to that used in the manufacture of ordinary brick. The process of firing, however, requires a much shorter period, usually two or three days in an ordinary down-draft kiln. It is proposed to utilize tailings from coal mines at the new plant at Lincoln, and it is stated that on account of the wide variety of materials which can be used, including the by-products of many industries, the process should be applicable in many localities where ordinary brick cannot be made on account of a lack of deposits of good brick clay.

The bricks manufactured by the new process have been repeatedly tested and analyzed. In one test conducted by Robert W. Hunt & Co., an absorption varying from 1.66 to 2.75 per cent was found, and after this absorption test the brick withstood a temperature of 0 to 10 deg. F. for 48 hours and a five-hour exposure to a temperature ranging up to 2,900 deg. F. without cracking or showing apparent damage. A crushing test of the brick conducted at the University of Illinois showed a unit compressive strength of approximately 20,000 lb. per sq. in. Microscopic examinations made by Professor Rollin D. Salisbury, geologist, University of Chicago, have indicated that the texture of the brick is such as to make possible a high polish and the grain is so fine and even that clean cut lettering and carving should be possible.

The American Brick Company, Lincoln, Ill., owns the patent rights on this process and is at present engaged in the construction of a plant at that point.

SUGGESTIONS FOR A BOOK OF RULES FOR THE MAINTENANCE OF WAY DEPARTMENT, EMBODYING THE SAFETY FIRST IDEA

By J. T. Bowser

Maintenance of Way Department, Queen & Crescent Route, Danville, Ky.

Assuming that the organization of maintenance of way employees into safety committees or other similar organizations is impracticable on account of the manner in which they are scattered over the entire length of the road, some other means must be used to reach them and imbue them with the Safety First spirit. This can be done to some extent by correspondence, safety buttons, signs and personal instructions by supervising officials, but these at best are intermittent or of but temporary effect. The following rules are offered as a basis for a printed book or pamphlet to be placed in the hands of every foreman or other responsible employee in the department. For practical use they would, of course, have to be varied to meet conditions or conflicting clauses in the current book of rules.

General

(1) It is the duty of all employees to watch for, and to report to their superior officers, all matters involving the safety of employees and the public.

(2) When it can be done without neglect of other duties, employees will warn off trespassers or others whose duties do not require their presence on the right of way or tracks.

(3) General instructions concerning safe practices must be posted in tool houses or camp cars where they can be seen by employees, and employees should be required to read such instructions.

Supervision

(4) Employees entering the service are required to read or have read to them outstanding instructions or rules involving their own safety or that of others.

(5) Foremen working on double track will require their men to step off of both tracks while trains are passing.

(6) Foremen are required to stay with their gangs at all times, to keep watch for trains and to see that their men perform their work in such a manner that neither their own safety nor that of others is endangered.

(7) Yard foremen or others in charge of men working in places where the passage of engines or cars is very frequent, are prohibited from taking part in the work at hand or performing any other work which will prevent their keeping a proper lookout for trains or cars, unless they assign some responsible man to keep such a lookout.

(8) Men having defective sight or hearing or men who are habitually careless in their work are not considered desirable employees and must not be retained in the service.

(9) The use of gauntleted gloves by employees handling heavy material is prohibited.

(10) Except in cases of emergency, classes of work usually handled by other employees must not be required of employees not familiar with that class of work. (This applies particularly to handling of equipment and electrical work.)

(11) Under no conditions must high tension electric power wires be handled by other employees than those whose duties require them to look

after such matters. In cases of the breakage of such wires, a watchman should be left at such break until the arrival of the proper person to make repairs.

Clearances and Bad Footing

(12) Except on explicit instructions from proper authority, no track will be laid, nor will any structure be erected, which will not give ample clearance to a man on the side of a car.

(13) When conditions necessitate the construction of a structure or track which does not afford proper clearance to a man on the side of a car, a warning sign giving proper notice of this condition must be posted and maintained at a point where trainmen or others cannot fail to see it.

(14) When it is necessary to obstruct or in any manner change the nature of the ground where trainmen or others habitually walk or alight from trains, the despatcher or other proper authority must be advised so that notice to this effect may be put out.

(15) When it is necessary to make any radical change in tracks, structures or appliances in habitual use, proper authorities must be notified so that notice to this effect may be issued.

(16) Excavations left over night must be protected by railings, and temporary obstructions of any nature must be protected at night by red lights when this can be done without danger of such lights being confused with signals for train operation.

Hand Cars, Push Cars, Motor Cars and Velocipedes

(17) Track foremen will not permit the use, on their sections, of hand, motor, push, or velocipede cars, by others than those whose duties require the use of such cars or those having written permission from a proper authority.

(18) The use of cars for other purposes than the performance of duties is prohibited.

(19) Cars will not be used except when in charge of a foreman or a competent assistant.

(20) When passing trains on double track cars must be set off of both tracks.

(21) Where operators, 'phones or other means of communicating with the despatcher are available, foremen will obtain line-ups on trains before going out with cars.

(22) Foremen will protect their cars by flag when passing through tunnels or over portions of the line where trains cannot be seen for a sufficient distance to enable cars to be set off.

(23) The use of hand cars with wooden handles is prohibited.

(24) Foremen will not carry, or permit to be carried on their cars, any one not an employee of the company or any employee whose duty does not require the use of the car.

Use of Locomotives or Trains

(25) Employees in the maintenance of way department are prohibited from riding on locomotives. (This applies to work trains as well as other trains.)

(26) Except in the performance of their duties, employees in the maintenance of way department are prohibited from swinging upon or riding on trains or cars.

Camp Cars

(27) When camp cars are to remain at one station a week or more they must be spurred out or otherwise protected from trains or cars.

(28) All movable articles in camp cars must be fastened down or otherwise prevented from moving when cars are to be handled.

(29) Heavy tools or material must not be suspended but must be placed on the floor or otherwise prevented from moving.

(30) Foremen in charge of cars are required to see that steps, hand holds, ladders, etc., are maintained in safe condition.

Special Equipment

(31) The responsibility for the maintenance of all special equipment in safe condition lies primarily with the operator, but foremen in charge of work on which such equipment is engaged will make frequent inspection.

(32) Lines, blocks and other apparatus on derricks, hoisting engines, etc., must be thoroughly inspected and tested before being used after the machine has been out of the service.

(33) In freezing weather all water must be drawn from a boiler at night unless provision is made to keep it hot, and when equipment is to be stored, water must be drawn from boilers regardless of weather conditions.

Road Crossings, Gates and Fences

(34) It is the duty of section foremen to see that all grade crossings are maintained in a safe and passable condition, especial care being exercised during the automobile season.

(35) Section foremen will keep cleared away from crossings weeds or other obstructions which prevent a clear view of approaching trains.

(36) All employees will close gates in right of way fences when they are found open and will endeavor to have parties who use these gates keep them closed.

(37) Foremen will look out for breaks in the right of way fences or other conditions which will permit the entrance of stock onto the right of way and will remedy such conditions or will report them to the proper authority.

Inspection and Use of Tools

(38) Foremen will satisfy themselves daily that all tools used by the men under their supervision are in safe condition, and they will prohibit the use of tools found to be defective.

(39) The use of jacks on the inside of the rail is prohibited.

(40) Tools must be removed from between the rails or from points close to the track while engines or cars are passing.

(41) Tools not in use must be kept picked up and placed where they will not be an obstruction.

Scaffolding

(42) Foremen in charge of work which requires scaffolding will personally inspect all material to be used in the scaffolds and satisfy themselves that such material is entirely safe for use.

(43) Foremen will personally oversee the construction of scaffolding and will see that a safe construction is used. During the use of the scaffolds foremen will see that they are not overloaded.

(44) The use of scaffolds by employees or others whose duties do not require it, is prohibited.

(45) Runways or ladders must not be located under scaffolds or at other points where tools or material are likely to fall, and where a considerable amount of work is to be done, temporary railings must be erected to keep men from going beneath them.

(46) Cable and tackle scaffolds which have been stored or shipped must be thoroughly tested for deterioration or injury before being used.

Loading and Unloading Material

(47) Cars must not be loaded beyond marked capacity and top-heavy loading must be avoided.

(48) Forement will inspect all material to be used for standards or stakes and will see that they are securely applied. Properly braced end boards must be applied where rails or similar material is loaded on flat cars.

(49) Rails will be loaded by machine where possible, but when necessary to load by hand the following precautions must be observed: (A) Divide the gang equally on the ends of the rail; (B) Do not attempt to throw rail unless an ample force is at hand to throw it clear; (C) designate one man to call directions and prohibit others from calling; (D) do not attempt to load where men cannot get away readily should the rail fall back.

(50) Loading must be discontinued while trains or cars are passing on adjoining tracks.

(51) When unloading material a lookout must be placed to warn persons passing the car.

(52) Material should not be unloaded from both sides of a car but from each side equally. The same principle applies to loading material.

(53) Men should be called out of the cars when material is being dragged out of hopper bottom cars and should not be permitted to remain in any car while it is being switched.

Handling of Explosives

(54) The use of torpedo signals on station grounds is prohibited.

(55) The storage of dynamite of other explosives in tool houses or camp cars is prohibited.

(56) All shipments of explosives must be made in accordance with the rulings of the Bureau for the Safe Transportation of Explosives.

(57) The use of explosives by others than experienced men is prohibited.

(58) Charges which fail to explode must not be approached until the expiration of ten minutes and they should be removed only by experienced men. All others must remain at a safe distance.

(59) Explosives must be drawn from the magazine only as required and must not be left on the work under any condition.

THE PACKING OF ICE

During the past year the Atchison, Topeka & Santa Fe has been conducting experiments at several ice houses on the Oklahoma division with different materials used in the packing of ice and noting the shrinkage resulting. At Arkansas City, Kan., 406 tons of ice were packed in sawdust at an average cost per ton for labor and material of approximately $0.40. At Purcell, Okla., 502 tons were packed in paper at a total cost per ton for labor and material of $0.31. At Arkansas City 60 tons, or 15 per cent, were lost by shrinkage, while at Purcell the shrinkage amounted to 128 tons or approximately 25 per cent. At Shawnee, Okla., where paper was also used, the results were more unsatisfactory, although conditions at the latter point were not strictly comparable with those at the two other stations, as the ice was carried for a longer period and the insulation of the house was not in good condition. These tests have indicated, however, that the use of sawdust is more effective than paper in the prevention of shrinkage and more than offsets the difference in the cost of packing.

Naphtha Fuel for Galician Railways.—It is reported that the Russian railway authorities in Galicia propose to utilize the local naphtha fuel for locomotives.

ACCOUNTING FOR RAIL AND TIES*

By Charles E. Parks
Superintendent's Office, Atchison, Topeka & Santa Fe, Winslow, Ariz.

In construction, addition and betterment work rail and ties constitute a large item of expense; while, in ordinary maintenance work, ties themselves form perhaps the largest single item with the exception of track labor. Naturally, when a railroad spends thousands and sometimes millions of dollars annually for such material, a strict account of it is desirable.

For all purposes rail may be considered as practically indestructible, either in track or out. Ties are perishable and no attempt is made to account for them once they have been used. Unlike rail, they have no value as second-hand material for accounting purposes. It is necessary to account for all rail upon a division, and a record must be kept of it from the time it is received to the time it is shipped away as scrap. This record is a history of the purposes for which it is used. All rail on a division is classed under three heads: (1) Rail charged out; that is, rail inserted in tracks and capitalized; (2) rail in temporary tracks; and (3) rail on hand. Under each of these heads it is still further classified, first, as to condition, whether new or second-hand, and, second, as to weight.

In this complicated classification many errors and discrepancies will arise, discrepancies of such a nature that they can be adjusted only by arbitrary methods. It is for this reason that accounting for rail is so difficult. To anyone even slightly familiar with rail accounting three well defined avenues of error become at once apparent: First, errors as to the quantity of rail reported; second, errors as to the class of rail reported; third, the error of not reporting at all.

The quantity of rail is reported in lineal feet, or sometimes in tons; but, as the lineal feet must be known before the tons can be arrived at, the former is the primal factor. In reporting rail, it therefore is necessary to measure each rail length or compare other rails with rails of known length. In this the error lies in mistakes of measurement, which may be due to a hundred causes. Errors as to the class of steel are more numerous. Such errors are not always the result of carelessness or negligence, but are more often mistakes of judgment. To illustrate:

A section foreman reports a carload of rail as shipped. He submits a statement showing the quantity of each class of steel in the car. The rail is received on another section, perhaps on another district or even division; but the statement which the receiving foreman submits as indicating the amount and class of rail received is entirely different from the amount shown as shipped. In an endeavor to adjust the matter a re-check of the rail is made, but this count is entirely different from either statements.

An extra gang is laying a temporary track. When the track is completed the timekeeper submits a form showing the exact amount of rail laid. A few months later the track is taken up. But both the class and quantity of rail reported taken up differs greatly from the class and quantity originally reported laid, and we have no reason to doubt either reporting. These are mistakes of judgment and there are no means of avoiding them.

Errors which come under the third head cause the greatest discrepancies in rail balances. They are more serious because they usually involve large quantities, and if not discovered within a short time, they are seldom detected and must result in an arbitrary adjustment on the rail report or inventory.

No doubt any division which attempts to keep an accurate record of its rail on hand has met with similar difficulties. It has been demonstrated on the Albuquerque division, and no doubt on others, that for the superintendent's office to keep an accurate record of rail on hand from the monthly reporting of section or extra gang foremen was impossible. A few months after the inventory was taken, the sectional rail balances had failed to reflect actual conditions. In fact, more than one-third of the sections were in the red. This state of affairs was accepted by many as being a natural one, the theory being that it was impossible to keep an accurate record of rail by sections. The chances of error being so great it was assumed they could not be overcome. However, an analysis of the discrepancies and red items appearing on the rail report and rail balances month after month disclosed the reasons for these errors, as indicated in a foregoing paragraph. To remedy such conditions and to endeavor to eliminate or reduce to a minimum the mistakes which naturally arise from the accounting of such a highly classified article, a system has been inaugurated on the Albuquerque division of the Santa Fe which involves a close co-operation of men and officers most interested.

To begin with, a reliable and accurate inventory is taken at the beginning of each fiscal year. This inventory is taken primarily by section foremen and includes all rail and ties and such other material as is necessary to be taken which lie within the boundaries of each section. The foremen are usually allowed two days in which to take this inventory and at the same time are assisted by the roadmasters and by the division accountant, who make it a point to travel over the districts for this purpose. The third day the inventory is checked. Each roadmaster, accompanied by some representative of the superintendent's office or the storekeeper, travels over his district, collects the inventory books and checks the entries. Sometimes this check requires three or even four days, but, as accuracy in the inventory is the foundation for rail balances throughout the year, the time is well spent.

As soon as possible after this inventory is taken each section foreman is given a statement showing the amount of rail or ties on his section. This statement also contains the amount of rail in tracks either connected or disconnected. Thereafter, at the end of each month, he is required to report to his roadmaster the amount of rail and ties on hand. The form of this report for rail is as follows:

Section Number 37

Statement of Rail on Hand for the Month of May, 1914

	New 90	New 85	Old 90	Old 85	Old 75	Old 66
Rail on hand 1st of month.....	450	33	66	900	30	5,000
Rail received during month.....	2,000	..	33	99	..	30
Total	2,450	33	99	999	30	5,030
Rail used during month.....	450	..	66	66	..	30
Rail shipped during month.....	..	..	..	900	..	5,000
Balance on hand end month..	2,000	33	33	33	30	..

Foremon

This is a mimeograph form sent out by the superintendent's office and is rendered by section foremen in addition to the regular report of rail transactions in the time book. In fact, it is rather a recapitulation of all rail transactions which occurred on the foreman's section during the month.

The same procedure is undergone in respect to ties, and a similar form is rendered. However, the accounting for ties is less complicated and the great source of error is the failure to report rather than errors in classification.

The co-operation which is secured by this report is self-evident. It encourages the section foremen to obtain accurate figures and indicates plainly discrepancies which are the result of errors. A foreman has but to take an inventory and he can tell immediately whether his rail reporting has been in error or whether there has been a mistake on the previous inventory. Roadmasters always have first-hand information as to the amount of rail or ties on their sections without waiting for tardy sectional balances from other departments. Superintendents' offices have a means at hand to check instantly any discrepancies or irregularities which may arise.

It might be said that these remarks apply only to divisions engaged upon routine work. Where much construction work is being done or where a large amount of double track is being laid the foregoing procedure will not apply, for it is then a matter more of good luck than of good judgment to keep the rail and tie balances straight.

*From the Santa Fe Magazine, February, 1915.

Promoting the Growth of Vegetation on the Slopes

Methods and Cost of Placing Sod and Various Plants to Prevent Erosion of the Banks and Reduce Maintenance

By W. F. Rench
Supervisor, Pennsylvania Railroad, Tacony, Pa.

It is only within about 15 years that the larger railroad systems have been committed to a definite policy of encouraging the growth of vegetation upon the slopes of cuts and within a still shorter period upon those of embankments. But the results obtained have been so marked that the practice has continued on those roads and has extended to the smaller roads and even to those upon which by reason of a total absence of passenger traffic the matter of appearance is of no special moment. The economy is therefore recognized and the only question is that concerning the type that is preferable for a particular location. To aid in the determination of this question certain types that are of somewhat general application will be discussed in detail.

SODDING

The sodding of slopes of both cuts and embankments is justified by the saving in roadway cleaning alone, aside from the improved appearance of the roadway. In addition, the advantage as a protection against accident may not be fully appreciated. Many maintenance officers have been concerned at some time with the upkeep of a new line. These men appreciate fully the dangers that are inherent in new fills even for long periods after their use is begun. Only in those rare instances where the fill is entirely of rock is there complete security against slipping. The breaking of a new embankment constructed wholly of gravel, during a heavy fall of rain lasting only one-half hour, which resulted in temporary discontinuance of service on the nearest track, is within the recent experience of the writer. Sodding the slopes of the new embankment was then in progress and the completion of this work at the point that failed furnished entire protection against further slipping. As the benefits that may be expected from sodding were fully illustrated in this one operation it will be instructive to review the work briefly.

The piece of road in question is part of a main line carrying a daily traffic of 250 trains. Although the height of the fill averaged 22 ft. for more than three miles service was inaugurated at a speed of 30 miles per hour, which was increased after 36 hours to 50 miles per hour and after one month to 70 miles per hour. The original grading was purposely made wide to provide for the erosion that was expected to occur through the winter, the shoulder of the fill being uniformly 9 ft. from the gage line. By the middle of the succeeding spring it was found that money was available for sodding and this work was prosecuted through the entire summer and fall until a total of 10 acres had been laid. This was possible during the months of July and August, which were very hot and almost rainless, by reason of an unlimited quantity of water being available through the fire hydrants of the city. The sod was all cut from company ground, but half of it had to be shipped from a point 15 miles distant. It was cut in 12 in. squares and was all handled flat. Experience has shown that the percentage of breakage is greater when the sod is cut of a greater dimension or when it is rolled. The sod cutter which effects a saving of two-thirds the labor of cutting by hand was not available for this operation.

The gravel of the fill contained very little loam and it was necessary to apply a covering of top soil. The considerable length of the slope, 40 ft. at the average depth, precluded the delivery of the top soil wholly from the bottom, although it was found practicable to thus supply the lower half of the slope. The upper half was supplied from cars working upon the nearer tracks which at that point were those assigned to passenger traffic but whose use was obtained at proper times. By reason of the great amount of top soil required and in order to occupy the main tracks as little as possible, a minimum thickness was decided upon which was generally 2½ in. This depth proved to be a good choice as practically none of the sod was lost through slipping although no pegging or other support was given. The sod was well rammed as laid and the watering through a 2½ in. hose was done without force. A very small area was lost during a heavy downpour of rain the spring following and this occurred where a depth of 12 in. of soil was used to fill a depression in the slope. It is quite probable if the top soil had been applied of a much greater thickness than 2½ in. there would have been extensive slipping. The need of fertilization for so thin a mold was not overlooked and the entire area was plentifully sprinkled with bone meal the spring succeeding the sodding and care was taken to afford the slope receiving the direct rays of the sun the greater advantage.

A careful account of the expense of this sodding as well as for an equal amount at other points gave an average cost for the sod in place of 1½ cts. per sq. ft. The regrading of the slopes and the addition of the top soil made the average cost of the finished work $1,000 per acre or about 2⅓ cts. per sq. ft. The total expenditure of $10,000 for sodding upon this one operation was warranted alone by the greater security against accident. The cost of mowing the banks, which is necessary about four times during the season, is $9 per acre at each cutting; but this is no more than a periodical regrading of the banks to resist erosion would have cost. There is the further item of attractiveness through the enhanced beauty of the roadway, which is not measurable.

STIMULATING GROWTH BY STREET DIRT

There are many slopes especially of cuts where the expense of sodding is not warranted or this method is impracticable, but where both for appearance and stability, a turf is desirable. It will be a matter of surprise to those who are unacquainted with the efficacy of street dirt fertilization to observe the quick growth that may be obtained by its use. A good turf has been developed in six months, a firm one in a year and two years produces the equivalent of an old sod.

There are certain points to be observed in this culture. On account of its lightness the material is easily washed away and the best results are obtained by applying it after the spring rains are over. If sown with eight bushels to the acre of the mixture given below, an application of this material about June 1 should produce a turf by the middle of September that would ordinarily be proof against the fall rains:

Awnless brome grass	1 bushel
Canadian blue grass	1 bushel
Orchard grass	1 bushel
Herd's grass	1 bushel
Turkestan alfalfa clover	1 peck

Street dirt should not be applied too thickly upon banks. A layer generally 2½ in. deep after all paper and other waste has been taken from it is the most favorable. It is not necessary to regrade the eroded surface of a bank before the street dirt is applied and this fact alone recommends the method where cheapness is a governing requirement. It may be spread as late as the middle of October, but after that time it is apt to be mostly dead leaves and should be allowed to rot in a pile over the winter to be ready for use in the spring. Besides its cheapness this method has been known to develop a growth when all other means have failed. There are cuts upon whose slopes sodding has been tried with every known precaution but without

avail, but which have responded to persistent applications of street dirt plentifully sown with the above mixture. The material may be obtained from contractors for street cleaning in any of the larger cities, loaded upon cars without cost.

HONEYSUCKLE

There are many varieties of this prolific vine but the only one of concern in this discussion is that which trails along the ground and is commonly known as woodbine. It most probably is a garden hybrid of the main family. The woodbine may be grown in any soil either from the root or a cutting. It takes root wherever it touches the ground provided the soil is not too hard. In that event it will not spread but will grow up bushy. The best results are had by planting in March either the roots or sections of the vines set five or six feet apart or closer if a mat is desired more quickly. It grows slowly the first year but faster thereafter and will cover the ground in about three years. The mat then formed will resist any wash. It is superior to sod for preventing unstable soils washing down into the ditches and as a means of retaining a steep slope necessary by reason of insufficient property, is of unequaled utility.

This vine blooms profusely in the early spring and continues a moderate flowering late into the autumn. The blossom is very fragrant and its odor may be caught on passing trains. Areas covered by it require no cutting and there is thus no expense but rather a saving of expense from its propagation. As it retains its moisture late, fires seldom catch in its vicinity.

There are several varieties of summer and autumn flowering perpetual briar roses which by reason of their dwarf habits and their wide and deep rooting characteristics form an excellent means of protecting the slopes both of cuts and embankments, besides supplying the element of beauty that tends to make travel agreeable. The R. Rugosa, or Japan rose, has been much employed upon both kinds of slopes but on account of its somewhat irregular growth it is apt to convey an impression of neglect and is somewhat better suited to fills where its holding advantages alone prevail. The R. Humilis or Lucida, which seldom grows higher than 18 in. and tends more toward uniformity of growth, is the preferable variety for use upon the slopes of cuts since it always presents the appearance of being cultivated even though no care is actually required. Both plants are exceptionally hardy and they may be grown anywhere between Maine and Florida. Their foliage is nearly evergreen but quite late in the fall the leaves turn purple, orange and yellow and they bear a red berry which gives the plants an exceedingly attractive appearance at all times. Like all roses they may be grown in almost any kind of soil except a very loose and sandy one and require little cultivation. They should be set out in the early spring, from 2 to 3 ft. apart and as deep as in the hot house mold. A light covering of street dirt is very effective when growth is being started. These roses can be propagated by seeds but they may also be grown readily in summer under glass from cuttings of nearly ripened wood. A single plant will furnish in several seasons as many as 500 cuttings. The R. Wichuriana, or Memorial rose, a half evergreen shrub with prostrate and creeping branches, and one of the hardiest of trailing perpetual briars, makes a beautiful covering for banks, but does not have as great holding power as the two other roses named. The abhorrence of all roses for continual dampness is well known and their cultivation on wet slopes is therefore not practicable. The New England roads have many miles of roadway planted with roses and the Pennsylvania has been using this protection with success for several years.

ALFALFA

This hardiest of perennial forage plants is cultivated in the most diverse localities, but is especially adapted to land that is neither low lying nor extreme in altitude. It has a large tap root with very few side roots. Its extreme penetrating power renders it a valuable protection against ultimate slipping of the banks but the time required for developing its hardiest growth renders it rather a better selection for older banks. It can only be grown in a fertile soil and the best results are had by developing this feature the year preceding the alfalfa seeding. Common fertilizer will produce a growth of weeds which must be destroyed before they reseed as these greatly impede the growth of the plant. It is even desirable to cut the first crop of alfalfa early before the weeds have had a chance to reseed. In fact, as full development cannot be expected until the third year, the principal aim in the meantime should be to eradicate the weeds. After a full growth is established no further cultivation is necessary.

For the best results the top soil should be light and not sandy and the soil of a clayey loam. It is desirable that the sub-soil also be of a clayey nature, as this will retain the moisture needed by the plants in the drier seasons. The thorough surface drainage necessary is afforded by its cultivation on slopes; but for the flat ground above or below the slopes it is necessary that depressions be filled up, as the plant will not thrive in marshy ground. A gumbo element in the soil if properly cultivated is not objectionable. Farm manure should be worked into such soil to lighten it and render it permeable to air and water.

It is usually thought that inoculating soil is necessary for the cultivation of alfalfa. Doubtless such addition is an advantage and its use is recommended where it can be conveniently obtained either from soils in which the plant has been grown or commercially. However, good results have been obtained without any inoculation.

This plant is a prolific seed producer and no expense is necessary for further seeding. It is a favorite food for all sorts of stock and it is seldom difficult to command the services of adjoining farmers to harvest the slopes for the hay obtained. As many as six cuttings might be made in a season. The plant has been successfully cultivated for a roadway protection upon the slopes of embankments throughout the low lying lands of the Atlantic sea coast.

OCCASIONAL GRASSES AND SEDGES

There are other plants which have been found useful for holding embankments but which are of somewhat less common application. Bermuda grass ranks high as one of the turf forming grasses. It is extensively cultivated in the southern states but is generally distributed over the warmer portion of the United States. It does not thrive in the more northerly districts, which are subject to long continued periods of dry weather, except where the means is available for plentiful watering. This grass spreads freely by creeping root stocks. Like the grasses in general it requires good drainage. Where appearance is an important consideration, June grass should be mixed with it. These supplement each other in different kinds of weather and assure a green bank during every part of the growing season. The other grasses that have good binding qualities are quack grass, Rhode Island Bent and red top.

Irish Heath is one of the sedges that has been used with greater or less success for holding the slopes of cuts. It is an evergreen plant and bears a small purple or white flower. It is propagated by seeds or cuttings and thrives best in peaty, sandy soils. Protection must be afforded the plant during the winter in the northern parts of the United States. Slopes along the Pennsylvania have had the protection of this plant for periods of 15 years, and while the growth is quite satisfactory when established, its development is somewhat tedious.

English Railways Compelled to Curtail Passenger Service.—It has been officially stated by the English Railway executive committee that in order to keep the lines as free as possible for military and naval traffic, it has been found necessary still further to curtail the service of passenger trains and facilities in certain particulars, which will be duly notified to the public.

A PNEUMATIC TIE TAMPER

The New York Central & Hudson River used 12 portable compressed air plants during the past season for the operation of pneumatic tie tampers. Experiments have been made on this road with pneumatic tools for this purpose for several years and the experience gained in these trials showed the necessity for a number of changes in the design of the early types of such tools to secure the best tamping results and to make them easy to operate.

The Compressor Car with Machinery Enclosed Ready for Operation as an Ordinary Motor Car

The principal advantage claimed for this system of tamping is the greater speed with which the work can be done. It has been stated by supervisors who have tried these machines that two men with a machine can tamp 350 to 450 ft. of track per day, or about as much as 10 men using ordinary tamping bars. One unit, consisting of a compressor and two machines, was worked continuously through one season and a careful record was kept of its performance and cost of operation. This record showed that two men could tamp 300 ties per day and the cost of tamping was $0.026 per tie as compared with a cost of from $0.10 to $0.20 per tie by hand tamping.

In addition to this, the rapid vibration of the tool serves to compact the ballast under the ties more uniformly than is ordinarily possible by hand tamping and the pneumatic tamper can be used around frogs, switches and crossings in limited space where it is extremely difficult to work a tamping bar. An indication of the increased stability of the track resulting from pneumatic tamping is furnished by tests conducted on the West Shore. Two adjacent sections, each 800 ft. long, located on the Hackensack Meadows where the foundation is soft and it is difficult to maintain the track, were selected for the tests, one section being tamped by hand and the adjacent section by the pneumatic machine. This track was not retamped for six months, during which time it was subjected to very heavy traffic. Provision was made to measure accurately the amount of settlement from fixed stone monuments, which showed at the end of the test that the maximum settlement in the hand-tamped track was 0.116 ft., and in the machine-tamped track 0.063 ft. The minimum settlement on the first section was 0.018 ft., and on the second, 0.004 ft. The average settlements were 0.067 ft. and 0.033 ft., respectively, showing that the machine-tamped track settled about half as much as the section tamped by hand. It is stated that the machine is equally effective in gravel, cinder, crushed stone or other ballast.

One of the Tamping Machines Fitted with the Proper Bar

The compressed air is furnished by an Imperial type, X-11, Ingersoll-Rand air compressor direct-connected to a 12-h.p. gasolene engine. The compressor and engine with the fuel tank, radiator, air receiver, tool box and automatic discharge unloader, are mounted on an ordinary 5 ft. by 8 ft. flat car fitted also with cross trucks having double-flanged wheels to allow the car to be removed easily and quickly from or placed on the track by four men. The car is self-propelled, being geared for a speed of 12 to 15 miles per hour and will carry 12 men. The compressor plant is completely housed in, although the sides of the housing may be removed when it is set out along the track for the operation of the tampers.

When the car reaches the work each side is raised in turn two or three inches to allow 2 in. by 4 in. scantlings to be slipped under the derailing wheels and on these the car is rolled to the outside of the main track. A simple rest suitable for supporting the car on steep embankments has been made by placing four old crossties vertically on the slope with their tops about level with

The Compressor Plant Supported at the Side of the Track Showing the Tampers in the Background

Two Men Operating the Pneumatic Tampers

the rails. These tie rests have been placed about 500 ft. apart, and, while very convenient, they are not absolutely necessary as a crib of ties will answer the purpose equally well. Where the fill is not great blocking will serve the purpose. As the car weighs only about 1,740 lb. fully equipped, four men can easily shift it in 45 minutes.

When the car is in position at the side of the track, the compressor plant is started and the ¾-in. supply hose connecting with the tampers is carried out along the tracks as needed. Supply hose in lengths up to 600 ft. has been used with satisfactory results. The compressor has a piston displacement of 49 cu. ft. at 80 lb. pressure, which is sufficient to operate two tampers continuously. Ordinarily two tampers are worked together on opposite sides of the tie in the manner usually followed with tamping bars. The tamping machine is fitted with two handles and its operation is not at all objectionable to the men. In some of the earlier models of pneumatic tamping machines a long stroke was imparted to the bar, but this was found to jar the man holding the machine so severely that it was quite uncomfortable. The machine illustrated herewith has a stroke of 1½ in. and can be held without any resulting jar. The tamper, including the bar, weighs 37½ lb. These compressor plants and the tamping machines were furnished by the Ingersoll-Rand Company, New York.

REMOVING THROUGH TRUSSES WITHOUT DISMANTLING

In renewing a four-span bridge over the Grand river at Ionia, Mich., on one of the branch lines of the Pere Marquette a unique method of removing the trusses without dismantling was developed. The old bridge consisted of three 130-ft. and one 150-ft. single track through pin-connected, skew-ended Pratt trusses with suspended floor beams upon which rested 15-in. I-beam stringers. The bridge was built in 1881 by the Detroit Bridge & Iron Works on piers and abutments of local sandstone of good quality. All the masonry was in good condition but the superstructure had become too light for the present loading.

After considering several plans for replacing this structure it

Raising the First Truss Span on Cars, Showing the New Girder Spans in Place

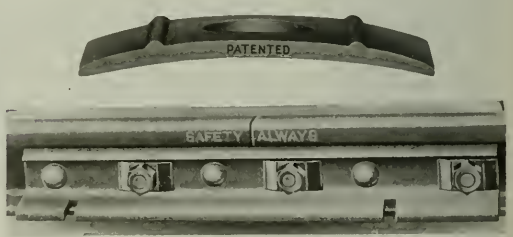
was decided to raise the grade about 6 ft. and install eight deck plate girder spans designed for Cooper's E-50 loading on the old piers and abutments and four new concrete piers at the mid-points of each of the old spans. The new piers were built first, using a derrick car for handling material and a concrete mixing plant mounted on a car in front of the derrick. In this way the new piers were completed without placing any of the plant in the river. After the piers were finished, the old trusses were jacked up to the new grade line and at the same time the earth fills were made in the approaches. As the work was handled at a season when the river is subject to sudden rises it was very desirable to avoid the use of false work and in the endeavor to accomplish this as well as to save expense the plan adopted was developed. The girder spans were placed one at a time, the main tracks being occupied about two hours for each of these operations. The new span was supported between two gondola cars which were run on the old structure to the proper location, the floor system of the old bridge in that portion of the span to be occupied by the girders was dropped into the river, and the new span then lowered into place. After the girders were all placed, the truss spans were raised one at a time enough to clear the tracks and approaches, and supported in this position on two gondola cars as shown in the illustration. The 130-ft. trusses weighed 107,500 lb. each, and the 150-ft. truss, 138,900 lb. The two cars

Lowering One of the Truss Spans from the Cars to Blocking Under the Panel Points

supporting the truss span were pulled to a point on the earth fill approach near one end of the structure where they were lowered onto blocking previously located to come under each panel point. With the trusses supported on this blocking the cars were removed and traffic could then be carried between them until they were dismantled. The track was occupied about four hours for the operation of supporting one of the spans on the cars, moving it and landing it on the blocking, the traffic being such as to permit this time to be arranged for. The dismantling of the trusses was handled quickly by a derrick car. The entire method worked out satisfactorily and proved to be very economical. This work was carried out under the direction of A. L. Grandy, chief engineer.

THE IMPROVED NEELY SPRING LOCK

The spring nut and bolt lock described in the *Railway Age Gazette* of August 21, has been radically changed in design, although it retains its distinctive features, which are the spring and the locking ribs. The new design shown in the accompanying illustrations is slipped over a bolt in the same manner as a washer, and as the nut is turned down it passes over the ribs until it is drawn tight, its final position being with the edges



The New Design of the Neely Spring Nut and Bolt Lock at the Top and Its Application to Track Bolts at the Bottom

of the nut parallel with the ribs. In this position the spring locking feature operates to prevent the nut from turning off or loosening under the impact of traffic, or as a result of the natural elongation of the bolt. This spring nut and bolt lock can be applied without special tools and can be used with either standard square or hexagonal nuts on standard track bolts. It is made from a high grade open hearth spring steel, each lock being heat treated, tempered in oil, and individually tested and inspected. This device is manufactured by the Neely Nut & Bolt Company, Pittsburgh, Pa.

Fuel Oil Stations for Extreme Climatic Conditions

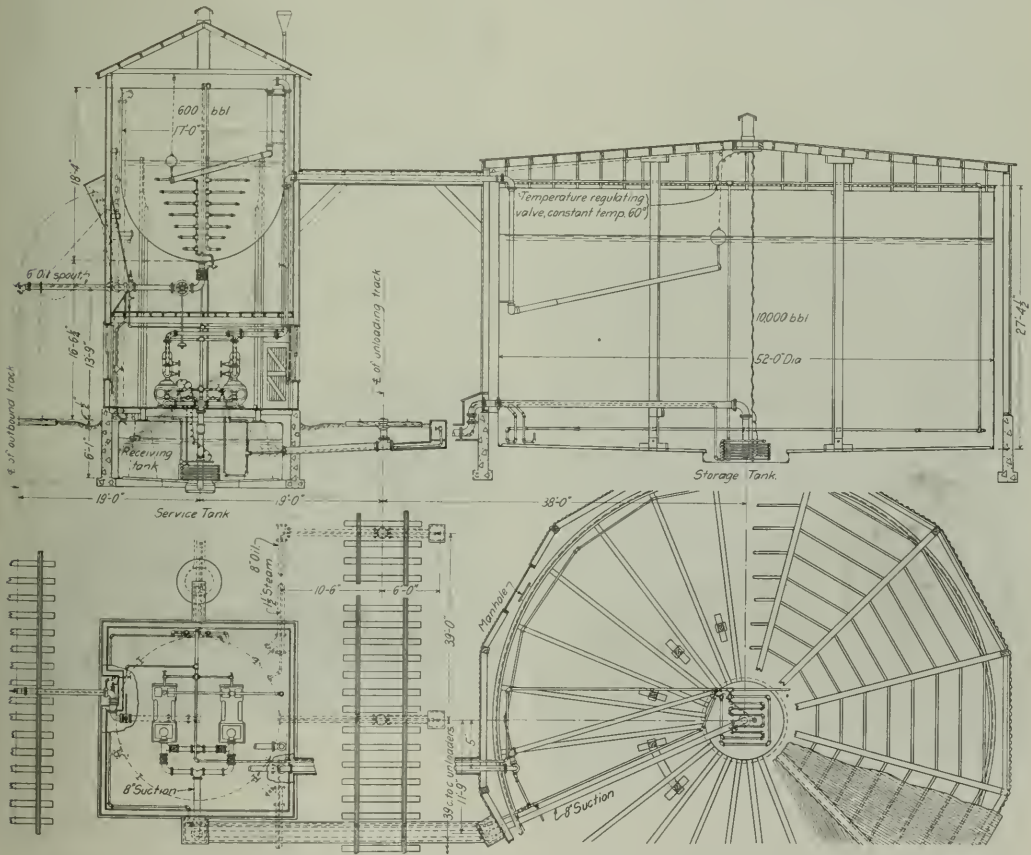
A Description of the Standard Layout Design for Six Divisional Points on the Grand Trunk Pacific

The Grand Trunk Pacific is planning to operate its line from Prince Rupert, B. C., east as far as Jasper, Alta., a distance of about 720 miles, with fuel oil, as soon as the necessary storage facilities are completed. This oil will be brought by boat from southern California to Prince Rupert, where large storage facilities will be provided by the oil company. The oil will be forwarded from this point to supply the interior fuel oil stations, which will be located at Pacific, Smithers, Endako, Prince George, McBride and Jasper.

While oil has been used for locomotive fuel on other western roads for a number of years, it has not been used under as extreme climatic conditions, the nearest approach being the Canadian Pacific lines, from 300 to 500 miles south. Along the line of the Grand Trunk Pacific the thermometer, which for weeks at a time stays in the neighborhood of zero, frequently descends to 40 below. On the other hand, California crude oil has the consistency of molasses and cannot run or be pumped unless it is at a temperature of 60 deg. F. This oil, to be delivered from the service tank to the locomotive must be heated to at least 100 deg. F. and not more than 110 deg., as a higher temperature will start evaporation of the volatile parts, thus reducing the efficiency of the oil as a fuel. From the above data it is evident that the proper heating of the oil is important.

The accompanying drawing shows the design which has been worked out to meet the above conditions. Each fuel station is located 400 ft. from the center of the roundhouse near the boiler room, from which the necessary steam for heating is obtained. The station is composed of two buildings, one, 20 ft. by 20 ft. by 35 ft. high, containing in the basement a receiving tank with a capacity of 240 bbl., on the ground floor a set of two pumps, indicators, etc., and on the upper floor a service tank with a capacity of 600 bbl. The other building of dodecagonal form, 56 ft. by 27 ft. high, contains the storage tank with a capacity of 10,000 bbl.

The service tank delivers the oil on the outbound track and a storage track is located between the two buildings. The building of the service tank rests on a concrete foundation



Plan and Elevation of Grand Trunk Pacific Fuel Oil Stations

forming the basement and is composed of a wooden structure, covered on the outside with corrugated galvanized iron, nailed to ship-lap and on the inside with ship-lap, hair insulator, nailing strips and ship-lap. The building containing the storage tank is a wooden frame structure resting on concrete foundations and covered with a roof made of five-ply roofing on ship-lap and the sides made of ship-lap, hair insulator, nailing strips, ship-lap and corrugated galvanized iron.

The receiving tank, which replaces the concrete sump generally used, will overcome the difficulty of heating and maintaining a concrete structure, which is almost impossible to keep water or oil tight, especially where the ground is soft, as it is at McBride and Smithers.

The receiving and storage tanks include a new feature in the design of their bottoms. Usually these large tanks have a bottom composed of rectangular plates with lap joints, which have to be assembled and riveted in the field. The assembling and riveting of such a large bottom is very difficult and has to be done on staging, which afterwards has to be removed while lowering the bottom to the ground. This is often the cause of deformation and rupture of rivets and plates and the disturbance of the foundation ground, which ought to be well leveled. It is not an unusual occurrence to have to raise the tank several times before water-tight joints are finally obtained. Besides these difficulties it is very hard to completely clean the bottom of the tank when necessary or to replace parts affected by rust or other causes of deterioration. To overcome all of these difficulties the bottom of the tank is divided into segments of such a size as can be readily furnished by the mills. These segments have small angles shop-riveted on them, the vertical legs of which are punched in order to connect the different segments together by riveting in the field. The whole bottom has a slight grade towards the center, which is made of a shallow tank one foot deep, shop-riveted and with the top angle turned inside; on this top angle the narrow ends of the segments are riveted. This arrangement allows the foundation, made of gravel and sand, to be well prepared and rolled to a true surface after the placing of the center part; then the different segments are placed side by side, temporarily bolted, and the riveting is done without disturbing the bottom. In case of accident the replacing of a part is easily accomplished by cutting the rivets in the vertical legs of the angles.

To operate these fuel oil stations one to three cars, placed on the storage track, are located so as to have their outlet pipes directly over cast iron catch basins, which carry the oil through 8 in. pipes direct to the receiving tanks. Steam pipes going through these pipes heat the oil running through the pipes and also the oil in the cars, by means of hose connecting the ends of the steam pipes to the heating systems in the cars. The oil in the receiving tank is heated, if necessary, by a set of steam coils placed in the center; the temperature being controlled automatically by a regulating valve, which will keep a constant temperature of 60 deg. F. This oil can be pumped direct to the service tank or to the storage tank through a 6 in. pipe, ended with an articulated galvanized iron spout to the extremity of which is attached a float keeping this extremity from 2 to 3 ft. below the surface of the oil. To the float is attached a cable which operates the indicators placed in the pump room. When no oil cars are available the oil is pumped directly from the storage tank to the service tank. The suction line is an 8 in. pipe leading from the floor of the storage tank directly underneath the tracks to the pumps. Both the inlet and outlet suction pipes, together with steam lines, passing between the two buildings are enclosed in wooden conduits. Each pump is of sufficient capacity to fill the service tank in two hours. Both pumps can be operated together in case of a rush or either pump may be shut off, allowing the other to work.

A system of steam coils, with a regulating valve, is placed in the storage tank, in order to keep the constant temperature of 60 deg. required around the suction pipe. A set of steam pipes with a regulating valve, giving a constant temperature of 100 to 110 deg. F., is also placed in the service tank. The oil from the service tank is delivered directly through a spout to the locomotive placed on the outbound track. This spout, when not in use, is raised and protected from the weather in a recess built in the side of the building. A Bowser self-registering pipe-line measure is located on the delivery pipe to indicate the amount of oil delivered to each engine.

The design of this station has been made by J. G. Legrand, bridge engineer. It was started under the general direction of B. B. Kelliher, former chief engineer, succeeded later by H. A. Woods, assistant chief engineer. The contract for these stations has been let to the Chicago Bridge & Iron Works, Chicago.

CONCRETE UNITS FOR CRIB CONSTRUCTION

By MacRae D. Campbell

Concrete units of various kinds have been made and used for crib construction for a number of years. Such units closely resemble ties and posts, even to the method of reinforcing. The type illustrated herewith, consists of an 8 in. by 8 in. concrete beam, reinforced against tension in the lower face, while light rods are placed in the top to protect against unusual strains in lifting and placing. The sections shown have so far been made in lengths varying from 4 to 8 ft. Two distinct types of members are used, one being used for the crib proper, and the other for the floor or front face of the wall where a true plane is desired. The units are held in place by steel pins which drop through holes in one unit and into others extending part way through the unit below.

The first use of this type of construction was in replacing

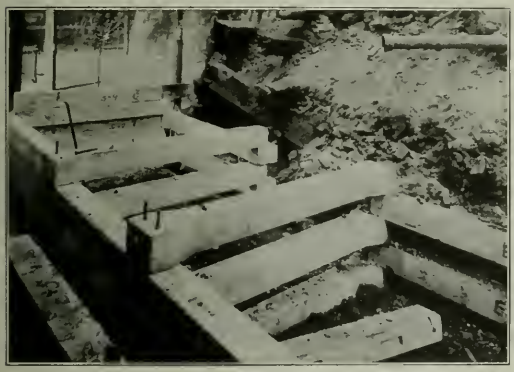
Condition of Wooden Bulkhead Replaced by the Concrete Crib Shown Below

wood cribbing holding the earth fill that carried the Pennsylvania tracks alongside of the historical block house at the corner of Liberty avenue and Water street, Pittsburgh, as shown in an accompanying illustration. Here the tracks are about 15 ft. above the elevation of the block house floor; and previous to placing the concrete cribbing, wooden construction shown had been used for 15 years, when its condition became such that replacement was necessary. The new crib, built of the concrete units, is 8 ft. wide at the bottom and 6 ft. wide at the top. The method of erection or assembling is shown by another view.

About the same time this construction was under way, a similar use was being made of this type of units on the Bessemer & Lake Erie, surrounding its storehouse and office building at Greenville, Pa. In this work a wall from 8 to 9 ft. high was

erected from header units extending back 6 ft. at the bottom and 4 ft. at the top. The Bessemer & Lake Erie construction represents a total of 880 ft. of face. Similar construction has been used by the State Highway Department of Pennsylvania, near Conemaugh, where the highway follows heavy fills, that were subjected to erosion from overflow wash during periods of high water before the concrete crib was used.

Concrete crib units suggest many possibilities. A unit, properly designed and constructed, represents a piece of enduring material. Present manufacturing practice involves the use of a rather wet mixture, such as would be best suited for concrete fence post manufacture, and placing forms on a vibrating table, so that the concrete may be made dense by agitating the mold, thus eliminating air and hence producing density and intimate contact of concrete with reinforcing metal. A 1:2:3 mixture is recommended. After the concrete has hardened sufficiently to



Placing the Concrete Crib Showing Method of Anchoring Units

permit removing the units from the forms, steam curing is used. This is the most approved method of curing concrete products, in that, if steam is properly admitted to the curing chamber by means of a pipe containing perforations on the lower side and placed in a trough filled with water, the steam released in the room will be saturated and the two elements most necessary to best cure the concrete, namely, heat and moisture, will be present at all times.

In building up the type of cribbing shown, the units are held together and in place by means of steel dowel pins, slipping through one unit and part way into a lower one, as already mentioned. The adaptability of this type of building material is shown by the fact that the construction may be permanent or temporary as desired. In the former case cement grout is poured around the dowel pins to give them protection against corrosion. In the latter case grout is omitted, so that if removal of the structure is contemplated within a relatively short time, the members may be taken down and used elsewhere.

Reinforcing metal of not less than ½-in. round steel rods should be placed in each of the four corners, not farther than 1 in. from the face. Certain requirements will call for metal of greater cross-sectional area. Concrete mixtures containing coarse aggregate not exceeding ¾ in. in maximum dimension are preferred. An advantage of placing equal reinforcement in all of the four corners is that workmen need not be watched to insure that a certain face always is placed down to attain effectiveness of reinforcement, which would be necessary if only the two corners in the intended lower face carried metal.

Modifications of the type of unit shown will suggest themselves in considerable number to interested engineers; for instance, a variation in the mortise-and-tenon feature of the filler units for the face of a wall. Forms can also be designed so that the ends of headers will interlock with stringers, thus doing away with some of the dowel pins.

Probably no greater field of usefulness exists for this construction than in the erection of temporary storage bins for coal, sand, gravel, and for temporary retaining walls or abutments where foundations are not the best; also for protection against water erosion along water fronts or embankments where such preventive construction is required. In the latter case these concrete cribs will furnish forms enclosing still water, in which concrete may be deposited to make a practically monolithic wall.

NEW BESSEMER & LAKE ERIE BLACKSMITH SHOP

The Bessemer & Lake Erie completed a new blacksmith shop last summer at Greenville, Pa., which embodies a number of improvements, the most notable being in the ventilation system provided. The building is of steel frame construction with brick walls, and is 120 ft. by 128 ft. 6 in. in plan and 28 ft. high to the lowest point of the roof.

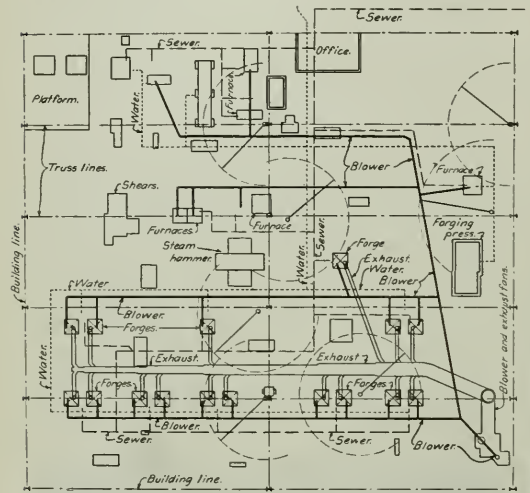
On account of the swampy nature of the ground the column pedestals and the walls were supported on 88 piles 32 to 38 ft. long, cut off at an elevation 1 ft. above the bottom of the foundation. A single string of 60-lb. rails was laid on the top of the wall-bearing piles except under the columns, where short rails were laid at right angles to the center line of the foundation. The walls are of common red shale building brick, and are 13 in. thick with 17-in. pilasters. The 168,000 bricks used in the building were laid in cement mortar made of clean river sand, Uni-

One of the Down Draft Forges in the New B. & L. E. Blacksmtih Shop

versal Portland cement and just enough lime to make it work smoothly. The windows in the sides and ends of the building are made up of nine sash, each of 16 lights, 12 in. by 14 in. The lighting surface in the walls amounts to 3,211 sq. ft., or 23 per cent of the wall surface, and in addition to this there are two monitors with 38 sash each of 9 lights, 12 in. by 14 in., a total of 798 sq. ft., or a grand total of 4,009 sq. ft. of glass. All lintels and sills are of reinforced concrete made on the ground and placed when the brick was laid.

The roof is supported by Pratt trusses, 128 ft. 6 in. long, with supporting columns under their center points. These trusses are

of extra heavy construction, as they were designed to carry one vertical concentrated load of 10,000 lb. applied at any point on the lower chord of any truss, and one horizontal concentrated load of 12,000 lb. acting in any direction applied at panel points on the lower chord of any truss. This provision was made to take



Arrangement of Pipe Lines Under the Floor of B. & L. E. Blacksmith Shop

care of swinging cranes. The lower chord is 21 ft. above the floor level, which is at the top of the foundation. The trusses are 7 ft. deep at the end and 15 ft. deep in the middle, giving the roof a slope of 1½ in. to the foot. The roof is of four-ply Ward-

Portion of the Interior of B. & L. E. Blacksmith Shop Showing the Clear Atmosphere

ren-Ehret built-up type, laid on 2-in. yellow pine sheathing. The inside surfaces of the walls were painted white with three coats of a special paint manufactured by the Illinois Steel Company and the underside of the roof was given two coats of white lead paint. All steel work in the trusses was painted black.

Special attention was given to means for keeping the atmosphere in the shop clear of gases by the installation of down-draft forges and the provision of ample ventilation. The accompanying photographs taken under normal operating conditions show how completely the smoke is collected from the 16 forges in the shop. The smoke and sulphur fumes from each forge pass up into a hood, then down through a suction pipe into a fan and up through the stack. The exhaust fan not only draws the smoke and fumes into the hood, but also additional air from around the forge which is naturally replaced by air coming in through the doors and windows, resulting in a constant supply of fresh air. The operation of the shop has shown that the atmospheric conditions are better than are obtained in the other shop buildings, contrary to the condition that ordinarily exists.

The blower, suction, sewer, water and gas lines are located under the floor, as shown in the accompanying drawing. The blower lines are of vitrified sewer tile with standard joints. Special care was taken to have all joints water tight under a pressure of 10 lb. per sq. in. These joints were made by carefully seating the spigot and then packing tightly around it a strand of oakum of a size not to exceed one-fourth the available space in the bell, which had been dipped in a neat cement grout.

Bessemer & Lake Erie Blacksmith Shop, Greenville, Pa.

The remainder of the bell was then filled with stiff cement mortar neatly beveled. The tile in these blower lines is from 4 in. to 15 in. in diameter. The completed line was tested by erecting a 6-in. pipe in a manhole and filling it with water to a height of 23 ft. The exhaust line, which is connected to the down-draft forges, is also a vitrified sewer pipe laid with the same joint as described above, but tested under a water pressure of 3 lb. per sq. in. This line is from 8 in. to 36 in. in diameter. The sewer line, which is arranged to drain all machine locations, varies in diameter from 4 in. to 10 in., and is also of vitrified tile. The water supply is brought in in a 3-in. main and distributed in pipes ranging down to ¾ in. in diameter. The gas for operating the furnaces is supplied in 3-in. lines.

This building was designed and built entirely by company forces under the supervision of the engineering department, H. T. Porter, chief engineer.

English Railwaymen with the Colors.—The question is now being frequently raised in England as to the percentage of railwaymen who have joined the colors. The Engineer has made a computation which leads to the belief that the percentage is 11.7. The Board of Trade returns showed that on December 31, 1913, there was a total of 643,135 employees on the railways of the United Kingdom. Of these, 49,047 were returned as boys and girls, but if it be assumed that all the engine cleaners, maintenance of way employees and others are over eighteen, and therefore eligible for enlistment, this figure is reduced by 7,284. Then among the 7,147 car cleaners there are some women. If 1,500 be allowed for these it makes the total number 600,000. As the number of men with the colors is now about 70,000, this makes the percentage 11.7, as above noted.

ECONOMY IN TRACK WORK AND ITS RELATION TO ROLLING STOCK

By J. W. Powers
Supervisor of Track, New York Central, Oswego, N. Y.

Due to the continuance of business depression, retrenchments have been made by the railways to the lowest limit consistent with safety in many departments. When the danger line is reached no further reduction in expenses can be made. This is especially true in the maintenance of way department. Railway managers realize that it is not good policy or economy to reduce the wages of trackmen since reliable and safe men are required and these can only be secured through the payment of fair wages. After the number of men has been reduced as much as safety will permit, the limit of retrenchment in forces is reached. Yet if we study the questions of the proper maintenance of track and endeavor to eliminate factors which tend to increase its cost, there appear possibilities by which the amount of track work itself can be reduced.

A definite standard of track is no longer problematical, as it can be made largely what a company desires it to be. Despite this fact, on many roads the track and roadbed are not being improved commensurate with the demands made upon them by the increase in the train loads. There was a time when maximum loads were 40,000 lb., and 60 and 70 lb. rails were standard. Today we are handling cars of 120,000 lb. capacity over 80, 90 and 100 lb. rails, the wearing qualities of which are admitted to be inferior to the former 60 and 70 lb. rails, some of which are still in use under the heavier loads and increased speed of our modern trains. This inequality is now beginning to receive the consideration that its importance merits and as a result heavier and stiffer rails are being laid. The use of such rails means a saving in ties, less disturbance of the ballast, and a reduction in the expense for maintenance, while it greatly reduces the friction or resistance of trains. These are matters which have a most important relation to the economy of track work and the general operation of the road.

It is an acknowledged fact that to secure safe and efficient operation and maintenance, the track must be in the best possible condition. Failure to maintain accurate gage, correct line and true surface result in lateral and vertical movements of trains and create impacts which still further derange and distort the materials in the track.

It frequently happens that heavy engines and cars of increased capacity are operated over light rail until the expense of track repairs becomes so great that it is found absolutely necessary to lay heavier rail. This is then often laid without any special preparations being made to receive it, even on lines whose roadbed is in poor physical condition and as a result the new rail soon assumes many of the kinks found in the old rail, especially if the work of tie spacing and renewals, surfacing, lining and gaging does not follow immediately after the rail is laid. If this entire process were reversed it would prove more satisfactory in the end. The time to increase the weight of motive power and rolling stock is after the track is put in good condition. Ties should be spaced, decayed or defective ties renewed and the track put in good gage, surface and line, to increase the life of new rail, decrease the cost of future maintenance and insure safe and efficient operation.

It should be understood that merely cutting down expenditures is not necessarily economy and that it is often a wiser policy to make a large outlay at one time and thus reduce the cost of maintenance for several years in the future than to distribute the expenditures in small sums and have a continual high charge for maintenance. There are many types of track appliances now available that will effect a saving in track maintenance and meet the demand for better, more rigid and permanent track construction. Some of the devices referred to are tie plates, rail anchors, guard rail clamps, improved guard rails, manganese frogs, etc.

Everyone who has served his apprenticeship on the track or who has even had his attention called to the subject of track repairs, has been forcibly impressed with the large amount of work which is annually expended in gaging track and adzing ties to hold the rail perpendicular or in such a position that the wheels will cover the entire surface of the ball of the rail, thus increasing the area of contact and decreasing the tendency to disrupt the rail, as well as decreasing the pressure per square inch and endeavoring to place the load over the web to avoid eccentric loading. This will also increase the tractive power of a locomotive and prevent it from slipping and blistering rails, while also decreasing the rate of wear of wheels.

We know that with new rails of ordinary design placed on new sawed ties and with car and engine wheels having a coning of 1 in 20, the line of pressure is moved from the center of the rail toward the inner edge of the head, making it necessary to adze the new ties in order to bring this line of pressure back to the center. It is also known that the rail tends to turn out under traffic causing the outer rail flange to cut down into the fibre of the wood more quickly than the inner. Thus the rail is canted outward, widening the gage, increasing the lateral sway of the train and making it necessary to again adze ties beneath the rail and to regage the track. Some railways are reducing the coning of locomotive tires to 1 in 38 and if all wheels were reduced to at least this ratio it would eliminate, to a great extent, the necessity of adzing the ties in order to incline the rail when gaging track. A considerable diversity of opinion exists among men in the motive power and car departments regarding the advantages of tapered wheels, while nearly all track men give a decided preference to non-tapered wheels which minimize rail breakage, decrease the rate of wear on wheels and insure safety in service.

The tie plate is an accessory which requires a great deal of careful study. The best tie plate is one that will not buckle, that will imbed itself thoroughly in the tie, that has a shoulder to protect the spikes and that has a bearing surface greater on the outside than on the inside of the rail to prevent the rail from tipping. There are many essential features which a tie plate should have to support the rail properly under its various movements. These movements of the rail under different conditions must be thoroughly understood in order to construct and adjust tie plates so that they will properly perform the duties required of them. In deciding upon the kind of plates to be used, due consideration should be given to the efficiency of the various types of plates, the labor of inserting them and the cost of material.

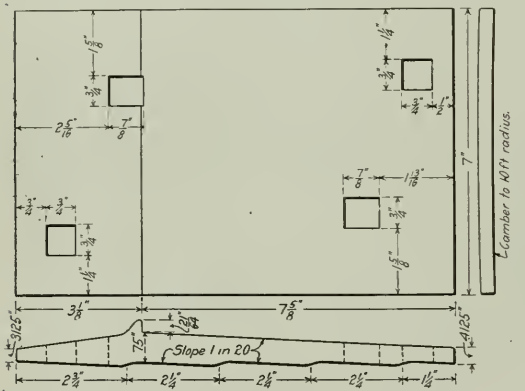
Those who have been observant have been forcibly impressed with the rapid destruction of frogs under heavy traffic despite the fact that vast improvement has been made during the past few years in the way of better and stronger construction and the use of manganese. The difficulty is that corresponding progress has not been made in the elimination of the destructive blows on frog wings and guard rails. If wheels are so mounted that they can deliver blows on frog and guard rails after they have been properly placed, the maintenance of way department will continue to suffer the effects.

It is practically impossible to adopt and maintain dimensions for the track and wheels that will entirely prevent blows to guard rails and frogs, but it is possible to adopt dimensions that will eliminate the impingements on the frog points and minimize the destructive effects of blows on the frog wings and guard rails. When we consider that every railroad has in its main tracks many frogs and guard rails over which high speed trains run and that under ordinary conditions many wheels of such trains are liable to strike

heavy blows on both the frogs and guard rails, the importance to the mechanical and maintenance of way departments is seen of the correct mounting of car wheels on their axles and their maintenance at proper gage, demonstrating the necessity for mutual discussion between departments.

EFFECT OF LUNDIE TIE PLATES ON RAIL WEAR

A recent inspection of test rails in the main track of a trunk line railroad near New York indicated clearly the effect in decreasing rail wear which is secured by the Lundie tie plate. New 100-lb. A. R. A. type A rails were laid on parallel tracks on a 5-deg., 40-min. curve carrying a heavy freight traffic one year before the inspection referred to. The Lundie tie plates were placed under the rails in one track while ordinary flat plates were used in the other track. The superelevation of the high



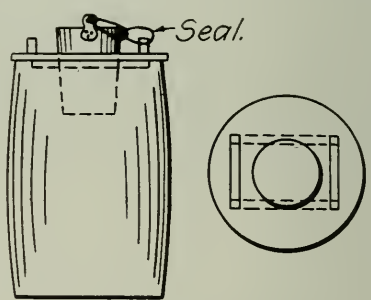
Details of a Lundie Tie Plate as Used on a Large Eastern Road

rail was standard. The usual wear of the rail head was found on the track laid with flat plates as indicated in the accompanying drawing reproduced from measurements made of the rail head at the time of inspection, while the rails laid on the canted plates show a slight wear uniform over the surface of the head. These plates are also in use in about 20 other installations in which it is said that similar results are being secured.

This tie plate is designed to support the rail at an angle of 1 in 20 with the horizontal, equivalent to the angle of coning on car wheels so that the surface of contact between the wheel and the rail and the rail and the tie plate will be perpendicular to the direction of application of the wheel load. In addition, the underside of the plate is given a bearing on the tie, a large part of which is perpendicular to this stress by a series of stepped surfaces, each of which has an angle of 1 in 20 with the horizontal. The advantages claimed for this method of support in addition to the reduction in wear on the rail head are: a decreased tendency of the rails to spread, a lessening of the internal stresses in the rail due to loading the head centrally and a reduction in wear on car wheels equivalent to that on the rail head. The plate is cambered on a 10-ft. radius parallel with the axis of the rail so that it does not present a sharp edge under the base of the rail when the wheel load passes over it. It is claimed that this feature gives the added advantages of an easy riding track in that the rail adjusts its bearing on the plate and an absence of rattling owing to the fact that the plate does not tilt under approaching or receding loads. The plate is said to perform its functions equally well on hard and soft ties, as on a hard surface which does not compact readily, the camber will allow complete resilience under load, the flattening of the plate producing stresses within the elastic limit of the metal. The accompanying drawing shows the details of one of these plates as applied on an important eastern road. The plates are patented by John Lundie, 52 Broadway, New York City.

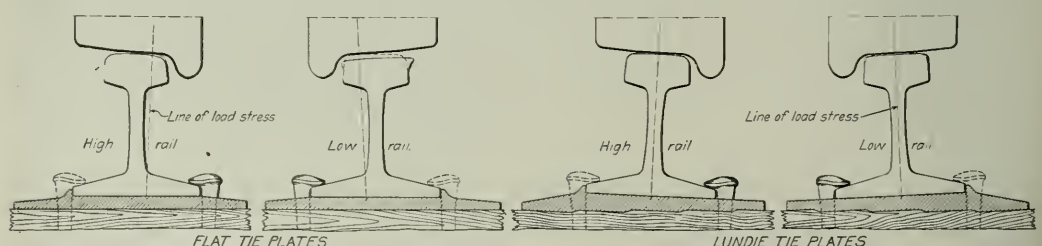
COVER FOR A WATER BARREL

The accompanying sketch shows a cover for a water barrel used for fire protection about stations, company buildings and bridges, which has been employed on the Coast division of the Southern Pacific for the past six or eight months, with very



Special Cover for a Water Barrel

satisfactory results. As shown in the sketch, this consists simply of an ordinary cover over the barrel, with an opening in the center in which the bucket is placed. In this position the bucket does not become water-soaked to the extent that it does if submerged in the barrel, while on the other hand its partial submersion prevents it from drying out from exposure to the weather. The handle of the bucket is fastened to the cover by an ordinary car seal, preventing its removal by maliciously inclined persons without some inconvenience.



Cross Sections of Rails in Adjacent Tracks After One Year's Service on Flat and Lundie Tie Plates, Respectively, Showing Difference in Wear on the Heads

General News Department

On March 4 the roundhouse of the Cleveland, Cincinnati, Chicago & St. Louis at Benton Harbor, Mich., was destroyed by fire.

The legislature of Indiana, which adjourned March 8, passed a law providing for workmen's compensation, to be administered by a state commission.

The Panama Railroad has bought for $150,000 one of the piers of the Pacific Mail Steamship Company at Colon. This leaves but one pier at Colon which is not under the direct control of the United States government.

John G. Cooper, of Youngstown, Ohio, until lately a locomotive engineer on the lines of the Pennsylvania company, is now the representative in Congress from the Nineteenth Ohio district. He has served two terms in the Ohio legislature. He has been a prominent worker in the anti-liquor campaign.

A resolution has been introduced in the legislature of California asking the federal government to buy and operate the Western Pacific Railroad, which is in the hands of a receiver. The resolution declares that the road, unless bought by the government, will become allied with other roads and competition will be destroyed.

The committee of the United States Senate which has been investigating charges that the Southern Railway, in dealing with coal traffic, has discriminated against Charleston, S. C., and other ports south of Norfolk, has apparently given up its quest; and the sub-committee in charge of the inquiry has referred it to the Interstate Commerce Commission.

E. J. Chamberlin, president of the Grand Trunk Railway of Canada, in a statement printed in the Montreal Gazette, says that for forty years past the Grand Trunk has been carrying the mails for the Canadian government at what has been definitely established is approximately one-half the actual cost to the company for the service.

The "Safety First" committee of the Baltimore & Ohio reports that 91 per cent of all items recommended to improve safety conditions during 1914 were disposed of by the company. Recommendations totaling 9,256 items were made by 698 employees who are members of safety committees on 23 divisions. Only 806 of the items reported remain under consideration.

Many railway builders of western Canada, men who have carried out large contracts in the construction of new railways during the past few years, are going to devote their forces and equipment this season to breaking up land for agriculture, and to the cultivation of wheat. It is said that many of these men will carry out this work on tracts owned by themselves.

In the federal court at Philadelphia, March 10, indictments were returned by the grand jury charging the Pennsylvania Railroad with granting rebates on coal and coke shipped from Kittanning, Pa., to Trenton and Hoboken, N. J. The road is alleged to have allowed 10 cents a ton on shipments made from the Glen-White Coal and Lumber Company's mine at Kittanning between December 1, 1911, and July 18, 1912.

The Canadian Pacific has asked the Canadian Parliament to authorize the establishment of a separate corporation to take over the ocean steamships owned by the roads, the new concern to be known as the Canadian Pacific Ocean Services, Limited; and the railway committee of the lower House has approved the bill to carry out the company's purpose. The new corporation will be organized in England and the proposed amount of capital is $15,000,000.

Rule G, the well-known paragraph of the Standard Code of Train Rules prohibiting the use of intoxicating liquors, has been taken as the theme for a motion picture, based on Rufus Steele's story in the Saturday Evening Post. The film was staged in the yards and offices of the Southern Pacific Company at San Francisco, and the road placed all its facilities at the disposal of the camera men. Even the actors were selected from the ranks of the company's employees. This film is to be shown in numerous places along the Southern Pacific lines, and elsewhere

After a thorough investigation of the results of the fire which occurred at the Thomas A. Edison, Inc., plant at West Orange, N. J., several weeks ago, the company's engineers and a special committee appointed by the American Concrete Institute, report that 87 per cent of the reinforced concrete buildings, which were subjected to a very intense heat, are in good condition and about 85 per cent of the machinery which they contained can be used after making minor repairs. Buildings made of other material were entirely destroyed. The committee commented on the advantages of monolithic structures.

C. W. P. Ramsey, of Montreal, engineer of construction on the Canadian Pacific, is to be the commander of the company of engineers which is to be recruited along the lines of the Canadian Pacific for service at the seat of war in Europe. Mr. Ramsey not only has had long experience in railway construction, and also in other departments of the Canadian Pacific, but is also a soldier, having served as lieutenant in the militia of Canada. This corps of engineers is to be made of two companies of 250 each, and all must have had railway experience. Recruiting will be begun at once, and will not be confined to employees of the Canadian Pacific. About 400 applications have already been received. Mr. Ramsey will have the title of lieutenant colonel, and there will be two majors.

The Supreme Court of the United States on March 4 issued an order restraining the New York State Public Service Commission, First district, from enforcing the alien labor law of New York pending a final adjudication of all the litigation by the Supreme Court. This has the effect of neutralizing the recent action of a New York state court in sustaining the law which forbade the employment of aliens on public work, and caused the dismissal of several hundred men by the contractors engaged on the subways in New York City. Four days after the action at Washington the legislature at Albany repealed the mandatory clause of the law in question; so now the alien can be taken back. The contractors say that most of the American citizens who have been employed temporarily have proved very inefficient. In the underground operations the men who have been long engaged in the work have come to possess a peculiar fitness, which the new men could not or would not acquire.

Cornell Men at the Engineering Convention

All Cornell men expecting to attend the annual banquet of the American Railway Engineering Association, to be held on Wednesday, March 17, who desire reservations at the Cornell table, are requested to advise H. G. Holloway, 647 Railway Exchange building, Chicago, not later than Monday, March 15.

Demurrage on One Car in 900

E. E. Mote, manager of the Pacific Car Demurrage Bureau, San Francisco, reports that in San Francisco and Los Angeles the carload freight handled by the principal draying concerns is rarely held in excess of the free time; and, searching for the causes of such good service he found that 15 of these concerns unloading in one year 14,332 cars paid but $48 demurrage. The California demurrage rate is $3 a day. Assuming that each charge at that sum represents a different car and a single day's delay in excess of the free time allowance, he finds that approximately, only eleven one-hundredths of 1 per cent of the cars were held overtime and that the entire overtime was 16 days; no allowance being asked for or made on account of inclement weather, although the rainfall was twice as much as in normal years. Practically all these cars were unloaded on the public delivery tracks, and the freight was hauled from the cars. This.

says Mr. Mote, shows that with active and systematic conduct of work by concerns properly equipped there is no real necessity for holding a single car long enough to incur demurrage.

Brooklyn Marginal Railroad

The New York legislature has passed an act to authorize the city of New York and a number of the principal railroads terminating on the shores of New York harbor to co-operate in the operation of a freight railroad on the waterfront of Brooklyn—along parts of the East river and the bay—and to make important improvements, and it is expected that this action will be followed by the construction of extensive additions to the present track facilities, owned by the city, on the docks in the region mentioned.

The law amends the New York City freight terminals act, so as to permit trunk line railroads to hold the stocks and securities of a terminal company, formed under the supervision of the city board of estimate; and, under contract with the city, for the operation of terminal facilities along the waterfront from South Brooklyn along the East river to Newtown creek in Queens Borough.

Valuation Inventories Called For

The Interstate Commerce Commission has issued valuation order No. 13, calling for inventories of railway property. It provides, in substance as follows: That every common carrier owning or operating a steam railroad whose property is to be valued by the commission under the valuation act of March 1, 1913, and every receiver or operating trustee of any such carrier, shall prepare and file with the commission a complete inventory of the quantities, units, and classes or kinds of property in its roadway and track; bridges, buildings and all other structures; signals and interlockers; telegraph and telephone lines; electrical apparatus; and any and all fixed property except lands and equipment included in valuation orders Nos. 7 and 8. Such inventory shall be filed upon such dates, in such detail, upon such forms, and for such part or parts of the property described below as the director of valuation shall require, provided that he shall allow in all cases a reasonable time for the preparation of such inventory, which shall in no case be less than 30 days: That the inventories herein required shall be made separately for the following accounts as described by the Interstate Commerce Commission in its classification of investment in road and equipment of steam roads effective on July 1, 1914:

3. Grading.
4. Underground power tubes.
5. Tunnels and subways.
6. Bridges, trestles, and culverts.
7. Elevated structures.
8. Ties.
9. Rails.
10. Other track material.
11. Ballast.
13. Right-of-way fences.
14. Snow and sand fences and snow-sheds.
15. Crossings and signs.
16. Station and office buildings.
17. Roadway buildings.
18. Water stations.
19. Fuel stations.
20. Shops and engine houses.
21. Grain elevators.
22. Storage warehouses.
23. Wharves and docks.
24. Coal and ore wharves.
25. Gas producing plants.
26. Telegraph and telephone lines.
27. Signals and interlockers.
28. Power dams, canals, and pipe lines.
29. Power plant buildings.
30. Power substation buildings.
31. Power transmission systems.
32. Power distribution systems.
33. Power line poles and fixtures.
34. Underground conduits.
35. Miscellaneous structures.
36. Paving.
38. Roadway and small tools.
39. Assessments for public improvements.
43. Other expenditures—Road.
47. Unapplied construction material and supplies.

Agreed Valuations of Freight Illegal

The bill to make common carriers liable for lost or damaged freight to its full value, regardless of any agreement limiting the amount recoverable, which was noticed last week, page 415, and which was signed by the President March 4, has been published, as Public Law No. 325. It takes the form of an amendment to section 7 of the Interstate Commerce law.

The first change is to make this section apply to all interstate commerce, all commerce in territories and all going to adjacent foreign countries. The liability of the carrier for damages clear through to destination, applies through to a destination in an adjacent foreign country. Any contract, rule or regulation limiting liability for losses is made invalid without respect to the manner or form in which it is sought to be made; but in the case of goods which the carrier cannot see and know the character of, he may require the shipper to state the value in writing; and the Interstate Commerce Commission may establish freight rates dependent on the value of the property as thus stated. Carriers are forbidden to limit to less than ninety days the period for giving notice of a claim; or less than four months for filing claims; or less than two years for the institution of suit; and if the loss or damage occurs while the freight is being loaded or unloaded, or is due to carelessness or negligence, no notice of claim nor filing of claim shall be required as a condition precedent to recovery. The act takes effect June 4, 1915.

C. P. R. Welfare Agent

T. G. Shaughnessy, president of the Canadian Pacific, has issued the following circular:

"In view of the benefits derived from certain voluntary agencies, such as the St. John Ambulance Association, the Safety First movement, the Railroad Y. M. C. A., and Athletic Associations, I have decided to appoint an officer to co-operate in the development of such organizations amongst the employees of the Canadian Pacific Railway, with the title of general welfare agent. Lieut.-Colonel Lacey R. Johnson, heretofore general superintendent of Angus shops district, who since he joined the service in 1882 has been actively identified with the general uplift of ideals and service among the railroad employees, will assume that office."

Check on Excessive Efficiency

Congress, in making appropriations for the support of the army for the next fiscal year, has inserted in the law a proviso that no part of the appropriations made at this time shall be available "for the salary or pay of any officer, manager, superintendent, foreman or other person having charge of the work of any employee of the United States government while making or causing to be made, with a stop watch or other time-measuring device, a time study of any job of any such employee between the starting and completion thereof, or of the movements of any such employee while engaged upon such work; nor shall any part of the appropriations made in this bill be available to pay any premium or bonus or cash reward to any employee in addition to his regular wages, except for suggestions resulting in improvements or economy in the operation of any government plant; and no claim for services performed by any person while violating this proviso shall be allowed."

Proposed Railway Legislation

A bill before the legislature of Connecticut proposes to tax railways on the basis of their gross earnings instead of on the valuation of stock, as at present.

A bill to provide for the incorporation of trackless trolley companies has been introduced into the Pennsylvania legislature. It would enable them to incorporate and to be governed by the same regulations as apply to automobiles and trucks.

The lower House of the Indiana legislature has defeated the bill to give the public service commission power to authorize an increase in passenger fares from 2 to 2½ cents a mile.

The House of the Missouri legislature last week passed a bill authorizing the state public service commission to advance passenger fares to 2½ cents a mile if the commission after a thorough investigation finds the increase necessary.

Officers of the principal railroads in Nebraska held a conference on March 3 with the governor and a committee of the legislature at Lincoln to urge support for the proposed increase in state passenger fares from 2 to 2½ cents a mile. Among those who addressed the governor and the committee were W. A. Gardner, president of the Chicago & North Western; Hale Holden, president of the Chicago, Burlington & Quincy; A. L. Mohler, president of the Union Pacific; E. J. Pearson, vice-president of the Missouri Pacific, and L. M. Allen, passenger traffic manager of the Chicago, Rock Island & Pacific. After presenting their arguments to the Nebraska committee these railroad men and others addressed the Des Moines (Iowa) Chamber of Commerce on the subject of passenger fares; and the chamber adopted resolutions favoring the adoption by the legislature of some plan that would give the railroads an opportunity to be

heard before a body or commission with authority to take such action as the facts may warrant.

TEXAS.

A prominent railway officer of Texas writes to the *Railway Age Gazette* as follows:

"The Texas legislature was a pioneer in passing drastic bills against the interests of railroads, but there has been a change. In the 33rd session, sitting two years ago, they began to carefully consider all restrictive measures, and the present session (the 34th) has turned down every objectionable bill, except the bi-monthly pay-day act, which will become effective January 1, 1916. As the day of adjournment is not far off we believe now no bad measures will pass. At least two-thirds of the members have shown an appreciation of conditions, which is indicated by the vote of 69 to 35 against the hospital bill and another vote of 87 to 38 against a resolution in the House to investigate the railroad lobby working against this same hospital bill. The proponents of this resolution approved of a strong lobby, mostly not railroad employees, working for the bill, but denied the right of employees and officers to work against it.

"The so-called representatives of union labor introduced about every notion that has ever been invented by railroad baiters and the union labor lobby has been as aggressive and persistent as ever, demanding obedience by members on penalty of losing the labor vote, though one member discovered there were only fourteen labor union votes in his district.

"The Texas legislature must be credited with considerable conservatism. One member of the Senate in speaking against a bill to require certain employees, including agents, to have a lay-off of four days each month, served notice on organized labor that they were going beyond the bounds of reason and had become too aggressive and domineering; that they must remember that they represented less than 15 per cent of the working people of Texas."

Western Society of Engineers

The Western Society of Engineers, Chicago, is planning a special "Electrification" program for the meeting on Tuesday evening, March 16, the week of the convention of the American Railway Engineering Association. The subject under discussion will be "The Operating Results of the Electrification of Steam Railroads." Among the speakers will be W. S. Murray, consulting electrical engineer, New York, New Haven & Hartford, and E. B. Katte, chief engineer, electric traction, New York Central. The projects of the Pennsylvania, the Norfolk & Western, the St. Paul and the Butte, Anaconda & Pacific will also be described.

American Society of Civil Engineers

The constitutional convention for the state of New York is to convene on April 15, 1915. Matters of interest concerning the engineering profession are to come before that convention, at which the American Society of Civil Engineers is to be represented by Arthur S. Tuttle, Henry W. Hodge and Alfred D. Flinn. On Wednesday, March 17, 1915, at 8:30 p. m., at the house of the society at 220 West Fifty-seventh street, New York, the above representatives will lay before the engineering profession the result of their deliberations.

Annual Dinner A. R. E. A.

The annual dinner of the American Railway Engineering Association will be held at the Congress hotel, Chicago, on the evening of March 17. The speakers will include Charles S. Gleed, president, Missouri & Kansas Telephone Company; Sir George Foster, minister of trade and commerce, Dominion of Canada; Frank L. Mulholland, president of the International Association of Rotary Clubs, and Benjamin Baum, chief engineer maintenance of way, Maumee Valley Railroad.

American Society of Mechanical Engineers

The third seasonal meeting of the Chicago Section of the American Society of Mechanical Engineers will be held on Friday, March 19, at the hotel LaSalle, Chicago, dinner being served at 6:30. The subject of Refrigeration, with special reference to ice-making as a by-product of central stations will be considered at 8 o'clock. Heywood Cochrane of the Carbondale Machine Company, Chicago, will make an illustrated talk.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, 1915, Jefferson Hotel, Richmond, Va.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 21-24, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, Atlantic City, N. J.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton, Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 26 to 28, 1915, Chicago, Ill.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

Railway Signal Association.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.				
Alabama & Vicksburg	143	$74,682	$28,408	$114,205	$13,295	$27,514	$3,865	$47,354	$2,099	$6,488	$100,616	$13,589	$8,600	$4,989	—$12,780
Ann Arbor	294	132,844	36,164	179,927	13,067	20,062	4,624	84,343	242	7,843	130,181	49,746	10,580	39,155	21,329
Atlanta, Birmingham & Atlantic	639	158,072	34,508	210,553	34,742	45,060	11,450	102,443	163	11,036	204,894	5,659	13,100	—7,467	—28,578
Baltimore & Ohio Chicago Terminal	79	.....	443	117,270	6,206	13,828	731	57,992	1,201	5,706	85,665	31,605	19,021	12,584	28,221
Bangor & Aroostook	631	280,659	39,690	335,947	37,159	44,146	2,407	105,512	3	9,682	198,908	137,039	12,525	124,514	39,685
Bessemer & Lake Erie	205	191,542	23,409	224,664	37,627	144,488	12,870	122,353	.....	11,881	324,699	—100,035	17,011	—117,049	3,567
Birmingham Southern	44	36,340	551	64,766	8,152	11,166	654	26,145	.....	3,400	49,517	15,248	2,153	13,095	2,101
Buffalo & Susquehanna R. R. Corp	253	103,240	5,988	112,417	17,912	39,114	2,178	36,440	.....	4,828	100,472	11,944	2,600	9,344	—22,337
Buffalo, Rochester & Pittsburgh	586	571,694	78,418	672,294	68,314	155,786	16,882	260,398	1,288	20,938	523,604	148,690	20,000	128,680	—56,736
Central of Georgia	1,924	666,206	227,598	1,003,030	112,816	185,844	32,254	367,234	1,484	34,734	733,483	269,547	50,552	218,247	172
Central New England	304	289,108	33,434	339,302	26,080	29,537	1,520	105,337	.....	4,550	167,019	172,283	12,001	160,281	123,051
Chesapeake & Ohio Lines	2,368	2,574,198	373,654	3,121,868	314,702	624,947	51,650	1,124,315	16,430	71,763	2,203,807	918,061	115,009	802,627	—65,922
Chicago & North Western	8,108	4,208,112	1,473,894	6,317,467	557,090	1,030,756	104,949	2,618,443	47,174	148,820	4,501,622	1,815,845	375,000	1,440,442	112,164
Chicago Great Western	1,429	811,620	234,150	1,142,831	94,722	211,261	43,403	477,727	7,378	35,644	869,528	273,302	48,668	223,593	—5,509
Chicago, Peoria & St. Louis	255	102,615	18,977	129,972	18,906	27,210	6,025	59,468	.....	5,349	116,957	13,015	5,700	7,315	20,868
Chicago, St. Paul, Minneapolis & Omaha	1,753	971,712	352,568	1,423,045	97,099	196,322	29,568	651,189	12,994	38,018	1,024,997	398,048	83,157	314,117	—122,650
Cincinnati Hamilton & Dayton	1,015	486,057	103,800	672,516	127,706	193,368	19,445	351,245	20,715	23,257	735,388	—62,873	34,525	—97,458	—15,094
Cincinnati Northern	246	89,670	14,468	108,271	20,879	30,754	2,520	42,899	.....	4,032	101,085	7,186	5,500	1,685	32,293
Cleveland, Cincinnati, Chic. & St. Louis	2,381	1,937,421	629,437	2,802,568	295,574	644,938	72,431	1,222,621	23,988	65,894	2,319,516	483,052	128,000	354,689	523,585
Colorado Midland	338	99,215	9,982	122,640	14,096	26,895	7,126	52,006	796	5,650	106,569	16,071	8,530	7,541	7,563
Cumberland Valley	164	151,684	50,044	214,139	19,090	30,914	4,289	81,794	1,204	7,636	144,926	69,212	5,794	63,418	—4,023
Delaware, Lackawanna & Western	960	2,077,096	596,505	3,030,952	258,745	565,430	69,367	1,168,676	26,027	82,356	2,110,415	920,537	186,600	733,868	18,542
Elgin, Joliet & Eastern	776	526,599	3	558,721	58,401	116,735	6,306	196,225	.....	17,230	394,895	163,826	40,890	122,936	—42,748
Florence & Cripple Creek	87	82,614	12,822	97,490	9,867	9,656	2,311	27,348	.....	3,414	52,596	44,894	4,787	40,108	2,263
Florida East Coast	745	213,817	213,621	512,507	63,999	62,740	17,590	162,199	3,506	14,885	323,590	188,917	18,000	170,154	17,932
Illinois Central	4,769	3,878,752	1,015,396	5,279,315	519,162	1,099,264	106,622	2,021,592	30,332	130,307	3,879,558	1,399,757	269,000	1,129,046	102,704
Indiana Harbor Belt	110	.....	.....	248,249	29,995	23,294	2,795	129,589	.....	7,653	193,325	54,923	6,950	47,966	19,092
International & Great Northern	1,160	662,894	125,981	851,638	126,943	150,215	21,229	369,447	2,865	29,964	700,664	150,974	40,000	110,798	—37,719
Kansas City Southern	827	619,581	102,953	788,351	79,420	85,908	28,079	297,399	.....	39,838	522,970	265,381	48,189	216,774	—82,556
Lake Erie & Western	900	359,587	54,868	436,772	53,330	76,972	11,892	191,464	.....	13,227	346,885	89,886	20,000	69,881	33,004
Lehigh Valley	1,444	2,531,510	262,388	3,003,715	322,159	569,412	86,192	1,324,141	10,667	78,544	2,390,102	613,613	144,000	467,631	104,735
Long Island	398	259,812	456,640	830,157	116,844	125,838	8,810	441,915	7,789	29,023	730,220	99,937	77,645	22,288	14,379
Louisville & Nashville	5,034	2,962,327	854,158	4,126,431	661,912	843,186	117,450	1,454,531	17,259	104,303	3,191,483	934,948	191,451	743,242	—129,928
Maine Central	1,219	567,710	194,440	836,448	128,184	135,731	9,041	355,745	11,220	25,553	665,473	170,976	53,082	117,893	—48,075
Mobile & Ohio	1,122	692,581	92,291	839,705	68,915	108,554	37,553	334,764	2,358	26,725	578,869	260,836	33,153	227,521	72,667
Monongahela	75	79,009	1,788	82,466	12,262	11,537	397	25,468	.....	2,024	51,689	30,777	1,810	28,967	—22,553
New Orleans & North Eastern	204	219,691	41,490	290,000	27,521	49,578	9,591	113,704	5,082	12,252	217,727	72,273	14,500	57,773	28,543
New Orleans Great Northern	283	91,169	18,612	122,470	18,105	19,020	2,389	37,659	186	6,384	83,743	38,727	3,150	35,577	—19,731
New York, Chicago & St. Louis	568	825,331	85,870	946,234	96,712	162,898	47,689	510,351	4,444	21,229	843,323	102,911	40,000	62,868	55,927
New York, New Haven & Hartford	2,003	2,225,990	1,946,684	4,721,801	448,701	772,609	31,612	2,027,999	56,320	127,129	3,463,670	1,258,132	200,000	1,057,938	606,705
New York, Philadelphia & Norfolk	112	190,809	35,281	247,581	27,054	56,874	3,943	125,379	4,513	10,291	228,053	19,528	9,500	10,028	—2,752
Norfolk Southern	900	191,987	74,467	288,899	37,741	52,534	7,591	122,859	85	20,253	241,062	47,837	9,460	38,377	—62,809
Northern Pacific	6,499	2,728,647	901,117	4,026,534	399,676	503,984	82,007	1,543,292	67,839	90,821	2,620,764	1,405,770	372,943	1,032,445	111,351
Pennsylvania *Company*	1,757	2,347,935	749,059	3,499,060	531,061	790,488	70,413	1,596,825	34,880	117,409	3,141,076	357,984	357	99,214	—401,694
Pennsylvania *Railroad*	4,512	9,461,174	2,842,196	13,617,879	2,047,946	3,228,797	165,917	5,713,957	220,410	426,692	11,803,720	1,814,159	638,586	1,175,072	—350,101
St. Louis, Brownsville & Mexico	548	95,191	54,301	166,168	30,145	21,602	5,434	66,783	.....	10,990	13,455	31,612	6,500	25,112	—12,537
Seaboard	3,101	1,128,833	363,874	1,712,168	194,420	254,708	60,938	678,878	13,676	60,166	1,262,787	449,380	86,004	362,625	—206,263
Southern in Mississippi	281	51,093	24,434	85,587	21,418	7,063	2,870	39,659	.....	3,674	74,684	10,903	8,375	2,526	—34,450
Southern Pacific	6,517	3,910,143	1,970,660	6,631,365	722,234	1,119,777	174,958	2,447,834	124,746	226,234	4,774,145	1,857,219	412,423	1,443,396	32,854
Toledo, St. Louis & Western	451	329,135	22,279	377,614	38,903	54,825	18,091	163,282	.....	7,846	282,947	94,667	17,864	76,803	—10,808
Union R. R. of Pennsylvania	31	.....	.....	141,435	61,095	77,184	100	108,726	.....	2,685	249,790	—108,355	5,300	—113,656	—21,156
West Jersey & Seashore	356	131,314	187,749	358,393	83,137	73,184	8,420	209,423	2,667	14,823	391,654	—33,262	28,693	—62,059	—33,500
Wheeling & Lake Erie	459	239,096	40,995	313,143	32,330	85,078	7,672	163,946	1,169	15,158	305,352	7,790	29,784	—21,994	—141,569

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.			
Alabama & Vicksburg	143	$566,227	$255,391	$906,820	$139,419	$225,998	$25,933	$340,903	$20,571	$39,637	$792,460	$114,359	$51,786	$62,574	—$138,200
Ann Arbor	294	966,639	338,811	1,394,958	152,086	191,179	34,315	557,692	2,946	52,241	990,459	404,498	90,560	313,563	—16,577
Atlanta, Birmingham & Atlantic	639	1,118,505	333,335	1,588,206	244,869	309,411	87,976	689,943	163	71,928	1,404,290	183,917	82,093	101,458	—235,757
Baltimore & Ohio Chicago Terminal	79	.....	4,292	938,916	93,224	134,662	6,167	399,795	15,882	32,749	679,268	259,648	133,148	126,419	24,302
Bangor & Aroostook	631	1,526,997	400,140	2,045,283	337,090	338,041	18,200	635,829	6,805	66,928	1,402,456	642,827	65,797	576,989	—61,141
Bessemer & Lake Erie	205	5,112,108	251,975	5,457,105	429,418	1,107,896	73,462	1,205,080	10,106	81,583	2,884,274	2,572,831	131,014	2,441,776	541,168
Birmingham Southern	44	284,636	6,951	514,515	111,523	88,532	3,410	196,795	.....	24,915	425,175	89,340	18,724	70,616	144,548
Buffalo & Susquehanna R. R. Corp.	253	811,642	49,319	882,790	167,456	264,366	8,749	262,941	.....	37,500	741,012	141,778	18,200	123,578	—100,942
Buffalo, Rochester & Pittsburgh	586	4,824,847	698,236	5,730,209	770,753	1,348,851	85,970	1,869,155	9,360	129,355	4,213,445	1,516,765	140,000	1,376,562	—564,835
Central of Georgia	1,924	4,692,287	1,898,728	7,336,412	1,009,047	1,388,406	239,868	2,583,549	8,983	237,585	5,444,407	1,892,005	322,661	1,566,637	537,947
Central New England	304	1,835,228	287,170	2,226,329	501,334	246,266	8,176	761,105	.....	26,100	1,542,682	683,646	80,002	603,610	—187,871
Chesapeake & Ohio Lines	2,368	17,713,548	3,535,169	22,641,354	2,617,595	4,841,121	384,953	7,492,980	143,582	510,248	15,990,479	6,650,875	774,541	5,874,831	—234,045
Chicago & North Western	8,108	31,943,756	12,824,239	49,816,492	6,817,740	7,853,611	766,406	17,865,440	362,564	1,015,615	34,563,391	15,253,101	2,625,000	12,625,078	—898,168
Chicago Great Western	1,429	5,909,395	1,909,877	8,528,246	1,142,396	1,464,850	329,238	3,067,209	47,196	247,920	6,290,353	2,237,893	340,679	1,894,230	—45,162
Chicago, Peoria & St. Louis†	255	651,707	149,366	850,880	139,683	153,176	35,490	355,474	.....	31,602	715,425	135,455	34,200	101,255	168,178
Chicago, St. Paul, Minneapolis & Omaha	1,753	7,064,259	3,147,846	11,018,099	1,274,867	1,455,119	202,558	4,054,781	104,576	254,074	7,330,071	3,688,029	624,246	3,061,501	—24,860
Cincinnati, Hamilton & Dayton	1,015	4,288,276	934,009	5,842,929	847,223	1,162,253	142,129	2,616,414	20,715	135,157	4,922,808	920,121	257,262	661,105	98,330
Cincinnati Northern	246	765,682	137,107	942,143	136,501	181,351	18,957	308,990	.....	24,362	670,161	271,981	36,963	234,737	266,560
Cleveland, Cincinnati, Chic. & St. Louis	2,381	14,506,971	5,167,050	21,584,413	2,301,835	4,204,748	555,071	8,249,838	169,551	432,621	15,879,980	5,704,433	909,027	4,786,435	2,729,179
Colorado Midland	338	896,638	154,195	1,168,051	181,156	247,550	53,557	458,223	8,700	39,693	988,880	179,171	59,709	119,462	107,051
Cumberland Valley	164	1,228,502	405,673	1,732,731	307,879	240,558	31,049	604,118	5,931	57,276	1,246,811	485,921	39,864	446,057	—87,338
Delaware, Lackawanna & Western	960	18,055,974	5,132,796	25,695,339	2,860,759	4,124,548	485,367	8,129,355	219,625	523,123	16,168,339	9,527,000	1,137,432	8,388,259	—55,629
Elgin, Joliet & Eastern	776	4,521,698	39	4,808,123	497,050	931,315	40,126	1,468,087	.....	129,158	3,065,397	1,742,726	238,240	1,504,453	—496,587
Florence & Cripple Creek	87	579,936	113,690	704,926	75,720	67,053	14,567	208,054	.....	28,714	394,107	310,819	38,675	272,144	—2,818
Florida East Coast	745	1,328,366	928,663	2,622,128	426,545	386,848	60,607	905,633	20,929	120,814	1,898,141	723,987	134,000	589,179	275,509
Illinois Central	4,769	27,118,588	7,924,876	37,903,149	5,091,055	8,239,886	733,176	13,600,107	211,975	887,082	28,560,967	9,342,182	1,907,000	7,422,520	—90,107
Indiana Harbor Belt	110	.....	.....	1,942,503	265,061	183,579	19,218	844,247	.....	53,331	1,365,435	577,068	53,357	523,081	158,684
International & Great Northern	1,160	4,116,499	1,158,055	5,675,094	912,461	936,270	163,901	2,464,090	20,126	209,459	4,706,367	968,788	220,000	748,295	—711,798
Kansas City Southern	827	4,618,364	893,946	6,076,927	665,377	724,121	205,234	2,042,429	.....	298,516	4,915,538	2,161,389	333,468	1,825,753	—310,558
Lake Erie & Western	900	2,703,257	476,985	3,354,281	464,698	571,809	99,316	1,352,603	.....	85,956	574,383	779,898	166,541	612,381	152,626
Lehigh Valley	1,444	21,081,202	2,572,417	25,120,743	2,756,027	4,965,940	545,531	9,075,172	88,187	507,415	17,936,593	7,184,149	985,000	6,190,939	—207,394
Long Island	398	2,201,166	4,831,748	8,095,238	822,482	828,048	84,540	3,345,248	51,102	193,875	5,325,294	2,769,944	474,830	2,293,039	524,674
Louisville & Nashville	5,034	23,095,671	6,704,573	30,970,710	4,911,827	6,357,778	786,966	10,645,294	111,944	722,779	23,501,156	7,469,554	1,297,167	6,169,096	—2,004,657
Maine Central	1,219	4,077,414	2,175,212	6,746,841	984,764	1,032,188	79,462	2,556,247	46,002	187,243	4,885,905	1,860,936	359,607	1,501,186	30,553
Mobile & Ohio	1,122	5,305,143	781,642	6,480,469	672,106	1,141,283	283,731	2,515,730	18,565	203,513	4,834,928	1,645,541	217,426	1,427,394	—196,264
Monongahela	75	577,917	14,784	604,856	112,901	52,684	4,228	163,558	.....	14,147	347,517	257,338	11,218	246,121	—254,816
New Orleans & North Eastern	204	1,537,468	324,337	2,048,336	217,335	426,407	68,102	731,762	40,551	82,698	1,566,854	481,482	102,990	378,492	—61,044
New Orleans Great Northern	283	677,109	178,200	740,011	120,240	139,875	18,451	288,689	1,266	45,608	614,128	125,883	20,150	105,717	—134,726
New York, Chicago & St. Louis	568	5,523,154	854,780	6,678,303	831,498	839,618	295,608	3,051,331	36,336	138,243	5,192,633	1,485,670	281,267	1,203,732	—8,100
New York, New Haven & Hartford	2,003	17,453,327	16,227,114	37,817,095	4,709,815	5,730,099	256,942	14,485,146	340,837	924,492	26,436,720	11,380,374	1,584,000	9,794,256	403,993
New York, Philadelphia & Norfolk	112	1,696,206	309,879	2,197,791	215,544	430,914	29,826	963,620	33,064	68,814	1,741,781	456,010	68,300	387,507	5,559
Norfolk Southern	900	1,420,642	657,169	2,252,737	307,367	363,537	52,369	851,684	609	139,160	1,714,728	538,009	77,511	459,133	—198,297
Northern Pacific	6,499	27,498,956	8,623,318	39,606,410	5,255,367	5,108,054	643,093	11,739,620	580,687	651,204	23,184,096	16,422,314	2,809,326	13,611,476	—1,528,506
Pennsylvania *Company*	1,757	22,694,220	5,920,270	31,935,771	4,741,542	5,895,473	538,627	11,873,749	258,405	786,364	24,094,160	7,841,611	1,844,324	5,996,301	—2,237,627
Pennsylvania *Railroad*	4,512	75,701,305	23,390,937	109,130,083	14,489,145	21,639,917	1,347,618	41,072,488	1,615,401	2,848,238	83,012,807	26,117,276	4,529,077	21,576,384	—1,037,599
St. Louis, Brownsville & Mexico	548	758,827	436,861	1,315,427	247,412	150,896	36,647	504,627	.....	75,861	1,006,956	308,470	43,923	264,547	11,673
Seaboard	3,101	8,109,182	2,658,314	12,082,362	1,437,718	1,840,760	447,336	4,529,300	55,533	384,743	8,693,132	3,389,229	632,145	2,753,025	—1,064,429
Southern in Mississippi	281	386,436	208,165	653,283	155,164	61,700	17,120	288,844	.....	25,922	548,750	104,533	59,282	45,171	—97,951
Southern Pacific	6,517	35,309,004	16,116,900	56,851,874	5,661,862	8,084,032	1,123,784	18,285,917	946,465	1,622,356	35,589,730	21,262,144	2,882,921	18,362,847	—2,582,447
Toledo, St. Louis & Western	451	2,276,505	204,320	2,669,585	331,336	415,414	115,825	1,045,334	.....	60,062	1,967,971	701,614	173,252	528,362	—303,748
Union R. R. of Pennsylvania	31	.....	.....	2,071,778	311,099	678,704	709	897,465	.....	23,584	1,911,561	160,216	19,472	140,744	—290,110
West Jersey & Seashore	356	1,082,847	2,661,560	4,114,662	652,885	601,444	85,907	1,697,752	19,750	93,619	3,151,357	963,305	200,096	762,943	51,827
Wheeling & Lake Erie	459	2,533,914	352,684	3,180,974	355,611	590,243	61,956	1,223,348	9,206	104,904	2,345,269	835,706	221,134	614,572	—748,271

†Figures shown are for 6 months.

Traffic News

The Panama canal has been blocked for nearly a week by landslides. When it was cleared, on Wednesday of this week, 27 ships went through in one day.

Railroads east of Chicago have filed tariffs with the Interstate Commerce Commission increasing lake and rail rates and ocean and rail rates where they are intimately related to the all-rail and lake-and-rail rates by about 5 per cent, effective on March 27 and later dates.

Protests against proposed freight rate increases asked by the Missouri railroads were heard by the Missouri Public Utilities Commission at a hearing in Kansas City on March 5. A committee representing manufacturers, produce and stock dealers, appeared before the commission.

The railroads of South Texas expect within the next month or two to carry northward more than 4,500 carloads of Bermuda onions. The land devoted to onions aggregates 7,850 acres, of which 4,200 acres is in the Laredo district. The principal shipments will originate on the International & Great Northern and the St. Louis, Brownsville & Mexico roads.

Governor Philipp of Wisconsin is reported as saying that if the legislature of Wisconsin should pass a bill allowing passenger fares to be put on the basis of 2½ cents a mile, he would veto the measure.

George B. Haynes, general passenger agent of the Chicago, Milwaukee & St. Paul, C. A. Cairns, general passenger agent of the Chicago & North Western, and James C. Pond, assistant general passenger agent of the Minneapolis, St. Paul & Sault Ste. Marie, this week began a speaking campaign in Wisconsin for the proposed advance in passenger fares from 2 to 2½ cents a mile, addressing first a meeting of the Merchants' and Manufacturers' Association of Milwaukee, on Monday.

The foot-and-mouth disease continues to interfere with livestock traffic at many places. Quarantines established two or three weeks ago are being lifted, here and there, but new quarantines are imposed. The state of Pennsylvania has put restrictions on the transit of animals through the state, causing much complaint at New York City. It is said that the New York Central and the New York, Chicago & St. Louis have disregarded this state quarantine. At Richmond, Va., an injunction was issued against certain transportation companies which violated the state quarantine. In Kentucky a single herd of cattle valued at $60,000 was destroyed; and the same course was taken with a herd worth $50,000 at Haddonfield, N. J. At Worcester, Mass., it was reported that a number of men had been infected with the disease.

Officers of Canadian railroads appeared before the Canadian Board of Railroad Commissioners on March 1 to offer testimony in support of their application for a general increase in freight rates. H. G. Kelley, vice-president of the Grand Trunk, testified that wages had been increased 23.19 per cent in 1914 over 1909. He gave other testimony regarding increases in wages and in the cost of supplies and of operation. C. E. Dewey, freight traffic manager of the Grand Trunk, gave detailed testimony regarding the rates which it is proposed to increase. E. W. Beatty, vice-president and general counsel of the Canadian Pacific, also presented statistical testimony on behalf of his road to show the need for an increase in rates. Counsel for the Dominion government announced that the government was opposed to an increase in rates at this time. The board will hold hearings at various places to discuss the rates on different commodities.

W. S. St. George, general passenger agent of the Missouri, Kansas & Texas, in an interview in reply to a statement issued by the Oklahoma Corporation Commission which gave figures to show that the railroads of the state are making more money under the two-cent passenger fare than under the three-cent fare, based on passenger earnings for four months, says that most of the increases shown in the statement resulted from two causes. First, the re-buying of tickets at border points to evade the higher interstate fares, and, second, increased travel resulting from a general increase in business and developments within the territory. "On the Missouri, Kansas & Texas," he said, "47 per cent of all selling stations during the four months of 1914 quoted in the commission's statement showed a decrease in passenger receipts as compared with the previous period, and of 53 per cent showing an increase only 41 per cent showed an increase of over 10 per cent." Some of the border stations, he said, showed an increase of nearly 300 per cent in 1914 as compared with 1912 because of the buying of tickets at border points.

Michigan Commissioner Finds Earnings Too Low

Lawton T. Hemans, chairman of the Michigan railroad commission, appeared before the railroad committees of the Senate and House of the Michigan legislature on March 4, and told them that the statistics submitted by the railroads in support of the request for an advance in passenger fares were substantially correct. "From such information as we have been able to reach," he said, "we are bound to say that for a period of 10 years the railroads have not been earning sufficient income for the services rendered. We are led to this conclusion by the reports and the opinions of the Interstate Commerce Commission as well as from railroad reports in our department. These reports are sworn to and we have every reason to believe that they are substantially correct. Our conclusion is that while in the past decade there has been an increase in the cost to the railroads of freight and passenger transportation, there has been a decrease in the rates for both of these services. Thirty-three out of fifty-six Michigan railroads are earning from their passenger service sums insufficient to pay interest on the passenger service proportion of their bonded debts."

Travel to the San Francisco Exposition

The Southern Pacific is now under contract to carry within the immediate future over 15,000 visitors to the Panama-Pacific International Exposition at San Francisco. To move these people, 104 special trains will be required, these being distributed through the El Paso, Ogden and Portland gateways. Other reservations for cars are coming in as fast as they can be handled.

In addition to the 104 special trains, the Southern Pacific has made arrangements for moving upwards of 40 private cars with their parties, and from now on up to the month of August every one of its 10 limited and express trains from eastern connections will be run with from one to three extra sections. Four of these regular expresses run through Ogden, three via Portland, and three via El Paso. This means an increase in regular daily train service from the East of from 10 to 30 or 40 trains.

From data which has been compiled it is expected by the company that the greatest number of transcontinental visitors will reach San Francisco during June, July and August. H. R. Judah, assistant general passenger agent, estimates that the 550 conventions to be held during the season of the exposition will attract between 700,000 and 800,000 people to San Francisco.

Car Surpluses and Shortages

The American Railway Association's Committee on Relations Between Railroads, Arthur Hale, chairman, has issued statistical statement No. 2, giving a summary of freight car surpluses and shortages for March 1, 1915, with comparisons. The total surplus on March 1, 1915, was 304,284; on February 1, 1915, 280,573, and on March 1, 1914, 159,480.

The surplus for February 1, 1915, shown above includes figures reported since the issue of statistical statement No. 1 (published in the *Railway Age Gazette* of February 19, page 343) and confirms the estimate made therein.

The increases over February 1 are chiefly in the west and central south. The total shortage on March 1, 1915, was 297; on February 1, 1915, 1,162, and on March 1, 1914, 5,573.

The figures by classes of cars follow:

Classes	Surplus	Shortage
Box	78,686	50
Flat	20,592	41
Coal and gondola	158,293	14
Other	46,713	192
Total	304,284	297

Commission and Court News

INTERSTATE COMMERCE COMMISSION

A hearing before George N. Brown, examiner attorney for the Interstate Commerce Commission, on the proposed charges for trap car service was held at Detroit on March 3 and 4.

The Chicago, Milwaukee & St. Paul has filed a formal complaint with the Interstate Commerce Commission against the Great Northern, alleging that the Great Northern unduly discriminates against it by refusing to make through routes and joint rate arrangements with it for the carriage of passengers to and from British Columbia and Washington via Seattle.

International Rates on Pulp Wood

International Paper Company et al. v. Delaware & Hudson et al. Opinion by Commissioner Clark:

Complaint is made against the reasonableness of an increase of generally one cent per 100 lb. made in August, 1913, in the rates on pulpwood from points in Canada on the Canadian Pacific, Grand Trunk, Intercolonial, Canadian Northern and Temiscouta to points in eastern and northern New York. These increased rates had already been found reasonable by the Board of Railway Commissioners for Canada on a complaint by the same parties. The rates were primarily established by the Canadian carriers for transportation, largely in Canada, and the increases accrue, almost wholly to them. For these reasons the commission believes that no relief should be granted. (33 I. C. C., 270.)

Proposed Increase in Freight Storage Rates at New York

C. V. Burnside, examiner for the Interstate Commerce Commission, took testimony at New York City March 4, 5 and 6 concerning the proposed increase in charges for storage and lighterage the tariffs for which were suspended by the commission. The new tariffs provided for charges for switching at numerous places where at present this service is performed free. One of the proposed changes was a new item in the tariffs making a charge of twelve cents a ton for the delivery of freight in Manhattan at docks other than those of the railroad companies. A large share of the freight coming to New York City reaches the west side of the Hudson River by rail, and the cars are taken from the trains directly to floats and carried across the river; and the freight is unloaded directly at the railroad company's piers. Freight going to other piers must in most cases be unloaded from the cars at Jersey City or Hoboken and taken across the river by lighter or by wagons on the decks of ferry boats.

Another important change proposed is a reduction from ten days to five days in the time allowed for free storage of flour. The flour merchants declare that the profit on their transactions is so small that the addition of a charge for storage heretofore given by the railroads for nothing, will greatly impair and in some cases destroy their business.

The Merchants' Association was represented at the hearing by J. C. Lincoln, and the city government by the corporation counsel, F. L. Polk; numerous large shippers and manufacturers were represented.

The contention of the railroads is that all the proposed charges are reasonable; while the city and local interests argue that conditions in New York City are so different from those in other places that no general rule can apply; the need of additional time to unload flour, so as to provide for delays in transportation, for bunching and for making adjustments with the final receivers of the freight, who have very limited storage room, makes it out of the question to pay the carriers any more than is now paid.

Jobbers in flour say that it is necessary that there shall be usually in New York City a reserve stock of about 20,000 barrels; this to provide for irregularities in arrival, etc.; and they say that a reduction of five days in the free storage time would force them to reduce this stock to 5,000 barrels. No fair comparison can be made with the rates in other cities because the conditions are different. In Philadelphia cars are taken directly to the doors of warehouses; but in New York this is out of the question.

Testimony was given on behalf of the flour merchants to the effect that the proposed charge of one cent per 100 lb. for each ten days on flour, equal to six cents per barrel per month, would be about twice the prevailing charge for keeping flour in public storehouses, which is three cents per barrel per month (though for the first month there is a charge of three cents a barrel for labor).

The present liberal practices of the railroads in connection with flour at New York City are of long standing. In 1902 the railroads allowed sixty days' free storage. After a time this was reduced to thirty days; then to twenty days and finally the present limit, ten days, was adopted about six years ago.

At a continuation of the hearing on Monday of this week Mr. Lincoln described the track facilities and the customs in freight handling in Chicago, to show the superiority of the system of distribution of freight provided in that city.

P. C. Staib, a wholesale grocer, declared that it would be impossible, as a rule, to move freight from the piers in New York to the consignees' warehouses within 48 hours of its arrival, which is the limit of the period for which the roads propose to allow free storage. The draymen of the city are not equal to the task of removing freight so rapidly.

An inspector of the New York State Public Service Commission, testifying concerning freight, largely structural steel, coming to the city to be delivered to contractors working on the new subways, said that the proposed charge of twelve cents a ton for the delivery of freight from lighters at points other than railroad company's piers, together with the additional charge of forty cents a ton on heavy pieces, would add to the cost of the city's subways about $104,380. The American Bridge Company presented a similar protest.

STATE COMMISSIONS

The Railroad Commission of Mississippi has imposed on the Illinois Central a fine of $500 for ignoring an order of the commission forbidding the collection of ten cents additional from passengers paying fares on the trains.

The Railroad Commission of South Carolina on March 3 issued an order making sweeping reductions in the rates for transportation of merchandise by express in that state. At the same time it was announced that hearings would be held concerning proposed changes in rates on other merchandise, not affected by the present order.

The Long Island road has appealed to the courts from the order of the New York Public Service Commission, First district, requiring it to put on two additional trains in the Manhattan-Far Rockaway service, and one additional train on the Atlantic division, and to have certain trains stop at St. Albans station on the Montauk division. The company has obtained a writ of certiorari from the Supreme Court for a review of the commission's action.

The Oregon Railroad Commission has been obliged to retrench because its appropriation for the next two years was reduced by the legislature to $25,000. It is announced that the chief electrical engineer, the auditor, the assistant secretary and the stenographer, are to be dismissed on April 1, and that other reductions in its staff are expected to follow. The commission's appropriation for the past two years has been $80,000, and for the two years before that was $105,000.

The New York State Public Service Commission, Second district, has decided in favor of William A. Wadsworth of Geneseo, in his complaint against the Erie Railroad for not maintaining his farm crossing. The crossing consists of a bridge over the tracks, and it has existed for about 60 years; but recently when it became necessary to build a new bridge the railroad notified Mr. Wadsworth that he himself would have to bear the expense; and a barricade was put across the present structure. The road claimed the commission had no jurisdiction in such a case; but, in an opinion by the chairman, it holds that, whatever its power as to originally establishing a farm crossing—although it believes it has such authority—it plainly has jurisdiction in a matter

like the present case, where the crossing has already been constructed and has been so long in use.

PERSONNEL OF COMMISSIONS

Joseph Pryor, assistant chief engineer of the Illinois Public Utilities Commission, has been appointed acting chief engineer, succeeding R. M. Feustel, resigned.

Charles C. Elwell, engineer of the Connecticut Public Utilities Commission, has been nominated by the governor (and confirmed) as a member of the commission, in place of T. B. Ford, to take office July 1, next. Mr. Elwell was born in 1855 at Belfast, Me., and was graduated from the University of Maine in 1878. He began railroad work in 1882 as assistant engineer on the New York & New England, and subsequently served in a similar capacity on the Philadelphia & Reading, the Baltimore & Ohio and the New York, New Haven & Hartford. On the latter road he was in charge of four tracking work between New York and New Haven from 1893 to 1895, and in the latter year was promoted to the position of superintendent at Norwich, Conn. In 1908 he was made engineer of electric lines controlled by the New Haven, which position he held three years. In 1911 he was appointed engineer of the state commission. He is a member of the American Society of Civil Engineers, and has just been elected president of the Connecticut Society of Civil Engineers.

COURT NEWS

A special court, consisting of Judges Kohlsaat, Landis and Geiger of the United States Court at Chicago, has declined to issue an injunction at the request of the Duluth & Northern Minnesota to prohibit the Interstate Commerce Commission from enforcing its orders reducing rates on logs and pulp wood on this road, which lies wholly within the state of Minnesota. The court held that, inasmuch as the logs and other commodities carried by the road were intended for shipment beyond, the road was engaged in interstate commerce within the meaning of the act; and as to the plea of confiscation, that the court may not hear testimony tending to show that the order results in confiscation of the carrier's property unless the commission has refused to hear such testimony.

Liability for Fires—Proximate Cause

In an action for damages by fire to the plaintiff's factory, it appeared that the fire was started by railroad laborers on the defendant's right of way for their own purposes, and there was no evidence that certain combustibles which the defendant had permitted to accumulate on the right of way became ignited and thereby communicated the fire to the plaintiff's property. The Missouri Supreme Court held that the negligence, if any, of the railroad company in permitting the accumulation was not the proximate cause of the fire. The court also held that the Missouri statute making railroads liable for fires started by engines and those communicated by the ignition of dry vegetation negligently permitted to remain on the right of way, does not make a railroad liable for a fire kindled by its laborers on the right of way outside the scope of their employment (in this instance to heat water to wash their clothes), and communicated directly to adjoining property without the ignition of rubbish upon the right of way.—Excelsior P. Mfg. Co. v. Kansas City Southern (Mo.), 172 S. W., 359.

Right to Refund—Conditions

In an action in the Oklahoma courts for a refund under a milling-in-transit arrangement, it appeared that the plaintiff, a lumber company, at different times between May, 1907, and February, 1908, shipped rough lumber to a milling point on the defendant's line. At the time a milling-in-transit privilege was given by the defendant's tariff, under which the finished product was required to be shipped out in certain quantities to destinations on the defendant's line, and under certain named tariffs carrying specified freight rates then in force. Before the plaintiff shipped out any of the lumber, that tariff on intrastate shipments had been canceled, and lower rates established to conform to an order of the State Corporation Commission; and thereafter the plaintiff shipped under such lower rates. The Oklahoma Supreme Court held that, not having complied with the conditions under which the right to a refund on inbound shipments was given, the plaintiff was not entitled to the benefit of it. Its right to a refund was dependent on the shipper causing the lumber to be moved under the existing tariffs. When this was not done, but, instead the lumber was shipped out under reduced rates, put in force by lawful authority, an action to recover such refund could not be maintained.—St. Louis & S. F. v. Walton-Chandler Lumber Co. (Okla.), 145 Pac. 340.

Employers' Liability Act—Interstate Commerce

The Wisconsin Supreme Court holds that a brief incidental absence from the scene of work, which is not inconsistent with the employee's duty to his employer, does not necessarily invalidate his claim to be still on duty and engaged in interstate commerce. A brakeman finished his regular duties, after a run between two state points on a train which had some interstate cars in it. He went to a saloon, and from there started to cross over a train to go to the station and learn if the conductor had any further orders for him. While crossing the train he was injured. The court held that he was employed in interstate commerce.—Graber v. Duluth, S. S. & A. (Wis.), 150 N. W., 489.

A laborer on a trestle, used by a railroad company in interstate commerce, boarded and slept in a bunk car furnished by the company, and which was moved about as the place of work was changed. The actual board was furnished by the foreman in charge of the work. The men went to and from the boarding cars sometimes on push cars and sometimes on foot. The laborer in question was injured while walking along the tracks to the cars after finishing his day's work. In an action against the company it was held by the Kentucky Court of Appeals that he was engaged in interstate commerce within the meaning of the federal employers' liability act, the course of his employment covering not only the time he was actually engaged at work, but the time he was engaged in going to and from his work.—Louisville & N. v. Walker (Ky.), 172 S. W., 517.

Duty Towards Licensees Walking Near Tracks

Action was brought for injuries to a boy 15 years of age, and weighing about 100 pounds, who was drawn beneath a freight train moving from 25 to 30 miles an hour while he was walking along a pathway alongside the defendant company's tracks. The Kentucky Court of Appeals assumed that the boy was a licensee and not a trespasser, so that the question sharply presented was: Does a railroad company owe to a licensee walking near its tracks, and who knows of the approach of the train, the duty of slackening the speed of its train to prevent him from being sucked under it? Witnesses had never heard of such an accident but, says the court, this does not show that such an accident had never happened, or that it should not have been anticipated; yet this rule is not without qualification. Every day hundreds of trains are run at the rate of 25 to 30 miles an hour. These trains pass hundreds and perhaps thousands of persons standing within five or six feet of the track. If the suction from trains were great enough to draw persons under them, there would have been innumerable accidents of the kind under consideration. Notwithstanding this fact, several railroad men, who certainly had an opportunity to speak from long experience, say that they never heard of a live object, capable of resisting, being sucked under a train. Not only so, but the only two cases that have ever come before the courts, so far as the court knew, are the case under consideration and the case of Graney v. St. Louis, I. M. & S., 157 Mo., 666, 57 S. W., 276, 50 L. R. A., 153, where a recovery was denied on the ground that the accident, even if it took place as claimed by the plaintiff, was not one that might have been reasonably anticipated. Where, in a case like this, it is contended that the accident was the result of the negligence of the railroad company, combined with a natural law, and where not only the character of the accident, but the conditions attending the everyday operation of trains, are such that the accident would have frequently happened if the natural law were such as to make it possible, evidence to the effect that no such accident had ever happened has a strong and important bearing on the question whether or not it should have been reasonably anticipated.

Even assuming the possibility of such an accident, the court

held the probability of its occurrence to be so remote that it could not be said to be an accident which should, in the exercise of ordinary care, be reasonably anticipated by those operating railroad trains. That being true, a railroad company does not owe the licensees walking along the side of its tracks, and who know of the approach of its trains, the duty of moderating the speed of the trains so as to prevent their being sucked under the cars.—L. & N. v. Lawson (Ky.), 170 S. W., 198.

Interchange of Cars and Freight

The Illinois Central sought to enjoin the enforcement of an order of the Louisiana Railroad Commission, regulating interchange of traffic. This order (No. 295) would require a railroad, upon demand of a carrier or shipper, and on terms fixed by the state commission, to switch empty cars from a competing interstate railroad to a designated side track within its own terminals for the purpose of being loaded there with goods intended for interstate commerce, and when so loaded to move the same back to the competitor's line for transportation to another state. The company would also be required to accept from competing interstate lines, at points within the city, loaded cars brought from other states, and place them on its own side track, although such track was the real destination contemplated at the time of the original shipment. The United States Supreme Court holds that switching movements of this kind constitute a part of interstate commerce, the regulation of which Congress has undertaken, and consequently the order of the state commission transcends the limits of its powers.

When freight actually starts in the course of transportation from one state to another it becomes a part of interstate commerce. The essential nature of the movement, and not the form of the bill of lading, determines the character of the commerce involved. And generally, when this interstate character has been acquired, it continues, at least, until the load reaches the point where the parties originally intended that the movement should finally end. Illinois Central v. De Fuentes, 35 Sup. Ct., 275.

West Virginia Two-Cent Fare Law

The United States Supreme Court on Monday of this week, in the suit of the Norfolk & Western, declared unconstitutional, as affecting that road, the law of West Virginia limiting passenger fares to two cents a mile. The decision was by Justice Hughes, who said:

"In making a reasonable adjustment of the carrier's charges, the state is under no obligation to secure the same rate of return from each of the two principal departments of business, passenger and freight, but the state may not select either of these departments for arbitrary control.

"In this case it is apparent, from every point of view, that the statutory rate, at most, affords a very narrow margin over cost. It is clear that by the reduction in rates, the company is forced to carry passengers, if not at or below cost, with merely a nominal reward, considering the volume of the traffic affected. We find no basis whatever upon which the rate can be supported, and it must be concluded, in the light of the principles governing the regulation of rates, that the state exceeded its power in imposing it."

The attorney general of the state contended that the 2-cent rate prescribed by the state law of 1907 should be taken in connection with the freight rates authorized in 1895 by the legislature and that passenger earnings cannot be segregated and considered apart; that all classes of railroad business need not be equally remunerative; that as the railroad company is earning between 6 and 8 per cent on its entire investment if its passenger business is not remunerative its freight traffic must be more than remunerative.

In deciding the case the court declared, as above, that the statutory rate, at most, affords a very narrow margin. "It is manifestly not a case where we are asked to enter the domain of legislative discretion, nor is it one in which it is necessary to determine the value of the property employed in intrastate business. . . ."

The Norfolk & Western brought suit in the Circuit Court of Kanawha county, W. Va., in 1909 to restrain the officers of the state from further enforcement of the law. At the old rate the road estimated that it was receiving a return of 3.7 per cent on its passenger business. For the fiscal year ending June 30, 1908, the first year the law was in operation, the return on its passenger business fell to 1.04 per cent per annum and the following fiscal year to 0.38 per cent.

In addition to these facts the road presented the claim that the penalties prescribed for disobedience were so heavy as to amount to denial of due process of law; and that the law was unconstitutional because it imposed the burden of the lower rate on roads whose mileage exceeded fifty miles while exempting shorter roads.

North Dakota Coal Rate Law Annulled

The Supreme Court of the United States, on Monday of this week, in the cases of the Northern Pacific and the Minneapolis, St. Paul & Sault Ste. Marie declared unconstitutional the law of North Dakota limiting freight rates on lignite coal.

The decision was by Mr. Justice Hughes, who has written most of the important decisions of the Supreme Court in rate cases recently. Justice Hughes lays down the principle that a state cannot select a particular commodity, coal, for example, on which to fix a rate, justifying itself by the fact that the return from a railroad's entire intrastate business is remunerative. The state has broad powers over railroads, but it does not enjoy the rights of an owner.

This case came before the court on appeal from a decision of the Supreme Court of North Dakota. The law was passed in 1907, and the carriers refused to obey it. A test case was begun, and in 1909 the Supreme Court of North Dakota handed down a decision that the rates were reasonable, and that the proper test of their reasonableness was whether they, with other rates on other commodities in intrastate transportation, gave the carrier a reasonable return on its business.

This decision was affirmed by the Supreme Court of the United States in 1910, but with the proviso that if after a trial of the rates they were still found to be confiscatory, the carriers might come into court and have another opportunity to prove that contention.

The rates were put into effect in 1910. Again the railroads, after a year's test of the rates, went into court to contest the law. The Supreme Court of North Dakota then held that in the case of the Northern Pacific the rates were "slightly remunerative, but in fact non-compensatory," and in the case of the other road "more than the actual costs of transportation," but less than the fixed and overhead charges "properly chargeable to the carriage of this commodity."

The court held that the rates were not confiscatory because to prove confiscation it must be shown that the rates are so low as to make a carrier's entire intrastate business unprofitable, after it should be demonstrated by valuation of the company's property what portion thereof was devoted to intrastate traffic. The court in addition held that it must be reasonably certain that the loss on the commodity in question reduces the total net freight earnings to a point where they as a whole fail to yield a fair return. The carriers declared it was impossible to answer such a question and again appealed to the Supreme Court of the United States for relief.

Justice Hughes said, further:

"The general principles to be applied are not open to controversy. The railroad property is private property devoted to a public use. As a corporation, the owner is subject to the obligation of its charter. As the holder of special franchises, it is subject to the conditions upon which they were granted. Aside from specific requirements of this sort, the common carrier must discharge the obligations which inhere in the nature of its business. It must supply facilities that are reasonably adequate; it must grant reasonable terms, and it must give service without unjust discrimination.

"But the fact that the property is devoted to a public use on certain terms does not justify the requirement that it shall be devoted to other public purposes, or to the same use on other terms, or the imposition of restrictions that are not reasonably concerned with the proper conduct of the business according to the undertaking which the carrier has expressly or impliedly, assumed. As a carrier for hire, it cannot be required to carry persons or goods gratuitously. The case would not be altered by the assertion that the public interest demanded such carriage. In such a case it would be no answer to say that the carrier obtains from its entire business a return as to the sufficiency of which it is not entitled to complain."

Railway Officers

Executive, Financial, Legal and Accounting

W. H. Sparger has been appointed auditor of the Oil Belt Railway, with headquarters at Jennings, Mo.

G. W. Alexander has been elected treasurer of the Detroit Terminal, with office at Detroit, Mich., vice W. E. Hackett.

Henry C. Ferris, of Muskogee, Okla., has been appointed co-receiver with Alexander New of the Missouri, Oklahoma & Gulf, vice Louis S. Posner, resigned.

Pending the return of T. J. Kennedy from abroad and his qualifying as co-receiver, Vivian Harcourt has been appointed sole acting receiver of the Algoma Central & Hudson Bay, with headquarters at Sault Ste. Marie, Ont.

Alberto J. Pani, vice-president of the National Railways of Mexico, at Mexico City, Mex., has been authorized by the executive committee of the company to assume the duties of president, due to the absence of Luis Cabrera, and Charles R. Hudson, vice-president at Mexico City, has severed his connection with this company.

The Continental Trust Company has resigned as co-receiver of the Denver, Laramie & Northwestern, and Marshal B. Smith is now sole receiver, with headquarters at Denver, Col. J. R. McCoy, assistant auditor at Denver, has been appointed auditor in charge of accounts, and his former position has been abolished.

William Alfred Worthington, vice-president and assistant director of maintenance and operation of the Southern Pacific Company, at New York, has been appointed vice-president and assistant to chairman, with headquarters at New York. Mr. Worthington was born on June 18, 1872, at Vallejo, Cal., and was educated in the public schools af Sacramento. He began railway work on March 1, 1887, with the Southern Pacific, and has been in the continuous service of that road ever since. He served as stenographer and clerk in the superintendent's office at Sacramento until June, 1888, and then became chief clerk to the engineer of maintenance of way at San Francisco. In October, 1893, he was appointed statistician in the general manager's office at San Francisco, and two years later was made chief clerk of the same office. From October, 1901, to April, 1904, he was executive secretary to assistant to president of the same road at San Francisco. Mr. Worthington went to Chicago in April, 1904, as chief clerk to the director of maintenance and operation of the Union Pacific System and the Southern Pacific Company. In November, 1907, he was appointed assistant to director of maintenance and operation at Chicago, and from January 1, 1912, to February, 1913, was assistant director of maintenance and operation of the same roads, with headquarters at New York City. In February, 1913, when the Union Pacific and Southern Pacific were separated under an order of the federal court, he resigned from the Union Pacific and was elected vice-president and assistant director of maintenance and operation of the Southern Pacific Company, which position he held at the time of his recent appointment as vice-president and assistant to chairman of the same road, as above noted.

W. A. Worthington

Operating

R. S. Toucey, assistant superintendent of the Union Pacific, Cheyenne, Wyo., has been appointed trainmaster at Ogden, Utah, succeeding George Brophy, promoted.

Will G. Dungan, whose appointment as superintendent of the Sterling division of the Chicago, Burlington & Quincy, with headquarters at Sterling, Colo., has already been announced in these columns, was born October 8, 1875, at Aledo, Ill. He attended the University of Nebraska 1891-1896, and began railway work in November, 1897, with the Chicago, Burlington & Quincy as axman. He held various positions in the engineering department on location, construction and maintenance, and in March, 1907, was appointed engineer maintenance of way of the Nebraska district. One year later he was appointed roadmaster and trainmaster at Orleans, Neb., and in September, 1912, was made trainmaster at McCook, Neb. He held the latter position until his recent promotion to division superintendent, as above noted.

Charles Hicks, whose appointment as general manager of the Tennessee, Alabama & Georgia with headquarters at Chattanooga, Tenn., has already been announced in these columns, was born on August 4, 1859, at Poughkeepsie, N. Y., and was educated in the high schools. He began railway work on July 26, 1881, with the Poughkeepsie & Eastern, now a part of the Central New England, serving consecutively as station agent and telegraph operator for twelve years, commercial agent for a year and a half, and as general superintendent for fourteen years. He then entered the service of the Chattanooga Southern as superintendent, and later was general manager until the latter part of 1910. Mr. Hicks was then out of railway work for about four years until his recent appointment as general manager of the Tennessee, Alabama & Georgia, the successor of the Chattanooga Southern.

Engineering and Rolling Stock

Charles A. Paquette, whose appointment as chief engineer of the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria & Eastern, with headquarters at Cincinnati, Ohio, has already been announced in these columns, was born at Detroit, Mich., on April 2, 1872. He was graduated from Notre Dame University in 1891, and began railway work in July of that year as transitman for the Lake Shore & Michigan Southern. From May, 1892, to April, 1893, he was transitman on the Peoria & Eastern, and was successively assistant engineer and engineer maintenance of way until October, 1899, when he became superintendent of that road. In September, 1902, he was appointed superintendent of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., and in June, 1906, he was made assistant chief engineer. In December, 1913, Mr. Paquette was appointed chief engineer maintenance of way, from which position he was promoted to that of chief engineer in charge of construction and maintenance on March 1, as above noted.

C. A. Paquette

W. L. Connors, general signal foreman of the Buffalo, Rochester & Pittsburgh, has been appointed signal supervisor on the Rochester division, with headquarters at Warsaw, N. Y., succeeding M. J. Brundige, deceased.

L. F. Lonnbladh, engineer maintenance of way of the Missouri, Kansas & Texas, has been appointed chief engineer, with headquarters at Dallas, Tex. A. A. Matthews, assistant engineer of maintenance of way, succeeds Mr. Lonnbladh, with office at Dallas.

William Pelham, master carpenter of the Erie at Marion, Ohio, has been appointed inspector of bridges and buildings, with headquarters at Cleveland. J. Orcutt, master carpenter at Huntington, Ind., succeeds Mr. Pelham, and H. D. Harlow has been appointed master carpenter at Huntington, succeeding Mr. Orcutt.

V. J. Lamb, car foreman of the Charleston & Western Carolina, at Augusta, Ga., has been appointed general foreman car repairs, at that place, succeeding W. F. Weigman, who has been appointed general foreman car department of the First division of the Seaboard Air Line, with headquarters at Portsmouth, Va.

OBITUARY

P. Dowling, general roadmaster of the Delaware, Lackawanna & Western, at Scranton, Pa., died in that city on March 6.

Frederick L. Brooks, formerly claim agent of the Chicago, Indianapolis & Louisville, died at his residence in Chicago on March 3, aged 56 years.

Adolph B. L. Scrivner, formerly assistant general superintendent of the National Lines of Mexico, died at Laredo, Texas, on March 1, aged 39 years.

Frederick W. Morse, formerly and for many years general passenger and freight agent of the Montpelier & Wells River, died on March 7, at Montpelier, Vt., at the age of 70.

Marvin J. Brundige, signal supervisor of the Buffalo, Rochester & Pittsburgh, died at the Warsaw hospital, Warsaw, N. Y., on February 21, following an operation for acute appendicitis.

G. D. Bacon, formerly from 1892 to 1905 general agent of the passenger department of the Chicago, Rock Island & Pacific, with offices at Cincinnati, Ohio, and St. Louis, Mo., died at Eustis, Fla., on March 4, aged 70 years.

W. L. Bisbee, formerly superintendent of the Second division of the Houston & Texas Central, died on March 4, at Houston, Tex., aged 63 years. He was retired from the active service of the company on January 1 last, at his own request, due to ill health, at that time having served the company continuously for 41 years.

Frederick M. Hawley, superintendent of the Allegheny & Bradford divisions of the Erie at Salamanca, N. Y., died on March 4, at Bradford, Pa. He was born on September 5, 1865, at Scottsville, N. Y., and began railway work in June, 1879, as a telegraph operator on the Erie, and remained in the service of that road ever since. He then served consecutively as despatcher, chief despatcher, passenger trainmaster and division trainmaster until May, 1912, when he was appointed division superintendent of the same road.

Morton Riddle, general manager of the Florida East Coast at St. Augustine, Fla., died at that place on March 4. He was born in 1869 at Petersburg, Va., and began railway work on April 1, 1887, and was consecutively rodman, instrument man and resident engineer on the Norfolk & Western and the Charleston, Cincinnati & Chicago, now a part of the Carolina, Clinchfield & Ohio, until May, 1890. He then entered the service of the Atlantic Coast Line as roadmaster, and in November, 1901, he was appointed superintendent. He was later assistant chief engineer, until 1905, when he was promoted to general superintendent of the same road at Jacksonville, Fla., leaving that company in February, 1914, to go to the Florida East Coast as general manager at St. Augustine.

Hiram R. Nickerson, formerly vice-president of the Mexican Central, died on March 8, at North Wayne, Maine. He was born on December 13, 1853, at North Wayne, and began railway work in February, 1872, as a messenger on the Atchison, Topeka & Santa Fe. He subsequently served on the same road consecutively as telegraph operator, station agent, brakeman, conductor, train despatcher, trainmaster, division superintendent and general superintendent of lines east of the Missouri river until 1888. Then for six years he was general superintendent of the entire system. In June, 1894, he was appointed assistant general manager of the Mexican Central, and from the following December to May, 1899, he was general manager of the same road. Mr. Nickerson was then elected vice-president and general manager. He continued as vice-president until 1907.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Vandalia is in the market for 25 Consolidation type locomotives.

The South Dakota Central has ordered 1 Consolidation type locomotive from the American Locomotive Company.

The Delaware, Lackawanna & Western has ordered 5 Pacific type locomotives from the American Locomotive Company.

The Chicago, Burlington & Quincy has ordered 50 locomotives from the Baldwin Locomotive Works. This will include 15 Pacific type, 20 Mikado and 15 Santa Fe type.

CAR BUILDING

The Chicago Great Western is in the market for 6 combination passenger cars.

The Chicago, Burlington & Quincy has ordered 200 50-ton all-steel gondola cars from the Haskell & Barker Car Company.

The Atchison, Topeka & Santa Fe has ordered 500 60,000-lb. capacity refrigerator cars from the American Car & Foundry Company.

The Illinois Traction is reported to have ordered 50 cars from the Haskell & Barker Car Company. This item has not been confirmed.

The San Antonio, Fredericksburg & Northern is reported in the market for 20 60,000-lb. capacity box cars. This item has not been confirmed.

The Chicago & Milwaukee Electric has ordered 15 all-steel passenger cars from the J. G. Brill Co., and has retained an option on 15 more.

The Boston & Maine has ordered 6 postal cars from the Laconia Car Company, and has also ordered 600 underframes from the Laconia Car Company, and 600 from the Keith Car & Manufacturing Company.

IRON AND STEEL

The Virginian Railway is in the market for 3,000 tons of rails.

The Kansas City Southern is in the market for 8,000 tons of rails.

The Toledo Terminal has ordered 500 tons of rails from the Algoma Steel Company, Sault Ste. Marie, Ont.

The New York, Chicago & St. Louis has ordered 2,500 tons of steel rails from the Lackawanna Steel Company.

The Pennsylvania Railroad has placed an experimental order for 2,000 tons of steel rails with the Illinois Steel Company.

The Chicago Great Western has just ordered 6,000 tons of 85-lb. open hearth steel rails from the Illinois Steel Company.

The Baltimore & Ohio is reported to have ordered 7,000 tons of steel rails from the Carnegie Steel Company. This item has not been confirmed.

The Great Northern recently ordered 10,000 tons of rails, divided among the Lackawanna, Bethlehem, Cambria and the Illinois Steel Companies.

The Northern Pacific has ordered 20,000 tons of rails, divided as follows: Illinois Steel Company, 8,500 tons; Lackawanna Steel Company, 7,500 tons, and the Colorado Fuel & Iron Company, 4,000 tons.

The Illinois Central has ordered 35,000 tons of 90-lb. rails from the Algoma Steel Company, Sault Ste. Marie, Ont. These rails are to be rolled under the American Railway Engineering Association specifications, with the nick-and-break test.

Supply Trade News

T. S. Leake, general contractor, has moved his offices from the Ellsworth building, Chicago, to the Transportation building.

The Railway Water & Coal Handling Company has moved its offices from the Ellsworth building, Chicago, to the Transportation building.

The Adams Motor & Manufacturing Company has moved its offices from 1716 North Kedzie avenue, to its new plant at 3918 Castello avenue, Chicago, Ill.

J. W. Fogg, formerly master mechanic of the Baltimore & Ohio Chicago terminal, has become associated with the Boss Nut Company, with headquarters at Chicago.

A. D. McAdam, formerly western sales agent of the Ralston Steel Car Company, Columbus, Ohio, has been appointed sales manager, with headquarters at Columbus.

A. B. Saurman, Pacific coast manager for the Standard Underground Cable Company, Pittsburgh, Pa., has recently been appointed southeastern manager, with headquarters at Philadelphia, Pa.

Robert E. Jennings, president of the Carpenter Steel Company, Reading, Pa., has been elected to fill the vacancy on the board of the Joseph Dixon Crucible Company, Jersey City, N. J., caused by the death of William Murray.

Sidney G. Johnson, vice-president of the General Railway Signal Company, Rochester, N. Y., in charge of sales and installations, has been elected a member of the board of directors of the General Railway Signal Company of Canada, Limited, Lachine, Que.

F. L. DeArmond, who for the past five years has been with John S. Latta, Philadelphia, Pa., representing the Manhattan Rubber Company, has been appointed sales agent of the Protectus Paint Company, with headquarters in the North American building, Philadelphia.

The Sprague Electric Works of the General Electric Company, New York, has opened a branch sales office in the Illuminating building, Cleveland, Ohio, and Frank H. Hill, who also has charge of the Pittsburgh office, has been appointed manager of the Cleveland office.

Joseph Mohr, president of John Mohr & Sons, boiler manufacturers of Chicago, Ill., died at his home on March 2, 1915. Mr. Mohr was born in Chicago in 1855, and, after serving an apprenticeship as boilermaker, he engaged in business with his father in 1882, under the firm name of John Mohr & Son, which was later changed to John Mohr & Sons.

Mussens, Ltd., Montreal, Que., railway mining and contractors' supplies, were placed in liquidation on March 5, by W. H. C. Mussen. John J. Robson has been appointed liquidator provisionally pending a meeting of the creditors. The liabilities are placed at $300,000, and the assets at $550,000. Depression in business is given as the reason for the liquidation.

A record of prompt shipment is reported by the Whiting Foundry Equipment Company, Harvey, Ill. This company received a telegraphic order for a three-motor electric traveling crane of 10-ton capacity and a 30-ft. span on January 23. The crane was to be delivered complete on the purchaser's runway at New Bridge, Del., on February 10. Drawings were made and the crane was constructed and shipped on January 29, reaching New Bridge on February 4, and it was erected complete for service by February 6.

E. S. Goodloe, storekeeper for the Eastern district of the New York, New Haven & Hartford at Readville, Mass., has left that company and opened an office in the National Metropolitan Bank building, Washington, D. C., where he will represent the Commercial Acetylene Railway Light & Signal Company, New York, the Woven Steel Hose & Rubber Company, Trenton, N. J., and the Automatic Ventilator Company, New York. Mr. Goodloe began railroad work with the Chesapeake & Ohio at Richmond, Va., and remained with that company seven years, during which time he was employed in the mechanical, store and purchasing departments. He was then appointed assistant purchasing agent of the Carolina, Clinchfield & Ohio, with headquarters at Johnson City, Tenn., which position he held for four years, and for the next six years was storekeeper of the eastern district of the New Haven, as noted above.

Railway Steel-Spring Company

The Railway Steel-Spring Company in the fiscal year ended December 31, 1914, had gross earnings of $4,351,465, as against $7,688,185 in 1913. Its total manufacturing, operating and administrative expenses and charges for repairs and depreciation totaled $3,638,180, of which $199,218 was for repairs, renewals and depreciation. The similar expenses in 1913 were $6,216,092, the charges for repairs, renewals and deprcciation being $463,120. The net earnings dropped, therefore, from $1,472,092 in 1913 to but $713,285 in 1914. The company paid bond interest of $338,831, and the usual 7 per cent dividends on preferred stock of $945,000, whereupon the December 31, 1913 surplus of $4,525,203 was reduced to $3,954,656 on December 31, 1914.

The Railway Steel-Spring Company has plants and properties valued at $33,314,362. The statement for December 31, 1914, showed inventories of $1,505,072 There were also accounts receivable of $1,006,076 and $1,669,896 cash. The company has issued capital stock of $27,000,000, of which one-half is preferred. It also has bonds outstanding of $6,628,000. Its statement for December 31, 1914, showed accounts payable of $297,308.

F. F. Fitzpatrick, the company's president, expresses the belief in his report that "all indications now seem to point to a return of confidence and a feeling of encouragement, which cannot help but be conducive to a gradual revival of business throughout the country."

New York Air Brake Company

Notwithstanding the depression of the past year, the New York Air Brake Company was able "through improved methods of manufacture and close economy" to pay its fixed charges, maintain its usual dividend and increase its surplus slightly. The company's total sales were $2,915,932 or but slightly less than the $3,244,312 of 1913 and the $3,078,256 of 1912. The manufacturing costs totaled $1,740,436, leaving a so-called factory profit of $1,175,496 There was other income of $18,524, which brought the gross profit up to $1,194,020. The net profit for the year, after the deduction of administration and other expenses, royalty and taxes, was $821,046. Interest was paid of $180,000 and dividends of $599,544, the same as in 1913. The surplus for the year was thus $41,502, as compared with $54,969 in 1913 and $422,494 in 1912, when but $149,886 was paid in dividends. The total surplus on December 31, 1914, was $273,012.

The company has factories, patents, water power, land and machinery having a value of $9,974,833. On December 31, 1914, its inventories were $1,391,824, and it had $782,124 accounts and bills receivable and $525,041 in cash. The company has issued $10,000,000 capital stock, and it has bonds outstanding of $3,000,000. On December 31, 1914, the accounts payable were $109,898.

President C. A. Starbuck expresses the opinion in his report that the outlook for the coming year is encouraging. The company has already received brake equipment orders from several foreign governments and expects an improvement in domestic orders and inquiries.

TRADE PUBLICATIONS

Coal Drier.—Bulletin No. 212 of the Link-Belt Company, Chicago, describes the Wendell continuous automatic coal drier which is designed to dry washed coal for coking purposes and the smaller sizes of steam and domestic coal. The booklet is a four-page folder and contains a number of illustrations, among which is a diagram showing the method of operation of the machine.

Titanium Aluminum Bronze.—An eight-page booklet just issued by the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., deals with the use of Titanium as a deoxidizer in alloys of aluminum and copper. The booklet contains a number of extracts from reports setting forth the properties of aluminum and copper alloys, the practical casting of which has been facilitated by the use of Titanium.

Paints.—The ninth edition of the Review of Technical Paints, by Frank P. Cheesman, has just been issued by Cheesman & Elliott, 100 William street, New York. This book contains 52 pages, is illustrated and is intended to give anyone interested in metal painting the benefit of the long experience of this firm. Various kinds of paints are considered in detail, and information given as to the best paint to use for any particular class of work.

Oxy-Acetylene Apparatus.—Catalog No. 111 of the Imperial Brass Manufacturing Company, Harrison street and Racine avenue, Chicago, deals with a line of oxy-acetylene welding and cutting outfits, torches, regulators, gages and other accessories. Aside from the usual information concerning the line, the catalog contains a number of illustrations showing the torches in operation on various classes of work and samples of broken parts repaired by the Imperial outfit.

Southern Pacific.—"High Points on Four Great Highways to the California Exposition," is the title of an artistic and descriptive folder just issued by the Southern Pacific. It contains 78 illustrations, picturing the attractions of San Francisco and San Diego, with their expositions, as well as those seen enroute through the four gateways via New Orleans, El Paso, Ogden and Portland. A panorama of the Panama-Pacific International Exposition, 31 in. long, shows the entrance to the Golden Gate and depicts the natural beauties of San Francisco and vicinity.

Oxy-Acetylene Welding and Cutting.—The Vulcan Process Company, Minneapolis, Minn., has issued a pamphlet outlining the use of its oxy-acetylene outfit, which includes an acetylene generator, in railway shops. It contains descriptions of some of the work performed by this equipment with the corresponding savings made in doing the repairs by this method. A table is included showing the cost of cutting and the cost of welding. The cost per foot of cutting ranges from $0.0126 for ¼ in. plate to $0.041 for 1½ in. plates and the cost per foot of welding ranges from $0.045 for ⅛ in. plate to $1.24 for ⅝ in. plate.

Railway Line Material.—The General Electric Company has recently issued bulletin No. 44,004, which forms an ordering catalog devoted to railway line material for direct suspension. This publication covers practically everything in line material for this method of suspension, except poles and wire. The parts are illustrated and each illustration is accompanied by the proper catalog numbers. The prices are not included. The bulletin contains also miscellaneous data relative to construction, overhead material per mile, general data on the use of solid copper wire and copper cable, dimensions of grooved trolley wire sections, etc.

Pennsylvania Railroad.—The Pennsylvania Railroad has recently issued a booklet, for distribution at the Panama-Pacific International Exposition in San Francisco, describing its activities and exhibit at the exposition. Accompanying a double page map for the entire Pennsylvania system, which is printed in the center of this booklet, are statistics showing the extensiveness of the system, which serves "52 per cent of the entire population of the United States." The booklet contains a photograph of the relief map of the Pennsylvania System shown at San Francisco—the largest relief map ever made, 42 ft. x 26 ft. It also contains pictures of the proposed Union station in Chicago, the main span of the East River bridge, and the model of New York City, 26 ft. square, which will be exhibited; a photograph of the latter is also reproduced in colors on the cover page.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Company, Burlington, N. J., has just issued a new 218-page general catalogue. The first 70 pages of this book are devoted to a general description, with illustrations, of the uses and adaptability of cast iron pipes. It relates the development of conduits and aqueducts, both with reference to material and construction, and describes the modern products and their uses as water pipe, in high pressure systems, submerged pipe, gas pipe, etc. Numerous illustrations show the method of laying these pipes. The methods of making various types of joints and connections are also explained. A general comparison between cast iron pipe and other pipes is made and causes of failures discussed. It also describes means of protecting mains against electrolysis, leakage at bell and spigot joints, etc. The next 100 pages contain specifications, tables of dimensions and weights of the various pipes and their fittings. The last portion of the book is devoted to miscellaneous foundry products, tables, and views of the company's works.

Railway Construction

Alamance, Durham & Orange Railway & Electric Company.—Application has been made in North Carolina for a charter to build an electric line from a point in North Carolina, southeast via Burlington, Graham and Haw River to Saxapahaw, thence east to Chapel Hill, and northeast to Durham, about 50 miles. J. Harden, C. B. Cox, J. M. Cook, D. M. Teague, Burlington, are incorporators.

Arizona & New Mexico.—This company is contemplating the construction of a 3½-mile branch line, which is to extend from Lordsburg, N. M., in a southwesterly direction, and to terminate at the "Eighty Five" mine in Grant county, N. M. The principal commodities this road will carry are copper ore, mining supplies, etc. Norman Carmichael, Clifton, Ariz., is vice-president, and P. Reisinger, Clifton, Ariz., is chief engineer.

Avery North Western.—A charter has been granted this company to build a railway from Edgemont, N. C., northwest via Pineola, Linville and Montezuma to Newland, 21 miles. The proposed route from Edgemont is up Wilson creek to Grandfather mountain, thence following Ridge Pass to Wild Cat Bluff, thence through Low Gap in Grandmother mountain and through part of the Linville Improvement Company's timber lands. W. W. Barber, Edgemont, E. C. Guy, A. P. Brinklev, C. B. Dancannon and J. W. Ragland, Newland, are incorporators.

Canadian Terminal.—This company, which was incorporated in 1907, has applied to the New Brunswick legislature for an extension of time in which to build from L'Etang Harbor, New Brunswick to St. Croix, with a number of branch lines. In 1912 the provisional directors were changed to J. S. Clark, G. W. Marsh, G. W. Ganong, H. I. Taylor, W. L. E. Marsh, J. L. Clark, W. A. Mitchell and G. J. Clarke.

Charleston Interurban.—An officer writes that the company expects to let contracts this coming summer to build an extension of the Kanawha Valley Traction from Charleston, W. Va., southeast via Marmet, Paint Creek, Cabin Creek, Coalburg and Handley to Montgomery, about 25 miles. Track has been laid on about two miles.

Conestoga Traction.—Surveys have been made, it is said, for building an extension on the Lancaster & Coatesville division. The new line is to be built from a point about a mile east of Conestoga Park, Pa., via Witmer to Intercourse, about 13 miles.

Entwistle & Southern Alberta.—Application has been made to the Canadian parliament for incorporation to build a railway from a point on the Grand Trunk Pacific, at Entwistle, Alta., south to the Saskatchwan river, about 50 miles. Pringle, Thompson, Burgress & Cote, Ottawa, Ont., are the solicitors.

International Railway (Electric).—This company plans to build a line from Niagara Falls, N. Y., southeast along the Niagara river through North Tonawanda, to Tonawanda, thence to a point in the northern part of the city of Buffalo. The grading, track laying, etc., will probably be carried out by the company's forces, and the work calls for about 24,000 cu. yd. of embankment to the mile. The maximum grade will be 7 per cent and the maximum curvature 6 deg. There will be eight steel bridges varying in length from 50 ft. to 175 ft. The plans also call for putting up a sub-station and a car house at Niagara Falls. (February 12, p. 289.)

Kanawha Valley Traction.—See Charleston Interurban.

Mississippi Roads.—Construction work has been started, it is said, on a six-mile railway from a point on the New Orleans, Mobile & Chicago, at Estes, Miss., to Noxapater swamp. There will be six small bridges on the line. W. W. Estes is back of the project.

Montreal & South Western Railway & Power Company.—Application has been made to the Quebec legislature for an extension of time to build a railway from Adirondacks Junction, Que., which is on the Canadian Pacific and the New York Central, along the St. Lawrence river to the International boundary; also to build from Adirondack Junction to Sunder. The pro-

visional directors include V. Casson, L. Dansereau, G. N. Cusson and R. Grange, Montreal, Que.

Nashville, Chattanooga & St. Louis.—Surveys have been made for building an extension to the Sylvan Cotton Mills at Shelbyville, Tenn., about two miles. The construction work has not yet been authorized, and it is not probable that the improvements will be carried out in the near future.

Palm Beach & Everglades.—A contract has been given to the Everglades Construction Company, it is said, to build from West Palm Beach, Fla., west to Lake Hicpochee. It is understood that the work will be finished by March, 1916. Charles H. Baker, president, New York. (January 29, p. 211.)

Petersburg & Appomattox (Electric).—Incorporated in Virginia with a capital of $100,000 to build an interurban line from Petersburg, Va., southeast to City Point, about 20 miles. T. M. Wortham, president; B. W. La Prade, vice-president, and W. W. La Prade, secretary, Richmond. E. Wortham, Jr., A. R. Holliday, Alexander Cameron, Jr., and R. E. Dudley and the officers are directors.

Sheboygan Railway & Electric Company.—Preliminary surveys are now being made for the proposed extension of this company's line from Elkhart Lake, Wis, to Chilton.

RAILWAY STRUCTURES

Blackwell, Okla.—The Atchison, Topeka & Santa Fe is completing plans for a small brick passenger and freight station at this point.

Brooklyn, N. Y.—The New York Public Service Commission, First district, has approved the recommendation of the New York Municipal Railway Corporation, that the contract for building seven stations on the Fulton street elevated railroad, in the borough of Brooklyn, be awarded to John Thatcher & Son, the lowest bidder, who offered to do the work for $258,664.

A contract has been given to Samuel Beskin, Beacon, N. Y., for the reconstruction of the DeKalb avenue station on the Fourth avenue subway, in the borough of Brooklyn, and this work is now under way. (December 11, p. 1108.)

Chicago, Ill.—The contract for the building of the temporary freight sheds for the Pennsylvania between Polk and Taylor streets, has been awarded to the Sumner Sollitt Company, Chicago. Work will be started at once and hurried to completion.

Pampa, Tex.—The contract for the construction of the brick passenger station for the Atchison, Topeka & Santa Fe, as reported in the *Railway Age Gazette* of March 5, has been awarded to Mr. Rice of Amarillo, Tex.

The Production of Pig Iron in the United States in 1914.—The Bureau of Statistics of the American Iron & Steel Institute in its special statistical bulletin No. 1 for 1915 announces that the production of pig iron in 1914 was 23,332,244 tons, a decrease of 7,633,908 tons, or 24.65 per cent from the 30,966,152 tons of 1913. The 1914 production of pig iron is the smallest for any year since 1906, with the exception of 1908, when 15,936,018 tons were produced.

Changing the Russian Vologda-Archangel Line to Broad Gage.—The present railway line from Archangel, the Russian port on the White Sea at the south of the Dwina south to Vologda is of narrow gage instead of the Russian five foot standard. The government has recently found it necessary to increase the capacity of this line and has decided to make it a broad gage line. At the same time it has also been decided to change the location of the line, which it is felt terminates too far from the port, by constructing a new track to cross to the eastern shore of the Dwina by a bridge to be built about 75 miles above Archangel. Work has already been begun on that part of the new line from Vologda to Xiandoma, 199 miles north of Vologda, and about halfway to Archangel. It is expected that the new line will be finished by the end of July. The topographical conditions which will have to be met are not favorable, as there are many swamps. It is estimated that the railway will cost $6,180,000, or about $31,076 per mile. Notwithstanding the winter, a large force is now engaged. The Russian government is also proposing to construct lines from Archangel to Kotlas, and from Archangel to Ukta and Ob, which will afford an outlet on the White Sea for freight from Siberia.

Railway Financial News

Artesian Belt.—A petition has been filed asking for the appointment of a receiver for this road, which runs from Macdona, Tex., to Christine, 43 miles.

Baltimore & Ohio.—See Western Maryland.

Cleveland & Pittsburgh.—See Pennsylvania Railroad.

Denver, Laramie & Northwestern.—The Continental Trust Company of Denver has resigned as co-receiver of the Denver, Laramie & Northwestern, and Marshall B. Smith is now sole receiver.

Missouri, Oklahoma & Gulf.—Henry C. Ferris, of Muskogee, Okla., has been appointed a co-receiver with Alexander New, succeeding Louis C. Posner.

Missouri Pacific.—Stockholders on March 9 elected the following board of directors: N. F. Brady, B. F. Bush, N. Carleton, E. A. Faust, A. J. Hemphill, W. H. Lee, E. L. Marston, E. G. Merrill, F. J. Shepard, Cornelius Vanderbilt, R. L. Williams, W. H. Williams and E. J. Pearson. The former board of directors was as follows: George J. Gould, B. F. Bush, Howard Gould, James Speyer, Kingdon Gould, E. L. Marston, E. D. Adams, J. G. Metcalf, E. T. Jeffery, E. G. Merrill, Finley J. Shepard and S. F. Pryor. The directors who resigned are understood to have represented the Goulds other than Mrs. Finley J. Shepard (Helen Gould), Speyer & Company, New York, and the Deutsches bank of Berlin. Of the new directors, A. J. Hemphill is president of the Guaranty Trust Company, New York; N. F. Brady is a director of the New York Edison Company; N. Carleton is a director of the Western Union Telegraph Company, and W. H. Williams is vice-president of the Delaware & Hudson. The directors whose names appear both in the old and new directorates are the president of the road, Mr. Bush; Finley J. Shepard and E. L. Marston, a member of Blair & Company, New York.

(See also St. Louis, Iron Mountain & Southern.)

Pennsylvania Railroad.—The Public Utilities Commission of Ohio has approved of the issue by the Cleveland & Pittsburgh of $1,482,550 guaranteed 4 per cent stock and its transfer to the Pennsylvania Railroad in payment for advances to the Cleveland & Pittsburgh.

St. Louis, Iron Mountain & Southern.—The following board of directors have been elected: B. F. Bush, N. F. Brady, N. Carleton, A. J. Hemphill, E. L. Marston, E. G. Merrill, C. A. Pratt, F. J. Shepard, E. C. Simmons, C. Vanderbilt, F. J. Wade, A. H. Wiggin and W. H. Williams

(See also Missouri Pacific.)

Western Maryland.—The Wall Street Journal says, apparently on good authority, that John D. Rockefeller has acquired a substantial interest which will give him control of the Consolidation Coal Company. Since the Rockefeller interests are in control of the Western Maryland, the assumption is that the Western Maryland will get a larger tonnage of the Consolidation Company's coal than heretofore. The Consolidation Coal Company was heretofore controlled by interests closely allied with the Baltimore & Ohio.

Western Pacific.—A press despatch dated San Francisco says that at a conference between Rudolph Spreckles and other bondholders a plan was discussed to have the Western Pacific taken over by the federal government, and that a measure would be submitted to the California legislature by Mr. Spreckles to have the legislature memorialize United States Congress on behalf of this plan.

Military Railway in Morocco.—The military railway in Morocco, which has been under construction since 1911, reached Fez on February 5.

French Rail Duty Off.—The French customs duties of $18 per metric ton on steel rails were suspended by government decree on March 4, until further notice.

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WE GUARANTEE, that of this issue 6,598 copies were printed; that of those 6,598 copies, 5,640 copies were mailed or delivered by messenger to regular paid subscribers; 675 copies were distributed among members and guests of the Railway Signal Association and at the Coliseum; 133 copies were mailed to advertisers; and 150 copies were set aside for office use.

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The R. S. A. Meeting Hall

The Recital Hall in the Auditorium Hotel where the stated meeting of the Railway Signal Association was held, has the marked advantage for such a meeting that its acoustics are good. There could have been no criticism by anyone attending the meetings yesterday as to the distinctness with which the speakers could be heard. It is difficult to carry on a discussion of a paper unless it is possible not only for anyone in the room to hear remarks from the presiding officer's position, but for him to hear a voice from any other part of the room. This condition exists in the hall referred to and is conspicuous by its absence in the Florentine room of the Congress hotel where the R. S. A. March meetings have previously been held and where the American Railway Engineering Association holds its convention. The change made by the former association this year undoubtedly resulted to its advantage, primarily through the accommodations provided for the members and for committee meetings, which have been difficult to obtain in the Congress hotel, as it is always crowded during this week with men attending the A. R. E. A. convention. The signal men were obliged to explore devious passageways in the approach to the meeting room in the Auditorium, and the proceedings were occasionally enlivened by the sounds of practicing in adjacent musical studios, so that it does not necessarily follow that the Engineering Association should consider such a move. The Florentine room possesses advantages which must be set off against its poor acoustic properties.

Interest in the Stated Meeting

The registration of the Railway Signal Association yesterday amounted to 163 active, junior, and associate members, the corresponding figure at last year's meeting being 222. This decrease in registration does not necessarily indicate a proportional decrease in interest or attendance. In fact, the discussion of two of the reports was very full, while at some of the former Spring meetings the discussion was perfunctory. In past years it has been easier for men to register who were in town to see the exhibit at the Coliseum, but not directly interested in the proceedings of this association. Also, in the past it was easy to register a goodly proportion of the members before the sessions began because they naturally congregated in the spacious lobby of the Congress near the meeting room, while this year the members were prone to congregate on the first floor of the Auditorium, and to come up to the meeting in such crowds that doubtless some did not wait to register. Summing up, the meeting this year developed at least as much interest among the members as any previous meeting. The conduct of the sessions by President T. S. Stevens is especially to be commended. The discussion was confined to

the subjects in hand and held the continuous attention of the members so there was little tendency to leave during the sessions.

Table of Operated Units

The discussion in tables A and B, operated units for mechanical interlocking, at the meeting of the Railway Signal Association developed into a consideration of the two tables, rather than a discussion of the features of table B, which was presented for the first time. While the adverse letter ballot was thought by many to have disposed entirely of table A, it developed that a large faction believed the basis of the table—a first cost basis—to be correct, but thought that certain parts should be eliminated. Undoubtedly anyone who figures out the distribution of the charges for a joint interlocking plant can see there is an advantage in having a basis for these charges which can be justified on a cost basis; especially if the distribution arrived at is challenged. Such would not be the case if table B was adopted as it stands. The probable result of the suggestions made to the committee will be a table based on the same ideas as table A but greatly simplified, so that the apportionment of charges can be accurately estimated from preliminary plans before the installation is decided on.

CIRCUITS FOR SINGLE-TRACK SIGNALING

It is conceivable that almost any degree of safety can be provided in single-track signaling by expending enough money for apparatus and control wires. Failures have been reduced to an extremely low percentage on many roads, with the simplest systems, and further improvement could not be more than a fraction of one per cent, and the cost would be excessive. There are some single-track lines where the overhead cost of such a system would be totally unjustified. In fact, there are places where the overhead burden of a simple system of automatics would spell the difference between net profits and deficits—where traffic is so light that absolute telegraphic block enforces no hardship.

The problem of the method of operating a single-track line involves many other features besides those of signaling. And one of the problems which the signal department should look into when called on to signal such a line, is the degree of protection that present or future traffic requires or justifies. A signal system with the greatest possible refinements, if obtained at considerably greater cost, on a single-track line with only two to four trains a day is like a "hundred dollar harness on a fifty dollar horse." There are places where an expensive system of protection is warranted —locations where the speed is high, the traffic dense and the physical conditions of the line are such that the view of the engineman is frequently obstructed on account of structures, tunnels or hills. Conversely, there are many locations where a single-track automatic signal system of an economical design is warranted, but where a more elaborate system would be unwarranted. These conditions should be considered and provision made for them.

The chairman of the sub-committee of the R. S. A. assigned the subject of typical circuit plans, submitted a circuit plan at the last annual convention. He stated at the meeting yesterday morning that this circuit affords practically complete protection against any combination of crosses or grounds at no greater expense than systems now in use, but some members seemed to desire more convincing proof of this statement, as the circuit seems to be much more complicated than others in use.

There is danger, of course, if one particular circuit is standardized, that it will contain features covered by the patents of some concern or individual which will debar other companies from competition. To do this is plainly at variance with the policy of the R. S. A. Results are what are wanted and results imply dependable service at a minimum cost. The details of circuits, relays, etc., should be susceptible of variation to suit individual needs or preferences and the adoption of a definite standard, especially if too elaborate, in this case might result in many lines remaining unsignaled where a less costly system might have been justified and installed.

ELECTRO-MECHANICAL PLANTS

The advocates of electro-mechanical interlocking plants originally met with a good deal of opposition. The opponents of the idea were of the opinion that there need be no middle ground between a straight mechanical and a straight electric plant. In other words, it was thought that where the conditions required or made it advisable to operate some of the units by power, a power plant would be justified; and that in all other cases a straight mechanical plant would answer the purpose. Recently this feeling has changed quite appreciably and many electro mechanical plants are in service or being installed. The first development was the adaptation of power at a mechanical plant for operating the distant signal where it was too far away to be operated efficiently with a pipe line. From this modest beginning the electro-mechanical plant has been developed, using power for the operation of signals, while switches, derails, etc., are operated manually.

One of the advantages of the electro-mechanical machine is that when automatics are installed very few changes are necessary in the signals, while in a straight mechanical plant many changes are necessary if the automatic features are carried through.

The electro-mechanical plant is subject in a lesser degree to the same limitations as a mechanical plant. There is a limit to the number of manually-operated levers which a leverman can operate, and in large plants it becomes necessary to have more than one leverman in order to obtain the desired speed of manipulation. The electro-mechanical plant is therefore desirable in smaller layouts where the number of lever operations is not likely to be great; and at small outlying junctions or crossings where this type of plant is being installed the number of lever movements is quite small, and certainly no leverman can have any justification for objecting to the little manual labor required for the relatively few lever operations required.

Electro-mechanical interlocking machines require less room than other types. The electric levers are mounted above the mechanical levers, which greatly reduces the floor space required in the tower. No generator is required with the sizes commonly being installed, 30 to 40 cells of primary battery often being sufficient to operate the signals. The saving in battery or electrically generated power is greater than the proportion of mechanical levers would suggest, because usually the switches require twice as much power as the signals, or even more. Consequently, one of these plants shows a great economy in current consumption as compared with an all-electric plant, which results in a reduction in the cost of materials and maintenance. In some recent installations a battery has been installed at the home signal locations, thus reducing the power loss due to transmitting electricity from the tower. This introduced an economy not usually possible in the all-electric type.

For small plants where the number of lever movements will be well within the capacity of one leverman, the electro-mechanical plant offers an installation, which, on account of the lesser cost of mechanical appliances, is appreciably cheaper in first cost, and for like reasons it can be installed much more rapidly; due to moving switches manually instead of by power, the cost of operation is lower, the wages of the leverman being no greater, although

he furnishes part of the power; and on account of the elimination of generators and reduction in electrical appliances, this type is appreciably cheaper to maintain.

CONVENTION PROGRAM

The sixteenth annual convention of the American Railway Engineering Association will be called to order by President Storey at 9:30 this morning. The convention will adjourn at 12:30. The afternoon sessions will extend from two o'clock until five. The following is the program:

Tuesday, March 16.

President's Address.
Reports of Secretary and Treasurer.
Reports of Standing and Special Committees.

XII.	Rules and Organization	Bulletin 172
X.	Signals and Interlocking	Bulletin 172
Special.	Uniform General Contract Forms	Bulletin 172
IX.	Signs, Fences and Crossings	Bulletin 172
XVI.	Economics of Railway Location	Bulletin 172
	Minority Report	Bulletin 174
I.	Roadway	Bulletin 173
XI.	Records and Accounts	Bulletin 173

Wednesday, March 17.

III.	Ties	Bulletin 173
XV.	Iron and Steel Structures	Bulletin 173
XIII.	Water Service	Bulletin 173
V.	Track	Bulletin 173
VI.	Buildings	Bulletin 173
XVII.	Wood Preservation	Bulletin 174
XIX.	Conservation of Natural Resources	Bulletin 174
Special.	Stresses in Railroad Track	Bulletin 173

ANNUAL DINNER AT 7:00 P. M.

Thursday, March 18.

VIII.	Masonry	Bulletin 174
VII.	Wooden Bridges and Trestles	Bulletin 174
Special.	Grading of Lumber	Bulletin 174
XVIII.	Electricity	Bulletin 174
XIV.	Yards and Terminals	Bulletin 174
IV.	Rail	Bulletins 170, 175
II.	Ballast	Bulletin 174

New Business.
Election and Installation of Officers.
Adjournment.

Friday, March 19.

Visit to National Railway Appliances Exhibition in the Collseum and Armory.

ANNUAL MEETING OF RAILWAY APPLIANCES ASSOCIATION

The annual meeting of the Railway Appliances Association will be held on Tuesday morning, March 16, at 11 o'clock in the meeting room at the south end of the second floor of the Collseum.

ELECTRIFICATION NIGHT

"Operating Results of the Electrification of Steam Roads" will be the subject of discussion at the meeting of the Western Society of Engineers tonight at its rooms in the Monadnock building. The speakers will include W. S. Murray, consulting engineer, New York, New Haven & Hartford; Edwin B. Katte, chief engineer, electric traction, New York Central; George Gibbs, consulting engineer of the Pennsylvania and Norfolk & Western, and C. A. Goodnow, assistant to president, Chicago, Milwaukee & St. Paul. Moving pictures will also be shown of the electrification of the Butte, Anaconda & Pacific.

Other leaders in this field will participate in the discusslon of this live topic. This meeting was set on this date to enable the railway men visiting in the city to attend and all are invited. This is the first time that the operating results of electrification have been presented in this manner and the meeting should therefore be of widespread interest.

WESTERN RAILWAY CLUB

The Western Railway Club will meet this afternoon at two o'clock at La Salle Hotel. Frank McManamy, chief inspector of locomotive boilers of the Interstate Commerce Commission, will talk on the direct results of the operation of the federal locomotive boiler inspection law.

BANQUET TICKETS

Those desiring tickets for the annual dinner to be held in the Gold room of the Congress Hotel on Wednesday evening should secure tickets from the secretary, room 1166, opposite the convention hall, as early as possible. Tickets will be on sale this noon at $3.50 each.

DINNER TO PRESIDENT HENCH

The directors of the National Railway Appliances Association gave a dinner on Saturday evening at the Chicago Athletic Club to President N. M. Hench. All the directors were present except T. R. Wyles. This takes the place of the dinner which has been given during the past three years by the president to the directors.

CORNELL TABLE AT THE DINNER

Following the custom of recent years the Cornell men at the convention will attend the annual banquet of the American Railway Engineering Association on Wednesday evening in a group. One table has already been filled and it is probable that a second will be required. All Cornell men expecting to attend the dinner are requested to advise H. C. Holloway, 647 Railway Exchange building, as soon as possible.

PRESIDENT'S DINNER

President W. B. Storey of the American Railway Engineering Association gave a dinner at the University Club last evening to the members of the Board of Direction and the Committee on Arrangements of that association. The dinner was entirely informal and is a continuation of the enjoyable custom inaugurated several years ago.

COURTESIES OF THE CHICAGO ENGINEERS' CLUB

The Chicago Engineers' Club extends the courtesies of its club—located on Federal street, immediately south of the Union League Club—to the visiting members of the American Railway Engineering Association during the week of this convention. Cards of introduction may be secured from C. H. Norwood, secretary, 417 S. Dearborn street.

SENATOR W. G. HARDING HERE

Among the guests at the Congress Hotel who attracted the attention of the visiting railway and supply men yesterday was United States Senator Warren G. Harding of Ohio. Senator Harding's face became familiar to many railway and railway supply men when he made one of the addresses at the annual dinner of the Railway Business Association in New York last December—an address which will be long remembered as one of the best of the many notable addresses which have been delivered at the dinners of the "R. B. A." Mr. Harding was passing through the city on his way from California to his home at Marion, Ohio.

Railway Signal Association Proceedings

Reports of Committees II, III, IV, VI, VIII, X and Special Committees, Together with the Discussions

The stated meeting of the Railway Signal Association was called to order at 9:30 a. m., on Monday, March 15, in the Auditorium Hotel, Chicago, by President T. S. Stevens, signal engineer of the Atchison, Topeka & Santa Fe. The following committees submitted reports for discussion: Committee II, Mechanical Interlocking, submitted specifications for electro-mechanical interlocking; Committee III, Power Interlocking, submitted specifications for incandescent electric lamps; Committee IV, Automatic Block, submitted specifications for grooved trunking and capping, and circuit requisites for single track, "traffic direction" automatic block signaling; Committee VI, Standard Designs, submitted 11 drawings, and revisions to plate 3, on Symbols; Committee VIII, Electric Railway and A. C. Signaling, reported progress; Committee X, Storage Battery and Charging Equipment, submitted specifications for Lead Type, Portable Storage Battery, and specifications for Lead Type Stationary Storage Battery, not of the pure lead type. The Special Committee on Lightning Protection submitted requisites for lightning arresters and requisites for choke coils. The special committee on contracts submitted two tables of Operated Units for a Mechanical Interlocking Plant.

T. S. STEVENS, President.

AUTOMATIC BLOCK

The committee, in connection with a subcommittee of Committee No. III, submitted a revision of the wooden trunking specifications. Circuit requisites were also submitted, these being a revision of those presented in the minority report at the annual convention in 1914.

CIRCUIT REQUISITES, SINGLE TRACK "TRAFFIC DIRECTION" AUTOMATIC BLOCK SIGNALING.

(a) Signals so located as to provide adequate spacing and head-on protection. (b) The control of signals to be such as to provide: (1) Stop, caution or proceed indication for following movements as on double-track; (2) that two trains meeting at a passing siding shall each first receive a caution indication before reaching a stop signal; (3) protection for switches and switching movements as on double-track; (4) that neither a single cross nor any combination of grounds or breaks will cause the energization of the controlling or signal operating devices; (5) that two opposing signals governing into the same block shall not display the proceed indication, simultaneously authorizing trains to move opposing each other; (6) that two opposing signals shall not display the proceed indication, simultaneously authorizing two trains to move from meeting points opposing each other, where operating conditions will permit.

W. M. VANDERSLUIS,
Chairman Committee on Automatic Block.

The committee as a whole agreed on the above requisites, but the subcommittee handling this assignment is of the opinion that one set of requisites should cover all single-track signaling while a majority of the committee favor having these requisites apply to traffic direction signaling only. Mr. Dryden, chairman of the subcommittee, offered the following additional requisite for the consideration of the Association: (7) That the giving of a proceed signal at the entrance to a block shall be dependent upon the signal governing the same block in the opposing direction indicating stop.

The committee consists of W. M. Vandersluis, chairman (I. C.); A. R. Fugina, vice-chairman (L. & N.); E. L. Adams (I. C. C.), E. E. Bradley (W. M.), F. H. Bagley (I. C. C.), C. N. Beckner (L. & N.), M. J. Brundige (B. R. & P.), J. J. Corcoran (N. Y. C.), T. N. Charles (C. N. O. & T. P.), G. H. Dryden (B. & O.), Leon D. Dickinson (U. P.), E. Folley (C. & E. I.), R. E. Greene (M. C.), W. R. Hastings (C. R. I. & P.), W. H. Higgins (C. R. R. of N. J.), B. A. Lundy (N. Y. C.), W. B. Nicol (B. & A.), R. M. Phinney (C. & N. W.), E. K. Post (P. R. R.), D. W. Rossell (N. Y. C.), A. H. Rice (D. & H.), D. S. Rice (L. V.), C. F. Stolz (C. C. C. & St. L.), E. G. Stradling (C. I. & L.), G. W. Trout (P. M.), I. A. Uhr (St. L. & S. F.), W. B. Weatherbee (D. L. & W.), F. E. Whitcomb (B. & A.), L. R. Wyant (C. R. I. & P.).

Discussion on Automatic Block.

It was suggested that clause 3 on Specifications for Wooden Trunking be changed to require that 30 per cent should come in 16-ft. lengths, and others were made suggesting 50 or 60 per cent of 14-ft. lengths. The committee stated it would reconsider and change this part of the specifications. It was also suggested that the wording regarding knots, clause 7-C, be changed to include all knots by eliminating the word "round" from the words "round sound knots." The committee is to reconsider the whole question, not only of the size of knots, but their distribution, it having also

Meeting of Railway Signal Association in Session.

been suggested that capping be covered in a different manner from the rest of the trunking. Some members believed that the specifications were too severe and believed that modifications would be desirable and that by so doing more competitive bids and better terms could be made with the manufacturers.

The subject of circuit requisites was taken up by paragraphs.

C. C. Anthony (Penn.): It seems to me that b-2 cannot always be carried out. In case a train at stop at a station would receive no caution indication when an opposing train starts from the siding in advance.

G. H. Dryden (B. & O.): I believe this requisite is covered by the circuits as presented. When trains are actually running toward each other, they will, I believe, in every case, first receive a caution indication, before a final stop signal. There is a condition where it is not possible to cover this regularly, namely, in case a meeting point is made at the passing siding, and one train should arrive 15 or 20 minutes before the other. In that case the signal should be set at stop or caution, as the case may be, and the first train arriving will unquestionably find all outgoing signals indicating "proceed." After stopping for a sufficient length of time the opposing signals will indicate "stop," due to the fact that an opposing train is coming in that direction.

W. H. Elliott (N. Y. C.): As I read it, this clause can only be carried out by arranging for circuits so that for each "stop" signal there shall be two signals displaying distant indications. The same might apply to trains approaching each other on single track. Unless there are two distant signals indicated from each home signal, one or the other train will receive a clear distant and approach a signal giving "stop" indication.

Mr. Anthony: The meaning of paragraph 3, "protection for switches and switching movements as on double track," is not perfectly clear.

Mr. Dryden: The difficulty here, I believe, is in not having a requisite for double track signaling. No prescribed method of protection has been prepared by this Association. A train in switching should be protected by "stop" and "caution" signals in the rear. In all cases, an opposing train, or following train, as well as a train that may be using the switch, should receive correct indications by which to stop.

H. S. Balliet (G. C. T.): I suggest that paragraph 3 should read simply "protection for switching and switching movements."

A. R. Fugina (L. & N.): I think we should state specifically what manner of protection we want to arrive at. I do not believe the requisite as it now stands is specific enough.

W. M. Post (Penn.): It seems to me the conditions in this paragraph 4 are very severe. In practically all of our signaling, generally speaking, we must depend upon the integrity of the insulation as against frost and against grounds. I do not doubt that we can get many points of ground that might produce energization of the controlling apparatus.

E. B. Pry (Penn. Lines West): A signal can fail due to a combination of grounds. If the Association makes this a requisite and any failure should occur which should cause a wreck, the company will be in a very embarrassing position in case of a damage suit.

Mr. Elliott: As I understand paragraph 4, it will call for metallic circuits for the control of each relay, and that each circuit to the signal will be cut both on the positive and negative sides by each control relay. If that is the construction that this request calls for it would seem to me that it is a very expensive one and that the end desired does not warrant such expense. Even with such an arrangement of circuits I am not at all sure that a combination of grounds might not result in the signal giving a wrong "proceed" indication. I believe paragraph 4 should be revised to indicate more clearly the control desired, and I believe the words "any combination" should be eliminated, because it is very hard to foresee, unless after very extended trial, the several combinations that might come up.

Mr. Dryden: I believe that the requisites presented here, with the exception of requisite 7, are fully covered by reference to the previous plan. It will be noted only four line wires are used between passing sidings, while generally we have not less than five; therefore, it seems to me, we have reduced the cost.

Mr. Fugina: This requisite will require separate metallic circuits, and I am not sure but what it will throw away our polarized scheme of signaling altogether.

F. L. Dodgson (Gen. Ry. Sig. Co.): Has the committee considered the case of one of the wires having the same resistance to ground as the relay? If you take that sort of ground and connect one of the wires to one relay and having two grounds, one of the same resistance as the relay work, then your relay will be operated by the two grounds.

Mr. Dryden: I can conceive of a point where one ground would be connected in order to control the line, and it might energize a relay of low resistance, but hardly one of high resistance.

C. E. Denney (U. S. & S. Co.): Two general requirements are covered by this specification; first, how the signal shall be operated, and only paragraph 4, possibly paragraph 7, cover the methods of control. I suggest that we separate paragraphs 1, 2, 3, 5 and 6, which cover the installation of signals and the method in which they shall operate be elaborated in paragraph 4. The straight circuit engineering is covered by paragraph 4, which to me is the ideal. I do not believe it is sufficiently complete that any circuit could be made and tested by any combination, and not have it thrown out.

J. B. Latimer (C. B. & Q.): It seems to me that from the discussion we have had it is a possibility that a condition may occur which will nullify this clause. Why should we put this in our specification if any condition of ground can overcome this specification?

L. R. Mann (Mo. Pac.): I think Mr. Denny brought out a good thought—is it necessary to have this as a requisite? If you are going to have that sort of a requisite, could not a great many pages of our specifications be filled with similar matter?

R. M. Phinney (C. & N. W.): When the requisite contained in paragraph 4 was first brought up by the committee I was against it on account of the cost, but Mr. Dryden has convinced me that it can be carried out with no more cost than the present scheme.

Mr. Mann: Would it not be well for the committee to revise this wording, so that the Association would know just exactly what they mean to say, which block would require independent circuits?

Mr. Dryden: I would say "No." We want to leave an opening for invention. It may be possible for someone to show us how to cover this requisite in another way, and if such a thing is possible we should leave an opening for it to be done.

Mr. Pry: I understand in B-5 that half of the system is normal danger—two signals governing into a block from either end cannot be cleared at the same time. If they are "clear" that is authority to proceed. Under this paragraph at least half the system is going to be normal danger. I do not believe that is the object of the committee.

Chairman Vandersluis: It is not.

Mr. Denney: Paragraph 1 speaks of stop, caution or proceed, and paragraph 5 says that two opposing signals governing into the same block shall not display the proceed indication simultaneously authorizing two trains to move from meeting points opposing each other, "etc." It would seem to authorize collisions at low speed under caution signals.

Mr. Dryden: The committee have in mind two opposing signals governing the same block. This requisite does not require that with two signals in one direction one shall stand normally at danger.

Mr. Dodgson: I think clause 5 is a little misleading. The block for one signal is not always the same as the block for another signal, but I think they mean to convey in No. 5 two opposing signals governing over the same piece of track. I think that would be plainer to most members instead of the "same block."

Mr. Elliott: As I understand it, B-6 will require a preliminary or traffic direction section. That would mean that the first train arriving at a station would hold a train at the adjacent station irrespective of its class.

Chairman Vandersluis: I would call Mr. Elliott's attention to the last 5 words of that clause, "where operating conditions will permit." If you feel that your operating conditions will not permit of your siding overlap it will not entitle you to put it in.

Mr. Elliott: I believe the signal systems should be so constructed as to permit trains to enter the block without traffic direction control by the circuits, leaving it to the operating department to establish such regulations as they require.

Mr. Denney: I agree with Mr. Elliott, that the requisite is in the negative. Personally I feel that the one essential to be met with in single-track automatic block signal is to allow the full use of tracks as though the signals were not installed; in other words, so that the tracks may be used to their full capacity, which means money.

Mr. Dryden: We have in service on the Baltimore & Ohio

130 miles of single-track automatic signaling, where the siding overlap is in use. One division superintendent has been kind enough to give me a letter on this subject, on the question of operation, in which he stated that he thought no more difficulty would be experienced in operation with the siding overlap, providing the trainmen and despatchers are properly educated; this system is desirable in that it assures that trains will meet only at sidings if they disregard orders or rules and operate on signal indications; I believe that with minor improvements, such an installation may be operated by signal indications alone. I believe we can handle trains with safety over a single-track railroad when telegraph and telephone communication have failed, and it is this that our committee is trying to lead up to. We do this in lock and block territory, when the despatcher is out of reach of his train.

Mr. Dunham: I think we are all agreed on that subject. It is true that even without signals a single-track railroad may be safely operated without telegraphic or telephonic communication, but with the signals you can do very much better. I am glad to note the thoroughness with which the committee appears to be tackling the subject. However, do we not beg the question by going into so many details? Would it not be better, so far as this Association is concerned, if we were to confine the work to the accepted and known practice and not to delve into inventions which may have immediate merit or merit at some time in the future?

J. A. Peabody (C. & N. W.): I made a close study of this subject before we started in with the single-track automatic signal, and decided at that time that the siding overlap could not be used except at very exceptional places without detriment to the operation of our trains, particularly the way freights. On all of the installations that we have now I believe that there are but two, or possibly three, places where we could put this in without detriment. Therefore, this should not be a requisite.

W. N. Manuel (G. R. & I.): I would like to see the committee have a list of the requisites that have been tried out, and which they know are feasible, and, in addition to that, I would like to see them have another list of desirable features under which they could include the things that we are now talking about.

Mr. Dryden read a paper on this subject in which he outlined fully his ideas.

Mr. Beaumont: The recommendations presented by the sub-committee are so far-reaching that it seems to be advisable to have this matter handled by the Board of Direction and have them say to the committee just what they will do. I certainly am not in favor of having this Committee on Automatic Block at this time prepare specifications for automatic regulation.

Mr. Dryden: As chairman of sub-committee V, I have received instructions to prepare typical circuits for single-track blocking, but you will find in looking the field over that the method of operation is so different on the various railroads represented here that we are up against it. What we get out for one man does not suit the next. Long ago we came to the conclusion that we must have a definite method of operation decided upon before we could ever come to any agreement.

Mr. Anthony: It seems to me that this whole matter is something for the committee to work on still further. I am inclined to think, as an individual that the committee, or some of its members, are after ideals, possibly, without sufficient regard to the relation of cost to what is obtained. Safety is a matter of cost, just as much as anything else on a railroad.

Mr. Fugina: The committee has not been able to get together on this matter at all, and I don't think we ever will, until we get instructions from this body. I think we ought to standardize the practice we have. I move that this committee do not proceed at present any further along these lines, but to standardize common practices that we now have in use to determine whether we want separate metallic circuits, to break signal control through switches and things of that kind. If we standardize these things we will have something definite to start work from.

Mr. Elliott: I will make an amendment to the motion, that discussion on paragraph 6 be closed. (The motion was carried.)

The President: I think the Board of Direction must take the discussion and make some rule in regard to the matter. I don't think any annual meeting will ever be able to do that.

Mr. Fugina: That will satisfy the committee.

Mr. Pry: I move that the committee be directed to confine its efforts to accepted and general practice and not to go into the realm of invention or uncertainty. (The motion was carried.)

STORAGE BATTERY AND CHARGING EQUIPMENT

The committee submitted two sets instead of one set of suggested specifications for Lead Type Storage Battery for Signaling, thus providing many features which are optional with the purchaser. The form and general arrangement of the specifications now in the Manual were quite closely followed and considerable descriptive matter as to details of construction was included in the specifications, so that one plan,

R. B. ELSWORTH,
Chairman Committee on Storage Battery and Charging Equipment.

showing the general assembly, will be all that is necessary in addition to the specifications.

The committee consists of R. B. Elsworth, chairman (N. Y. C.); G. E. Beck, vice-chairman (N. Y. C.); J. G. Bartell (L. V.), E. G. Hawkins (N. Y. C.), A. B. Himes (B. & O.), J. Fred Jacobs (C. R. R. of N. J.). T. L. Johnson (D. L. & W.), A. H. McKeen (U. P.), T. J. O'Meara (N. Y. C.), John Parker (N. Y. C.), F. A. Purdy (U. P.), C. O. Warner (N. Y., N. H. & H.). A. H. Yocum (P. & R.).

Discussion on Storage Battery and Charging Equipment.

H. M. Beck (El. Stor. Bat. Co.): The rating of these cells as ordinarily given, that is, the 40 ampere hour, is on what is known as a service rating. At the eight-hour rate of discharge they will not give this capacity. I would like to ask if it is the committee's intention to change the rating of the 40 ampere hour cell to a rating on a basis of 40 hours that is, the equivalent of a very slow rate discharge, to one at which it will give 40 ampere hours in eight-hour discharge.

Mr. Manuel: Our standard is 60 ampere hours, and we use it because the 40 is too small and the 80 too heavy.

Mr. Elsworth: The first criticism made by H. M. Beck has not been covered, in establishing a rating for the capacity of the battery. The committee will investigate the question very thoroughly and see if we cannot cover that criticism and definitely establish the size of the battery.

F. W. Pfleging (U. P.): For eight years we have sealed all of our portable batteries, and several years ago we found we were having a large amount of breakage, due to the sealing compound around the top edges breaking the jar. We developed a soft rubber nip cover, which we are using, and it not only makes the inspection easier, but answers the purpose of a seal, and keeps the sloppage down in transportation, and is much better.

Mr. Mann: I will ask if the committee has made any investigation in connection with the effects of temperature.

Chairman Elsworth: That is one of the questions the committee is trying to straighten out. The present specification provides for both kinds of sealing.

W. N. Manuel (G. R. & I.): We are having some trouble with broken jars, which we think is due to brittleness of the compound. It might be well to look into the specification to see if the compound is just right.

LIGHTNING PROTECTION

The committee submitted the following requisites for lightning arresters and choke coils for signaling:

REQUISITES FOR LIGHTNING ARRESTERS.

(1) A lightning arrester shall be so constructed that it will relieve the line of excess energy well below the breakdown voltage of the insulation of the apparatus which it protects; (2) it shall be so constructed as to prevent an arc continuing across the gap from normal voltage after surplus energy has been discharged; (3) it shall be constructed from materials of the best quality; (4) the dielectric strength of the insulating material shall be such as to insure against leakage of normal energy from circuits; (5) metal and energized parts, together with ground connection, shall be so fastened that they will not loosen and close the discharge gap or space between adjacent conductors; (6) binding post shall be separated and fastened to provide proper working space and prevent turning; (7) line and ground terminals, together with discharge points, shall be so alined as to provide as direct a path as possible for discharge; (8) arresters shall have sufficient current capacity to handle ordinary lightning discharges and shall be designed with a sufficient margin to insure against excess changes in the electrical properties due to these discharges.

REQUISITES FOR CHOKE COILS FOR SIGNALING.

(1) Choke coils shall be so constructed as to provide the highest possible reactance that will not interfere with the proper working of the apparatus that it is to protect; (2) they shall be constructed from materials of the best quality; (3) the dielectric strength of insulating materials shall be such as to insure against leakage of normal energy from the circuit; (4) choke coils shall be made as compact as possible and shall be provided with sufficient insulation between adjacent turns and layers to prevent a break-down when subjected to sudden abnormal surges of energy; (5) resistance of coil shall be such as not to interfere with the proper working of the apparatus that it is to protect; (6) binding posts shall be separated and fastened to provide proper working space and prevent turning; (7) coil shall be designed with sufficient current-carrying capacity to prevent overheating or permanent deterioration of its insulation when subjected to a continuous normal operating current.

The committee consists of E. G. Hawkins, chairman (N. Y. C.); J. C. Mill, vice-chairman (C. M. & St. P.); G. R. Cowherd (E. P. & S. W.), L. D. Dickinson (U. P.), Thomas Duffy (B. & A.), C. E. Goings (P. R. R.), G. B. Gray (P. L. W.), K. A. Hinton (C. H. & D.), Stanley W. Law (N. P.), H. W. Lewis (L. V.), B. W. Meisel (C. & N. W.), J. D. Phillips (P. & R.), W. H. Stillwell (L. & N.), Edgar Winans (A. T. & S. F.),

Discussion on Lightning Protection.

Chairman Hawkins: The committee in an effort to differentiate between requisites and specifications has reached

C. J. KELLOWAY.
Chairman Committee on Mechanical Interlocking.

the conclusion that the requisites are general clauses upon which specifications may be based and are not for use in designing material, but more for the purpose of outlining specifications, while specifications are used for the designing material.

MECHANICAL INTERLOCKING

The eastern body of the committee held three meetings in New York with excellent attendance, at which all subjects assigned the committee were carefully discussed and considered. A sub-committee of the eastern body was appointed to draw up specifications for electro-mechanical interlocking and presented a complete set for consideration at the meeting.

The committee consists of C. J. Kelloway, chairman (A. C. L.); D. M. Case, vice-chairman (C. N. O. & T. P.); Larsen Brown (A. T. & S. F.), G. W. Chappell (N. Y., N. H. & H.), W. H. Fenley (Panama R. R.), C. S. Foster (P. R. R.), Oswald Frantzen (N. Y., N. H. & H.), T. E. Kirkpatrick (N. Y. C.), J. W. McClelland (P. & R.), E. E. Mack (C. & E. I.), Sam'l Miskelly (C. R. I. & P.), W. B. Morrison (D. L. & W.), W. M. Post (P. R. R.), Chas. Stephens (C. & O.), J. I. Vernon (N. Y., N. H. & H.), F. E. Whitcomb (B. & A.), W. F. Zane (C. B. & Q.).

Discussion on Mechanical Interlocking.

The specifications were submitted for the first time, to obtain criticisms and suggestions for changes and improvements. A large percentage of the matter was taken from the specifications for electro-pneumatic and mechanical interlocking plants, already adopted by the Association. The committee withdrew mention of all wire connected signals and apparatus. The discussion related to suggestions and criticisms of individual paragraphs, all of which were noted by the committee for use in revision.

CONTRACTS

In view of the fact that the table of operated units was rejected by letter ballot after the last annual convention, the committee again presented this table, as well as another in simpler form for consideration, with the request that the two

J. B. LATIMER,
Chairman Special Committee on Contracts.

tables be given full discussion and a conclusion reached so that the committee can continue its work on the different forms of contracts for joint interlocking. Table A is the one previously presented and table B was presented for the first time at the March meeting.

TABLE A.

Points			Units
(1)	(a)	Each spare space in tower for one lever	3
	(b)	Each spare space in tower with spare space in machine	5
	(c)	Each spare space in tower with space in machine and lever	6
(2)	(a)	Each 100 feet of pipe line or fraction thereof	2
	(b)	Each 100 feet of mechanical wire line (2 wires, stakes, carriers, etc.)	1
(3)		Each separate line control for power signal or other functions.	
	(a)	For first 1,000 feet from tower or less	6
	(b)	For each additional 1,000 feet or fraction thereof	3
(4)		Each D. C. track circuit	8
(5)	(a)	Each bracket post	6
	(b)	Each high signal mast	4
	(c)	Each dwarf signal post	1
	(d)	Each signal arm	1
	(e)	Each signal light	1
	(f)	Each electro-mechanical slot	6
	(g)	Each low voltage signal mechanism	14

(6)	(a)	Each derail or pair of points for switch or crossing	6
	(b)	Each facing point lock	4
	(c)	Each switch and lock movement	8
	(d)	Each 30 feet of detector bar or fraction thereof	2
(7)	(a)	Each electric lock	4
	(b)	Each annunciator	2
	(c)	Each tower indicator	4
	(d)	Each time or hand release	2
	(e)	Each time lock	4
	(f)	Each track instrument	6
(8)	(a)	Each drawbridge coupler	4
	(b)	Each drawbridge, rail, surface or alinement lock for one rail	2
	(c)	Each drawbridge wedge or machine lock	4

TABLE B.

Points		Units
1.	Each power signal arm working in two or three positions, normal indication locking included	2
2.	Each mechanical signal arm working in one or two positions	1
3.	Each pair of switch points	1
4.	Each pair of movable point frog points	1
5.	Each derail, Scotch block, or smash board	1
6.	Each detector bar (any length operated by one pipe line, including F. P. L. or S. & L. movement)	1
7.	Each facing point lock or switch and lock movement used without bar	1
8.	Each drawbridge coupler	1
9.	Each drawbridge surface and alinement lock	1
10.	Each track circuit	1
11.	Each annunciator and its line circuits	1
12.	Each indicator and its line circuits	1

The committee consists of J. B. Latimer, chairman (C. B. & Q.); C. A. Christofferson, vice-chairman (N. P.); R. L. Davis (M. C.), Chas. A. Dunham (G. N.), R. L. Huntley (U. P.), C. D. Purdon (St. L. & S. F.), E. B. Pry (P. L. W.), L. S. Rose (C. C. C. & St. L.), W. M. Vandersluis (I. C.).

Discussion on Contracts.

Chairman Latimer: I stand for a simple table, the simpler the better, in my judgment. The object of a table of operated units is to systematize and make easy the division of the expense of joint interlocking plants. Nowadays it is almost invariably written into the contract, and remains binding as long as that document is in force. The question of the installation of joining interlocking plants is pretty generally settled by officers other than the signal engineer. We do not want a table which would require measurements to be taken on the ground. In the year 1910 a committee of, what was then known as the American Engineering and Maintenance-of-Way Association, a large part of which committee was composed of signal engineers reported a table of units to be adopted by that body. It has filled all requirements and nearly every signal engineer who has used it has told me the same thing. The second table in the committee's report shown as Table B is practically the same thing, and if it were adopted it would in no way conflict with the contracts already containing the old table.

W. H. Elliott (N. Y. C.): I feel that the basis on which this table is arranged is not as good as the old one, Table A. This practically jumbles up a lot of units and assigns almost a numerical value of one to them. The division or unit basis on which a value is assigned is, in my opinion, too large, and to get a true equation of values a smaller unit should be used. I am very much in favor of Table A instead of Table B.

J. A. Peabody (C. & N. W.): We have used Table B or one slightly amplified from it, in a great many contracts. This table may have some objectionable features, which the committee may thresh out, but it includes the units that I would suggest for both mechanical and electric interlocking, side by side. In this table of units that I have proposed I have two headings; first, electrical units, within mechanical plants; second, mechanical units in mechanical plants or units in an electrical plant.

E. B. Pry (Penn. Lines West): I am opposed to this table. I don't believe it is founded on a proper basis. Mr. Latimer said the object of the table was to make distribution easy. I differ with him on that. It is an expense as long as the plant exists, and there have been a number of different methods of dividing the expense in the past at interlocking plants. I believe that any table adopted by this association should provide for the present method of construction or any construction which may be used in the future, and I believe it is possible to revise the table or build another table on that basis, and provide for any kind of construction. Table B has exactly the same faults that all the other methods had.

A. R. Fugina (L. & N.): I don't agree with Mr. Pry. This association is standardizing certain practices. All of the items under Table B have had the careful consideration of the committees in developing certain specifications. Let us put in the interlocking plants in accordance to approved practice, and adopt a table broad enough to embrace that standard practice.

W. N. Manuel (G., R. & I.): I believe that most of the objections raised so far could be met should the committee consider giving some unit value to so many feet of pipe line, and so many feet of line wire.

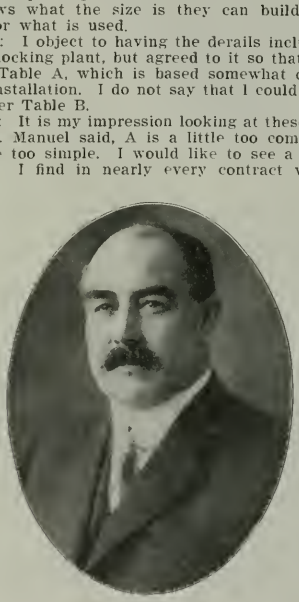
Mr. Latimer: That was tried in Table A, and that was one of the principal reasons the signal engineers objected to the tables. They said, "You have to go out on the ground and measure it."

Mr. Post: It seems to me that railroad companies generally will not split hairs of the division of expenses of interlocking. The testimony of Mr. Latimer as to the application of what is practically Table B, being unusually satisfactory, shows that. I think Table B is along the right lines, and that we should have a table that is generally acceptable, and the construction that Mr. Pry refers to as being objectionable would be rather unusual, and an exception that we would not consider in devising tables to meet this purpose.

Mr. Pry: It is a question whether you should base a value on a switch regardless of how it is handled or base the value on it depending on how it is handled. If the committee knows what the size is they can build up a table providing for what is used.

Mr. Mock: I object to having the derails included as part of the interlocking plant, but agreed to it so that they would accept the Table A, which is based somewhat on the value or cost of installation. I do not say that I could consistently do that under Table B.

Mr. Mock: It is my impression looking at these two tables, that, as Mr. Manuel said, A is a little too complicated and B is a little too simple. I would like to see a combination of the two. I find in nearly every contract we draw we must add to the distribution of unit values and nearly all are a little different. I think it is crude, because a table which may be alright for valuation purposes and construction purposes may be entirely wrong for maintenance from an equitable standpoint.



F. P. PATENALL,
Chairman Committee on Standard Designs.

C. C. Anthony (Penn.): I do feel that Table B is too simple.

R. B. Elsworth (N. Y. C.): Table A is not objected to only on account of the measuring, but there was an objection to it for the reason that some members thought it was very good for valuation and construction purposes, but not correct for maintenance.

Mr. Mock: I really think we should get something finer than Table B. That is rather a crude proposition. It has some relation to cost and some relation to maintenance cost, and a little relation to value, but there is no part of it that you can defend when you get down to a controversy upon what you are going to divide the expense on, and you have a fellow who is keen, and you may simply say—we have tried to make some sort of a compromise on this. I do not like that, but like to feel that we have something we can depend on upon a business basis.

(It was voted that the committee work on the improvement of Table A.)

STANDARD DESIGNS

The committee submitted 13 drawings, some of which are revisions of previous issues, as follows: Drawing No. 1015—One-Inch Signal Pipe and Coupling; No. 1020—Guide Clamps.

Brackets and Caps for Vertical Connections on Bracket Posts; No. 1021—Guide Clamps for Vertical Connections on Signals; No. 1022—Guide Support and Caps for Vertical Connections on Signals; No. 1023—Guides for Vertical Connections on Signals; No. 1024—Crank Bracket Fittings for Pipe Bracket Post; No. 1025—Crank Bracket Fittings for Pipe Bracket Post; No. 1026—Ladders for Mechanical Ground Masts; No. 1027—Ladder Parts; No. 1028—Ladders for Bracket Posts and Mechanical Bracket Masts; No. 1029—Ladder Clamps and Stays; No. 1196—Guides for Vertical Connections on Bracket Posts; No. 1198—Crank Brackets for Bracket Posts; Plate 3—Symbols—a revision was submitted which harmonizes the R. S. A. with A. R. E. A. standards.

The committee consists of F. P. Patenall, chairman (B. & O.); C. C. Anthony, vice-chairman (P. R. R.); G. E. Ellis (K. C. T.), W. A. Hanert (N. Y. C.), C. J. Kelloway (A. C. L.), J. C. Mock (M. C.), F. W. Pfleging (U. P.), M. E. Smith (D. L. & W.), R. E. Trout (St. L. & S. F.).

THE COLISEUM EXHIBIT

The exhibit of the National Railway Appliances Association at the Coliseum cannot fail to impress a visitor with the optimistic feeling prevailing among the railway supply fraternity and the belief that the worst has passed. While the exhibit is confined to the Coliseum and annex this year, and does not extend to the First Regiment Armory as during the past two years, the number of firms exhibiting is equal to that of last year, and the reduction in space has been secured by cutting down the areas allotted to some of the larger track exhibits. Thus the full size switch layouts of last year are absent this year.

This concentration of the exhibit in one building will meet with the favor of many railway and supply men, for it has been the experience in previous years that many railway men, with a limited amount of time at their disposal, did not get to the First Regiment Armory at all. From an educational standpoint this year's exhibit surpasses any previous one, consisting as it does of a greater variety of full sized equipment in actual operation and less of models, except in certain cases where the size of full size units makes their installation impracticable.

The signal exhibit, concentrated largely in the north end of the building, as in previous years, is of special interest, including as it does a number of new and important developments of the past year. These exhibits of full sized equipment in operation are becoming increasingly attractive to the operating as well as to the signal officers.

Of special interest to track men are the usual standard appliances with which such improvements as have been made during 1914. More attention is paid to these this year, and a visitor will be impressed with the almost complete absence of new and untried devices such as have been shown at some previous exhibits.

Each succeeding year shows the increating attention which is being paid to the development of numerous accessories in the maintenance of way department. While the exhibits of a decade ago were confined very largely to standard track materials, one will see this year steel bunks, motor cars, a tie tamping machine and much similar equipment which is meeting with ready adoption by the railways.

As in previous years, the entire exhibit impresses one with its thoroughly businesslike character. There is no attempt to provide comfortable lounging quarters for guests, all of the space being utilized for the installation of exhibits. The best indication of this is the fact that many railway men come to Chicago primarily to visit the exhibits and to secure information about certain equipment. One supervisor came all the way from Maryland to spend the entire day yesterday investigating motor cars, and will return this morning before the engineering convention opens. Such illustrations are a definite proof of the recognition of the educational value of this exhibit.

NATIONAL RAILWAY APPLIANCES ASSOCIATION

The National Railway Appliances Association, which, as in former years, is responsible for the success of the supply exhibit at the Coliseum, and in general represents the interests of the railway supply industry at these conventions, is too well known to require extended comment. As at present constituted, the association represents a development of 19 years of steady and constant growth in strength, numbers and influence. The present organization is the direct outgrowth of the Road and Track Supply Association, which was organized in 1894 to exhibit at, and supply entertainment for, the Roadmasters' Association. In 1900, after the organization of the American Railway Engineering and Maintenance of Way Association, which is now the American Railway Engineering Association, the supply association transferred its activities from the Roadmasters' Association to the new organization, and has since held its exhibitions in connection with the conventions of the latter body and of the Railway Signal Association. In 1910 the name was changed to the Railway Appliances Association and in 1911 it was regularly incorporated under the laws of Illinois with its present name.

N. M. HENCH,
President.

The chief function of the association is to organize and conduct the exhibition of railway appliances held annually in the Coliseum, which is so vital a feature of the engineering and signal association conventions.

The officers and members of the board of directors of the National Railway Appliances Association are: President, Norman M. Hench, Carnegie Steel Company, Pittsburgh, Pa.; vice-president, Philip W. Moore, the P. & M. Company, Chicago; secretary, Bruce V. Crandall, Chicago; treasurer, C. W. Kelly, Kelly-Derby Company, Chicago; honorary director, Tom R. Wyles, Detroit Graphite Company, Chicago; directors, H. M. Sperry, General Railway Signal Company, Rochester, N. Y.; L. G. Parker, Cleveland Frog & Crossing Company, Cleveland, Ohio; E. H. Bell, the Railroad Supply Company, Chicago; J. Alexander Brown, Pocket List of Railroad Officials, New York; E. E. Hudson, Thomas A. Edison, Inc., Orange, N. J.; M. J. Trees, Chicago Bridge & Iron Works, Chicago. The photographs are reproduced herewith.

President Hench is engineer of track appliances with the Carnegie Steel Company, Pittsburgh, Pa. He was graduated from Lafayette College, Easton, Pa., in 1897, and entered the service of the Pennsylvania Railroad in the maintenance of way department. He was promoted to supervisor of track within four years and was last located at Altoona, Pa. In 1905 he resigned to accept his present position of engineer of track appliances with the Carnegie Steel Company. He was elected a director of the National Railway Appliances Association four years ago and is also a member of the American Society of Civil Engineers and the American Electric Railway Association.

P. W. Moore is vice-president and general manager of the P. & M. Company, Chicago. He is a native of Boston, Mass.,

E. H. BELL,

J. ALEXANDER BROWN.

H. M. SPERRY.

E. E. HUDSON.

M. J. TREES.

T. R. WYLES.

B. V. CRANDALL,
Secretary.

P. W. MOORE,
Vice-President.

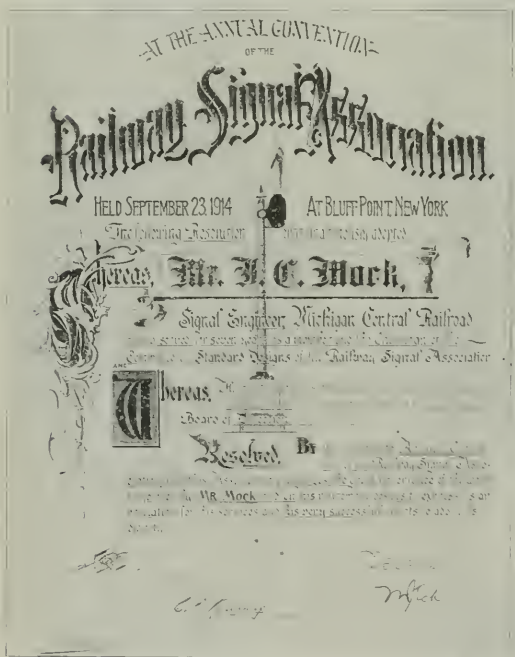
C. W. KELLY,
Treasurer.

OFFICERS AND DIRECTORS NATIONAL RAILWAY APPLIANCES ASSOCIATION.

and graduated from the Massachusetts Institute of Technology, with the class of 1901, with the degree of B.S. in the department of mechanical engineering. After graduation he was a draftsman in the chief engineer's office of the Pennsylvania Steel Company at Steelton for a little over a year. He was then transferred to the sales department and came to Chicago in connection with that department in the summer of 1903. Three years later, in the summer of 1906, he left that company to enter the employ of the Railway Specialty & Supply Company, upon its organization. This company is now known as the P. & M. Company.

R. S. A. APPRECIATION TO J. C. MOCK

At the close of the morning session of the Railway Signal Association meeting yesterday, President T. S. Stevens presented J. C. Mock, signal engineer of the Michigan Central, with a framed copy of the resolutions passed by the nine-



Facsimile of Framed Resolution Presented to J. C. Mock by the R. S. A.

teenth annual convention in Bluff Point last fall, expressing the appreciation of the association for the work that Mr. Mock accomplished as chairman of Committee VI, on Standard Designs. The resolution, which was neatly engrossed, read as follows:

"WHEREAS, Mr. J. C. Mock, Signal Engineer, Michigan Central Railroad, having served for seven years as a member and the Chairman of the Committee on Standard Designs of the Railway Signal Association, and

"WHEREAS, he has tendered his resignation as Chairman of said Committee and his resignation as Chairman of said Committee and his resignation having been accepted by the Board of Direction, be it therefore

"RESOLVED, by the Nineteenth Annual Convention of the Railway Signal Association that this Association recognize the great importance of the work performed by Mr. Mock, and on his retirement desires to express its appreciation for his services and his very successful efforts to add to its dignity."

R. S. A. COMMITTEE MEETINGS

The following committee meetings of the Railway Signal Association are called for to-day at the places and times mentioned below. Committee II, Mechanical Interlocking, 10:00 a. m., Room 140 Auditorium Hotel.

Committee III, Power Interlocking, and IV, Automatic Block, 8:30 a. m., Room 138, Auditorium Hotel. Committee IV, Automatic Block, 9:30 a. m., Room 244, Auditorium Hotel.

Committee V, Manual Block, 9:00 a. m., Room 3, Auditorium Hotel.

Committee VII, Relays, 8:30 a. m., Room 354, Auditorium Hotel.

Committee VIII, Electric Railway and Alternating Current Signaling, 8:30 a. m., Room 354, Auditorium Hotel.

Committee X, Storage Battery and Charging Equipment, 8:30 a. m., Room 444, Auditorium Hotel.

ANNUAL BANQUET

The annual banquet will be held in the Gold Room at the Congress Hotel at 7 o'clock on Wednesday evening. The speakers will include C. S. Gleed, president, Missouri & Kansas Telephone Company; Sir George Foster, minister of trade and commerce, Dominion of Canada; Frank L. Mulholland, president of the International Association of Rotary Clubs, and Benjamin Baum, chief engineer maintenance of way, Maumee Valley Railroad.

REUNION OF A. T. & S. F. SIGNAL OFFICIALS

The past and present members of the Santa Fe signal supervisor's committee held a reunion at a dinner given at the Congress Hotel, Monday noon. This was the first annual dinner of this committee and many accepted the call to the colors. Of the past members, the following were present: Burt T. Anderson, assistant signal engineer, Delaware, Lackawanna & Western; George R. Cowherd, signal engineer, El Paso & Southwestern; Park B. Hyde, signal and electrical engineer, Thomas A Edison, Inc.; Harold K. Ferguson, secretary, Samuel Austin & Son's Company; J. Earl Saunders, electrical engineer, Union Switch & Signal Company; and Jack Hobson, general sales manager, Union Switch & Signal Company. The active members who did justice to the dinner are T. S. Stevens, signal engineer; Larsen Brown, assistant signal engineer; Harry Hobson, signal supervisor Eastern lines; Ed Hanson, signal supervisor, Gulf Lines; William Rife, signal supervisor, Western Lines; and E. Winans, signal supervisor, Coast Lines.

WOOD PRESERVERS' MEETING

About 20 members of the Executive Committee and committee chairmen of the American Wood Preservers' Association met at the Hotel Sherman yesterday afternoon to discuss business affairs of that association and to outline committee work for the ensuing year. They also took dinner together at the Hotel Sherman at 6 o'clock.

CHANGES IN PULLMAN COMPANY ORGANIZATION

Le Roy Kramer, assistant to the president, and Richmond Dean, general manager of the Pullman Company, have been elected vice-presidents of the company. C. S. Runnells has been appointed assistant to the president, succeeding Mr. Kramer, and L. S. Hungerford, general superintendent, succeeds Mr. Dean as general manager. All will have office at Chicago.

REGISTRATION—RAILWAY SIGNAL ASSOCIATION

ACTIVE MEMBERS.

Adams, W. M., Sig. Supr., Atlantic Coast Line, Jacksonville, Fla.
Ahrens, C. R., Storekeeper, Sig. Dept., D. L. & W. R. R. Co., Hoboken, N. J.
Allan, E. A., Supr. Sigs., Northern Pacific Ry., Livingston, Mont.
Allen, W. P., Inspr. of Sigs., P. R. R., Philadelphia, Pa.
Ambach, E. T., Asst. Supt. Tel. & Sigs., B. & O. S. W. R. R., Cincinnati, Ohio.
Anderson, B. T., Asst. Sig. Engr., D. L. & W. R. R., Hoboken, N. J.
Anderson, James, Sig. Inspr., N. Y. C. R. R., West of Buffalo, Cleveland, Ohio.
Anthony, C. C., Past President, Asst. Sig. Engr., P. R. R., Philadelphia, Pa.
Arnold, R. B., Sig. Inspr., Sig. Engr.'s Office, C. & N. W. Ry., Chicago, Ill.
Baird, M. A., Gen. Sig. Inspr., Erie R. R., Suffern, N. Y.
Ball, Frank L., Supr. Sigs., D., L. & W. R. R., Maplewood, N. J.
Balliet, H. S., Asst. Term. Mgr., Grand Central Terminal, New York, N. Y.
Barnes, A. H., Supr. of Sigs., N. P. Ry., Tacoma, Wash.
Beaumont, J., Sen. Sig. Engr., Valuation Board, Interstate Commerce Com., Chicago, Ill.
Beck, Geo. E., Chf. Sig. Inspr., N. Y. C. R. R., West of Buffalo, Cleveland, O.
Beoddy, J. A., Gen. Sig. Inspr., N. & W. Ry., Roanoke, Va.
Bidwell, J. N., Sig. Eng., R. R. Com. of Wis., Madison, Wis.
Black, E. A., Supr. Sigs., N. Y. C. R. R., West of Buffalo, Ashtabula, Ohio.
Bradley, E. E., Sig. Eng., Western Maryland R. R., Baltimore, Md.
Brown, Larsen, Gen. Sig. For., A., T. & S. F. Ry., Topeka, Kan.
Caley, Glenn H., Elec. and Sig. Supr., N. Y. O. & W. Ry., Middletown, N. Y.
Carroll, Phil, Supt., St. L. I. M. & S. Ry., Poplar Bluff, Mo.
Chappell, G. W., Asst. Eng., N. Y., N. H. & H. R. R., New Haven, Conn.
Christofferson, C. A., Sig. Engr., Northern Pacific Ry., St. Paul, Minn.
Clark, A. C., Chf. Clerk to Sig. Engr., Erie R. R., Jersey City, N. J.
Clark, W. A., Chief Engr., D. & I. R. R., Duluth, Minn.
Combs, Harry, Supr. Sigs., L. E. & W. R. R., Tipton, Ind.
Corcoran, John J., Dist. Sig. Inspr., N. Y. C. R. R., East of Buffalo, Rochester, N. Y.
Cormick, James H., Sig. Engr., Can. Northern Ry., Winnipeg, Man.
Cotton, Chas. A., Div. Sig. For., A., T. & S. F. Ry., Chillicothe, Ill.
Cowherd, G. R., Sig. Engr., E. P. & S. W. Ry., El Paso, Texas.
Dawley, W. M., Engr., Erie R. R., New York, N. Y.
Dawson, Wm., Asst. Supr. Sigs., N. Y. C. R. R., West of Buffalo, Chicago, Ill.
Dodd, E. B., Supr. Sigs., M., St. P. & S. S. M. Ry., South Minneapolis, Minn.
Dows, Wm. G., Pres. and Gen. Mgr., C. R. & I. C. Ry., Cedar Rapids, Iowa.
Dryden, G. H., Prin. Asst. Sig. Engr., B. & O. R. R., Baltimore, Md.
Dunham, Chas. A., Vice-President, Sig. Engr., Great Northern Ry., St. Paul, Minn.
Eck, W. J., Vice-President, Sig. and Elec. Engr., Southern Ry., Washington, D. C.
Elliott, W. H., Sig. Engr., N. Y. C. R. R., East of Buffalo, Albany, N. Y.
Ellis, G. E., Director, Sig. Engr., Kansas City Term. Ry. Co., Kansas City, Mo.
Elsworth, R. B., Engr. Maint. of Sigs., N. Y. C. R. R., East of Buffalo, Albany, N. Y.
Finch, J. C., Inspr. Sigs., Mo. Pac. R. R., St. Louis, Mo.
Foale, H. J., Sig. Engr., Wabash Ry., Decatur, Ill.
Ford, F. A., Supr. Sigs., C. & O. Ry., Hinton, W. Va.
Fox, M. J., Asst. Sig. Engr., C., B. & Q. R. R., Lincoln, Neb
Frantzen, Oswald, Supr. Sigs., N. Y., N. H. & H. R. R., Boston, Mass.
Frohman, Oscar, Chf. Draftsman, C. & N. W. Ry., Chicago, Ill
Fugina, A. R., Director, Sig. Engr., L. & N. R. R., Louisville, Ky.
Gallagher, E. B., Sig. Inspr., Ill. Cent. R. R., Chicago, Ill.
Gault, Paul M., Sig. Inspr., Ill. Cent. R. R., Chicago, Ill.
Gifford, H. E., Jr., Gen. Sales Mgr., Nat. Elec. Spec. Co., Chicago, Ill.
Gray, G. B., Sig. Inspr., Penna. Lines West, Pittsburgh, Pa.
Gray, H. E., Supt. Constr., Gray-Thurber Auto. Train Control Co., Carnegie, Pa.
Green, R. E., Asst. Sig. Engr., M. C. R. R., Detroit, Mich.
Hanson, E., Sig. Supr., Gulf, Colorado & Santa Fe Ry., Galveston, Tex.
Hassel, L. H., Inspr. and Engr. Maint. of Sigs., N. Y. C. R. R., East of Buffalo, Albany, N. Y.
Hastings, W. R., Asst. Sig. Engr., C., R. I. & P. Ry., Des Moines, Iowa.
Hawkins, E. G., Power Engr., N. Y. C. R. R., East of Buffalo, Albany, N. Y.
Hiles, Wm., Inspr. of Sigs., C., C., C. and St. L. Ry., Cincinnati, Ohio.
Hinds, Chas. B., Sig. Engr., Western Pacific Ry., Oakland, Cal.
Hobson, Harry, Sig. Supr., A. T. & S. F. Ry., Topeka, Kan.
Hodgdon, C. R., Sig. Engr., Canadian Pac. Ry., Winnipeg, Man., Canada.
Hovey, M. H., Consulting Sig. Engr., Madison, Wis.
Hulmes, Wm. A., Sig. Supr., L. & N. Ry., Louisville, Ky.
Kellenberger, K. E., Senior Sig. Engr., Interstate Commerce Com., Chicago, Ill.
Kelloway, C. J., Sig. Engr., Atlantic Coast Line, Wilmington, N. C.
Kilian, H. L., Supr. Sigs., N. Y. C. R. R., West of Buffalo, Toledo, O.
Kirkpatrick, T. E., Supr. Sigs., N. Y. C. R. R., West of Buffalo. Elkhart, Ind.
Knight, Harold, Sig. Engr., Erie R. R. Co., Jersey City, N. J.
Kolb, E. W., Director, Sig. Engr., B., R. & P. Ry., Rochester, N. Y.
Lavarack, Percy, Supr. Sigs., Penna. Lines West, Newcastle, Pa.
Law, Stanley W., Inspr. Sigs., Northern Pacific Ry., St. Paul, Minn.
Leisenring, John, Sig. Engr., Illinois Traction Co., Springfield, Ill.
Lindsey, E. R., Sig. Inspr., C. & E. I. R. R., Chicago, Ill.
Lomas, H. F., Asst. Sig. Eng., I. C. R. R., Chicago, Ill.
Lorenzen, H. C., Constr. Engr., N. Y. C. R. R., East of Buffalo, Albany, N. Y.
Lynch, N. S., Supr. Sigs., Mo. Pac. Ry., Kansas City, Mo.
Mann, B. H., Past President, Sig. Engr., Mo. Pac. Ry., St. Louis, Mo.
Mann, L. R., Supr. Sigs., Mo. Pac. R. R., St. Louis, Mo.
Manuel, W. N., Director, Sig. Supr., G. R. & I. R. R., Grand Rapids, Mich.
McIntyre, Malcolm, Sig. Supr., Michigan Central R. R. Co., St. Thomas, Ont.
Meisel, Benjamin W., Asst. Eng., Sig. Dept., C. & N. W. Ry., Oak Park, Ill.
Mill, J. C., Sig. Eng., C., M. & St. P. Ry., Milwaukee, Wis.
Miskelly, Samuel, Asst. Sig. Engr., C., R. I. & P. Ry., Chicago, Ill.
Mock, H. F., Sig. Inspr., C. & N. W. Ry., Green Bay, Wis.
Mock, J. C., Sig. Engr., M. C. R. R., Detroit, Mich.
Morgan, H. G., Office Engr., Sig. Dept., I. C. R. R., Chicago, Ill.
Morrison, C. H., Sig. Engr., N. Y., N. H. & H. R. R., New Haven, Conn.
Morrison, W. B., Gen. Mech. Inspr., D., L. & W. R. R., Newark, N. J.
Newman, W. H., Supr. Sigs., N. Y. C. R. R., East of Buffalo, Buffalo, N. Y.
Nicol, Wm. B., Asst. Engr., B. & A. R. R., Boston, Mass.
O'Laughlin, W. M., Sig. Supr., N. Pac. Ry., St. Paul, Minn.
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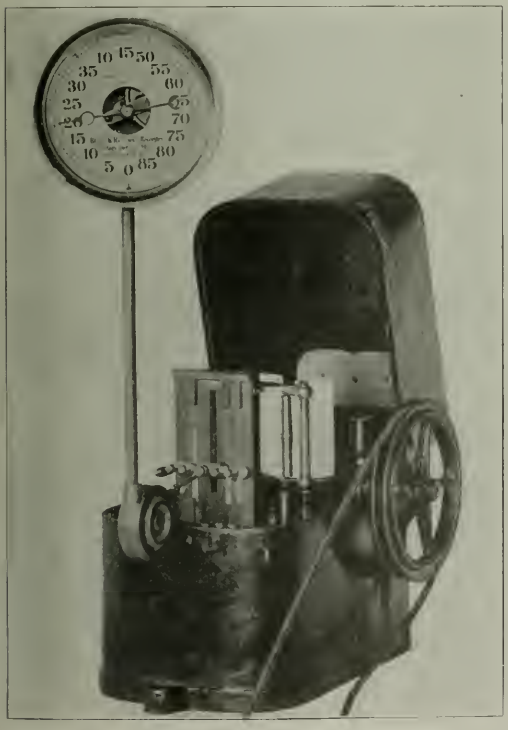
AUTOMATIC SPEED CONTROL

The Julian-Beggs Co., Terre Haute, Ind., has recently placed on the market an electro-mechanical device for controlling automatically the speed of a train. The operation is entirely independent of signals or in fact any exterior arrangement, the speed of the train mechanically operating the device through a spring belt running over a car or locomotive axle the belt and a wheel, through an oil cylinder and piston, make and break a normally closed circuit which controls the speed through an air valve operated by a solenoid magnet.

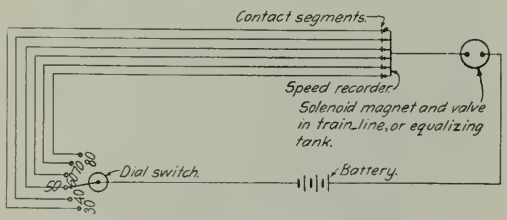
The belt operates a wheel attached to a small pump which forces oil into the oil cylinder with increasing velocity as the speed increases; a small hole in the bottom of the cylinder emits oil at a practically constant rate. The faster the oil pump is operated by the belt from the car axle, the higher the piston rises in the oil cylinder. As the plston rises, it carries with it a series of platinum points which move along silver segments of various heights. Above the silver segments are insulating segments of Bakelite. When any one of the platinum points is in contact with a silver segment, it completes a connection up to the dial switch, of which an illustration is shown. The pointer is placed on the contact at the desired speed; a connection must be completed through



Speed Recorder and Control for a Locomotive; Arranged for Three Speeds Only.

the pointer of the dial to complete the circuit, which will then be from the battery to the solenoid magnet, to the platinum contact points, to a silver segment, through the wire connected up with the contact at the indicated speed, through the movable pointer, and back to the battery.

When the circuit is closed it holds up a solenoid magnet, which operates a valve in the train line. When the circuit is broken, the solenoid valve is deenergized, the air pressure opens the valve, which is connected in the train line or equalizing tank. A service application of the air is made, the brakes staying on until the speed reduces enough to allow the platinum points to again come in contact with the segment, so that the circuit will again be completed. When the circuit is completed, the solenoid magnet is reenergized and thus automatically closes the valve. This automatic speed control device can be installed on any car or the locomotive of a train.



Circuit Diagram for Julian-Beggs Automatic Speed Control Apparatus.

and no matter on what railway such car or locomotive is placed, the speed can be controlled as desired. The current required is about 0.1 amperes.

The device was given an all-day test February 8, on the General Manager's car of the Queen & Crescent Route. Various speeds were tested out by moving the pointers on the speed dial, and in each case it was impossible for the engineman to exceed the speed limit indicated on the dial. The device operated without failure in the tests, and has since been placed on a number of cars of the Queen & Crescent Route. On all types of the apparatus which have been considered by the R. S. A., the Association's standards were followed.

UNUSUAL WIRE ROPE SERVICE

A wire rope of compound construction intended for use with ballast unloaders, drag line excavators and in similar service where the rope is subject to severe strain, sudden shocks and an unusual amount of abrasion, is manufactured by the Broderick & Bascom Rope Company, St. Louis, Mo., following a special design made to secure a rope that would give satisfactory service in connection with the unloading plows used to dump the material excavated from the Panama Canal. The conditions on this work were unusually severe. The material was handled in trains of 17 to 19 cars, each unloading cable being 1,000 ft. long. The material contained a large amount of rock, much of which was in the form of large boulders. In pulling the unloading plow along the train the wear of the cable over these stones would frequently cut deep grooves in the rock, and particularly after a train load of material had stood over night and been soaked by rain, the strain on the cable in plowing off was much higher than is usually encountered in such work. The combination of these conditions resulted in the breakage of ordinary wire rope after the unloading of a maximum of 500 trains. As a result of a study of this situation and numerous tests this company perfected the compound cable using its "yellow strand" wire, the complete design being known as the "Frederick patent." After this rope was put in service on the canal zone the unloading record increased to a maximum of 2,010 trains with one rope. This cut the cost of the cable to approximately one cent per car.

This compound wire rope permits the use of a larger wire rope core than in the common construction, increasing the strength of the rope about 25 per cent. The tendency of the strands to cut and chafe each other is prac-

tically eliminated and as the inner rope core lies in the interstices of the outer strand there is a tendency to prevent the wires in the outer rope from creeping, which is a destructive tendency. The service of this rope has shown it to be able to withstand sudden shocks, heavy strains and severe bending without affecting its elasticity up to the ultimate breaking strain of ordinary wire rope of the same diameter and quality. While the rope used at Panama had a diameter of 1½ in., seven other sizes smaller than this are also made, the smallest being ⅝-in. in diameter.

THE USE OF DUMP CARS IN THE OPERATION OF A DITCHER

Several roads have found it more economical in the operation of a ditching machine to load the excavated material into two dump cars, one on either side of the flat car carrying the machine, than to use a train of 10 to 15 flat cars and unload them with a plow, as is the practice quite generally at present. On one road such a ditching outfit has loaded an average of 24 cars per day with 15 yd. to the car at a cost of $0.14 per yd., not including any interest or depreciation charges on the ditcher or the locomotive.

Estimates prepared by the Western Wheeled Scraper Company, Aurora, Ill., based on performances with two 20-yd. Western air dump cars and twelve 40-ton flat cars, respectively, show that the first cost of the dump car train, exclusive of the locomotive, is about one-half that of the flat car train, that the two outfits will handle approximately the same yardage per day and that the cost per yard will be about $0.18 and $0.25, respectively, for the dump car and the flat car train. The statement of first cost in this estimate is based on the use of new cars, making the valuation of the flat car train higher than would be the case if old equipment was used. In addition to the difference between the charges for interest and depreciation on the cars for the two trains, the dump car train also shows an economy in the elimination of the unloader, plow cable and car, and two extra men required for stretching the cable.

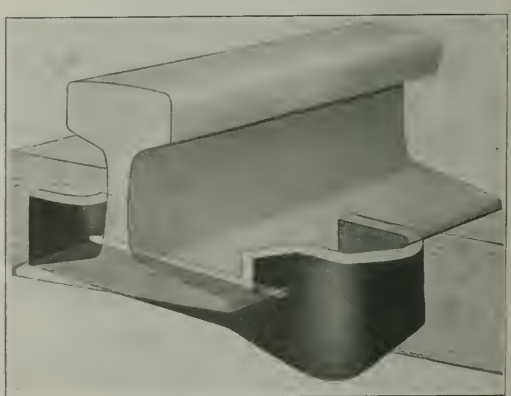
The conclusion that approximately the same yardage will be handled per day by the two methods is reached on the assumption, first, that the dirt be hauled three miles, which is probably a maximum for this class of work; second, that a siding is located at the point where the ditcher is working, which is the ideal switching condition for flat car operation and is, of course, rarely if ever met in practice, and, third, that train service will limit the working day to five hours, which is thought to be an average condition. On these assumptions the two dump cars could be loaded in 60 min., the complete train run direct to the dump without switching the ditcher or turning the engine in 9 min., the two cars dumped and righted in 2 min. and the train returned to the cut in 9 min., making a total for one trainload of 80 min. On the other hand, the flat car train of 12 cars, 1 of which carries the plow and 1 the ditcher, could be loaded in 180 min., the ditcher set out and the unloading cable strung in 17 min., the run to the dump made in 9 min., the cars unloaded in 6 min., the plow switched to the rear and the ditcher attached to the front end of the train in 13 min., and the run back to the cut made in 9 min., a total of 234 min. The dump car train could therefore practically complete four trips per day, handling 200 yd., and the last flat car train one trip with 150 yd. and load four more cars in the remaining 1 hr. and 6 min. This is equivalent to about 195 yd. loaded and dumped, which makes the performance by the two methods approximately equal.

A number of incidental advantages arise through this use of dump cars. One of these is the rapidity with which the dump cars can be unloaded, allowing the work train to place the material and return in a much shorter interval between trains. Again, the material can be dumped at exactly the point desired, as in widening embankments or filling trestles. The possibility of accidents through the plowing off of the material is also obviated. A lighter engine can be used for the work train service when dump cars are used, and the excavating capacity of the ditcher can be increased since no time is lost in swinging the rails.

When the haul is short, the cost of ditching can be further reduced, if conditions will permit, by the following method: With the locomotive on the dump end of the train, the car next to the locomotive can be pulled to the dump as soon as loaded, and while the locomotive is gone the ditcher can be loading the second car. As soon as the first car is returned it can be loaded and the whole train then taken to the dump. In this way the ditcher stands idle during one run to the dump for three cars of material instead of for two cars. The ditcher can spot the one flat car while the locomotive is gone by putting the dipper against the bank in the direction opposite to the movement and engaging the traveling gears. This pushes the car from underneath the ditcher and places the train where it is desired. It is estimated that this method can be used with advantage for hauls up to 1½ miles. The water for the ditcher can be piped from the locomotive by using automatic hose couplers between the cars. Portable rail sections can be used or the car can be permanently railed. Air dump cars of not greater than 20-cu. yd. capacity are recommended.

THE "SUPERIOR" RAIL ANCHOR

A new form of one-piece rail anchor is now in use on about 30 railroads, including the Pennsylvania, the Philadelphia & Reading, the Delaware, Lackawanna & Western, the Central Railroad of New Jersey, the Lehigh Valley, the Chicago, Burlington & Quincy and the Southern Pacific, where it is reported to be giving satisfactory service. This "Superior" rail anchor is made of ⅜-in. heat-treated and oil-tempered steel with one end bent to form a spring which rests against the side of the tie and two lugs bent out on the upper edge of the anchor to engage the upper surface of the rail base when in place in the track, as shown in the accompanying illustration. The elasticity of the steel of which the anchors are made tends to prevent them from being loosened by vibration or by expansion or contraction of the rail.



The One-Piece "Superior" Rail Anchor.

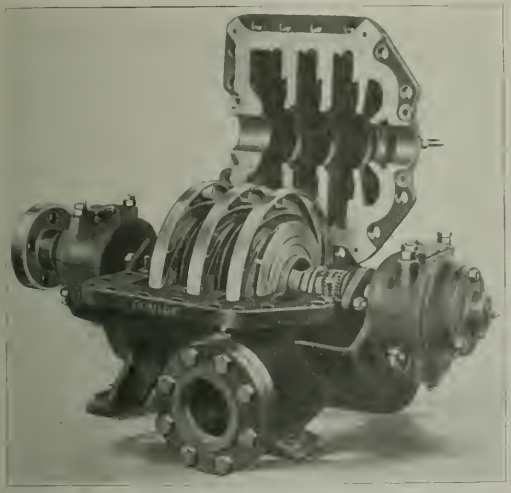
The device can be applied by any average track man without other tools than a light hammer. When placed at right

angles to the rail the lugs can be slipped up over the edges of the base, after which the device is twisted until the lugs come in contact with the upper surface of the base, and the spring is against the side of the tie. The holding power is dependent on the grip furnished by the reaction of the steel spring and the "shackle hold" secured by the wedging action of the lugs on the sloping surface of the rail brace when the device takes its diagonal position across the rail. This device is manufactured by the Track Specialties Company, New York City

NEW TYPES OF CENTRIFUGAL PUMPS

A new high-speed single-stage centrifufal pump, designed for direct connection to electric motors, and a multi-stage pump for use where the head is greater than can be efficiently handled by a single-stage unit, have been developed recently by the Goulds Manufacturing Company, Seneca Falls, N. Y.

The single-stage pump is of the enclosed impeller type, with a volute casing, supported on a bed plate that can be swiveled to any one of eight different positions. The impeller is made of gray cast iron and is balanced against

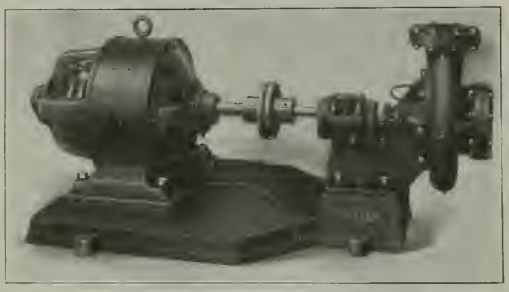


Three-Stage Horizontal Single-Suction Centrifugal Pump, with Top of Casing Removed.

end thrust hydraulically, statically and dynamically. Any slight end thrust occurring in operation is taken up by shaft collars bearing on babbitted surfaces, the collars also serving to space the impeller properly in the casing. The impeller is pressed on a high carbon open hearth steel shaft of ample size to transmit the maximum power. The volute is made of gray cast iron, the section being of uniform thickness and the waterway being carefully proportioned to convert the velocity energy of the water leaving the impeller into pressure with the minimum loss due to shocks or eddies.

The support head casting forms the stuffing box cover of the casing containing the two bearings and carrying the complete pump when assembled. The ability to shift the casing on the bed plate increases the adaptability of the pump where space for pipe fittings is limited, and also allows a discharge elbow to be dispensed with. The pump can be arranged either for direct connection to a motor or for belt drive. This pump is made in five sizes, the normal capacity of which ranges from 80 to 140 gal. per min., for the smallest, to 700 to 1,000 gal. per min., for the largest size.

The multi-stage pump is of the horizontal suction type. The bearing housings are cast integral with the lower half of the pump casing, and it is believed that the danger of leakage between stages has been obviated. These pumps are made in four sizes, the two smaller sizes being provided with impellers independently balanced against end thrust and also fitted with thrust bearings to carry any



Single-Stage Horizontal Centrifugal Pump Direct Connected to Electric Motor.

thrust developed in actual operation, these bearings running in an oil bath. The two larger sizes are equipped with an automatic internal balancing disc, which dispenses with external thrust. The pump can be furnished in two to five stages. The capacities range from 200 to 300 gal. per min. for the smallest size to 1,000 to 1,500 gal. per min. for the largest.

A NEW MOTOR INSPECTION CAR

The Kalamazoo Railway Supply Company, Kalamazoo, Mich., has recently placed on the market a new light motor inspection car for the use of roadmasters or others whose duties require frequent trips over the line. This car is known as the No. 20 and is equipped with a 9-hp. air-cooled motor driving through a friction disc transmission and roller chain to one of the axles. The car body is light, allowing it to be removed from the track easily by one

A New Type of Motor Car for Inspection.

man. Spring cushioned revolving chairs are provided and the space on the deck is ample for baggage and paraphernalia. The car is made double-ended for operation in either direction and has variable speeds in both the forward and reverse. It is equipped with Hyatt roller bearings throughout and has brakes acting on all four wheels. An oil and gasoline storage capacity sufficient for a trip of 200 miles under normal conditions is provided.

THE BAIRD ELECTRIC LANTERN

An electric hand lantern, which is unique in its design, is being used by trainmen and other employees on a number of roads, including the Chicago & Alton, the Chicago, Rock Island & Pacific and the Lake Erie & Western. On some roads the company has purchased the lantern to supply the men, but on the three mentioned an arrangement is in force identical with that covering the renewals for oil lanterns. The lanterns and the renewal parts are kept in the company's stock room and issued to the men at cost in the same way as supplies for oil lanterns. The cost of this electric lantern has been bought down to a point only slightly above that for an oil lantern so that in many cases the men prefer to purchase them rather than to buy a new oil lantern to replace a lost or damaged one.

An Electric Hand Lantern with the Bulb Below the Batteries.

The frame of the lantern is of brass and steel nickel-plated to prevent corrosion, and the batteries are enclosed above the lamp instead of below it, as in the ordinary design. A sliding frame normally supports the lantern but when desired this can be closed up so that with the ball dropped, the lantern occupies a space only 6 in. by 6 in. by 7 in. On account of its construction, the lantern throws no downward shadow, an evident advantage for many uses, particularly in signaling by hand. The light is turned on or off by the position of the bail. When raised or when lowered on one side, the light remains on, and when lowered on the other side it is switched off. The bail snaps into place in the vertical position.

The power is furnished by a dry battery consisting of four cells made up in two units so that when one is exhausted the other is ready and one-half can be renewed at a time. This battery furnishes six volts to a miniature tungsten filament lamp, giving four times as much illumination as a carbon lamp. The lamp is doubly protected by a wire guard close to the bulb and by the sliding frame which supports the lantern. A receptacle is provided in the duplex battery for an extra bulb so that a failure need never destroy the usefulness of the lantern. The life of a battery is stated to be from 60 to 65 hours, and the life of a bulb 150 hours. The extra bulbs are retailed at 25 cents and the duplex batteries at 80 cents. This lantern is manufactured by the Federal Sign System (Electric), Chicago.

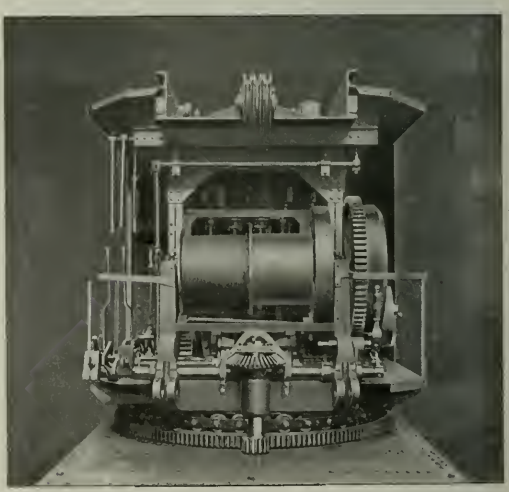
NEW LOCOMOTIVE CRANE

A new locomotive crane has been placed on the market by the Cleveland Railway Supply Company, Cleveland, O., which combines several distinctive features. One of the important points in its design is the rigid and heavy construction of the bed. The car frame is built of two heavy longitudinal side girders, between which are heavy cross beams supporting the roller bed, upper structure and propelling mechanism. The frame is mounted on two standard 4-wheel trucks with 33-in. wheels and heavy axles, the wheel base being 20 ft. 6 in. The rotating bed is 105 in. in diameter or about 18 in. larger than in common designs. The lower ring is composed of 44 conical rollers of ample diameter and face to carry the load. These rollers are attached by pins to a spider which has a bearing on the center pin of the frame, assuring the alinement of the rollers. The rotating bed that carries the hoisting, rotating and traveling mechanism is a heavy machined casting, resting directly on the rollers. Particular attention has been given to the accessibility of all shafts, clutches, gears

New C. R. S. Locomotive Crane.

and other working parts, so that adjustments and repairs can be made with the least possible delay and without dismantling other parts of the frame.

The disc friction type of hoist and travel clutches are used, one-half of the disc having a contact surface covered with asbestos facing, which runs either with or without oil. The gearing is of cast steel and the small pinions of forged steel. The teeth, fulcrum gear and the pinion which meshes with it are of cast steel. All other gears have cut teeth. The shafts 3½ in. in diameter and less



Operating Mechanism of New C. R. S. Locomotive Crane.

are of cold rolled shafting, the larger sizes being forged All bearings are bronze bushed.

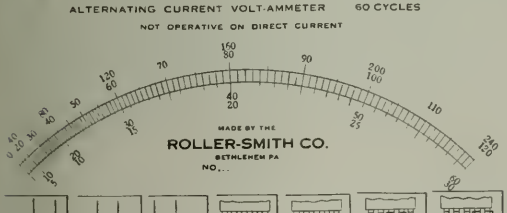
For raising and lowering the boom and the load, as well as for traveling, the engine has two vertical cylinders 9 in. in diameter with a 12-in. stroke. Rotation is handled by a swinging engine with a 4-in. by 6-in. cylinder mounted on the rotating bed. The control is smooth, for either fast or slow rotation, and a quick acceleration is obtained. The

traveling power is applied to one axle on each truck through beveled gears and pinions and two clutches for driving the crane backward and forward without reversing the engine. The hoisting drum is 20 in. in diameter and is driven by gears and pinions operated by a clutch. The load is controlled by means of a strap brake operated by both hand and foot levers. A 12-in. drum connected to a worm gear is mounted in the top structure of the crane for raising and lowering the boom. The ropes lead directly from the drum to the sheaves in the head of the boom and then to the purchase block connected to the top structure, thus giving them the best possible leverage for the support of the boom. The crane is rotated by a pinion meshing with teeth on the outside of the rotating ring, the pinion being driven by the rotating engine through a worm and gear.

A low center of gravity and an increased capacity is obtained by placing the operating mechanism low down, and another advantage is gained by placing the operator on the right side of the crane, a little forward of the center, where he can see the various operations without having his view obstructed. The crane has a coal capacity of 2,000 lb. and a water storage of 500 gal. It is built in standard sizes from 15 to 30 tons, inclusive, and with booms from 30 to 50 ft. in length. It is designed to travel at speeds of from 600 to 1,000 ft. per min., and has a rotating speed of 3 to 4 r. p. m. It can be used with either bottom block for ordinary lifting, grab bucket, drag line bucket, lifting magnet or pile driver, steam or drop hammer. Changes from one to the other of these attachments can be made with little delay.

NEW VOLT-AMMETER FOR A. C. SIGNAL TESTING

A new alternating current volt-ammeter especially designed for the testing of alternating current signaling circuits and apparatus has been placed on the market by the Roller-Smith Company, New York City. The ranges have been selected carefully to avoid the necessity for carrying a number of ammeters and volt-meters on this class of work. When used as an ammeter the instrument has three ranges, 3, 12 and 60 amperes, and as a voltmeter four ranges, 6, 30, 120 and 240 volts. Each binding post is marked with a numeral corresponding to the scale value



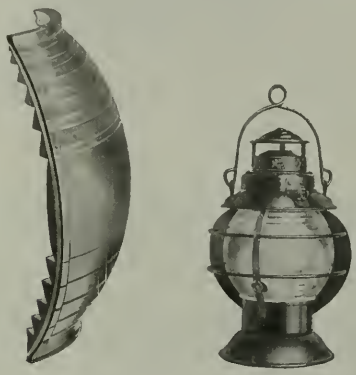
Facsimile of Scale on New Type SS Volt-Ammeter.

which is obtained when that binding post is used, and diagrams are shown for reference in making the proper connections for the various ranges, indicating also in each case the values per scale division. These instruments operate only on alternating current and are calibrated for the frequency on which they are to be used.

The instrument is contained in an oak case 6⅞ in. by 7 in. by 4¼ in., the complete outfit weighing 7 lb. It is provided with a leather handle, hinged cover and snap catch. The binding posts are heavy and have non-removable tops. A zero adjuster is also provided for manipulating the instrument.

SPHEROIDAL LENS BRIDGE AND PIER LAMP

A new line of signal lamps for use on bridges and piers over navigable waters which conform with the regulations of the United States Light House Bureau has been placed on the market by the Armspear Manufacturing Company, New York City. All parts of these lamps, including the spheroidal lenses, are made to interchange with the switch, semaphore, tail light and engine classification lamps that



Spheroidal Lens Sector and Top Bridge Lamp.

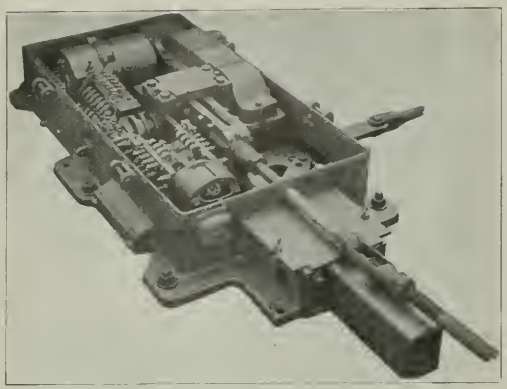
have been furnished by this company since 1913 The new lamps are made of No. 18 gage steel plates, the parts being dipped in molten lead and tin to prevent corrosion After completion the lamps are baked with two coats of Japan varnish. A system of top ventilation is provided in which all the ventilating parts are in plain sight, allowing easy access.

The spheroidal lens sectors are made of moulded glass, each sector covering a 90-deg. arc. When the regulations call for an angular vision of less than 90 deg. the desired portion of each sector is covered with metal strips attached to the steel uprights of the lamps, which are removable when it is desired to convert the lamps for other service. Arcs which are not to be illuminated are filled by drawn steel panels built to the same dimensions as the glass sectors. All panels and lens sectors are contiguous, the joints being made air-tight by asbestos packing placed in grooves provided for this purpose. The lamps can be supplied with burners for the use of kerosene oil, with outside wick adjustment, or for electricity or other illumination as desired. Any standard method for attaching the lamps to bridges, piers, etc., can be used.

The ruby lens is now being made in a "high transmission" glass, which has increased the range of the signal about one-third. Tests have showed that this lens will give a pick-up signal at two miles.

A. C. SWITCH AND LOCK MOVEMENT

The Model 13 enclosed switch and lock movement, manufactured by the Union Switch & Signal Company, Swissvale, Pa., has been adapted for use on alternating current of any commercial voltage and frequency, by the substitution of an a. c. motor of the commutator type for the standard direct current motor and an a. c. circuit controller for the usual d. c. circuit controller. A set of gears which are interchangeable with the gears used with the d. c. motor give a slightly



Enclosed Electric Switch and Lock Movement (Arranged for A. C. Operation).

higher gear ratio on account of the higher speed of the a. c. motor. The circuit controller is of the two-element motor type operated on a polarized control circuit, and is normally energized. The same indication circuit controller is used as with the d. c. movement.

The switch movement is designed to operate in connection with the Type "F" system, using polarized control, and a polarized indication; current for the latter is obtained from a small transformer located in the same housing with the movement, providing a separate source of energy for each indication circuit. The motor requires only about 750 watts to operate a single switch with detector bar.

DESPATCHERS 'SELECTIVE SIGNALING SYSTEM

The General Railway Signal Company, Rochester, N. Y., has recently made an installation of despatchers' selective signaling system, which, in connection with telephone train despatching and selector equipment, affords means by which the despatcher can control train-order and take-siding signals located at various stations on his division. He can determine, also, whenever he desires, the indication displayed by each signal and the system may be utilized to indicate to the despatcher a train passing a certain point and the direction in which the train is proceeding, corresponding to the operator's O. S. or train report.

The essential feature of the system is an "answer-back" mechanism which indicates the normal and reverse position of the respective signals by sending in to the despatcher, when he operates the proper key, a distinctive series of audible code impulses which can be repeated as often as the despatcher desires. The system operates on closed circuit so that any failure of current causes a danger indication. Selectively controlled train-order signals are intended for use at train-order stations which can be operated without an operator, and at other stations where the number of operators can be reduced; and also for places where traffic conditions would not warrant the expense of one or more operators. The figure shows control circuits for a selectively controlled train-order signal, an "answer-back" O. S., and a take-siding signal. Each arm of the train order signal is controlled by two keys, one for normal position and one for reverse position in the despatcher's office, through the telephone wires, the contacts of selector S and the stick relay R. Current for operation of the signal motor is supplied by a local battery.

The combination of electrically-controlled train order signals and "answer back" O. S. arrangement are designed to afford many of the advantages of a train-order station without the expense of the operator's wages. Take-siding signals can be used to afford a means of displaying to certain trains an indication to take siding at points other than scheduled meeting or passing points. When stopped by a take-siding signal, trainmen can communicate with the despatcher by telephone and obtain definite orders or instructions.

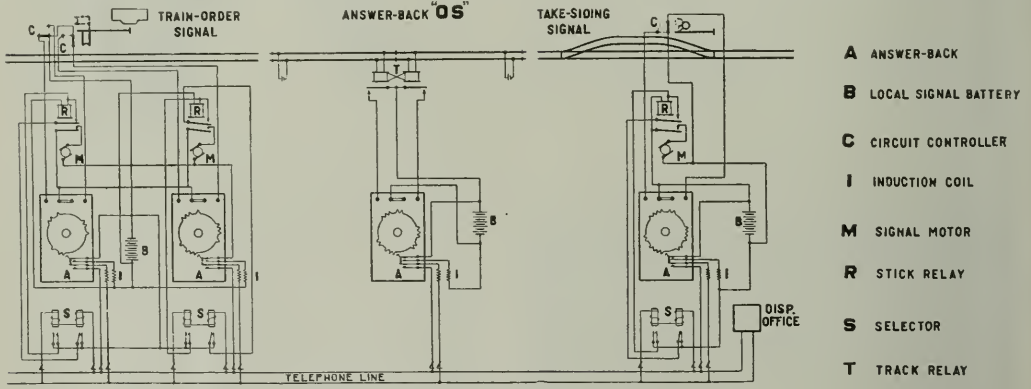


Diagram of Despatchers' Selective Signaling System.

AN IMPROVED TYPE OF FIXED GANTRY CRANE

The fixed gantry crane shown in the accompanying illustration was recently installed on a western road at a point where the amount of freight to be handled is not great enough to justify a traveling crane, and the inconvenience occasioned by the necessity of moving cars from time to time during unloading is negligible. A traveling crane for this location would have cost at least 50 per cent more than the one shown. This crane, which was manufactured by the Northern Engineering Works, Detroit, Mich., is equipped with the type E trolley, and also with the latest improvements, such as the use of enclosed gears and the elimination of overhanging gears. The hoist has forged and cast steel gearing, bronze bearings, a double brake system, all wiring in steel conduits and cast housings for the gear trains as far as possible. All parts are made interchangeable by the use of standard jigs and templets.

The gantry structure has an enclosed steel cage for the

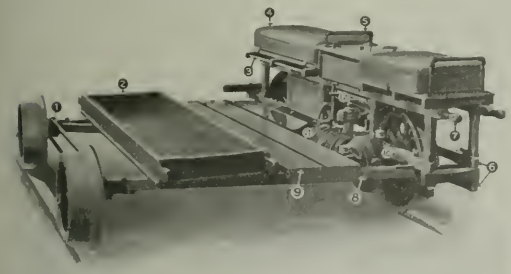
operator, fitted with sliding steel sash windows. Steel ladders and a platform with railings are furnished for access to the crane bridge. This crane has a capacity of 10 tons,

A 10-Ton Fixed Gantry Crane with Improved Type of Trolley and Hoist.

although this type is made in sizes up to 50 tons capacity, and similar equipment is furnished for traveling gantry cranes using three motors.

NEW MUDGE MOTOR CAR

A new inspection motor car known as the "Power Queen," which is equipped with a 6-h. p. engine and embodies a number of improved features is being placed on the market by Mudge & Co., Chicago. The motor is of the two-cycle air-cooled type similar to those used on the 4-h. p. inspection cars manufactured by this company. The cylinder has a bore



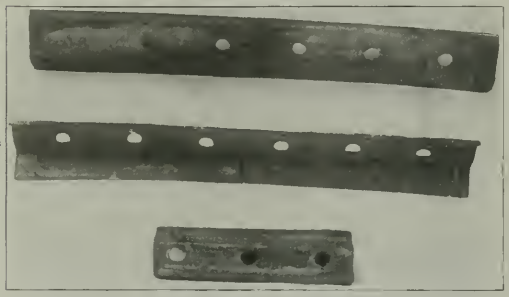
The New Six-Horsepower Mudge Inspection Car.

of 1½ in. and a stroke of 5 in., the power being developed under the slow duty of 600 r. p. m. The motor has only three moving parts, cams, valves, chains and belts having been eliminated. The cylinder is indicated at the figure 11 on the accompanying illustration, being supported for its full length between the double lower rails of the car frame. The oval gasoline tank is shown at 12 just above the motor, the raised operating table making possible the use of a 4-gal. tank which provides power for a trip of 250 miles.

In the design of the car frame and fittings a number of special safety features have been introduced. The guide wheels are tied together by two rods instead of one as formerly, grab irons are provided on both sides of the seat board, marked 3 in the illustration, hand rails, marked 5, serve to keep the passengers off the control levers and the floor boards, marked 9, cover completely the space between the tool tray and the car body preventing passengers from tripping on the guide arms or getting their feet caught in any open space. These boards can be removed as a unit by loosening thumb screws. The main rails of the frame are of ash and the cross arms are of one piece iron extending through both double lower rails. These arms are inclined slightly toward each other at the outer end to increase the rigidity of the frame. They are secured by bolts and thumb nuts, allowing them to be removed quickly for baggage car loading. The handles on this car have been placed on the upper rails instead of the lower, enabling the car to be removed without undue bending. The car is equipped with spiral spring cushions and a tool tray of ample length.

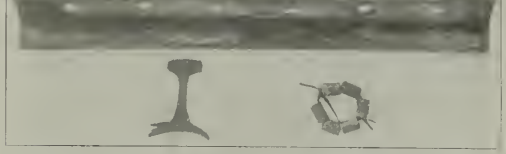
SERVICE OF INSULATING FIBER

The accompanying illustrations show some insulated joint fibers which have withstood severe service. These fibers were manufactured by the C. H. Whall Company, Boston, Mass., the basis of the material being cotton rags made into a paper pulp and then treated chemically. No pressure is



Insulated Joint Fibers Removed from Service for Examination, Upper Two After Two Years; Lower After Four Years.

used in the manufacture, the action of the chemicals hardening the fiber. The two sound fibers shown at the top of one of the illustrations are ⅛-in. plates used on 100-lb. section, 36-in. joints, which were in service in main line track for two years. The bushings and end posts used with these plates were also in good condition. In the same illustration is shown a 3-16-in. plate taken from a Keystone joint after being in service four years under heavy traffic. In both of these



Joint Insulation After More than Three Years' Service.

cases the insulation was removed to show what service was being obtained, and not on account of wear.

The other illustration shows a complete set of fiber for 100-lb. rail, which was placed in service on a descending grade January 3, 1912, and taken out March 1, 1915. These were taken out of the track on account of an annunciator circuit

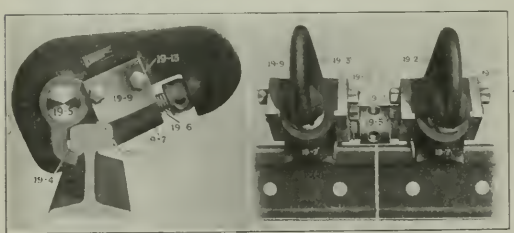
being discontinued, the joint at that time still giving good service. The crack in one of the plates, which did not injure the insulation, was evidently caused by the joint pulling apart and ripping the insulation. While the end post was rather ragged, it was giving satisfactory insulation and its condition shows the severe service to which it was subjected. The illustration indicates that the bushings are in very good condition, as is also the top plate under the head of the rail, which is very little damaged.

A supervisor of signals reporting on an Atlas insulated joint in which Whall special railway fiber was used states that a number of joints which had been in service for six years without having any attention paid to the insulation are at present in a condition which indicates that at least five more years' service can be expected.

THE CHICAGO RAIL JOINT EXPANDER

A new device has recently been placed on the market by which the ends of adjacent rails in the track may be forced apart for the insertion of fiber end posts without the use of chisels, sledges or rams. While its principal use, as indicated, is to expand the joint, it may also be used for drawing the ends of rails together to bring the bolt holes in line.

The rail joint expander consists of a pair of vise-like jaws, that are clamped diagonally across the head of the rail by means of two screws marked 19-6 in the accompanying illustration. The entire device is made of steel, the jaws having hardened replaceable steel inserts that are slightly roughened to insure a good grip on the head of



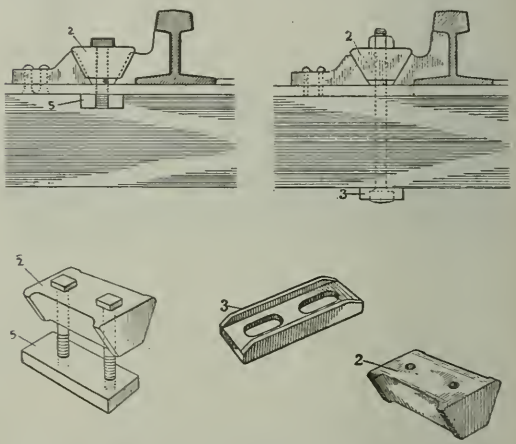
Sectional View of One Jaw and an Assembled View of the Complete Rail Joint Expander.

the rail. The two jaws are connected over the head of the rail by an expanding screw with a very deep and fine thread, with which it is claimed one man can open any joint that can be forced apart by any other means. The short screw shown in the illustration can be replaced by a screw long enough to span any length rail joint if desired, allowing the device to be operated without removing the splice bars or bolts, and also to be left in place while the fiber is being renewed or the new insulated joints placed in service. Without such a provision for holding the rails apart it is often extremely hard to install or renew insulations, particularly during the summer months, when the rails are tight.

This device has the advantage over sledges or rams that it does not batter the ends of the rails and that it can be operated with one or two men, while the other methods require a larger number. Tests in service have shown that the rail joint expander can be removed from the head of the rail in from 12 to 15 seconds, so that it involves less danger to approaching trains than methods in which it would be necessary to replace the splice bars or remove wedges from between the ends of the rails before a train could be allowed to pass. The expander equipped with the short screw weighs 115 lb., so that in case of necessity one man could easily handle the device. Under ordinary circumstances, however, two men are used. This device is manufactured by the Chicago Railway Signal & Supply Company, Chicago.

THE WELDAY ADJUSTABLE RAIL BRACE

A new rail brace known as the "Welday adjustable" has been developed by the Signal Accessories Company, New York City, and has been in service for about two years on the Nashville, Chattanooga & St. Louis. This brace consists of three parts, one fitting between the under side of the rail



Details of Welday Adjustable Rail Brace, Showing Two Methods of Bolting Wedge.

head and the upper surface of the rail base, another riveted to the tie plate and the third in the form of a wedge separating the other two and furnishing the adjustable feature. This wedge-shaped piece is held in place by two bolts passing through the tie plate or through the plate and the tie, as may be desired.

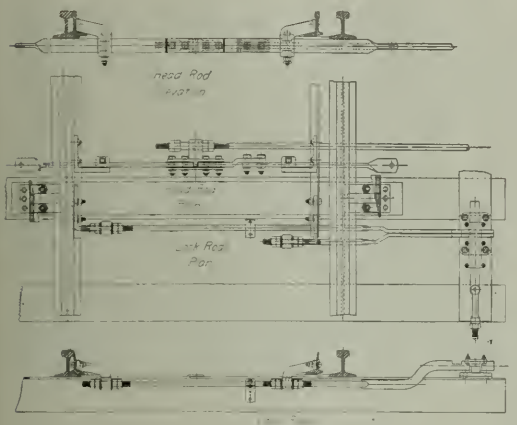
In the former case the bolts are screwed into a long thick washer which receives both bolts and which bears upward against the bottom of the tie plate. In the latter case the bolts are prevented from turning by a double washer which takes the heads of both bolts and bears against the bottom of the tie. Flanges on the ends of the wedge-shaped piece

The New Adjustable Rail Brace in Track.

fit over the ends of the other two sections and hold the brace against the surface of the rail with a uniform pressure throughout its bearing surface. When a train passes over the rail a certain amount of stress is placed on the bolts which locks them during the passage of the train, preventing their being loosened by vibration. The entire device is made of malleable iron.

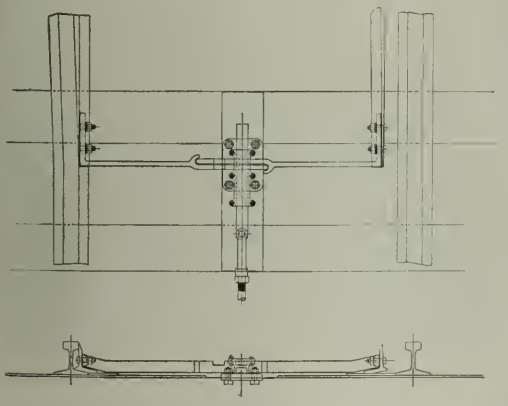
IMPROVED HEAD FRONT AND LOCK RODS

Accessories for moving and locking interlocking switches, frogs, etc., which embody certain improvements have recently been placed on the market by the T. George Stiles Company, Arlington, N. J. One of the illustrations herewith shows an insulated head rod ⅞ in. by 3 in. in section mounted vertically in the lugs which are bolted to the



New Type of Head Rod and Separately Connected Lock Rods.

switchpoint. At the connection, vertical notches are cut in the top and bottom edges of the rod into which projections on the lugs fit snugly. These projections extend far enough beyond the face of the rod to permit a bolt being passed through to clamp them to the rod. On the inner face of the lug and bearing against the rod is a semi-circular projection of small radius and vertical axis. This allows a slight turning resulting from the necessary relative motion between the rod and the lug when the switch is being moved, but at the same time holds the point firmly against



New Combined Front and Lock Rod.

the stock rail. The lugs are rigidly bolted to the switchpoint but the bolt holes are elongated to allow for lateral adjustment necessitated by the creeping of the switches.

This illustration also shows a new type of insulated lock rod with a ¾-in. by 2-in. flat plunger lock. This plunger has a large area and is less likely to shear than a round plunger. The rods are attached independently to each switchpoint, which makes it necessary for the two to act in unison to permit the movement of the plunger to lock them in the required position. The switch lugs for the lock rods are also slotted to allow for lateral adjustment. Electric switch lock rods can easily be attached to either switchpoint.

The second illustration shows a combined front and lock rod designed to give the maximum safety. While a center lock is in general obsolete, chiefly on account of its location between the rails, this type has the reputation of best preventing the switchpoint from rolling from the head of the stock rail. The lock can be covered and ramped at each end, if desired, to avoid damage from dragging brake beams, etc. The improvement in this design consists in dividing the rod into two parts, the blades overlapping each other and at the same time driving each other in operation so that the movement of each tongue of the switch is detected in its movement, making it impossible to lock the switch if either point has become detached from the lock or operating rod. This design also uses the flat ¾-in. by 2-in. plunger lock mentioned above.

AN UNUSUAL MOTOR CAR TRIP

A representative of the Railway Educational Bureau, Omaha, Nebr., is making a trip on a track motor car, over a number of the central and western roads, which is unusual in the distance covered, the objects and results of the trip, and in the service which is being secured from the motor car. This bureau conducts correspondence courses in various branches of railway work and it has been found that the most practical way in which to inform track men of the opportunity offered through these courses is to send a man over the line on a motor car to explain the matter to each gang. For several years it has been the custom on the Illinois Central and the Union Pacific to have a representative of the bureau go over the road twice a year in this manner. This man is also able to reach station men, signal men, bridge men and other employes working between terminals and these trips have invariably resulted in a marked improvement in the educational work of the men thus reached. The present trip, covering the Illinois Central system, a portion of the Union Pacific, the St. Joseph & Grand Island and a portion of the St. Louis & San Francisco, had comprised about 17,500 miles up to March 8, and had occupied an elapsed time of 250 days during which a vacation of 30 days was taken. Subtracting also the number of Sundays during this time, as no runs were made on Sunday, the total number of days available for traveling has been 190 or an average of 92 miles per day. The average based on the number of days of actual moving would be considerably greater than this, however, as some time was lost on account of rain, snow, etc. Although this trip has covered the winter months and a portion of it was made during very severe weather, the motor car which is being used has given uninterrupted satisfaction, has required no repairs and has never been in an accident.

The man who is making this trip, K. M. Houchins, started from Chicago, on July 1, 1914, with a new No. 19 Buda motor car. He first covered the entire Illinois Central system on the following summarized itinerary: Chicago to Freeport, Ill., Freeport to Centralia, Ill., including all of the branch lines on this district, arriving Centralia July 15. Centralia to Mattoon, Ill., covering the branch lines to Indianapolis, Ind., and Evansville. Mattoon to Carbondale, Ill., covering all the branch lines in the coal district surrounding that point. Carbondale to Paducah, Ky., and Louisville, covering branch lines on this district, arriving at Paducah, August 1, returning to Fulton, Ky., on August 10, and from there to Memphis, Tenn. Memphis to New Orleans, La., over the Y. & M. V., covering all branch lines, reaching New Orleans September 5, returning over the main line to Fulton, on September 21. Fulton to Birmingham,

Ala., and return, then up the main line to Chicago and west to Omaha, Neb., working all of the branches and arriving at Omaha on October 20. On account of the amount of doubling necessary to cover the branch lines it is estimated that about 11,000 miles were made in the trip over the Illinois Central system.

Mr. Houchins started over the Union Pacific main lines from Omaha to Cheyenne on November 25, arriving at Cheyenne December 9, after having covered all of the branches in the main line territory between those points. He left Cheyenne for La Salle, Sidney and Denver and the branches around that point, then left Denver on December 31 for Kansas City. He encountered some very bad snowstorms on the branch lines on this return trip and was quite badly delayed in bucking snow, digging out drifts and carrying men back and forth in helping to open the line. He finished all of the branch lines except the Leavenworth Western and covered the St. Joe & Grand Island, reaching Kansas City on February 2. The mileage on the Union Pacific amounted to about 5,000, all of it made during the winter months and a part of it against very strong winds and under bad snow conditions.

From Kansas City Mr. Houchins started over the Frisco system, going through Fort Scott, Afton, Tulsa, Sapulpa, Madill and the branch lines to Enid and Snyder. From Madill he went to Hope, back to Hugo, up to Fayetteville, and on March 8 was on the line from Fayetteville to Okmulgee. The distance so far covered on the Frisco amounts to about 1,500 miles.

Mr. Houchins has not lost a day on account of trouble with his car and has done a great deal of work in addition to meeting the trackmen, such as bringing men to wrecks, washouts, etc., discovering several broken rails, helping to put out fires, etc. He is always accompanied by either a roadmaster or signal supervisor, and has carried many other officers for parts of the trip. An important advantage to the roads covered has been the demonstration to the track men of the possibility of keeping their motor cars in service all of the time if they are given the proper care. The car used for this trip has been inspected every day, kept clean and oiled, with the result that it is reported to be in as good shape today as when the trip was started. The only renewal of parts necessary on the car has been a new chain, made necessary by the theft of the old one. Mr. Houchins thought he was having trouble with the magneto and sent it to the factory, running the car for a considerable distance on the batteries. The factory tested out the coil and found it all right, returning it to him to put back in service. He then discovered that the trouble had been caused by someone tampering with the wiring in the switch box from the magneto to the battery side, cutting out the magneto.

The amount of gasolene and oil used has varied considerably, according to the conditions of weather, wind and road, but on an average he has made about 20 miles to a gallon of gasolene and about 100 miles to a quart of cylinder oil. This consumption is greater than would be necessary on the same car in ordinary service for the reason that he stops to talk with all the employes along the road, and many times where the stops are short he does not shut down the engine. This consumption of oil and gasolene is also high on account of the heavy snow and the head winds which he encountered for a good part of the trip. A recent examination of the brasses on the car showed them to be in good condition. The valves and the engine parts have never been taken out, so that it is impossible to say what condition these parts are in, but the car performs as well as it did when the trip was started, and there is no indication of wear in any of the machinery.

Mr. Houchins has found the safety features of this Buda car to be important in his work, as in many cases he stops on a bridge to talk to men and can let the engine run or start by cranking without having to run across the bridge ties to push the car. Also, if he hears something on the track or at a switch that sounds wrong he can stop and reverse the car, go back to see what the difficulty is, while with other cars a condition of this kind might be passed without taking the trouble to dismount and push the car back to the point where the sounds were heard.

The method of interesting the men in the educational courses is first to explain thoroughly to the roadmaster just what the bureau can do and obtain his approval of the work before starting out on the trip. The roadmaster then usually accompanies the car, and the foreman and any of his gang who may be interested are given a thorough explanation of the work by Mr. Houchins. They are shown samples of the lesson papers, told what the correspondence school methods are and what the studies have done for other men in similar positions. Those that express an interest are enrolled for the courses. On the present trip over the Frisco 112 section foremen and 125 assistant foremen and laborers have been enrolled, the majority of these men, on the recommendation of their roadmaster, taking the track course lessons and special lessons on the time table, book of rules and railroad track motor cars. A considerable number of them have also asked for lessons on mathematics, signals, concrete construction, surveying and mapping, etc., and many of the foremen have asked for a special course of reading and study to broaden their general knowledge of railroading, in addition to a review of the practical lessons of track work and similar subjects.

By the use of these instructional methods, considerable progress has been made on some lines in solving the problem of the section foremen of the future. On one western road the Educational Bureau furnished last spring a list of 80 section laborers whose educational work indicated that they were ready for promotion as section foremen. Among these 80 men were found enough to fill all the vacancies in foremen during that spring. A further advantage in this work is that as men see section laborers promoted within a reasonable time as a result of study, they will take a renewed interest in the work of the section laborer and less difficulty should be experienced in securing the right class of men for this work.

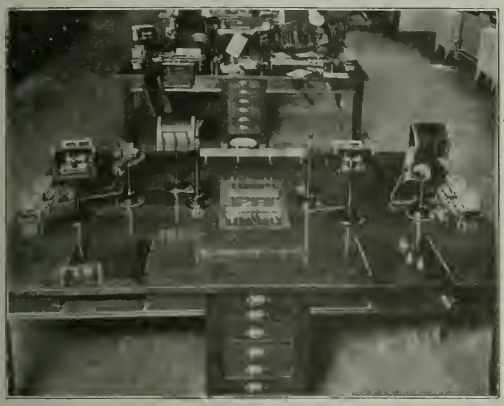
AUTOMATIC TELEPHONES ON THE KANSAS CITY TERMINAL

In planning for the operation of its new station and belt line the Kansas City Terminal Railway has made probably the most extensive installation of automatic telephones in use on any railroad in the country. This system is used for all communications between different offices and departments of the Terminal company, as well as for the operation of trains, and only about 40 Bell phones on city service have been installed. With these the somewhat unusual expedient was adopted of charging to each department the rental of the phones it used instead of charging the gross rental to one miscellaneous account. In planning this comprehensive automatic system a number of new and interesting features were developed.

One of these innovations was the substitution of the automatic telephone for the push button system throughout the terminal offices, so that instead of pressing a button to call a clerk to secure the file of correspondence on any subject he is given instructions by the use of the telephone and makes only one trip, with a net saving in time. This made unnecessary the wiring for the push button system, which item alone amounted to $1,100 in one recent terminal.

Three special switchboards are provided, a 300-line board for the general offices, a 100-line installation for the despatching of trains and a 25-line board for the use of the Harvey system. The 100-line switchboard devoted exclu-

sively to train operation is a new feature, as this is believed to be the first installation of automatic telephones for train despatching. These telephones connect the despatcher's office, the platforms, the train gates, the interlocking towers and numerous points about the yards. By their use train conductors are able to obtain their final



One of the Four Position Desks in the Telegraph Office.

authority to leave from the platform, and they are also able to advise the gateman a short time before leaving, and again as their trains leave, so that the gatemen can be governed accordingly in admitting passengers to the platforms. Iron box sets are provided on the platforms, so arranged that they are protected from the weather while at the same time readily accessible for use. Special hand sets are provided for the use of the gatemen and are hung in small alcoves in the wall when not in use.

Each man in each of the two towers is provided with a telephone on the despatching and also one on the general office board. To reduce the noise and prevent confusion,

The Automatic Switch Board and Power Board.

calls in these towers are indicated by drops and the lighting of small lamps rather than by bells.

Two train despatching circuits are provided, covering the entire belt line. The despatchers are located at Sheffield, about four miles east of the Union Station. These despatchers not only direct the movements of all passenger trains in and out of the station, but all freight and switching movements on the main line and the east side freight line as well. An operator in the Union Station in direct communication with the despatchers delivers all orders to the crews of outgoing passenger trains. Call indications are given to him by light signals on the cabinet shown near the left end of his desk in the accompanying photograph instead of by bells.

Several new features are also installed in the telegraph office. Instead of using the ordinary instruments all calls come in over a concentrating cabinet on selectors. While this particular feature is not original, as it has been used in some commercial telegraph offices, this is the largest railroad office so equipped, as there are 80 such selectors here. The operation of these selectors lights lamps in front of the telegraph operators, who pick up the calls by plugging in on the lines. Three four-position and one two-position tables are installed, each table being connected with 30 telegraph and 20 telephone lines. In addition to lighting a small light on the desk each call lights two red pilot lamps. The lines are so arranged that any operator can plug in and answer any call coming to his desk, while

The Train Operator's Desk in the Union Station.

if the red pilot lights indicate to the chief operator that calls are coming in on one table faster than the operators can handle them he can switch some of these calls on the test board to another table to relieve the congestion. Jacks are provided on each table, by means of which the operators can also cut in on the despatching circuit, enabling a further adjustment of work to be accomplished if desired. In addition to the telegraph lines, 15 to 20 telephone train despatching circuits come into this office, all of which pass through the wire chief's board and can be switched to any table as desired.

While it is very difficult to make any estimate of the economy secured by such an installation because of the wide variety of assumptions made in preparing such estimates, it is conservatively figured that the Kansas City Terminal is saving at least 50 per cent of the entire cost of the installation annually in the reduction in the cost of operation. The accompanying views show clearly the various important details of this installation, all of which was provided by the Automatic Electric Company, Chicago.

List of Supply Exhibitors at the Coliseum

Companies, Space Numbers, Devices Exhibited and Names of Representatives—How to Locate Each Exhibit

The following is a complete list of all exhibits in place or being installed in the Coliseum and Annex. Spaces numbered from 1 to 191 are in the Coliseum proper, and those from 192 to 227 are in the Annex.

Adams & Westlake Company, The, Chicago, Ill.—Signal lamps, switch locks, unity fixtures for station warehouse and freight terminal lighting. Represented by A. S. Anderson, C. B. Carson, H. G. Turney, Wm. J. Piersen, Thos. A. Galt, J. F. Stender and G. L. Walters. Spaces 83, 84 and 102.

Adams Motor & Manufacturing Company, Chicago, Ill.—Inspection type motor car. Represented by W. E. Adams. Space 219, Annex.

Ajax Rail Anchor Company, Chicago, Ill.—Double grip rail anchors. Represented by F. B. Bradley and H. G. Elfborg. Space 14.

Allith-Prouty Company, Danville, Ill.—Door hangers, spring hinges, fire door hardware, overhead carriers, store ladders, hardware specialties. Represented by A. Vere Martin, H. R. Maxwell, F. B. Coates and D. E. Willard. Space 187.

American Blue Print Paper Company, Chicago, Ill.—Mechanically reproduced tracings. Eureka litho process. Represented by Vernou T. Brauns, L. J. Steffens, James Hall. Space, Suite 1148, Congress Hotel.

American Guard Rail Fastener Company, Philadelphia, Pa.—Vaughan guard rail clamps, anchor guard rail clamps, anchor No. 2 guard rail clamps, tie plate guard rail fasteners. Represented by Mr. Vaughan and L. T. Burwell. Space 119.

American Hoist & Derrick Company, St. Paul, Minn.—Photographs of the American railway ditcher. Represented by W. L. Manson and F. J. Johnson. Space 67.

American Steel and Wire Company, Chicago, Ill.—Rail bonds, trolley wire, insulated and bare copper wire, woven wire fence, gates, steel fence posts. Represented by L. P. Shanahan, B. H. Ryder, J. W. Collins, A. W. Fronde, M. E. Evans, C. J. Boone, J. F. Alexander, C. Denniston, Frank Conkling and A. W. Durant. Spaces 51 and 70.

American Valve & Meter Company, Cincinnati, O.—Poage automatic water columns; Fenner non-freezable drop spout; Poage automatic float valves, tank fittings, etc.; Anderson economy and quick repair switch stands; interlocking switch stands and safety switch locks; safety appliances. Represented by Mr. J. T. McGarry and F. C. Anderson. Spaces 130-131-132.

American Vulcanized Fibre Company, Wilmington, Del.—Vul-Cot railroad insulation, vulcanized fibre insulation, boxes, cans, etc. Represented by C. C. Bell, W. A. Jordan and John Barron. Space 126.

Armco Iron Culvert Manufacturers, Middletown, O.—Armco (American Ingot) iron corrugated culverts, and various other products of rust-resisting pure iron, including corrugated roofing, terne plate metal lath, corrugated battery wells, etc. Represented by B. G. Marshall, G. F. Ahlbrandt. Spaces 99-100.

Asphalt Ready Roofing Company, New York, N. Y.—Protection brand asphalt roofing. Hudson asphalt shingles. Represented by H. H. Huested and C. A. Sparrowhawk. Space 170.

Atlas Preservative Company of America (Inc.), New York, N. Y.—Atlas "A" weed killer and track preservative. Method of applying Atlas "A" weed killer, Atlas "E" boiler preservative and Atlas "Ruskilla" protective paint. Represented by R. N. Chipman, B. G. Thompson and J. Kramer. Space 12.

Automatic Train Control & Signal Company, Pittsburgh, Pa.—Electric interlocking machine and train control apparatus. Represented by Gardner B. Gray, Guy P. Thurber, A. G. Williamson and A. E. Gray. Space 183.

Barrett Manufacturing Company.—Roofing (Barrett Specification roofs); Tar-Rok sub-floor construction; bridge waterproofing; waterproofing and dampproofing for masonry; hydronon-dampproofing. Represented by W. S. Babcock, H. B. Nichols, E. J. Caldwell, S. R. Church, L. B. Shipley, J. J. Ross, B. B. Brewer and S. B. Faison. Space 107.

Bausch & Lomb Optical Company, Rochester, N. Y.—Transits, tachymeters, theodolites, levels, alldades, binoculars and projection apparatus. Represented by C. A. Benston. Space 146.

Booth-Kelly Lumber Company, Eugene, Ore.—Pacific coast lumber for maintenance of way, bridges and structural work and car material. Douglas fir. Represented by E. R Hutchins, R. G. Hutchins, C. B. Hutchins. Spaces 201-214.

Boss Nut Company, Chicago, Ill.—Boss lock nuts. Represented by J. A. MacLean, T. W. Fogg and M. C. Beymer Space 13.

Bowman, T. B., Chicago, Ill.—Efficiency one-piece rail anchor. Represented by T. B. Bowman, A. S. Flowers, T. H Fowler, W. D. Thomas and C. P. Williams. Space 165.

Brach, L. S., Supply Co., New oYrk, N. Y.—Automatic flagman, track controlling devices, hydrogrounds, arresters, time recorders, switchrods, testing instruments, solderall, etc. Represented by L. St. Clair Brach and Godfrey Gort Space 2.

Bruley Steel Fence Post Company, Green Bay, Wis.—Steel fence post. Represented by L. C. Jorgensen.

Bryant Zinc Company, Chicago, Ill.—Railway signal supplies, highway crossing signals, "Autoflags," Waterbury batteries, bells, relays, concrete battery vaults, electrical supplies. Represented by Stanley C. Bryant, Geo. A. Blackmore, Wm. P. Graves, Jerry P. Costigan, John F. Gubbins Ward Leary, Rob't P. Klink, Harry F. Worden. Spaces 153-154-155 and 156.

Buda Company, The, Chicago, Ill.—Motor cars, bumping post, electric headlights, jacks, crossing gates, replacers switch stands, tool grinders, track drills, bonding drills, electric freight house and warehouse trucks, hand and push cars, etc. Represented by C. H. Bull, J. L. Artmaier, H. C Beebe, W. Krause, T. H. Wheeler, L. Hamill, N. C. Study J. J. Gard, W. C. Dyer, F. E. Place, Wm. P. Hunt, Jr., L M. Viles, M. A. Ross, E. Johnson and W. F. Hebard. Spaces 86, 87, 88 and 89.

Carnegie Steel Company, Pittsburgh, Pa.—Steel crossties; Duquesne rail joints; Braddock insulated joints; passenger and freight car wheels; rolled steel locomotive pistons; nickel-plated samples of rails, ties, joints and piling Represented by John S. Unger, C. F. W. Rys, Chas. E Dinkey, John McLeod, H. D. Williams, John Oursler, L. P Lincoln, Louis C. Lustenberger, Norman M. Hench, P. W O'Brien, D. E. Sawyer, Orin Baker, Edwin S. Mills, C. B Friday, G. E. Dix, H. van Zandt and G. W. Landrus. Spaces 52, 53, 71 and 72.

Casey Universal Saw Company, Cincinnati, Ohio.—Saw machine designed to cut timber to any desired angle. Represented by John Casey. Space 172.

Chicago Bridge & Iron Works, Chicago, Ill.—Model steel water tanks and enlarged pictures of tanks, coaling stations, etc. Represented by George T. Horton, M. J. Trees C. M. Ladd, C. S. Pillsbury, K. I. Small. H. B. Murphey F. L. Cook, H. B. Horton, R. H. Murray, J. C. Phelps, J. C Vosburgh, J. L. Zeller and G. S. Sangdahl. Spaces 65 and 66.

Chicago Malleable Castings Company, Chicago, Ill.—The Thomas rail anchor tie plate. Represented by J. S. Llewellyn and J. W. Thomas. Spaces 200, 215, Annex.

Chicago Railway Signal & Supply Co., Chicago, Ill.—Various types highway crossing alarms, crossing signs locomotive type crossing bells, magnet and motor operated the Chicago electric flag, cable poles, relay boxes, indicators, relays, interlocking forgings and fittings, Chicago rail expander, Chicago track drill and a complete line of signal accessories and maintenance supplies. Represented by E. W. Vogel, W. M. McClintock, Wm. H. Dayton, P. P Williams, R. Harvey White, Arthur C. Dunne, W. C. Martin Carl Suhr, F. L. Rainbow, H. C. McNell and W. A Schroeder. Spaces 5, 6, 7 and 8.

Cleveland Frog & Crossing Company, Cleveland, O.—Frogs, crossings, switches and switch stands. Represented by G. C. Lucas, Geo. Stanton and L. G. Parker. Spaces 91 and 110.

Cleveland Railway Supply Company, The, Cleveland, O.—Railway supplies. Represented by W. S. Newhall, F. A Peck and S. W. Linn. Spaces 198 and 217, Annex.

Clyde Iron Works, Chicago, Ill.—Standard double cylinder three drum contractors' hoist, with boiler and improved full wheel swings. New patented renewable ball and socket derrick base. Represented by E. S. Quinn and G. P. Miller. Space 182.

Commercial Acetylene Railway Light & Signal Company, New York, N. Y.—Commercial acetylene and A G A flash

light as applied to railroad signals; commercial acteylene as applied to locomotive headlights; commercial acetylene for oxy-acetylene welding and cutting. Represented by C. E. Lee, O. F. Ostby, E. T. Sawyer, H. G. Doran and C. A. McCune. Spaces 135, 136.

Creepcheck Company, Inc., The, New York, N. Y.—Dinglage Creepcheck anticreepers. Represented by M. S. Schmalholz. Space 190.

Crerar, Adams & Co., Chicago, Ill.—Ideal mixers, Novo pumping outfit, Calumet track drills, Eureka bonding drills, Hercules steel trucks and other devices. Represented by Russell Wallace, W. I. Clock, J. A. Martin, G. D. Bassett, T. W. Barrett and S. M. Roberts. Space 28.

Curtain Supply Company, The, Chicago, Ill.—Car curtains, ring curtain fixtures, Rex all-metal curtain rollers, vestibule curtains, Rex vestibule curtain shields, release handles, steel rollers, hooks, etc., CSCO and Rex vestibule diaphragms, Rex sash balances, etc. Represented by W. H. Forsyth, W. H. Bentley and F. M. Egolf. Space 127.

D. & A. Post Mold Company, Three Rivers, Mich.—Machines for making cement fence posts, samples of posts, reinforcements. Represented by G. H. Dougherty, O. Dougherty and C. J. Spaulding. Space 180.

Daniels Safety Device Company, Chicago, Ill.—Bulldog nut. Represented by T. M. Daniels, A. S. Armstrong, J. C. Holschemacher, W. D. Collins and L. F. Crossette. Space 204, Annex.

Detroit Graphite Company, Detroit, Mich.—Graphite paint for structural steel. Represented by Tom R. Wyles, L. D. Mitchell, B. O'F. Randolph, A. H. Kuerst, G. H. Varney, Eston Randolph and J. J. Hogan. Space 106.

Dickinson, Paul, Inc., Chicago, Ill.—Smoke jacks, ventilators, chimneys and cast iron buildings. Represented by A. J. Filkins and J. A. Meaden. Space 101.

Dilworth, Porter & Co., Limited, Pittsburgh, Pa.—Railroad spikes, railroad tie plates. Represented by W. F. Schleiter, C. Stein and Joseph Dilworth. Space 27.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Graphite products for railroads, Dixon's silica graphite paint, airbrake and triple valve graphite, boiler graphite, graphite grease. Represented by H. W. Chase, F. B. Gibbs, Jr., and J. E. Simpson. Space 117.

Drouve, G., Company, The, Bridgeport, Conn.—"Anti-Pluvius" puttyless skylight, "Straight-Push" sash Lovell, improved Lovell sash operator. Represented by William V. Dee and R. S. Adam. Space 152.

Duff Manufacturing Company, The, Pittsburgh, Pa.—Genuine Barrett track and automatic lowering jacks, Duff ball bearing high speed screw jacks and Duff ball bearing journal box jacks. Represented by Messrs. T. A. McGinley, E. A. Johnson, C. N. Thulin, G. A. Edgin and B. W. Parsons. Space 9.

Edison, Thomas A., Inc., Bloomfield, N. J.—Edison primary cells. Represented by E. E. Hudson, F. J. Lepreau, E. W. Brown, P. B. Hyde, E. McGall, P. A. Garrity, I. P. Rodman and O. P. Rose. Spaces 20 and 21.

Edison Storage Battery Company, Orange, N. J.—Batteries for interlocking. Portable batteries for automatic block signals, track circuits, car lighting, telephone and telegraph. Represented by H. G. Thompson, F. V. McGinness, W. F. Bauer and C. A. Luckey. Spaces 21 and 22.

Elastic Car Waste Company, Philadelphia, Pa.—Elastic car waste for packing steam and electric railway cars, and also electric motor bearings. Represented by Frank B. Birch, Arthur B. Birch and James Gibson. Space 202, Annex.

Electric Railway Improvement Company, The, Cleveland, O.—Samples of electric weld and copper weld rail bonds. Apparatus for installing same. Represented by M. T. Stanton and Gerald Howatt. Space 191, Annex.

Electric Storage Battery Company, The, Philadelphia, Pa.—Gravity Charging signal outfit. Maps showing use of Gravity Charging outfit. Miniature Block Signal operated by Exide Battery. Samples, batteries and plate. Represented by G. H. Atkin, T. Milton, H. M. Beck, G. H. Morris, P. G. Downton and T. A. Cressey. Space 1.

Eymon Continuous Crossing Company, Marion, Ohio. Continuous crossings.—Spaces 49-50. Represented by W. E. Harkness.

Fairbanks, Morse & Co., Chicago, Ill.—20 h.p. type oil "Y" engine operating 5 in. centrifugal pump, in actual service, and driving electric generator, furnishing special lights for exhibit. Electric motor; motor cars, including new 30 h.p. inspection motor car; scales, steam pump, power pump, sectionalized centrifugal pump and No. 11 telescopic spout standpipe. Represented by W. W. Adams, G. J. Akers, J. P. Brown, F. M. Condit, E. P. Drinker, Rob't Elder, J. C. Flanigan, E. M. Fisher, F. F. French, C. T. Fugitt, E. C. Golladay, J. T. Gratiot, D. J. Higgins, G. Howard, J. George Jones, L. J. Jones, U. C. Kalar, F. E. Kaeppell, T. C. Kennedy, D. H. Lee, L. H. Matthews, E. E. Pendray, F. V. Roy, J. F. Snarenberger, A. A. Taylor, H. E. Vergosen, E. D. West, C. H. Wilson and F. N. Whitesell. Spaces 73-76 and 92-95.

Fairmont Gas Engine and Railway Motor Car Company, Fairmont, Minn.—Railway motor car mowing machine, electric generating set, section and inspector motor cars, handcar engines. Represented by F. E. Wade, H. E. Wade, R. B. Ballard, R. I. Sawyer, W. F. Kasper and M. J. Egleston. Space 193.

Federal Signal Company, Albany, N. Y.—Type "4" signal, top post and bottom post mechanism, A. C. & D. C. operation; Federal power interlocking machine; type "4" switch movement; A. C. and D. C. relays; electric locks; circuit controllers, etc. Represented by Messrs. Renshaw, Cade, Henze, Ware, Turreff, Hackett, Reichard, Kelly, Ober and Loughridge. Spaces 36-37 and 55-56.

Fibre Conduit Company, Orangeburg, N. Y. Fibre conduits.—Represented by Frank C. Smith.

Frictionless Rail, The, Boston, Mass.—Frictionless rail for curves. Represented by F. A. Barbey, S. W. Simonds, G. H. Bryant, W. E. Cade, Jr., and T. F. Dwyer, Jr. Spaces 133-134.

General Electric Company, Schnectady, N. Y.—Automatic door, substation and locomotive head lighting set and signal lighting arresters. Represented by B. F. Bilslander, C. C. Bailey, J. Roberts, S. W. McCune and R. H. Parker. Space 103.

General Railway Signal Company, Rochester, N. Y.—One 16-lever Model 2 unit-lever type electric interlocking machine, equipped with rotary circuit controllers, lever lights and mechanical time release; operating switchboard; two-arm Model 2A, 110 volt non-automatic top-of-mast signal; Model 2A, 110 volt semi-automatic signal; 110 volt Model 5 switch machine; relays and indicators. Model 2A low-voltage power signals; relays, and switch circuit controllers. One 8-lever electro-mechanical interlocking machine; Garber switch-and-lock movement; 10 volt Model 2A top-of-mast signal; 10 volt Model 2A base-of-mast signal; three-position motor relay; track and line relays; "Copper-cup" ground plate; and Model 1B lightning arrester. Model 2A base-of-mast signal, equipped with 110 volt, 60 cycle induction motor; light signal; line and secondary transformers; impedance bond; track and line relays; push-button switch indicator with switch circuit controller; stub pole, equipped with line transformer, plug cut-outs, lightning arresters, connections, etc. One six-contact selector, one answer-back selector, controlling signal, two bells, line relay, silencer equipment, key cabinet and miniature track circuit demonstrating the "OS" arrangement. Track and signal diagrams showing the absolute-permissive block system. Model 5 low-voltage switch machine for the operation of outlying switches. Map showing signaling on Brooklyn Rapid Transit System. Colored photographic enlargements showing various signal installations. Represented by M. R. Briney, P. E. Carter, W. W. Coleman, S. M. Day, L. E. Dodge, F. L. Dodgson, W. S. Henry, W. K. Howe, F. H. Jones, R. F. Kelley, H. W. Lucia, F. W. Moffett, G. D. Morgan, C. O. Poor, F. W. Rizer, W. W. Salmon, V. I. Smart, H. M. Sperry L. Thomas, A. Thomas, S. N. Wight, M. Wuerpel, W. R. Young and Sidney G. Johnson. Spaces 38, 39, 40, 57, 58 and 59.

Gordon Primary Battery Company, Waterbury, Conn.—Gordon primary cells. Gordon track battery. Represented by G. A. Nelson, E. A. Everett and O. S. Flath. Space 18.

Gosso Company, The, Chicago, Ill.—Gosso beds. Represented by A. E. Gosso, T. J. Burke, L. Grant and D. Garrick. Space 213, Annex.

Gurley, W. & L. E., Troy, N. Y.—Field instruments for civil, mining and hydraulic engineers and land surveyors; portable kits for railroad scale inspectors; railroad coach thermometers. Represented by Frank Shrauder and William S. Hopkins. Space 137.

Hall, H. B., Homer, Ill.—Concrete and steel ties. Represented by H. B. Hall. Space 210.

Hall Switch and Signal Company, New York, N. Y.—Automatic signal apparatus, electric interlocking apparatus, telephone and telegraph selectors, railway crossing alarms and signals. Represented by W. J. Gillingham, L. H. Thullen, W. A. Peddle, H. L. Hollister, O. B. Frink, Roy Connell, D. R. Day, C. S. Rhoads, and J. A. Ritter. Spaces 77, 78, 79 and 80.

Hatfield Rail Joint Manufacturing Company, The, Macon, Ga.—The Hatfield rail joint and Hatfield rail joint fastenings. Represented by Walter T. Johnson, DeWitt McCrary, U. R. Hatfield, T. B. Bowman and C. P. Williams. Space 166.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails, models C, CX, E, EX, HP and HXP with operating stands and target stands. Represented by E. L. Ruby, E.

W. Brown, Arthur Gemunder, F. C. Stowell and S. W. Hayes. Spaces 140 and 167.

Hazard Manufacturing Company, Wilkes-Barre, Pa.—Insulated wires and cables, railroad signal wire, lead covered cables, armored submarine cables. Represented by E. L. Willson, C. E. Swanson and C. B. Semple. Space 181.

Hoeschen Manufacturing Company, Omaha, Neb.—Railway signals. Represented by H. P. Ryner, H. A. Holdrege, R. Wood, W. D. Cleveland, R. A. Fry and E. Ebrig. Spaces 157 and 158.

Hubbard & Co., Pittsburgh, Pa.—Railroad track tools, track shovels and locomotive scoops. Represented by R. L. Mason, W. S. Perry, O. W. Youngquist and George H. McCammon. Spaces 115 and 116.

Indianapolis Switch & Frog Company, Indianapolis, Ind.—Portable electric track welder, portable track grinder, R-N-R type of solid manganese frog, R-N-R type of solid manganese crossing, Indianapolis type standard manganese crossing, manganese tipped switch points, sectional exhibit unit, drilled and bolted frogs and crossings, miniature standard railroad construction, the Eymon continuous crossing, electric welded rail joints and bonds, and electric welds of iron, steel, manganese and brass; Indianapolis high duty blue bolt of Indian-electro steel for bolting frogs and crossings. Represented by E. C. Price, W. H. Thomas, T. L. Hanley, H. H. Murray, W. L. Walker, W. E. Harkness, J. H. Eymon, J. C. Jameson, C. S. Sale and W. M. Whitenton. Spaces 49 and 50.

Ingersoll-Rand Company, New York, N. Y.—Imperial tie tamping equipment, including a self-propelled gasoline-driveu air compressor car supplying compressed air to operate two Imperial tie tampers shown in operation on a short section of track. Represented by W. H. Armstrong, C. W. Melcher and J. R. Randle. Spaces 199 and 216, Annex.

International Steel Tie Company, The, Cleveland, Ohio.—Steel crossing substructure with crossing section on it. Section of track using insulated twin steel ties. Plate steel tie with rail electrically welded to it. Represented by William P. Day, William C. Mahon and L. C. Shank. Spaces 207 and 208, Annex.

Jaeger Machine Company, Columbus, Ohio.—Concrete mixer. Represented by W. H. Peters. Space 209.

Johns-Manville Company, H. W., New York, N. Y.—Transite smoke jacks, prepared and built-up asbestos roofings, high and low pressure pipe coverings, asbestos packings, corrugated asbestos roofing and siding, Keystone hair felt insulation, asbestos wood, waterproofing materials, mastic floors, cork insulation, A-S refrigerating machines, lighting fixtures, frink reflectors, Transite asbestos shingles, Regal wool felt roofing, sectional conduit for underground steam lines, fibre conduit for electrical wiring, fuse devices (Noark). Represented by George Christenson, F. J. Horne, C. D. Folsom, H. L. Leach, H. B. Sewell, H. T. Morris, R. A. Hamaker, John E. Meek, L. E. Hassman, C. E. Murphy, D. L. Jennings, W. J. Hennessy, W. B. Mallette, J. C. Younglove, G. A. Nicol, H. G. Newman, E. T. Wade, E. H. Willard, H. A. Waldron, F. W. Doty and P. C. Jacobs. Spaces 174 and 177.

Jordan Co., O. F., The, Chicago, Ill.—Spreader car. Represented by C. S. O'Connell, A. J. Smero and R. H. Kraft. Space 223, Annex.

Joyce-Cridland, The, Company, Dayton, O.—Railroad jacks. represented by Geo. M. Llewellyn, Frank I. Joyce and Chas. D. Derby. Space 29.

Julian-Beggs Signal Company, Terre Haute, Ind.—Speed control device for use on cars and locomotives. Represented by Stephen Smith, M. H. Hovey and Thomas E. Clark. Space 227.

Kalamazoo Railway Supply Co., Kalamazoo, Mich.—Hand, push and velocipede cars, motor cars, inspection cars, track drills, track jacks, track gauges, track levels, cattle guards, steel wheels and grinders. Represented by W. N. Sidnam, W. D. Waugh, L. W. Bates, John McKinnon, F. E. McAllister, H. N. Whipple, M. Babcock, D. A. Stewart, H. R. Miller, Wm. Winterle and H. Bosma. Spaces 23, 24 and 25.

Kellogg Switchboard & Supply Company, Chicago, Ill.—Railway telephone equipment, selective signaling apparatus, power apparatus for signaling purposes. Represented by E. A. Woodward and A. J. Carter. Space 197, Annex.

Kelly-Derby Company, Chicago, Ill.—Pumps, gasoline and oil engines, deep well equipment, strainers and cylinders, wire cloth, steel warehouse trucks, crucibles, combination rail brace and tie plate, rail laying machine, full line of rubber goods. Represented by C. W. Kelly, W. B. Holcomb, H. D. Mathews, C. Penberthy, H. L. Bachman, S. D. Baldwin. Spaces 11 and 30.

Kerite Insulated Wire & Cable Company, The, Inc., New York, N. Y.—Insulated wires and cables and insulating tapes. Represented by R. D. Brixey, Azel Ames, P. W. Miller, J. W. Young, B. L. Winchell, Jr., and G. A. Graber. Spaces 44 and 63.

Keuffel & Esser Company, Hoboken, N. J.—Surveying instruments and drawing material. Also a new device—the Optical Plummet. Represernted by F. M. Pralll, A. W. Keuffel, H. B. Huster, Joseph Lamb and Edward Veasey. Space 48.

Keystone Grinder and Manufacturing Company, Chicago, Ill.—The Keystone tool grinder with attachments. Represented by H. C. Holloway, John S. Wincrantz, S. S. Newman, J. C. Barr, J. C. Kirby, D. L. Braine, W. Harding Davis and George Denney. Space 194.

Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio.—Photographs and models of automatic air dump cars for railroad construction and ditching work. Represented by David Greene. Space 211.

Lackawanna Steel Company, Lackawanna, N. Y.—Tie plates, joint plates, improved splice bars, steel sheet piling, deseamed rails, rails, spikes, bolts and structural material. Represented by C. R. Robinson, A. P. Van Schaick, F. E. Abbott, C. H. Hobbs, J. L. Hench, H. H. Barbour, J. Chandler and A. H. Weston. Spaces 32, 33 and 34.

Lehon Company, The, Chicago, Ill.—Mule-hide roofing, Mule-hide saturated burlap, Mule-hide passenger coach canvas, Per-Bona insulating paper, Mule-hide car roofing, Mule-hide sill covering and Damptite waterproofing compound. Represented by Tom Lehon and D. B. Wright. Space 168.

Lidgerwood Manufacturing Company, New York, N. Y.—Photograprs of hoisting and conveying machinery, including unloaders, cable ways, excavators, logging machinery and steam and electric mining and contractors' hoists. Represented by F. B. Knight, O. D. Weaver, W. R. Elden, W. G. Wilmot, G. N. Crawford, Jr., and William Kinsley. Space 47.

Louisiana Red Cypress Company, New Orleans, La.—Louisiana red cypress, trunking and capping, crossarms, car siding and roofing, railroad ties, fence posts, etc. Represented by C. A. Nesom, H. P. Altman and F. N. Snell. Spaces 203 and 212, Annex.

Lufkin Rule Company, The, Saginaw, Mich.—Measuring tapes and rules. Represented by Theo. Huss, S. B. McGee and F. G. Brown. Space 121.

M. W. Supply Company, Philadelphia, Pa.—Vaughan rail anchor. Represented by D. L. Vaughan, L. T. Burwell and L. Parker Lloyd. Space 138.

MacRae's Blue Book Company, Chicago, Ill.—MacRae's Blue Book, the Railway Supply Index Catalog. Represented by Thos. H. MacRae, Lloyd Simonson, L. R. Rollins and E. B. Cooke. Space 184.

Madden Company, The, Chicago, Ill.—Three man track layer, rapid nut tightener, switch point straightener, the Blair tie spacer. Represented by H. C. Holloway, T. D. Crowley, V. L. Walker, J. C. Barr and F. C. Webb. Space 195.

Massey Company, F. C., Chicago, Ill.—Reinforced concrete pipe, unit and monolithic portable houses, battery wells, piling and concrete bridges for track elevation. Represented by C. F. Massey, A. Christ, Jr., Chas. Gilman, E. M. Hatheway, D. A. Hulgren, H. W. Wilder and George B. Massey. Spaces 35 and 54.

Metal Post and Culvert Company, Niles, Ohio.—T. & T. metal fence posts and nestable culverts, Lohmanized products. Represented by E. D. Thompson. Space 169.

Morden Frog & Crossing Works, Chicago, Ill.—Manganese rigid frogs, solid and rail bound, Unity switch stand, Morden Safety switch lock, guard rail clamps, etc. Represented by I. T. Hartz, A. C. Smith, W. H. Hartz and W. J. Morden. Spaces 108 and 109.

Mudge & Co., Chicago, Ill.—Mudge inspection and section motor cars. Represented by Burton W. Mudge, R. D. Sinclair, George W. Bender, Sherman C. Amsden and Blake C. Howard. Spaces 142 to 145.

National Carbon Company, Cleveland, Ohio.—Primary and secondary batteries, arclight carbons, carbon brushes, carbon specialties, flash lights, volt and ammeters. Represented by Charles Pflasterer, L. W. Fischer and W. H. Arkenburgh. Space 151.

National Concrete Machinery Company, Madison, Wis.—Machines for making concrete fence posts, samples of concrete posts. Represented by W. L. Casady and Victor Rogers. Space 206.

National Electric Specialty Company, Toledo, O.—Various types of "Vac-M" vacuum lightning arresters, test sets, etc. Represented by H. E. Gifford, Jr., P. H. Chapman, C. F. Wall, J. T. Greene and L. L. D. Chapman. Space 113.

National Indicator Company, Long Island City, N. Y.—Train departure indicators. Represented by J. Hutchinson, M. E. Penso and T. W. Wilder. Spaces 149 and 150.

National Lead Company, Chicago, Ill.—"Dutch Boy" red lead in oil. Represented by Charles Barr Field and F. M. Hartley. Space 220, Annex.

National Lock Washer Company, The, Newark, N. J.—Hi-power nut locks and demonstration of their development. Represented by John B. Seymour, R. L. Cairncross, Jesse Hough, John T. Patterson and A. T. Thompson. Space 15.

National Malleable Castings Company, The, Cleveland, O. Malleable iron journal boxes for use on freight and passenger cars, malleable iron anti-rail creepers, rail braces, tie plates, washers and steel wrecking hooks. Represented by T. W. Aishton, J. J. Byers, J. A. Slater, J. H. Slawson and L. S. Wright. Space 105.

National Standard Company, Niles, Mich.—Bonding drills, grinders, flat drills, cattle guards, railway jacks. Represented by W. H. Parkin, E. Cook, W. S. Runnels, C. R. Wescott, F. A. Buckley, R. L. Brown, H. M. Buck, W. F. Harrah and J. B. Given. Space 128.

New York Blue Print Paper Company, New York, N. Y.—Mechanically reproduced tracings. Litho zinc process. Represented by John H. Mathias. Space, Suite 1148, Congress Hotel.

Nichols, George P. & Bro., Chicago, Ill.—Transfer table (working model), portion of turntable tractor. Represented by George P. Nichols, S. F. Nichols and Henry Fries. Space 173.

Northwestern Motor Company, Eau Claire, Wis.—"Casey Jones" motor cars and handcar engine. Represented by R. R. Rosholt and K. Rosholt. Space 196, Annex.

Ogle Construction Company, Chicago, Ill.—Model steel coaling station. Represented by R. A. Ogle, M. W. Powell and C. F. Bledsoe. Spaces 96 and 97.

Okonite Company, The, New York, N. Y.—Insulated wires and cables. Represented by Lewis G. Martin, F. J. White, W. M. Candee, W. T. Kyle and J. D. Underhill. Spaces 16 and 17.

Otley Paint Manufacturing Company, Chicago, Ill.—Bridge paints, steel car paints, iron cements, graphites, refrigerator car paints. Represented by Benj. F. Otley, Jas. J. Otley, Walter A. Otley and William Kessler. Space 10.

Spencer Otis Company, Chicago, Ill.—Economy tie plates, Absolute lock nuts, Tiger steel bunks. Represented by Carter Blatchford, T. W. Blatchford, W. L. DeRemer, J. T. DeRemer and H. H. Hart. Spaces 122 and 141.

P. & M. Company, The, Chicago, Ill.—P. & M. rail anti-creeper, bond wire protector and Crane guard rail retainer. Represented by F. A. Poor, P. W. Moore, F. A. Preston, F. N. Baylies, George E. Johnson, A. R. Sutter, D. T. Hallberg, R. W. J. Harris and W. W. Glosser. Spaces 123 and 124.

Patterson, W. W., Company, Pittsburgh, Pa.—High-grade hand-made double extra heavy tackle blocks. Represented by W. W. Patterson. Space 147.

Pittsburgh-Des Moines Steel Company, Pittsburgh, Pa.—Elevated Steel Tanks. Space 148.

Pocket List of Railroad Officials, The, New York, N. Y.—The Pocket List of Railroad Officials. Represented by J. Alexander Brown, Charles L. Dinsmore and Harold A. Brown. Space 26.

Positive Rail Anchor Company, Louisville, Ky.—Positive one-piece rail anchor, Betts anti-creeper tie plate, Economy separable switch point, Economy foot guard, Betts guard rail holder. Represented by W. M. Mitchell, J. C. Haswell, W. E. Marvel, W. A. Wallace, J. A. Shoulty and L. C. Ferguson. Spaces 178-9.

Prest-O-Lite Company, Inc., The, Indianapolis, Ind.—Working exhibit of portable welding outfit employing Prest-O-Lite dissolved acetylene in safety storage cylinders, actual welding and cutting operations, etc. Represented by H. S. Smith, W. H. Adkinson, C. M. Wills, Stanley Winger, W. L. Harris, and S. R. Sutton. Spaces 3 and 4.

Pyrene Manufacturing Company, New York, N. Y.—Pyrene fire extinguishers, Pyrene liquid, Pyrene vehicle brackets. Represented by E. L. Kent and J. D. Cole. Space 186.

Q. & C. Company, The, New York, N. Y.—Bonzano rail joint, rolled steel step joint, Vaughan rail anchors, guard rail clamps, rail benders, derails, tie plates, adjustable braces, rail saw. Represented by C. F. Quincy. Spaces 120 and 139.

Rail Joint Company, The, New York, N. Y.—Continuous, Weber, Wolhaupter and 100 per cent rail joints. Represented by L. F. Braine, Percy Holbrook, McLeod Thomson, V. C. Armstrong, J. A. Greer, E. A. Condit, Jr., G. C. Isbester, A. C. Chapman and W. A. Chapman. Spaces 81 and 82.

Railroad Supply Company, The, Chicago, Ill.—Tie plates and derails, highway crossing protective devices; also signal accessories for steam and electric railways. Represented by H. S. Hawley, E. H. Bell, J. M. Fitzgerald, H. M. Buck, Geo. M. Kenyon, F. C. Webb, R. D. Hawley, Geo. T. Cook, A. H. Smith, H. G. Van Nostrand, Geo. Nibble, P. F. Hanley, R. S. Prentice and J. M. Spangler. Spaces 85 and 104.

Railway Age Gazette, New York and Chicago.—See Simmons-Boardman Publishing Company.

Railway Review, The, Chicago, Ill.—Represented by Willard A. Smith, W. M. Camp, Chas. J. Bates, A. E. Hooven and J. E. Gougeon. Space 64.

Ramapo Iron Works, Hillburn, N. Y.—Automatic safety switch stands, manganese reinforced switches and frogs, guard rail clamps, rolled shoulder switch slide plates, etc. Represented by Thomas E. Akers, Arthur Gemunder, W. C. Kidd and James B. Strong. Space 90.

Reading Specialties Company, Reading, Pa.—Samson type rail benders, Reading reversible rail bender, rail straighteners, swing joint guard rail clamp, compromise joint, car replacers. Represented by B. J. Buell and R. G. Ross. Spaces 163 and 164.

Richards-Wilcox Manufacturing Company, Aurora, Ill.—Door hangers and track for freight and ware house doors and any door that slides, grindstones, hardware specialties. Represented by W. D. Jamison, Jesse V. Wise, J. H. Wise, Ray Wise and E. J. G. Phillips. Space 189.

Risley and Associates, Dalton, Chicago, Ill.—Ballou safety rail bolt nut and Ballou insulated joint. Represented by C. E. Ballou, C. C. Zimmerman and Dalton Risley. Space 218.

Roadmasters & Maintenance of Way Association, Sterling, Ill.—Space 222.

Roberts & Schaefer Company, Chicago, Ill.—Locomotive coaling plants, sand drying plants. Represented by Clyde P. Ross and Edward E. Barrett. Space 114.

Robertson, William, & Co., Chicago, Ill.—Robertson cinder conveyor, Robertson sand dryer, Robertson sand hoist and sand tower. Represented by William Robertson, W. S. Young and J. W. Bryce. Space 224.

Sanitary Bunk Company, Indianapolis, Ind.—Single, double and triple deck steel bunks. Represented by L. H. Mummert and O. L. Mummert. Space 205.

Sellers Manufacturing Company, Chicago, Ill.—Sellers anchor bottom tie plates. Represented by J. M. Sellers, G. M. Hogan, R. A. Van Houten and T. F. Geraghty. Space 125.

Shepherd Automatic Switch Company, Montgomery, Ala.—Automatic switch closing device. Represented by W. L. Shepherd. Space 226.

Signal Accessories Company, New York, N. Y.—Signal materials. Represented by F. C. Lavarack. Space 118.

Simmen Automatic Railway Signal Company, Buffalo, N. Y.—Automatic speed control, continuous cab signals, automatic recording of train movements and central control of signals. Represented by P. J. Simmen, C. E. Chatfield, L. Ringer and G. P. Simmen. Spaces 159 and 160.

Simmons-Boardman Publishing Company, New York and Chicago.—The Railway Age Gazette; Maintenance of Way Daily; The Signal Engineer, and Railway Age Gazette, Mechanical Edition. Represented by Edward A. Simmons, Samuel O. Dunn, Lucius B. Sherman, Henry Lee, John N. Reynolds, Frank S. Dinsmore, C. R. Mills, H. H. Marsh, E. T. Howson, R. E. Thayer, H. H. Simmons, Harold F. Lane, F. H. Thompson, Walter M. Ford, Kenneth L. Van Auken, E. G. Zack, Fred Koch, John H. Cross and T. E. Crossman. Space 45.

Snow, T. W., Construction Company, Chicago, Ill.—Oil crane, water crane, tank valves, coaling stations, water stations, oil engines. Represented by T. W. Snow, R. E. Robinson and W. B. Lane. Space 46.

Standard Asphalt & Rubber Company, Chicago, Ill.—"Sarco" No. 6 waterproofing, mineral rubber floors, refrigerator compound, dampproofing, mineral rubber pipe coating, electric insulation, R. S. A. specification roofing material. Represented by C. V. Eades, R. F. Trumbull, G. S. Woodford, W. A. Levering and H. C. Riehle. Spaces 161 and 162.

Standard Underground Cable Company, Pittsburgh, Pa.—Electric wires and cables of all kinds for light, power, telegraph, telephone and railway signal service; also cable terminals for outdoor and indoor service. Represented by R. B. Wilcox, R. C. Houck, W. M. Rogers, E. J. Pietzcker, E. F. Norton and H. K. Weld. Space 19.

Staple Post Mold Company, Westerville, O.—Fence post molds and machinery for making the Staple cement post. Represented by H. L. Pettit and R. B. Bennett. Space 171.

Strohm, W. J., Moline, Kas.—Torpedo holder. Represented by W. J. Strohm.

Templeton, Kenly & Co., Ltd., Chicago, Ill.—Simplex track and ballast jacks, Simplex emergency jacks, Simplex industrial jacks, Simplex car jacks, Simplex motor jacks. Represented by Alfred E. Barron, E. J. Curran, Harry M. Hood, Arthur C. Lewis, Thomas L. Stitt and Walter B. Templeton. Space 31.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.—Ferro carbon-Titanium, Titanium-treated steels, Titanium aluminum bronze. Represented by H. H. Cook and A. C. Hawley. Space 188.

Unión Switch & Signal Company, The, Swissvale, Pa.—Position light signal, A. C. electric interlocking, low voltage

switch movement, enclosed electro-pneumatic switch movement, direct current crossing bell, Style "B" and Style "S" signals, D. C. and A. C. "T-2" signals, Model 14 light signal, "P-4" electro-mechanical interlocking machine, three-way interlocked electrically locked indicator and circuit controller, D. C. and A. C. relays, indicators and locks, transformers, impedance coils, clockwork time release, spiral switch guard, Keystone insulated rail joints and lightning arresters. Represented by W. D. Uptegraff, T. W. Siemon, W. H. Cadwallader, J. S. Hobson, J. P. Coleman, C. E. Denney, Aaron Dean, W. W. Talbert, S. L. Shober, F. J. Ackerman, J. F. Talbert, J. L. Loucks, F. H. Nicholson, J. W. White, L. F. Howard, C. O. Harrington, M. D. Hanlon, Geo. Marloff, A. C. Livermore, V. K. Spicer, H. W. Griffin, T. H. Patenall, J. B. Struble, H. R. Sheene, H. A. Wallace, J. J. Cozzens, J. E. Saunders and S. E. Gillespie. Spaces 41, 42, 43, 60, 61 and 62.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Water columns, railroad penstocks or standpipes, wood tank and steel substructures, waterspouts, valves and appliances, switch stands and windmills and pumps. Represented by L. E. Wolcott, C. E. Ward and G. E. Vermilyer. Spaces 111 and 112.

Verona Tool Works, Pittsburgh, Pa.—Track gauges, levels, jacks, nut locks and track tools. Represented by H. S. Paul, H. Fischer, W. H. Remmel, E. Woodings and H. C. Mull. Space 129.

Wayne Oil Tank & Pump Company, Fort Wayne, Ind.—Oil storage tanks and pumps, self-measuring and non-measuring. Space 225, Annex.

Western Electric Company, New York, N. Y.—Train dispatching selective equipment; lamps; telephone equirment used in train dispatching; line anchors; wire and cables. Represented by J. C. Binning, Geo. H. Porter, G. K. Heyer and J. B. Harlow. Space 98.

Wharton, Wm., Jr., & Co., Inc., Philadelphia, Pa.—Switches, frogs, switchstands, switch rods, insulated switch rods, guard rail clamps, etc. Represented by R. C. McCloy, H. F. McDermott, A. S. Partridge, Thomas O'Brien, G. R. Lyman, J. S. Morrison and J. R. Bolgiano. Spaces 68 and 69.

Wyoming Shovel Works, Wyoming, Pa—Mayari steel shovels and scoops for track and locomotive work. Represented by G. E. Geer. Space 221.

THE KNICKERBOCKER BATCH MIXER

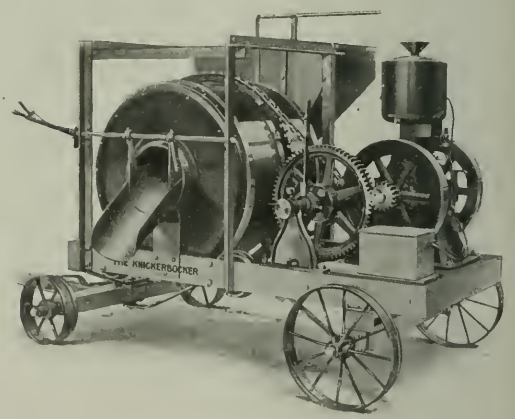
The Knickerbocker Company, Jackson, Mich., has developed a new batch mixer which is made only in capacities of 6 and 10 cu. ft. and is adapted to work where the yardage is not great, making it more economical to operate a small mixer at its greatest capacity than a large mixer intermittently. Although small, these machines have been designed with particular care to make their construction rugged. They are provided with a heavy, rigid frame, bronze-bushed trunnion rollers, heavy gage mixing drum and strong gearing and shafts.

The machine is of the non-tilting type, the cylindrical drum being built up of tank steel plates of No. 6 gage for the head and No. 8 gage for the body, around which are placed two tracker bands of ¾-in. steel 2 in. wide, but welded, and a sprocket in four interchangeable segments which is engaged by a heavy malleable link chain transmitting the power from the countershaft. The machine can be equipped with a standard or stationary batch hopper or with a power loader charging through a central opening in one head of the drum.

The concrete is mixed by a combination of buckets and blades on the interior of the drum, the 6-ft. size containing 4 buckets and 4 blades. The buckets are long and deep, giving them the necessary capacity and insuring that the material will be carried up to the maximum height before emptying. This also increases the rate of discharge, as the large buckets do not interfere with the free flow of the concrete and fill properly even when the drum is partially emptied. One long blade extends at a slight angle from the head to the edge of the bucket, with one edge close to the shell in order to carry over the liquid portion, the other three blades being inclined at the same angle but with their edges clearing the shell to leave a space for thin material and water to pass under. The ends of these blades adjacent to the buckets are shortened 4 in. to permit some of the material to flow into the blade area and keep the aggregate as equally distributed as possible between the buckets and the blades. The discharge spout has a sufficient pitch to insure a rapid, continuous discharge, the bottom of the spout being 24 in. above the ground in the No. 6 and 25 in. in the No. 10 machine.

The frame is built of 6-in. 6½-lb. channels in the No. 10 and 4-in. 4½-lb. channels in the No. 6 machine. The axles are also of channels 4 in. deep and 3 in. deep, respectively, with castings riveted in the channels for a distance of 8 in. at each end to provide a rigid bearing for the truck wheels. On the loading side of the frame over the front axle is attached an upright adjustable cold rolled shaft threaded on one end and controlled by a hand wheel. This shaft works in a block attached to the bed sill of the frame, so that when it is in position against the axle it prevents the mixer from tipping when the loader is being operated. The mixer drum is supported on 10-in. rollers with a 2½-in. face mounted on shafts 1 11-16 in. in diameter on the No. 10 size and 1 7-16 in. on the No. 6. The rollers are chilled and fitted with bronze bushings and compression grease cups.

The machines are equipped either with Novo or Ideal gasoline engines of 3-hp. capacity on the No. 6 and 6-hp



Discharge Side of Ten Cubic Foot Mixer with Stationary Batch Hopper, Engine Housing Removed.

on the No. 10 mixers or General Electric motors of 3 and 5 hp. capacity, respectively, if electric power is specified. The engines are enclosed in a steel housing to protect them from dust and weather. A heavy pinion and gear transmits the power from the engine to the countershaft and a link chain from this shaft to the drum, as mentioned above. The countershaft is equipped with an expansion ring friction clutch, by which the operation of the mixing drum is controlled. When the power loader is used, it is operated by a small clutch constructed as a part of the hoisting sheave. Both clutches are arranged to be handled conveniently by one man. The equipment for the machine includes a water tank with a pipe leading to the drum, equipped with a three-way valve and check valve under the tank. The mixing drum is operated at a speed of 18 r. p. m. on the No. 6 and 16 r. p. m. on the No. 10 machine, resulting in a rated capacity of 5 cu. yd. per hour for the smaller and 9 cu. yd. per hour for the larger machine with standard hopper and double those capacities with the power loader. The maximum weights of these machines with gasoline engines and power loaders are 2,300 lb. for the No. 6 and 3,900 lb. for the No. 10.

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CONTENTS

An Excellent Report

The convention spent all of yesterday afternoon considering the report of the committee on Economics of Railway Location. No committee of the American Railway Engineering Association has any problems for consideration of greater importance to the railways than that on Economics of Railway Location, and probably no committee has worked harder. However, this committee has had a somewhat checkered career during the past few years and ran true to its previons form this year in submitting majority and minority reports. In the discussion, however, the differences of opinion largely disappeared. The active part of many members took in the discussion yesterday afternoon showed not only their interest in this subject, but their appreciation of the importance of the committee's recommendations. While the chairman and his associates received a considerable grilling from the members on the floor they stood their ground and in most cases were supported by the convention.

The Electrification Discussion

The papers and discussion on the "Operating Results of the Electrification of Steam Railroads" at the meeting of the Western Society of Engineers last night form a valuable addition to the literature on this subject, based as they are very largely on the results secured and expected from the important projects inaugurated so far. Up to this time the advocates of steam railway electrification have advanced claims without being able to offer definite figures in support of their statements. As a result some of these statements have been exaggerated while others have been equally conservative. The interest shown in last evening's meeting by the railway men in attendance at the convention indicates that this subject will receive closer attention in the future than it has in the past because of the existence of statistics such as those presented last night.

Condensing Committee Reports

Although the report of the treasurer showed a surplus of over $3,000 for the past year, the financial problem before the American Railway Engineering Association is a pressing one, especially since the American Railway Association has withdrawn its support to the Rail Committee. There are a number of vitally important investigations which can well be undertaken by this association to the benefit of all the railways. However, it has been impossible to finance any of these special investigations except by contributions from outside sources. It is in this way that the work of the Rail Committee, the investigations of impact and the study of stresses in track have been financed. Practically all of the funds of the association are devoted to their publications, including the bulletins, the annual proceedings and the Manual. President Storey called attention to one means of reducing expense in his annual address yesterday morning by the condensation of the committee reports. This is highly desirable, entirely aside from the consideration of the cost of their publication. The reports have grown more voluminous each year, those presented at this convention exceeding in volume those of any previous year. To a considerable extent this is due to the endeavor of many of the committees to include all information incident to the subject under consideration which may be of possible interest to the members. The result is that the reports are so voluminous and contain such a number of replies from various railway men, many of which are either contradictory or a duplication, that the average man does not give the reports the attention they deserve. If the committees would give this large amount of information the attention it deserves and condense it in the reports they would be of greater value to the membership at large. The collection and compilation of the data on any particular subject should be only a portion of the committee work. Equally important is its condensation into the minimum space consistent with the inclusion of all pertinent facts. With 22 separate and independent committees it is very difficult to secure the same degree of condensation. For this reason the suggestion has been made that a special editing committee be appointed to consider all reports and to co-operate with the various committees in the preparation of their reports for publication.

SIGNALING AND THE A. R. E. A. MANUAL

An important question of policy was raised yesterday morning in the discussion of the recommendation of the Committee on Signals and Interlocking that a long list of standards and specifications of the Railway Signal Association be printed in the Manual as information. Active opposition to this move developed on the ground that such an action is not consistent with the rules for the publication of the Manual which provide only for "definitions, specifications and principles of practice that have been made the subject of special study by a committee and which, after due consideration and discussion, have been voted on and formally adopted by the association." The committee, which is composed largely of men who have also been active in the work of the R. S. A., felt that in view of the large volume of matter adopted by that association it would not be practicable to present for consideration by the A. R. E. A. in its convention all of the standards and specifications which may be of value to its members and that the cost of reprinting this matter would be excessive and unwarranted. A number of members favored the acceptance of the committee's recommendation as the only practicable way for the A. R. E. A. to cover the highly technical features of signaling and urged the necessity for co-operating in some such mannner with the organizations representing the various specialized branches of railway engineering and maintenance. It was made clear that no question was being raised as to the value of the work done by the R. S. A. or the interest that this matter would have for members of the A. R. E. A. and most of the argument centered on the question of publishing the list in the Manual or only in the proceedings.

The ease with which material can be located in the Manual and the difficulty connected with a search in the numerous volumes of the proceedings was apparently largely responsible for the final vote to accept the committee's recommendation. While this action may have been justified in this instance, any tendency to adopt specifications in wholesale lots or otherwise to lower the high standards held up for the Manual is to be very carefully guarded against. The specifications and principles of practice contained in the Manual should be such as can be put in practice by the members. The general index of the contents of the annual proceedings which is to be prepared will to some extent remove the objections to putting valuable information needed for frequent reference only in the proceedings. To serve its fullest purpose, this index should be very complete, detailed and cross referenced and in addition should be revised frequently to keep it up to date.

THE SCIENCE OF ORGANIZATION

Following the gradual replacement of the relatively efficient English-speaking track laborer of 20 years ago with the greatly inferior laborer from southern Europe and Mexico, the impression has gradually arisen that the railways can expect to secure only the poorest laborer for this work, and that satisfactory results cannot therefore be expected. Undoubtedly this feeling has contributed largely to the inefficiency of track labor. Because of the large numbers of men employed in track work, relatively little attention is paid to the character of those selected, this being left largely to the labor agents, to whom one man is as good as another.

The cost of maintenance of way is rising rapidly from year to year. A considerable part of this increase is undoubtedly due to the decreasing efficiency of the labor employed. Any means, therefore, which will tend to increase its efficiency is highly important to the railways. For this reason the report of the committee on Rules and Organization on the subject of "Maintenance of Way Organization" is of special interest. Only a start could, of course, be made on a subject as broad as this in one year, and the present report is therefore an abstract discussion of the general principles underlying scientific organization, without special reference to the maintenance of way department. These principles must form the basis of any such a study, and the problem is to properly adapt and apply them to the particular field.

The saying that,

> If you think you're beaten, you are.
> If you think you dare not, you don't.
> If you would like to win, but think you can't,
> It's almost a cinch you won't,

is of special application here. Contractors and other employers have been able to convert far more of our foreign laborers into efficient workmen than have the railways. It would seem possible for the railways to do as well as the contractors in this regard, if they would first convince themselves that they can. There is no more important problem confronting the maintenance of way officer, whether he be the chief engineer, supervisor or foreman than that of securing the proper organization to obtain the best results, and all the steps leading to this end are worth the most careful study.

TO-DAY'S PROGRAM

The convention will be called to order at 9:30 this morning. The following reports will be presented:

III.	Ties	Bulletin 173
XV.	Iron and Steel Structures	Bulletin 173
XIII.	Water Service	Bulletin 173
V.	Track	Bulletin 173
VI.	Buildings	Bulletin 173
XVII.	Wood Preservation	Bulletin 174
XIX.	Conservation of Natural Resources	Bulletin 174
Special.	Stresses in Railroad Track	Bulletin 173

Annual Dinner at 7:00 p. m.

In addition the Rail report will be presented at 2 o'clock this afternon as a number of the members of the committee will be unable to remain for the sessions Thursday. In addition, the reports of the committees on Roadway and Records and Accounts were held over yesterday afternoon.

BLOCK SIGNAL COMMITTEE OF ELECTRIC RAILWAYS

The joint committee on Block Signals of the American Electric Railway Engineering Association and the American Electric Railway Transportation and Traffic Associations was in session at the Congress hotel yesterday. The principal subjects under discussion were rules, definitions, aspects, standardization and highway crossing protection.

ANNUAL MEETING NATIONAL RAILWAY APPLIANCES ASSOCIATION

The annual meeting of the National Railway Appliances Association was held yesterday morning at the Coliseum. A motion was made and carried dispensing with the reading of the minutes of the last meeting, but during the discussion of the question it was brought to the attention of the administration that it was quite desirable especially for out-of-town members who did not have easy access to the secretary's office, to receive a printed report.

President Hench in his address called attention to the advantage of confining the exhibit this year to the Coliseum. All the space was rented, all collections have been made and there is a small waiting list of concerns desiring to exhibit. Last year there were 160 members, as compared with 140 this year.

Treasurer Kelly reported that this year the association would probably show a profit of a little over $700.

A rising vote of thanks was given the retiring adminis-

tration and F. R. Wyles, retiring director, for the very efficient work done in the face of unfavorable conditions. The following officers were elected for the ensuing term:

President, Philip W. Moore, P. & M. Co.; vice-president, H. M. Sperry, General Railway Signal Co.; treasurer, C. W. Kelly, Kelly-Derby Co.

Directors: Three years—P. C. Jacobs, H. W. Johns-Manville Co.; R. C. McCloy, Wm. Wharton, Jr., & Co., Inc.

THE PAST AND THE FUTURE KING SNIPE

A DAY WITH JERRY, THE KING-SNIPE OF TWENTY YEARS AGO.

Run the car out of the house, byes,
And set her on the thrack;
Put on the picks and linin' bars
And don't forget the jack.

We've six long miles to pump her, byes,
Before the stroke of seven,
For I want yez all to be at work
When the Boss goes East on 'Leven.

So heavy on the lever, byes,
Come on, me hearts of oak,
Whilst I set on the water keg
And watch ahead for smoke.

Let yez set the car off here, byes,
And unload all the tools.
We'll raise the jints and tamp the ties
Accordin' to the rules.

Now pull the bad ties out, byes,
And, Paddy, take the jack.
Raise the jint ahead a notch
And then the center back.

Tamp all thim ties up snug, byes,
And spike thim right to gauge.
Then dress the ballast to the line,
For neatness is the rage.

Let's put the car on now, byes,
'Tis just the stroke of six.
Load up the jacks and water keg,
The level board and picks.

Now heavy on the lever, byes,
And let her roll to town.
Pick up the slow flag as we pass
So the Mail need not slow down.

Roll the hand car in the house, byes,
And lock the door up tight.
Be here early in the mornin'
'Twas a good day's work—Good-night.

A DAY WITH TONY, THE KING-SNIPE OF THE FUTURE.

Come on, every bod', it's time-a to go!
My watch-a say seven o'clock.
Push-a da gas car on-a da track
And watch if we get-a da block.

What! No gas'line in-a da tank?
Angelo, tak-a da can
And get-a some at da dippo, quick.
From da big-a Agent man.

We gotta plenty time, you know,
To fix-a up da track
So sit-a down here on da car
Till Angelo com-a back.

Ah! here he com-a, now fill-a da tank
And lock-a da car-house, Joe.
Com-a here in front and turn-a da crank
Dat's fine—Away we go.

Here is da place, take off-a da tools
And set off da big gas car
No tak-a da picks—too hard on da back—
Just use-a da tamping bar.

Tree or four you fellas tak-a da car,
Bring some hot macarone from da town.
Be sure and stay in da pass-a track
When da fast Passenger go down.

Too hot-a out here, I go to da shade.
Pietro, you raise-a da track.
Set-a da spot board two inch or so—
At four o'clock I com-a back.

Now I feel-a good, let's dress-a da rock
And line-a da track up swell.
What! Brought-a no lin-a bars out today?
Well, tomorra just as well.

Hurry up, you fellas, it's half past five,
And verra hungry I feel.
We gotta be at da camp at six
To getta da good hot-a meal.

M. E. Carroll.

A BIG CONTRACT

The Cumberland Valley will close bids to-day at the office of T. B. Kennedy, engineer, Chambersburg, Pa., for the construction of a double-track concrete arch bridge 4,000 ft. long across the Susquehanna river at Harrisburg, Pa. The structure will consist of 45 spans, each approximately 75 ft. long, on foundations built by the railway last year. This will require the placing of 56,000 yd. of concrete. It is desired that the first half of this structure having one track be completed this year. Over 40 bids have been received.

CHANGES ON THE B. & O.

W. H. Averell, assistant general superintendent of the Baltimore & Ohio at New York, N. Y., has been appointed general superintendent, succeeding U. B. Williams, whose headquarters have been at Wheeling, W. Va. Mr. Williams has been appointed general agent.

SPOKANE TRACK ELEVATION WORK

The Northern Pacific started work last week on the elevation of about two miles of line in Spokane, Wash. The roadbed is from 85 to 225 ft. wide and will be raised 12 to 16 ft. on a fill between retaining walls. The concrete in the retaining walls and abutments for about 20 street bridges is being placed by the McMichael pneumatic mixing and placing process, the contractor for this work being the Pacific Concrete Placing Company. One machine mounted on a flat car is now being used and another soon will be mounted to push the work. The cars on which the pneumatic mixers are mounted carry bins for the concrete aggregate, which are filled from gondola cars by locomotive cranes with clam shell buckets. The work is being handled under the direction of W. L. Darling, chief engineer, the general contractor being The W. J. Hoy Company, St. Paul, Minn. The concrete mixing and placing apparatus is leased by The Concrete Mixing & Placing Company, Chicago.

Proceedings of Railway Engineering Association

Abstracts of Five Reports Including Rules and Organization, Signals and Economics of Railway Location

The Sixteenth Annual Convention of the American Railway Engineering Association opened at 9:35 a. m. on Tuesday, March 16, in the Florentine Room, Congress Hotel, Chicago. W. B. Storey, Jr., vice-president, Atchison, Topeka & Santa Fe, was in the chair. The minutes of the last annual meeting were approved.

PRESIDENT'S ADDRESS

Your Association during the past year has continued the work so well planned by the founders of the organization. The Committees have worked with interest and zeal; reports have increased in volume, and as an indication of

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W. B. STOREY, JR., President.

the interest being taken we find a tendency toward the publication of more and more data, all of it interesting.

The year that has passed has been one of stress in railway circles. The credit of the roads being impaired, money has been hard to borrow, and as a consequence the building of new lines has been curtailed and improvement of old ones has been impossible. This in turn has affected the general business of the country, and, with other causes not pertinent for discussion here, has made hard times, diminishing in turn the revenues of the roads and making economies necessary in every direction, and in many cases more than economies, viz., the postponement of work that must eventually be done in order to keep the roads up to the requisite standard.

The usefulness of your Association would be increased if we had more funds. We would, if we had it, spend money on many lines of investigation with profit to our profession, with credit to our organization and to the advantage of the railway interests of this country. The Association, however, has been compelled to restrict its work to the publication of reports by its Committees except in cases where we have had outside help. We should publish a General Index, and it is the purpose of the Board to undertake this at an early date. It is true that we have accumulated something of a surplus, but the publication of a new edition of the Manual, together with the Index, will make large inroads on this surplus within the next year or two.

About the only way in which the receipts of the organization can be increased is by increasing membership. While we have been growing steadily and consistently, it is suggested that a special effort should be made to bring into our Association all those in the railroad world eligible to membership. Many railway men feel that the work of the Association does not directly interest them and that they will not be gainers by holding membership. Possibly this class could be reached by pointing out to them that we need their help, and that they should join in order to assist in the improvement of the railroad profession. We have in the past year taken in 137 new members. The hard times have somewhat increased the total of deductions from these additions, so that the total gain is 89.

As stated above, the work of your Association has been confined to publications except where we have had outside help. We have had this in the matter of the impact tests, which were undertaken a number of years ago, and more recently in our rail investigations. The American Railway Association has been bearing the expense of this work. Unfortunately for this work that Association has now withdrawn its support, and your Association is confronted with the necessity of stopping the work so well begun, and it is felt that the full benefit of the work already accomplished will be lost unless some arrangement can be made to carry it forward. We, as engineers, recognize that any improvement, no matter how small, in the matter of steel rails will justify any expenditure that has been or may be made, but the difficulty confronting us is convincing our operating people of this. The Executive Committee of the American Railway Association is charged with the responsibility of the expenditure of money, and its action has been taken because we have not convinced it that the expenditure pays. Possibly if we made individual effort with our operating superiors we might bring about a unanimity of action on the subject that, communicated to the Executive Committee, would change its present attitude, and it is requested that the members of your Association will do what they can in this direction.

There is one further subject to which the efforts of the individual members of the Association might be called, viz., the Fiscal Year. The Track Committee has recommended that it be changed and made coincident with the calendar year. It is true that some roads at the present time use this method of division. The majority of the roads, however, and the Interstate Commerce Commission make the fiscal year from July 1 to June 30. A search for reasons for this division has disclosed that it is largely a matter of custom. To change it, however, will be difficult owing to the necessity for changing the by-laws of practically all the roads in the country, together with dates of annual meetings. While the Interstate Commerce Commission has specified this particular division, it is felt that it did so for the sake of uniformity and because the greater part of the mileage of the country used it. The objections from a track maintenance point of view are very strong. Under the present method we are unable to plan intelligently the work for an entire season, which at its best is but short, and under present conditions work must often be abandoned after being begun, or possibly cannot be started until after the beginning of the new Fiscal Year. To make the change will take time and continued effort, but it is felt that our membership might accomplish much toward this end.

An inspection of the reports submitted for this convention will show an unusual amount of statistical data, principally tabulations of replies received by the respective Committees in response to inquiries. It is believed that if your Committees would give certain attention to condensing this data and showing same graphically, a very marked saving might be effected by diminishing the amount

of our printing and the value of the information increased to those who have occasion to use it.

Probably your most important publication is the Manual, in that it embodies the principles which have been adopted as representing standard railway practice in this country. These vary, and must of necessity do so or there would be no progress. It is the intention, therefore, to republish the Manual as soon as possible after the convention, and

Photo by Matzene, Chicago.

ROBERT TRIMBLE, First Vice-President.

it will contain the approved recommendations for the past sixteen years, and it may be said, without contradiction, that this volume will exemplify the best present practice for railway engineering and maintenance of way work.

While your work, as stated above, is circumscribed by lack of funds necessary for special research, the financial condition of the Association, due to the lines which have been followed, is gratifying, there being in the Treasury at the close of the last calendar year over $17,000. The cost of republishing the Manual and the proposed General Index will reduce this, it is estimated, by about $7,000. It is to be hoped that the members of the Association will use every endeavor to increase the sale of publications.

It may be said that the European War is hardly one for consideration by a body of this kind, but the catastrophe is so great, and its influences will be so widespread, that it is of paramount interest even to an organization like ours. Railroad transportation has played a very important part in its prosecution. The mobilization of vast armies, greater than any before gathered together, and this in an incredibly short time, is solely due to the railroad facilities. It may be said that the transportation problem is one of the great features of the war, and the men who are handling this are as responsible for the success of their side as the generals in command.

Financial conditions have very seriously affected all railway and engineering construction during the past year, and as a consequence there is lacking the usual long list of notable achievements. One event stands out prominently, viz., the opening of the Panama Canal, which is so directly allied to our character of endeavor. This is now introducing economic features in the country's transportation problem which may have a farreaching effect, possibly changing a large element of the transportation of the country from rail to shipping, and incidentally raising questions of economical handling of freight at docks and wharves, and the attention of our members interested in this class of work is called to this fact. At the present time the overland roads are feeling seriously the inroads on the business formerly carried by them, and as the shipping interests are enlarged the subject may be of even greater importance.

The valuation of railways under the Interstate Commerce Commission has begun in earnest. Parties have been and are at work in all parts of the country, and on some of the roads the work has progressed so far that the quantities are nearly complete. The principles to be followed are being worked out gradually, but there is still much to be determined. Our entire membership should be vitally interested in this work, involving, as it does, not only the actual measurement of earth work, but the more intricate determination of the face of the country before any construction was begun; the establishing of unit prices that include elements not used when the work was originally built, such as transportation; the fixing of land values, and, finally, questions of depreciation not only in the roadway and structures, but in equipment. All of these matters demand our earnest consideration, and as was pointed out by your President last year, your Association should lead in the study and consideration of the questions involved.

One of the small results of the European war in this country has been the curtailment of our supply of creosote from Germany, and this in turn has necessitated changing

A. S. BALDWIN, Second Vice-President.

the methods of treatment of our ties. We could, of course, in time meet this by the manufacture of creosote in our own country, but manufacturers are hardly justified in undertaking this, as immediately on the cessation of the war we can look forward to the resumption of the low-priced German product. Some of us have substituted chloride of zinc, and others are putting in ties without treatment.

Reports of Secretary and Treasurer

Balance, cash on hand, December 31, 1913		$14,276.74
Consisting of:		
Cash in bank	$ 5,066.41	
Six railway bonds, par value $1,000 each, at cost	5,206.06	
Four Lincoln Park bonds, par value $1,000 each, at cost	4,004.27	
Total		$14,276.74
Receipts during the year 1914:		
From members	7,901.00	
From publications	15,594.19	
From interest on bank balance	115.94	
From interest on investments	400.00	
From. Am. Ry. Assn.—(Rail Committee Expenses)	6,650.13	
Miscellaneous	1,585.99	
Total receipts in 1914		$32,247.25
Expenditures during 1914	29,211.72	
Excess of receipts over expenditures	$ 3,035.53	3,035.53
Balance on hand, December 31, 1914		$17,312.27
Consisting of:		
Six railway bonds, par value $1,000 each, at cost	$ 5,206.06	
Four Lincoln Park bonds, par value $1,000 each, at cost	4,004.27	
Cash in Standard Trust and Savings Bank	8,101.94	
	$17,312.27	

G. H. BREMNER, Treasurer.

RULES AND ORGANIZATION

The committee on Rules and Organization worked during the past year under the following instructions:

(1) Review rules and instructions heretofore adopted by the Association and recommend such changes and additions thereto as may seem desirable. (Not reported on.)

(a) Formulate rules for the guidance of the maintenance of way department pertaining to safety.

(3) Continue the formulation of rules for the guidance of field parties: (Not reported on.)

(a) When making preliminary surveys.

(b) When making location surveys.

E. H. FRITCH, Secretary.

(c) When in charge of construction.

(4) Continue the study of science of organization.

SAFETY RULES.

The following safety rules are recommended for adoption and printing in the Manual:

(1) It is the duty of every employe working on or about the tracks to exercise great care to avoid injury to himself and others, and nothing in these rules is to be so construed as to relieve any employe from performing his full duty in that respect.

(2) Employes must examine and know for themselves that tools, materials, etc., which they must make use of in performing their duties are in proper condition. If not, they must put them so, or report them to the proper person and have them put in proper order before using.

(3) In handling rails, ties and other heavy materials, special care must be used to avoid injury.

(4) On the approach of a train, employes who are working on or about the tracks must move to places of safety, standing clear of all running tracks. They must not walk or stand on the tracks, except when necessary for the proper performance of their duties.

(5) Watchmen, patrolmen, trackwalkers and others on duty which makes it necessary for them to be on the track, where there are two or more tracks, should, when practicable, travel against the current of traffic, keeping a sharp lookout in both directors for approaching trains.

(6) Foremen or others in charge of employes must see that their men are alert and watchful to avoid danger, and when working on or about the tracks they will take the

CONVENTION OF THE AMERICAN RAILWAY ENGINEERING ASSOCIATION IN SESSION.

necessary precautions to see that all men working under their immediate supervision receive warning of approaching trains in time to reach places of safety.

(7) When working on tracks in places where approaching trains cannot readily be seen because of permanent obstructions to the view, curves, or temporary obstructions, such, for instance, as fog, storms, snow, or engines or cars, extra precautions must be taken to warn the men of approaching trains. Foreman, watchmen, and others in charge of gangs or squads of workmen should provide themselves with whistles or other means for warning the men when working in places where approaching trains cannot readily be seen.

(8) When large numbers of inexperienced men are working on the track, they should be divided into small squads, each squad placed in charge of an experienced man, and all necessary additional precautions taken to prevent accident.

(9) Employes working in or near the ends of tunnels must clear all tracks when trains approach from either direction, and if in the tunnel, must occupy the manholes.

(10) In tunnels and in other places where there is insufficient clearance and no manholes or other places of

G. D. BROOKE,
Chairman Committee on Rules and Organization.

safety provided, foremen must arrange with the proper officer for the use of the track and work under flag protection.

(11) Employes are required to carry lanterns or torches when passing through any tunnel where men cannot readily be seen. When an entire gang is working close together in a tunnel, an adequate number of lights should be used, but not less than two.

(12) Hand or push cars must not be used at night, nor in the daytime when approaching trains cannot readily be seen by reason of fog, storm or snow, except under proper protection.

(13) Trains will be run in either direction, on any track, whenever necessary or expedient, and employes will be governed accordingly.

(14) Employes will keep the right-of-way, and particularly the main, yard and sidetracks and the footpaths along them, free of obstacles, such as old material, broken drawbars, lumps of coal, and anything over which they or others may stumble.

(15) Any employe, who is careless about the safety of himself or others while on duty, or who disregards warnings, will be disciplined.

SCIENCE OF ORGANIZATION.

The committee's work on this subject has consisted in collecting some additional data in regard to the forms of organization of the maintenance of way department in use on the various railroads, and the internal workings of these various organizations. An attempt to assemble data bearing on the historical aspect of the development of the present maintenance of way organizations has not met with much success, but further efforts will be made along this line. It is desirable to draw attention to the fact that several of the great railroad systems are making successful experiments in selecting and training men for positions in the maintenance of way department, and there is undoubtedly a growing tendency in favor of the systematic developing of men to supervise maintenance of way forces.

NEXT YEAR'S WORK.

The following outline of work for next year is recommended:

(1) Review rules and instructions heretofore adopted by the Association and recommend such changes and additions thereto as may seem desirable.

(2) Continue the formulation of rules for the guidance of field parties.

(a) When making preliminary surveys.
(b) When making location surveys.
(c) When in charge of construction.

(3) Continue the study of the science of organization.

(4) Report on the clearance of switchstands, signal stands, platforms, platform shelters, mail cranes, water columns, coal chutes, water tanks, etc., under the assignment from the Committee on Maintenance of the American Railway Association.

G. D. Brooke (B. & O. S. W.), chairman; F. D. Anthony (D. & H.), vice-chairman; R. P. Black (K. & M.), L. L. Beal (A. B. & A.), Ralph Budd (G. N.), A. M. Burt (N. P.), J. B. Carothers (B. & O. S. W.), S. E. Coombs (N. Y. C.), Curtis Dougherty (Q. & C.), B. Herman (Southern), Jos. Mullen (C. C. C. & St. L), E. T. Reisler (L. V.), Committee.

APPENDIX A.

Report to Board of Direction on the Study of the Science of Organization.

The committee on Rules and Organization was instructed, in addition to other work, to "Begin the study of science of organization and report to the board of direction how this study can be made profitable to the Association."

Organization is the direction of the efforts of a number of individuals to a common purpose. In the commonly accepted use of the term, an organization is a collection of individuals, or groups of individuals, acting under a central control, by means of which their efforts are directed to a common purpose.

The science of organization is the systematized knowledge pertaining to, or the acknowledged laws, as demonstrated by observation or deduction, relating to the direction of the efforts of groups or individuals to common ends.

In its workings, the individual is the prototype of the organization. Every physical act of the human animal requires three distinct processes of effort in its performance: (1) The knowledge of an existing reason for or the self-impelled desire for the act. This is mental effort. (2) The instruction to the hand, eye, or other physical member to perform and how to perform. This is also a mental process. (3) The execution by the physical member. This is physical effort.

Consider next a small group of men as a unit for the performance of work, as a squad of soldiers or a section gang. A leader or foreman is necessary, who is the mind or brain of the unit; the other men are the physical agencies. (1) The leader possesses the knowledge of or conceives of what is to be done. (2) He communicates to the men what is to be done and how it is to be done. (3) The men perform the work.

Continuing the analogy, the logical development is the company of soldiers and the force under a supervisor; the regiment and the track forces of a division; the brigade and the forces of a district; the army corps and the maintenance of way department of a railroad system. Each successive unit is made up of a number of smaller units; each larger unit is under the control of a head who conceives or plans the work, and conveys his instructions as to what is to be done; the constituent units receive the directions and execute the work. The efficiency of any unit depends upon the ability of the leader in planning work or devising action to meet varying situations; his method of transmitting the instructions to the constituent units, since this determines with what degree of clearness his ideas and plans are understood; and the spirit and the degree of preparedness of the constituent units in receiving and executing the instructions.

There are certain fundamental principles of organization which may be classified, as: The proper selection of material; Compensation; Education; *Esprit de Corps;* and discipline.

The athlete in training is required to conform to rigid rules of diet and habits. In practice and during contests he must obey in letter and spirit the instructions of coach or manager. Failure to comply with rules and instructions will result in the offender being dropped from the team or

subjected to other penalty. In military service the infraction of regulations or disobedience of instructions are penalized by fines, confinement, hard labor or dismissal from the service according to the circumstances and the nature of the offense.

The maintenance of way organizations of the railroads of this country have been developed by the force of attendant circumstances rather than along preconceived or well-studied plans; this was particularly true prior to a decade ago, but is still true to a large extent. Nevertheless, it has on the whole fulfilled its object admirably and has risen to the heights which each successive occasion has demanded. Within the past few years the realization of the importance of a well-balanced organization has been growing and considerable thought and attention have been devoted to bettering existing organizations in some quarters, with good results, so far as they have gone.

A study of the maintenance of way organization to determine to what extent each of the five principles above enumerated has been applied, is being applied, and can be applied; if some of them are being applied to the undue exclusion of others; and the best means of effecting a proper balance of them in any further development that may be undertaken, will constitute a study of the science of organization as applied to the maintenance of way department.

The committee has started the collection of data as to the maintenance of way organizations of the various railroads, represented in the Association, and proposes to make use of the information gathered by the committee on Track and other committees in connection with the studies of economics of track and other labor.

An example of what can be accomplished by thorough instruction is found in the method of the signal maintenance forces of one trunk line. Monthly meetings are held by the signal engineer, which all assistant engineers, signal supervisors and signal inspectors are required to attend. Materials, methods and proposed instructions are discussed fully and the minutes of the meetings distributed in printed pamphlets to all interested. In this way the best ideas are secured, the reasons for adopting standard practices in methods or materials are fully understood, and all minds are freed of any possible prejudice towards them. And when circulars putting standard practices into effect are issued, there is the assurance that they are interpreted uniformly over the entire system. The excellent results obtaind in a very few years are a splendid justification of the application of scientific organization.

Benefits from Study.

As illustrating the present-day tendency to devote more serious thought to the question of organization, attention is directed to the splendid paper on "Development of Young Men in Railroad Work," by George M. Basford, read before the New England Railroad Club on January 13, 1914, and the discussion which followed (see *Railway Age Gazette*, January 16, 1914). While dealing primarily with the needs of the mechanical department Mr. Basford brings out forcibly the application of the ideas to the other departments.

Discussion on Rules and Organization

The report was presented by Curtis Dougherty by paragraphs, and adopted, the committee being excused.

SIGNALS AND INTERLOCKING

The committee was instructed to continue the study of Economics of Labor in Signal Maintenance, to formulate and present requisites for switch indicators, to present for approval specifications which had been previously adopted by the Railway Signal Association and which the committee considered would warrant consideration, and to study the problem of signaling single-track roads with reference to the effect of signaling and proper location of passing sidings on the capacity of the line.

The committee presented an amplification of the adjunct in the standard code and requisites for switch indicators which has been adopted by the Railway Signal Association.

SWITCH INDICATORS.

(C) Indicators at main track switches to indicate, on roads of two or more tracks, one or more of the following: (a) Whether or not a train is approaching; (b) whether or not that portion of the block between the switch and the next home block signal in advance is clear; (c) whether or not the next home block signal in the direction of approaching trains is at stop.

REQUISITES OF INSTALLATION.

(1) Switch indicators, if practicable, located: (a) At main track switches connecting with tracks on which trains may clear main tracks, and in which either there are no derails or diverging switches, or the derails or diverging switches are connected with the main track switches; (b) at independently operated derails or diverging switches in tracks on which trains may clear main tracks; (c) at points from which switches of crossovers between main tracks are operated, where both switches are operated from the same point; (d) at independently operated switches of crossovers between main tracks, the indicator at the switch in one track operated in connection with the other track; (2) switch indicators that cannot be identified by their locations, marked with the designations of the tracks in connection with which they are operated.

(3) The connections of switch indicators used to indicate whether or not a train is approaching, so arranged that an indicator will indicate the approach of a train that has reached a point at least such a distance in the rear of the second block signal in the direction of approaching trains that if the switch is thrown at the moment when a train reaches

T. S. STEVENS,

Chairman Committee on Signals and Interlocking.

that point the caution signal will be displayed in time to be observed by the engineman and will continue so to indicate until the train passes the home block signal in the rear of the switch, or approximately, the clearance point of the switch when the switch is more than ..... feet in advance of the home block signal. The distance of the point at which the approach of a train is first indicated will be determined in each case by the grade, speed of trains, view of the signal or other local conditions.

It was recommended that the amplification of these recommendations for switch indicators be adopted and included in the next issue of the Manual.

The committee gave subject 3—Specifications of the Railway Signal Association Which in the Judgment of the Committee Warrant Consideration by the American Railway Engineering Association—careful study and presented a list of specifications and standards which represent 654 pages of printed matter. All of this has been very carefully considered by committees and adopted by the active and representative membership of the Railway Signal Association. They are being used extensively and therefore are standards of many railroads as well as the R. S. A. As all of this material is available in the Manual of the Railway Signal Association and because of the large expense involved in reproducing it, it was suggested by the committee that a list only of specifications and standards be included in the Manual of the A. R. E. A., and for reference as to details any member could consult the Proceedings or Manual of the Railway Signal Association.

RATING OF OPERATED UNITS

The committee presented a table of operated units and points assigned to each unit as a revision of the Table of Units now included in the Manual. This was thought necessary because the present table does not take many electrical

units into consideration and is therefore incomplete. The table presented not only brings the original table up to date in so far as the operated units are concerned, but assigns points to each unit which are more in accordance with the actual cost than does the present table. This table appeared in the *Daily Railway Age Gazette* of March 16 as Table A under the report of the committee of the Railway Signal Association on Contracts.

AUTOMATIC TRAIN CONTROL.

The committee presented as information the findings of the joint committee of the American Railway Association on the subject of Automatic Control of Trains. These requisites were published on page 1192 of the *Railway Age Gazette*, May 29, 1914.

REVISION OF MANUAL.

The committee recommended that the section on Conventional Signs be omitted from the manual having been superseded by the Conventional Signs adopted in 1914, volume XV, pages 81 to 92. Arrangements of Signals and Interlocking Plants has been superseded by the report adopted in 1913, and published in Volume IV, pages 71 to 75. Specifications for Mineral Matter, Rubber Compound, Insulated Wire and Cable have been materially revised by the Railway Signal Association, and are available in the Manual of the R. S. A., and the committee therefore recommended that these be omitted from the Manual of the A. R. E. A.

The committee consists of Thomas S. Stevens, chairman; C. C. Anthony, vice-chairman; Azel Ames (Kerite Co.), H. S. Balliet (G. C. T.), J. B. Cameron (B. & O.), W. B. Causey, C. A. Christofferson (N. P.), C. E. Denney (U. S. & S. Co.), C. A. Dunham (G. N.), W. J. Eck (Southern), W. H. Elliott (N. Y. C.), G. E. Ellis (K. C. T.), M. H. Hovey (Consl. Engr.), A. S. Ingalls (L. S. & M. S.), A. M. Kenpell (W. T.), J. C. Mock (M. C.), F. P. Patenall (B. & O.), J. A. Peabody (C. & N. W.), D. W. Richards (N. & W.), A. H. Rudd (Penn.), W. B. Scott (S. P.), A. G. Shaver (Hallett Iron Works).

Discussion on Signal and Interlocking

The report was presented by T. S. Stevens.

Mr. Stevens: On subject 3 the committee presents a list of specifications of the Railway Signal Association. It is suggested that this Association should publish, in its literature, preferably in its Manual, this list of the specifications which have been approved by the Railway Signal Association, and as these have been approved not only by the individual members, but by the representative vote of the Railway Signal Association, it would seem that they are worthy of endorsement by this Association.

The President: The Committee having made the recommendation to include this in the Manual, the matter will be handled as a motion on the part of the committee, to adopt this conclusion. Is there a second to that motion?

(The motion was seconded.)

L. C. Fritch (Can. Nor.): It seems to me that we look upon our Manual as containing Recommended Principles of Practice. This is simply a matter of information. It may fall into the hands of some of our legal friends, and they may take this as absolutely agreed upon, and that these specifications have been approved, and if any of us should have an action involving signals, it might put us in bad shape. It seems to me that as long as it is information simply, it will serve the purpose if it is in our proceedings. If we adopt the specifications, it will then go into the Manual.

Mr. Stevens: There is a broader question than that involved. These specifications are practically the specifications of a large majority of the railroads of the country to-day. They have been tried and approved, at least those that Committee X thought were worthy of being endorsed by the Association. We feel that they would be given more dignity if this Association would agree to place the list in the Manual. The Railway Signal Association has spent four or five years getting them out, and it seems to me that, to be of value, it would be proper that this Association should put them in a convenient place for its membership to find them.

G. H. Tinker (N. Y. C. & St. L.): I agree with Mr. Fritch. This is too much of a wholesale approval of the work of an Association. The only matters which should be put into the Manual are those which have been considered in detail and adopted by the Association.

A. S. Baldwin (I. C.): The declination to include this list in our Manual does not in the slightest degree reflect on the value of this work to the members of this Association. The point we make is that what goes into the Manual should first be passed on and discussed at a meeting of the Association, whereas, if these matters were to be put into our Manual it would be taking in one bunch a whole mass of specifications and data which has not been submitted to the discussion of the members of this Association.

Hunter McDonald (N. C. & St. L.): I inquire in what manner Mr. Baldwin and Mr. Fritch expect to perfect our Manual, in so far as signals are concerned? Do they expect our Committee X to go back and work over this matter with the Signal Association, or do we expect finally to treat the Signal Association as a committee of this Association and endorse their findings?

Earl Stimson (B. & O.): I am in favor of the motion made by the committee. As I understand it, every member of this committee is also a member of the Signal Association. It cannot be expected that this one committee will do the work of probably a dozen committees in the Signal Association, and we certainly should have confidence enough in the Signal Association, through our old members on this committee, to endorse their findings.

Mr. Fritch: I will answer Mr. Stimson by saying that we do not object to accepting the recommendations of the R. S. A., but we do not want to incorporate in our Manual something which is submitted as a matter of information. To my mind, all these recommendations, before they are finally passed by this Association, should go before the American Railway Association, as that is the parent Association, and these matters are of sufficient importance to submit to them. We are following that practice, with regard to rail specifications and other matters, and I do not see why we should not with regard to any matter which involves operation as the signal rules and specifications do. In my opinion, it is beyond the power of this Association to pass upon such a matter.

E. H. Lee (C. & W. I.): The committee is asking for the endorsement of these specifications in turns. Some of the speakers have intimated that if our Association gives this endorsement it will have done so without mature consideration. Our Signal Committee is composed of the best brains in the Association along that line, who have devoted several years to the study of this question. They have had the assistance of a great body of men who are intimately acquainted with the subject, who have devoted years to the consideration of this particular subject, which is highly technical and involved. It would seem exceedingly difficult to consider a subject of this kind in any other way than as recommended by the committee.

(After further discussion the suggestion of the committee was adopted, together with the suggestions of the revision of the Manual.)

UNIFORM GENERAL CONTRACT FORMS

The committee was instructed to make a critical examination of the subject-matter in the Manual and submit

E. H. LEE,
Chairman Committee on Uniform General Contract Forms.

definite recommendations for changes, and to continue the study of general forms, including the form of bond.

At the first meeting of the committee a form of bond was agreed upon, which has been unanimously approved by

the members of the committee, and it is presented to the Association with the recommendation that it be adopted.

The members of the Association were invited by circular letter to inform the committee whether they were making use of the uniform general contract form, and also to make such criticisms and suggestions as they might deem pertinent. The response to this letter was very gratifying, nearly 100 letters having been received. About one-third of the replies indicated that the writers were using the uniform general contract form, the remainder, including many from representatives of the larger railroad companies, preferring their own general form of contract, as was, perhaps, to be expected. The general tenor of letters received, however, indicates that the form has served a useful purpos, either directly or indirectly.

At the last two meetings of the committee the form printed in the Manual was carefully considered, and certain changes were agreed upon, which are:

E. H. Lee (C. & W. I.), chairman; C. A. Wilson (Cons. Eng.), vice-chairman; C. Frank Allen (Mass. Inst. of Tech.), W. G. Atwood (Interstate Commerce Commission), John P. Congdon (Cons. Engr.), Thos. Earle (Pa. Steel Co.), J. C. Irwin (B. & A.), R. G. Kenly (M. & St. L.), C. A. Paquette (C. C. C. & St. L.), J. H. Roach (L. S. & M. S.), Committee.

AGREEMENT FORM.

THIS AGREEMENT, made this ..... day of ..... in the year ..... by and between ..... party of the first part, hereinafter called the Contractor, and ..... party of the second part, hereinafter called the Company:

WITNESSETH, That, in consideration of the covenants and agreements hereinafter mentioned, to be performed by the parties hereto, and of the payments hereinafter agreed to be made, it is mutually agreed as follows:

The Contractor shall furnish all materials, superintendence, labor, equipment and transportation, except as hereinafter specified, and shall execute, construct and finish, in an expeditious substantial and workmanlike manner, to the satisfaction and acceptance of the chief engineer of the Company, ...

in accordance with the plans hereto attached identified by the signatures of the parties hereto, or herein described, and the following GENERAL CONDITIONS, requirements and specifications, forming part of this contract

The work covered by this contract shall be commenced ..... and be completed on or before the..... day of .....191.... time being of the essence of this contract .....

And in consideration of the completion of the work described herein, and the fulfillment of all stipulations of this agreement to the satisfaction and acceptance of the chief engineer of the Company, the said Company shall pay, or cause to be paid, to said Contractor, the amount due to the Contractor, based on the following prices:

.....

CONSTRUCTION CONTRACT.

General Conditions.

1. *Bond.*—The Contractor agrees, at the time of the execution and delivery of this contract and before the taking effect of the same, to furnish and deliver to the Company a good and sufficient bond of indemnity to the amount of ..... dollars, as security for the faithful performance, by the Contractor, of all the covenants and agreements on the part of the Contractor contained in this contract. The security in such bond of indemnity must be satisfactory and acceptable to the Company.

This bond shall remain in force and effect in such amount, not greater than that specified, as shall be determined by the Chief Engineer.

2. *Contractor's Understanding.*—It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent or employe of the Company, either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

3. *Intent of Plans and Specifications.*—All work that may be called for in the specifications and not shown on the plans, or shown on the plans and not called for in the specifications, shall be executed and furnished by the Contractor as if described in both these ways; and should any work or material be required which is not denoted in the specifications or plans, either directly or indirectly, but which is nevertheless necessary for the proper carrying out of the intent thereof, the Contractor is to understand the same to be implied and required, and shall perform all such work and furnish any such material as fully as if they were particularly delineated or described.

4. *Permits.*—Permits of a temporary nature necessary for the prosecution of the work shall be secured by the Contractor. Permits for permanent structures or permanent changes in existing facilities shall be secured by the Company.

5. *Protection.*—Whenever the local conditions, laws or ordinances require, the Contractor shall furnish and maintain, at his own cost and expense, necessary passageways, guard fences and lights and such other facilities and means of protection as may be required.

6. *Rights of Various Interests.*—Wherever work being done by Company forces or by other contractors is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the engineer, to secure the completion of the various portions of the work in general harmony.

7. *Consent to Transfer.*—The Contractor shall not let or transfer this contract or any part thereof (except for the delivery of material) without the consent of the chief engineer, given in writing. Such consent does not release or relieve the Contractor from any of his obligations and liabilities under the contract.

8. *Superintendence.*—The Contractor shall constantly superintend all the work embraced in this contract, in person or by a duly authorized manager acceptable to the Company.

9. *Timely Demand for Points and Instructions.*—The Contractor shall not proceed until he has made timely demand upon the engineer for, and has received from him, such points and instructions as may be necessary as the work progresses. The work shall be done in strict conformity with such points and instructions.

10. *Report Errors and Discrepancies.*—If the Contractor, in the course of the work, finds any discrepancy between the plans and the physical conditions of the locality or any errors or omissions in plans or in the layout as given by said points and instructions, it shall be his duty to immediately inform the engineer, in writing, and the engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

11. *Preservation of Stakes.*—The Contractor must carefully preserve bench marks, reference points and stakes, and in case of wilfull or careless destruction, he will be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

12. *Inspection.*—All work and material shall be at all times open to the inspection, acceptance or rejection of the engineer or his duly authorized representative. The Contractor shall provide reasonable and necessary facilities for such inspection.

13. *Defective Work or Material.*—Any omissions or failure on the part of the engineer to disapprove or reject any work or material shall not be construed to be an acceptance of any defective work or material. The Contractor shall remove, at his own expense, any work or material condemned by the engineer, and shall rebuild and replace the same without extra charge, and in default thereof the same may be done by the Company at the Contractor's expense, or, in case the chief engineer should not consider the defiect of sufficient importance to require the Contractor to rebuild or replace any imperfect work or material, he shall have power, and is hereby authorized, to make an equitable deduction from the stipulated price.

14. *Insurance.*—The Contractor shall secure, in the name of the Company and for its benefit, policies of fire insurance on such structures and in such amounts as shall be specified by the chief engineer, not exceeding .....

15. *Indemnity.*—The Contractor shall indemnify and save harmless the Company from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against it, by reason of any act or omission of the said Contractor, his agents or employes, in the execution of the

work or in consequence of any negligence or carelessness in guarding the same.

16. *Settlement for Wages.*—Whenever, in the opinion of the chief engineer, it may be necessary for the progress of the work to secure to any of the employes engaged on the work under this contract any wages which may then be due them, the Company is hereby authorized to pay said employes the amount due them or any lesser amount, and the amount so paid them, as shown by their receipts, shall be deducted from any moneys that may be or become payable to said Contractor.

17. *Liens.*—If at any time there shall be evidence of any lien or claim for which the Company might become liable, and which is chargeable to the Contractor, the Company shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify the Company against such lien or claim, and if such lien or claim be valid, the Company may pay and discharge the same and deduct the amount so paid from any moneys which may be or become due and payable to the Contractor.

18. *Work Adjacent to Railroad.*—Wherever the work embraced in this contract is near the tracks, structures or buildings of this Company or of other railroads, the Contractor shall use proper care and vigilance to avoid injury to persons or property. The work must be so conducted as not to interfere with the movement of trains or other operations of the railroad; or, if in any case such interference be necessary, the Contractor shall not proceed until he has first obtained specific authority and directions therefor from the proper designated officer of the Company and has the approval of the engineer.

19. *Risk.*—The work under this contract in every respect shall be at the risk of the Contractor until finished and accepted, except damage or injury caused directly by Company's agents or employes.

20. *Order and Discipline.*—The Contractor shall at all times enforce strict discipline and good order among his employes, and any employe of the Contractor who shall appear to be incompetent, disorderly or intemperate, or in any other way disqualified for or unfaithful to the work entrusted to him, shall be discharged immediately on the request of the engineer, and he shall not again be employed on the work without the engineer's written consent.

21. *Contractor Not to Hire Company's Employes.*—The Contractor shall not employ or hire any of the Company's employes without the permission of the engineer.

22. *Intoxicating Liquors Prohibited.*—The contractor, in so far as his authority extends, shall not permit the sale, distribution or use of any intoxicating liquors upon or adjacent to the work, or allow any such to be brought upon, to or near the line of the railway of the Company.

23. *Cleaning Up.*—The Contractor shall, as directed by the engineer, remove from the Company's property and from all public and private property, at his own expense, all temporary structures, rubbish and waste materials resulting from his operations.

24. *Engineer and Chief Engineer Defined.*—Wherever in this contract the word engineer is used, it shall be understood as referring to the chief engineer of the Company, acting personally or through an assistant duly authorized in writing for such act by the chief engineer, and wherever the words chief engineer are used it shall be understood as referring to the chief engineer in person, and not to any assistant engineer.

25. *Power of Engineer.*—The engineer shall have power to reject or condemn all work or material which does not conform to this contract; to direct the application of forces to any portion of the work which, in his judgment, requires it; to order the force increased or diminished, and to decide questions which arise between the parties relative to the execution of the work.

26. *Adjustment of Dispute.*—All questions or controversies which may arise between the Contractor and the Company, under or in reference to this contract, shall be subject to the decision of the chief engineer, and his decision shall be final and conclusive upon both parties.

27. *Order of Completion; Use of Completed Portions.*—The Contractor shall complete any portion or portions of the work in such order of time as the engineer may require. The Company shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of the work so taken or used, or any part thereof. If such prior use increases the cost of or delays the work, the Contractor will be entitled to such extra compensation, or extension of time, or both, as the chief engineer may determine.

28. *Changes.*—The Company shall have the right to make any changes that may be hereafter determnied upon, in the nature or dimensions of the work, either before or after its commencement, and such changes shall in no way affect or void the obligations of this contract. If such changes make any change in the cost of the work, an equitable adjustment shall be made by the chief engineer to cover the same.

29. *Extra Work.*—No bill or claim for extra work or material shall be allowed or paid unless the doing of such extra work or the furnishing of such extra material shall have been authorized in writing by the..... .....engineer..

The price for such work shall be determined by the chief engineer, who may either fix a unit price or a lump-sum price, or may, if he so elects, provide that the price shall be determined by the actual cost, to which shall be added ..... per cent to cover general expense and superintendence, profits, contingencies, use of tools, Contractor's risk and liability. If the Contractor shall perform any work or furnish any material which is not provided for in this contract, or which was not authorized in writing by the engineer, said Contractor shall receive no compensation for such work or material so furnished, and does hereby release and discharge the Company from any liability therefor.

If the Contractor shall proceed with such extra work or the furnishing of such extra material after receiving the written authority therefor, as hereinbefore provided, then such work or material, stated in the written authority of the engineer, shall be covered, governed and controlled by all the terms and provisions of this contract, subject to such prices as may be agreed upon or fixed by the chief engineer.

If the Contractor shall decline or fail to perform such work or furnish such extra material as authorized by the engineer in writing, as aforesaid, the Company may then arrange for the performance of the work in any manner it may see fit, the same as if this contract had not been executed, and the Contractor shall not interfere with such performance of the work.

30. *Property and Right of Entry.*—The Company shall provide the lands upon which the work under this contract is to be done, except that the Contractor shall provide land required for the erection of temporary construction facilities and storage of his material, together with right of access to the same.

The Contractor shall not ship any material or equipment until he has received written notice from the engineer that he may proceed with said work or any part thereof.

31. *Unavoidable Delays; Extension of Time on Parts of Work.*—If the Contractor shall be delayed in the performance of the work from any cause for which the Company is responsible, he shall, upon written application to the chief engineer at the time of such delay, be granted such extension of time as the chief engineer shall deem equitable and just.

32. *Suspension of Work.*—The Company may at any time stop the work, or any part thereof, by giving ..... days' notice to the Contractor in writing. The work shall be resumed by the Contractor in ten (10) days after the date fixed in the written notice from the Company to the Contractor so to do. The Company shall not be held liable for any damages or anticipated profits on account of the work being stopped, or for any work done during the interval of suspension. It will, however, pay the Contractor for expense of men and teams necessarily retained during the interval of suspension, provided the Contractor can show that it was not reasonably practicable to move these men and teams to other points at which they could have been employed. The Company will further pay the Contractor for time necessarily lost during such suspension at the rate of ..... per cent per annum on the estimated value of materials, equipment and fixtures furnished by the Contractor on the work which are nenessarily idle during such suspension, said rate of ..... per cent per annum being understood to include depreciation, interest and insurance. But if the work, or any part thereof, shall be stopped by the notice in writing aforesaid, and if the Company does not give notice in writing to the Contractor to resume work at a date within ..... of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work so suspended and he will be entitled to the estimates and payments for such work so abandoned, as provided in Section 38 of this contract.

33. (a) *Expediting Work, Correcting Imperfections.*—If the

chief engineer of the Company shall at any time be of the opinion that the Contractor is neglecting to remedy any imperfections in the work, or is not progressing with the work as fast as necessary to insure its completion within the time and as required by the contract, or is otherwise violating any of the provisions of this contract, said *chief* engineer, in behalf of the Company, shall have the power, and it shall be his duty to notify the Contractor to remedy such imperfections, proceed more rapidly with said work, or otherwise comply with the provisions of this contract.

(b) *Annulment.*—The Company, if not at fault, may give the Contractor ten (10) days' written notice, and at the end of that time if the Contractor continues to neglect the work, the Company may provide labor and materials and deduct the cost from any money due the Contractor under this agreement; and may terminate the employment of the Contractor under this agreement and take possession of the premises and of all materials, tools and appliances thereon, and employ such forces as may be necessary to finish the work. In such case the Contractor shall receive no further payment until the work shall be finished, when, if the unpaid balance that would be due under this contract exceeds the cost to the Company of finishing the work, such excess shall be paid to the Contractor; but if such cost exceeds such unpaid balance, the Contractor shall pay the difference to the Company.

(c) *Company May Do Part of Work.*—Upon failure of the Contractor to comply with any notice given in accordance with the provisions hereof, the Company shall have the alternative right, instead of assuming charge of the entire work, to place additional forces, tools, equipment and materials on parts of the work for the purpose of carrying on such parts of the work, and the cost incurred by the Company in carrying on such parts of the work shall be payable by the Contractor, and such work shall be deemed to be carried on by the Company on account of the Contractor, and the Contractor shall be allowed therefor the contract price. The Company may retain the amount of the cost of such work, with ..... per cent added, from any sum or sums due or to become due the Contractor under this agreement.

34. (a) *Annulment Without Fault of Contractor.*—The Company shall have the right at any time, for reasons which appear good to it, to annual this contract upon giving 30 days' notice in writing to the Contractor, in which event the Contractor shall be entitled to the full amount of the estimate for the work done by him under the terms and conditions of this contract up to the time of such annulment, including the retained percentage. The Contractor shall be reimbursed by the Company for such expenditures as in the judgment of the chief engineer are not otherwise compensated for, and as are required in preparing for and moving to and from the work; the intent being that an equitable settlement shall be made with the Contractor.

(b) *Notice—How Served.*—Any notice to be given by the Company to the Contractor under this contract shall be deemed to be served if the same be delivered to the man in charge of any office used by the Contractor, or to his foreman or agent at or near the work, or deposited in the postoffice, postpaid, addressed to the Contractor at his last known place of business.

(c) *Removal of Equipment.*—In case of annulment of this contract before completion from any cause whatever, the Contractor, if notified to do so by the Company, shall promptly remove any part or all of his equipment and supplies from the property of the Company, failing which the Company shall have the right to remove such equipment and supplies at the expense of the Contractor.

35. *Failure to Make Payments.*—Failure by the Company to make payments at the times provided in this agreement shall give the Contractor the right to suspend work until payment is made, or at his option, after 30 days' notice in writing, should the Company continue to default, to terminate this contract and recover the price of all work done and materials provided and all damages sustained, and such failure to make payments at the times provided shall be a bar to any claim by the Company against the Contractor for delay in completion of the work, due to such suspension or failure to pay.

36. *Monthly Estimate.*—So long as the work herein contracted for is prosecuted in accordance with the provisions of this contract, and with such progress as may be satisfactory to the chief engineer, the said chief engineer will on or about the first day of each month make an approximate estimate of the proportionate value of the work done and of material furnished or delivered upon the Company's property at the site of the work, up to and including the last day of the previous month. The amount of said estimate, after deducting ..... per cent and all previous payments, shall be due and payable to the Contractor at the office of the Treasurer of the Company on or about the ..... day of the current month.

37. *Acceptance.*—The work shall be inspected for acceptance by the Company promptly upon receipt of notice in writing that the work is ready for such inspection.

38. *Final Estimates.*—Upon the completion and acceptance of the work, the chief engineer shall execute a certificate over his signature that the whole work provided for in this agreement has been completed and accepted by him under the terms and conditions thereof, whereupon the entire balance found to be due to the Contractor, including said retained percentage, shall be paid to the Contractor at the office of the treasurer of the Company within ..... days after the date of said final certificate. Before the time of payment of said final estimate the Contractor shall submit evidence satisfactory to the chief engineer that all payrolls, material bills, and outstanding indebtedness, in connection with this work, have been paid.

.....

This agreement shall inure to the benefit of and be binding upon the legal representatives and successors of the parties respectively.

In Witness Whereof, the parties hereto have executed this agreement in ..... the day and year first above written.

Witness:

.....

.....

BOND.

Know All Men by These Presents:

.....

That the undersigned .....

..... are held and bound unto the .....

..... in the sum of .....

..... dollars, lawful money of the United States of America, to be paid to said .....

its successors and assigns, to which payment the undersigned, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns.

The condition of this obligation is that if .....

Contractor shall faithfully furnish and do everything required in the contract, executed in writing, dated .....

191... between ..... Contractor, and

..... Company

for .....

this obligation shall become of no effect; otherwise it shall continue in full force.

Signed, sealed and delivered this ..... day of ..... 191...

Attest:

.....

.....

The form of bond submitted contains no *notarial* or official acknowledgment. In certain states such acknowledgment may be necessary. Decision as to the fact should be made by the Legal Department of each company.

Attention is called to the fact that the proposed form of bond is intended solely for use in connection with the adopted Uniform Contract Form.

Discussion on Uniform General Contract Forms.

The report was presented by Chairman Lee. The form of bond and uniform contract form was adopted and the committee continued.

SIGNS, FENCES AND CROSSINGS

The following work was assigned for the consideration of the committee:

(1) Report on the economy of concrete and metal signs and signals as compared with wood.

(2) Report on the economy of concrete and metal as compared with wood for fence posts.

(3) Investigate methods used and the comparative costs of repainting crossing and other signs; also present specifications for whitewashing cattle-guard wing fences.

REVISION OF MANUAL.

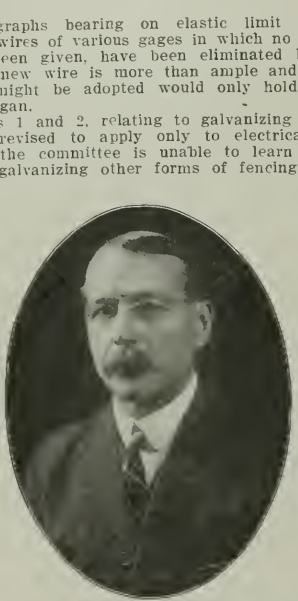
The committee made a careful examination of the subject-matter of the Manual. A few new definitions were added, the diction in a number of the old ones was improved and others were abbreviated and made more concise.

An additional class of fence has been added under "Specifications for Standard Right-of-Way Fences" to cover fences constructed of galvanized ribbon, smooth round or barbed

wire, all widely used but not heretofore provided for in the Manual. A slight change has been made in the spacing of the longitudinal wires of the different classes of fence, to conform to the standard spacing used by several of the largest American manufacturers. The length of end, corner, anchor and gate posts has been reduced from 9 to 8 ft. and intermediate or line posts from 8 to 7 ft., as these lengths agree with the standards of a large percentage of railways reporting on fence posts this year. As concrete posts have heretofore been promoted as a suitable substitute for wood, this class of posts has been added under "material."

The paragraphs bearing on elastic limit and tensile strength of wires of various gages in which no values have heretofore been given, have been eliminated because the strength of new wire is more than ample and any standard which might be adopted would only hold good until oxidation began.

Paragraphs 1 and 2, relating to galvanizing fence wire, have been revised to apply only to electrically wended fencing, as the committee is unable to learn of any advantage in galvanizing other forms of fencing after it is



W. F. STROUSE,
Chairman Committee on Signs, Fences and Crossings.

fabricated. The joints in the hinge type of woven fencing would be disturbed during erection, which would defeat the object of regalvanizing, to say nothing of the waste of spelter which would fill the crevices in the locks or joints.

A number of minor changes were made in the text bearing on "Snow Fences, Snow Sheds and Recommended Methods of Snow Removal."

The use of the term "stock-guard" instead of "cattle-guard" is considered desirable in view of the fact that the laws in over half the states require a guard to be of such type as will turn not only horses, cattle and mules, but sheep and swine as well. The definition of "Section" was eliminated, as some forms of stock-guards are not made up in sections.

Specifications for Standard Right-of-Way Fences.

1. *Classes.*—Standard right-of-way fences shall be divided into four classes, the height to conform to statutory requirements, generally about 4 ft. 6 in. above the ground.

2. *First Class.*—A first-class fence shall consist of 9 longitudinal smooth galvanized steel wires; the top and bottom wires shall be No. 7 gage, and the intermediate and stay wires No. 9 gage. The spacing of the longitudinal wires commencing at the bottom shall be 4, 4½, 5, 5½, 6, 7, 8 and 9 in. The bottom wire shall be 5 in. above the ground and the stay wires shall be spaced 12 in. apart. When used as a hog-tight fence, the bottom wire shall be not over 3 in. above the ground, with a strand of barbed wire 1½ in. below same.

3. *Second Class.*—A second-class fence shall consist of 7 longitudinal smooth galvanized steel wires; the longitudinal and stay wires shall be No. 9 gage. The spacing of the longitudinal wires, commencing at the bottom, shall be 6½, 7, 7½, 8, 8½ and 9 in. The bottom wire shall be 7 in. above the ground and stay wires shall be placed 18 in. apart.

4. *Third Class.*—A third-class fence shall consist of 5 longitudinal smooth galvanized steel wires; the longitudinal and stay wires shall be No. 9 gage. The spacing of the longitudinal wires, commencing at the bottom, shall be 7½, 8, 8½ and 9 in. The bottom wire shall be 9 in. above the ground and the stay wires shall be spaced 24 in. apart.

5. *Fourth Class.*—A fourth-class fence shall consist of 5 strands of galvanized steel ribbon, smooth round or barbed wire fencing. The spacing of the wires, commencing at the bottom, shall be 10, 10, 12 and 12 in. The bottom wire shall be 10 in. above the ground.

The longitudinal wires of all woven wire fencing under classes 1, 2 and 3 shall be provided with tension curves to take up expansion and contraction.

6. *Wood Posts.*—Posts shall be made of cedar, locust, chestnut, Bois d'Arc, white oak, mulberry, catalpa or other durable wood native to the locality or of treated timber. They shall be straight and free from splits, rot or other defects. If sawed or split posts are used, their dimensions shall be at least equal to those hereinafter specified for round posts.

7. *End Posts, etc.*—End, corner, anchor and gate posts shall be at least 8 ft. long and 8 in. in diameter at the small end, set 3 ft. 4 in. in the ground.

8. *Intermediate Posts.*—Intermediate or line posts shall be at least 7 ft. long and 4 in. in diameter at the small end, set 2 ft. 4 in. in the ground.

9. *Braces.*—Braces for end, corner, anchor and gate posts shall be made of intermediate or line posts or 4 in. by 4 in. sawed lumber of a quality equal in durability to that of the posts, and free from large knots, splits, rot and other defects.

10. *Concrete Posts.*—Concrete posts shall consist of one part Portland cement to four parts run of pit gravel; or one part Portland cement, two parts clean, sharp sand and four parts crushed stone of low absorption or screened gravel. Gravel or broken stone should be of such size as will pass through a ½-in. screen but be retained on a ¼-in. screen.

11. *End Posts, etc.*—End, corner, anchor and gate posts shall be at least 8 ft. long, 6 in. square at the top and 8 in. square at the base, set 3 ft. 4 in. in the ground. The reinforcement shall consist of 4⅜ in. square twisted rods.

12. *Intermediate Posts.*—Intermediate or line posts shall be at least 7 ft. long, 4 in. at the top and 5½ in. at the base, set 2 ft. 4 in. in the ground. The reinforcement shall consist of 3 in. or 4¼ in. square twisted rods, depending on the design of the posts.

13. *Braces.*—Braces for end, corner, anchor and gate posts shall be made of concrete, 4 in. by 4 in. in section, reinforced with 4¼ in. square twisted rods.

14. *Wire.*—Woven wire fences shall be constructed of basic open-hearth galvanized steel wire. It must stand, winding tight around wire of the same size, without sign of fracture.

15. *Locks.*—The locks or fastenings at the intersection of the longitudinal and stay wires shall be of such designs as will prevent them from slipping either longitudinally or vertically.

16. *Staples.*—The staples used for fastening the longitudinal wires to the posts shall be made of No. 9 galvanized steel wire. They shall be 1 in. long for hardwood and 1½ in. long for softwood.

17. *Galvanizing.*—The galvanizing shall consist of an even coating of zinc, which shall withstand one-minute immersion tests in a solution of commercial sulphate of copper crystals and water, the specific gravity of which shall be 1.185 and whose temperature shall be from 60 to 70 deg. F. Immediately after each immersion the sample shall be washed in water and wiped dry. If the zinc is removed, or a copper colored deposit formed at the end of the fourth immersion, the lot of material from which the sample is taken shall be rejected.

18. *Manufacture.*—The fence shall be so fabricated as not to remove the galvanizing or impair the tensile strength of the wire.

19. *End, Corner, Anchor and Gate Posts.*—End corner, anchor and gate posts shall be set vertical, at least 3 ft. 4 in. in the ground, thoroughly tamped, braced and anchored.

20. *Intermediate or Line Posts.*—Intermediate or line posts shall be set at least 2 ft. 4 in. in the ground, and 16½ ft. apart.

21. *Post Holes.*—Holes of full depth shall be provided for all end, corner, anchor and gate posts, even if blasting must be resorted to. For intermediate or line posts, where rock is encountered, not more than 2 adjacent wood posts shall be set on sills 6 in. by 6 in. by 4 ft. long,

braced on both sides by 2 in. by 6 in. braces, 3 ft. long. Holes shall be provided for all other posts. Posts shall be set with the large end down and in perfect line on the side on which the wire is to be strung. After the fence is erected, the tops of the wooden posts shall be sawed off with a one-fourth pitch, the high side being next the wire and 2 in. above it.

22. *Anchoring.*—Wood end, corner, anchor and gate posts shall be anchored by gaining and spiking two cleats to the side of the posts, at right angles to the line of the fence, one at the bottom, the other just below the surface of the ground. The cleat near the ground surface shall be put on the side next the fence and the bottom cleat shall be put on the opposite side. Intermediate wood posts set in depressions of the ground shall be anchored by gaining two cleats into the side near the bottom of the post, same to be properly spiked.

23. *Cleats, Sills, etc.*—All cleats shall be 2 in. by 6 in. by 2 ft. long. All sills, braces and cleats shall be made of sawed timber of a quality equal in durability to that of the posts.

24. *Bracing.*—Wood end, corner, anchor and gate posts shall be braced by using an intermediate or line post or a piece of 4 in. by 4 in. sawed lumber of a quality equal in durability to that of the posts, gained into the end, corner, anchor or gate post, about 12 in. from the top and into the next intermediate or line post about 12 in. from the ground, and be securely spiked. A cable made of a double strand of No. 9 galvanized soft wire looped around the end, corner, anchor or gate post near the ground line, and around the next intermediate or line post about 12 in. from the top, shall be put on and twisted until the top of the next intermediate or line post is drawn back about 2 in. Four in. by four in. reinforced braces shall be used with concrete posts.

25. *Stretching.*—Longitudinal wires shall be stretched uniformly tight and parallel; stays shall be straight, vertical and uniformly spaced. Wires shall be placed on the side of the post away from the track.

26. *Stapling.*—Staples shall be set diagonally with the grain of the wood and driven home tight. The top wires shall be double stapled.

27. *Splicing.*—Approved bolt clamp splice or wire splice made as follows may be used: the ends of the wires shall be carried 3 in. past the splicing tools and wrapped around both wires backward toward the tool for at least 5 turns, and after the tool is removed, the space occupied by it shall be closed by pulling the ends together.

The use of smooth wire in preference to barbed wire is recommended for right-of-way fences.

The use of heavy smooth wire, or a plank at the top of a barbed wire fence, is recommended.

Galvanized Wire Fencing.

(1) The rapid deterioration of modern woven galvanized fence wire is caused by the coating of zinc being too thin and of an uneven thickness. To provide better protection for the wire and a longer life for the fence, it is necessary to secure an increased uniform thickness of zinc coating on the wire. To insure that the galvanizing is intact after the fence has been fabricated, it is recommended that a second coating of zinc be applied to electrically welded fencing after it is manufactured.

(2) It is further recommended that wire which has received a zinc coating which will stand the test prescribed in the specifications be used in the manufacture of fencing, and that in the case of electrically welded fencing, the galvanizing be applied after it has been fabricated.

Gates for Right-of-Way Fences.

A hanged metal gate is recommended.

The width of farm gates should not be less than 12 ft., depending upon the size of agricultural machinery in use in the vicinity, or as required by the laws of the states through which the railroad operates. The minimum height of farm gates should be 4 ft. 6 in. from the surface of the roadway.

Farm gates should be hung so as to open away from the track, and, if hinged, should swing shut by gravity.

CONCRETE FENCE POSTS.

(1) Concrete fence posts are practical and economical and a suitable substitute for wood.

(2) Reinforcement should be placed as near to the surface of the post as possible; ½-in. from the surface is the best location.

(3) Posts should taper from the base to the top.

(4) Posts should not be less than 5½ in. wide at the base and 4 in. at the top.

(5) Concrete should consist of one part cement to four parts run of pit gravel; or one part cement, two parts sand and four parts crushed stone of low absorption, or screened gravel. Gravel or crushed stone should not be less than ¼-in. nor more than ½-in. in size. Concrete should be of a quaking consistency.

(6) Molds should bave a jogger or vibratory motion, while concrete is being placed to compact it and smooth up the surfaces of the posts.

(7) Posts should not be made out of doors in freezing weather. They should not be exposed to the sun, and should be sprinkled with water the first eight or ten days after being made to aid curing.

(8) Molds should be carefully oiled or soaped to prevent the concrete sticking to them.

(9) Posts should be cured for not less than 90 days, when cured naturally, before being set or shipped.

(10) Posts should be carefully handled and packed in straw, sawdust or other suitable material for shipment.

TRACK CONSTRUCTION AND FLANGEWAYS AT PAVED STREET CROSSINGS AND IN PAVED STREETS.

(1) Treated ties should be used, laid on a bed of crushed rock, gravel or other suitable material, not less than 8 in. in depth, placed in about 3-in. layers, each thoroughly rammed to compact it.

(2) Vitrified tile drains not less than 6 in. in diameter, with open joints, leading to the nearest point from which efficient drainage may be obtained, or with sufficient outlets to reach sewers or drainage basins, should be laid on either side of and between tracks, parallel with the ballast line and outside of the ties.

(3) One hundred and forty-one-lb. 9-in. depth girder rail, or a similar section, with suitable tie-plates and screw-spikes, should be used. Tracks should be filled in with crushed rock, gravel or other suitable material, allowing for a 2-in. cushion of sand under the finished pavement.

(4) Ballast should be thoroughly rammed as it is installed to prevent settlement of paving foundations. Two inches of good sharp sand should be placed on top of the ballast.

(5) Paving must conform to municipal requirements, granite or trap rock blocks preferred. Hot tar and gravel should be poured into the joints as a binder.

ECONOMY OF CONCRETE AND METAL SIGNS AS COMPARED WITH WOOD.

Sixty-two replies were received in response to inquiries relative to concrete, metal and wood signs. Fifteen roads report having used concrete signs, generally of the simpler type, 39 roads report the use of metal in signs, either complete or in combination with wood or concrete, while all roads with one or two exceptions use wooden signs.

The use of concrete does not date back more than 12 or 15 years, and in most of the cases reported, it covers a much shorter period. Comparatively few roads, therefore, were willing to go on record as to the probable life of concrete signs. With our limited experience in this direction, it could only be a matter of conjecture to specify any definite period. Another consideration, and one having a very important bearing on the life of concrete structures, is the quality of the concrete. To keep the cost within reasonable bounds, concrete signs should be designed along mathematical lines. This generally means a light structure with just sufficient reinforcement to meet the requirements, based on first-class material and workmanship. In practice, this condition is not always realized and defects frequently develop some time after the work has been completed and put in service. It is, therefore impossible to estimate the life until after the quality has been determined.

In a number of instances, cast or wrought plates are attached to wood or concrete posts or other structures. The use of signs made wholly of cast-iron is confined to comparatively few roads, while the use of wrought posts and cast plates is quite general. The use of old T-rail for posts was reported by several roads. Old boiler tubes are frequently used in making wrought posts. It would appear more economical to use new material unless the old tubes are in good condition. The life of wrought-iron or steel signs depends largely on the condition of the tubes and plates when used and the means employed for their protection. If the tubes are filled with concrete as specified by some roads and set in a concrete base which should extend several inches above the ground, and then properly protected by paint, they should last for 30 to 40 years. Some roads have estimated their life as 30 years, while others have stated it was indeterminate; some have made no estimate.

The committee is of the opinion that where either cast-

iron or wrought-iron or steel signs are properly protected by paint and concrete, they will last as long as concrete and from two to three times as long as wood.

As the posts of signs generally fail first, and as some kinds of wood are more durable than others, it is very essential that good posts be provided if wood is used. In some cases, preservatives have been used with good results. This is particularly true where creosoted timber is used for the base, the superstructure of untreated timber being bolted to the same. The average life of wood signs as reported would appear to be about ten years, although many place it as low as eight years.

All contributors were asked to express their opinions as to the relative economies in the use of different materials. Ten roads express a preference for concrete, six favor metal and eleven wood. Twelve roads show variable preferences which are governed by circumstances and 20 roads make no reply.

ECONOMY OF CONCRETE AND METAL AS COMPARED WITH WOOD FOR FENCE POSTS.

In response to inquiries relative to fence posts, 72 replies were received. Seventeen roads report the use of concrete posts, three are using a few experimentally, and the balance in lots running as high as 15,000 to 20,000. Sixteen roads are using metal posts, 13 having purchased them from manufacturers, and 3 having made them with their own forces. All roads, with two or three exceptions, are using wood posts.

Concrete posts have been in service covering periods ranging from 6 months to 9 years; a number of roads having used them 5 or 6 years. Their use has not covered a sufficiently long period to enable anyone to give any very definite information as to their life. Some have placed it at 15 to 50 years, others 10 to 20, while most of the roads have advised it was indefinite or gave no reply With proper material and workmanship in their manufacture, there seems to be no reason why they should not be good for 30 to 40 years if not subjected to sudden shocks or severe strains.

The percentage damaged in handling was reported by the roads as ranging from 0 to 5 per cent, with a probable average of not over 2.5 per cent, the damage in many cases occurring while the posts were being removed from the molds. The method of shipment varied from loading on flat cars crosswise with no packing to the use of hay, straw or sawdust. The average cost of line posts would seem to be about 25 cents, the anchor or corner posts 50 cents, while the average cost to install would probably run about 12 cents.

Some roads are just beginning to use metal fence posts, while others have had them in use as long as six years. Quite a few roads have been using them two or three years. As in the case of concrete, their use has not covered a sufficiently long period to determine definitely their life. It has been variously estimated at 10 to 20 years, except in old boiler tubes, which fail in 6 to 8 years. The line posts cost about 25 cents, end posts $1.60 and corner posts $2.30. The cost of setting line posts ranges from 2 to 10 cents, with a probable average of 6 cents. The cost of setting corner or end posts varies from $1.00 to $1.50 if set in concrete, not including the cost of materials.

Information secured from 66 railroads relative to wood posts shows that the prevailing timber used is cedar, locust, chestnut and oak, with some Bois d'Arc, catalpa, cypress and pine. The life varies from 5 to 6 years for oak and pine to 20 years for the cedars and 40 to 50 years for Bois d'Arc. The loss by fire in most cases is low, but in some localities runs as high as 25 per cent, while several roads report as high as 50 per cent.

Only three companies, have undertaken the cultivation of timber for posts, two reporting results satisfactory and one poor. The prices paid for posts range from 7 to 38 cents, the average being about 18 cents, with about 2 cents for delivering along line of road. The average cost to set wood posts is about 10 cents. A number of roads advise they are considering changing to concrete or metal. Others advise that where timber is plentiful and cheap, wood is most economical.

From some investigations made bearing on the relative economy of concrete, metal and wood posts, it was found that where cedar and locust posts, for example, can be bought for 16 to 18 cents, with a probable average life of 15 years, there is little economy in using concrete posts at 25 cents each unless their life can be definitely fixed at over 30 years.

In the report of this committee two years ago, reference was made to concrete posts which were being used by the Board of Water Supply of the City of New York around Ashokan reservoir, spoil banks, borrow pits and gate houses and other locations along the Catskill Aqeduct, comprising about 150 miles of fencing, making it no doubt the largest individual user of concrete posts in the country at this time. This year the committee presents some additional information.

In enclosing the Ashokan reservoir property, over 14,000 concrete posts were used in constructing about 43 miles of fencing, the posts being placed at intervals of 16 ft. Straining or anchor posts were used on straight lines at intervals of about 300 ft. and at all abrupt angles. These posts were 3½ in. square at the top, 8 in. square at the bottom and 7 ft. 9 in. long. They were reinforced with four ¼-in. square twisted steel bars, held in position by 5 hoops made of the same material. The line posts were "U" shaped, 5½ in. over all at the bottom and 3½ in. at the top, reinforced with four No. 5 U. S. steel wire gage rods. All posts were made on the site by the contractor for the fencing, the concrete consisting of one part cement to four parts aggregate in which the sand was limited to ¼ in. maximum size and the stone to such size as would pass through a ¾-in. screen and be retained on a ¼-in. screen. The specifications required that the posts be protected from the hot sun and from freezing and that they be kept moist for at least two weeks after being cast. As most of them were set during the years 1913 and 1914, the Board has had no opportunity to judge as to their durability; but as they are not subject to deterioration due to the elements as wood and metal, it is but fair to assume the average life of the posts to be at least 25 years.

As stated above, the specifications required the posts to be kept moist for a period of two weeks. It was found that occasional sprinkling was not satisfactory and that it was necessary to cover them with something that would retain the moisture. After being cured from 15 to 30 days, the posts were hauled from the place of manufacture to the site on wagons equipped with a platform so that they were supported their entire length, no packing of any kind being used. The number damaged in handling probably did not exceed 1.5 per cent. In common with the property of other large corporations, the trespasser considered it necessary to try his marksmanshp either with gun or stones, with the result that some posts have had the tops broken off. The posts in general have been satisfactory, but would perhaps have been more satisfactory had the square posts used as end or anchor posts been made with a heavier section, as an unbalanced strain occasionally broke the posts off at the surface of the ground.

These posts were furnished under a contract which included the manufacture, delivery and setting, but not the excavation of the hole or the cement and reinforcement used in their manufacture. At the contract prices, the cost of the line posts in place was $1.47 each, distributed as follows: Post $0.90, cement $0.145, reinforcement $0.175, excavation and backfilling $0.25. The corner and anchor posts, set in concrete with one brace and thrust block, complete in place, cost $13.81, made up of the following items: Post $1.30, cement $0.32, reinforcement $0.43, earth excavation $0.50, concrete to refil post hole $6.00, galvanized angle-iron brace $3.02, excavation for thrust block, earth $0.14, concrete for thrust block $2.10. Post holes for line posts in rock cost $0.40 each additional and for corner and anchor posts and thrust blocks $1.02 additional.

TESTS OF CONCRETE POSTS.

The tests of concrete posts, of which mention was made in last year's report, have been completed. The purpose of these tests was to determine the relative strength of the different types of concrete posts. The tests were made at the Lewis Institute, Chicago, by D. A. Abrams of the Institute, as director by the committee and with his assistance.

Through the secretary, various railroads using concrete posts were solicited for posts for the tests and six companies responded. The posts were all made about a year previous to the tests, so that differences in the age of concrete does not enter into the results. The following instructions were sent to each company furnishing posts:

"Fifteen posts should be made. It is expected that the posts will be made carefully, but not more carefully than posts which are to be used for fence purposes should be made.

"The concrete mixture should consist of one part cement, two parts sand and four parts crushed rock or screened gravel—gravel or crushed rock not to be smaller than

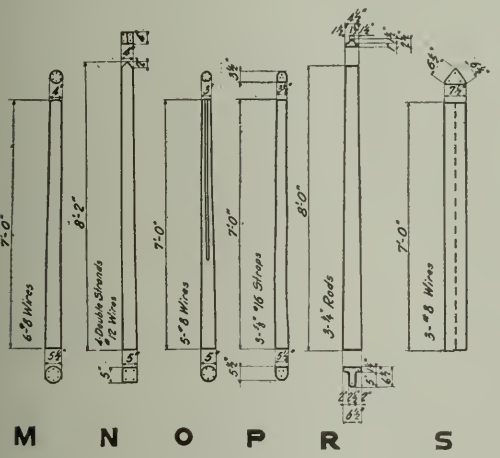
¼ in. or larger than ½ in. in size. If it is not possible to obtain the above materials, the concrete mixture should consist of one part cement to four parts of pit-run gravel, with the above maximum limit in size. Concrete should be of quaking consistency.

"The posts should not be exposed to the sun, and should be sprinkled with water the first eight or ten days after being made, to aid curing. It is expected that the tests will be made about 60 days after the completion of the posts. Shipping directions will be furnished later. Posts should be crated to avoid breakage due to improper handling in shipment. There is no objection to placing several posts in a crate if the weight is not too great.

"In addition to the posts, five 4-in. cubes should be made of the same concrete materials and at the same time as the posts and shipped with them. Care should be taken to have the concrete in the cubes of the same consistency and density as that in the posts.

"A full description of the materials used, including water, cement, sand and gravel, and the method involved in making the posts, should be furnished. Each post should be marked with the date on which it is made."

In general the instructions were complied with, but two sets of posts were shipped uncrated and two companies did not furnish the test cubes called for. Some of the



Types of Concrete Posts Tested.

posts of one type shipped without crating showed quite distinct horizontal cracks, but in the tests failure occurred at other points. Two of the types were eight-foot posts. In making the tests, however, the extra foot was neglected —that is, they were supported and loaded at the same distance from the lower end as the seven-foot posts.

The committee desired to subject the posts to conditions similar to those occurring in actual use, and decided on three tests—a simple beam, a cantilever, and an impact test. For the simple-beam test a Riehle compression machine was used, the supports being placed 3 in. and 6 ft. 6 in. from the lower end of the post and the load applied 2 ft. 6 in. from the lower end.

For the cantilever and impact test a method for holding the post had to be devised. This was accomplished by constructing on a 12-in. by 12-in. timber a heavy wood box having an area of about one square foot and a depth of 2 ft. 6 in. The post was placed in the box in an upright position, and screened gravel, about one-quarter to three-quarters of an inch in size, was poured around it and lightly tamped. The load was applied 6 ft. 6 in. from the bottom of the post to bring the fence side of the post into tension. The pull was measured with a tension dynamometer.

For the impact test the post was placed in the box, as before, and a wooden washer or plug, fitting loosely about the post, was bolted down on top of the gravel to prevent its falling out. The post and box were then turned to a horizontal position, which brought the upper end of the post under a weight which could be moved vertically in a pair of guides or leads. This weight was of wood loaded to 33 lbs. The first drop was for a distance of 5 in., and this was increased 1 in. at a time until failure of the post occurred.

Tests of the reinforcement showed the following average values of the yield point and the ultimate load:

Post.	Yield Point in lbs. per Sq. In.	Ultimate Load in lbs. per Sq. In.
M	98,800	106,700
N	75,700	83,600
O	.....	94,000
		72,000
P	41,900	50,100
R	42,600	56,700
S	65,800	80,200

In the case of Post "O" it was not possible to obtain the yield point on the metal, because of the fact that the wires were crimped. Apparently there were two grades of steel used in this wire.

In Table 8 a comparison is made of the breaking load, as determined in the contilever test, per pound of post and per pound of reinforcement. It is felt that these units afford a good basis of comparison, because they have direct bearing on the cost of making as well as the cost of handling the post.

Attention is called to the fact that in spite of the wide variation in the strength of the concrete, all of the posts failed in tension, and this brings out the important relationship which the quantity and distribution of reinforcement bear to the strength of the posts. It is believed that there is an advantage in using some type of reinforcement in which the position of the longitudinal members is definitely fixed near the outside of the post. A dense concrete is required to thoroughly protect the steel in this position.

TABLE 8—TESTS OF REINFORCED CONCRETE FENCE POSTS.

Type of Post	Average weight in lbs.	Average breaking load, in cantilever test applied 48" above the ground line, in lbs.	Breaking load, as before, per lb. of post	Estimated weight of reinforcement in lbs.	Breaking load, as before, per lb. of reinforcement
M	115	420	3.68	2.88	145
N	147	231	1.57	1.79	130
O	75	325	4.33	2.41	135
P	80	185	2.31	2.59	71
R	90	335	3.72	2.55	131
S	150	135	.90	1.44	94

METHODS USED IN REPAINTING SIGNS, AND SPECIFICATIONS FOR WHITEWASHING CATTLE-GUARD WING FENCES.

Sixty-two replies were received in response to inquiries relative to methods used in repainting signs and whitewashing cattle-guard wing fences. The prevailing practice in vogue on the majority of the railroads from which replies were received is to send paint gangs of from two to six men, supplied with material and equipment, over the road, on speeders or hand cars, who first repaint the posts and backgrounds of the signs and then either return to paint the inscriptions or are followed by another gang about two days later which does that class of work. In a few instances when signs need repainting, they are replaced by new ones and the old ones are sent to the shops for repairs and repainting. Thirty-three roads use stencils in repainting inscriptions except in the case of special lettering, which is done freehand. A few roads advise their use to a limited extent only, while 11 roads report they do not use them for any work.

The replies indicate that white lead and linseed oil are almost universally used where the posts and backgrounds are painted white, and lamp black and linseed oil for black lettering, etc., on wood signs. For repainting metal signs, the same materials are generally used, although in a limited number of cases red lead and graphite are used. Some roads report the use of commercial paints, of their standard colors. Over half the roads have no specifications, but use leads and oils in proper proportions or commercial paints of known reputation; others, in lieu of specifications, give the proportions of the ingredients used.

There does not seem to be any well-defined general practice in regard to frequency of repainting signs. Some roads repaint every year, others every two years, while others advise they repaint every three or four years or when needed. Metal signs require more frequent repainting than wood to keep them in proper condition. The committee has been unable to get any very definite information on cost data.

Most roads whitewash their cattle-guard wing fences, but a few use cold water paint. Some roads advise they have

under consideration abandoning the practice, as the results hardly justify the expense. There is considerable variation in the specifications for whitewash. Some roads report the use of ordinary lime and water, others add salt, glue, whiting, rice, etc.

In the report submitted by this committee two years ago, some figures were presented on the cost of setting concrete, metal and wood posts. This year the committee has secured some information from the Baltimore & Ohio, giving cost data on two sections of test fence, each 4,620 ft. in length, erected in May, 1913, on its Philadelphia division. Metal posts were used in one section and wooden posts in the other. Electrically welded wire fencing made of No. 9 galvanized steel wire was used in both cases. Both sections of fence were erected on reasonably level ground and where the soil was composed largely of clay and sand. The metal posts were driven 2½ ft. in the ground and the soil around them tamped to make them more rigid. The wooden posts were set in the usual manner, in holes dug about 2½ ft. deep, the holes being backfilled and tamped. All the posts were 7 ft. in length. The steel end or anchor posts were set at intervals of 40 rods (the length of a large roll of wire) in concrete about 30 in. deep and 12 in. square. The steel intermediate or line posts were set at intervals of 16½ ft. or as near thereto as the condition of the ground would permit. The same spacing wes used in setting the wooden posts. The average cost of labor for driving and tamping 279 steel intermediate or line posts was $0.0573 each. The average cost of digging holes, distributing and setting 288 wooden intermediate or line posts was $0.0879 each. The cost of labor setting the steel end or anchor posts was $1.22 each. The average cost of labor erecting the section of fence in which steel posts were used was $0.18 per rod, or $57.60 per mile. The average cost of labor erecting the section of fence where wooden posts were used was $0.1576 per rod, or $50.43 per mile. The average cost of stretching the wire on metal posts was $0.0613 per rod, or $19.62 per mile. The average cost of stretching the wire on wooden posts was $0.0672 per rod, or $21.50 per mile. From the above it will be noted the cost of setting a wooden post was about 50 per cent greater than that of setting a metal post, but the average cost of erection of the fence complete was less where wooden posts were used than where metal posts were used. This was due to the high cost of setting anchor posts. The metal line posts cost $0.245 each, or $0.3023 in place; the wooden posts cost $0.18 each, or $0.2679 in place. A recent examination of the above metal posts failed to detect any indication of corrosion, although the wire fencing showed unmistakable evidence of rust.

CONCLUSIONS.

Subject No. 1.

(1) Concrete is a practical, economical and satisfactory material for the more simple forms of signs of small or moderate size.

(2) Metal is a practical, economical and satisfactory material for the more complicated forms of signs of medium size.

(3) Wood is the most economical and satisfactory material for the larger forms of signs, particularly where timber is plentiful and cheap.

Subject No. 2.

(1) Concrete is a practical, economical and satisfactory material for fence posts, where suitable timber is scarce and expensive.

(2) The use of metal fence posts has not as yet covered a sufficient period to demonstrate their practical and economical qualities for that purpose.

(3) Wood is the most economical and satisfactory material for fence posts in localities where timber is plentiful and cheap.

Subject No. 3.

(1) The most practical method of repainting signs is to send paint gangs with material and equipment over the road on speeders or motor cars.

(2) White lead and linseed oil with pigments of proper coloring and lamp black and linseed oil for lettering are the most practical and satisfactory paints for both wood and metal signs.

RECOMMENDATIONS.

(1) In view of the variation in the design of concrete, metal and wood signs, and the consequent variation in cost, and also the comparatively short time that concrete has been used for signs, the committee finds itself unable to present a complete report this year, and it therefore recommends that the material collected be accepted as information and that the subject be reassigned for next year to permit a further study of the various designs received with a view to making definite recommendations for standards to meet country-wide conditions.

(2) As both concrete and metal fence posts have been in use but a few years and their durability is still considerably in doubt, the committee is unable to present any definite information as to their relative economies as compared with wood. From a careful analysis of the information received relative to concrete and wood posts, it finds that where suitable timber is plentiful and cheap there is no economy in the use of concrete unless its life should prove much longer than now estimated. It therefore recommends that further consideration of this phase of the subject be deferred until more definite information can be secured on both concrete and metal posts.

(3) The following specification for whitewash for cattle-guard wing fences is recommended:

Take half a bushel of unslaked lime, shake it with boiling water, cover during the process to keep in the steam, strain the liquid through a fine sieve or strainer, and add to it a peck of salt, previously dissolved in warm water, three pounds of ground rice boiled to a thin paste and stirred in while hot, half a pound of Spanish whiting, and one pound of clean glue, previously dissolved by soaking in cold water and then hanging over a slow fire in a small pot hung in a larger one filled with water. Add five gallons of hot water to the mixture, stir well and let it stand a few days, covered from dirt. It should be applied hot, for which purpose it can be kept in a kettle or portable furnace.

A pint of this mixture, if properly applied, will cover one square yard, will be almost as serviceable as paint for wood, brick or stone, and is much cheaper than the cheapest paint.

W. F. Strouse (B. & O.), chairman; G. E. Boyd (D. L. & N.), vice-chairman; R. B. Abbott (P. & R.), H. E. Billman (M. P.), E. T. Brown (B. & O.), A. C. Copland (C. & O.), Arthur Crumpton (G. T.), J. T. Frame (C. G. W.), L. E. Haislip (B. & O.), Maro Johnson (I. C.), L. C. Lawton (A. T. & S. F.), G. L. Moore (L. V.), W. F. Purdy (W. P. T.), Thomas Quigley (I. C.), C. H. Splitstone (Erie), committee.

Discussion on Signs, Fences and Crossings.

The report was presented by Chairman Strouse.

Mr. Strouse: I move that the definitions that are marked with an asterisk be eliminated in the reprint of the Manual.

The President: If there is no objection to that motion it will be regarded as passed.

Robert Trimble (Penn. Lines): There is one matter that I want to call your attention to, and that is the specification as to right-of-way fence, first-class, second-class, third-class, and fourth-class. Heretofore the Association has objected to that kind of classification, because it is a class that might be criticized. Take our roadway, that is classified as first, second and third class. I think we ought to change this, and I move that that change be made.

The President: The committee will accept that suggestion.

C. Dougherty (C. N. O. & T. P.): I move that the last paragraph, under "Gates for right-of-way fences" be amended by adding, "and the end of the gate opposite the hinged end shall lap by the post a sufficient distance thoroughly to prevent it from being opened by side pressure."

The President: The committee will accept the motion. The committee moves that the specifications as read will be adopted and included in the next Manual.

(The motion was seconded and carried.)

The President: The adoption of the definitions and general requirements for surface cattle-guards will be passed on by the convention, and the same as to stock guards and general requirements. The committee moves the adoption of the report.

(The motion was carried.)

The conclusions at the end of the report were also adopted.

L. C. Fritch (Can. Nor.): Under the heading, "track construction," etc., is that to be included in the Manual?

The President: That is part of the Manual.

Mr. Fritch: Clause 3 calls for "141-lb., 9-in. depth girder rail," and I think that will be pretty expensive on some lines. I think that ought to be modified.

Mr. Strouse: In regard to the criticism of that paragraph, it states "141-lb., 9-in. depth girder rail, or similar section, with suitable tie-plates and screw-spikes, should be used." It does not necessarily tie us down to that particular weight. The idea in using that depth of rail is to take care of the ordinary style of paving, that is so frequently done, namely, the use of granite blocks, which usually range between 5½

and 6½ inches in depth, and, in addition to the block, of course, provision is made for the sand cushion. Where sheet asphalt is used on a concrete base, a shallower rail can be used, but this is the depth of rail that was recommended in one of the former reports, and it had reference particularly to the use of granite blocks for the paving.

Robert Trimble: I move that this be changed to read: "One hundred and forty-one-pound, nine-inch depth girder rail, or similar section, with suitable tie-plates, should be used for tracks laid longitudinally in streets, when the conditions require such construction. Tracks should be filled in with crushed rock, gravel or other suitable material, allowing for two-inch cushion of sand under finished pavement. For street crossings the standard track construction should be used, with such modification as may be required to suit the situation."

(The motion was carried.)

Mr. Campbell: In the fifth section, I move to strike out the words "grantie or crushed rock, block preferred," making it read "to conform to municipal requirements."

L. C. Fritch: I think the first part of that is objectionable, that they must conform to municipal requirements. The tracks are subject to vibration, and I don't think that we should bind ourselves to conform to municipal requirements.

Mr. Campbell: I will be in favor of referring this back to the committee. I do not believe the specification, as it stands, covers the situation fully. I would like to see this eliminated, and this specification put on a basis so that it will cover the whole situation.

(The motion was changed so as to eliminate this part from the Manual at the present time, and refer it back to the committee for further consideration, and was carried.)

Hunter McDonald: Does that also include the plan?

The President: That will be withdrawn also.

C. S. Churchill (N. & W.): It seems to me, in the way the heading on Paragraph 3 in the recommendations at the end of the report is worded, we are led to the conclusion that that is the standard for general use all over the country. I think we should avoid any such intimation as that. Many railroads do not practice whitewashing of fences or anything else. The wording should be made so that it should be considered as optional, not a standard of practice in use everywhere. I suggest that it be recommended wherever the practice of whitewashing is followed.

Mr. Strouse: The recommendation of the committee is the specifications adopted by the United States Government.

The President: The committee will accept the modification suggested by Mr. Churchill.

(The recommendations were read as amended and adopted, and the committee was discharged.)

ECONOMICS OF RAILWAY LOCATION

The work assigned to this committee was as follows:

(1) Study the question of grade, curvature, rise and fall and distance, and, if possible, present conclusions as to reasonable values of same in a usable form, in order that they may be of use for the information and guidance of locating engineers.

(2) Continue the important study of economics of railway operation heretofore carried on by the committee, in order that the information may lead to more economical methods in railway operation, and that information may be obtained for correcting values given to the physical features in the locating of railways.

(3) Make special efforts to collect information in regard to effects of passenger and freight traffic on the cost of maintenance.

The chairman of the committee assumed the responsibility of changing the instructions to the sub-committee having charge of subject (1) to read, "Study the question of grade, curvature, rise and fall and distance, and, if possible, present instructions to enable engineers to obtain reasonable values for grade, curvature, rise and fall and distance."

If the methods outlined by this committee are approved, the immediate work for the future will be:

(1) Make a study of the resistance of trains running between 35 and 75 miles an hour.

(2) Make a study of the effect on the cost of maintenance of way and maintenance of equipment of fast trains.

(3) Make a study of the effect curvature has on the cost of maintenance of way.

(4) Make a study of the effect curvature has on the cost of maintenance of equipment.

(5) Make a study of the amount of fuel consumed in doing an actual horsepower-hour of work. It is believed that a study of this subject will not only be valuable as a basis in determining the economics of location, but that the results will be beneficial to operating officers, calling to their attention various losses in the fuel supply, and especially so in the cost of operating a very busy single-track vs. the cost of operating double-track lines.

(6) Preparation of a method for the comparison of alternative locations with varying ruling gradients.

CONCLUSIONS.

The following conclusions are submitted for approval:

(1) A line is located when its position is fixed horizontally and vertically.

(2) Locating a railway means designing an economical plant for handling a given traffic. The economical plant for a given quantity and class of traffic cannot be the economical plant for a greater or less quantity of traffic or for traffic of a different class. It is considered good prac-

J. G. SULLIVAN,
Chairman Committee on Economics of Railway Location.

tice to discount the future within reasonable limits, providing the necessary funds are available.

(3) The most general formula for the economic value of a location is:

$$\frac{R-E}{C}=p \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where R = Annual revenue (receipts from operation);
E = Annual expense of operation, including depreciation and taxes;
C = Capital invested (cost of construction);
p = Percentage of profit on investment.

(4) The following equation may be used in certain cases, especially where the annual revenue, known or unknown, is constant:

$$R-(E+I)=P \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where I = Amount of interest on cost of construction;
P = Amount of profit (net corporate income).

When the revenue is constant the condition of equation (2) is that the sum of operating expenses, plus interest on cost of construction, shall be a minimum, and is convenient in many cases, but does not indicate the proportion of profit to investment. Care should be taken not to use too low a rate of interest. The ratio of profit to investment should be considered.

(5) In order to make an economical location of a railway, the engineer must know or make a reasonable assumption of the amount and class of traffic that the railway will be called upon to handle, the class of power and the approximate efficiency and cost of the fuel that will be used, the rate of wages that will be paid to employes, the cost of maintenance materials, and the rate of interest considered a proper return for additional expenditures involved in the improvement of the line for the reduction of operating expenses.

(6) One of the most difficult problems to be solved is the desirable length of engine districts, but the question is governed to such an extent by other considerations that no definite rule can be given. One of the necessary requisites for a terminal point is a suitable water supply for locomotives and for domestic use. It is desirable, where possible, that terminal points should be located on minor summits.

(7) Passing sidings and road water supplies should preferably be located on minor summits.

(8) If passing sidings must of necessity be located on ruling gradients, then such gradients should be compensated through and for a full train length in each direction from either end of the siding. The rate of compensation will be governed by the ruling gradient.

(9) In deciding upon the ruling gradient for each engine district, where different ruling gradients are contemplated for adjoining districts carrying approximately equal traffic, due consideration must be given to the breaking up of trains, which may be caused by the difference in ruling gradients. Where a fixed elevation is to be overcome, the development of distance to reduce the rate of ruling gradient is often a mistake, provided the ruling gradient of the shorter line is within reasonable operating limits. Where curvature and distance are introduced for the sake of ruling gradient reduction, line resistance, and thereby fuel consumption, is increased, as is also the cost of maintenance of way and equipment. Some of the benefits derived from a reduction of the ruling gradient are the saving in weight of locomotives to be lifted over the summit, train and engine wages and engine mileage reduced and the capacity of the track increased. Full advantage cannot be taken of the apparent train rating increase due to ruling gradient reduction on an engine district having a large percentage of grade at or near the proposed ruling rate, as in all probability, if this anticipated increase in rating is in direct proportion to the proposed reduction in ruling gradient, the required time for movement of trains over the engine district cannot be made. On crowded single-track lines a feature affecting train rating to a great extent is the loss of time at meeting and passing points; it, therefore, is necessary to estimate the train rating for any line as the tonnage that can be handled in a given time, due allowance being made for necessary stops.

In estimating the time required for trains to pass over an engine district, a speed curve and time card should be plotted. There is little increase of tonnage for local and fast freights, and none for passenger trains, to be credited to a reduction of the ruling gradient on lines with light, undulating grades.

In establishing a ruling gradient and determining the effect of it on future operating expense, due consideration must be given to possible future revisions of the line; thus, in comparing alternative locations, one of steep ruling gradient may appear more economical than another of low ruling gradient, but the situation of the former may be such that its revision would necessitate an abandonment of all or a large percentage of the location; while the application temporarily of a steep ruling gradient to the low-gradient location might bring the cost of the latter line within such limits that, considering future traffic, its construction would be desirable.

(10) In the construction of a line where the contemplated immediate traffic is small and the future traffic large, sharp curvature and steep temporary gradients, so situated as to be possible of reduction when justified by the traffic, may be advantageously introduced; a line being thus constructed which will provide for immediate requirements and which can be improved for future requirements at a reasonable expense. Before deciding upon such temporary expedients, care should be taken to compare the cost of the work ultimately to be abandoned with the interest saved on the extra cost of construction that would have been necessary to construct a line on the final location during that period in which the more expensive construction would appear uneconomical.

In the construction of temporary lines due consideration must be given to the location of station buildings, and these should not be located on portions of the line where revisions are contemplated, owing to the fact that if a receiving and delivery point for local traffic is once established, opposition from the public may prevent its removal. In the matter of terminal property the future requirements should be estimated for a longer period than is justified for the line between terminals.

(11) Momentum gradients, not exceeding that over which a locomotive loaded for the ruling gradient can handle its train in two parts if stalled for any reason in the sag, may be used to reduce construction cost without decreasing the train rating or the efficiency of the railway, and should be used where economy in construction cost is thereby effected, except at points where train stops or reduced speed, below the limit necessary to operate the gradient, are likely to be necessary. In the calculation of the lengths of momentum gradients the maximum speed of freight trains at the bottom of the sag should not exceed the speed limit for such trains on the engine district under consideration; and the minimum speed at the top of the grade, where the velocity grade adjoins an ascending grade of any considerable length, should not be less than 11 miles per hour. Where the top of the momentum gradient is at a summit, the minimum speed may be less than 11 miles per hour.

In fixing the grade line for any alinement, care should be taken to insert vertical curves at all grade-line intersections. Curves should be connected to tangents by spiral or easement curves of such length as to provide ample space in which to make the required superelevation, giving due consideration to future requirements of increased speeds.

(12) The location of terminal points, ruling gradient, and pusher gradients having been decided upon, the effect of the minor details of location, namely, distance, curvature and rise and fall, upon operating expenses may be determined approximately in the following manner: Alternative locations may be compared by distance, curvature and line resistance; the distance being the length of the line measured along the center line of the location; the curvature the number of degrees of central angle subtended by the center line of the track, and which may be divided into sharp curvature, necessitating a reduction of speed for trains, and ordinary curvature, which will again be subdivided into that increasing line resistance in both directions and that increasing line resistance in one direction only and line resistance which is the sum of the rolling resistance (or friction resistance), plus the resistance of gravity overcoming difference in elevation on up-grades, plus the resistance due to curvature, minus the energy of gravity on trains on descending grades, from which has been subtracted the loss of energy (or velocity head) due to the application of brakes. For purposes of comparison this item should be reduced to its equivalent in feet of vertical lift.

Friction resistance, under normal conditions, of warm weather, modern freight equipment, and speed between 7 and 35 miles an hour, may be obtained from the formula

$R = 2.2\ T + 121.6\ C.$

R = Total resistance on level tangent.

T = Total weight of cars and contents in tons.

C = Total number of cars in train.

This amounts to 4 lb. to 8 lb. per ton, depending on whether the cars are fully loaded or empty. This is equivalent to a rise of from 10 ft. to 20 ft. per mile. For mixed traffic a conservative estimate is, train resistance equals rise of 15 ft. per mile. Train resistance increases at lower temperatures, and at extreme low temperature may go as high as 30 lb. per ton for empty freight cars. However, in comparing different locations in the same country, it is deemed necessary to make comparisons for the ordinary conditions only. The resistance due to curvature may be taken at 0.04 ft. per degree of central angle.

(13) *Fuel Consumption.*—It is the unanimous opinion of the committee that the train-mile basis alone is not a reliable or correct method of estimating fuel consumption for comparative purposes. The following two methods are recommended: First, dividing the fuel consumed into the amount required for the movement of the locomotive alone, calculated on a time basis, for consumption in yards, roundhouses and sidings, and the amount required for the actual movement of cars, and this last amount can be computed as varying directly with the amount of work done. Second, calculating fuel consumption by means of the speed curve, calculating from this the fuel consumed by locomotives working, drifting and standing. These methods for calculating fuel consumption also lend themselves to the comparison of lines with varying ruling gradients.

(14) To determine the relative value of the minor details of location under consideration (curvature, distance, rise and fall), it is first necessary to decide upon a method of studying the effect of these factors on the cost of operation. The following method is recommended: Curvature increases resistance at the rate of 0.04 ft. per degree of central angle; it also affects the cost of maintenance of way and the cost of maintenance of equipment, but sufficient data is not available to warrant a conclusion as to the definite amounts.

Rise affects line resistance and time; the principal effect of eliminating rise will be found in the fuel account. It also affects the cost of manitenance of equipment and maintenance of track, but to what extent is unknown. It may be neglected in comparing alternate locations.

Distance affects train wages, line resistance, maintenance of way and maintenance of equipment. The effect of distance on line resistance will be found in the fuel account. The effect of distance on train wages can be computed on a direct train-mile basis. The effect of distance on maintenance of way is a more complicated problem on account

of the uncertainty as to the basis on which maintenance should be calculated. A fixed sum per mile to cover factors of maintenance that are more or less constant plus a rate for the equivalent ton-mile unit, using multiples for weights of engines and passenger cars, is correct in principle, but until such time as information is obtained as to the value of these multiples, this item may be calculated on a basis of a constant per mile plus a fixed sum per train mile. The effect of distance on maintenance of equipment, for comparative purposes, may be calculated on a train-mile basis.

(15) *Special Structures.*—The maintenance and operation of special structures must be considered on their respective merits for each location.

(16) Time will not in general constitute an important factor in the consideration of the minor details of location, but if the difference in time required to operate over alternative locations is of sufficient importance to affect the amount of equipment to operate the line, and consequently the annual charge for same, the earnings of the line, or the trainmen's wages through overtime, this item must be taken into consideration.

(17) In comparing lines of varying lengths, consideration must be given to the effect of distance upon revenue. Another item worthy of consideration is the fact that the reduction of distance in engine runs of less than 100 miles, which constitute the entire day's work for trainmen employed on same, may not reduce the amount of wages to be paid to such employes.

(18) The data in the Manual on the subject of "power" should be amplified and altered to the extent recommended by the sub-committee on Stokers and Superheaters so as to provide for the increase in coal consumption and tractive power due to these improvements.

John G. Sullivan (C. P. R.), chairman; C. P. Howard (Cons. Eng.), vice-chairman; F. H. Alfred (P. M.), R. N. Begien (B. & O. S. W.), J. F. Burns (L. & N.), Maurice Coburn (Vandalia), A. C. Dennis (Contr. Eng.), A. S. Going (G. T.), F. W. Green (L. & A.), L. C. Hartley (C. & E. I.), P. M. LaBach (C. R. I. & P.), Fred Lavis (Cons. Eng.), J. deN. Macomb, Jr. (A. T. & S. F.), C. W. P. Ramsey (C. R. R.), E. C. Schmidt (Univ. of Ill.), A. K. Shurtleff, H. J. Simmons (E. P. & S. W.), F. W. Smith (Contr. Eng.), Walter Loring Webb (Cons. Eng.), M. A. Zook (Interstate Commerce Commission).

The report was accompanied by reports of subcommittee 1, on Grades, Curvature, Rise and Fall and Distance, elaborating on conclusions Nos. 5 to 17, inclusive; subcommittee 2, on Economics of Railway Location, presenting additional information in support of its conclusion of last year that the equivalent ton-mile unit is the correct basis for a comparison of maintenance of way expenses and a discussion, upon which conclusions Nos. 1 to 4, inclusive, were based; and of subcommittee 3, which presented information on stokers and superheaters, compiled from the reports of the committee on Locomotive Stokers of the American Railway Master Mechanics' Association and on information furnished by 15 roads using automatic stokers. Based on this information, this subcommittee recommended that the Manual be revised as indicated in conclusion 18.

MINORITY REPORT.

The undersigned cannot agree with that portion of the report concerning the foot-ton method of calculating the fuel consumed referred to in Conclusions 12 and 13. The fuel consumed per indicated horsepower of work varies from about 7.7 lb. with locomotives working full stroke to about 4.75 lb. at its maximum efficiency at about 3.6 times the speed that it can maintain full cutoff. The indicated horsepower at maximum efficiency is also over 60 per cent more than at full cutoff.

With these two facts in view it appears that the amount of coal per 1,000 foot-tons will vary widely. Another factor, however, enters into the work done by the locomotive, and it may or may not be a considerable percentage of the total work. This factor is the power exerted in accelerating trains which will vary from less than 1 per cent of the total power used on heavy gradients to more than 20 per cent on level grades, depending on the distance between stops. No notice is taken of this factor in the method set down in the report of the committee, and yet it is liable to add considerably to the total foot-pounds.

In a table were shown data from simple cases of three stations ten miles apart on a tangent, and a train starting at one end of the line and working at its maximum power on level and ascending grades, but stopping at both the other stations, using brakes for the last 1,500 ft. of stop. There is one exception to this: on descending grades, the train accelerates by gravity to 35 M. P. H., then is held at this speed to the foot of the grade, and then drifts to within 1,500 ft. of the station where brakes are applied.

The four separate cases are: (1) A level grade the entire distance. (2) A level grade for one-half mile; 9 miles of ascending 0.4 per cent grade; a level grade for one mile with station stop in it; 9 miles of descending 0.4 per cent grade, and one-half mile of level grade. (3) Same as (2), except 0.7 per cent grades are used instead of 0.4 per cent. (4) Same as (2), except 1.0 per cent grades are used instead of 0.4 per cent.

There is no question which of the above would be the most economical to operate. The whole idea of using the above is to illustrate the fallacy of using the foot-ton method in calculating fuel.

As tables covering the distances used in acceleration and retardation on the various gradients had been worked out for a consolidation locomotive in an article "Locomotive Fuel Consumption and the Speed Diagram," pp. 3 to 20, Part 2, Vol. 14, American Railway Engineering Association Proceedings, the same engine and train were considered here.

	Weight.	Resistance.
Locomotive	173 tons	2,450 lbs.
Train	1,306 tons	7,052 lbs.
Total	1,479 tons	9,502 lbs.
Average resistance per ton-train		6,425 lbs.
Equivalent grade resistance		0.3125 per cent

From the table which was prepared it was shown that the coal used per 1,000 foot-tons varies from 6.20 to 8.03 lbs. Taking the difference in foot-tons and the coal used for the various lines, we can get still wider results as follows:

Line.	Foot-Tons.	Lbs. Coal Used.	Lbs. Coal Per 1,000 Foot-Tons.
1.0 per cent	959,185	7,703	
0.7 per cent	748,339	4,914	
	210,846	2,789	13.23
0.7 per cent	748,339	4,914	
0.4 per cent	537,492	3,163	
	210,846	1,751	8.30
0.4 per cent	537,492	3,163	
Level	487,634	3,054	
	49,858	109	2.19

It is rightly claimed that we cannot be exact, owing to variables that enter into consideration of the subject, but we can be more exact than the foot-ton method of calculating the coal, as there is absolutely nothing to use as a base per 1,000 foot-tons. The above shows that you can figure it from various angles and get a maximum of over tix times the minimum. The simplest method and the one of greatest accuracy is by calculating the time of engine working and the time drifting and multiply this by the fuel consumed per hour working and drifting.

In the second paragraph of Conclusion 9 of the committee's report it is proposed to plat a speed diagram of the line. To do this the economical thing to do is work up tables, such as are shown on pp. 16 to 19 of the article on "Fuel Consumption" referred to above, for the assumed train on the maximum grade. This can be worked up in a diagram for convenience of the fieldmen. In order to expedite the work, time diagrams can be worked up covering the time consumed on the various grades in passing from one speed to another. With the speed diagram, however, it is simple to calculate the time.

Furnish the locating engineer a set of the tables or a diagram covering the information contained therein, and in comparing two alternate locations it is a small job to get very approximately the difference in coal used. He cannot get it by the foot-ton method except by chance. As has been shown, it is not a question of getting the average of minor variables, but trying to get an average of something which may vary over 500 per cent, depending on the way the thing is figured. There is no average.

With the above points in view the undersigned recommend the following changes in the conclusions as shown in the report:

Insert in Conclusion 12, after the first paragraph:

"The above method must be understood to not take into account the resistance due to accelerating trains. This may or may not be a considerable part of the total resistance, depending on the rate of grades and the distance between stops."

The next to the last sentence in Conclusion 12 should be changed to read:

"In comparing different locations, the resistance under average conditions should be used."

Conclusion 13, take out the last sentence and insert:

"It should be understood that the first method does not give information as to actual fuel consumed.

A. K. Shurtleff, Maurice Coburn, Vandalia; J. deN. Macomb, Jr., A. T. & S. F.

Discussion of Economics of Railway Location.

The report was presented by Chairman Sullivan, and the conclusions were considered individually.

L. C. Fritch (Can. Nor.): It does not seem to me that the statement in Conclusion 2 will hold good where it says: "The economical plant for a given quantity and class or traffic cannot be the economical plant for a greater or less quantity of traffic or for traffic of a different class." I suggest eliminating it entirely.

Chairman Sullivan: We will change it to read, "It may not be the economical plant."

Mr. Fritch: That covers the point.

E. J. Benzler (West. Church Kerr & Co.) presented a written discussion on Conclusions 3 and 4 which was summed up as follows: First, the problems of railway economics should not be complicated by the introduction of methods of financing. Second, formulas (1) and (2) give identical results if based on the same premises. Third, for a determination of economic value of a new line the most useful formula is one which shows the ratio of investment to surplus available after payment of operating expenses and interest on investment. Fourth, for a determination of economic values of alternate lines, including relocations, where revenue is not affected, the problem is simply to find on which line the sum of operating expenses and interest on investment is a minimum. Where revenue is affected, that line is best on which revenue less sum of operating expenses and interest is a maximum. Fifth, to get a proper basis for comparison it is necessary that the assumed traffic, conditions as to quantities of business handled, speed and length of trains, and other factors are consistent with the estimates of cost of line and equipment.

C. P. Howard (Con. Eng.): This equation (1) is simply a statement of the fact that the general formula or basis of comparing lines is that the ratio of profit to investment shall be a maximum. It is necessary to have some basis on which to compare different lines. Sometimes the other view is taken, represented by equation (2), that the sum of fixed charges to operating expenses shall be the minimum. The latter consideration does not take into account the ratio of profit to investment, and might be misleading in some cases, so it was concluded that the first statement should be the most general form of comparing an investment, that is, the ratio of profit to investment should be the maximum.

G. J. Ray (D. L. & W.): I think there should be something in Conclusion 5 in regard to traffic. Is the committee willing to have the word "direction" inserted after the word "amount" on the second line, so that it will read, "a reasonable assumption of the amount, direction and class of traffic," etc.?

The President: The committee will accept that suggestion.

Mr. Fritch: It seems to me the committee should give a definite rule for the length of engine districts in Conclusion 6.

Chairman Sullivan: That is one of the things that we paid as much attention to as any other. We knew it was no use to put in the mileage, as the association would not agree on proper mileage distance for a sub-division.

A. S. Baldwin (I. C.): I would suggest the following: "That the district shall be sufficiently long to avoid constructive mileage and short enough to enable the maximum slow freight train to make the run within the hours of service required.

The President: The committee is willing to accept that suggestion.

F. W. Green (L. & A.): Does Mr. Baldwin's suggestion carry with it the implication that there is a disposition on the part of the railroads to go the full 16 hours?

The President: Mr. Baldwin did not include any reference to sixteen hours in his suggestion. If there is no objection the substitute will be accepted.

Mr. Fritch: Nothing is said in Conclusions 7 and 8 about not locating passing sidings on curves.

Chairman Sullivan: I think possibly that was an oversight. We have in all of our instructions said that stations will not be located on curves; in fact, we are not doing it where we have a chance, and especially that no obstructions shall be placed on the inside of curves.

Mr. Baldwin: I would think that the gradient "should be compensated for a full train length, in either direction, from either end of the siding," is excessive. I have had experience on long maximum gradients, where it is exceedingly difficult to get a curved gradient compensation, and it is not necessary to have compensation for the full length of the train. There is only a small part of the train on the switch and the approach, and a much shorter compensation is sufficient than with the full length of the train.

H. R. Safford (G. T.): Is that not an erroneous use of the term "compensation"? Compensation really refers to compensation for curvature.

Chairman Sullivan: The committee will accept your suggestion.

The President: The former suggestion has not yet been passed on by the committee, the one in regard to carrying the compensation beyond the end of the sidetrack.

Chairman Sullivan: There is a great deal in what Mr. Baldwin states. This, of course, is the ideal condition, if you can get your sidetrack on a lower rate of grade, and for a full length at either side, say when you pull the train in going uphill; it is an ideal condition. Personally, however, I don't know that it is of a great deal of use, because when you are building a line at first you will probably have your stations ten miles apart, and later you will put in sidings; you cannot compensate at one point, and you must lower accordingly.

C. Frank Allen (Mass. Inst. Tech.): As I understand the purpose of the committee it is to meet this condition, that the train resistance at starting is probably fourteen to eighteen pounds per ton. The train resistance after you get going is more likely to be five pounds per ton. If I understand the purpose of the committee it is to reach that condition and not the curve of the siding or anything else.

Chairman Sullivan: That is true, of course, but at the same time your engine is more efficient; it can pull a greater load. We can start the trains usually on any grade, if they have not frozen up; but it is an aid to operation.

Mr. Baldwin: I wish to reiterate that I am not opposed to the reduction of the gradient through the sidetrack, but I think to make it a full train length, each side of the switch is too long, because it is adding a large amount to the cost.

The President: Will Mr. Baldwin accept the words "preferably for a full train length?"

A. S. Baldwin: Yes.

Mr. Fritch: That first clause of No. 9 is beyond my comprehension. We try to get all the tonnage we can on our local freight trains and our fast freight trains, and I think it is quite an important element in regard to those trains; and also as to passenger trains. There may be a case where we have a limit on passenger trains up to the time of double headers.

Mr. Baldwin: I concur with Mr. Fritch on that. An essential requirement in the study of that problem is the determination of what increase will be had in the rating of not only your dead freight trains, but your manifest freight and your local freight, and each of these is a problem to be considered on its own basis, and I think it should not be dismissed with the mere statement that but little increase in tonnage can be looked for. I would suggest that the clause be made to read, "the prospective increase in tonnage rating for local and fast trains should be given careful consideration." There are times when we can get a great deal of benefit in that class of traffic by a reduction.

Chairman Sullivan: I think Mr. Baldwin is probably right and justified in his conclusions, because we do give credit to the reduction of the ruling gradients. I think that should be struck out. It really is not a ruling gradient. It should be a reduction of gradients.

Mr. Baldwin: I have seen occasions where a reduction in gradient did not help the manifest freight a particle. Again I have seen where you had a steady manifest business, you got a proportion of increase in tonnage in the manifest trains, the same as in the dead freight, and I have seen where local freight trains have handled a large amount of tonnage that they did not handle before, and you got a large amount of credit in that in figuring the expenses. I think this dismisses the problem too lightly.

Chairman Sullivan: Mr. Coburn has written a letter objecting to the words "location of station buildings," and suggesting stations, meaning to include all buildings and track in Conclusion 10, which the committee will accept.

Mr. Ray: You state in Conclusion 11 that "momentum gradients, not exceeding that over which a locomotive loaded for the ruling gradient can handle its train in two parts, if stalled for any reason in the sag, may be used to reduce

construction costs," and later in the fifth line you say, "should be used where economy in construction cost is thereby effected." I think there are exceptions to that rule. Certainly it would be a bad thing to do on a railroad where traffic is so heavy that you could not have trains cut in two in the sag. I suggest that we add to that paragraph the words, "and except where traffic is unusually heavy." I don't think that should be a positive statement.

Chairman Sullivan: You are objecting to the use of velocity grades at all where traffic is heavy?

G. J. Ray: No, I say where traffic is heavy you could not afford to cut the trains in two at the bottom of the sag.

Chairman Sullivan: We mean if we are broke in two or flagged and stopped there. I am afraid we can't accept that. That is an economic question that will have to be figured out in detail for each position. If you can raise twenty feet rather than take a cut five miles long, twenty feet deep, or a fill back of that six miles long, twenty feet high, and you have double track, which you might have in that kind of construction, I fail to comprehend how heavy the traffic would be to warrant you in not putting in a momentum grade.

A. K. Shurtleff: The committee's report has entirely neglected one item of resistance, that is, the resistance overcoming acceleration. This may or may not be a large per cent of the resistance in some cases. It will be 20 per cent of the total resistance overcome between two points, in some cases; in other cases it will be only one per cent. I can't see how it is going to compare two lines without taking into consideration the acceleration resistance. In this same conclusion there is a repetition of a previous conclusion. They are speaking of the formula. If it is as stated, it may be obtained from the formula as given in the Manual, they can do away with the giving of the formula here.

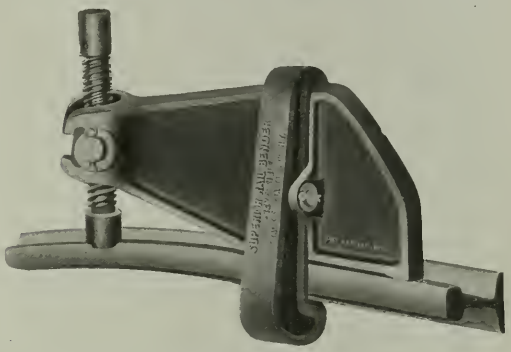
Chairman Sullivan: Answering Mr. Shurtleff, what he says about the formula is true. This is the formula adopted by the association. When this was written up by Mr. Dennis, Mr. Ramsey and myself it was thought that at that time we would make this report take the place of a good deal that was in the Manual; there was no idea of taking the credit for this formula away from Mr. Begiem and Mr. Shurtleff, who had worked on it in previous years. Answering Mr. Shurtleff's question regarding acceleration; acceleration can be taken into consideration, if necessary. If you are going to run your trains at 25 or 30 m. p. h. you know the velocity head; you know that you have spent that much energy to get it up to that velocity, but in comparing the minor details between the different points, if you go to that refinement, you have it for today, but you don't know how many trains you will run tomorrow, how many stops you will make, or what the conditions will be; but I think we are safe in assuming that they will be usually about the same on this line or that line, the two alternate lines that are under comparison. What we are aiming to get is a value for the resistance that we can eliminate, and are not trying so much to find out the exact economy of operation or how much coal we are using in operating the line in this problem. The committee is willing to insert in Conclusion 12, after the first paragraph, the following matter: "The above method must be understood to not take into account the resistance due to accelerating trains. This may or may not be a considerable part of the total resistance, depending on the rate of grades and the distance between stops."

We are also agreeable to changing the next to the last sentence in Conclusion 12 to read as follows: "In comparing different locations, the resistance under average conditions should be used."

Mr. Churchill: I want to ask one or two questions in order to bring out some information. The committee reports that they have assumed $200 a mile per year as a saving in eliminating distance. I do not see how they could get such a low figure as that. I believe when everything is taken into account we shall have to assume a minimum of not less than $600. The most recent case I had to do with in estimating these costs was in the study of the practicability of the electrification of a certain district. We got nowhere until we took the logs of every engine, the time consumed and the stoppages on every portion of the 30 miles. To my mind that is the only way to get at anything like true results. On page 116 of the report the statement is made with regard to the effect of minor details on operating expenses, that nothing is known, particularly, about what the effect of curvature is. I obtained from the Pennsylvania Lines West quite a long time ago some figures on actual results secured on wear of rail on curves, and turning these figures around in this form, after having added some information obtained on our own road, it is like this—if the life of the rail on the straight track is taken at 1.00, on a two degree curve it will be 0.90; on a two degree to four degree curve, 0.71; on a four degree to six degree curve, 0.66; on a six degree curve, 0.56; on a nine degree curve 0.33. There is a basis for determining what you can contribute to the rail wear on different degrees of curvature on the same kind of study. I will send this data to the committee.

THE "SUPERIOR" RAIL BENDER

A rail bender which combines in one device the right and left hand tools commonly used for bending rails has recently been placed on the market by the Track Specialties Company, New York, and is in use on several roads. The construction of this bender is clearly shown in the accompanying illustration, the principal features being the reversible yoke and the swivel collar through which the screw passes, serving to keep the screw always in a perpendicular position to the rail, thus eliminating the possibility of fracturing the casting.



A Reversible Rail Bender.

THE NICK-AND-BREAK TEST

The recent order for 35,000 tons of rails placed by the Illinois Central with the Algoma Steel Company, with specifications covering the nick-and-break test for every ingot has created a great deal of interest in this test. Although this is included in the rail specifications of the American Railway Engineering Association, many railway men are unfamiliar with its requirements. For this reason the following is an abstract of this portion of the specifications, as included in this order:

DESTRUCTION DROP TESTS

(a.) The test pieces from heats which have been accepted under the drop test requirements, and also the crop end representing the tops of all other "A" rails in each heat shall be nicked and broken. If the fracture shows no interior defect, all the rails of the ingot represented by such "A" rail end shall be accepted, but if the fracture shows interior defect the "A" rail of each ingot shall be rejected, and a test piece cut from the bottom end of this "A" rail. This piece shall be nicked and broken and if its fracture shows no interior defect, the "B" rail and the remaining rails of that ingot shall be accepted, but if it shows interior defect the "B" rail shall be rejected, and a test piece cut from its bottom end to be similarly tested for the rejection or acceptance of the "C" rail, and so throughout the rails of any one ingot as far as necessary to get sound steel.

(b.) The words "Interior Defect" shall be interpreted to mean seams, pipes, laminations, cavities, cinder or interposed foreign matter, or a distinctly bright or fine grained center evidencing segregation.

C. W. KOUNS HERE

C. W. Kouns, general manager of the Atchison, Topeka & Santa Fe, Topeka, Kan., spent yesterday afternoon at the convention and the Coliseum exhibits.

Operating Results of Steam Railroad Electrification

A Resume of the Present Status of This Development from the Standpoint of the Engineering and Operating Officers

A large number of the members of the American Railway Engineering Association attended the meeting of the Western Society of Engineers last evening. The subject "Operating Results of the Electrification of Steam Railroads," was selected with special reference to this convention, and the papers and discussion were confined to features of interest to the steam railroad engineering and operating officers, to the exclusion of the somewhat technical details more commonly discussed. The rooms were crowded, the meeting being one of the largest in the point of attendance in the history of the society. George Gibbs, consulting engineer of the Pennsylvania and the Norfolk & Western, and Edwin B. Katte, chief engineer, electric traction, New York Central, spoke and papers prepared by W. S. Murray, consulting engineer of the New York, New Haven & Hartford, and C. A. Goodnow, assistant to president, Chicago, Milwaukee & St. Paul, were also read, the latter two gentlemen being unable to be present. An abstract of the papers and discussions follows:

RESULTS SECURED ON THE NEW YORK CENTRAL

By EDWIN B. KATTE,

Chief Engineer Electric Traction, New York Central; New York.

The most interesting thing about electrification to railroad men at the present time is the first cost, and here the comparison with steam operation is most unfavorable. For example, a modern steam locomotive costs about $25,000, and an electric locomotive of the same capacity costs, say, $45,000. That is not all. The cost of the power station, transmission lines, substations and working conductors must be added, which will bring the equivalent cost up to about $110,000, more or less, depending upon the system adopted and the character of the service. Hence, there should be a large saving in operating costs to cover the increased fixed charges, or there must be some other good reason for incurring the additional expense.

The New York Central electrified its lines into Grand Central Terminal because it had a bad four-track tunnel condition to deal with at the most congested point of traffic. After electrification was decided upon, a very comprehensive scheme of improvements followed, which has cost in all something like $120,000,000, resulting in radical changes in the movement and operation of trains. It is for this reason that a direct comparison between the former steam and the present electric operation is impossible. However, some general comparisons can be made, based upon rather broad assumptions.

The average cost per locomotive mile, derived from a large number of records of steam locomotives in all classes of service, has been found to be about 26 cents, including fuel and supplies, maintenance, repairs and engine house expenses. A similar figure for electric locomotives operating in and about New York City can be shown to be about 21 cents, but when fixed charges are added the comparison becomes 30 cents for steam locomotives and about 60 cents per mile for electric locomotives. This comparison is only approximate and open to criticism, because of the fact that conditions in New York permit but an average of 85 miles per day for electric locomotives, while the steam locomotives are averaging about 150 miles per day. Further, many assumptions, too numerous to describe in this brief discussion, were necessarily made which would preclude the acceptance of these figures as a direct comparison of facts, but are sufficiently accurate to indicate the tendency.

The electric locomotive service in New York and vicinity includes switching in yards and terminals, hauling shop trains about six miles, and a main line express service on one division of 34 miles and another division of 24 miles. The average cost for maintenance, including inspection, repairs, renewals, cleaning and painting, varies from month to month, but the average, covering a period of eight years, is not far from 3½ cents per mile. The maintenance during the past year has been about 4½ cents per mile. The increase was caused by the renewal in one year of driving wheel tires on the first 35 locomotives purchased.

The suburban service in the vicinity of New York City is handled by multiple unit trains, consisting of from two to eleven cars, with trailers used in the proportion of two motor cars to one trailer on trains having easy schedules. Maintenance, including mechanical and electrical repairs, inspection, renewals, painting, etc., excluding only sweeping and window cleaning, has averaged somewhat less than 2 cents per car-mile.

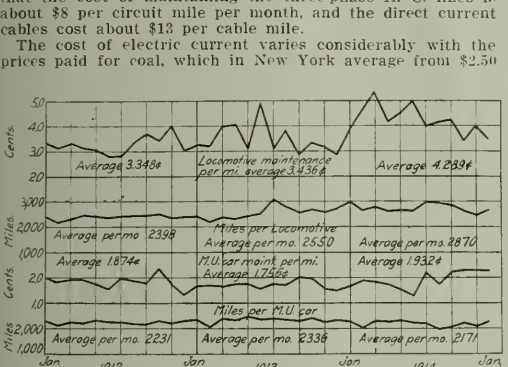
Modern Electric Locomotive of the New York Central.

The working conductor used by the New York Central is a special type of underrunning third rail, and is believed to afford greater protection from accidental contact than any other third rail. Its chief characteristics are, first, a wooden sheath enclosing the live third rail, except at the bottom or contact surface, and second, an insulated support, so hung as to afford flexibility to prevent strains due to the up and down movement of the supporting ties under traffic. The cost of maintaining this protected third rail is naturally higher than for the usual type of third rail, and the large amount of construction work in progress adjacent to the third rail has increased the maintenance

cost above normal conditions. The average cost has been about $26 per mile, per month, on the main line and $40 for yards and terminals, including track bonding and cable connections, both positive and negative.

The cost of maintaining the New York Central Railroad's cable system can be of little comparative value, because of the great diversity of its character to meet unusual local conditions. Lead-covered, paper-insulated cables are used in underground tile ducts. Steel-wrapped, varnished-cambric cables are used in iron pipes on the Park Avenue viaduct; armored, lead-covered, rubber-insulated cables are laid under the Harlem river, while bare copper, aerial cables, supported on steel poles, are used in the outlying and less congested districts. However, as a general statement, it may be said that the cost of maintaining the three-phase A. C. lines is about $8 per circuit mile per month, and the direct current cables cost about $13 per cable mile.

The cost of electric current varies considerably with the prices paid for coal, which in New York average from $2.50



Operating and Maintenance Cost of Electric Locomotives and Multiple-Unit Cars. Also Average Miles Per Month Per Electric Locomotive and Multiple-Unit Car on the New York Central.

to $3 per short ton. Also the fact should be noted that power stations in the vicinity of New York City are operated on three 8-hour shifts in place of the more common 12-hour shifts. Eleven thousand volt, three-phase, 25-cycle current measured at the busbars of the Port Morris power station averages between 0.45 of a cent and 0.50 cent per kilowatt hour for operating labor and materials. When fixed charges are added, the cost averages about 0.75 cent. The transmission of current to the substations, transforming in substations, the loss in the working conductor system, and auding all fixed charges will bring the average total cost of current delivered to the shoes of equipment, to about 1.75 cents per kilowatt hour.

As a measure of the reliability of electric equipment, a comparison of the locomotive or car miles per detention is preferable to a comparison of the miles per minute detention, since the former excludes delays to following trains and other causes of delay in no way contributed to by the equipment. During the year 1914 the average locomotive miles per detention was 22,000, while the multiple-unit cars averaged 51,000 miles per detention. The train-minute delays due to electric power troubles totaled 840 minutes for the year. The aerial lines contributed most largely, namely, 535 train-minutes; the third rail caused 244 minutes' delay, substations 25 minutes, and the power stations have never caused a minute's delay during their eight years of operation.

The electric locomotive shown in the illustration is the latest type used by the New York Central in express passenger service. It has a speed of 60 miles per hour when drawing a 1,200-ton train. All axles are equipped with motors, each having a continuous capacity of 250 h. p., or 330 h. p. on the one-hour rating, that is, 2,640 h. p. total. The locomotive is equipped with an oil-fired, flash type boiler having a capacity of 2,000 lb. of water per hour for heating through trains. The complete weight of the locomotive is 132 tons, all of which is carried on the drivers, thus giving a drawbar pull of 66,000 lb., assuming 25 per cent adhesion. The multiple-unit cars are of all-steel construction, 60 ft. long over buffers and weigh about 57 tons. They seat 64 passengers each. There is one motor truck under each motor car, having two motors of 200 h. p. each. The maximum speed of the train is 54 miles per hour.

THE ADVANCE OF ELECTRIFICATION

By W. S. MURRAY,

Consulting Engineer, New York, New Haven & Hartford; New Haven, Conn.

We are rapidly putting far behind us the days when the attitude of railroads was to sit by and watch some one or two other railroads experiment with electricity as a motive power. Indifferent interest has given way to the realization that these pioneer roads who have been using this new power in every form of railroad movement have developed a fund of data which entitles electrification to more than passing interest, and requires that the other roads be keenly alive to the possibilities it may hold out in the matter of betterments to their own property.

That a thing of any character has the right to live and improve is based entirely on whether it is founded on correct principles. In the early days, when electrical movement was first introduced on heavy traction railroads, theory was strong and practice severely limited. The guiding principle upon which electrical men based their opinions that electrification had its proper place in the economic world was that by its use certain savings could be effected that would justfy the investment necessary to secure it. There was entirely outside of this, but indirectly an economic factor, the advantage accruing to the passenger in the form of a clean ride.

While I have, of course, been keenly interested in electrification that has been applied to other railroads, naturally the past 10 years' association with the New Haven work, during which time over $15,000,000 have been expended in this department of betterment, has brought the real elements of its progress within very close range.

In June, 1914, the first New York, New Haven & Hartford passenger train was operated from Grand Central Station to New Haven over a four-track electrified route of 73 miles in length. Between New York and New Haven, measured upon a single track basis, there are some 500 miles of electrified line, of which 184 are included in yards and sidings. On these tracks to-day, every class of passenger, freight and switching movement is made, and electrical statistics are kept of all power house, line or equipment failures, a reference to them suggesting the features of electrical operation that requires first attention for the betterment of service.

A feature of electrification which at present is the most appealing to one who has given the subject some consideration, is in the matter of freight and switching movements. Since 1907 the New Haven road has been operating its regular 100 per cent electric passenger service between Stamford and New York. But recently, experience with regards to electric movement in switching and classification yards, and more recently that with regard to freight movement on main line track, has indeed been a revelation in the possibilities of heavy electrical traction. For example, during the month of January past, on the New Haven over 40,000,000 ton-miles trailing load were handled by electric locomotives, this total tonnage being made up of fast, slow and local freight movement. Wattmeters are installed on all of the electric engines to register the kilowatt hours of consumption. Records of these wattmeters indicate that fast freights require about 34 k. w. hours per train mile; slow freights about 60 k. w hours per train mile; local freights about 36 k. w. hours per train mile, these figures being for trains varying in tonnage from 1,000 to 3,000 tons.

Of interest also are the kilowatt hours per 1,000 ton-miles of trailing load. For fast freight the kilowatt hours per 1,000 ton-miles are about 30: for slow freight 30; and for local freight 85. I mention these figures only to illustrate this new and vast sum of information that is daily coming to us. The "watt hour constants" are of necessity average figures, made up of trains having varying weights and schedules, and yet the records from which they are taken admit of instant segregation into any class of service for which a constant is desired. The question that might be asked in looking at these constants is: What do they signify? And the answer is brief. An electrical ton-mile as against a steam ton-mile reduces the coal pile in a ratio of 1:2.

While our present freight movement by electricity on the main line is to-day limited both on account of the general depression in business, together with the fact that a full complement of electric freight locomotives is not yet at hand, there is no question in my mind but that the greatest returns to be secured by electrification will be through freight movement. While in the past we have appreciated the economies to be secured through electrification, by virtue

of the lesser expenditures required in fuel and maintenance of electric engines as against steam, there is fast coming to the front what might be called a more visualized economy in the reduction of expenses by effective savings in train miles.

Illustrative of the economic value of a "kilowatt hour" in its application to an electrification system, I quote from a part of a recent letter which had reference to the utilization of some 4,500 k. w. of demand in connection with its application to the eastern section of our electrification zone. I would particularly draw your attention to the item of $49,275, which has reference to the economies to be gained by the double heading of freight trains operated between Harlem River and New Haven. This economy, and its automatic complement, the increase of track capacity, are the phases of electrification that are striking deep into the consideration of the steam operating railroad man.

"(1) The extension of the station contemplates, as you know, supplying a maximum single-phase demand of approximately 4,500 k. w. This amount of power, measured by train units, would permit the operation of 12 additional daily trains in fast freight service of average tonnage or its equivalent in any other class of service between Harlem River and New Haven.

"(2) The number of kilowatt hours which would be consumed by the above 12 trains would be 17,500 k. w. h. annually, and, upon a coal ratio of 1 to 2 in electric and steam service and a basis of 3 lb. per kilowatt hour and $3 per ton, an annual saving to the railroad company of $78,750 is indicated.

"(3) Further translating the above movement into engine miles, our log sheet records indicate that the number of engine miles required for the above movement would be 990, which, multiplied by the difference in cost of engine repairs at five cents per engine mile, effects an annual saving of $18,250.

"(4) The transfer of 12 daily trains from steam to electric service will permit a further extension of our present practice of 'double heading' trains in electric service, thus saving 450 daily train miles, which, as shown by our log sheet, will secure an annual reduction in train wages of 30 cents per train mile, corresponding to an annual reduction of $49,275.

"(5) A supply of approximately 3,000 k. w. (average) to the New Haven end of the line will effect a further saving of $16,500 in transmission losses, as compared with the transmission losses of the same amount of power from Cos Cob Station, the above savings being based upon the conservative cost of 5 miles per k. w. h. In explanation of the apparently large value of the saving in transmission losses to be effected by this small installation, it will be evident that its value is a maximum when applied at the extreme end of the transmission system.

"(6) No tangible values can be assigned for the very important effect upon the regulation in line voltage at New Haven, which will be reflected in the cost and efficiency of operation in many ways.

"(7) The summary of the total savings as above which will be effected is as follows:

Fuel	$78,750
Engine repairs	18,250
Engine and train wages	49,275
Transmission losses	16,500
	$162,775"

If any criticism can be placed with regard to the matter of freight movement by electricity, I would say it would be in the matter of speed. The electric freight locomotives of the New York, New Haven & Hartford were built on specifications that permitted them to operate 1,500-ton trains on level track at 35 miles per hour. While the speed element, in as far as the New Haven service is concerned, may be entirely justified, due to the very large ratio of passenger to its total service, thus permitting the freight trains to clear more promptly for passenger traffic, I would say that where the ratio of passenger service is less, the speed element for equal horsepower could be more valuably thrown into traction. For example, the New Haven locomotives have drawbar pull characteristics that permit the operation of 3,000-ton trains by double-heading. If these engines were reduced in speed by 35 per cent and their traction increased by the same percentage, 4,000 tons would be the resulting double-header trailing load, which in turn would effect a large saving in train miles, were these engines to be operated on a property less subject to passenger movement.

Much valuable information has been developed in the past two years in connection with the handling of classification and switching yards by electric motive power. An idea as to the reliability of this class of service may be gained in saying that in 1,000,000 electric switch engine miles there has been but one failure. The New Haven property includes in it two large switching yards; the Oak Point yard, containing 35 miles of track, and the Harlem River yard, 25 miles. The introduction of the electric engine in these yards has increased the speed of the yards very greatly, and, as nearly as I can gather from the yardmasters, this increase of speed has been secured with a ratio of electric engines to steam engines replaced varying between 4 to 6 and 6 to 10.

Electricity in trunk line territory is now on a plane of consideration entirely different from the earlier days, when it was new, untried, and problematical. The future will see its agency playing a most important part in railroad competition.

It would seem very inappropriate, with so good an opportunity as this, not to say a word or two as to "system." I am frankly willing to admit that I am a firm believer in the single-phase system for trunk lines, the governing element in which, from an electrical standpoint, has been the transmission system. In a rigorous determination to adhere to this principle as correct for such a field it has not been to gainsay the application of direct current in the territory where it rightly belongs, namely, where the governing element has been (mass trains under acceleration and braking in close headway) in translation. As a citation of the two examples, I would offer: (1) The electrification from New York to New Haven, and (2) the electrification of the New York subways.

In closing my address I would speak of two things which to my mind are most pertinent to the advance and successful utilization of electricity in the field of heavy traction. The first is with reference to the mercury arc rectifier, and the second is in regard to the effect of electrical administration on the railroads electrifying.

With reference to the mercury arc rectifier, I feel sure that it will be of interest to state that a car has been in commercial operation on the New Haven road taking power from the 11,000-volt overhead contact system, and converting it into direct current for application to its propulsion motors. This car has been giving a most successful service, and the problem of the production and maintenance of the vacuum tube, through the agency of which the alternating current is converted into direct current, has been electrically and commercially solved. What are the possibilities accruing from such a result? This can be epitomized in the statement that if the economies in the transmission system of the single-phase system justified the utilization of a heavier and less efficient motive power, to-day we are in a position not only to secure the economies gained in this transmission, but operate beneath the contact wires of such a system the more efficient and lighter direct current apparatus. As a concrete and practical application of this result, the present alternating current motive power now in use on the New Haven will be increased 25 per cent, by the application of the rectifier, and will also permit it to enjoy simultaneously transmission and motive power facilities of the highest order of efficiency.

With regard to administration, past experience with the enginering, construction and operation of a trunk line property of the character of the New Haven road has indicated forcibly the necessity of a very complete understanding of the difference between the operation of a steam and an electric property. In my judgment there will be no necessity for any general change in the administration or organization at present observed in steam operated properties to effect proper electric operation, but the fact should be impressed upon the minds of higher officials in the steam roads using or contemplating using this new mode of electric power that the methods pursued in producing a ton-mile of any character, passenger, freight or switching upon a steam basis must be abandoned when the drawbar pull comes from electricity. The error of holding a steam master mechanic responsible for an electric engine mile of any character is patent and the error is equally patent of holding a steam railroad shopman responsible for the maintenance and repairs of electric engines. Like electric power houses and transmission lines requiring the proper electrical talent the electro-mechanics inside and outside of the shop are essentially necessary to the success of proper maintenance and inspection of electric motive power. Such an arrangement does not change, but merely affects the splendid railroad organization and administration that has come down to us. A successful operating result after electrification has been applied is entirely dependent on a clear understanding and observation of this real difference between steam and electrical operation.

ELECTRIFICATION WORK ON THE MILWAUKEE

By C. A. GOODNOW,
Assistant to the President, Chicago, Milwaukee & St. Paul.

The Chicago, Milwaukee & St. Paul is now engaged in the electrification of that portion of its main line to the Pacific coast between Harlowton, Mont., and Avery, Ida., a distance of 440 miles. This project is of special interest because: (1) it provides for the electrification of four entire engine districts, and (2) this work is being done to effect economies in operation on a single-track line of moderate traffic and not to overcome congestion on a busy line now working to its capacity or to eliminate the smoke nuisance.

Between Harlowton and Avery this line crosses three mountain ranges, the Belt mountains at an elevation of 5,768 ft., the Rocky mountains at an elevation of 6,350 ft., and the Bitter Root mountains at an elevation of 4,200 ft. There are several tunnels, the longest of which is the St. Paul Pass tunnel at the summit of the Bitter Root mountains, 9,000 ft. long. The maximum grade westbound is 2 per cent for 20.8 miles on the eastern slope of the Rocky mountains, while the maximum grade eastbound is 1.7 per cent for 24 miles approaching the St. Paul Pass tunnel. The hardest problem of this nature, however, is presented by the continuous 1 per cent grade for 44 miles ascending the western slope of the Belt mountains, involving as it does the necessity for special precautions to avoid overheating the motors while working at their maximum capacities for this long period of time.

Besides the yards at Harlowton and Avery, intermediate terminals are now located at Three Forks, Deer Lodge and Alberton. These terminals are all small and with the exception of Butte and Missoula, there are no towns of any importance within these limits. There is therefore practically no breaking up of trains as all traffic is through business. Including these yards and side tracks about 650 miles of track will be electrified.

Power will be purchased from the Montana Power Company. Owing to the ample supply of water power available and the low cost of construction, the unusually low contract rate of $0.00536 per kilowatt hour has been secured. By contracting for its power the railroad thus avoids expending directly the large amount required for the construction of power plants. To minimize peak loads it is probable that the duties of the train and power despatchers will be combined. In this way the spacing of trains can be best arranged to keep the peak loads down to the minimum. With the traffic existing on this line it is expected that this can be done without serious interference with the operation of freight trains.

To minimize the dangers of interruptions to the delivery of power a tie-in transmission system is being built by the railway to permit feeding each substation from two directions and from two or more sources of power. The transmission line is being constructed with wooden poles, will operate at 100,000 volts and in most cases will follow the right-of-way.

The Montana Power Company will deliver energy to the line at seven points between Harlowton and Avery. On the engine district between Three Forks and Deer Lodge, on which work is now under way, three substations are being built to convert the 100,000-volt, 60-cycle, 3-phase alternating current to 3,000 volts direct current. This is the first direct current installation using as high a potential as 3,000 volts and was adopted after observing the results secured with the 2,400-volt, direct current installation of the Butte, Anaconda & Pacific, which parallels the inc of the St. Paul for a short distance west of Butte.

The trolley construction is of the catenary type with two 4 0 trolley wires flexibly suspended from a steel catenary and supported on wooden poles with brackets on tangents and flat curves and cross spans on the sharper curves and in yards. The twin-conductor trolley consisting of two 4 0 wires suspended side by side from the same catenary by independent hangers alternately connected to each trolley wire. This permits the collection of very heavy current by reason of the twin contacts of the pantograph with the two trolley wires.

Contracts were let last year for nine freight and three passenger locomotives for use on the first engine district, while nine additional locomotives were ordered early this month for use on the second engine division from Three Forks to Harlowton. The passenger locomotives are designed to haul 800-ton passenger trains at a speed of 60 miles per hour on the level or 35 miles per hour on a 1 per cent. grade and will be equipped with oil-fired steam-heating outfits for heating the train. The freight locomotives are designed to haul a 2,500-ton train on all grades up to 1 per cent. at a speed of approximately 16 miles per hour. This same train load will be carried unbroken over the 1.7 and 2 per cent. grades with the help of a second similar locomotive acting as a pusher. At the summits of the grades, provision is being made to run the pusher locomotive around the train and coupling it to the head end to assist in the electric braking on the descending slopes. In addition to providing the greatest safety in operation, this will also enable a considerable amount of energy to be returned to the trolley for the assistance of other trains and reduction in the power bill. The electric locomotives will have sufficient electric braking capacities to hold the entire train on the down grade, having the air brake equipment for use in emergencies or when stopping the train.

At the present time work is being actively pushed on the engine district between Three Forks and Avery, 113 miles, crossing the summit of the Rocky mountains, and it is expected that this will be ready for operation next October. Work is now also being started on the engine district from Three Forks east to Harlowton and it is planned to start work on an additional district each year until all four are completed. The contract with the electrical company provides that the entire 440 miles be in electric operation by Jan. 1, 1918.

Several important economies are expected from the electrification of this line. In the first place this is the first time an entire engine district has been electrified, permitting the complete substitution of electric for steam locomotives between the terminals. In other installations throughout the country only a portion of a division has been electrified resulting simply in a shortening of the steam-operated engine district. With the present schedules enforced with train employees this has not enabled the savings to be secured which will result from the operation of the entire engine district by electricity. Furthermore, with the electrification of four adjoining engine districts, it is planned to change locomotives only at the second terminal or at Deer Lodge. The crews will be changed at the intermediate terminals, Three Forks and Alberton, but there will not be the delay incident to the present methods of operation. It will be possible to abandon these intermediate terminals with the exception of a small amount of trackage on which to set out bad order cars, hot boxes, etc. It is also expected that with the low contract price for power which has been secured, a considerable saving will be made over the amount now expended for fuel. From these and other savings expected, it is anticipated that this expenditure will yield a very attractive return on the investment. If this is realized it is possible that electrification may be extended from Avery across the Cascade mountains to Seattle and Tacoma, a total distance from Harlowton of 850 miles, but not, however, in the near future.

ELECTRIFICATION WORK ON THE NORFOLK & WESTERN AND PENNSYLVANIA RAILROADS

By GEORGE GIBBS,
Consulting Engineer, Norfolk & Western and Pennsylvania.

The Norfolk & Western is an important trunk line with a large and diversified business. Especially important is its growing business in coal, both east and westbound. Eastbound from the summit of the Allegheny Mountains to tidewater, a distance of 375 miles, is the part of the road that we are especially interested in in connection with electrical equipment. The grade selected for electric traction is known as the Elkhorn grade in the Pocahontas coal region. The tonnage on the road is very heavy, and has doubled during the past four years. It amounts now to an average of 40,000 tons a day and has exceeded 60,000 tons. This produces a favorable condition for electric traction, as density of traffic has an important bearing on economies.

Another important consideration in the decision to electrify is the fact that the section selected is a gathering division, starting at Bluefield west of the Allegheny summit and includes about 30 miles of heavy grade along the western slope, including practically the entire gathering division for that particular Pocahontas field. This means that the division now is operated as a switching and gathering division by segregated class of power. Starting from Vivian eastbound, there are about 5.5 miles of one per cent grade. Then another 5.5 miles of 1.5 per cent grade, and then about 4 miles of 2 per cent grade, to the Elkhorn tunnel. Beyond the tunnel one descends a 2.5 per cent grade for about a mile and then encounters a 0.4 per cent ascending grade for about 9.5 miles. Finally there are 4 miles of 1.3 per cent grade into Bluefield where the Classification yard is located.

The trains over these heavy grades are hauled by Mallet

engines, three engines being required to haul the train at a speed of 7 or 8 miles an hour over the division. In the Elkhorn tunnel this speed is reduced to about 6 miles per hour.

The tunnel is of limited cross-section and difficulties with smoke have, therefore, been intensified. The tunnel has been equipped with Mr. Churchill's method of ventilation, which consists of an annular nozzle through which air is blown into the portal of the tunnel at a speed slightly greater than the speed of the train—7 miles an hour for a train running 6 miles an hour. Naturally, the fact that the tunnel is on a heavy grade and the space limited, and that it is a single track tunnel, makes it the neck of the bottle for the entire movement.

That line is a very crooked one, about 60 per cent of the entire division being curved with maximum curves running up to 12 degrees on the main line, and 16 degrees on the sidings. While the weight of the trains is 3250 tons now with Mallet service, the weight is cut down in winter time to as low as 2,900 tons in order to get the trains over the division.

A decision was arrived at about two years ago to electrify, and the matter was put in the hands of myself and partner as consulting engineers of the company to carry it out. It was apparent, in going over the line, which goes through a narrow valley, that it would be impossible to use a third-rail system, and that it was necessary to use some overhead system. That narrowed the problem to a consideration of the high voltage direct current and the high voltage single-phase system. A further analysis of the cost and other advantages of the latter system, resulted in the adoption of the single-phase system. That was of especial importance on account of the enormous power which we were required to apply to each train, meaning that the amount of current to be collected would be great at low voltage, and therefore that it was desirable to keep it down as low as possible by adopting the highest possible voltage.

In adopting this system a number of novel features were introduced especially in the type of locomotive. We bring the single-phase power to the locomotive, convert it into three-phase power and use it in three-phase motors. By this arrangement we obtained the advantage of a single overhead conductor, which advantage is great in complicated yards and on crooked lines. The three-phase motor is not adapted to other classes of railway service. It is essentially a one or two-speed motor. It is not suitable for main line service requiring very little speed, but it is eminently suitable for tonnage work on heavy grades, as it is a rugged type of electric motor. Without commutator and having characteristics we have not been able to obtain in direct single-phase motors.

When I say that it has one or two speeds, I mean that the speed of the train will be maintained, irrespective of the load and the grade at any speed at which the motors are set. If on going down grade the speed is exceeded by coasting, the train pushing the locomotive, the motors automatically return the current to the line at normal voltage and may be used in propelling trains up grade if there are any trains to propel. If there should be none there it is sent through steel combs which dip in the water and spill it over in the water.

For this service we had built and provided 12 locomotives, besides having three-phase motors that have some novel mechanical characteristics. Each locomotive is equipped with eight three-phase motors, arranged with four 8 and 4 pole combinations, to produce 14 and 28 miles per hour, respectively. The total length of the locomotive is 105 ft. over all and the diameter of the driving wheels 62 in. The Norfolk & Western locomotives weigh a total of 270 tons apiece, with 220 tons on the drivers. The drawbar-pull varies from 114,000 lbs. during acceleration at the 14-mile per hour speed, to 86,000 lbs. when operating at this speed uniformly on a one per cent grade, but on a recent test a locomotive developed a tractive effort in excess of 170,000 lbs., indicating, however, a coefficient of adhesion which cannot be assumed in practice. The maximum guaranteed accelerating tractive effort for a locomotive is 133,000 lbs. At the present time about half of this section of the road, including the entire heavy grade division, has been operating for about a month, and the experience we have thus far encountered indicates that our anticipations are to be realized in obtaining a remarkably successful installation. The trains accelerate promptly and without jerking on the heavy grades. On the 0.4 per cent grades we obtain a speed of 32 miles per hour with a 5,200-ton train behind the engine. On a 2.5 per cent down grade we are able to hold the trains at a speed not to exceed 14 miles an hour. As soon as the speed exceeds the 14-mile limit the current drops to zero, then mounts up in the opposite direction, and we return automatically to the line an amount of current probably in excess of 2,000 kw.

The acceleration of these heavy trains, as regards the amount of power required, is impressive. Our preliminary tests indicate a development of 11,000 hp. on one train during the acceleration period, and 8,000 hp. when running at uniform speed. I believe these figures are in excess of any amount of power delivered on steam locomotive trains anywhere in the world.

[This Norfolk & Western project will be described in detail in an early issue of the Railway Age Gazette. Mr. Gibbs concluded with a brief description of the electrification of the Pennsylvania main line between Broad St. Station, Philadelphia and Paoli, a distance of 20 miles. Only the suburban traffic will be operated electrically. This installation was decided upon solely to afford temporary relief for the congestion at Broad St. Station and it is not expected that it will yield any financial return on the increased investment. This project was described in detail in the Railway Age Gazette. June 5, 1914, page 1243.]

Discussion.

Chas. S. Churchill, assistant to the president, Norfolk & Western, presented the following details of the studies which prompted the electrification of the Elkhorn grade.

The Norfolk & Western started its investigation in 1905. The first reports were not favorable, but later studies showed a saving in coal consumption and an increase in capacity and in safety of operation of the line. A log record of all freight trains on the 30-mile district under consideration was kept for a considerable time, all locomotive repairs and other costs being detailed. With three Mallet locomotives pulling a tonnage train on a two per cent grade there are of necessity numerous delays limiting the steam locomotives to one trip a day. On the other hand, the electric engines can make two or three trips so that 33 electric locomotives are replacing 11 steam locomotives. The statement that the electrified line carries 60,000 tons per day is an indication that no lighter traffic would justify the expenditure.

J. C. Mock, electrical engineer, Detroit River Terminal, stated the general conditions under which the Michigan Central tunnel under the Detroit river is being successfully operated by electric power. This is strictly a terminal service between Detroit and Windsor, the trip for freight trains being about 4 miles and for passenger trains about 3 miles. The grades on the tunnel approaches are 2 per cent in one direction and 1½ per cent in the other, necessitating two electric engines on the head end of passenger trains and two on the front and one on the rear of tonnage freight trains. The first locomotives weighed 100 tons, but the latest order was for 120-ton units, the additional weight being required for the heavier passenger trains which had increased from 600-800 tons to 1,000 tons and more. The electric service now covers about 1,300 cars per day, including about 100 passenger cars, the total tonnage averaging about 50,000.

E. W. Herr, vice-president of the Westinghouse Electric & Manufacturing Company, called attention to the rapid progress made in electrification work in the decade since the introduction of the first heavy electric power and urged the necessity for careful investigation to justify any change from steam to electric traction in the best interest of the future development of the industry.

The subject was also discussed by E. H. Lee, vice-president and chief engineer, Chicago & Western Indiana. Judge Jesse B. Holdom and W. F. M. Goss of the Chicago Association of Commerce Committee on Smoke Abatement and Electrification of Railway Terminals, and B. J. Arnold, member of the Chicago Railway Terminals Commission.

THE HUNT "SPECIAL" RAIL INSPECTION

The "special" inspection of the manufacture of steel rails under which continuous inspection is maintained at the open hearth furnace, or Bessemer converter, the blooming mill, the rail mill and the drop test machine was inaugurated by Robert W. Hunt & Co., Chicago, in April, 1912. A number of the larger roads soon availed themselves of the opportunity to secure this service, so that during the year 1913, 70 per cent of all rails inspected by this company were given the "special" inspection, and in 1914 this figure increased to 78 per cent.

Before the inauguration of this system, the inspection of rails by this company followed general practice covering such mechanical standards as section, weight, length, straightening, sawing and finishing of the ends, drilling of the holes, etc., in addition to an examination of all rails for the appearance of flaws and physical defects, such as pipes,

seams, laps and other conditions made manifest by the drop test. Necessarily much of the work of an inspection of this character was limited, for as mill work proceeds both day and night, while the inspectors worked only in the day, there was a possibility that through carelessness a substitution, for example, of drop test pieces might occur before the inspector arrived in the morning. Under the "special" inspection both day and night supervision is established at all parts of the mill, and all of the operative mills in the country can now be covered in this way if a road ordering rails desires it. The normal force of special inspectors includes 97 men, divided approximately as follows: 20 open hearth furnace inspectors, 6 Bessemer furnace inspectors, 27 blooming mill inspectors, 23 rail mill inspectors and 21 drop test inspectors. The men at each mill are under the supervision of a chief inspector, who in many cases has a clerk and a well-equipped office.

This special service has now been in operation long enough to demonstrate many of its advantages, although, of course, it is too early to determine the final effect upon the wear and breakage of rails in the track. Any improvement in the quality of the rails which is effected by this inspection is not due to any change in the mixing, blowing, pouring or rolling, but to the careful watch which is kept on the minor details of these processes, with a view to eliminating any bad practices that may be adopted by employes to increase the output or to make the work easier for them. In general, the mill executives and superintendents are co-operating with the inspectors, as they appreciate the beneficial effect on their men of such an inspection. In reality these inspectors perform a service equivalent to that of additional foremen, although they have no direct authority over the employes in the mill.

A very common phrase in rail specifications covering the mill work is that the "manufacture of the steel and its subsequent treatment shall be according to the best current practice." This absence of definite clauses covering the processes of manufacture makes it very difficult to enforce any absolute rules, and the inspectors accomplish their purpose by suggestions to the men or the foremen and by reporting, both verbally and in writing, on any practices of which they do not approve. Such reports are generally so timed as to permit the mill to divert the steel or the rails to some other use in preference to having the evidence collected by the inspector presented to the road for which the rails are being rolled. A card record is started of each heat by the open hearth or Bessemer inspector, who turns it over to the blooming mill inspector after he has seen the ingots stripped. This man keeps up the record until the blooms are rolled and sheared, after which the rail inspector's duties begin. The drop test inspector also receives the card when the tests are to be made, so that a permanent and complete record of the manufacture and treatment of each heat of steel is provided.

A few examples of practices discovered and corrected by these inspectors will illustrate the possibilities of this system. During the blowing of several Bessemer heats the converters "spit" badly, obviously reducing the amount of metal contained. Without regard for this, however, the customary amount of recarburizer was added in each case, producing steel with high carbon and high manganese. A report on this occurrence resulted in the superintendent of the Bessemer department being disciplined, and he later left the company's employ. After an open hearth heat is tapped and most of it is in the ladle, the melter may suddenly decide that it is too low in carbon and add coal to the metal as it rises to the top of the ladle. Under favorable conditions the carbon will diffuse itself evenly throughout a heat, but when conditions are not the most favorable it is likely to segregate, and the chemical test might fail to show this segregation, although some of the rails would be adversely affected.

If an ingot is rolled very cold in the blooming mill the heater at the reheating furnaces may open up his furnace to its full capacity in order to heat the bloom a little quicker, with the result that the top corners become too hot, and if the top part of the bloom is rolled into the flange of the rail, a weak flange may result. While it may look all right, the quality will probably not be equal to that in the remainder of the rail section. The superintendents in some mills have watched the timing of the ingots in the soaking pits more carefully at the suggestion of the special inspectors, with the result that the ingots have been more evenly heated and better rolling secured. At a large mill where a number of heats are being cast at the same time, or where Bessemer and open hearth plants are using the same soaking pit, the heats may sometimes become mixed. In one instance 16 ingots were reported cast in one heat and the blooming mill inspector noticed that 17 were charged into the soaking pit. Investigation showed that one ingot from a 0.16 per cent carbon heat had been mixed with the high carbon ingots. If this ingot had been rolled, eight very soft rails would have resulted.

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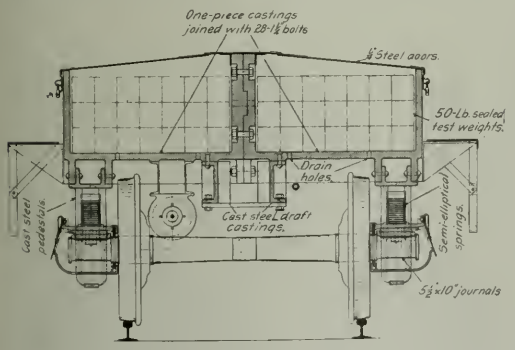
Houghton, Clarence G., Ch. Draftsman, Grand Trunk Ry., Montreal, Que.
Holmes, R. L., Div. Engr., Texas & Pacific Ry., Marshall, Tex.
Hubbell, C. C., Pur. Agt., Delaware, Lackawanna & Western R. R., New York City.
Hand, E. S., Pennsylvania Wire Glass Co., New York City.
Hunter, Morton T., Asst. Western Editor, Engineering Record, Chicago, Ill.
Haskins, J. C., Asst. Engr., Louisville & Nashville R. R., Louisville, Ky.
Jefferes, J. A., Fuel Agt., Illinois Traction System, St. Louis, Mo.
Johnston, A., Jr., Ry. Fence Contractor, Chicago, Ill.
Johnston, J. H., Supt. B. & B., Grand Trunk, Montreal, Que.
Jnstice, E. R., Pennsylvania Lines, Pittsburgh, Pa.
Jackson, E. G., Montreal, Que.
Kearney, R. P., Roadmaster, Lackawanna & Wyoming Valley R. R., Scranton, Pa.
Kirkland, H. B., Pres., Concrete Mixing & Placing Co., Chicago, Ill.
Kouns, C. W., Gen. Mgr., Atchison, Topeka & Santa Fe Ry., Topeka, Kan.
Krause, L. G., Res. Engr., Delaware, Lackawanna & Western R. R., New Milford, Pa.
Leatherberry, W. J., Roadmaster, Ottawa, Kan.
Lloyd, M. G., Electrical Review, Chicago, Ill.
Matre van R., Joyce Watkins Co., Chicago, Ill.
McArthur, R. H., Div. Engr., Nashville, Chattanooga & St. Louis Ry., Tullahoma, Tenn.
Murphy, M. J., Chicago, Terre Haute & Southeastern Ry., Terre Haute, Ind.
Moore, L. E., Bridge & Signal Engr., Mass. Public Service Com., Boston, Mass.
McGuigan, J. S., Roadmaster, St. Louis & San Francisco R. R., St. Louis, Mo.
Middleton, R. J., Engr. Track Elev., Chicago, Milwaukee & St. Paul Ry., Chicago, Ill.
Morrill, Frank P., Asst. Engr., Boston & Albany R. R., Watertown, Mass.
Minert, A. A., Sig. For., Atchison, Topeka & Santa Fe Ry., Newton, Kan.
McVay, C. M., Engr. M. of W., Kanawha & Michigan Ry., Charleston, W. Va.
Murr, L. A., Asst. Engr., Seaboard Air Line Ry., Portsmouth, Va.
McClure, O. D., Ishpeming, Mich.
Noyes, A. H., Asst. Treas., Ayer & Lord Tie Co., Chicago, Ill.
Neilson, A., Insp. Engr., Grand Trunk Ry., Montreal, Que.
O'Connell, G., Inspector, Grand Trunk Ry., Toronto, Ont.
Ogle, R. A., Ry. Contractor, Chicago, Ill.
Olshausen, Geo. R., Engr. Physicist, Bureau of Standards.
Orton, Dr. I. F., Asst. Gen. Mgr., Interstate Chemical Co., Galveston, Tex.
Philbrick, E. H., Chicago, Ill.
Pierson, J. C., Supvr., Erie R. R., Marion, Ohio.
Pierson, J. Supvr., Erie R. R., Meadville, Pa.
Pleasants, A. B., Asst. Engr., Atlantic Coast Line R. R., Wilmington, N. C.
Reagan, J. H., Grand Trunk Ry., Chicago, Ill.
Reeves, W. T., Robert W. Hunt & Co., Chicago, Ill.
Rench, W. F., Supervisor, Pennsylvania R. R., Perryville, Md.
Reynolds, H. H., Inspector, New Haven, Conn.
Rice, S. L., Res. Eng., D. L & W., Scranton, Pa.
Rights, Lewis C., Mgr., Lewis F. Shoemaker & Co., New York, N. Y.
Ruff, J. S., N. Y. N. H. & H. R. R., South Braintree, Mass.
Scammell, F. A. S., Supt. Rail Mill, C. F. & I. Co., Pueblo, Colo.
Schaefer, John V., Chicago, Ill.
Schwinn, F. S., Asst. Supt., So. Pac. Co., Lafayette, La.
Sharpley, H. F., Prin. Asst. Eng., C. of Ga., Savannah, Ga.
Shenk, Steven, Foreman Water Service, D. L. & W., Buffalo, N. Y.
Siegner, W. A., Asst. Engr., Grand Trunk, Stratford, Ont.
Smith, Arthur C., V. P., Morden Frog & Crossing Works, Chicago, Ill.
Smith, H. J., Res. Eng., So. N. E., Palmer, Mass.
Steward, H. M., Boston Elevated Ry., Boston, Mass.
Stockdale, E. C., Asst. Sales Mgr., Paint Products Co., Chicago, Ill.

Swartout, Wm. C., Asst. Engr., Missouri Pacific Ry., St. Louis, Mo.
Tilley, C. M., Inspector, Southern Ry., Washington, D. C.
Van Voorst, A. E., Harbor Comm., Chicago, Ill.
Wray, Edward, Electrical Railway Engineer, Chicago, Ill.
Wattinger, J. J., St. Louis Southwestern, St. Louis, Mo.
Williams, S. D., Jr., Div. Engr., Mich. Cent., St. Thomas, Ont.
Walker, W., Asst. Eng., Grand Trunk, Ottawa, Ont.
Walker, A. O., Civil Engineer, Chicago, Ill.
Young, C. D., Engr. Tests, Penna, R. R., Altoona, Pa.
Young, R. D., Asst. Engr., D. L. & W., Buffalo, N. Y.

A NEW 80,000-LB. TRACK SCALE TESTING CAR

A new track scale testing car weighing 80,000 lb. has recently been designed by the Fairbanks Company, New York, superseding the 60,000-lb. car formerly made and used by this company. The old car, which was built up of structural steel, was not rigid enough for the heavy load which it carried, it required a great many test weights, as its tare weight was only 20,100 lb., and its total weight 60,000 lb. was hardly considered heavy enough for testing scales on which freight cars with a maximum weight of 80 tons are weighed. The new car has some additional advantages over the old one, which are brought out in the following description:

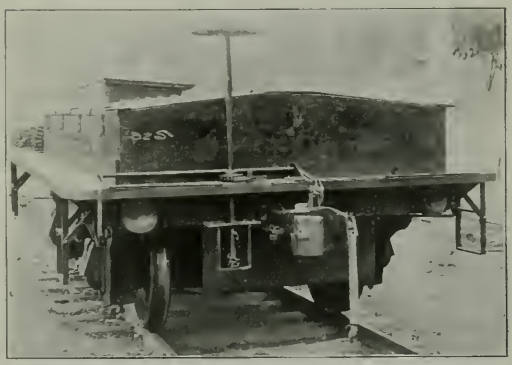
The car is of the rigid wheel base type with a cast iron body, having a total length of 14 ft. 11 in., a width over the platform of 9 ft. 10 in. and a wheel base of 7 ft. The car is designed to offer a very slight wind resistance, and its center of gravity is low, both of which are important features in securing an accurate test. The underframe, body and weight compartments are formed by two one-piece castings, accurately machined where they connect and provided with a recess and a projection to relieve the shear on the connecting bolts. They are connected by 28, 1¼-in. bolts, the nuts having spring washers to prevent their loosening due to the vibration of the car. Recesses are provided for the heads of the bolts and for the nuts in order to preserve straight surfaces inside the test weight compartments. The



Cross Section of Scale Testing Car, Showing Details of Construction.

castings have sockets at the corners to form push pole pockets. There are eight weight compartments, each 3 ft. 4½ in. by 3 ft. 2½ in., with drain holes in the bottom, each compartment being closed by a hinged door of ¼-in. steel plate opening toward the center of the car and held closed by a padlock.

The draft castings are of cast steel riveted to the main castings. The car is equipped with the Westinghouse friction draft gear, standard M. C. B. couplers and coupling device, Westinghouse air brakes and a hand brake, the wheel of which is arranged to be detached easily to allow the end compartment doors to be opened, cast steel journal pedestals riveted to the main body castings, semi-elliptical pedestal springs, M. C. B. standard journal boxes, bearings, axles and wheels. The car is provided with a platform extending around all sides which is 8 in. wide at the end and 14 in. wide at the sides. This platform is built up of ¼-in. checkered steel plates reinforced with angles on the edges and supported by pressed steel brackets attached to the main casting. A tool box is attached to the under side of the car which is built up of ¼-in. plates and steel angles, having a door on each side of the car and a sliding tray which provides a means for sealing the car to an exact weight. A ⅛-in. steel plate is attached to the under side of



A New Type of Scale Testing Car Weighing 80,000 lb.

the car and extended back to the tool box to prevent the accumulation of snow and ice on the projection under the car.

The car is designed to have a tare weight of as near 38,000 lb. as possible. This may vary within a few hundred pounds either way, but if it does, this weight may be adjusted by means of the tray mentioned above and the car sealed to the nearest 100 lb. It is designed to carry 42,000 lb. of 50-lb. test weights, making the total weight 80,000 lb. The object in having the test weights greater than the tare weight of the car, is to provide a means for verifying the weight of the car on any track scale in good working condition. The test weights used with this car are of high grade close grained cast iron arranged with a pipe handle which furnishes a ready means for handling and also contains the sealing material. This is held in position inside the pipe by a screwed plug which is sealed by means of a lead cap forced into a dove-tailed recess, thereby furnishing evidence that the weight has not been tampered with after final sealing. The weights are painted with a special non-absorbent paint, which prevents as far as possible the absorption of moistnre. While the government tolerance of these 50-lb. weights is 20 grains, the weights with which this car is equipped are sealed to a tolerance of 2 grains.

FOUR-CYCLE GASOLINE ENGINE FOR HAND OR PUSH CARS

The Kalamazoo Railway Supply Company, Kalamazoo, Mich., has recently produced a new gasoline engine of the two-cylinder, four-cycle type designed especially for application to hand or push cars. The principal features of this motor are similar to those used in the engine of the No. 30 car which has been in satisfactory use for some time, the principal change beiug in the mounting of this engine on a sub-base. It is built up as a complete unit with the gasoline tank rigidly attached to the top of the crank case and carrying the control levers for the spark and throttle. It

can be equipped either with a pulley or chain and sprocket drive, the engine sliding on its sub-base to tighten the belt in the former case. When a chain drive is used a friction clutch is furnished for application to the drive axle.

The engine is air-cooled and reversible. The cylinder has a 4-in. bore and a 6-in. stroke. It is lubricated by forced feed lubrication, the crank shaft and connecting rod being lubricated by a combined splash and ring bearing lubrication. The engine uses either magneto or battery ignition and is equipped with a heavy fly-wheel having fan blades for spokes. It normally develops about 8 hp. The company can also furnish this engine applied to a motor car in which case it is known as the No. 50 car.

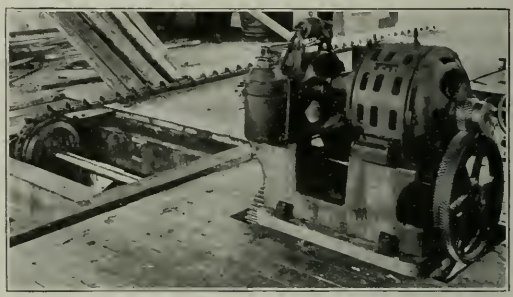
INCLINED ELEVATOR FOR FREIGHT HOUSES AND DOCKS

The Pere Marquette has recently installed an inclined elevator in its terminal warehouse at Third and Congress streets, Detroit, Mich., similar to those which have been successfully used for some time at docks along the seaboard for handling freight between the warehouse and

Handling Freight to the Upper Warehouse Floor of the Pere Marquette Station in Detroit on an Inclined Elevator.

vessels. The construction of this elevator, which consists briefly of a moving ramp and an endless chain with lugs which engage the axles of the ordinary two-wheeled trucks was described in the Railway Age Gazette of April 11, 1913. The elevator in the Pere Marquette house is arranged to operate either up or down and has replaced three hydraulic elevators with platforms approximately 10 ft. by 10 ft., having a capacity of 4,000 lb. at a speed of 50 ft. per minute. This elevator handles all of the overflow of the incoming freight from the first to the second story of the warehouse. By its use the freight can be removed from the car directly to its place of storage on the upper floor without transferring the load.

While it is too early to determine the exact economy effected in the Detroit installation, the experience previously gained with these elevators indicates that such economies can be effected. For instance, at the Weehawken docks of the New York Central it is reported that the labor cost with these machines is reduced from two to three cents per ton, and the time of unloading lighters is decreased by an amount equivalent to increasing the capacity of the marine equipment from 20 to 40 per cent, depending upon conditions. At the New York and Norfolk terminals of the Old Dominion Steamship Company the inclined elevators are reported to save the labor of four longshoremen for periods of approximately five hours per day. The Merchants & Miners Transportation Company, which has two of these machines at its Savannah, Ga., terminal, four at its Mystic Wharf terminal in Boston, and

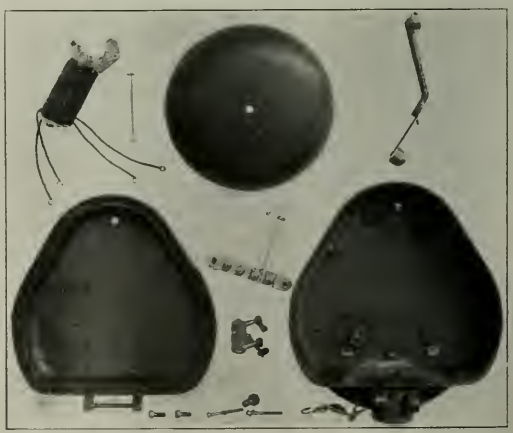


The Operating and Control Apparatus of the Inclined Elevator at the New York Central Dock at Weehawken, N. J.

six at its new city terminal in South Boston, estimates savings of 13 to 15 per cent in the cost of handling freight by the use of these elevators. At another installation it has been stated that the inclined elevators save nine cents in the cost of transferring a ton of freight, the cost of power in this case being about $0.001 per ton.

DIRECT CURRENT CROSSING BELL

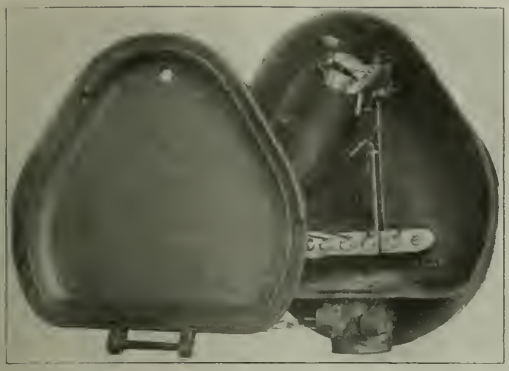
The Union Switch & Signal Company, Swissvale, Pa., has developed a new design of d. c. crossing bell which complies with R. S. A. specifications throughout, and in which the most notable feature is simplicity. Coils and contacts are readily removed or replaced without disturbing or changing the adjustment of other parts of the mechanism, and the operating mechanism may be readily exposed for inspection



Direct Current Crossing Bell Details.

without the removal of the gong or in any way interfering with the operation of the bell.

The coils are wound to 10 ohms resistance for a normal operating battery of 6 volts. The bell, however, will operate satisfactorily on less than 4 volts. Special features are the removable arcing tips which protect the circuit controller



Direct Current Crossing Bell, Complete.

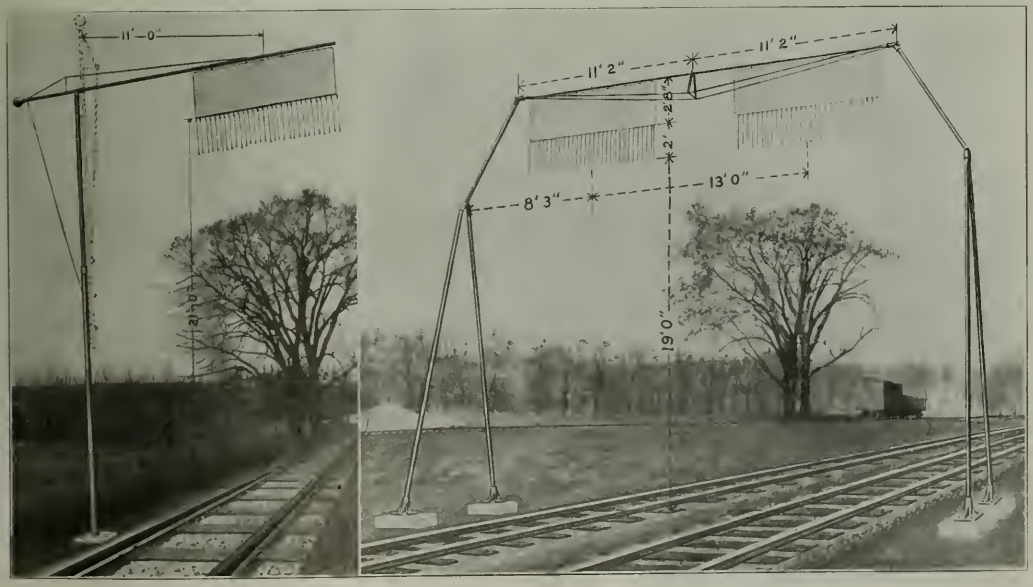
contacts from injury, and a simple circuit controller adjustment which permits the contact opening to be varied without bending the springs or loosening the terminal posts.

TWO NEW TYPES OF BRIDGE WARNING SIGNALS

The Chicago Railway Signal & Supply Company, Chicago, has recently placed on the market two new styles of bridge warning signals which use the same form of screen and "tickler" cords but differ in the design of the supporting structure. The style A signal shown at the left in the accompanying illustration is a single-track warning made of heavy steel pipe so arranged that the cross arm can be folded down out of the way when necessary. To accomplish this purpose the horizontal pipe is counterweighted on one end and is stiffened by a truss rod and an anchor rod connecting it to the vertical post. The wire screen is 8 ft. long and 2 ft. 8 in. deep, being made of extra heavy wire with 1-in. mesh connected to an endless rim. The screen serves to keep the cords in position at all times and is supported from the horizontal pipe by closed hook bolts which allow it to be swung without danger of unhooking. The cords are chemically treated to increase their life. They are wired to the screen and their lower ends are wound with marline to prevent fraying. Unless otherwise specified, this warning is furnished with a clearance of 21 ft. to the bottom of the screen and 8 ft. from the near rail to the supporting pole. Sufficient cord, wire and marline are furnished for 33 drop cords, each 24 to 36 in. long.

The same type of warning signal is furnished for spanning two to ten tracks, the only differences in construction being that the screens are supported by a heavy galvanized steel cable on which they are hung by galvanized slip links and are held in place laterally by flexible galvanized wire rope, the ends of which are left long to allow the screens to be pulled to either side without removing them from the supporting cable. Each pole is anchored by two steel guy rods equipped with long turnbuckles which permit of adjustment and alinement of the signals and with anchor rods having an anchor plate and nut suitable for fastening to the foundation and on the other end an eye for attaching to the guy rods. The interchangeability of the parts of the single and multiple track warnings make it possible to utilize a single track signal when additional tracks are built by erecting a second supporting pole and substituting the cable for the cross pipes. For warnings spanning from 3 to 10 tracks, heavier and longer poles are used with a curved messenger cable above the supporting cable to strengthen the construction.

The style D warning of which the double-track form is shown at the right in the accompanying illustration, is also of metallic construction throughout using the same screen and cords described above. Unless otherwise specified these warnings are made with a clearance of 19 ft. below the lower ends of the tickler cords and 8 ft. 3 in. from the center line of the track to the supporting posts. The cords are usually furnished 2 ft. long but can be made any desired



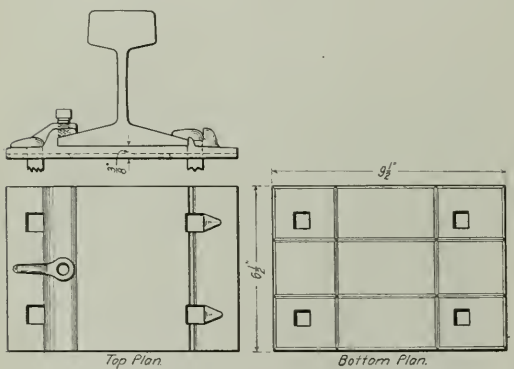
Single-Track, Style-A Chicago Bridge Warning.

Style-D Metallic Bridge Warning Signal, Spanning Two Tracks.

length. The screens are hung directly from the top supporting pipe by closed hook bolts, the truss rods shown in the illustration being omitted in the single-track warning. These warnings are assembled complete at the company's plant before shipment and can be erected in the field without fitting, threading or pipe cutting. Each of the supporting pipes is equipped with a base casting which is calked to the pipe before shipment and is accompanied by the necessary anchor bolts for attaching to the foundation. The warnings of these types in the standard dimensions illustrated are being kept in stock to allow immediate shipment.

THE THOMAS RAIL ANCHOR TIE PLATE

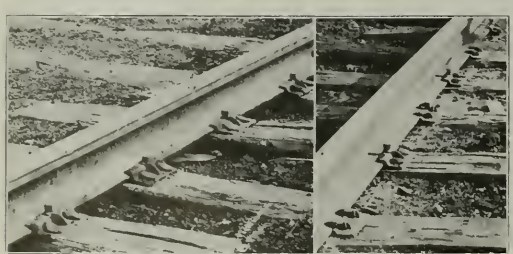
The Thomas rail anchor tie plate has been in use on the Kansas City Terminal for the past four years, is now installed on a curve and a turnout of the Union Pacific in Kansas City and is being tested by a number of other roads. This device



Section and Plans of the Thomas Rail Anchor Tie Plate.

consists of a plate 6½ in. by 9½ in. by ⅜ in., with a shoulder along each edge of the rail base, a lug back of each inside spike hole to heel in the spikes and a rib on the outside edge of the plate extending up over the shoulder, through which is placed a ⅝-in. diameter set screw bearing against the upper surface of the rail base. The under side of the plate has small corrugations at right angles to the edges.

The edges of the plates are strengthened against buckling or breaking by the shoulders, lugs and rib and the rail is



Two Views of the Rail Anchor Tie Plate in Track, One Showing the Plates Reversed on Alternate Ties.

retarded from creeping by the grip of the set screw and the friction of the outside overhanging shoulder and the inside spike. This anti-creeping feature is operative for traffic in either direction. The set screw is cup-pointed and made of tempered steel. It is inserted perpendicularly and when screwed down against the rail the threads of the screw become meshed forming a lock which prevents it from loosening. One engineer maintenance of way reports that he has noticed that within three or four months the set screws become rusted sufficiently to make them immovable to any pounding by traffic. In the Kansas City Terminal test the set screws are said to have remained tight for the entire four years. In addition to the action of this device as a tie plate and rail anchor one general roadmaster who has tested it finds that by reversing the plates on alternate ties they can be used on sharp curves to prevent the rails from turning and spreading.

The rail anchor tie plate is made from the best grade of Bessemer and charcoal malleable iron, each cast being analyzed in the laboratory and each heat subjected to physical test. These plates are manufactured by the Chicago Malleable Castings Company, West Pullman, Chicago, Ill.

TWO SCHERZER ROLLING LIFT BRIDGES FOR THE DELRAY CONNECTING RAILROAD

The Solvay Process Company, in making general improvements on its subsidiary railroad, the Delray Connecting, found that it would be advisable to replace a center pier swing bridge, over the River Rouge at Detroit, Mich., with

Two Scherzer Rolling Lift Bridges Operated from One Controller House.

Scherzer rolling lift bridges to facilitate the increasing traffic between the company's plant and the railway yard. The government requires a 120-ft. clear opening between fenders on this river, and as the two bridges were to be within 150 ft. of each other, plans were approved for two single-track rolling lift bridges at diverging angles from the south bank.

The east bridge has a movable span of 210 ft., a track girder span of 40 ft. on the south bank and an approach span of 20 ft. on the north end, while the west bridge has a movable span of 141 ft., a track girder span on the south of 34 ft. and an approach girder span of 20 ft. at the north end. Both bridges are designed for Cooper's E-60 loading and under the American Railway Engineering Association specifications. In addition to the railway traffic, the short span is used by highway bridge and has 4-ft. sidewalks carried on brackets on the outside of the trusses. A roadway of 15 ft. between curbs and 26 ft. 5 in. between sidewalk railings is provided. The movable span is of the Warren through truss type, 16 ft. 3 in. center to center of trusses with parallel chords 29 ft. center to center. The span is equipped with a 37-hp. a. c. motor and

with means for operating by hand when desired. It operates through an angle of 81 deg. 10 min. The 210-ft. span has the same general details with the following exceptions: It is strictly a railway bridge with trusses 18 ft. center to center and a sloping top chord. The bridge is operated through an angle of 76 deg. 23 min. and is equipped with two 30-hp. a. c. motors and also with means for operating by hand. Both bridges are operated from one house, which is supported on brackets on the west side of the track girder span of the long bridge. Each has a separate control and one operator can move them together or separately as desired.

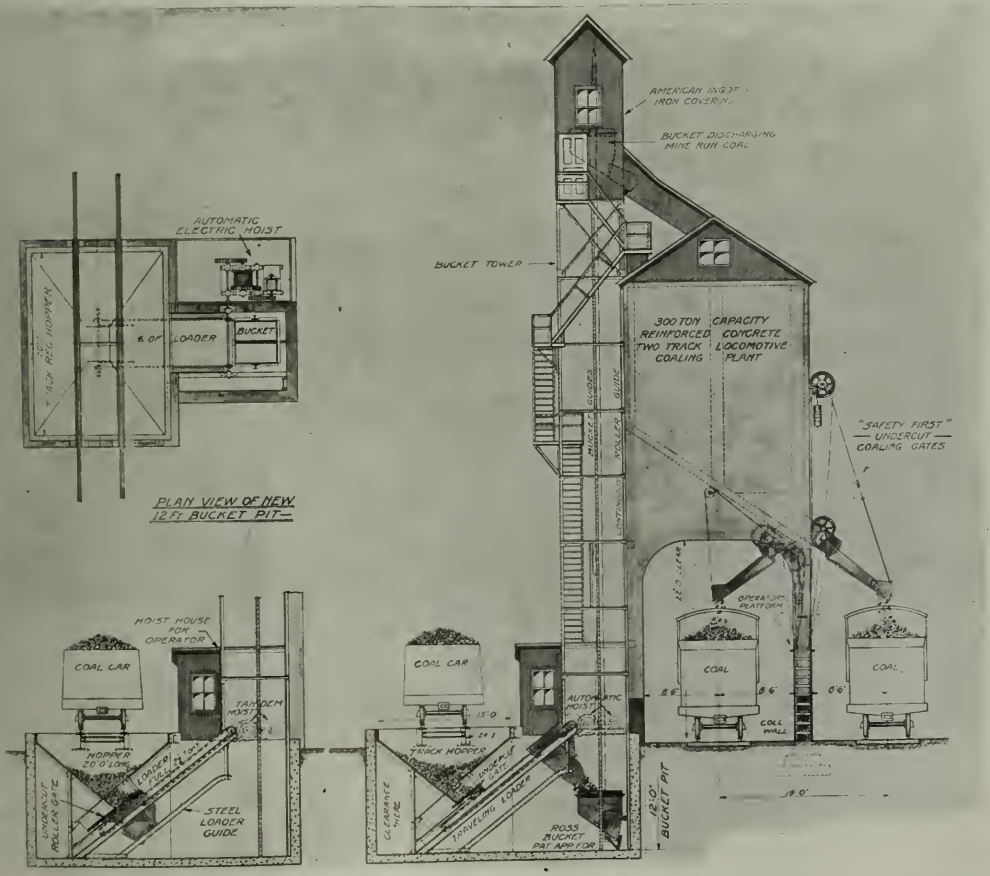
Rapid progress was made on both of these bridges. On the longer one the first steel was raised on May 20, 1914, erection was completed on July 19, the bridge was operated on July 27 and on August 15 it was opened to traffic. On the 141-ft. span erection was started on October 6 and was completed on November 7, the bridge was operated on November 14 and traffic was placed on it December 3.

The Scherzer Rolling Lift Bridge Company, Chicago, furnished the designs, plans and specifications of the superstructure, operating machinery and power equipment for these bridges and also maintained a consulting engineering supervision during the manufacture and erection. The engineering department of the Solvay Process Company designed the substructures. The Pennsylvania Steel Company manufactured and erected the superstructures and Messrs. Ginzel and Towler, Detroit, Mich., were the contractors for the substructures.

A SHALLOW PIT LOADER FOR A COALING STATION

A new type of pit loader for use at locomotive coaling stations that requires a depth of pit of only 12 ft. has recently been designed by the Roberts & Schaefer Company, Chicago. This loader is intended for use with the "Holmen" type of elevating bucket, which is also installed by this company. The loader consists of a large, heavy steel receptacle with a capacity of 2½ tons of mine-run coal which operates on an inclined track of heavy channels from its unloading position under the track hopper to its dumping position over the elevating bucket. A continuous roller guide is provided for the loader discharge apron to keep it positively in the closed position except when loading the elevating bucket. A ¾-in. steel undercut gate mounted on rollers controls the flow of coal from the receiving hopper and is actuated by the traveling loader.

The loader is operated by an automatic electric hoist which also controls the elevating bucket. This hoist has a diffen-



A Holmen Coaling Station Equipped with 12-ft. Bucket Pit. Loader Filled, Gate Open and Elevating Bucket Discharging at Left, and Bucket Loading with Hopper Closed at Right.

tial action with a ratio of travel of 7:1 for the pit loader and the coal elevating bucket. The loader is geared directly to the hoist. The entire equipment, being automatic, is under the control of the operator in the hoist house by means of an electric push button.

A COMPARISON OF TITANIUM TREATED AND STANDARD OPEN-HEARTH RAILS

In bulletin No. 170 of the American Railway Engineering Association dated October, 1914, there appears a report by M. H. Wickhorst, engineer of tests of the Rail Committee on "The Influence of Carbon on the Properties of Rail." This report covers an extended series of tests made at the plants of the Carnegie Steel Company and the Maryland Steel Company. The blooms from which these rails were rolled were selected from stock and no effort was made to locate the position of each rail in the original ingot. It is fair to assume, therefore, that these samples were in general representative of the average run of steel rails of approximately the same analyses as reported.

In Mr. Wickhorst's report he presented a formula for the tensile or ultimate strength

$$T = 40{,}500 + 1{,}250\ C$$

T being the tensile strength in pounds per square inch and C being the amount of carbon in 0.01 per cent.

Mr. Wickhorst states that, "this is for open-hearth steel with about 0.03 per cent phosphorus and about 0.70 per cent. manganese in test specimens of ½-in. diameter and 2-in. gage length and between limits of 0.30 and 0.80 per cent carbon."

On another page he presented a formula for the calculation of elongation as related to the tensile strength

$$E = 52 - \frac{T}{3300}$$

He stated that, "this formula applies for tensile strength of 80,000 to 130,000 lb. per sq. in. It gives the average elongation and individual results may fall above or below this average."

Previous to the appearance of this report the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., had issued seven bulletins covering detailed studies of 17 standard and 17 Titanium treated open-hearth rails.

Following the appearance of the A. R. E. A. report the Titanium Alloy Manufacturing Company applied these formulæ to the results secured in the tests reported in their bulletin. On two of the samples of each set chemical analyses were not taken from points identical with those from which the tensile test specimen pieces were taken and it was therefore possible to make a comparison on only 15 of the 17 samples of each class of rails.

The accompanying table shows the results of this comparison, samples 6 and 7 of each class being omitted for the reasons just stated. Columns 2 to 6 inclusive, show the analyses of carbon, manganese, phosphorus, sulphur and silicon, respectively, in the center of the head of each sample. Column No. 7 shows the theoretical tensile strength calculated by Mr. Wickhorst's proposed formula. Column No. 8 shows the actual tensile strengths of the various samples as reported in the manufacturer's bulletins. Column No. 9 shows the theoretical elongations according to Mr. Wickhorst's formula, while column No. 10 shows the actual elongations as previously reported in the bulletins. Column No. 11 shows the percentage of the actual to the theoretical ultimate strength while column No. 12 shows the percentage of the actual elongations to the theoretical. The last column shows the "merit" of the various specimens obtained by multiplying the percentage figures in column 11 by those in column 12.

From this comparison it is seen that the average ultimate strength of the Titanium-treated rails is 95 per cent, of the theoretical strength computed by the Wickhorst formula as compared with 90 per cent. for the untreated rails while the Titanium-treated rails showed an average elongation of 98 per cent. of that computed by the formula as compared with 83 per cent. with the untreated rails. The average "merit" for the Titanium-treated rails is seen to be 94 per cent. as compared with 75 per cent. for the untreated rails, or over 20 per cent. greater. As the amount of Titanium remaining in the steel is very slight, these results would indicate that the logical explanation for this improvement lies in the greater uniformity of the treated steel.

COMPARISON OF SAMPLES FROM 15 UNTREATED OPEN HEARTH A-RAILS AND 15 TITANIUM TREATED OPEN HEARTH A-RAILS AS REPORTED IN OUR BULLETINS 1 TO 7 INCLUSIVE, AND SUMMARIZED ON PAGES 4 AND 5 OF BULLETIN No. 7.

Standard Open Hearth A-Rails		C	Mn	P	S	Si	Theoretical Wt. Str.	Actual Wt. Str.	Theoretical Elongation	Actual Elongation	Percentage Actual to Theoretical: Ultimate Strength	Elongation	Merit
Untreated	1	.74	.682	.025	.028	.170	133,000	122,700	14.9	9.5	92%	64%	59%
	2	.75	.901	.026	.050	.145	134,250	122,100	15.0	8.5	91%	57%	52%
	3	.85	.816	.026	.049	.120	146,750	115,700	17.0	4.0	79%	24%	19%
	4	.71	.584	.019	.035	.109	129,250	116,200	16.8	14.0	90%	83%	75%
	5	.88	.770	.028	.041	.160	150,500	120,900	15.4	4.5	80%	29%	23%
	8	.75	.811	.023	.055	.140	134,250	125,800	14.0	15.8	94%	113%	105%
	9	.74	.857	.020	.040	.160	133,000	124,900	14.2	15.8	94%	111%	104%
	10	.82	.943	.027	.027	.106	143,000	119,800	15.7	16.5	84%	105%	88%
	11	.71	.859	.025	.045	.113	129,250	117,700	16.4	18.0	91%	110%	100%
	12	.72	.882	.029	.052	.100	130,500	119,100	16.0	18.0	91%	113%	103%
	13	.73	.588	.020	.112	.192	131,750	129,900	12.7	9.5	99%	75%	74%
	14	.82	.594	.018	.056	.070	143,000	141,400	9.2	7.5	99%	82%	81%
	15	.73	.827	.018	.021	.107	131,750	121,800	15.1	14.3	92%	95%	88%
	16	.54	.541	.015	.028	.053	108,000	98,700	22.1	22.3	91%	101%	92%
	17	.64	.530	.013	.026	.062	120,500	99,400	21.9	16.8	82%	77%	63%
Averages		.74	.745	.022	.044	.120	133,250	119,726	15.7	13.0	90%	83%	75%
Titanium-Treated	1	.70	.735	.024	.024	.110	128,000	121,000	15.4	14.3	95%	93%	88%
	2	.77	.810	.018	.035	.092	136,750	129,250	14.2	9.5	94%	67%	61%
	3	.83	.784	.018	.034	.130	144,250	127,100	13.5	13.0	88%	96%	85%
	4	.64	.646	.016	.030	.075	120,500	115,800	17.0	13.3	96%	78%	75%
	5	.77	.761	.029	.039	.100	136,750	124,500	14.3	13.0	91%	91%	83%
	8	.73	1.040	.026	.027	.080	131,750	128,200	12.6	16.8	97%	133%	130%
	9	.67	.776	.025	.031	.094	124,250	120,700	15.5	18.8	97%	121%	117%
	10	.74	.904	.023	.043	.094	133,000	125,700	14.6	16.8	95%	120%	113%
	11	.75	.943	.030	.043	.122	134,250	123,500	11.6	13.5	99%	116%	116%
	12	.75	.815	.018	.034	.108	134,250	124,000	14.5	15.0	92%	103%	95%
	13	.74	.578	.011	.050	.066	133,000	132,600	11.9	12.0	100%	101%	100%
	14	.79	.615	.016	.063	.056	139,250	140,900	9.6	11.5	101%	120%	121%
	15	.77	.735	.023	.028	.103	136,750	125,500	14.0	11.8	92%	84%	77%
	16	.71	.652	.024	.026	.056	129,250	122,000	15.1	11.5	94%	76%	72%
	17	.73	.828	.021	.030	.086	131,750	126,600	14.0	14.0	96%	102%	98%
Averages		.74	.775	.022	.036	.091	132,916	126,206	13 8	13.6	95%	98%	94%

Railway Age Gazette

DAILY EDITION

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WE GUARANTEE, that of this issue 6,744 copies were printed; that of those 6,744 copies, 5,840 copies were mailed or delivered by messenger to regular paid subscribers; 821 copies were distributed among members and guests of the American Railway Engineering Association and at the Coliseum; 133 copies were mailed to advertisers; and 150 copies were set aside for office use.

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CONTENTS

A Well Organized Committee

The adoption of three new rail sections and specifications for carbon and heat-treated angle bars within five minutes after their presentation and without any discussion or objections from the floor of the convention yesterday afternoon illustrated the well-oiled machinery within the Rail Committee. Including within its members nearly all the leading authorities on rail matters within the association, it was evident the differences of opinion were all adjusted before the report was presented to the convention. These recommendations were adopted with as little commotion as if they referred to only a minor change in wording of some specification.

Reports on Substitute Ties

In view of the continually increasing cost of wooden cross ties and the resulting agitation for the substitution of ties of other materials, the Tie Committee is performing a valuable service in compiling information from year to year regarding the design and the service results secured from the numerous experimental installations of substitute ties. Not only is this report of value because of the information given concerning the particular designs referred to, but a study of the different failures reported reveals many points to be avoided in later designs. The duty of the subcommittee on Substitute Ties is not to attempt the design of a tie, but rather to observe the results secured with the many designs already in service. The report this year is of more than usual value, as it contains an index to the reports made previously on the various substitute ties, enabling one to ascertain the history of any special tie in so far as the committee has reported on it. It is to be hoped that this index as well as the report will be continued from year to year.

The Importance of Drainage

It is axiomatic that water is the greatest enemy of track and that most of the ills from which a track suffers are the result of an excess of moisture. At the same time it is only in recent years that it has been considered advisable to increase the expenditure for original construction to eliminate future water trouble. In many cases the funds for these increasing expenditures have not been available previously. One of the subjects on which the Roadway Committee reported yesterday was "The Prevention or Cure of Water Pockets in the Roadbed," and it mentioned several precautions which may be taken to prevent them. Closely connected with this same subject is that of sodding of slopes to prevent the washing down of the embankment material into the drainage ditches. The Roadway Committee also reported on this, describing the practices of a number of roads and presenting specifications for this work. While relatively expensive, the sodding of embankments is becoming more general at those points where trouble is expected and many instances may be cited where such precautions have saved their first cost many times over in reduced maintenance expenditures, all of which shows that we are gradually adopting higher standards and building more permanently for the future.

President Robert Trimble

Robert Trimble, who was elected president of the American Railway Engineering Association, is chief engineer maintenance of way of the Pennsylvania Lines West of Pittsburgh, Northwest System, with office at Pittsburgh, Pa. Mr. Trimble was born at Butler, Pa., and was educated at the Western University of Pennsylvania during the years 1872 to 1875. He entered railway service in the latter year as chainman for the Pennsylvania Company, and until 1903 occupied various positions in the engineering department, including that of principal assistant engineer. In 1903 he was appointed chief engineer maintenance of way, which position he still holds. Like most Pennsylvania officers, his entire service has been with that one road. A very interesting piece of information in connection with Mr. Trimble's career is the fact that he was the resident engineer in charge of construction of the present Union Station at Chicago, which was completed and put in service on April 4, 1881. Thomas Rodd, who is now chief engineer of the Pennsylvania Lines West of Pittsburgh, was then principal assistant engineer. Mr. Rodd is now chief engineer of the Union Station Company, which is about to replace the present structure with a magnificent new one, and Mr. Trimble is the chairman of the board of advisory engi-

neers, to which has been committed the study and supervision of certain of the construction features in connection with the work. Mr. Trimble has been first vice-president of the Association during the past year, and during the previous year was second vice-president.

An Increasing Knowledge of Paint

Not many years ago the railways bought their paints almost entirely on the recommendations and reputations of the manufacturers. This condition existed because the paints were all mixed by secret formulas, which the manufacturers protected vigilantly. During the past two years reports on the subject of paint have been presented before the American Society for Testing Materials, the American Railway Bridge & Building Association, and the Maintenance of Way Master Painters' Association, and the report of the committee on Iron & Steel Structures of the American Railway Engineering Association, presented yesterday, also contains an elaborate and valuable discussion of this subject. Thus the railways are themselves securing a greater knowledge of paints and paint materials, and they are therefore able to discriminate more carefully between the various brands on the market. In fact, one or two roads have prepared detailed specifications for the paints they desire to use, and call for bids from the various manufacturers on the basis of the specifications outlined. Equal attention is also being given to methods of application of the paint. Instead of allowing any mechanic to be employed in a painting gang, there is coming to be a greater realization of the fact that this is a trade in itself and that the best results can only be secured by employing skilled workmen.

The Fiscal Year

At various times during the past year we have called attention in these columns to the serious effect of the present limits of the fiscal year on the track department. President Storey emphasized the importance of the same idea in his annual address. The Track Committee yesterday repeated its recommendation of a year ago that the American Railway Engineering Association, strongly urge upon the American Railway Association the adoption of December 31 as the end of the fiscal year, and the president stated that the Board of Direction was now giving this subject its attention. No other single action would have as great a beneficial effect on maintenance of way work. The railways have the means within their own power to make this change, for the only other party concerned, the Interstate Commerce Commission, would undoubtedly offer no objection to changing from June 30 to December 31. The beneficial results which would be obtained by this change are so obvious to every maintenance of way officer that he has difficulty in understanding why the railway executives do not make it. He should not, however, become discouraged with the lack of support, because many important reforms are secured only by prolonged agitation. That progress is being made is shown by the fact that the Erie has decided within the past month to change from the fiscal year ending June 30 to the calendar year in making its annual report to its stockholders. If a few more roads follow this example, the movement may become general. That the calendar year is not unpractical is proven by the fact that two of the largest railway systems in the country, the Pennsylvania and the New York Central, have operated for many years on the calendar rather than the fiscal year.

ENLARGING THE CLEARANCE DIAGRAM

No subject brought out a more vigorous discussion yesterday than that with reference to the clearance diagram proposed by the committee on Iron and Steel Structures. The diagram previously approved and now published in the Manual provides for a minimum horizontal clearance of 14 feet. The diagram presented by the committee increases this to 15 feet. The purpose of the committee in increasing the horizontal clearance was essentially one of safety. The employes' organizations and numerous state commissions have been demanding increased clearances frequently in recent years. As a result a number of states now require clearances considerably greater than those specified by the standards of the association. In opposing the change, Mr. Schall pointed out the effect it would have on the eastern roads built in the more congested centers where any changes are correspondingly expensive. The adoption of an enlarged clearance diagram permitting the operation of larger cars by one road soon affects every other road in the country, for with the present free interchange of equipment the cars of one road may be expected to move over any other line. Representatives of several western roads joined in the opposition to this measure, but on different grounds. Attention was called by several members to the fact that the adoption of increased clearances would soon result in the design of larger cars and locomotives by the mechanical department. Conditions would then soon again be as they now are. In reply to this the chairman of the committee called attention to the fact that any measure which will increase the ultimate returns to the railways are justified. If an increase of the clearances with the resultant revision or rebuilding of the structures will permit the operation of larger equipment and thereby reduce the cost of transportation sufficiently to increase the ultimate net revenue, such changes are justified. The rejection of the proposed diagram by a majority of only five votes indicates the closeness of the decision.

MR. GLEED ON THE HUMAN MIND

Charles S. Gleed is not a politician or in any sense a candidate for the favor of the public. He is a business man, a lawyer, a scholar, a philosopher and a lover of his fellow men. These facts explain the address entitled "About the Human Mind," which he delivered at the dinner of the American Railway Engineering Association last night. He had the courage to make the speech because he is not a candidate for public favor and apparently never intends to be one. He had the knowledge of human nature which enabled him to prepare it because he is a business man, a lawyer, a scholar and a philosopher. And he got up out of a sick-bed to prepare it and came to Chicago to deliver it because he felt that it is the duty of one who loves his fellow-men to take advantage occasionally of good opportunities to tell them a few plain truths about themselves.

Mr. Gleed's address, which is published elsewhere in this issue, is a severe arraignment of human nature, especially of human nature in masses. Dean Swift himself was not more caustic or pessimistic; and one who considered both the substance and the literary attractions of Mr. Gleed's remarks, might regard him as a real, modern Swift. But that would be to fly wide of the mark. For while Swift both castigated and hated human nature, and was hated and deserved to be hated, by most of those who knew him, Mr. Gleed, as we have intimated, is a lover of his kind, and is also one of the gentlest, kindest and most generous of men.

Why, then, does he thus whip mankind with scorpions? Probably he has recently been brooding over the awful catastrophe which has lately befallen Europe and over the recent course of politics and business in his own country. He has for years taken an intense interest in the public regulation of railways and other business concerns; and any intelligent and honest man who is familiar with the kind of legislation regarding business matters which the public during the last ten years has permitted, approved and even demanded, finds it difficult to repose or express much confidence in either the

fundamental intelligence or the fundamental honesty of human nature in the mass.

But there is another side. Somehow, in spite of the imperfections of the human mind and of human character, we do manage to muddle along. We seem to go backward as often as forward, but the cumulative effects of the advances are greater than the cumulative effects of the retreats. The public soon tires of real statesmen and turns them out, but it also soon tires of the demagogues and turns them out, and they are less likely to be called back than the statesmen. When times are good the public, like Jerushun, waxes fat and kicks, the result being foolish attacks on business enterprise; but publicity, discussion and the pinch of hard times soon bring the public around to another point of view. It is seldom possible to appeal successfully to the mere intellect of the public on important questions; but most important questions have to be determined on moral as well as logical considerations, and at bottom the public is honest, and therefore in the long run usually decides important questions right. Of course, as Mr. Gleed indicates, sometimes it is a terribly long run.

Mr. Gleed's speech was fine as far as it went. But we don't think he finished it. He was most eloquent in his pessimism. But we think he could say some more things on his subject, which would be as eloquently optimistic. We hold no brief for the human mind. We think that any lawyer who took its case would have difficulty in getting it acquitted, if Mr. Gleed appeared, as he did last night, as attorney for the prosecution. But nevertheless, we think that a pretty good case could be made out for poor, old, befuddled human nature.

TO-DAY'S PROGRAM

The convention will be called to order at 9:30 this morning. The following reports will be presented:

XVII. Wood Preservation.
Special. Stresses in Railroad Track.
VIII. Masonry.
VII. Wooden Bridges and Trestles.
Special. Grading of Lumber.
XVIII. Electricity.
XIV. Yards and Terminals.
II. Ballast.
New Business.
Installation of Officers.
Adjournment.

N. & W. ELECTRIC LOCOMOTIVES

In his discussion of the electrification which the Norfolk & Western has recently completed west of Bluefield, W. Va., C. S. Churchill, assistant to the president, stated before the Western Society of Engineers on Tuesday night that they had been able to replace 33 steam locomotives by 11 electric engines. These figures were inadvertently transposed in our report of this discussion in yesterday morning's Daily. The context explains the ability of the electric power to perform this increased service through the elimination of many of the delays incident to steam locomotive operation.

NEW A. R. E. A. OFFICERS

The result of the election of officers of the American Railway Engineering Association for the coming years, as reported for the tellers by the secretary just before the close of the afternoon session yesterday was as follows:

President, Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines West, Pittsburgh, Pa.; first vice-president, A. S. Baldwin, chief engineer, Illinois Central, Chicago; second vice-president, John G. Sullivan, chief engineer, Western Lines, Canadian Pacific, Winnipeg; treasurer, George H. Bremner, assistant district engineer, division of valuation, Interstate Commerce Commission, Chicago; secretary, E. H. Fritch, Chicago; directors for three years, H. R. Safford, chief engineer, Grand Trunk, Montreal, Que.; C. F. W. Felt, chief engineer, Santa Fe System, Chicago, and A. N. Talbot, professor, municipal and sanitary engineering, University of Illinois, Urbana, Ill.; members of the nominating committee: Paul Didier, principal assistant engineer, Baltimore & Ohio, Pittsburgh, Pa.; Hadley Baldwin, assistant chief engineer, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, O.; C. E. Smith, assistant chief engineer, Missouri Pacific, St. Louis, Mo.; F. E. Turneaure, dean, college of engineering, University of Wisconsin, Madison, Wis., and D. J. Brumley, valuation engineer, Illinois Central, Chicago.

PENNSYLVANIA ALUMNI HERE

A number of the alumni of the University of Pennsylvania in attendance at the convention and exhibit took lunch together yesterday at the Hotel Stratford.

LOST—RAILROAD PASSES

C. C. Hill, engineer of construction, Michigan Central, reports the loss of a sole leather case containing his Michigan Central and foreign road passes in the Coliseum on Tuesday. Finder please return to room 1162, Congress Hotel.

B. & B. ASSOCIATION COMMITTEE MEETINGS

The Executive Committee of the American Railway Bridge and Building Association held a meeting at 4 o'clock yesterday afternoon in the Congress hotel. The committee on reinforced concrete bridge work also held an informal meeting for the discussion of its work.

STRESSES IN TRACK

A meeting of the joint committee on Stresses in Track of the American Railway Engineering Association and the American Society of Civil Engineers was held in the Florentine room after the afternoon session Tuesday, at which methods of procedure were discussed and an instrument with which certain preliminary tests have been made was examined.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION

The chairman and many of the members of the standing committees of the Roadmasters' and Maintenance of Way Association met at the Auditorium Hotel yesterday morning. The committee subjects and committee work for 1915 were discussed and suggestions given. The meeting was for the purpose of reviewing the work already done on the reports for the annual convention. A meeting of the executive officers was also held. The attendance was 25.

VISITORS AT THE COLISEUM

H. E. Speaks, general superintendent of the New York Central at Columbus, was an interested spectator at the exhibit yesterday.

Henry Baker, general manager of the Queen & Crescent Route, attended the exhibit yesterday and evinced considerable interest in automatic train control, cab signals, and automatic stops.

C. C. Hubbell, purchasing agent of the Delaware, Lackawanna & Western, visited the Coliseum yesterday and spent a good deal of time in the signal exhibits. Among the purchasing officers who attended the exhibit yesterday are J. F. Marshall, manager of purchases and supplies of the Chicago & Alton, and F. D. Reed, assistant to vice-president and purchasing agent of the Chicago, Rock Island & Pacific.

Proceedings of Railway Engineering Association

Abstract of Eight Reports, Including Iron and Steel Structures, Rail, Roadway, Ties, Building and Track

The Wednesday morning session of the American Railway Engineering Association was called to order at 9:30 a. m. by President Storey in the Florentine Room of the Congress Hotel, Chicago.

ROADWAY

The Board of Direction assigned the following subjects for consideration:

(1) Continue the study of unit pressures allowable on roadbed of different materials, conferring with committee on Ballast and with special committee on Stresses in Railroad Track.

ROBERT TRIMBLE, President-Elect.

J. G. SULLIVAN, Second Vice-President-Elect.

(2) Submit specifications for the protection of slopes by sodding or otherwise.

(3) Recommend means for the prevention or cure, as the case may be, of water pockets in roadbed.

(4) A petition signed by ten members of the Association, addressed to the Board of Direction, requesting the appointment of a special committee to investigate and report on the subject of separating the grades of roads and streets with railroads, was referred to this committee for such further investigation as might be deemed necessary or desirable.

REVISION OF MANUAL.

A number of changes in the Manual were suggested, most of which were in wording only and did not affect the meaning to any great degree.

UNIT PRESSURES ALLOWABLE ON ROADBED OF DIFFERENT MATERIALS.

The chairman of the sub-committee, J. R. W. Ambrose, has designed and tried out an apparatus for measuring under traffic the pressure at any point exerted by the ballast on the roadbed, which, when calibrated, gives promise of furnishing valuable information. No actual results in pounds per square foot have as yet been obtained.

An air-tight box is placed under the track in any desired position, the upper side of the box having a movable diaphragm. The spring within the box is to keep the diaphragm in the extended position after the load is removed. This box is connected by a pipe or hose to a similar box placed on edge, and having a thin rubber diaphragm; to the center of this diaphragm a connection is made to the side of a small mirror; thus any deflection of the diaphragm is multiplied by the mirror. A ray of light is passed on to the mirror, which in turn is deflected according to the magnitude of the impulse given this transmitter, onto a sensitized film moving at a constant speed, recording the movements of the light ray. In these experiments the transmitter was 12 in. under the tie, covered with gravel ballast; the recording mechanism was located 300 ft. from the track.

During the past year we have endeavored to make a preliminary classification of soils preparatory to investigating the allowable unit pressures thereon. This question has been handled quite exhaustively by the United States Department of Agriculture, and in Bulletin No. 84, Messrs. Fletcher & Bryan describe the apparatus and method of making a mechanical analysis of soils and give seven subdivisions into which soils, excluding gravel, stone and rock, may be divided, namely:

	Material.	Size.	
No. 1	Fine gravel ..... 2.	— 1.	mm.
No. 2	Coarse sand ..... 1.	— 0.5	mm.

No. 3	Medium sand	0.5	— 0.25	mm.
No. 4	Fine sand	0.25	— 0.10	mm.
No. 5	Very fine sand	0.10	— 0.05	mm.
No. 6	Silt	0.05	— 0.005	mm.
No. 7	Clay	0.005	— 0.0000	mm.

The committee feels that since the first five of the above materials may be determined by screening, that we should define and adopt the following screens as standards:

	Material.	Screens—Pass Through	Retained On
No. 1	Fine gravel	No. 10	No. 18
No. 2	Coarse sand	No. 18	No. 32
No. 3	Medium sand	No. 32	No. 70
No. 4	Fine sand	No. 70	No. 160
No. 5	Very fine sand	No. 160	No. 230

By the number of sieve is meant the number of meshes per linear inch in the wire cloth, woven from brass wire, having the following diameters for

Sieves Nos. 10 and 18	0.0165	inches diameter
Sieve No. 32	0.0112	inches diameter
Sieve No. 70	0.0045	inches diameter
Sieves Nos. 160 and 230	0.0024	inches diameter

The mesh should be regular in spacing and the cloth should be mounted on the frame without twisting. The last two subdivisions, silt and clay, are more difficult to determine, but the method is fully set forth in the Bulletin, No. 84, of the Bureau of Soils, Agricultural Department, above referred to. If the above subdivisions are adopted, we can then classify various soils by giving the percentage of the materials contained. The percentage of water contained in each sample of soil should also be determined by weighing, drying and reweighing, as the moisture content has a decided influence on the bearing power of many soils.

W. M. DAWLEY,
Chairman Committee on Roadway.

SPECIFICATIONS FOR PROTECTION OF SLOPES BY SODDING OR OTHERWISE.

A general letter was sent to all roads, and 124 replies were received. Sixty-eight had nothing to offer, while 83 practiced sodding to a limited extent and 15 to a much larger extent. Out of the 124 replies, only 6 specifications for sodding and 1 for seeding were received.

Seeding does not appear to be in much favor, as only 4 advocated seeding. Protection by tiling or otherwise met with light response; a few favored tiling. Several advocated cinders, while others advocated honeysuckle or willows on wet slopes. Perhaps the reason for the light response was that the Roadway committee made a report on draining banks, with recommendations covering the ground for drainage in quite a thorough manner. Roads in arid countries point out the fact that sodding is useless on account of lack of water, while others in wet countries state that sodding is unnecessary, as the slope soon becomes sodded naturally. The principal points to be covered by the specifications for sodding are as follows:

Nearly all agree that there should be some preparation of the slope, and there should be a dressing of good soil on top. There is a difference of opinion as to manure dressing, the objection being that it introduces objectionable weeds. There is a wide difference of opinion on the limit of slopes that can be successfully sodded, but it is evident that steep slopes can be sodded by pinning the sod until it is well rooted. The difference of opinion on the cutting of sod is largely on account of the different kinds of sod used. For Bermuda and all running plants, it is evident that the sod should be set out in small pieces, so as to grow a new sod. For grasses that do not have creeping stems, this, of course, would not be true, and in that case all the slope should be sodded.

The letters do not show what kinds of grasses require full sodding. All agree that the sod should be well watered until firmly rooted. Most of the replies advocated staking the sod, but this does not appear to be necessary on slopes that are not steeper than 2 to 1.

There is a great difference of opinion regarding settling banks before sodding, but for Bermuda grasses with creeping stems there appears to be no necessity for waiting for banks to settle. For other grasses this is an open question. The correspondence does not show much interest in seeding. We have only one specification for seeding, which appears to be quite complete. On banks that are wet and springy at the toe of the slope, such as steep hillsides or reservoir banks, the planting of willows or other trees should be looked into more fully.

If, in the opinion of the Engineer, pins longer than 8 in., but not exceeding 12 in., or more than two pins per square yard are required, they shall be furnished by the contractor and used without extra compensation.

Sod shall be paid for as measured in place.

Any defects that may appear in the sod or in the work for a period of six months after the work is completed, shall be made good by the contractor at his own expense, and if not attended to promptly after notice from the Engineer, the defects will be remedied by the company and the cost of doing the work will be deducted from payments due the contractor.

The following specifications for sodding with Bermuda Grass are recommended for adoption and inclusion in the Manual:

The slopes should be graded to a uniform surface and all depressions should be filled in with suitable material and padded down firmly with shovel.

Sodding Banks at Toronto.

If the material of the slope is not fertile it should be given a dressing of 6 in. of good rich loam. If good loam is not available a dressing of manure should be placed on the surface and well raked in. Care, however, should be taken against the use of such manure as have seeds of objectionable grasses or weeds. Before placing the loam the surface of the slope should be loosened up roughly to insure a good bond. Lay out the surface of the slope to be sodded in shallow horizontal trenches 12 in. apart and 3 in. deep. Separate the Bermuda sod into tufts or small pieces not more than 4 in. square and apply in trenches at intervals of 6 in. to 1 ft. apart, according to the quality of the sod and the character of the soil, the object being to place only sufficient old sod to furnish enough creeping stems to cover the slope in a reasonably short time, thus creating a new sod on the slope in pref-

erence to the old sod. The top of the sod should not extend above the surface of the slope, and if the season is advanced so that it is liable to have hot or freezing weather the sod should be depressed just below the surface and a covering of loam placed over the soil. Loose earth should also be packed firmly around the sod.

All sod laid during the day should be thoroughly watered as soon as practicable after laying, and no sod shall be left over night not laid without water. All sod shall be watered daily for 20 days after laying. On slopes steeper than 2 to 1 the sod shall be in narrow strips 3 to 4 in. wide and 3 ft. long, and shall be staked to the bank with small stakes 8 in. to a foot long, stakes being placed every 1½ ft. apart. After the slope has been filled, sod should be rolled or firmly padded down with a shovel to a smooth uniform surface. All sod must be taken from good, rich soil, be uniform in texture, free from objectionable grasses or weeds and in healthy condition, with no signs of decay, and must contain sufficient moisture to maintain its vitality during transportation.

Sod should preferably be cut 3 ft. or more long and 18 in. to 2 ft. wide and not less than 2½ in. thick, large pieces of sod being preferable on account of retaining their moisture and standing transportation better than small pieces. Sod should be as fresh as possible and received on the work daily. Any sod to be left over night should be thoroughly watered. Any sod that is heated will not be accepted. All sodding must be finished before the continued frost sets in.

Sod shall be paid for as measured in place, and shall include the entire surface sodded—this price to include the furnishing the sod and handling it. Transportation of sod, men and material, also to include stakes where it is necessary to take the sod. The entire work shall be done in a thoroughly workmanlike manner so that the appearance after completion shall be as nearly as possible that of good natural growth in place.

All objectionable grasses and weeds shall be removed from time to time to prevent shading the grasses until such time that the sod has taken hold or the creeping stems have covered the entire slope. Where springs have developed on the slope a blind drain of cinders or broken stone should be laid from the spring to the top of the stone should be laid from the spring to the toe of the slope.

MEANS FOR THE PREVENTION OR CURE OF WATER POCKETS IN A ROADBED.

A circular letter, containing a list of 8 questions on this subject, was addressed to those members of the Association directly in charge of maintenance work, or who were supposed to have a detailed knowledge of the treatment of water pockets. Fifty-three replies to this letter were received.

From a consideration of the data now in hand, it is concluded that our knowledge of water pockets in the roadbed is yet in its experimental stage, and it is so related to other questions now being investigated by the Association that it would be inadvisable at this time to attempt any recommendations on the subject.

In reporting progress it is the purpose of the sub-committee to give a resume of its investigation to date, in order that individual members of the Association may further continue the investigation during the forthcoming year and be prepared to assist the committee in reaching its conclusions.

Briefly, a water pocket may be defined as "a depression in a roadbed of variable extent, with ballast or other porous material, wherein water collects and is confined." From opinions expressed, it appears to be well established that the underlying causes of water pockets are the absence of adequate drainage in roadbed; the deformation of the original roadbed prior to ballasting; and an insufficient depth of ballast and heavy wheel loads and the action of frost on the roadbed in climate where the frost line extends below sub-grade. It is also the opinion there is an increased tendency towards the formation of water pockets on old operated lines, which might naturally be expected to follow a neglected track drainage and improper ballast requirements for the increased wheel loads on such lines. The committee's assignment requires two lines of investigation: The prevention of water pockets and the cure of water pockets. It is our conclusion that the prevention of water pockets is the more important subject to be dealt with, and since our investigation will naturally lead to a consideration of the proper depth of ballast and unit allowable pressures on roadbed surface, we must await the conclusion of other committees now handling these subjects.

Prevention of Water Pockets.

Many descriptions of methods tried by various members to prevent water pockets in newly constructed or ballasted track have been reported, but there appears to bo no uniform practice. One reply to our circular advises that extreme care should be exercised prior to ballasting to remove all deformation and to properly shape the roadbed surface so as to quickly shed all water. In this connection it is stated that more water pockets are formed in one day by permitting engines and cars in rainy seasons to use track laid on a flat sub-grade without full ballast, or with no ballast at all than would be formed in years with a sufficient depth of ballast, as in every case where tie beds itself into the roadbed surface a deformation occurs, which collects and holds water and gives foundation for a water pocket, regardless of the amount of ballast afterwards applied.

One of the two lines reported that it is their practice in opening up new track to traffic to spread over the entire roadbed, prior to ballasting, a layer of sand, sandy loam, granulated furnace slag, screenings from stone crushers of certain impervious materials which have been found will shed water. When this material has compacted, ballast is applied, and no trouble is experienced from water pockets.

Bridge-filling methods on some operated lines have been found to be responsible for water pockets in embankments. We are informed by one member, who has made a special study of bridge-filling methods, that where a new fill is permitted to settle before the deck and stringers are removed, water pockets invariably appear, and the amount of trouble experienced in the upkeep of the track varies in proportion to the length of time the stringers and deck remain. He advises that in the past eight years he has made it a practice to remove the deck and stringers when banks are not filled to over 10 or 12 ft. wide on top, and in 12 linear miles of bridges filled, water-pocket trouble was absolutely eliminated.

In climates where the frost line extends below the sub-grade, when the frost is leaving the ground, thawing from the top downward, that part of the soil which has thawed, retaining all its moisture, on account of the impervious frozen layer of soil beneath it, becomes almost liquid, thus losing its supporting power, and it is readily displaced from beneath the ties under traffic. On account of slight variations in the character of the soil, this displacement is not uniform, and the resulting inequalities leave depressions in which water accumulates. The methods suggested for the prevention of water pockets formed in this manner are to carry the ballast below the frost-line, adopt some method of raising the frost-line (soil in extreme cold weather freezes but a few inches deep under a good sod), or to construct the upper portion of the roadbed of frost-resisting materials.

We are indebted to H. T. Porter, chief engineer, and F. R. Layng, engineer of track of the Bessemer & Lake Erie, for the following description of an unusual method of preventing water pockets in new track:

"Between Keepville and Albion, 2.4 miles, the Bessemer & Lake Erie was a single-track road on the towpath of the Erie and Pennsylvania canal, the towpath being approximately 8 ft. above the canal bed. In 1910 it was decided to double track this line and the material was excavated by steam shovel at Albion, hauled on flat cars, plowed off with a side plow and spread with a Jordan spreader. The material consisted of shale and clay of such character that it was unfavorable to good drainage. With the idea of consolidating this material and forming a crust at sub-grade so that the ballast would not punch holes into the sub-grade, a 10-ton Kelly-Springfield roller was used to roll the sub-grade behind the spreader. If the roller developed soft spots they were replowed and rolled again, with the result that before track was laid we had a hard crust formed at the top of the grade. The rolling for the 2.4 miles cost $300, or at the rate of $125 per mile. The track was then laid and ballasted with screened slag and has not been given a resurfacing since. On this entire stretch there is not a single indication of the formation of a water pocket. This new track is the northbound main, and during nine months of the year carries from 24 to 30 freight and three regular passenger trains daily. As a matter of fact it has hardly been necessary to set a jack under this track, and no lining has been done except in a few spots. It is remarkable the way the track has stood up, and it is our belief that the rolling of the sub-grade is in a large measure responsible for the results obtained."

No methods of preventing water pockets in old-operated track have as yet been reported, evidently for the reason it has not yet been possible to tell where and when a

pocket may develop. Every one admits that adequate drainage of the ballast and roadbed surface is essential to prevention, but it does not seem that anything but the usual maintenance methods are followed prior to formation.

In conclusion, the Committee asks the members of the Association to further study the prevention of water pockets along the following lines: (1) In new track, single and multiple. (2) In old-operated tracks, single and multiple. (3) Filled bridges and (4) yards and terminals.

Cure of Water Pockets.

Water pockets have been known to some of our members for 20 years or more, and it is quite natural that methods of cure should be generally known, but, nevertheless, there appears to be a wide difference of opinion as to the most practicable and economical methods. In cuts it is the prevailing opinion that tile drains give the most satisfactory relief from water pockets, but the kind of tile and in what relation to the end of the tie it should be laid is a problem yet unsolved. It appears to the committee that only vitrified socket pipe of a diameter not less than 6 in. should be used for draining cuts, but we are not yet prepared to recommend any specifications for laying or its position in relation to the track.

In embankments, water pockets are prevalent at the ends of the cuts at low points in grade, at trestles replaced by embankments along multiple tracks, and many other points where drainage has become impaired. Relief in such places is secured by opening the pockets and restoring drainage. The methods of restoring drainage to pockets in embankments are many, but the one most widely used consists of cross-draining or tapping the pockets with trenches back-filled with porous material. In many cases drain tile is laid in the trenches, but it is not always beneficial, on account of the tendency to shift its lines and grade under pressure of the load from above or the distortion of the walls of the trench.

The life and efficiency of cross-drainage depends largely upon the depth of the trench and the character of the material used in back filling. Where a proper outlet can be obtained, present experience would seem to indicate that the bottom of the trench should be placed at least 12 in. below the lowest point of the pocket to be drained. Material for back filling consists of cinders, furnace slag, gravel, crushed stone or riprap. It, however, does not appear to the committee that any of these materials alone, with the possible exception of furnace slag, will make an efficient and permanent drain, but that any of the materials mentioned in combination with cinders will give better results. This statement is based upon experience with drains composed of crushed stone or gravel, where in the course of one or two years' life they have been found completely filled by the material from the walls of the trench forcing its way into the voids.

Somewhat similar experience has been had with cinder-filled trenches, except that, instead of the voids being filled, the walls of the trench have become distorted under pressure from loads on track, and have so compressed the cinders as to render them useless for purpose of drainage. It appears that an ideal material for back-filling is one that will prevent the distortion of the walls of the trench and at the same time permit water to filter through. It is believed that a mixture of stone and cinders or slag and cinders will best fulfill these conditions, but a definite conclusion will depend upon further investigation.

Other methods of curing pockets which have been reported consist of driving old boiler tubes into pockets from the side of the embankment, the plowing away of the shoulder to a considerable depth below the base of the tie and restoring the slope with sand, ballast and other pervious material, widening banks and increasing depth of ballast, etc.

Interesting information regarding the difficulties experienced in curing a section of track of water pockets is found in the following quotation from a letter from a member of the Association:

"A section of high-speed main track 4,000 ft. long required constant attention on account of water pockets. We started to overcome this condition by cleaning out the water pockets and running out short sub-ditches from them each year for several years. This became a perpetual nuisance, however, and we made little if any, improvement in track conditions. A little later on we dug the sub-ditches reasonably deep and cleaned out the ballast in quite a thorough manner to permit of the free flow of water from the roadbed through the ballast in the sub-ditches. This afforded excellent relief for the first year, a reasonable degree of relief during the second year, and fair relief during the third year. We observed, however, that we were gradually getting back into the same condition that we were in originally. We then laid a line of pipe between each of the four tracks, and also a larger line of pipe in the outside ditch, with cross drains leading from the lines of pipe between the tracks to the main side pipe. These pipes were laid with the flow line about 34 in. below the top of the rail, because of local conditions, and we filled over them with ashes to the top of the sub-grade. We then cleaned the ballast thoroughly to sub-grade, making what was practically a newly constructed piece of track with ample provision made for drainage. This piece of track was renewed about two years ago.

"Since this improvement was made very little attention is given to this section of track. Both rail and tie conditions have been improved. In former years, when we had a severe storm, the tracks were submerged and water ran from them for several days afterwards. Now, in a few hours after a storm has abated, the pipes are practically dry. During the course of a storm no water is seen on the roadbed, but a large volume is discharged from the mouth of the main pipe, being fed by the smaller pipes between the tracks. We have established manholes just below the ballast surface every 500 to 600 ft. to provide for cleaning out, if necessary, although no such attention has been required. We feel that we have been amply repaid many times over for the expense that we have gone to in connection with this particular piece of track."

CONCLUSIONS.

(1) That the classification of soils be adopted and included in the Manual.

(2) That the specifications for sodding with Bermuda grass be adopted and included in the Manual.

W. M. Dawley (Erie), chairman; J. A. Spielmann (B. & O.), vice-chairman; J. R. W. Ambrose (G. T.), A. F. Blaess (I. C.), Ward Crosby (C. C. & O.), W. C. Curd (M. P.), Paul Didier (B. & O.), R. C. Falconer (Erie), S. B. Fisher (M. K. & T.), Frank Merritt (G. C. & S. F.), L. G. Morphy (B. & A.), F. M. Patterson (Interstate Commerce Commission), W. D. Pence (Interstate Commerce Commission), L. M. Perkins (H. P.), W. H. Petersen (C. R. I. & P.), A. C. Prime (P. R. R.), H. J. Slifer (Cons. Engr.), J. E. Willoughby (A. C. L.), W. P. Wiltsee (H. & W.), Committee.

Discussion on Roadway.

Chairman Dawley presented the report.

Chairman Dawley: The subject of Unit Pressures Allowable on Roadbed on Different Materials should have further consideration. The committee has drawn no conclusions, and would ask the Association to follow up the subject along the lines of, first, prevention and cure of water pockets in new track, single and double; second, in old operating tracks, single and multiple; third, in field bridges, and, fourth, in yards and terminals, giving the committee the benefit of their experience during the coming season.

John G. Sullivan (C. P. R.): There is one point in paragraph 23, under the specifications for the formation of the roadway, that has caused some trouble, and that is the latter part. It says: "The classification of the material shall be in accordance with its conditions at the time of removal, regardless of prior conditions." In overbreak in rock cuts, if you classify that as loose rock, most specifications do not specify how it shall be measured. We know that loose rock will measure more than the space it occupies as solid rock in the cut. In order to avoid disputes I have inserted in our contracts that the measurement shall be the original space occupied by the material regardless of classification. That may be wrong or may not be, but it is definite and a man knows when he is taking a contract how he is going to be paid. I will move that there be added to that paragraph that the measurement of this material shall be the original space occupied, regardless of the classification.

J. E. Willoughby (A. C. L.): The objection to classifying it when it is softer than it was in its original position is that it is not quite fair. It is entirely feasible to cross-section a slide, after it has come into a cut.

Mr. Sullivan: I have no objection to making it that way, but make it something definite.

W. H. Courtenay (L. & N.): One objection to Mr. Sullivan's suggestion is that certain slides cannot be met. They frequently extend four or five hundred feet in the roadbed, and come down gradually, and as you take them out they develop. The ground crumbles up gradually, slides down a little at a time. In many cases they occur where it is impracticable to measure the space occupied by the slide. It is a difficult question any way you look at it.

A. W. Carpenter (N. Y. C.): I would offer as an amend-

ment to insert in the last sentence of the paragraph, after the word "classification," the words "and measurement."

Mr. Sullivan: I can see that we are going to have the same trouble here that we are having with all the specifications. You have your measurements on the building of the line, and the material comes down, broken down probably, or a slide. You must recognize that we can't build a railroad without having an overbreak, or else use a channel and cut out in a straight line. Where you divide the classification between solid and loose rock, or give it all loose rock, how are you going to measure it? It all goes out at the same time. You can't possibly measure during construction. I have had no trouble in doing work with the specifications I have mentioned, and I have had trouble when I did not have that clause in. The only possible way in construction work, when you are taking out rock cut, to measure overbreak, is the solid contents of the cut.

J. R. W. Ambrose (Toronto Term.): I will second Mr. Sullivan's motion. The work that has been done on the Grand Trunk within the last year or two has not had a great deal of solid rock. But they have had some work in the West where there is a great deal of solid rock taken out and considerable overbreak, resulting from, perhaps, carelessness. The question of measurement, it seems to me, is independent of the classification.

J. L. Campbell (E. P. & S. W.): I agree with the impracticability of determining the volume of this broken material other than by proper cross-section after the excavation has been completed. Moreover, I believe the space originally occupied is the fair basis for determining what shall be paid for the work on the classification, and I believe in the case of rock the proper classification would be loose rock.

(The President put to vote the amendment offered by Mr. Sullivan, and it was adopted.)

In 48-a, the second sentence in the fourth paragraph was changed to read, "The compensation to be rendered therefor shall be determined by multiplying the *excavation* yardage, etc."

Mr. Campbell: I would offer this as a substitute for paragraph 59: "The contractor shall, without loss or liability to the company, construct all roads necessary for his use in the execution of this contract."

Chairman Dawley: The committee is willing to accept that amendment.

Mr. Sullivan: In paragraph 60, "where designated" is quite broad. Would not the committee be willing to put some limit to that distance? I would say that we change that wording to read, "Where designated, within limits agreed upon."

Chairman Dawley: The committee will accept that.

Mr. Campbell: In paragraph 5, under "General Contract Requirements," I believe this part of the contract requirement should be referred back to the committee for consideration of the specified width of the roadbed. I do not believe the width stated Class A, 20 ft.; Class B, 16 ft., and Class C, 14 ft., are wide enough. I do not think they are as wide as the roads are now finding it necessary to build. I notice that the Committee on Ballast has recommended a width of 26 feet for ballasting tracks.

The President: It seems to me to be advisable to refer this paragraph back to the committeee.

Hunter McDonald: I do not know whether the committee has been in touch with the committee which has been appointed by the American Society of Civil Engineers on the question of soils. I understand that committee is making a very extended, thorough and scientific research into this question. I think the adoption of this matter at the present time would be premature and I should oppose it being done.

A. M. Talbot (U. of Ill.): I would like to bring up a question concerning the terms used in the list under unit pressures allowable on roadbed of different materials. I understand these refer to the sizes and the grades of these different classifications. We have to look out in regard to bearing upon other lines of work, as, for example, mortar and sand, where the largest grains are the grains which would be compared with the terms used here. By the classification of sand for mortar purposes adopted by the Association, the size of sand may run up to one-quarter of an inch particles, passing an opening one-quarter of an inch in diameter. The term "high in gravel" used here is for the largest size. The term coarse sand; while this is given as very fine sand, it is mastandard Ottawa sand used in testing cement; not a very coarse sand; while this is given as very find sand, it is material which we would hardly consider as available for such things as mortar-making purposes. I would like to suggest two things in this: That some word be added after these terms, like size or grain, to distinguish between this mortar classification, that which is used for mortar-making purposes, and instead of the words "fine gravel" the term "very coarse sand" be employed. Personally, I should be pleased to see these sizes made somewhat larger than they are, but I don't think that is an important point.

(Conclusion (1) was referred back to the committee and Conclusion (2) was accepted.)

RECORDS AND ACCOUNTS

The following subjects were assigned:

(1) Make a comprehensive study of the forms in the Manual, adopted a number of years ago, and bring them up to date.

(2) Continue the study of reports required by Federal and State railway commissions.

(3) Continue the study of a feasible and useful subdivision of I. C. C. classification account No. 6, with a view to securing uniformity of labor costs.

The sub-committee appointed to deal with revision of the Manual and the study of the forms in the Manual suggested a few minor changes.

In connection with reports required by State and Federal Commissions, the committee feels that there is a diminution of the activities of the state commissions in connection

W. A. CHRISTIAN,
Chairman Committee on Records and Accounts.

with the valuation of railway property and a tendency on their part to await the valuation now in progress by the Interstate Commerce Commission.

SUB-DIVISIONS OF I. C. C. CLASSIFICATION ACCOUNT.

Since this subject was assigned to the committee, the Interstate Commerce Commission has issued a new classification of operating expense accounts, which went into effect on July 1, 1914. In that new classification former account No. 6 has been divided into two parts—No. 202, Roadway maintenance, and No. 220, Track laying and surfacing. The splitting of this account into two parts perhaps reduces the necessity of further sub-dividing the two new accounts. However, in the event that this further sub-division is desired, the following sub-divisions are submitted for consideration of the Association:

Account 202, Roadway Maintenance:
(A) Care of Roadbed;
(B) Bank Protection;
(C) Clearing and Cleaning Roadway and Track;
(D) Watching Roadway and Track;
(E) Flood Damage;
(F) Work Train Service.

Account 220, Track Laying and Surfacing:
(G) Renewing Track Material;
(H) Maintenance of Line and Surface;
(I) Other Expenses;
(J) Work Train Service.

The application of the sub-divisions above mentioned to the various divisions of these two accounts, as shown in the I. C. C. Classification, would be as follows:

No. 202. Roadway Maintenance.

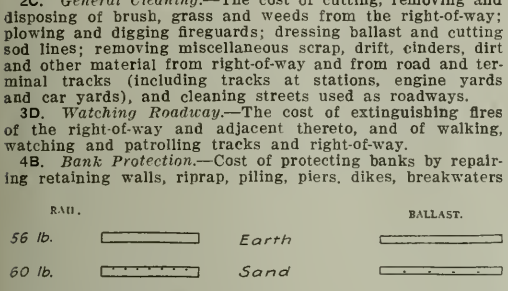
1A. *Care of Roadbed.*—The cost of blasting rocks; constructing and cleaning tile ditches, open ditches and drains;

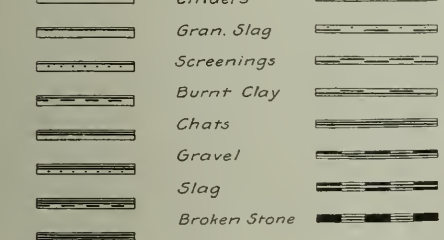
crowning track ties with retaining earth; filling borrow and cattle pits; landscape gardening along the roadway; oiling the roadbed; removing dangerous rocks; removing slides; restoring roadbed, cuts, fills and embankments to standard width; sloping cuts; sodding roadway; **E**, building temporary tracks around slides and washouts; keeping tracks clear and repairing subgrade in case of washouts; removing temporary tracks around slides and washouts; repairing roadbed damaged by washouts.

2C. *General Cleaning.*—The cost of cutting, removing and disposing of brush, grass and weeds from the right-of-way; plowing and digging fireguards; dressing ballast and cutting sod lines; removing miscellaneous scrap, drift, cinders, dirt and other material from right-of-way and from road and terminal tracks (including tracks at stations, engine yards and car yards), and cleaning streets used as roadways.

3D. *Watching Roadway.*—The cost of extinguishing fires of the right-of-way and adjacent thereto, and of walking, watching and patrolling tracks and right-of-way.

4B. *Bank Protection.*—Cost of protecting banks by repairing retaining walls, riprap, piling, piers, dikes, breakwaters





Proposed Conventional Signs.

and revetments, and by changing the channels of streams to prevent cutting, washing and sliding of embankments.

5F. *Train Service.*—The cost of work-train service in connection with work pertaining to roadway maintenance.

6A. *Track Changes.*—The cost of roadway work in connection with taking up and relocating tracks.

7A. *Other Expenses.*—The cost of roadway work not provided for elsewhere, such as official roadway inspection train service and premiums in connection with roadway maintenance.

No. 220. Track Laying and Surfacing.

1G. *Applying Ballast.*—The cost of labor expended in preparing the roadbed and applying ballast for repairs of tracks.

2G. *Applying Ties.*—The cost of labor expended in unloading, distributing and applying ties for repairs of tracks; in gathering up and disposing of the ties released; **H**, and in respacing ties.

3G. *Applying Rails.*—The cost of labor expended in unloading, distributing, cutting, slotting, drilling, adzing for and laying rails for repairs of tracks; in gathering up and loading rails released; **H**, and in adjusting for expansion and contraction of rails.

4G. *Applying Other Track Material.*—The cost of labor expended in unloading, distributing and applying other track material for repairs of tracks, and the cost of gathering up and loading the material released.

5H. *Track Maintenance.*—The cost of labor expended in alining, surfacing, gaging and shimming tracks; in tightening track bolts and track spikes; in restoring rails, ties and ballast in case of washouts, derailments and wrecks, and taking up tracks.

6J. *Train Service.*—The cost of work-train service (except work trains distributing ballast material) in connection with work pertaining to track laying and surfacing.

7H. *Track Changes.*—The cost of track work (exclusive of the cost of track material) in taking up and relocating tracks.

8I. *Other Expenses.*—The cost of track laying and surfacing work not provided for elsewhere, and expenses, such as repairing and replacing rail rests, official track inspection train service, and premiums in connection with track repairs.

The numbers indicate the I. C. C. classification subdivisions; and the letters indicate sub-divisions under which the whole or portions of the I. C. C. sub-division are classified.

CONVENTIONAL SIGNS.

The committee submits herewith for approval additional symbols relating to "Rail," "Ballast," and "Electrified Lines." These symbols were incorporated provisionally in the pamphlet issued during the summer of 1914, and are now in use by railway companies in the work of preparing maps and profiles to comply with the Government valuation act;

W. A. Christian (I. C. C.), chairman; M. C. Byers (W. M.), vice-chairman; F. J. Bachelder (Cons. Engr.), W. S. Danes (Wabash), Lester Bernstein (B. & O.), G. D. Hill (I. C.), Huntington Smith (N. Y. C. & St. L.), Henry Lehn (N. Y. C.), J. H. Milburn (B. & O.), J. W. Orrock (C. P. R.), J. C. Patterson (Erie), H. C. Phillips (A. T. & S. F.), J. H. Reinholdt (M. & St. L.), R. C. Sattley (C. R. I. & P.), Guy Scott (P. L. W.), H. M. Stout (N. P.), Frank Taylor (C. R. R.), J. L. Vollintine (C. B. & Q.), W. D. Wiggins (P. L. W.).

Discussion on Records and Accounts.

The suggested changes in the Manual were adopted. The suggestions under "Sub-divisions of I. C. C. Classification Account" were received as information. "Conventional Signs" were next considered.

W. H. Courtenay (L. & N.): It is utterly unnecessary to adopt that complicated system of symbols to designate the weight per yard of the rail. It is much cheaper and quicker to adopt the method of marking the weight per yard in figures. It will take draftsmen a long time to represent the weight per rail by these symbols. It will be a considerable strain on the memory of the man who refers to the drawing data to recognize one of these symbols. If he has the figures before him there will be no mental strain whatever. I move that the convention do not adopt the conventional symbols to designate the weight per yard of the rail, but in lieu thereof represent the rail by one straight line, with the weight per yard marked on it in figures The valuation engineers of the Interstate Commerce Commission have indicated their intention to adopt the symbols that are adopted by this Association. If the valuation engineers demand that this system of symbols be used to designate the weight of the rail, it will add to the cost of the preparation of the maps.

Chairman Christian: If you will go back to the Manual you will find that the Association approves colors representing the different weights of rail. We have tried to relieve all carriers of using any colors on account of blue prints, and we put in these symbols as a substitute.

(Mr. Courtenay's motion was put and carried.)

The President: The ballast symbols will be counted as approved, together with the symbols for electrified lines.

TIES

The following subjects were assigned:

(1) Continue the study of the effect of the design of tie-plates and track spikes on the durability of cross-ties. (Not reported on.)

(2) Continue the study of the economy in track labor and material affected through the use of treated compared with untreated cross-ties.

(3) Continue the study of metal, composite and concrete cross-ties, building up a history of same.

(4) Investigate and report on the future timber supply for ties (not reported on).

(5) Report on the distribution and care of cross-ties.

STUDY OF THE ECONOMY IN TRACK LABOR AND MATERIAL EFFECTED THROUGH THE USE OF TREATED COMPARED WITH UNTREATED CROSS-TIES.

The committee reported in last year's proceedings as fully as is possible at present on the comparative cost and life of treated and untreated ties. Various experiments with ties are being made which will in future furnish valuable data on the subject. It is evident that there are wide differences in the manner in which tests of tie life are being made, as well as in the way in which the records of the tests are kept by different railway companies. It is therefore suggested that standards of tie-life tests and of tie records be adopted by this Association, in order that the greatest possible benefit be derived from future experiments along these lines. In 1918 it is estimated that the Association may with profit again take up this subject with a view to tabulating information which will then probably be available.

The committee recommends for adoption and publication in the Manual:

Economic Comparison of Railroad Ties of Different Materials.

Except in isolated cases, ultimate economy in labor and material results from the use of properly treated ties, as compared with untreated ties.

Photo by Moffett, Chicago.

L. A. DOWNS,
Chairman Committee on Ties.

The economy of any tie of known price and life may be determined by the following formulas:

Given:

C = First cost of tie in place;
C^1 = Amount at compound interest which will produce interest equalling the first cost of tie during the life of the tie;
R = Rate of interest;
n = Life of tie in years;
I = Interest on first cost.

Required—Total capitalization of tie:

$$= C + C^1 = \frac{C\,(1+R)^n}{(1+R)^n - 1} \quad \ldots\ldots(1)$$

Given:

C = First cost of tie in place;
R = Rate of interest;
I = Interest on first cost;
A = Amount at compound interest which will provide for renewal at end of life of tie.

Required—Total annual cost:

$$I = CR$$

$$A = \frac{CR}{(1+R)^n - 1}$$

Total annual cost =

$$I + A = \frac{CR\,(1+R)^n}{(1+R)^n - 1} \quad \ldots\ldots(2)$$

Given:

R = Rate of interest;
C = Cost of tie of n years life;
C^1 = Cost of tie of n^1 years life.

Tie costs are equivalent when the capitalization or annual costs are equal, or

$$C^1 = \frac{C\,(1+R)^n}{(1+R)^n - 1} \times \frac{(1+R)^{n^1} - 1}{(1+R)^{n^1}} \quad \ldots\ldots(3)$$

USE OF METAL, COMPOSITE AND CONCRETE TIES.

During the year the sub-committee assigned to report on the use of metal, composite and concrete ties inspected substitute ties on the Bessemer & Lake Erie, the Pennsylvania Railroad, the Pennsylvania Lines (Northwest System), the Pittsburgh & Lake Erie and the Union Railroad of Pittsburgh. They have also taken up with each railroad on which substitute ties have been used the question of a report for this year, and the more important replies received bringing out new information, are given below:

"Fifty cast steel ties manufactured by the Metal Tie Co. were installed in the Baltimore & Ohio eastbound main track in March, 1909. A recent examination showed the ties to be in fair condition. The wooden blocks, however, have to be renewed on account of splitting. This renewal was made about a year ago. Screw spikes and screw spike tie-plates are in use. The track seems to hold to good line and surface, although the expense of maintenance is probably greater than with the ordinary tie, on account of the depth to which it is necessary to go in order to surface."

Since the Bessemer & Lake Erie first started to use the I-beam tie in 1904, 1,012,939 of the M-21 section (8-in. base) have been purchased and at the present time approximately 87 per cent. of the main line between North Bessemer and Conneaut Harbor, a distance of 141 miles, is laid with these ties. Of this 141 miles, 130 miles is double track and 8.9 miles is two single-track lines. These ties continue to give satisfaction, nothing having developed in the ten years they have been in that would indicate that the tie is not a practical substitute for the wood tie.

In 1908 a number of ties were carefully weighed separately, the actual weight was stamped with a steel stamp on each tie and put in the track at various points. In 1914, just six years later, 30 of these ties were taken out and reweighed after being given a thorough cleaning. The following is the result:

Original weight of 30 ties	5,213 lbs.
Present weight of 30 ties	4,912 lbs.
Loss in six years	301 lbs.
Loss per year	50 lbs.
Loss per tie per year	1.6 lbs.

In June, 1914, 3,200 ties of a heavier design were installed in the southbound track one mile south of Hartstown, Pa. They were laid under new 100-lb. A. R. A. type B rail, spaced 20 to a 33-ft. rail, and ballasted with screened slag. The ties are not insulated. This tie is known as Carnegie Steel Company Section M-28 and weighs about 27.75 lb. per ft., making the weight per tie 8 ft. 6 in. long, 235.9 lb. The fastenings weigh 33.4 lb., so that the weight complete is 269.3 lbs.

A comparison of the detail dimensions of this tie and the M-21 tie which is the section of which the road has over a million, is made below:

Section	Depth	Weight per ft.	Area section	Width of Top	Flange Bottom	Web	Weight tie only 8 ft., 6 in. long
M-21	5.5	21.2 lbs.	5.9	4.5 in.	8 in.	7/16 in.	181 lbs.
M-28	6.5	27.75 lbs.	8.18	5 in.	10 in.	3/8 in.	236 lbs.

In 1913 the Elgin, Joliet & Eastern installed 494 sets and in 1914 85 sets of steel switch-ties. In 1913 we used 1,638 steel cross-ties and in 1914 240 steel cross-ties. We have 160 sets of steel switch-ties on hand which will be put in track next year. In every case where we put in steel switch-ties we are putting in new gravel ballast, as we find that the old ballast contains considerable cinders, which, of course, is very hard on steel ties. The 62 Bates concrete ties we have in at Whiting are still in service and are apparently in as good condition as when first placed. They are certainly holding up in good shape.

The Florida East Coast installed 16 Percival concrete ties in the main line at St. Augustine in March, 1906. They are under 70-lb. A. S. C. E. rail and in sand ballast. Twenty-four trains pass over them daily. The 16 ties are under one rail. No defects have developed. Examination shows that they are in good condition in all respects. The fastenings are holding well and have never been touched since they were put on. The cushion between the bottom

of the rail and the tie is made of gumwood and has never been changed. The present shape of the ties between the rails is a "V" and they do not hold up well in our sand, but if the ties were flat-bottomed it is thought that they would.

A number of Percival concrete ties are interspersed with ordinary ties on the Galveston, Harrisburg & San Antonio at Edgewater, Tex. These ties were installed October 22, 1906. A derailment broke three ties, which were replaced by cypress ties, and disfigured 14 other ties. On Jan. 28, 1908, the defaced ties were replaced, but the three removed after the wreck were not replaced, thus reducing the number of ties in the track from 50 to 47. This derailment did not occur on the concrete ties, but on wooden ties, and the derailed car ran onto the concrete ties. Since date of replacement and up to July 1, 1914, ten ties have broken and have been replaced with cypress ties. An inspection during July, 1914, showed that all wooden cushions were badly cracked and must be removed. Seven ties were cracked and broken under rail and six or eight screw spikes were broken off. All failures were under rail and there were no noticeable cracks in the center of the ties.

In another test section at the same place the ties were laid out of face. An inspection in July, 1914, showed all wood cushions badly cracked and six cushions entirely rotten. All are to be renewed. Three ties were broken under the rail. All failures were on joint ties. The one tie reported as having been renewed last year was an error, as none of the original ties were changed.

Another test is being made of Percival concrete ties 7 in. by 8¼ in. by 8 ft. at Bayou Sale, La. There are 96 ties, the joint ties having been inserted after the chart was made. All ties are sound and in good condition with no cracks except in one tie. All wood cushions are cracked with the grain of wood. Owing to the practice of dumping cinders on this track, the majority of the wood cushions are burnt.

A number of National steel ties have been in the track of the Pennsylvania Lines, Northwest System, near Emsworth, Pa., about ten months and all are still in good condition. The cost of maintenance has been about the same as the cost of maintenance for an equal number of wooden ties. The traffic passing over these ties the last year has averaged about 60 passenger and 10 freight trains.

Fifteen Reigler concrete steel ties were placed in the westbound main passenger track of the Pennsylvania Lines just west of Emsworth, Pa., May 9, 1908, where they have been subjected to heavy traffic. All of the ties are still in good condition and giving satisfactory service, with no apparent depreciation. They have now been in the track 6½ years. The action of these ties under traffic shows that there is considerably less deflection of the track than in the adjacent wood tie track. No separate records of the cost of maintenance have been kept, but the opinion of the supervisor is that much less work is required for both line and surface than for wood ties. An average traffic of about 60 passenger and 10 freight trains passes over this track daily.

Twelve Rohm steel ties were installed in the easthound freight track of the Pennsylvania just east of Chestnut street, Sewickley, Pa., on June 15, 1910, and have now been in the track about four years and four months. Three of these ties have been removed from the track because of the failure of the wedges to keep the clamps tight. They will be put back again as soon as new wedges are received. It is necessary to tighten the wedges about once a month. As these ties are spaced alternately between wooden ties, it is impossible to keep any record of the cost of maintaining surface and line, but it is thought that they require about the same amount of surfacing as wood ties, and a little more work that wood ties to keep in line. The hollow triangles have been filled with cinders and considerable rust has taken place.

DISTRIBUTION AND CARE OF CROSS-TIES.

Untreated Ties.

On many roads it is necessary for the purchasing agent to have in the fall an estimate of the number of ties required the next spring for renewals, but an actual count in the fall comes so close upon the renewals made in the summer, when all unserviceable ties are supposed to have been removed, that it is but little better than a guess. On old roads an estimate based upon the average renewals for a series of years is more rational than an actual count in the fall, and is sufficiently close for the purchasing agent. Just before the time for distributing comes, the ties should be inspected and a record made of the number needed for renewals (1) between each two telegraph poles, or (2) on each curve and on each tangent.

In the first method the number should be marked with chalk on the pole which stands in the direction from which the train will come when distributing; the best plan is to take a short ladder and place the marking out of reach of mischievous persons. In the second method the number for each tangent and for each curve should be recorded in a book and the ties unloaded accordingly. Another method that is sometimes followed is to drive a stake on the shoulder temporarily for each ten ties required. When the ties are unloaded, any one of the three methods will make it an easy matter to throw off the required number, almost in place.

The details of the work of distributing wood ties for renewals vary considerably with different roads, according to conditions of supply, density of regular traffic, ideas concerning economical methods, etc. Where the supply of ties can be bought in the district tributary to the road they are usually received at the stations or at sidetracks or at other points along the right-of-way and loaded upon flat cars, to be distributed by the sectionmen or by a work-train crew. In some cases the loading of ties is contracted.

For rapid distribution the ties where possible should be loaded on flat cars, crosswise, except two under courses at each end. These courses should be placed lengthwise on the car, each course blocked under the outer end by a tie placed crosswise, to give a pitch toward the middle of the car. These slanting courses act as guards to keep the ties placed crosswise from being jarred or rolled over the end of the car. If in these slanting courses the two thickest ties of each course are placed on the outside, they will be held in place by the weight from above and no stakes will be needed.

The exact number of ties wanted for renewals in places can be known and the right number of new ties can be dropped off, just as well as not. Much useless handling and trucking of ties results from throwing them off by guess while distributing, for without some system of estimating or counting the number required and the number delivered there will usually be either too many or else not enough. Where ties are thrown off in excess of the requirements it is usually the case that many old ties which could profitably remain another year will be removed simply to make room for all of the new ties. On the other hand, if an insufficient number of ties is distributed in places, the deficiency must be made good by trucking, or else some old ties will remain in the track which ought to come out.

When ties are delivered in box, stock or gondola cars a strong force is needed to unload them promptly—say 25 or 30 men. On the average it takes four men about 30 or 45 minutes to unload a box car holding 300 oak ties. If the ties are loaded on flat cars a few men can tumble them off rapidly, and 15 to 18 men are a sufficient force.

The best way to control the number of ties put off when unloading from flat cars is to work the men in relays of a few men each. It is much easier to control the movements of a few men working rapidly than of a whole crew working at the ordinary gait. When unloading from flat cars four or five men besides one to tally are usually a sufficient force working at one time to do the unloading.

The train should not in general run faster than six miles per hour; and on high fills quite slowly, because in such places ties are thrown too hard will roll to the bottom of the slope. The foreman of the section whereon the ties are being unloaded or the supervisor or roadmaster should invariably accompany the train to advise as to the number of ties wanted and the exact location of the same. It is also well to have the section crew, or part of it, follow the train on a hand car, to throw out any ties which may have fallen too close to the track.

At narrow cuts it is a good plan to throw off the whole number in piles at each end of the cut, especially if the old ties are not to be taken out for some time, and the same is true for high, narrow embankments. Proper attention should be given to loading and throwing off the hardest ties for the curves. In distributing ties on curves observations should be taken of the side of the track from which the ties will have to be pulled in when making renewals, and the ties should be thrown off on that side. At all times, however, the ties should be so unloaded as not to require rehandling in order to remove old ties from track.

The question of using way-freight trains for tie distribution depends upon the traffic conditions. On roads where the local freight business is light it is found to be economical to send the ties out a few carloads at a time with these trains, to be unloaded in place by the sectionmen, who are previously notified to be on hand at the point where the ties are wanted. The delay to the train in waiting for the ties to be unloaded is necessarily considerable, and on roads where the local freight work is heavy the

way-trains are frequently or nearly always behind time, and the extra work of tie distribution is considered inexpedient. Such is also quite liable to be the decision where the ties are to be unloaded from box cars, or where a trainload of ties arrives and there is a demand for prompt release of the cars.

As a general thing ties distributed from a work train are put off in better shape than from a way-freight. The crews of the latter rush the work too fast, either by urging the men or by moving the train too fast for the men to properly unload the ties. An ordinary result of such haste is that ties are thrown down embankments, into bridge openings, or are so sparsely distributed that much time is lost in carrying them to place where renewals are made.

On roads where ties are handled by way-freight it is quite customary to begin the distribution as early as January, for the obvious reason that only a few carloads can be distributed each day, and it is necessary to take a good deal of time in order to get over the division by spring. Again, on roads where the ties are received from outlying sources of supply it is frequently the case that the distribution begins late in the fall, so as release the cars promptly and avoid piling the ties up in the yards. It is doubtful whether anything is gained in either case. In the first place, ties should not be unloaded and left lying on the ground through the winter, as in this position they gather moisture from the ground, are covered with snow or lie in ditches or wet places and become watersoaked, so that the germs of decay are well inducted before the ties see any service at all. In order to obtain all the advantage possible from seasoning, the ties that are received during the fall and winter, preferably, should be carefully piled at points exposed to the wind and sun, but it costs no more to do this in the yards and along sidetracks and to load them up again on flat cars in the spring and deliver them right where they are wanted, than it does to pile them up all along the right-of-way and then carry or truck them to place when the renewals are made. In the second place the practice of piling up new ties along the right-of-way, to remain three to six months before they are used, is contrary to principles of good policing. If the right-of-way is piled with new ties all winter and spring and with old ties all summer and perhaps most of the fall, there are but a few months when it presents a clean or finished appearance. In the third place, an accurate count of the ties to be renewed cannot be made until the time for renewing is close at hand, and then is the best time to make the distribution, unloading the ties where they are wanted, and so near the time they are to be used that they need not be piled.

When possible, all ties in any one car should be unloaded on the section on which car is opened. When ties are unloaded in piles, each pile should be distinctly marked with the car number.

Counting and Inspection.

The roadmaster, or his assistant, should, if possible, take charge of unloading ties when the work train is used, and see that a proper count and inspection are made. This count and inspection again should be verified by the section foremen going over the ties unloaded on their section, rechecking and reporting results to the roadmaster.

The general rules given above governing untreated also apply to treated ties.

In the case of zinc-treated ties, there seems to be a difference of opinion in regard to the piling. A number of railways which have used them very extensively believe that they should be piled in open piles similar to untreated ties, but a number of others that have gone into it from a more scientific standpoint, especially in the South, where the climate is warm and the seasons are long, think that by being piled in open piles their drying is so rapid that they develop checking, which is a serious objection to the wearing and life of the tie, and for this reason they are piling zinc-chloride ties the same as creosoted ties.

Treated ties should be handled with tongs. Creosoted ties in piles should be covered with cinders or earth to eliminate the danger of fire from sparks from passing engines. If treated ties, especially creosoted, are stored in large quantities a system of fire protection should be inaugurated.

L. A. Downs (I. C.), chairman; G. W. Merrell (N. & W.), vice-chairman; C. C. Albright (Purdue Univ.), W. A. Clark (D. & I. R.), E. D. Jackson (B. & O.), F. R. Laying (B. & L. E.), J. B. Myers (B. & O.), R. J. Parker (A. T. & S. F.), H. S. Wilgus (P. S. & N.), W. J. Burton (M. P.), S. B. Clement (T. & N. O.), E. P. Laird (A. C. L.), E. R. Lewis (D. S. S. & A.), J. V. Neubert (N. Y. C.), J. G. Shillinger (Rutland), Louis Yager (N. P.).

Discussion on Ties.

The report was presented by Chairman Downs.

The definitions presented by the committee were adopted.

Chairman Downs: The next subject is No. 2. Last year the committee made a report on this, and we asked that it be received only as information. This year we have a formula that we recommend for the Manual as economic comparison of railway ties of different materials. I move that this be adopted, to be printed in the Manual.

Mr. Sullivan: In the first paragraph C is taken to mean "first cost of tie in place," but further down, C has a different meaning.

Chairman Downs: We will alter that.

The President: The formula will be adopted for insertion in the Manual.

Chairman Downs: I move that the subjects on the use of metal, composite and concrete ties, and the distribution and care of cross ties be received as information. (The motion was carried.)

IRON AND STEEL STRUCTURES

The subjects assigned for investigation during the past year were:

(1) Report on the methods of protection of iron and steel structures against corrosion.

(2) Study designs and report on built-up columns, co-operating with other investigators and committees of other associations.

A. J. HIMES,
Chairman Committee on Iron and Steel Structures.

(3) Report on the design, length and operation of turntables.

(4) Report on the relative economy of various types of movable bridges.

Other subjects continued from the preceding year were:

(5) Investigation of secondary stresses and impact.

(6) Adaptation of designs of movable bridges to signal and interlocking appliances required.

(7) An elastic requirement for steel.

(8) Bridge clearance diagram.

A report on "Methods of Protection of Iron and Steel Structures against Corrosion" was submitted in Appendix A as information and without recommendation.

The study of built-up columns has continued throughout the year. The U. S. Bureau of Standards has furnished and tested 18 columns according to the plans and under the direction of the committee. A progress report was submitted in Appendix B which included the records of the above tests. It is expected that the Bureau will continue its generous co-operation with the committee and that further tests will be made during the ensuing year. The committee is in close touch with the special committee on Columns and Struts of the American Society of Civil Engineers and the work of the two committees has been supplementary and harmonious.

The "Design, Length and Operation of Turntables" has received considerable study and investigation. Much valuable information is being accumulated, but it is too early for the committee to make any recommendations. A progress report was presented.

The "Relative Economy of Various Types of Movable Bridges" has received much original study and experimental investigation. The data thus far accumulated has not yet been prepared for publication and the committee can only say that much progress has been made and that some very useful information will probably be available during the coming year.

A brief statement of progress in the study of "Secondary Stresses and Impact" was made. The committee is now contemplating a revision of the specifications with the purpose of making use of the experimental data heretofore accumulated.

At the last annual convention the "Adaptation of Designs of Movable Bridges to Signal and Interlocking Appliances Required" was referred back to the committee. The subject has received some discussion and information concerning current practices has been secured. Owing to a pressure of other work, no conclusions have been reached, and only a progress report was made at this time.

Sub-committee G prepared a very complete and careful statement of the need of an elastic strength requirement for steel, which was presented. Specifications were drawn for this requirement, and were recommended for adoption.

A report on the Bridge Clearance Diagram was also presented.

CONCLUSIONS.

The committee recommends that the following action be taken on the report submitted herewith:

(1) That the report on methods of protection of iron and steel structures against corrosion be received as information.

(2) That the report on the design of built-up columns be received as a progress report.

(3) That the report on the design, length and operation of turntables be received as a progress report.

(4) That the report on the relative economy of various types of movable bridges be received as a progress report.

(5) That the report on secondary stresses and impact be received as a progress report.

(6) That the report on the adaptation of designs of movable bridges to signal and interlocking appliances required be received as a progress report.

(7) That the specifications for an elastic strength requirement for steel be adopted and printed in the Manual.

(8) That the bridge clearance diagram shown be adopted by the Association and substituted for the diagram now published in the Manual; also that a footnote be added to the specifications calling attention to the recommendations of the Committee on Electricity for a clear height of 25 ft. in electrified zones.

A. J. Himes, chairman (N. Y. C. & St. L.); O. E. Selby, vice-chairman (C. C. C. & St. L.); J. A. Bohland (G. H.), W. S. Bouton (B. & O.), A. W. Buel (Cons. Eng.), A. W. Carpenter (N. Y. C.), Charles Chandler (I. C.), C. L. Crandall (Cornell Univ.), J. E. Crawford (N. & W.), F. O. Dufour (Interstate Commerce Commission), W. R. Edwards (Interstate Commerce Commission), A. C. Irwin (C. M. & St. P.), B. R. Leffler (N. Y. C.), W. H. Moore (N. Y., N. H. & H.), P. B. Motley (C. P. R.), Albert Reichmann (Am. Br. Co.), C. E. Smith (M. P.), H. B. Stuart (G. T.), G. E. Tebbetts (K. C. T.), F. E. Turneaure (Univ. of Wis.), L. F. Van Hagan (Univ. of Wis.).

APPENDIX A.

METHODS OF PROTECTION OF IRON AND STEEL STRUCTURES AGAINST CORROSION.

The study of this subject has been continued along the lines of further investigation into the protection by means of paint and protection by means of concrete encasement.

It is realized that the vast bulk of iron and steel structures are protected by means of paint and must continue to be protected by this agency until something more effective and equally economical is introduced. As paints are made of a variety of materials in many forms and combinations, the relative efficiency of which for the purpose under consideration has not been well established, there appears to be a field for usefulness on the part of the committee in pursuing the investigation of this line of protection.

Study of Principles Underlying the Choice of Materials for Efficient Paints.

Paints for the protection of iron and steel structures may be simple liquids, as drying oils; dissolved solids, as asphalt paints and coal tar paints; combinations of pulverized or finely-divided solids, known as pigments, and of drying oils, known as vehicles; and lastly almost any combination of any of the above. Varnishes, which are mixtures of gums and oils compounded by means of heat, are frequently introduced into the vehicles of paints.

The most important and extensively used paints are those which are mechanical mixtures of pigments and vehicles. The most important and common vehicle is linseed oil. Other vehicles are fish oils, china wood oil, soya bean oil and mineral oils. All of these except china wood oil have been frequently used as cheap and inferior substitutes for adulterations of linseed oil, although china wood oil, soya bean oil and menhaden (fish) oil are recognized as valuable assistants in certain paints. Turpentine and light mineral oils (such as benzine, benzol, naphtha, etc.) are used as thinners and solvents and are so used both legitimately and otherwise.

An oil paint generally requires, in addition to the pigment and the oil, a small proportion of dryer, which is generally a liquid which, when incorporated into the paint, causes the film of it to dry by oxidation with the desired rapidity. Films of other paints, such as asphaltum and coal tar paints, dry by the evaporation of the solvent.

It is quite generally considered that the most durable paints are those which are composed of pigments with linseed oil as the principal ingredient of the vehicle. Linseed oil varies in its composition and properties according to its method of extraction from the flaxseed, and its later manipulation. There is little or no choice nowadays to the consumer as regards the method of extraction from the seed, this being controlled by large commercial concerns whose methods are practically identical in that they all employ the hot-pressed method which possibly gives inferior oil to that obtained by the cold-pressed method. (Cold-pressed oil is obtainable commercially at a large advance in price (10 cents per gallon at time of writing) over raw oil.) After pressing, however, the oil is processed and refined by many methods and graded commercially accordingly. Raw oil and boiled oil are the two general kinds employed for structural metal paints and both of these are variously treated so as to considerably modify their properties.

Raw oil with drier added to it without heating has been sold as boiled oil—"bung hole" boiled or "chemically" boiled by those who understand the difference between this makeshift and true boiled oil which is heated to a relatively high temperature, and generally has driers added also. When heated in open kettles, which is generally considered the best method, it is called open-kettle boiled and there is supposed to be some virtue in having the heat applied by means of a wood fire under the kettle.

There is room for much difference in treatment and skill in manipulation in boiling oil by the heating process and this leads to many claims of superiority by different paint manufacturers for their particular and secret methods in this line. Just how much if any real superiority there is in these special-processed oils over the commercial open-kettle boiled, now readily obtainable of the large oil manufacturers, is difficult to prove or disprove. It is generally conceded that neither raw nor boiled linseed should be free from certain ordinary impurities in order to give the best results in paints. There is a great difference of opinion as to the merits of raw or boiled oil for paint-making purposes, but for metal paints the tendency seems to be towards the use of the open-kettle boiled oil.

As films of linseed oil-and-pigment paints are always more or less porous and pervious to water and moisture, considerable experimentation has been undertaken towards increasing the impermeability of the film by adding varnishes, bitumens and other kinds of oils to the linseed oil in certain minor proportions. If the proportions of these added materials become too great, the durability of the film is generally decreased on account of brittleness or otherwise.

The most extensive scientific study of the properties of paint materials probably has been made on pigments. For a long time paints have been known principally to engineers and others simply by the name of the pigment element, as iron oxide paint, red lead paint, graphite paint, etc., and it was long supposed that the pigment was the principal factor in determining the efficiency of these aints.

Pigments are commonly divided into two general classes, which may be called primary and secondary. Those in the primary class are the ones strong in color or in covering power and sometimes forming chemical combinations with the vehicles. Those of the secondary class are weak in color and covering, generally not suitable for use alone as pigments, but suitable as fillers and extenders when mixed with these primary pigments; these are commonly known as "inert" pigments, although this is really a bad designation, since many of the primary pigments are chemically inert to all atmospheric influences and to the usual paint vehicles.

The principal primary pigments used for structural metal paints are the following:

(1) White leads, (a) The basic carbonate, which is the kind made by the well-known Dutch process, and (b) the basic

sulphate, commonly known as the "sublimed" variety. (2) Zinc oxide or white zinc. (3) Red lead. (4) Blue lead. (5) Iron oxides, including Venetian red. (6) Lampblacks, generally the product of burned petroleum oils. (7) Carbon blacks, generally the product of burned natural gas. (8) Graphites, natural and artificial. (9) Ochres. (10) Natural carbons, slates, clays, etc., possessing peculiar properties fitting them for pigments. (11) Chrome greens and yellows, used generally for tinting only.

The cost of the above pigments will usually range from 2c to 10c per pound, except the chrome pigments which, when pure, are much more expensive. Pigments which are sometimes used, but are generally prohibitory on account of their high cost, are American Vermillion and other chromates and Prussian Blue.

The principal secondary pigments are: (1) Silica. (2) Asbestine. (3) Barytes (natural sulphate of barium). (4) Calcium carbonate, including chalks (frequently called whiting). (5) Clays. (6) Gypsum. (7) Blanc fixe (artificial sulphate of barium).

These are all cheap materials, usually costing under 2 cents per pound. When used they are mixed with the primary pigments to cheapen the product and often with definite ideas of improvement of the paint. For instance, a small percentage of calcium carbonate is said to counteract any free acid that may be present in the primary pigment; silica is thought by some to give a "tooth" for holding subsequent coats; asbestine and china clay aid in keeping pigments in suspension in the vehicles; barytes gives weight and body to paint; blanc fixe, used in large proportions in proper mixtures, is said to give excellent results for certain sea air exposures.

As before mentioned it has been generally thought for many years that the pigment is the ingredient which has the greatest influence on the durability and efficiency of paint coatings, especially those for the protection of steel surfaces, although paint technologists recognize the great importance of the vehicle and that the two must largely be considered together. So many pigments have been available and in so many variations and combinations that it has not been easy to determine their relative merits or the properties which are necessary for suitable pigments. The question of color often is the determining factor, especially when white and very light shades of color are wanted, for which the white leads and zincs must be used; but for dark colors almost any of the pigments can be used, tinting as required, even the white pigments. (It may surprise some to know that a black pigment can be produced by mixing 45 parts by weight, of white lead and 55 parts of carbon black.) Excepting the question of color, the present field of pigments may be said to be the survival of those found fittest by many years of trial. To further determine the relative merits of these pigments, many tests have been made by individuals, paint manufacturers, railroad companies, technical associations and other, with coatings made with these various pigments, applied both to test plates and to structures in service, exposed to various atmospheric influences and to artificial substitutes for them, and except for certain special conditions of application and exposure, without decisive results. Probably the most prominent of these tests are those of the American Society for Testing Materials and widely known as the Atlantic City and the Havre de Grace Bridge tests.

A circular letter was sent out to 67 different railroads in the United States and Canada. The circular made inquiry by means of several questions grouped under the beadings of (1) shop coat on new fabricated steel; (2) field coats on new fabricated steel; (3) repainting or maintenance of bridges under traffic. Replies were received from 53. The following is a summary showing the extent of the use of each kind of paint as indicated by the replies; figures and percentages referring to individual railroads:

1. Kind of shop paint used:

Red lead pigment paint, 29 out of 50, equal to 58 per cent.

Linseed oil only, 5 out of 50, equal to 10 per cent.

Linseed oil, parts in contact after assembling with red lead pigment paint, 2 out of 50, equal to 4 per cent.

Linseed oil, parts in contact after assembling with various proprietary paints, 4 out of 50, 8 per cent.

Graphite and carbon pigment paints, including lampblack paint, 8 out of 50, 16 per cent.

Miscellaneous, 2 out of 50, 4 per cent.

2. Kind of paint (classified as to pigment) used for field coats on new steel:

Red lead straight or in part, 12 out of 48, 25 per cent.

Carbon or graphite or both, 24 out of 48, 50 per cent.

Miscellaneous, 12 out of 48, 25 per cent.

3. Kind of paint (classified as to pigment) used in maintenance:

Carbon, 13 out of 46, 28 per cent.

Graphite, 7 out of 46, 15 per cent.

Both carbon and graphite, 4 out of 46, 9 per cent.

Red lead straight or in part, 11 out of 46, 24 per cent.

Various, 11 out of 46, 24 per cent.

APPENDIX B.

COLUMN TESTS.

At the sub-committee's first meeting, July 10, 1912, after a discussion of the program of tests which had been arranged by the committee on Steel Columns and Struts of the American Society of Civil Engineers, it was decided to make drawings for a preliminary series of test columns to cover eight sections commonly found in the compression members of railroad bridges. It was planned to test a light and heavy section of each type made up in three lengths to give slenderness ratios of 50, 85 and 120. Three specimens of each column to be fabricated, making in all 144 test-columns for the series, which is designated as "Series No. 1."

James E. Howard, then engineer-physicist of the Bureau of Standards, stated on behalf of S. W. Stratton, director of the Bureau of Standards, that the Bureau would be glad to furnish the columns and make the tests, provided the sub-committee would furnish the detailed plans. It was expected that the 2,300,000-lb. Emery machine would have been completed late in 1912, but it was not in working order until about September, 1913. The fabrication of the columns was taken up in October, the first 18 columns were shipped to Washington in December and the first column of the series was tested in the presence of the committee on January 20, 1914. By October 15, 15 of the first 18 columns had been tested, and by November 30 all of the columns had been tested, and the complete test reports were received December 7. It will take at least three years more to complete the preliminary programs of the American Railway Engineering Association and American Society of Civil Engineers column tests. It is the expressed intention of the Bureau to carry on both sets of tests simultaneously.

It was the intention of the committee that the material should be rolled and the columns fabricated in accordance with the Specifications for Railway Bridges of the American Railway Engineering Association, but the Bureau, in ordering the first lot along with some columns for the American Society of Civil Engineers series, used the latter's very rigid specifications for this material. The difficulty of obtaining this material, in part, accounted for the delay in fabricating the columns. The material complied extremely closely with the specifications, being of very uniform quality, its weight per cubic in. being 0.2835-lb.

TABULATION OF PART OF TESTS, COLUMN I, SERIES I.

	No. of Test Piece	L/r	Nominal Section Sq. In.	Actual Section Square Inches	Failure lbs. per sq. in.	Method of Failure
1	12	50	9.56	9 55	37,930	
2	57	50	9.56	9.12	39,254	Failed by deflecting south and up.
3	74	50	9.56	9.29	38,200	Failed by deflecting south and down.
4	7	50	12.50	12.55	38,500	Failed by triple flexure.
5	72	50	12.50	12 45	37,765	Failed by buckling down and north.
6	73	50	12 50	12 48	35,380	Failed by buckling down and north.
7	17	85	9.56	9.636	32,860	Failed by triple flexure.
8	58	85	9.56	9.12	35,000	Failed by triple flexure buckling in center.
9	61	85	9.56	9.38	34,093	Failed by deflecting north and up.
10	20	85	12 50	5.92+5.73=11.65	34,060	Failed by triple flexure buckling in center.
11	60	85	12 50	11.83	34,937	
12	62	85	12.50	12.45	34,000	
13	29	120	9.56	9.42	33,020	Failed by triple flexure buckling n center.
14	55	120	9.56	9.54	32,000	
15	66	120	9.56	9.45	34,000	Failed by deflecting south and up.
16	25	120	12.50	12.28	32,565	Failed by triple flexure ibuckling in center.
17	67*	120	12.50	12.34	29,000	
18	68	120	12 50	12.39	30,863	

*Before testing, Column No. 67 was found to be bent down 0" .21 and south 0" .07.

Note.—The length of the column was assumed to be the total length between the milled end of the channels composing it. The actual sections are found by carefully weighing the channels, as it was found impossible to get very accurate results by calipering, or even by using the planimeter on imprints of the ends of the sections.

The sub-committee now proposes, instead of proceeding to Section No. 2 of the series, to make a sub-series of tests on Section No. 1, varying a detail at a time, in order to study the effect of the details on the strength of the column. Dr. Stratton assures the sub-committee that he will proceed to obtain the columns for these sub-series and test them as rapidly as possible.

APPENDIX C.

DESIGN, LENGTH AND OPERATION OF TURNTABLES.

The changes in railway structures and facilities due to the rapid increase in the weight and length of locomotives in recent years is not more marked anywhere than in the case of turntables. In 1895 the ruling length of turntables was perhaps 65 ft.; in 1915 it surely will be 85 ft. or more, thus showing in increase of 1 ft. per year. The increase has been quite uniform, but, of course, not in 1-ft. increments, the changes in length being made usually 5 ft. at a time. The increase in strength has kept pace with the increase in length, but both have fallen behind the proper requirements of the heaviest locomotives for the reason that a turntable failure does not result in disaster, but only in inconvenience and delay, and naturally the tendency is to get along with the old as long as possible rather than incur great expense for new.

In 1913 the committee caused to be sent to the membership a circular letter of inquiry concerning current and recommended practice in regard to ten of the principal features of turntable design. Length is, of course, the primary feature of design. Eighty-one per cent. of the replies gave 80 ft. or more as standard practice and 87 per cent. gave 80 ft. or more as the length recommended for ordinary road engines. Sixty-five per cent. of the replies favor either 85 or 90 ft. The conditions which determine the length of the turntable are the length of wheel base of the longest locomotive to be turned and the position of its center of gravity. For ease of turning the locomotive should be balanced, and for determining the length, the most unfavorable condition, that is, with the tender empty and the boiler filled, should be assumed. The length required then becomes twice the distance from the center of gravity to the rear tender wheel, with an arbitrary addition of, say, 1 ft. at each end for margin to facilitate spotting and to clear wheel flanges.

The question of designing turntables to be turned by power without balancing, in order to reduce the length necessary, has received some attention. Many turntables are so operated because they are too short to balance, but they are not designed for such operation and the result is a large expenditure of power and unsatisfactory service. This method of operation will require especially heavy and carefully designed end bearing journals and other features not common in present practice.

A table 85 to 90 ft. long will be long enough to balance most of the heavy freight and passenger engines exclusive of the Mallet type and a 100-ft. table will be required for roads which find it necessary to turn ordinary Mallet engines.

Type.—The replies indicate that the deck type is used and preferred almost to the exclusion of the through type. Only four roads indicated a preference for the through type. One of these gives as reasons, drainage, economy of pit construction and economy of time in reconstruction of the center at busy terminals. The other three roads give no reasons, but the above three are the ones commonly cited together with the one that the shallow pit of the through type is less subject to obstruction by snow.

Drainage is not a controlling feature if the turntable is at a modern engine house with drop pits, because the drainage necessary for the drop pits will take care of any reasonable depth of turntable pit. Economy of pit construction is in favor of the through type, but the increased weight and cost of the turntable neutralize part of it. The shallow pit also is conducive to safety, but this is partly offset by the hazard of narrow clearances and knee braces inside the through girders.

The economy of time in reconstruction of the center foundation does not exist in the case of a new location, and it may not be realized in the case of the renewal on an old center if the old center foundation requires reinforcement to carry the added load.

Obstruction by snow may be minimized in either type by providing ample space throughout, not less than 18 in., between the bottom flange of the girders and the pit floor.

Type of Center.—The majority in both practice and preference favor roller centers. Only 7 roads replying use disc centers, but 11 indicate a preference for that type. The disc center has been greatly improved in recent years and has advantages which entitle it to be thoughtful consideration. The roller center has the advantage of ease of turning. The disc center has few and simple parts, but is conceded to require more power to turn. This disadvantage is minimized by the fact that practically all heavy modern turntables will be equipped with power and the cost of the power consumed is negligible. Some tests which were made recently of the power required to turn a number of both disc and roller center turntables show that in the worst cases the power cost, including tractor losses, does not exceed ½ cent per 180 deg. turn. The first cost of the two types is about the same, if designed on similar specifications.

Good practice requires low-unit pressures on both types. For roller centers the pressure in pounds per linear inch of roller from full live and dead load on the center should not exceed 400 times the diameter of the rollers. This is exceeded in many centers in use, and much of the trouble in maintenance is attributable to too high unit pressures. For disc centers practice has varied from 3,000 lb. per sq. in. down to 1,500. The latter figure produces a very large disc and increases the lever arm of the frictional resistance unnecessarily. High unit pressures increase the difficulties of lubrication and pressures much in excess of 3,000 lb. per sq. in. have caused failures in the bronze discs. It has been found that a hard phosphor bronze, which will not flow under the pressure used, gives good results.

End Lift.—The most damaging thing in the operation of a turntable is the hammering of the ends by entering wheels. It has been proposed to reduce this damage by means of end lift or shock-absorbing devices. The replies indicate that only 4 roads replying use such devices and 15 consider such a device necessary. Where successful, they have been very expensive. Standard practice cannot be said to include them. Undoubtedly more liberal design of end bearings and better circle rail support will do away with the necessity for such devices to a great extent.

End Latch.—One-third of the roads replying use end latches and about half of them consider them necessary, or, in other words, one-sixth have them in use, but do not consider them necessary on power-operated turntables. The best designs for latches have a heavy sliding tongue connected to the girders by a breakable connection and engaging cast-iron sockets set in the pit wall. Preferably there should be a latch at each end. The latch should not be attached to any part of the track or track fastenings or deck.

Type of Deck.—The use of timber cross-ties is almost universal, although a few through turntables have been built with steel plate floors on I-beams. Eight of the replies express a preference for I-beam decks, and possibly more would have done so if there had been familiarity with that type of construction. A deck of transverse I-beams riveted between the girders just under the top flange has the advantages of permanence and rigidity without prohibitive cost. It also permits of greater depth of girder than the superimposed timber deck, but this advantage is shared with a timber deck similarly placed. In both cases the sidewalks are carried on riveted brackets outside the girders and independent of the track floor.

Live Load.—No single feature of the replies shows wider variations than the live load used for designing. The center loads vary from 312,000 to 720,000 lbs. Certainly the load should not be taken at much less than 500,000 lbs. where Mallets are not used, and justification can be found for loads from that up to 700,000 lbs. where Mallets are used. The 720,000-lb. center load reported is not an engine load, but results from the use of an arbitrary uniform load.

The center bending moments for one girder due to live load vary from 951 to 4,375 thousand foot-pounds. A great number of the replies indicate the use of some form of long wheel base consolidation or Mikado type locomotive giving a bending moment of from 2,000 to 2,500 thousand foot-pounds. Twenty out of 48 replies are between those limits. A surprising number indicate the use of some one of Cooper's series, which seems to betray lack of careful consideration of the matter on the part of those replying.

Unit Stresses, Impact and Deflection.—The permissible unit stresses are determined by the permissible deflection, and the two subjects should be considered together. Unit stresses, which would be entirely safe against failure, might permit excessive deflection of the ends and produce an unsatisfactory result. The replies as to permissible deflection probably are of little value because it is evident that the clearance over the circle rail has been confused with the deflection. From those replies on which this distinction seems to be understood clearly, it appears that the permissible deflection, measured at one end with the other end down on the rail, should be limited to from ¼ to ¾ in. The wheels of the loaded turntable should stand well clear of the circle rail at each end, not less than ¼ in.

The unit flange stress in tension used varies from 8,000 to 12,000 lb. per sq. in. without impact, and 21 out of 48 replies

give 10,000 as the permissible stress. The turntable should be designed so that the sum of the deflections at both ends will not exceed one one-thousandth of the length of the turntable and so that the unit tensile stress will not exceed 10,000 lb. per sq. in. The reversal of stress, which occurs near the center of each arm, should be provided for in accordance with the specifications for steel bridges. Provision for the reversal has the effect of extending the heavy flange sections toward the end and the heavy web requirements toward the center, which is beneficial as it increases the mass and stiffness of the girders. Parts not contributing to the end deflection of the girders may be designed by ordinary structural unit stresses, say 16,000 lb. per sq. in. tension. One condition of loading not often taken into account is that of a dead engine being pushed across the turntable by another engine. This condition is especially severe on the web and the stresses should be investigated for each design. Inasmuch as the turntable is not turned with such a load the higher unit stresses will apply.

Pit.—The hammer blow from wheels entering and leaving the turntable is especially severe on the circle rail and shore rail supports. Designers who have given attention to these details and their improvement are divided in opinion between a timber support for the sake of elasticity and an unyielding support on metal and concrete. More than 40 per cent. of the replies favor metal and concrete supports for the circle rail and more than 25 per cent. favor it for the shore rail support on the edge of the pit, indicating that this form of construction is growing in favor, as not many years ago the use of timber was universal.

APPENDIX E.

ELASTIC STRENGTH REQUIREMENT FOR STEEL.

The general specifications for steel railway bridges contain no elastic strength requirement for the steel otherwise specified. The only reference to the elastic strength of the materials is in the clause reading: "The yield point, as indicated by the drop of beam, shall be recorded in the test reports."

In 1901 the committee on Iron and Steel Structures presented certain specifications for structural steel as a basis for discussion and criticism at the annual meeting of the association. Two grades of structural steel were proposed at that time and a minimum value was fixed for the tensile yield point for each grade. In 1903 revised specifications were presented, calling for a single grade of structural steel with a specified range of ultimate tensile strength, and no definite requirements as to the yield point, but with the clause relative to this poiut as in the present specifications and as noted above. The opposition to the omission of the requirement was so strong that the specifications were not adopted at that meeting, but were referred back to the committee. They were presented again at the meeting of 1904, identical as regards the yield point, and the printed record of the Proceedings shows no discussion of this feature in the meeting, although there was a written discussion which questioned the propriety of dropping the yield point requirement. The specifications were adopted by the Association by a majority vote at the 1904 meeting.

Following the Quebec Bridge failure in 1907, the superimportance of the elastic strength over the ultimate strength in structural steel, especially for compression members, was so emphasized that it is to-day axiomatic. The question occurs: Is it not dangerous to suoordinate such a critical property to less important and misleading ones among those which are determined for the acceptance of material?

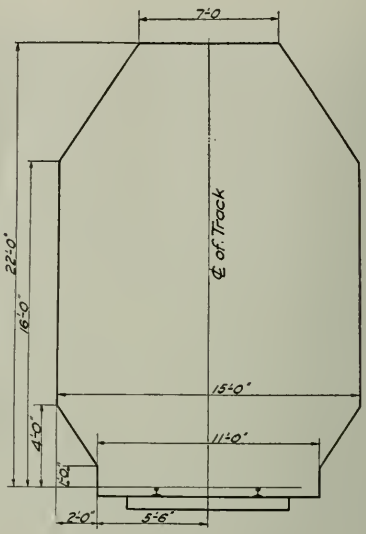
These considerations have led to an agitation for the restoration of an elastic strength requirement in specifications in which it has been omitted. The standard specifications for structural steel for bridges of the American Society for Testing Materials, which had previously been identical with those of the A. R. E. A. as regards the elastic strength requirement, were revised in 1913 to provide a yield point requirement. This sub-committee believes that the time is opportune for this committee to consider this question.

This sub-committee is of the opinion that the general specifications for steel railway bridges should include an elastic strength requirement that the yield point is the correct indication of the elastic strength and that the specifications should require a yield point not less than 30,000 lb. per sq. in. for structural steel, and not less than 25,000 lb. per sq. in. for rivet steel.

APPENDIX F.

BRIDGE CLEARANCE DIAGRAM.

Bulletin No. 163 of the Association published the replies to a circular letter, which indicate that the majority of the railroad engineers are in favor of increasing the width of the clearance diagram. In order to secure more detailed information as to the prevailing clearance diagram in use on the various roads limiting the size of equipment, and also to obtain information as to the size of the largest existing equipment, a letter was sent to the members of this committee and to several chief engineers of large railroad systems. After an extended discussion, a revised clearance diagram was



Proposed Clearance Diagram.

adopted for presentation to the Association. This diagram has been shown on the accompanying plan. There has also been placed on the plan a footnote calling attention to the recommendations of the committee on Electricity calling for a clear height of 25 ft. in electrified zones.

Discussion on Iron and Steel Structures.

The report was presented by Chairman Himes. Conclusion (1) was received as information.

C. E. Smith (Mo. Pac.): Many tests have been made of various kinds in Subject 2, in which the variables have been so numerous that a difference of behavior could not be assigned to a specific case. In the tests which we have underway we propose to work one detail at the time so that when we get through we will know what was the cause of the difference in behavior.

Chairman Himes: We are very fortunate in being able to secure the co-operation of the Bureau of Standards on Subject 2. This is submitted as a progress report, and I move that it be accepted as such.

(The motion was seconded and carried.)

O. E. Selby (C., C., C. & St. L.): The report on turntables is submitted as a progress report only. In the matter of length there has been a progressive increase in the requirements for some years. They seem to have gotten up to something like 85, 90 or 100 feet. It is important to decide whether we are to recommend two different lengths of turntable, or one standard length. The committee would like to ask the attention of the convention particularly to the features of length, live load, and unit stresses.

W. H. Courtenay (L. & N.): As to the first item, that of length, it seems to me that is hardly a matter for this association to decide—that is a matter which will be fixed by each individual railway company.

J. G. Sullivan (C. P. R.): The chairman of the sub-committee has given information we have all been looking for; a general idea of the lengths of turntables the roads are going to. It would be well in addition to this information to get some data as to different types of heavy locomotives in use, and how much room they must have so that they can be turned when the tank is full of water and when there is coal on the engine.

Mr. Courtenay: As to live load, it seems to me that the cooper intact is not generally figured on. Any one who has the care of turntables knows that turntables are subject to end shocks, being struck endwise by engines. My experience is that it is necessary to have the turntable stiff, and they

should be figured for an impact provision at the outset; very low working stress and stiffness is an important consideration with turntables. They should be particularly stiff laterally, with ample spacing and lateral bracing.

Mr. Smith: A large number of the roads are using Cooper's loading. The overload on the turntables for the ordinary Mikado engine is practically 80 per cent over and above the stresses given by Cooper's loading. It works in the other direction in the turntable than it does on a bridge. We have just completed the design of a 90-foot turntable to replace a 75-foot turntable. We made four designs. One was a 90-ft. complete deck design, giving a distance of 9 ft. from rail to top of center. Another one was double I-beam, flush type of girder, level with top of rail, to fit the center now used by the 75-ft. table. Another one was half through, with the girders half and half above the rail, the girders 13 ft. center to center, and the fourth a straight through type, girders about 16 ft. center to center. Leaving out the item of drainage, there is very little difference in the cost of the four designs, they all figure about $12,000 for the table and center, without tractor and without piles. The pile foundation costs about $1,000 more. The tractors will run $500 to $1,500 more, so in round figures a 90-ft. table will cost from $14,000 to $15,000, without drainage. To have a 90-ft. deck type turntable will require a 19-ft. pit, to be installed, to replace the 70-ft. table with the 6-ft. pit, and the increased pit will render heavy expenditure necessary for drainage in many cases.

F. E. Schall (Lehigh Valley): We are designing our tables for Cooper's 60-ft. load, but we interpose a uniform load, so as to make the action of the cantilever of sufficient section to stiffen the table something like a 6,000-lb. to the lineal foot, and then we are using regular bridge requirements with 100 per cent impact. I think the committee should be asked to fix the unit stiffness to be adopted for turntables.

C. H. Cartlidge (C., B. & Q.): We have found for general purposes in a through type table that building the turntable as a frame structure and not as a girder is the more economical. I agree with Mr. Smith that it is useless to try to design according to the Cooper classification. A turntable is necessarily designed for particular service, and it is very easy to design it for the engines which are to be placed on it. A combination of two very different services is required —a turntable must deflect very slightly, and low unit stresses should be used for all members which are directly concerned in the deflection. Other parts in a through table, whether a through girder or a through truss may be designed with high unit stresses, with resultant economy in the floor system throughout, and the floor system is a large part of the total weight. Proceeding along these lines our experience has been that a turntable such as Mr. Smith described, 90-ft. long for the heaviest power we run, will cost about $10,000 with a pit of a depth of not over 4.5 ft. deep in the center. I would suggest, in connection with the designing of turntables, that it is within the province of this committee to make designs for pits, ring wheels and center bearings as well as the turntable itself.

C. F. Loweth (C., M. & St. P.): I think that the committee should confine itself to giving requirements for different lengths of turntables and if it does this the different railroad companies can very readily determine what is the proper length for them to use in special cases. In almost every case it is a special thing when you come to the matter of turntable length.

The President: The recommendation that this be accepted as a progress report is before you, and if there are no objections it will be so received.

(The fifth subject was received as a report of progress.)

C. E. Smith (Mo. Pac.): Regarding the sixth subject, both mitered and square-end rails with easer bars have given entire satisfaction for drawbridge connections on heavy traffic lines when properly maintained, while both designs have also caused trouble when not properly maintained. On account of the comparatively uneven surface offered by the mitered ends they ride more smoothly and quietly than the square enos and the reduced pounding causes less wear and less danger of breakage. As the wearing surface of the easer bar or sliding tongue used with square ends must of necessity be outside the rail head the bearing of the wheel tread is widened for the short distance through which the easer bar carries the wheel over the joint. The resultant pounding rapidly wears down both the rail ends and the easer bar and causes hard, noisy track. Regardless of the type of rail and connection creeping must be absolutely avoided either by the use of a sufficient number of anti-creepers or by inserting switchpoints in the track at the proper places.

Hunter McDonald: The appliance Mr. Smith referred to has been in use on two drawbridges on our lines for about four years. On one of them we have about 60 trains a day. It was developed as a result of complaints on the part of the signal department that they could not interlock the easer rail, and that the split rail raised up was not a safe device. The split switch is fastened to the stock rail by means of a permanent cuff, it cannot separate more than 1-16 in., so that there is no danger in using the split points in the main line under these conditions. As soon as the stock rail is driven home into the socket prepared for it, on the fixed span a hollow block is driven behind it by means of a signal which holds it in position. I can only say that since we put it in about four years ago, our expenses for repairs have been about seven dollars. One was installed on a drawbridge 397 ft. in length and the other on a drawbridge 365 ft. in length, the latter being open three times a day and the former being open about three times a week.

Mr. Carpenter: I would like to offer this motion on the interlocking of the signal and bridge functions: The bridge operating functions shall be interlocked with the signal system in such a manner that none of the functions for opening can be performed until the signals have been set at stop indication and so that the signals cannot be set at proceed indication until all of the functions for closing have been completed. The bridge operating functions shall be interlocked with each other so that they must be performed in a predetermined order, both for opening and for closing:

T. S. Stevens (A., T. & S. F.): I would like to see that motion changed to require that the home signals shall display the stop indication.

C. E. Lindsay (N. Y. C.): I think the case would be covered if we say "until the signals controlling the movement of trains over the draw have been set at stop indication."

Mr. Carpenter: This will be considered simply as the sense of the convention.

Mr. Loweth: I do not understand that the motion offered provides that all draw bridges shall be interlocked. If it does I should be opposed to it. It seems to me that there are many bridges where the necessity for interlocking is not apparent.

(The motion of Mr. Carpenter as amended by Mr. Lindsay, was then put to vote and adopted.)

Chairman Himes: The next subject on which we will ask to report is on an elastic requirement for steel. We present a proposed revision of that specification. I move the adoption of the revision.

(The motion was seconded and carried.)

Mr. Carpenter: In order to carry that revision through the specifications consistently, we should have added a proposal to modify paragraph 163 of the General Specifications to Steel Railway Bridges, which refers to the Full Sized Tests of Eye-bars, as follows:

"In eye-bar tests, the minimum ultimate strength shall be 55,000 lbs. per sq. in., and the minimum yield point, as indicated by the drop of the beam or of the mercury column of the testing machine, shall be 29,000 lbs. per sq. in. Bars shall generally break in the body and the fracture shall be silky or fine granular, should a bar break in the head and develop the specified elongation, ultimate strength and character of fracture, it shall not be cause for rejection, provided not more than one-third of the total number of bars break in the head."

C. H. Cartlidge: I would like to ask the committee if it is decided as to whether 29,000 lbs. is the maximum minimum. Cannot they get a 30,000 lb. limit about as easily as 29,000 lb.? It is my experience that it is possible to get as high an elastic limit in eye-bars as we specify for the ordinary material in the same structure.

A. F. Robinson (A. T. & S. F.): I think we should let the elastic limit in the sample tests go in just as it is, and leave the other parts for further consideration. I do not think we ought to take quick action on the matter.

Mr. Carpenter: I do not understand that there will be any difficulty in obtaining the 29,000 lb. minimum proposed with the full size eye-bars. It seemed consistent and rational to drop the limit for the yield point of the full sized test a little below that for the specimen test.

Thomas Earle (Pa. Steel Co.): I know you will have difficulty in many cases in meeting the 29,000 lb. in your full sized test, where you only specify 30,000 lb. in your specimen test, and it also must be evident that if the grade is to be picked out and separated by the manufacturer, so as to obtain these results, while you may not see it, it is certain that you will pay the extra expense.

Mr. Selby: I think it is common practice with manufacturers whether specified or not, to pick out the higher grades of steel within the range of ultimate strength required by specimen tests and manufacture their eye-bars out of this steel.

Mr. Carpenter: I present the matter as a motion for adoption by the Association.

(The motion was carried.)

Chairman Himes: The next subject which we were to con-

sider, continued from last year, is the bridge clearance diagram. It is not a general clearance diagram. It is a diagram that is recommended for iron and steel structures for bridges and is 15 feet. If adopted it would mean that that was recommended by the Association as good practice, and it would be presumed that in future construction this clearance diagram would be followed. It is largely a question for the Association to decide whether they want to change the clearance diagram, and if they do whether this change is satisfactory. It is the recommendation of the committee that this diagram be adopted, and I so move.

Mr. Schall: The Manual specifies 14 ft. in the clear, and if you make an analysis on the 13 ft. standard space which is now adopted by the Association, you will find that on a 6 deg. curve, with a 45-ft. car, passing on multiple tracks, on which a train is moving and the other is at a standstill, you will have 1 ft. 9 in. clearance, or the same clearance as you will have on a straight track on a bridge built for 14 ft. clearance. If you have a four track system you will have to provide for two lines of trestles and make the track spacing 18 to 19 ft. centers, and it will cost a lot of money. What are you going to gain? We have freight cars 10 ft. 6 in. wide, and 14 ft. 11 in. or 15 ft. high. You have not gained anything except you are producing a lot of trouble for the eastern roads, who have tunnels of small capacity.

Mr. Loweth: I represent one of the western roads, and I know that we do not want this clearance. The standard clearance now in the specifications is 14 ft. and I think that is as far as this Association should commit itself.

Mr. Courtenay: If this Association increases the clearance from 14 to 15 feet it will encourage legislatures, and anyone who has been before them, to try to stop some of this erratic legislation knows that they don't know much about matters affecting railroads. I think this would be a dangerous thing.

H. T. Porter (B. & L. E.): I have made some investigation of the question of clearance and I have come to the conclusion that we cannot get what you call safe clearance unless we go to 16 ft. There are trainmen who can hang on the side of box cars, with 16 ft. clearance and hang out far enough to be rubbed, and 15 ft. clearance might reduce the accidents and might not, and if the bridge is wider the chances are they will be less careful.

C. E. Smith (Mo. Pac.): If our predecessors had adopted this same attitude, undoubtedly we would to-day be building bridges 11 ft. wide, with 14 ft. overhead clearance. I think the Association should anticipate the fact that increased clearance is going to be insisted upon and grow up to it. I am not prepared to recommend any larger diagram than that, but hope the diagram recommended by the committee will be adopted.

Mr. Robinson: I think we ought to leave the diagram just as it is, 14 ft. and if the various railway commissions or parties in control of these matters want to call for increased widths in certain states we can give it to them, but I don't think we ought to increase it above 14 ft.

Mr. Churchill: The recommendation of the committee, as I understand it, is largely based on the requirements of some of the state laws. Those state laws do not place the limit on cars but on another part of the equipment. A large portion of the engine cabs now used is wide enough to require a greater clearance than 14 ft. at bridges, under the state laws. The Ohio law reads that the clearance shall be 1 ft. 6 in. outside of the widest equipment, and 14 ft. does not comply in that case. It is a question of whether we should put that on record as the action of this Association. The fact still remains that many of the roads must build bridges 15 ft. clear.

C. H. Cartlidge (C. B. & Q.): It seems to me that it ought to be remembered that what the Association has adopted in the past and what it has now printed in the Manual is not a recommendation for the maximum clearance, but a recommendation of minimum clearance. Anyone who has conditions requiring larger clearances is completely at liberty to provide such larger clearances. The danger in adopting enlarged minimum clearance is very real.

E. A. Frink (S. A. L.): I think there is a great deal more to this subject than that. If there was any prospect of widening the clearance that would cure the evils that we anticipate, I think it would be well, but I don't think there is any. I think the width of the cars and other equipment will have to follow the widening of the clearance. It has taken us a good many years to get a right-of-way that will carry our equipment. When you widen the track you will have to get wider cars, and that will mean a heavier load per ft. for the equipment, and you know what that means on bridges.

Chairman Himes: It seems that there is a strong desire on the part of some members to set up a templet on the railroads that will throttle the capacity of the railroads and will not permit the passage of large equipment. It is fair to presume that the reason we are using larger locomotives and heavier, stronger cars is because by so doing we can handle the traffic more economically, and it is for the purpose of making money. Now, if by building greater locomotives and greater cars the road can earn enough more money to pay for the structures they want to take down and renew, it looks like pretty good business to do so. It is clear that there has been a little mismanagement in permitting a perpetual see-saw between the engineering department and the motive power department, by which we get larger bridges and so on at a great waste of money, but that is not a problem of engineering. I think the idea that we must so erect our structures that we will throttle the development of the motive power department, and the equipment department is entirely wrong. Second, in regard to the danger: I don't think that it is a matter for us to consider what the custom in the past has been in regard to the clearance diagram. We have to consider the element of safety to those who operate the railroad. (The chairman's motion was put and lost.)

RAIL

The subjects assigned for investigation and report are as follows:

(1) Recommend standard rail sections.

(2) Continue investigations of rail failures and deduce conclusions therefrom.

(3) Continue special investigation of rails.

(4) Present specifications for material in rail joints.

STANDARD RAIL SECTIONS.

The present A.R.A. sections "A" and "B" were adopted in 1908. We were instructed by the American Railway Associa-

J. A. ATWOOD,
Chairman Committee on Rail.

tion to study these sections and submit a single type for standard.

During 1908 and 1909 very little rail of the A.R.A. sections was laid, and, generally, it has not been laid in such manner as to give comparative results of the value of the two sections; in fact, up to the present time there have been but three places the committee has knowledge of where the "A" and "B" sections were laid in order to secure comparative results under similar track and traffic conditions. The matter of sections has been under consideration since 1908 and, owing to the lack of information giving comparative results, the committee has deemed it desirable not to be hasty in submitting new sections.

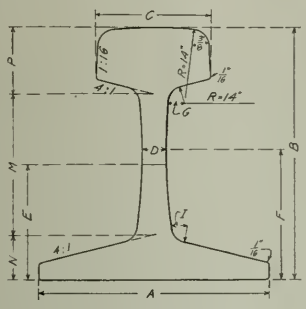
Tentative sections proposed by several members of the committee were submitted to the whole committee. These were criticised by members of the committee, and as a result there is now submitted for approval sections for rails weighing 100, 110, 120, 130 and 140 lb. per yd.

Suggestions have been made to the committee that a common fishing space should be used for more than one section; also, that a common width of base should be used for more than one section. To use a common fishing space for more than one section would result in a greater sacrifice in design-

ing some of the sections than seems desirable. To do so would be sacrificing one of the most expensive parts of our track, in order to help out a much less expensive part, and would appear to be a violation of the economical or theoretical principles which should control our work.

A common base for more than one weight of rail is less objectionable, and the only feature in the design that would necessarily be sacrificed would be the matter of stability against overturning. It seems desirable, however, to propose different widths of base for each of the sections recommended.

The designs submitted have kept in view the feature of the rail as a girder, and we have kept in mind a design having the



DIMENSIONS OF PROPOSED R. E. RAIL SECTIONS

Section	90-lb.	100-lb.	110-lb.	120-lb.	130-lb.	140-lb.
A	5-1/8"	5-3/8"	5-1/2"	5-3/4"	6"	6-1/4"
B	5-5/8"	6"	6-1/4"	6-1/2"	6-3/4"	7"
C	2-9/16"	2-11/16"	2-25/32"	2-7/8"	2-15/16"	3"
D	9/16"	9/16"	19/32"	5/8"	21/32"	11/16"
E	2-25/64"	2-3/4"	2-53/64"	2-59/64"	3-1/32"	3-9/64"
F	2-29/32"	2-31/32"	3-1/8"	3-1/4"	3-3/8"	3-1/2"
G	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"
I	3/8"	5/8"	5/8"	5/8"	3/4"	3/4"
J	1"	1-1/16"	1-1/8"	1-3/16"	1-7/32"	1-1/4"
M	3-5/32"	3-9/32"	3-13/32"	3-17/32"	3-11/16"	3-27/32"
P	1-16/32"	1-21/32"	1-23/32"	1-25/32"	1-27/32"	1-29/32"
Actual Weight (lb.)	89.96	101.49	110.36	120.87	129.64	138.62
Area Head (sq.in.)	3.20	3.80	4.04	4.40	4.63	4.93
Per Cent	36.2	38.2	37.4	37.1	36.4	36.3
Area Web (sq.in.)	2.12	2.26	2.49	2.69	3.02	3.28
Per Cent	24.0	22.6	23.0	22.7	23.8	24.1
Area Base (sq.in.)	3.50	3.90	4.29	4.76	5.06	5.37
Per Cent	39.8	39.2	39.6	40.2	39.8	39.6
Total Area (sq.in.)	8.82	9.95	10.82	11.85	12.71	13.58
Moment of Inertia	38.7	49.0	57.0	67.5	77.4	89.2
Sect. Mod., Head	12.56	15.1	16.7	18.9	20.8	23.1
Sect. Mod., Base	15.23	17.5	20.1	23.1	25.5	28.4
Ratio M.I. to Area	4.39	4.92	5.27	5.71	6.09	6.56
Ratio Sec.Mod.to Area	1.42	1.52	1.65	1.69	1.64	1.70

Proposed R. E. Rail Sections.

highest ratio of section modulus to area of section. The radia of the fillets between the head and web, and web and base, have been made as large as possible without interfering with the bearing of the joint bars.

Although the committee submits designs for sections weighing 130 and 140 lb. per yd., it does not consider them necessary, nor does it recommend them for adoption. They should be received as embodying the ideas of the committee in regard to such sections, and are a development along the lines of the sections 100 to 120 lb., inclusive.

The committee offers no new designs for sections under 100 lb., and for the 90-lb. section recommends the A.R.A. "A" section for the single type standard. The sections now in general use do not vary sufficiently from those that might be submitted as to make any marked difference so far as mill practice or wear in service are concerned, the distribution of the metal in sections of 80 lb. and under being such that it cannot be varied, except in minute details that will not affect the life or safety of the rail in service.

SPECIAL INVESTIGATION OF RAILS.

During the year special reports have been prepared and presented to the rail committee, as follows:

Influence of Carbon on the Properties of Rails, by M. H. Wickhorst.

Formula for Deflection of Rails in Drop Test, by M. H. Wickhorst.

Study of a Rail with Internal Fissures, by M. H. Wickhorst.

Comparative Service Test of 100-Lb. Sections, P.S. and A.R.A.-A on the Pennsylvania Lines West of Pittsburgh, by W. C. Cushing.

Influence of Finishing Temperature on Open-Hearth Rails, by M. H. Wickhorst.

Internal Fissures in New Rails, by M. H. Wickhorst.

SPECIFICATIONS FOR MATERIAL IN RAIL JOINTS.

The following specifications are presented for adoption:

(a) Specifications for High Carbon Steel-Joint Bars.

(b) Specifications for Heat-Treated, Oil-Quenched Steel-Joint Bars.

(c) Specifications for Medium Carbon Steel Track Bolts with Nuts.

(d) Specifications for Heat-Treated Steel Track Bolts with Nuts.

RAIL LENGTHS.

The question submitted to the committee was the advisability of using rails longer than 33 ft. The question may be considered in several parts, as follows: (1) The most suitable length of rail from the track standpoint; (2) the transportation of longer rail; and (3) the manufacture of longer rail.

With longer rail the advantages would be in better riding track, and the saving in the number of joints and in the labor of applying and maintaining them. From the standpoint of securing the best track, it is desirable to use the greatest length of rail, the necessary expansion for which will not increase the pounding at the joints, or materially increase their cost of maintenance. This is principally a question as to what maximum expansion per joint can be used. Rail specifications permit a variation of $\frac{1}{32}$-in. from square at the ends, which tends to increase the length of expansion space used above the amount prescribed. Some manufacturers mill the ends, which eliminates this trouble; and this would be especially desirable for longer rail. While the best track cannot be secured nor the lowest maintenance cost reached unless the expansion space is uniformly distributed, and kept so, this would be more important with longer rail. Some think the expansion space now generally prescribed could be reduced; from this standpoint, any reduction would permit a relative increase in the length of rail that could be used, and it is desirable to have this carefully investigated.

The disadvantages would be the increased expansion space at the joints and the increased difficulty of handling longer rail. Special tests should be made to determine the maximum expansion space that is practicable, considering the riding of the track and the cost of maintenance. The labor cost involved is relatively small, as compared with the cost of material renewals. As the use of power appliances for the loading and unloading, laying and relaying is economical, and is becoming general, the principal difficulty in handling would be by the section gangs in replacing failed rails, which will be further reduced by the increasing use of motor cars by these gangs. As this represents such a small part of the whole maintenance, it will not be sufficient to limit the length of rail.

What the most desirable length is from a track standpoint, as suggested, must be determined by additional tests, but it probably is considerably longer than 33 ft. Most European roads use lengths not less than 39 ft., while many use 45 ft. and over, including lengths of 49 plus, 54 plus, 59 plus, 60 and some even 72 and 78 ft.

As to the transportation of rail, considering the present equipment over 33 ft. long of nine roads, Eastern and Western, only 10 per cent is long enough to handle rail over 40 ft. in length, while 60 per cent will carry rail 39 ft. long and 70 per cent is long enough for 36-ft. rail. Eastern roads transport rail largely in open top cars, while in the West stock cars are used extensively. With the present equipment, generally rail over 40 ft. long would have to be handled in two open top cars, at some additional cost for blocking.

As regards manufacture, some mills could probably furnish rail in lengths of 36 or 39 ft. without changes in their plants, while others might need some reconstruction of their hot-beds

and finishing facilities. There seems to be some additional difficulty in straightening very long rail, but this does not appear sufficient to appreciably affect such lengths as we may tentatively consider. On the other hand, there would be fewer rail to saw, drill, finish and handle for a given tonnage.

The sub-committee on Length of Rail adopted the following resolution:

"From tests of long rail on American roads and the general practice in Europe, it seems that a longer rail—probably not exceeding 45 ft.—would yield advantages from the standpoint of economy and better riding track, providing, however, there is no additional cost per ton."

The character of present equipment may render inadvisable the use of lengths greater than 36 ft. or 39 ft., but if transportation is practicable for lengths of 45 ft., it is the opinion of the sub-committee that a general trial use should be made for lengths above 33 ft. up to 45 ft.

Transverse Fissures.

Investigations have been made during the year to determine the cause of transverse fissures, if possible. Report No. 42 is a study of a rail, in service, in which transverse fissures developed. It shows the presence of a large number of small fissures, many of which were transverse fissures. Report No. 46 gives the result of a similar examination of new rails. The report shows the presence of interior fissures similar to those shown in rail in service by Report No. 42. The investigations have not progressed to a point where definite conclusions can be reached, but present indications point to these internal fissures—the result of rolling conditions—as a possible cause or at least a contributing cause of transverse fissures.

FUTURE WORK.

About the time when 100-lb. rail began to come into considerable use (1906) the railroads experienced great difficulty in getting proper rail material. Tonnage, and not quality, was the aim of the manufacturer. Agitation by the railroads for better material developed a criticism by the manufacturer of sections then in use—the manufacturer claiming that good material could not be produced unless the section was modified. The American Railway Association appointed a committee to revise the sections. This committee reported the A.R.A.-A and A.R.A.-B sections. The American Railway Association then asked the American Railway Engineering Association to investigate the use of these sections and report a single section for each weight of rail. Since that time the Rail committee has been making a study of the rail situation —both in the mill and in track. In making the investigations it has had the financial support of the American Railway Association, and it is gratifying to report that the manufacturers have given the committee increasing support and co-operation.

Coincident with the work of the committee, there has been a gradual improvement in the quality of the material in rails until now there is no longer, as in 1906, a hesitancy on the part of railroads to order 100-lb. rail because of their inability to get good material in that weight of rail. The committee, holding, as it did, a semi-official position (as representing the A.R.A., as well as the A.R.E.A.), has been able to influence, to a considerable degree, general opinion on the subject of the manufacture and use of rails, and this influence, it believes, has been a considerable factor in the better rail conditions now prevailing.

The A.R.A. will discontinue its financial support after April 1, 1915. Mr. Wickhorst has, however, been retained for one year after that date by the A.R.E.A. The committee feels that it is unfortunate that the financial aid of the A.R.A. has been withdrawn, and hopes that it will be only temporary. The A.R.E.A., of course, cannot employ Mr. Wickhorst permanently, but the standardization of practice in the manufacture of approximately $100,000,000 worth of rails per year would seem to warrant the small outlay incident to the prosecution of the work of the committee.

CONCLUSIONS.

The committee recommends the adoption of the following conclusions:

First (a), That the sections of rails recommended for weights of 100, 110 and 120 lb. per yd. be approved as standard and printed in the Manual.

(b) That the A.R.A.-A section be adopted as standard for 90-lb. rails.

(c) That for sections below 90 lbs. it is inadvisable to recommend any changes in the sections now in use.

(d) That the above conclusions be presented to the A.R.A. for adoption.

Second, that the specifications for material in Joint Bars be adopted and printed in the Manual.

Third, that the revisions of the specifications for Carbon Steel Rails be adopted and printed in the Manual.

J. A. Atwood (P. & L. E.), chairman; W. C. Cushing (P. L. W.), vice-chairman; E. B. Ashby (L. V.), A. S. Baldwin (I. C.), Chas. S. Churchill (N. & W.), J. B. Berry (Cons. Engr.), G. M. Davidson (C. & N. W.), Dr. P. H. Dudley (N. Y. C.), C. F. W. Felt (A. T. & S. F.), L. C. Fritch (C. N.), A. W. Gibbs (P. R. R.), A. H. Hogeland (G. N.), C. W. Huntington (M. & St. L.), John D. Isaacs (S. P.), Howard G. Kelley (G. T.), C. F. Loweth (C. M. & St. P.), H. B. MacFarland (A. T. & S. F.), R. Montfort (L. & N.), C. A. Morse (C. R. I. & P.), J. R. Onderdonk (B. & O.), J. P. Snow (Cons. Engr.), F. S. Stevens (P. & R.), A. W. Thompson (B. & O.), R. Trimble (P. L. W.), Geo. W. Vaughan (N. Y. C.), M. H. Wickhorst.

APPENDIX F.

INFLUENCE OF FINISHING TEMPERATURE ON OPEN-HEARTH RAILS.

An investigation was made concerning the influence of finishing temperature on the properties of open-hearth rails. The problem was divided into two parts—first, the influence on the rails of varying the initial temperature of the ingots as drawn from the pits; and, second, the influence on the rails of varying the finishing temperature by holding the bar toward the end of the rolling. A set of five ingots, all of one heat, was drawn from the soaking pits with varying temperatures and rolled into rail in the same manner, but, unfortunately, this part of the work was not successful, due to failure to obtain much range in the initial temperatures of the ingots. Another set of five ingots from the same heat was drawn from the soaking pits at about the same temperature for the several ingots, and rolled into rail in the same manner, except as to the length of time the bars were held toward the end before the finishing pass. The work was done at Gary, Ind., at the works of the Illinois Steel Company, who kindly furnished all the material and facilities for making this investigation. The rails were tested by means of drop tests, slow bending tests, tensile tests, transverse tests of the base, microphotographs and polishing of cross-sections.

The finishing temperatures of the rails were determined by means of a radiation pyrometer, showing the temperature of the bottom of the flange toward its edge. The comparisons between different temperatures, mentioned below, refer to differences in finishing temperatures obtained by holding the bar varying lengths of time before finishing. The finishing temperatures of the flange varied from 850 deg. C., with a shrinkage of 6.95 in., to 695 deg. C., with a shrinkage of 5.70 in. in a 33-ft. rail. The first bar was finished without holding between rolls, while the latter was held 115 seconds. The average decrease in shrinkage was .011 in. per second held.

The results in the drop, slow bending and transverse tests of the base were about the same for the different finishing temperatures, varied by holding the rail bar between rolls before final finishing. In the tensile tests the results were also about the same, except that the lower finishing temperatures showed a little greater elongation and reduction of area. The lower finishing temperatures also showed a somewhat finer grain structure.

APPENDIX G.

INTERNAL FISSURES IN NEW RAIL.

By M. H. Wickhorst, engineer of tests, Rail Committee.

In Report No. 42, "Study of a Rail with Internal Fissures," it was shown that a rail that had failed in service, due to a tranverse fissure, contained numerous small cracks or fissures in the head of the rail. These were most numerous in the lower part of the head and were mostly longitudinal, but some were transverse near the middle of the head. That work did not, however, show whether these cracks were developed in service or were contained in the original rail as made.

Report No. 45 described tests of rails finished at different temperatures, and cross-sections were selected from those rails for polishing by the improved method described in Report 42. The A and E rails were examined from 10 ingots of one heat and 4 sections were cut from each rail, making a total of 80 cross-sections. From each rail one section was cut from near each end and two from near the middle. The manufacture of these rails is described in Report 45. The rails were 100-lb A.R.A. type A section and were tested without straightening or gagging.

The preparation of the sections consisted of polishing with emery, etching or pickling with copper-ammonium chloride solution until the deposited copper could be wiped off easily and finally polished with tripoli to a point where any minute cracks or fissures showed plainly.

A few of the sections showed small cracks in the head or web, or both. All the cracks found were in the upper half of the A rails and none were found in any of the E rails. A

few of the cracks occurred in the web and had the appearance of being small slag enclosures, but most of them that occurred in the head had ragged sides and appeared to be tears or breaks in the steel.

This work indicates that cracks or ruptures may occur in new rails as made, but does not show at what stage of the manufacture these breaks occur, nor does it show the conditions that influence their occurrence. It is interesting to note that in this work they were found only in the A rails where some unevenness of composition would occur, and they occurred at different finishing temperatures, but the matter can be worked out only by considerable further experimental work.

APPENDIX I.

SPECIFICATIONS FOR HIGH-CARBON STEEL-JOINT BARS.

1. *Basis of Purchase.*—Inspectors representing the purchaser shall have free entry to the works of the manufacturer at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the joint bars have been made in accordance with the terms of the specifications.

2. All tests and inspection shall be made at the place of manufacture prior to loading, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

3. *Material.*—Material for joint bars shall be steel, made by the open-heart process.

4. *Chemical Properties.*—The chemical composition of each melt of steel from which joint bars are manufactured shall be within the following limits:

Phosphorus, per cent, maximum 0.04.

5. The manufacturer shall furnish the inspector a complete report of ladle analysis, showing carbon, manganese, phosphorus and sulphur content of each melt represented in the finished material. The purchaser may make a check analysis from the finished material; such analysis shall conform to the requirements in Section 4.

6. *Physical Properties and Tests.*—Joint bars shall conform to the following physical requirements:

(a) Tensile strength, lb. per sq. in., minimum, 85,000.
(b) Elongation, per cent in 2 in., minimum, 16.
(c) Cold bending without fracture on the outside of the bent portion through 90 deg. around an arc the diameter of which is three times the thickness of the test piece.

7. All test pieces shall be cut from finished bars.

(a) Standard ½ by 2-in. specimens, as adopted by the American Society for Testing Materials, shall be used for tension test.
(b) The bend test specimens shall be ½-in. square in section, or a rectangular bar ½-in. thick, with two parallel faces as rolled.

8. *General Requirements.*—The different sections of joint bars shall be rolled to dimensions specified in drawing furnished by the purchaser. No variation will be allowed in the dimensions affecting the fit and the fishing spaces of the rail. The maximum camber on either plant shall not exceed $\frac{1}{32}$-in. in 24 in.

9. The joint bars shall be sheared to the length prescribed by the purchaser and shall not vary therefrom by more than ¼-in.

10. (a) All joint bars shall be punched, slotted and shaped at a temperature of not less than 800 deg. C. (1470 deg. F.).

(b) All bolt holes shall be punched in one operation, without bulging or distorting the section, and the bars shall be slotted for spikes, when required, in accordance with the drawings, the slotting being done in one operation; a variation of $\frac{1}{32}$-in. in the size and location of the holes will be allowed.

11. All joint bars must be finished smooth and true, without swelling over or under the bolt holes, and be free from flaws, seams, checks or fins, and the fishing angles must be fully maintained.

12. The manufacturer's identification symbol, kind of material, month and year rolled and number of design, shall be rolled in raised letters and figures on each bar. The number of the melt shall be plainly stenciled on each lot of joint bars.

13. *Inspection.*—The joint bars from each melt shall be piled separately until tested and inspected by the purchaser's inspector. One joint bar for tension test shall be selected by the inspector for each melt represented in finished bars, or by agreement specimen for tension test may be cut from the bar as rolled. One joint bar for bend test shall be selected by the inspector for each lot of 1,000 bars or less presented.

SPECIFICATIONS FOR HEAT-TREATED, OIL-QUENCHED, STEEL-JOINT BARS.

[Where specifications for heat-treated bars are the same as those for high-carbon bars given above they are not repeated.]

6. *Physical Properties and Tests.*—Joint bars shall conform to the following physical requirements:

(a) Tensile strength, lb. per sq. in., minimum, 100,000.
(b) Yield point, lb. per sq. in., minimum, 70,000.
(c) Elongation, per cent in 2 in., not less than $\frac{1{,}500{,}000}{\text{Ten. str.}}$ minimum, 12.
(d) Cold bending without fracture on the outside of the bent portion through 90 deg. around an arc, the diameter of which is one and one-half times the thickness of test piece.

8. *Heat Treatment.*—Joint bars shall be heated and quenched in an oil bath from a temperature of about 810 deg. C. (1490 deg. F.), and shall be kept in the oil bath until cold enough to be handled.

13. *General Requirements.*—The manufacturer's identification symbol, kind of material, month and year rolled, number of design, and the letters "HT," to signify heat-treated, shall be rolled in raised letters and figures on each bar.

14. *Inspection.*—The joint bars from each melt or heat treatment lot shall be piled separately until tested and inspected by the inspector. One joint bar for tension test shall be selected by the inspector for each melt or heat treatment lot represented in finished bars. One joint bar for bend test shall be selected by the inspector for each lot of 1,000 bars or less presented, or from each heat treatment lot.

Discussion on Rail.

Chairman Atwood presented the report offering the first conclusion for consideration. Paragraph (a) was adopted.

W. H. Courtenay (L. & N.): I favor the A. R. A. B. section in preference to the A. R. A. A section. It seems to me that A. R. A. B is better. It has a heavy base. I am told by some manufacturers that it is a better rolling mill proposition and ought to last longer.

(Paragraphs (b), (c) and (d) were then adopted.)

The investigations of the Rail Failures and the conclusions deducted therefrom were received as information as was the work on the special investigation of rails.

Chairman Atwood: The next subject specifications for material in rail joints. We have presented for your consideration specifications for high carbon steel joint bars and specifications for heat-treated oil-quenched, steel-joint bars, and these specifications we present for adoption by the convention.

(Both specifications were adopted as were the changes in the Manual and the second and third conclusions.)

Chairman Atwood: Dr. Dudley has made some investigation of transverse fissures which has not yet come generally before the Rail Committee. He has some points he would like to speak to you about.

Dr. P. H. Dudley: We find that in a very few rails that leave the hotbeds the transformations are not entirely complete, from hot molten metal to the finished product, during the recrudescence of the head and the base. That sometimes leaves a central core in the head that is less ductile than it is in another place, and that is injured more or less in the gagging. If there are any transformations that are not complete enough, the tendency of the gag is to uncap this slightly, leaving an impression there, and the wheels will develop a crack in that metal from which an interior transverse fissure will develop. That will be a high rail and gagged upon the head. The low rails will have the base turned up. The metal in the base must be shortened, and that in the head lengthened, the reverse of what it is in the high rail. If there are any incomplete transformations in the head of that rail, we may check that core. Those I found and could trace all of those with the straight edge where they had been gagged more or less, and I termed that the inter-granular neuclea. We had only a few specimens and I termed those non-ductile metal. It was difficult to find any metal that was separated, except the track. In the past few days we have had a great many specimens come in, in which we were able to show that the fissure was produced by the gagging as well.

One of the interesting developments of the inter-granular neuclea came in a few days ago in a Bessemer rail that was rolled in 1906. That was when they were making the rails as fast as they could in the Bessemer output, and we were using a two-in. nozzle for steaming the ingots. In this case we have the inter-granular neuclea shown too plainly in the head of the rail. An ideal etching of that same section shows there was an inclusion of cast iron cut out from the stool, and we have an outside envelope, a very ductile metal, and a higher carbon shown by the shading, but a central core that was checked in the gagging. This was a low rail, and gagged from the base. We have all the different tests

showing that it was very much harder; the base was tougher, and we have all the exterior envelope to show that that was a non-ductile metal. There is probability that considerable improvement can be made, even under the present methods of gagging. In gagging some of these high rails in the center, they are often bit four or five times in very short spaces. You straighten that long sweep in the rail by making a series of short curves and you gag it in ten, twelve, or fifteen places on top, and cut that long sweep into a series of short curves, and shorten it at each place it is gagged. If we had maximum by which we could take out that long sweep stretching over an inch, probably it would not be injured so much.

We have been making a number of observations by chalking rails and noticing the width of the mark. We chalk right across the rail. We notice the mark made by some passing wheel. Some of the wheels only removed about a quarter of an inch of the width of the mark, and another would take off a half inch at a different place. This is all under the passenger equipment. Now, the proposition is to carry the chamfering out pretty nearly to the rim of the wheel, so that as the train wheels run over the rails, we will produce a wear very uniformly over the head, as we did a decade ago. I have had trouble with these transverse fissures, and I wanted to see whether we had conclusive proof of the effect of the gagging of these rails, and they have all given proof that the coning of the wheels and the shape of the tread is not what it should be, and they want to return to a less coning, but have the tread extend out so that it will cover the full width of the head, for the tangents at least, so that it will be wider on all of the curves that happen to be laid a quarter of an inch or a half inch wide on the curves. We think the wheel pressure tenses are entirely too great, not only upon the wheel but on the rail heads for the best wear of the rail. Our rails from New York to Chicago cost for the two passenger tracks, about ten million dollars. In going over portions of the line the other day we saw that we were only wearing off inside the web. There were hardly any marks outside of that, so we expect to extend out the chamfer so as to distribute the wheel contacts, make those larger, and our wheel intensities over a larger area of circuits.

Mr. Trimble: What do you think of canting the rail in order to overcome the difficulties you have just mentioned?

Dr. Dudley: We have the rail canted in several places, but we don't think it meets the condition at all. We are going to extend the coning out, so that we can get it over the head, as we had it a few years ago.

C. E. Lindsay: Has Dr. Dudley found any fissures in the base of the rails due to gagging?

Dr. Dudley: No, sir; you break the rail. All the breaking enect comes from the locked-up strains in the gagging.

WATER SERVICE

The following subjects were assigned:

1. Complete report on the design and relative economy of track pans from an operating standpoint.

2. Report on deep wells and deep-well pumping and relative economy of this as compared with other sources of water supply.

3. Report on the use of compounds in locomotive boilers to counteract: (a) Foaming. (b) Scale formation.

4. Continue the study of recent developments in pumping machinery and various kinds of fuels used.

The committee has given careful consideration to the subject of the revision of the Manual, and presents for approval a number of important changes in the subject matter now embodied in the Manual under the heading of water service.

The committee reports progress on the subject of design and relative economy of track pans from an operating standpoint.

REVISION OF MANUAL.

EFFICIENCY OF WATER-SOFTENERS.

Substitute the following for paragraphs 1, 2 and 3:

Designing and Installation.

(1) Special study should be made relative to the economical value of treating the water, and the method best adapted to meet the conditions.

(2) The installation of softening plants should follow a systematic plan. Greater success is generally obtained by completing the installation on one division first, rather than installing plants at individual points of especially bad water.

(3) Before the treatment of a water supply is undertaken the effect of the treatment on the water should be determined by complete analysis of the water.

(4) The plant should be of adequate capacity. It is necessary to anticipate possible increases in the consumption of water at the station considered.

(5) The mechanical device for introducing reagents should be such as to insure as near as possible a quantity of reagent in direct proportion to the flow of the untreated water. It should be simple of construction and operation and not readily thrown out of adjustment.

Operation, Maintenance and Supervision.

(1) Adequate supervision is necessary to the successful operation of a softening plant. Such supervision should be exercised at least in part by a chemist, or an engineer having adequate knowledge of water treatment.

(2) Provision should be made for frequent analyses or hardness tests of both treated and raw water. This is necessary, principally as a check on the treatment, and also on account of changes in the condition of the raw water.

In order that the analyses shall be effective, they must be made under the supervision of a competent chemist.

(3) Where the consumption of water is in excess of the rated capacity of the plant the use of undertreated water should be avoided by the use of raw water to such an extent as to give ample time for the proper treatment of all water that passes through the softener. The exception to this rule

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is the case of water which is being treated for corrosive properties. Such water should not be used raw if it can be avoided.

(4) The solutions containing the reagent should be properly prepared.

(5) The reagents should be as near chemically pure as practicable.

FOAMING AND PRIMING.

Substitute the following:

Foaming from treated water is due to the presence of sodium salts, as a result of treatment for incrusting sulphates, together with such quantities of the alkali salts as may have been present in the raw water. This condition is aggravated and is to a large extent due to the presence of suspended matter in the water.

Concentration of foaming solids in locomotive boilers reaches the critical point at about 100 grains per gallon. Concentration above this point will result in foaming.

The grains per gallon of foaming matter in solution represent the minimum per cent of water which must be wasted from locomotive boilers to prevent concentration rising above the critical point.

The cost of each pound of foaming matter per 1,000 gal. of water is approximately equal to the cost of pumping, treating and heating 70 gal. of water to the temperature of the boiler water.

The most efficient results are obtained by systematic, frequent blowing-off of the boilers on the road, as well as at terminals, together with occasional complete blowing-down and washing of boilers.

There are, of course, conditions where the concentration of foaming solids is so great that the required amount of blowing-off would be both impracticable and uneconomical, and it is necessary to resort to anti-foaming compounds.

DEEP WELLS.

The committee finds, after careful consideration, that a comparison between deep wells and other sources of water supply as such would be of questionable value and recommends as a substitute, for another year's work, a comparison of the costs of pumping under various conditions and with various types of equipment.

The committee submitted a tabulated statement on deep wells and deep-well pumping, covering information from 34 railroads. This showed the character of the wells and gave cost data and other information concerning pumps and pumping for deep wells. The special features of this statement were the figures given for pumping by the air lift. The striking feature about this was that the quantity of air used per gallon of water pumped as given ranged from 1 cu. ft. to 48 cu. ft. The first is abnormally low, but it may be explainable by exceptional conditions, if such exist, not developed by the investigation. The second can only be explained on the assumption that a vast amount of air is being forced through a well whose capacity is limited, thereby resulting in great waste of air.

Some tests on the El Paso & Southwestern developed the fact that whereas the compressor had been running at a speed of 100 revolutions per minute, maintaining an air pressure of 100 lb. at the well and consuming 5 to 6 cu. ft. of air per gallon of water pumped, the same quantity of water was lifted by reducing the speed of the compressor to 50 revolutions and the air pressure at the well to 85 lb., resulting in a reduction of air consumed to 2.7 cu. ft. per gallon of water lifted.

The committee's investigations lead it to the conclusion that the air lift is in many respects a desirable system for many deep wells, especially those in which the water is delivered from fine sand, requiring for the exclusion of the latter screens so fine, in order to avoid trouble with the pump plungers, that the capacity of the well is limited. By the substitution of the air lift for such wells, it appears that coarse strainers may be used, thereby permitting pumping out the fine sand and the collection of coarser material around the strainers, resulting in largely increased yields from the wells.

THE USE OF COMPOUNDS IN LOCOMOTIVE BOILERS TO COUNTERACT FOAMING AND SCALING.

The practice of introducing substances into a boiler for the purpose of preventing or tending to prevent the formation of scale on the interior surface of a boiler is probably almost as old as the use of the steam engine. The substances having an anti-scale action may be divided into two general classes: first, those having a mechanical action; second, those having a chemical action.

Prevention of scale by mechanical means consists in dilution of the scale-forming solids as they are thrown out of solution so as to exhaust or destroy their cementing properties. The materials used for this purpose may be divided into two general classes: first, purely inert materials which become suspended in the boiling water in a finely divided state, and are then deposited with the scale-forming material as it is thrown out of solution; second, materials of an oily or gelatinous nature or which assume this state when suspended in water; such materials have a tendency to surround the scale-forming matter with a slimy coating and to cover the water surface of the boiler in a like manner.

To the first class belong clay, talc, moss, coloring matter, ground glass, bran, sand and sawdust. To the second belong algæ, potatoes, starches, linseed, sugar, molasses, gum, dextrines, stearine, peas, oils, graphite, animal carcasses and resin. Of these some could be placed in both classes of mechanical acting substances, while others have more or less of a chemical action in addition to the mechanical effect. To these classes may be added a third to cover the use of wire, brush, twigs, etc., which afford additional surface upon which the scale may form.

The use of inert materials in a boiler cannot be recommended. It is very doubtful whether inert inorganic materials, such as earths or ground glass or sand, do any good at all. The other materials, in order to be at all effective in the prevention of scale, must be introduced in great quantities, with the result that the tendency to foam is augmented. The quantity of matter carried to the bottom of the boiler is also greatly increased, thus requiring an increase in the amount of blowing-off and washing and increasing the chances of mud burning. With waters tending to foam, the suspended matter may be carried over into the valves and cylinders, resulting in excessive wear of the working parts.

Petroleum oils are very commonly used in boilers, both alone and as an ingredient of compounds. They serve the twofold purpose of loosening the scale already in the boiler, and preventing its subsequent formation. Many grades of oil are used, from kerosene to heavy crude oils. While there seems to be a wide disparity of opinion as to the use of oils in boilers, the fact remains that oils as anti-incrustants have many strong advocates.

The action of oils is to coat the entire interior surface of the boiler, with a slippery veneer, to which the scale-forming solids cannot adhere. Even with the boiler surface covered with a coating of scale, the oils will tend to work into the cracks and with expansion and contraction gradually spread over the metal surface. Some oils also have a chemical action in that they combine with the calcium and magnesium salts to form insoluble soaps.

Several objections are raised to the use of oil, of which the most serious is the danger of burning and blistering due to the formation of a dense paste composed of a mixture of sediment and oil. In the absence of any fatty oils there does not appear to be much danger that this condition will be obtained unless they are used to excess or without proper care. Certain tests seem to indicate that oil has non-conducting properties far greater than those of scale, so that a film of oil of even inappreciable thickness may result in considerable fuel losses. Owing to the lack of sufficient verification, the extent of these losses can be only very roughly approximated at the present time. Oils sometimes give trouble through the passing into the cylinders of volatile constituents, which destroy the lubricating oils and rubber packing. When kerosene is used, open flames must be kept away from open manholes of empty boilers.

Oils are introduced into the boilers in most cases by some form of injector, such as the ordinary lubricator attached to the feed water pipe. A small pipe with a valve and immersed in a vessel of oil will serve the purpose. Another method is to throw the oil onto the surface of the water in the opened boiler, upon which it spreads out in a thin film to the sides of the boiler. Then as the boiler is emptied, this film of oil is carried down, covering the surface of all flues and the shell below the water line. Another method is to paint the interior with oil when empty.

The proportions of oil used seem to be governed more by the horsepower of the boiler than by the amount of incrustants in the water used. One advocate of kerosene recommends the use of one quart per day to 100 boiler horsepower.

Graphite.

Graphite is said to have properties similar to those of heavy oil and is introduced in the same manner. The flake or crystalline form of graphite is superior to the amorphous or powdered form for this purpose.

Prevention of scale formation through materials having chemical action comes about through reaction with the incrusting solids in the water to form new salts, which are either solubles to a high degree of concentration, or insolubles which have no incrusting properties, being precipitated as a sludge which is readily blown or washed out of the boiler.

Following is a list of chemical reagents which may be used to produce the results outlined above. Some are in common use, others are not, the considerations affecting a preference being cost, possible corrosive action, tendency to cause foaming, poisonous character, etc.:

Inorganic.—Sodium carbonate (Na_2CO_3), sodium silicate (Na_2SiO_3), tri-sodium phosphate (Na_3PO_4), sodium fluoride (NaF), caustic soda (NaOH), barium carbonate ($BaCO_3$), barium hydrate ($Ba((OH)_2$), barium chloride ($BaCl_2$), salammoniac (NH_4Cl), chromates, bichromates and oxalates.

Organic.—Tannic acid—tannates, other wood extracts, acetic acid, sugar, glycerin, oils and soaps.

Sodium Carbonate.

Sodium carbonate is the most common reagent used in boilers. It is found on the market in various forms under the names of soda crystals, sal soda, washing soda, scotch soda, concentrated crystal soda, sesqui carbonate of soda, crystal carbonate of soda, black ash, soda ash and pure alkali. The form commonly known as soda ash is the cheapest form of commercial sodium carbonate. Until recently it contained considerable quantities of impurities, but can now be obtained readily from 97 per cent to 99 per cent pure.

The principal disadvantage in the use of soda ash in boilers is the tendency of both sodium carbonate and sodium sulphate to cause foaming. The conditions are more severe when soda ash is used as a compound rather than as a reagent in a water-softener, because very little of the carbonates of lime or magnesia have been precipitated before entering the boiler and thus aggravate the foaming conditions by their presence in suspension.

Sodium carbonate is said by some to be much more conducive to foaming than sodium sulphate, consequently its

presence in a boiler ought to be prevented. By careful manipulation this may be accomplished fairly well in the water treated by a softening plant. On the other hand, with the use of sodium carbonate directly in locomotive boilers (tanks), an excess of the carbonate is almost sure to be obtained at some time during a run because of the impracticability of exact proportioning for the varying grades of water taken into the tank.

Soda ash is said to have a corrosive action on boilers, but from the consensus of opinion there appears to be small ground for this assertion. The use of large quantities of soda ash in boilers coated with scale will result in the rapid dissolving and loosening of the scale, thus uncovering leaks previously closed by the encrusted matter; and the leaky condition of the boiler thus produced has been incorrectly interpreted as an evidence of a corrosive action of the soda ash. In fact, it is the practice in the United States Navy to keep boiler waters alkaline by the use of soda ash as a measure for the prevention of corrosion.

Although this reagent has been repeatedly condemned by advocates of other chemicals, it remains the cheapest substance for the purpose. It is an ingredient of many proprietary compounds, including some for which all claims are based entirely on a mechanical action.

Sodium hydrate or caustic soda acts more quickly and powerfully than sodium carbonate. It is less desirable as a boiler compound than soda ash, because its caustic nature makes it dangerous to handle. There seems to be some difference of opinion as to possibility of corrosion from caustic soda.

Salammoniac.

Salammoniac, NH_4Cl, or ammonium chloride, and known also under the name of muriate of ammonia, is a by-product of the gas industry. It is not a desirable reagent for use in boilers owing to the possibility of liberating free hydrochloric acid with waters containing any amount of magnesium salts.

Barium Carbonate.

Barium carbonate is found in nature as witherite. It is also rapidly formed when baryta, hydrated or anhydrous, is exposed to the atmosphere and is also artificially made from heavy spar ($BaSO_4$). It is poisonous and only sparingly soluble in water.

Barium Chloride.

Barium chloride is prepared from witherite, the natural carbonate, or heavy spar, the natural sulphate. It is very soluble in water and very poisonous, but when used in the proportions required for water treatment is in no sense dangerous. The use of barium chloride with magnesium sulphate is not recommended on account of the corrosive tendency of the unstable magnesium chloride obtained in the reaction.

Barium Hydrate.

Barium hydrate, $Ba(OH)_2$, is an artificial product, not occurring in nature. It crystallizes from solution in crystals, $Ba(OH)_2 8H_2O$, which dissolve in water—20 parts at 15 deg. C. to 2 parts at boiling. The solution is caustic, but to a lesser degree that alkali caustic and decomposes on exposure to air with the formation of a film of barium carbonate.

Tannins are a rather common ingredient of boiler compounds.

The action of tannins in a boiler is complex and is still a matter of considerable conjecture. Ordinary tannins or tannic acid, whether free or combined with a metal when subjected to temperature and pressure conditions of a boiler, go through a series of reactions which result in the formation of one or more of a series of acids closely allied to tannic acid. Among these are gallic acid, pyrogallic acid, quercitanic acid, etc. These in turn act on the calcium and magnesium salts present in the water to form tannates, gallates, etc., of calcium and magnesium. Hydrates of these two salts may also be formed. Tannic acid or tannates when dissolved in hard or relatively pure water tend to cause corrosion, and must not be used in such waters unless made alkaline, as by the use of soda ash or other alkali salts.

British patent No. 23,618 of 1909 covers the use of barium salts with tannin. Barium tannate is formed by the action of tannin on the barium compound. The reaction in use in the boiler is as follows: Calcium carbonate plus calcium sulphate plus barium tannate equals barium sulphate plus barium carbonate plus calcium tannate. All these are non-incrusting compounds.

Sugars.

Sugar and substances containing sugar are used in boilers because they develop both a mechanical and a chemical effect. The mechanical action has been taken up previously. The chemical effect is due to a resulting increased solubility of lime and also to the formation of various sucrates of calcium and magnesium. A disadvantage of the use of sugar is the possibility of decomposition with storage where too warm, forming acetic acid, which, while it has a strong anti-scale effect, is sure to cause corrosion. Molasses of a grade which is by price available to use in boilers is liable to contain more or less sulphuric acid, a chemical not to be recommended for use in boilers.

Anti-Foaming Compounds.

Foaming of boilers results ordinarily from a concentration of alkali salts in the water, the exact degree of concentration to cause trouble depending on a number of other conditions, such as the amount of suspended matter in the water, rate of evaporation, etc. Unless the alkalinity of the water entering the boiler is too high, it is possible to control the concentration of the alkali salts by blowing-off. With some waters, however, notably in the states west of the Missouri river, this practice would result in the loss of excessive amounts of water and a large waste of fuel. Under such circumstances, the anti-foaming compound becomes a very important factor in boiler operation.

The action of materials tending to prevent foaming is physical, not chemical, and may be said, in general, to consist in a reduction of the surface tension of the water. Oils have this effect, petroleum oils and castor oil being commonly used. Tannic acids are also effective.

Very little has been written on the subject of anti-foaming agents and the use of other than patented or proprietary compounds seems to be very limited.

Extent of Use of Boiler Compounds.

Circular letters were sent out to mechanical officials on about 100 roads, inquiring as to the extent and manner of use of anti-scale and anti-foaming compounds. Fifty-nine replies were received, from which the following summary has been drawn as to the extent of use:

Roads reported	59
Roads using some form of boiler compounds	42
Roads using no boiler compound	16
Indefinite replies	1
Of those using compounds, extent of use is as follows:	
Use experimentally, or on less than 10 per cent of engines	12
Use on 10 per cent, but less than 50 per cent of engines.	13
Use on 50 per cent, but less than 90 per cent of engines.	7
Use on 90 per cent to 100 per cent of engines	10
Roads using some form of anti-scale compound	37
Roads using soda ash	19
Roads using caustic potash	2
Roads using proprietary compounds	26
Roads using a common chemical as well as proprietary compounds	8
Roads using some form of anti-foaming compound	20
Roads using proprietary compounds exclusively	18
Roads using both common chemical and proprietary compound	2
Roads using little or no anti-scaling compound	29
Of these 18 report reasons as follows:	
Good water	9
Use of water-softeners	5
No benefits	4

Boiler compounds are introduced in various ways, which may be enumerated as follows:

In the engine tank, the material being generally mixed in enough water to partially suspend it and then thrown into the tank at the time of filling.

Into the working boiler through the feed pipe. Oils, liquids and solids dissolved or suspended in water may be introduced in this way; generally by means of a syphon attached to the feed pipe outside of the injector. Special inspirators are sometimes used.

In the open boiler. Some forms of proprietary compounds are placed in the boiler in solid sticks or bricks through manholes or washout plug holes when boilers are being refilled after washing.

With a chemical-acting anti-scale agent, the best method of use, from a theoretical standpoint, is obviously one in which the chemical is added in exact proportion for the amount and quality of water as it is taken into the tank or boiler. To accomplish this it would be necessary to modify the treatment of water at each water station according to the content of incrusting solids. To this end, a compound for anti-scale use is sometimes given out to enginemen with instructions as to the amount to be used in engine tanks at the various water stations, but in general the practice has not been a success. In most cases such compounds as are placed in the tanks are applied only at terminals by the attendant

who fills the engine tanks, the amount being proportioned as well as possible to suit average condition of the water on the division.

Where a compound must be used to prevent foaming, the situation is somewhat difficult. In general, the material is introduced in proportion to the tendency to foam, as determined from experience and observation, rather than from a knowledge of the composition of the water.

For this reason the use of the anti-foaming compound is left much more to the judgment of the engineman. This applies both to compounds put into the tank and those introduced through the injector, though in the case of the former instructions are usually issued, giving the proportions to be used, but authorizing the engineman to use more than the specified amount if found necessary. Such instructions should always be accompanied with instructions for regular and thorough blowing-off.

The introduction of a compound through the injector is particularly advantageous where trouble with foaming is experienced, because this method permits of a quick increase or decrease in the proportion of compound in the water.

RECENT DEVELOPMENTS IN PUMPING MACHINERY.

The development of the internal combustion engine and the extension of electric power lines throughout the country, providing means for a reduction of the cost of operation of stationary engines, has resulted in the adoption of these agencies in numerous pumping plants.

The usefulness of any particular type of pumping plant is dependent upon its adaptation to the work required. The choice of the type for any particular location is determined primarily by the source of power available, source and character of water, quantity to be pumped and point of delivery. Having learned which kind of power is available, the further choice of the pump best suited for the purpose is dependent upon the economy of fuel, the efficiency of the pumping machinery and the degree of success in operation.

Centrifugal Pumps.

During the past 12 years great progress has been made in the theory and design of centrifugal pumps, so that now there has come into use the high pressure centrifugal pump capable of delivering large quantities of water under high heads, such as are used in certain mines where quantities of 1,000 gal. per min. against more than a 500-ft. head are delivered. The advantages of centrifugal pumps are the low cost, simplicity of parts, freedom from pulsation in operation, small floor space required, their adaptability to drive by belt or by direct connection to electric motor or steam turbines, the small amount of attention required and the small quantity of oil needed for lubrication. Centrifugal pumps are classified as high or low pressure pumps, the dividing line between the two types being about 30 to 50 ft. head of water delivered. They are also classed as horizontal or vertical pumps, according to the position of the shaft. Another distinction is made between two types of pumps, the Volute and the Turbine, the former without and the latter with guide vanes. The guide vanes were found to increase the efficiencies of high pressure pumps and are well suited to that class, though they also increase the efficiency of the low pressure type and are generally used with both.

The centrifugal pump has either an entrance or suction pipe, depending upon manner in which water is led into it. In a pump with entrance pipe, the pump is placed below the water level and is, therefore, always ready for service. Its inaccessibility when cleaning or repairs are needed is a serious disadvantage. The suction pipe is generally uesd, even though in most cases priming is necessary before it can be operated. The pump can, however, be thoroughly drained and made accessible.

There are six methods commonly used in driving centrifugal pumps: electric motor, gas engine, belt, steam turbine, water turbine and steam engine. By reason of their purely rotary motion, the electric motor and steam turbine are best suited. The efficiency obtainable is influenced by the speed at which pump is to be run, the head, the capacity and the characteristics desired. The following table gives the efficiency of centrifugal pumps as claimed by a leading manufacturer, covering those sizes applicable to railroad water stations:

Gals. per hr.	Gals. per min.	Size of pump.	Eff. of pump. Per cent.
8,000	133	2½	48
14,000	233	3	50
20,000	333	3½	55
30,000	500	4	60
40,000	667	5	65
50,000	833	6	68

Internal Combustion Engines.

The internal combustion engine has been developed industrially during the past 50 years. In railway water stations for many years gasoline had been used almost exclusively in this type of engine. During the past few years, however, the increased demand for gasoline has resulted in such an increase in price that gasoline engine plants no longer show a saving when compared with steam plants. It has, therefore, been necessary to find some other less expensive fuel to be used as a substitute and this emergency has been met by making use of oils of lower grades. Manufacturers have, therefore, developed a wide range of pumping units which utilize a number of these low grade oils for fuel, or may be operated by using the more expensive oils should occasion demand.

The oil engines in most common use in railway water stations are of two types:

(1) A two-cycle valveless type engine governed on the throttling principle, in which ignition is accomplished quite simply by means of a hollow hot ball.

(2) The four-cycle type, wherein there takes place four strokes of the piston or two revolutions of the crank. Ignition is effected by an electric spark or by contact with a hot surface, forcing the piston outward and by means of a connecting rod transmitting power to the crank shaft.

A number of gasoline engines have been converted into low grade oil-burning engines by the installation of appliances for heating the oil before it enters the cylinder. These attachments consist of generators, or mixing chambers, where the oil is heated by the exhaust of the engine, and are made in various sizes and types, both for throttling and hit-and-miss governors. Two methods of starting these engines are employed:

(1) By using gasoline for a quick start, running the engine on that fuel until sufficiently heated to permit changing to the heavier fuel oil on which it will subsequently run regularly.

(2) By installing a pocket or retort in the air inlet pipe where it can be heated by a torch. In this method approximately 15 minutes are required to start from cold and get the engine running regularly.

In connection with the use of either type of engine, an automatic stopping device can be installed. This will stop the engine when the tank or reservoir is full, at the same time opening the drain cocks to the water cylinder and pipe connections. These engines are also equipped with self-lubricating devices, and in some instances a reserve supply is maintained in case the other should clog. Attendance upon these engines is therefore necessary only in starting, but it must not be assumed that no other inspection of the machine is necessary.

KINDS OF OIL USED FOR FUEL.

These engines operate on gasoline, gas, naphtha, benzine, kerosene, crude oil and oils of lower grades, such as fuel oil, distillate, gas oil, solar oil, stove oil, engine distillate and Diesel oil.

Electric Motor-Driven Pumps.

The installation of electric power plants for the mechanical facilities of railroad terminals and the extension of electric power developments by private corporations and municipalities have made electric power so widely available that it is being used to a considerable extent in the operation of many railway water stations. Where current is available from the railroad powerhouse, it is apparent that it would be desirable to utilize it in the pumping station and thus avoid the installation of additional pumping facilities. In the case of private, corporate or municipal ownership of plants, it is often found that the owners are desirous of selling their power at an attractively low rate, providing that it is not consumed at a time when they are operating near their peak load. The operation of the water station may often be regulated so as to conform to these requirements and thus secure an economical power cost. In either situation it is many times possible to eliminate constant attendance and by use of an automatic controller for starting and stopping motors to cause the plant to be operated automatically, requiring attendance only for the inspection, repair and lubrication of machinery.

The electric motor speeds are so well adapted to the most desirable speeds for centrifugal pumps that the motor drive is most commonly employed. These pumps are designed for direct connection to either direct or alternating current motors. Where alternating current is used, consideration must be given to the available speeds in designing the pumps. With 25 cycles it is only possible to use speeds which correspond to synchronous speeds of 500, 750 and 1,500 revolutions per minute, except in large sizes, where lower speeds can occasionally be used. The centrifugal pump when direct con-

nected to a motor operates without any vibration, giving a decided advantage over the reciprocating pump in that heavy foundations are not required.

The initial cost of a centrifugal pump is less than that of a reciprocating pump, and at the same time the motor for the former will be cheaper than for the latter. Direct connected centrifugal pumps require high speed motors, whereas reciprocating pumps require slow speed motors.

Conditions Governing the Choice of Pumping Unit.

In small pumping plants, with a daily consumption of 50,000 gal. or less, it is usually possible to eliminate constant attendance. Under those conditions the internal combustion engine, using fuel oil, will prove most economical. Where the yield of water supply is sufficiently rapid, economy in operation will generally be secured by installing a pump of sufficient capacity to deliver the daily supply in a few hours. In the small pumping station, steam plants are uneconomical on account of requiring skillful attendants. The waste of fuel in firing up and in drawing or banking fire causes a further loss, tending to make such plants still less desirable. Where natural gas is available at 25 cents per 1,000 cu. ft., or less, it is an economical fuel. In localities where electric power is available at a low rate, as in connection with terminal machine shops or office building lighting, electric pumping plants are more economical than steam, gasoline or fuel oil engines unless the last named is secured at an exceptionally low rate.

If a rather constant delivery is required, resulting in a lower capacity for the pump, it will be found that the triplex reciprocating pump will prove to be more efficient than the centrifugal pump. In this case a slow speed motor direct connected to the pump will give the more satisfactory operation.

Table I, headed "Cost of fuel in various types of engines and pumps," giving the cost of fuel per unit of work done covering various types of engines, indicates the economy resulting from use of different fuels in the tests herein specified.

Table 1 - Cost of Fuel for Various Types of Pumps and Engines

Type		Fuel		B. H. P. Hour	Eff. H.P.	
Pump	Engine	Kind	Price	Fuel Used	Cost	No.	Cost 10 hr
Reciprocating	Steam (Slide Valve)	Bit.Coal	$2.00 per ton	14 lbs.	$0.0126	40	$3.16
"	Internal combustion	Coal Gas	0.50 M cu.ft	1/2 cu.ft	0.0050	60	1.50
"	"	Ill. Gas	0.75 M cu.ft	12 cu.ft	0.0090	60	1.90
"	"	Nat. "	0.25 " "	8 " "	0.0020	60	.40
"	"	Fuel Oil	0.06 per gal	1/8 gal.	0.0075	60	1.60
"	Electric motor	Elec.	0.06 K.W.Hr.	.746 K.W.	0.0224	60	4.48
Centrifugal	"	"	0.06 " "	.746 " "	0.0224	60	4.48
"	Internal combustion	Gasoline	0.16 per gal	1/8 gal.	0.0200	60	4.00
"	"	Fuel Oil	0.06 "	1/8 "	0.0075	60	1.60

Note: The last column, "Eff. H.P. Cost 10 hr." covers the work required to elevate 400 gal. per minute 100 ft., this being equivalent to a delivery of 240,000 gal. per day of 10 hours and is an average requirement condition of a railroad water station.

This table has been prepared from data secured from a series of tests of various pumping plants conducted by one of the largest railroads in the country, and from specific information relative to other tests conducted by other railroads, as well as by observations of tests by members of the Association and the committee.

A. F. Dorley (M. P.), chairman; J. L. Campbell (E. P. & S. W.), vice-chairman; J. T. Andrews (B. & O.), C. A. Ashbaugh (O. C. & S. F.), M. C. Blanchard (A. T. & S. F.), F. T. Beckett (C. R. I. & P.), C. C. Cook (B. & O.), R. H. Gaines (K. C. S.), W. S. Lacher (C. M. & St. P.), E. G. Lane (B. & O.), W. A. Parker (St. J. & G. I.), R. W. Willis (C. B. & Q.).

(The report was received and the committee excused.)

TRACK

DOUBLE-SLIP CROSSINGS, DOUBLE CROSSOVERS AND GUARD RAILS.

Your committee submitted drawings of typical layouts for Nos. 8, 11 and 16 double-slip crossings with movable points, to be operated by interlocking plant, together with drawings illustrating the spacing of ties for 16 ft. 6 in., 22 ft. and 33 ft. switch points for hand-throw and interlocking respectively.

The committee also submitted drawings of typical layouts for Nos. 8, 11 and 16 double crossovers for tracks 13-ft. centers.

Attention was called to the unsymmetrical arrangement, with the crotch frogs 6 ft. from the center of one track and 7 ft. from the center of the other.

The object of this arrangement is to properly guard the frog and crossing points, which is difficult and sometimes impossible with a symmetrical crossing when the distances between track centers are between 12 and 14 ft. With 12-ft. centers the upper half of the drawing would be used for both tracks, and with 14-ft. centers the lower half would be used, making symmetrical crossings. With centers under 12 ft. or between 13 and 14 ft., the upper half of the drawing would be used for one track and the distance from the crotch frog to the centers of the other track and the resulting leads would be varied to suit. With centers over 14 ft. or between 12 and 13 ft., the lower half would be used for one track and the layout

J. B. JENKINS,
Chairman Committee on Track.

for the other track varied to suit. Thus with any fractional distance between track centers, at least one of the two standards would be used.

The committee resubmitted for adoption the drawings of typical plans of Nos. 8, 11 and 16 double-slip crossings, changing the titles to read "Typical Layout for No. — Double-Slip Crossing."

The committee has made but little progress in the matter of guard rails.

RELATION BETWEEN WORN FLANGES AND WORN SWITCH POINTS

The committee has continued the study of the relations between worn flanges and worn switch points, with a view to correcting the causes and decreasing the number of derailments due to the combination of worn switch points and worn flanges on wheels, and has prepared a tentative rule for removing worn switch points, which will be used mainly as a basis for securing further information.

ECONOMICS OF TRACK LABOR.

The subjects assigned to the sub-committee for this season's work were:

(1) To continue the study of equating track values.

(2) To continue the study of extension of section foremen's duties.

One hundred and three requests were made for co-operation among the members of the Association in an effort to conduct a series of track tests for the purpose of arriving at relative values and track characteristics, and 17 railroads indicated their willingness to co-operate and have arranged to collect the necessary data. The tests will extend for one year, and the test sections have been selected with a view to

obtaining, as far as possible, all the various conditions entering into track maintenance.

With reference to subject No. 2, no further information is presented at this time, but we are watching the experiments which are being conducted by several railroads in connection with this subject and hope to present during the coming year some further light on the matter.

The sub-committee further recommends that the following subjects be taken up for the work next year:

(a) Economics of the use of motor cars.

(b) Investigation of the desirability of working a uniform track force throughout the season.

The sub-committee further recommends that the officers of the Association communicate again with the American Railway Association, strongly urging the adoption of December 31 as the end of the fiscal year, the reasons for which have been well put forward in the discussion of this matter at the 1914 convention.

CONTOUR OF CHILLED CAR WHEELS.

DESIGN OF MANGANESE FROGS AND CROSSINGS

The first subject was assigned to the sub-committee to consider jointly with a committee of the Master Car Builders' Association. No joint meeting was held with that committee, but the two committees have been in communication. The committee of the Master Car Builders' Association is compiling statistics of breakages of flanges in order to determine what part of the flange needs strengthening.

At a joint meeting of the sub-committee with the Standardization Committee of the Manganese Track Society and Manganese Steel Founders' Society and a committee of the Association of Manufacturers of Chilled Car Wheels, the questions of increased flanges on car wheels and increased flangeway and of standard design of manganese frogs and crossings were discussed. Until it is determined that the increased flanges are necessary, this committee does not feel called upon to take any action looking to an increase in flangeway, but will continue consideration of the subject in conjunction with a committee of the Master Car Builders' Association.

The committee offers the following tentative plans and specifications for manganese frogs and crossings:

Manganese Track Standards—Specifications.

Solid Frogs.

Referring to Drawing No. 1 of a solid frog, the minimum dimensions should be as follows:

a:—Not less than head of rail.
b:—1⅜ in.
c:—1 in.
d:—⅞ in., tapered to ¾ in.
e:—¾ in.
f:—½ in.
g:—¾ in.
h:—2¾ in.
j:—⅜ in.
l:—1¼ in.
m:—½ in.
n:—1 in.
o:—⅞ in., tapered to ¾ in.
p:—½ in.

q:—Place the actual point of frog at ⅝-in. spread of theoretical gage lines and chamfer the top to ½ in. wide, sloping the sides on a bevel to give a ¾-in. thickness of metal at ⅝ in. below the top; then join to the bottom of the groove with large fillet; the front of point to be sloped on an angle of about 45 deg. and curved or filleted to the bottom of the throat.

r:—Not less than ¼ in. and not more than ½ in. wider than the throatway.

s:—2¾ in.

Cross-ribs or tie-bars are recommended in the U section throughout the frog. They should be ¾ in. in thickness and not more than 18 in. apart.

"Section 4" to be not less than 1 in. thick at any point.

Rail-Bound Frogs.

Referring to drawing No. 2 of a rail-bound frog, the minimum dimensions should be as follows:

a:—2 in.
b:—1⅜ in.
c:—1 in.
d:—¾ in.
g:—¾ in.
i:—1⅜ in.
m:—½ in.

q:—Drawings No. 3 and 4. Place actual point of frog at ⅝ in. spread of theoretical gage lines and chamfer the top to ½ in. wide, sloping the sides on a bevel to give ¾ in. thickness of metal at ⅝ in. below top; then join to the bottom of the groove with a large fillet; the front of the point to be sloped on an angle of about 45 deg. and curved or filleted to the bottom of the throat.

r:—Not less than ¼ in. and not more than ½ in. wider than the throatway.

s:—Not less than 4¾ in., measured between gage lines at the ends of the rails.

t:—¾ in.
u:—¾ in.
v:—Not more than 2 in. nor less than 1¾ in.
w:—¾ in.
x:—⅜ in.

y:—With the head of the rail narrowed, the distance from the gage line of one heel rail to the back of the other heel rail shall not be less than 3½ in.

The manganese steel shall be carried beyond the waist (or bend in the wing rail) a sufficient distance to protect the rolled wing rail from the side blows of the wheel.

Minimum distance from gage line of one heel rail to back of other heel rail, at the top of the incline of the heel block, shall be 4½ in.; the length of slope, 6 in., with ½ in. drop, and the length of heel block, minimum, 15 in.

Cored holes to be not more than ⅛ in. greater diameter than bolt, except where a shearing strain comes on the bolt, and in such places the hole should be not more than $\frac{1}{16}$ in. larger than the bolt.

Bolts for all rails with a fishing section of over 3 in., measured on the vertical center line of the rail, should be 1¼ in. diameter; for rails with a less height of fishing section, down to and including 80-lb. rails, bolts should be 1⅛ in. diameter.

Sections for Solid Crossings.

Two sections are recommended for solid crossings, drawing No. 6 of a plain box or U-shape, with the webs flush with the outside edges of the top surface, and drawing No. 7, with an overhang of tread and guard to produce a fishing section for use at joints and where reinforcing bars are used.

The following dimensions are recommended:

Width of tread, 4 in.
Thickness under running surfaces, not less than 1⅜ in.
Thickness under groove, not less than 1 in.
Thickness of webs, not less than ⅞ in.
Thickness of flanges at out side edges, not less than ½ in.
Throat of groove to be 1⅞ in. deep and 1¾ in. wide at a point ⅝ in. below the tread surface.
Width of base flanges to be not less than 3½ in. each.
Width of guard for plain U section, 1¼ in. minimum.
Width of guard for reinforced section, 1¾ in.
Overhang of head or guard for fishing section, 1¼ in. minimum, but not less than the head of the adjoining rail.

Thickness of ribs or tie-bars on the plain U section, or the reinforced section where no metal surrounds the bolt, ¾ in., the vertical rib to extend to within ½ in. of the bottom of the section.

Cored holes to be of not more than ⅛ in. greater diameter than the bolts, except at the external joints, where larger or oblong holes can be used to compensate for shrinkage variations.

Bolts for all rails with a fishing section of over 3 in., measured on the vertical center line of rail, should be 1¼ in. diameter; for rails with a less height of fishing section, down to and including 80-lb. rails, bolts should be 1⅛ in. diameter.

Regarding the arms of crossings, it is recommended that easer extensions should be used in all cases, and the shaping of the arms to single web-rail section is not recommended. The run-off of the easer should be as long as possible, and a drop of ½ in. in a length of 12 in. is recommended where construction will permit. The general dimensions of the main sections, as far as applicable, are to be carried into the sections at the end joints and easer extensions. For internal joints of crossings, a miter joint across the tread, or a lap joint, is recommended.

REVISION OF MANUAL.

SUB-COMMITTEE NO. 5.

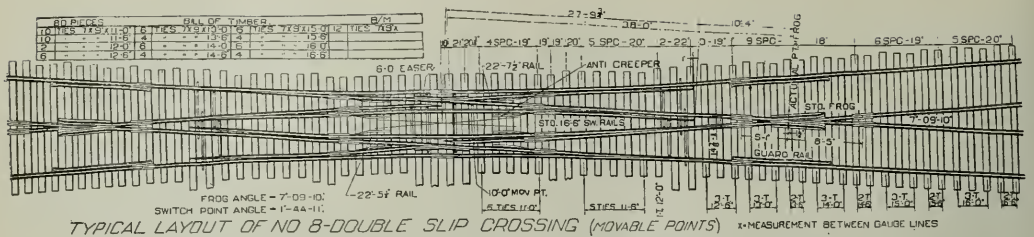
A number of minor changes in wording were recommended. The following additional definitions were proposed:

Connecting Track.—Two turnouts with the track between the frogs arranged to form a continuous passage between one track and another intersecting or oblique track or another remote parallel track.

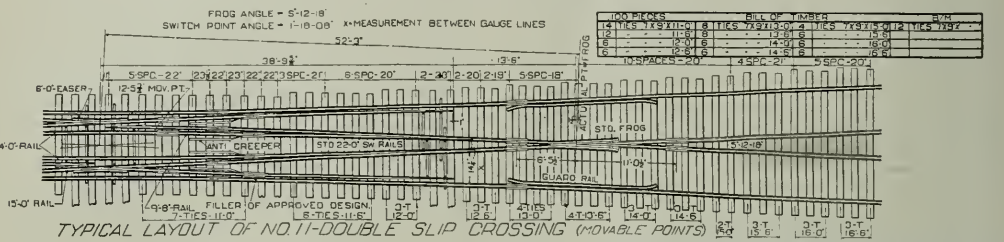
Crossover.—Two turnouts with the track between the frogs arranged to form a continuous passage between two nearby and generally parallel tracks.

Crossover, Double.—A combination of two crossovers in opposite directions which intersect between the parallel tracks.

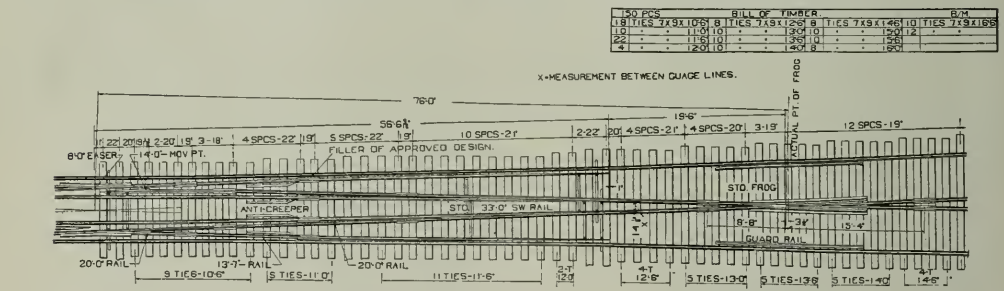
Frog.—A device used where two rails intersect to permit engines and trains on one rail to cross the other.



TYPICAL LAYOUT OF NO 8-DOUBLE SLIP CROSSING (MOVABLE POINTS) X=MEASUREMENT BETWEEN GAUGE LINES

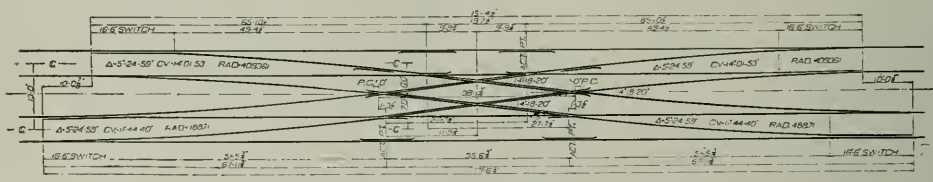


TYPICAL LAYOUT OF NO 11-DOUBLE SLIP CROSSING (MOVABLE POINTS)

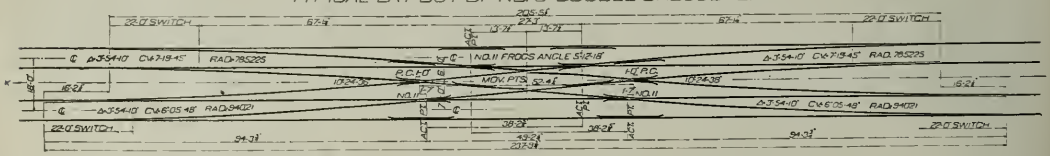


TYPICAL LAYOUT OF NO 16-DOUBLE SLIP CROSSING (MOVABLE POINTS)

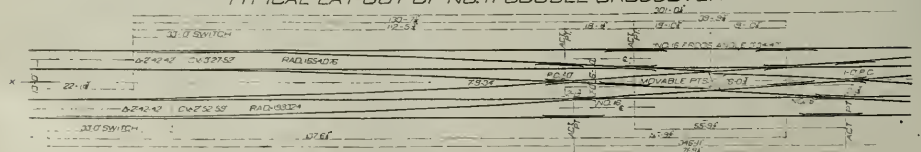
Double Slip Crossing Layouts Recommended for Adoption.



TYPICAL LAY-OUT OF NO. 8 DOUBLE CROSSOVER



TYPICAL LAY-OUT OF NO. 11 DOUBLE CROSSOVER



TYPICAL LAY-OUT OF NO. 16 DOUBLE CROSSOVER

Typical Layouts for Double Crossovers.

Gage (a tool).—A tool by which the gage of track is determined.

Lining Track.—Shifting the track laterally to conform to the established alinement.

Out of Face (referring to track work).—Work that proceeds completely and continuously over a given piece of track as distinguished from work at disconnected points only.

Scissors Crossover.—See "Crossover, Double."

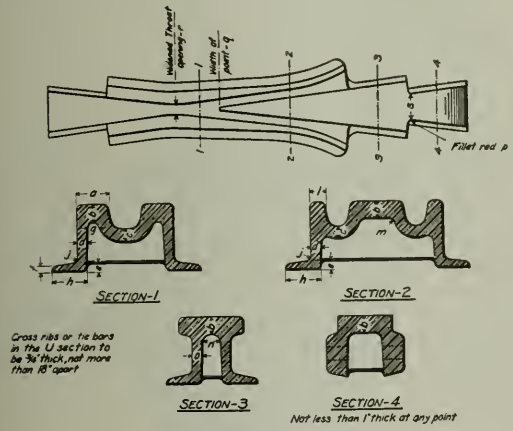
Slip Switch.—A combination of one or two pairs of turnouts and a crossing where each pair of turnouts has a common curved lead and stock rail, and the end frogs of the crossing serve for the turnouts.

Spiral (when used with respect to track).—A form of easement curve in which the change of degree of curve is uniform throughout its length.

Spiral, Ten-Chord.—An approximate spiral measured in ten equal chords and whose change of degree of curve is directly proportional to the length measured along the spiral by such chords.

Switch.—A device consisting of two movable rails, necessary connections and operating parts, designed to turn an engine or train from a track on which it is running.

Turnout.—A track device consisting of a switch and frog with connecting and operating parts and supporting ties by which engines and trains may be passed from one track to



Drawing No. 1.

another. A turnout begins with the switch and ends with the switch ties, or with the frog where long ties are not used.

Wye.—A principal track and two connecting tracks arranged like the letter "Y" with the top closed, by means of which engines or trains may be turned.

CONCLUSIONS.

Receiving as information:

(1) Drawings of typical layout of Nos. 8, 11 and 16 double-slip crossings, movable points to be operated by interlocking plant.

(2) Drawings of spacing of ties for switches to be operated by hand and by interlocking plant when No. 1 rod is used as lock rod.

(3) Drawings of typical layout of Nos. 8, 11 and 16 double cross-overs.

Receiving as a progress report:

The report on Economics of Track Labor.

For adoption:

(1) That it is very desirable that there be defined standards for the manufacture of manganese frogs and crossings.

(2) That drawings Nos. 1, 2, 3, 4, 5, 6 and 7 and specifications for solid frogs, rail-bound frogs and sections for solid crossings, Manganese Track Standards, appear to be satisfactory and that they be placed in general use as representing minimum sections, but they be not incorporated in the Manual for the present.

(3) That all frog, crossing or other track structures manufactured in accordance with these designs and specifications be stamped with the manufacturer's name and the initials "M. T. S.," signifying Manganese Track Specifications.

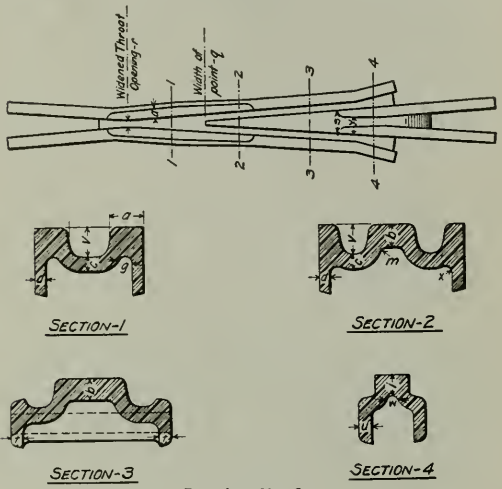
For adoption and publication in the Manual:

(1) Drawings of typical layout of Nos. 8, 11 and 16 double-slip crossings to be operated by hand as representing good practice for hand-thrown double-slip crossings.

(2) The recommended revision of the Manual.

The committee recommends for next year's work:

(1) Typical plans for guard rails, double-slip crossings to be operated by interlocking, typical layouts of Nos. 8, 11 and 16 double crossovers and specifications for crossings.



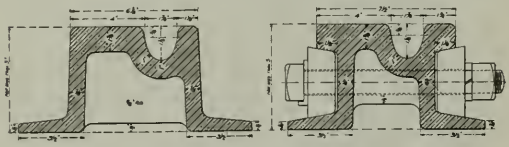
Drawing No. 2.

(2) Study the relation between worn flanges and worn switch points, with a view to correcting the causes and decreasing the number of derailments due to the combination of worn switch points and worn flanges on wheels.

(3) Continue the study of Economics of Track Labor.

(4) Confer with the Wheel committee of the Master Car Builders' Association on the question of increased flangeway to provide for wider flanges.

J. B. Jenkins (B. & O.), chairman; G. J. Ray (D. L. & W.), vice-chairman; Geo. H. Bremner (I. C. C.), H. M. Church (B. & O.), Garrett Davis (C. R. I. & P.), J. M. R. Fairbairn (C. P. R.), T. H. Hickey (M. C.), E. T. Howson (*Railway Age*



Drawings No. 6 and No. 7.

Gazette), L. J. F. Hughes (C. R. I. & P.), T. T. Irving (G. T.), J. R. Leighty (M. P.), A. C. Mackenzie (C. P. R.), P. C. Newbegin (B. & A.), F. B. Oren (I. C.), R. M. Pearce (P. & L. E.), H. T. Porter (P. & L. E.), E. Raymond (A. T. & S. F.), W. G. Raymond (Univ. of Iowa), S. S. Roberts (Cons. Engr.), L. S. Rose (C. C. C. & St. L.), H. R. Safford, (G. T.), C. H. Stein (C. R. R. of N. J.), A. H. Stone (K. C. Term.), W. I. Trench (B. & O.).

Discussion on Track.

The report was presented by Chairman Jenkins. The conclusions submitted as information were accepted as such.

W. H. Elliott (N. Y. C.): I would like to suggest to the committee the checking up of the position of the head block tie with reference to the switch point of the interlocking switch.

C. E. Lindsay (N. Y. C.): On the same subject the committee has presented drawings of layouts, eight, eleven and sixteen, double slip crossings, to be received as information, those to be operated by interlocking. Down below they recommend for adoption and publication in the Manual the drawings of similar layouts for hand-thrown switches. In practice it is very desirable to put in an interlocking slip

switch and operate it by hand before the interlocking is complete.

Chairman Jenkins: The committee will take that under consideration.

(On motion the division of the report dealing with the economics of track labor was adopted.)

Mr. Safford: The sub-committee working on economics of track labor after considerable amount of study developed a plan whereby a great deal of valuable information can be collected, reflecting the distribution of labor and other expenses in all kinds of track conditions. We have distributed blanks calling for this information and desire the co-operation of the members in securing it.

The portion of the report dealing with the drawings of typical layout Nos. 8, 11 and 16, was referred back to the committee for further consideration in conference with the Railway Signal Association.

The other recommendations of the report were approved.

CONSERVATION OF NATURAL RESOURCES

The work assigned was as follows:

(1) Continue the study of tree planting and general reforestation.

(2) Continue the study of coal, fuel-oil and timber resources.

(3) Continue the study of iron and steel resources.

TREE PLANTING AND GENERAL REFORESTATION.

It is estimated that $75,000,000 is lost annually because the forest lands of the United States are unproductive, and that 40,000,000 acres of natural forest lands now denuded are incapable of being regenerated naturally. As we are using 40 cu. ft. of timber per capita annually, while the annual growth of the forests produces only 13 cu. ft. per capita, or only one-third of the timber consumed is replaced by growth, it was estimated at the Fifth Conservation Congress that we will experience a scarcity of timber in 33 years unless proper measures are taken to prevent it.

Work of reforestation is being conducted by the federal government, by several state commissions and institutions, by railroads and by private individuals.

The Forest Service of the United States Department of Agriculture is now reforesting about 20,000 acres per year in the western national forests.

The states which are reported as most extensively engaged in reforestation are New York, Pennsylvania, Massachusetts, Vermont, New Hampshire, Connecticut, Ohio, Michigan, Wisconsin and Minnesota. The New York State Conservation Commission furnished some 5,000,000 young trees in 1914, which were planted on about 5,000 acres, divided between the State Forest Preserve, state institutions and private owners.

The following railroads are known to have experimented with tree planting and reforestation: L. & N., D. & H., C. V., N. & W., B. & A., P. R. R., Pa. Lines West, A., T. & S. F., C. P., I. C., and N. Y. C.

The Louisville & Nashville reports over 1,500,000 trees planted in 1904, 1905 and 1906, mainly black locust, in Kentucky, and Catalpa Speciosa in other states from Illinois to Florida At Carney, Ala., 700 acres were planted in catalpa, though usually planted on small tracts of land at different points available, some being planted on the edge of the right-of-way, where wide. The main object was to encourage owners of vacant lands to follow this example and utilize their lands for tree planting, incidentally giving considerable timber for ties. Mr. Courtenay considers the experiment a failure, and thinks the company will probably never recover its expenditure. Eleven thousand catalpa trees were planted in northern Kentucky in 1904 and 1905, and an inspection during the summer of 1910 showed only 17.8 per cent in good condition, while 67.1 per cent were dead or missing, the remainder being rated as fair or bad; 74,600 locust trees were planted in the same territory in 1904-1905, and 65.6 per cent of these were reported dead or missing. Perhaps the most favorable growth of catalpa was planted in the depot park at La Grange, Ky., in 1903, where one of the best trees was cut March, 1913, and the maximum diameter of the trunk within the bark was found to be a little less than 6 in. During the first three or four years after planting a large amount of money was expended in cultivating them and in destroying worms which infest catalpa.

The Delaware & Hudson reports that 2,600 acres have been planted, beginning in 1907 and continued to date. The plantations vary in size from two to 650 acres. The lands planted have been mainly worn out agriculturally or denuded through cutting operations and subsequent fires. Very little broadcast sowing has been done, as it has been found that better results are obtained from setting out seedling and transplants. The poplar planted is expected to produce good pulp timber in 20 to 25 years, and the pine to be available for general use in 40 to 50 years. The land planted is not a producing territory and has a relatively low value. It is estimated that the net returns will ultimately be from 5 to 10 per cent annually. The company does not consider it wise to plant trees for railroad purposes on account of the time element and the possibility of using substitute materials in railroad construction.

The Cumberland Valley reports 200 acres planted in plots varying from 2 to 60 acres, the soil varying from a good quality of clay, underlaid with limestone, to the poorest slate and gravel. Plantings are on strips variously located, from joining the right-of-way to three miles distant from the tracks. Early in 1906, 10,000 yellow locusts were planted; in 1908, 13,600 red oak seedings; in 1909, 63,000 red oak seedings; in 1910, 4,000 yellow poplar (on deep, moist ground), 5,000 yellow locust, 38,000 red oak; in 1911, 49,000 red oak; in 1912, 68,000 red oak. These were one year old, 6 to 12 in. high. Young trees did better where grass and weeds were kept trimmed back; in some cases seedlings showed better in poor land than on richer soils, where grass and weeds grew rank. The plantings are designed to produce car lumber, switch timber and ties in 40 to 60 years, depending on the variety of tree and character of soil in which grown. The reforesting will also help to preserve the water supply.

The Norfolk & Western reports that in 1905 about 2,000 catalpa trees were planted at Ivor, Va., but a short trial showed them unsuitable, and the loblolly pine is the natural timber for the eastern section of the railway, so that the company has discontinued its experiment in reforestation.

The Boston & Albany Railroad reports a planting of 25 acres of catalpa some 20 years ago without success. Nothing further has been done in reforestation.

Incident to extensive changes of line and grade, the Pennsylvania Railroad acquired property in excess of actual right-of-way and station needs. Most of this land was unsuitable in size, shape and location for sale to farmers. Though more suitable to agriculture than silviculture, the Pennsylvania Railroad undertook to plant trees upon it to encourage farmers along its line to similarly use their waste areas. Many tree planters have profited by its advice and experience. The first planting was made in 1902, and black locust was used exclusively until 1906, on advice that it was the most desirable tree. Professional foresters were then engaged and the planting of locust discontinued. In the railway territory that tree is subject to attacks by two boring insects, which so infested the plantations that the trees grew much more slowly than expected, and have generally been made unfit for other than fence-post material. Since 1906 plantings have had no unusual troubles and promise to furnish timbers as large as cross-ties within 50 years. All the lands available had trees planted during 1913.

COAL, FUEL-OIL AND TIMBER RESOURCES.

Reports were issued in 1914 by the U. S. Geological Survey on the production in the year 1913 of coal, petroleum and natural gas; also fuel briquetting. Interesting points of information noted in the report on the production of coal are that there is good reason for the belief that the maximum annual production of anthracite coal is nearly attained, and that production will soon decline; no such condition is anticipated in the case of bituminous coal, but the supply known to be available is about 4,000 times the amount exhausted in 1913, so that a tremendous increase must be made in production in order to exhaust the supply within any moderate period. The anthracite supply may be estimated at about 88 times the amount exhausted in 1913.

The committee considers that it has a field of usefulness in collecting and presenting to the Association information as to progress in the use of methods to preserve and of more permanent materials to replace the perishable materials now in general use, such as untreated timber and bare steel. It is also felt that the employment of such methods and materials should be urged wherever they appear economical, and that careful consideration be given to the economics of such methods and materials. In this category falls the preservative treatment of timber ties, piles, telegraph poles, etc., the substitution of reinforced concrete for timber structures, poles, piles, etc., and for bare steel in bridge spans.

For next year's work the committee suggests that it be assigned the following subjects:

(1) Study of developments in methods of lumbering and forestry tending to prolong the timber supply.

(2) Collection of statistics on extent of use of treated timber and of permanent materials to replace untreated timber and bare steel.

(3) Study the conservation and utilization of water power for railway purposes.

(4) Continue the study of coal, fuel-oil, timber, iron and steel resources.

C. H. Fisk (Cons. Engr.), chairman; A. W. Carpenter (N. Y. C.), vice-chairman; R. H. Aishton (C. & N. W.), Moses Burpee (B. & A.), F. F. Busteed (C. P. R.), A. L. Davis (I. C.), W. A. Hammel, William McNab, (G. T.), A. L. Moorshead (Erie), Francis Lee Stuart (B. & O.), S. N. Williams, R. C. Young (L. S. & I.).

(The recommendations of the committee were approved.)

BUILDINGS

REVISION OF MANUAL.

Numerous changes in the Manual were recommended. The following are the more important:

Engine House Design.

Turntable.

(a) The turntable should be long enough to balance the engine when the tender is empty.

(b) A deck turntable is preferable to a through table.

(c) At important terminals, turntables are most economically operated by mechanical means. Where few and light engines are turned, hand operation may be desirable. Where electric power can be obtained at a reasonable cost, an electric tractor is the most efficient means for operating a turntable, the cost of power is cheaper, and it is superior in continuity of service and maintenance. The first cost is approximately the same as an air motor of equal power and size.

Power wires are brought to the table either overhead or underground. The overhead device has the advantage of

M. A. LONG,
Chairman Committee on Buildings.

accessibility for inspection and repair. Special care must be taken to properly protect the collector head from weather and gases and to support the collector rigidly (the framework supporting same should be fastened to the steel frame of the table and not to the ties, and must be securely braced); the wires should be large enough to keep them from breaking from sleet and should be supported to the framework supporting collector. Any play at the table multiplies at the collector head. Wires should be brought to pole, close to curb of turntable, keeping lines as far distant from nearest wall of roundhouse as possible, to minimize the danger of destruction by fire.

When the underground system is properly installed, its advantages are that all exposed, non-current carrying parts are permanently grounded, including the circular-track rail (the only part of the system to repair is collector head); and non-interference from the weather if the turntable pit is properly drained. The disadvantages are that the wire is not so easily repaired, and is much more difficult to install originally, as it must be properly protected from water and cannot be laid successfully in a fill or on ground where settlement or shifting takes place. Where turntable pit cannot be well drained, it cannot be used with success. It has the advantage of protecting the power to run the table in case of fire in the roundhouse, especially in one of a nearly complete circle.

Compressed air tractors are frequently used. Ordinarily the power costs much more than electricity and is not so reliable. At points having no power plant the locomotive to be turned furnishes the compressed air; in this case an auxiliary supply should be maintained by providing a small air tank secured to the turntable for operating it before or after the engine is placed.

(d) The deck on the turntable should be wide enough to provide a walk on each side and be protected with hand-rails.

Turntable Pit.

(a) The turntable pit should be well drained and preferably paved.

(b) The circle wall should be of concrete or brick, with a wood coping not less than 6 in. thick.

(c) The circle rail should preferably bear directly on a concrete base. The use of wood ties and tie-plates supported by masonry is desirable under some conditions.

(d) Easy access to the interior of a turntable for the oiling of bearings, paintings and inspection should be provided in the design of the turntable pit, unless ample provision is made in the turntable itself.

Door Openings.

The clear opening of entrance doors should not be less than 13 ft. in width and 16 ft. in height.

Doors.

Doors should be easily operated, fit snugly, be easily repaired and maintained, and should admit of the use of small doors.

Tracks.

(a) Lead tracks to the turntable should line up with tracks of the engine house where possible.

(b) Tracks should be on a level grade and should be provided with stop blocks.

(c) Special fastenings of the track rails at the circle wall and on the turntable are desirable to prevent movement of the rails, to give good bearing and to lessen the damage from derailed wheels.

Position of Locomotive.

In a circular house the locomotive should stand normally with the tender toward the turntable.

Length of House.

The length of stall along center line of track should be at least 15 ft. greater than the over-all length of the locomotive, to provide a walkway behind the tender, a trucking space in front of the pilot and a certain distance in which to stop the locomotive or to move it to bring the side rods or other parts into convenient positions.

Materials.

(a) The material used in the construction of the house should be non-corrosive, unless proper care be taken to prevent corrosion.

(b) The additional security against interruption to traffic from fire warrants serious consideration of the use of a fireproof roof, and dividing the engine house into units of approximately 10 stalls by the use of division walls built of fireproof material.

(c) When the roof is of reinforced concrete the columns and roofbeams should be of the same material.

(d) Reinforced concrete should be used for the walls only where special conditions reduce its cost below that of brick or plain concrete, and should not be used for that portion of the wall directly in line of track where engine is liable to run into it.

The specifications for roofings and the principle covering the design of inbound and outbound freight houses adopted last year were also presented for inclusion in the Manual.

A detailed set of specifications for a rest house for employes was presented.

METHOD OF HEATING FOR MEDIUM SIZED STATIONS.

Methods of Heating.—There are four general methods of heating medium-sized stations: stoves, hot air, steam and hot water. In small stations where there is but one waiting room, or two waiting rooms contiguous and adjoining the office on one side, a single stove can be used for heating the office and the waiting room or rooms. The stove is placed in the partition so that about half of it is in the waiting room, and the half with the fire door, ash door and damper in the office. The partition about the stove and for several feet from it to be of wire grillwork. Where the waiting room is not too large, such a plant is satisfactory and represents about the cheapest installation that will provide comfort in cold weather.

Where the waiting room is large or where two waiting rooms are separated by the office, another stove is necessary or a central heating plant required. Stoves of large size are more desirable than small ones, as they give greater economy in fuel consumption and require less attention. Stoves are hazardous

at best. In placing a stove, care should be taken to place it at a safe distance from wood walls or partitions and if the clearance is restricted, metal shields with air space should be provided to deflect the heat. On wood floors a metal mat or pan should be placed under the stove and project far enough in front of it to catch any coals that may fall out of the fire or ash doors should they be left open. Stove-pipes should not pass through the ceiling. If it is necessary for the pipe to go through a wood partition, it should be protected by a double metal ventilated thimble of fireproof construction around the pipe.

Central Heating Plant.—While accurate figures are not available, it is the opinion of the committee, obtained after careful observation, that in stations in cold climates where more than two rooms are to be heated and where an agent and operator are on duty 18 or more hours per day, that a central heating plant is more economical, cleaner, constitutes a less fire hazard and requires less attention than stoves. The plant may be of the hot water, steam or hot air type. There is little choice between hot water and steam; each has some advantages over the other. Hot air is doubtless the least desirable of the three.

Care should be taken in installation that the boiler, where hot water or steam is used, is of ample size. For stations in a northern climate, the boiler should be rated at about two-thirds its advertised capacity. A very liberal ratio of radiating surface to cubic contents of room heated should be used. Where supervision can be depended upon in care of the plant, it is sometimes desirable in hot water heating to use the closed system, so that the water may be raised to a higher temperature before boiling. Thermostats or damper regulators, properly designed for the kind of installation used, are recommended as fuel savers—they should be automatic in operation.

Hot Air Furnaces—Advantages and Disadvantages.—The advantages of heating by hot air furnace, as compared with stoves, are, in general, its greater convenience and cleanliness and greater economy of fuel and its less cost of installation as compared with heating by hot water or steam. Its main disadvantages are due to the fire risk when hot air furnaces are carelessly handled, and to its unsatisfactory results when a building is so large and has so many rooms that long air ducts are required. The principal objection to heating with hot air is that on windy days it is impossible to maintain heat in all parts of a large room.

Advantages of Hot Water.—The advantages of heating by hot water compared with heating by steam are mainly the less consumption of fuel, the less cost of maintenance of the plant, and the greater ease with which an even temperature is maintained; and in the spring and fall, when a small amount of heat is required, it can be readily secured by a hot water plant without overheating the building. Steam radiators will not begin to get warm until the fire in the heater is sufficient to give some steam pressure, whereas any increase in the temperature of the water in a hot water heater will at once cause the circulation of the water in the radiators.

Advantages of Steam.—The advantages of heating by steam compared with heating by hot water are that the original cost of the plant is at least 20 per cent less; that after steam is raised the building is more quickly heated than with hot water, and that there is less liability of damage to the radiators if, through neglect, the system is allowed to freeze.

Signal Towers, Etc.—For heating interlocking towers and similar buildings, when not larger than about 500 sq. ft., a hot air furnace made from an ordinary cast-iron coal stove enclosed in a well-made case of No. 22 or No. 24 galvanized iron is satisfactory. A space of six inches to a foot is left between the stove and the casing and a little more than a foot above the top of the stove where the case converges into a hood. Two hot air pipes, 10 to 12 in. in diameter, lead from the hood to the register above. This method of heating towers gives sufficient heat and keeps the floor warm, but has been found to be objectionable on account of the danger of fire caused by overheated stoves. A more satisfactory arrangement is to place a small stove on the second floor of the tower, or to use a low pressure steam heating system. The chimney should be well built of fireproof material and lined with fire clay or terra cotta flue lining. It should start from the ground and be built so that it will not interfere with the mechanism of the interlocking machine. It is usually found best to build the chimney outside instead of inside the tower. For towers or buildings larger than 500 sq. ft. hot water steam should be used.

METHODS OF LIGHTING MEDIUM-SIZED STATIONS.

Where current can be obtained at reasonable cost electricity should be used for lighting. In wiring stations, the rules and regulations recommended by the National Board of Fire Underwriters should be followed. Where electric current cannot be obtained, gas may be used. The principal hazard from gas lighting comes from the gas where an open jet is used. A mantle is preferable and recommended. The fixtures should be stationary. If the jets or mantles are less than three feet from a combustible ceiling overhead, a heat deflector suspended at least 4 in. below the ceiling should be provided. All gas connections to the building should have a shut-off valve in the service pipe at the entrance to building or at curb line. Where natural gas is used, a pressure regulator to guard against varying fluctuations in pressure should be provided.

In small towns where neither electricity nor gas can be had, the most available source of light is usually from kerosene oil. Well-made metal lamps only should be used. But a small quantity of oil should be kept in the building, and the supplies should be carefully safeguarded. A metal or metal-lined cabinet is desirable, with a metal receptacle for the oily waste.

There are several types of acetylene installations that are approved by the Underwriters. These provide a very effective lighting system, which requires very little labor and will provide a better light than oil at a cost about equal to gas lighting, where gas is selling for 80 cents per thousand feet. The fixtures for the acetylene installation are similar to a gas installation. There should be sufficient light, and it should be properly distributed so that there will be no dark corners, for where dark corners appear one can always find an insanitary condition existing.

On side platforms and island platforms, where no shelter sheds are provided, lamp posts should be provided about 80 to 100 ft. apart, depending on the kind of illumination used. Where shelter sheds are used, the lights should be placed preferably in the ceiling, one to each panel, or approximately 20-foot centers, using proportionately smaller light units.

SANITARY PROVISIONS FOR MEDIUM-SIZED STATIONS.

There are few items in railway operation more annoying than keeping the small and medium sized station neat and clean. To facilitate sanitary stations, the building should be designed to that end. All different planes should be connected by curves. All beads and angles that may collect dirt and protect disease germs should be avoided. In frame stations the wearing surface of the floor should be composition, laid on top of a single layer of T. & G. flooring. A better wearing surface would be to place a false floor about two inches below the top of the joists, beveling off the joists and laying approximately four inches of cinder concrete, and on this concrete lay vitrified tile. These tiles are made in various colors—the ones mostly recommended are dark red and gray. Where a solid fill can be had, vitrified brick, laid in pattern on (approximately) a 4-in. concrete base, provides a very satisfactory floor.

In frame stations with masonry founoations, the foundation walls may be brought up to the window sill, and when cement floors with hard plaster base and walls are used, the same end is effected at but little extra cost. All woodwork should be closely fitted and plain in detail. For waiting rooms and offices, sufficient ventilation may be had from windows and doors, but it is desirable to hang the window sash with balance weights, and, in many cases, to place transoms over the door. Sunlight is the greatest disinfectant, and the more of it the design of the building admits, the easier it will be to secure sanitary stations.

The designer should keep in mind that when his own work is finished the station agent's begins, and the easier he can make it for the janitor or agent to keep the place clean, the nearer will sanitary stations be approached. Care must be taken in installing water-closets in freezing climates to have all water pipes protected from frost. Means of draining the system are necessary. In general, when the work is installed in accordance with good practice in that particular latitude or locality, trouble from freezing will not be great if reasonable care is taken of the building. Where connection with water under pressure and sewers can be made, water-closets in the stations should be provided. They should be plain, durable and carefully installed by the best practice.

Where water under pressure is available, but connection with a sewer cannot be had, septic tanks may be used, and are recommended in small towns where drainage is practicable and at not too great a distance from the station. The capacity if a septic tank should be more than equal to the daily volume of sewage. The tank preferably should be covered, and in cold climates protected from freezing. The tank should be located where there is no liability of its overflow contaminating wells, springs or other drinking water, for while the overflow is clear and limpid, many deadly germs and bacilli are not eliminated. Septic tanks do not require a great deal of attention. The bacteria in the scum live upon the solids of the sewage, so that a large part of the solids pass off either in gas or in solution in the overflow. No disinfectant should be allowed to enter the sewage that is discharged into a septic tank, for the disinfectant will kill the bacteria that live upon and destroy the organic matter in the tank. The remaining solids must be washed or

flushed out of the tank occasionally. Suitable openings with valves are left in the tank for this purpose. In addition to septic tanks, there are other methods for disposing of toilet waste.

Several methods of chemical treatment of toilet waste are being exploited. One apparatus is of water-closet appearance in outward form, but the fecal matter, instead of going into a sewer, is caught in a tank of from 20 to 100 or so gallons in size. This tank contains, perhaps, 10 per cent of its capacity of water, to which has been added a strong disinfectant or solvent. After the tank has been partly or nearly filled, it is taken out and trucked to a convenient place and the contents emptied or buried. The seats and covers of these closets are made practically air-tight by use of specially made gaskets and a ventpipe leads out from the closet to a chimney or through the roof, so that but little odor escapes into the building.

Closet incinerators are also to be had. They have (the same as the chemical treatment) the advantage of destroying all germs, whether dangerous or not. They are more expensive to install and operate, and require more attention than the chemical closets. There is also some greater fire hazard where installed in the station building, but they have the advantage of totally destroying all refuse placed in them, and there is no objectionable residue left to be carried or carted away.

A last resort is the privy, and as there are perhaps more installations of this type than any other, they should receive attention, and be built to keep flies from making a breeding place out of them. Holes for ventilation should be covered with wire screen, and seats provided with lids. The excreta should be caught in an iron kettle, and this should be dosed with chemicals made for the purpose and then buried. They should be located at least 25 ft. from the station, preferably on the same side of the main track; and at combination stations they should preferably be located at the freight end.

M. A. Long (B. & O.), chairman; G. H. Gilbert (B. & O.), vice-chairman; G. W. Andrews (B. & O.), C. H. Fake (M. P. & B. T.), J. P. Canty (B. & M), E. A. Harrison (A. T. & S. F.), D. R. Collin (N. Y. C.), A. T. Hawk (C. R. I. & P.), W. H. Cookman (P. R. R.), H. A. Lloyd (Erie), C. G. Delo (C. G. W.), P. B. Roberts (G. T.), W. T. Dorrance (E. B. T.), W. S. Thompson (P. R. R.), Committee.

(The recommendations of the committee were approved.)

THE ANCIENT SNIPE AND HIS MODERN SNIPES

"No lik-a to start till seven a clock," said Tony Chirigos.
"Put on the kyar, 'tis half past six," quoth the Irish Section Boss.
"Dis big-a lever car no good," said Tony Chirigos.
"Ye gas-kyar Ginnies make me sick," quoth the Irish Section Boss.
"I'll have yez know, ye shrimps, that whilst yes worruk on Section 'Leven
Yez'll all be on the thrack tampin' ties at sthroke of seven;
Ye air not here for yer health, ye know; I'll see ye airn yer livin'
Whilst yer worrukin fer Mulcahey on the Section."

"Dis-a line-a bar too heavy," cried little black Angelo.
"Let two of yez, thin, pull wan bar," they heard Mulcahey bellow.
"We gotta no tampa bars today," cried little black Angelo.
"Thin bend yer back and use thim picks," came back Mulcahey's bellow.
"Wid the tampin' bars, ye stand and talk; wid the picks, I'll make yez worruk,
Whilst I kape me eagle eye on yez, ye'll have no chanee to shirk.
Any three of ye'll tamp less jints than wan good husky Turk
Who'ud be worrukin fer Mulcahey on the Section."

"How long-a before we stoppa work?" old Dominick then cried.
"We'll put the hand-kyar on at six," the weary King Snipe sighed.
"Too late-a for our macarone," old Dominick then cried.
"Ye haven't done a day's worruk yet," the weary King Snipe sighed.
"A-chassin' ye and drivin' ye all day sure makes me weary,
I'd rather be a-diggin' peat on the bogs in County Kerry;
Sure I wisht I could send over there and just get wan good Jerry
To come worrukin' fer Mulcahey on the Section."

M. E. Carroll.

C. A. STEPHENS PROMOTED

C. A. Stephens, assistant engineer of the Texas City Transportation Company and the Texas City Terminal Company, has been appointed chief engineer, vice T. H. Kilpatrick, resigned.

SOME NEW CONTRACTS

The Flint River Railroad & Navigation Company has let a contract to Ricks & Co., Lilly, Ga., to build its line from Hawkinsville, Ga., to Albany, 80 miles. Ten miles of track has been laid.

The Philadelphia & Reading has let a contract to the Reading Contracting Company, Reading, Pa., for a 90-foot steel bridge north of Wagontown, Pa.

ANTI-PLUVIUS FOR NEW M. I. T. BUILDINGS

The G. Drouve Company of Bridgeport, Conn., has just received the contract for the installation of its Anti-Pluvius skylights and window-operating mechanism in the eleven new buildings for the new location of the Massachusetts Institute of Technology at Cambridge, Mass., for which the Stone & Webster Engineering Corporation has the construction contract. Skylights are generously used over practically all the buildings and in addition to the side lights will be the means of lighting the class and drafting rooms on the upper floors.

PROPOSED NEW PRODUCE TERMINAL FOR CHICAGO

The Atchison, Topeka & Santa Fe will petition the city council of Chicago in the near future for permission to close a few unimportant streets and build a fruit terminal on its property between Eighteenth and Twenty-second streets, Wentworth avenue and the Chicago river. The improvement as planned will include an auction house, a banana house, a cold storage plant and team tracks with a capacity of 1,000 cars per day. Some grading and leveling work will also have to be done and old tracks relocated and new ones laid. If the council passes this ordinance construction work will be begun at once. The estimated value of the land of the proposed site is $3,000,000.

ATTENDANCE AT THE COLISEUM

A large and enthusiastic crowd visited the Coliseum yesterday morning and from the interest shown and the opinions of the majority of the visitors that conditions in the buying field would soon approach a normal basis. One of the features of the convention this year is the improvements in the well-known appliances—the improvements in many instances showing a greater tendency toward simplicity with corresponding reduction in cost of manufacture. Naturally a large proportion of the visitors yesterday were track and signal men, but there were many operating and engineering officers. Many of the latter who are in town were doubtless at the meeting at the Congress Hotel. The exhibits of track tools and materials, and signal appliances, on account of the character of the visitors, were the busiest, and many of the exhibitors reported prospective purchases.

Annual Dinner of the Engineering Association

Abstracts of the Addresses Made at the Sixteenth Annual Banquet Last Night in the Gold Room of the Congress

The sixteenth annual dinner of the American Railway Engineering Association was given in the Gold room of the Congress hotel last night at seven o'clock. The banquet room was filled to capacity with members and guests who were entertained during the dinner by a musical program of orchestral and vocal selections. President W. B. Storey as toastmaster introduced the speakers, who were Chas. S. Gleed, president Missouri & Kansas Telephone Company; Sir George Foster, minister of trade and commerce in the cabinet of the Dominion of Canada; Frank L. Mulholland, President International Association of Rotary Clubs, and Benjamin Baum, chief engineer maintenance of way, Maumee Valley Railroad.

ABOUT THE HUMAN MIND

By CHARLES S GLEED.

It is the habit of your lives to study foundations. In all the countless tasks that you undertake your first thought and your last relates to rocks, clays, soils, quicksands, water at the mercy of those about you acting individually or in masses. It behooves you to know all you can of the weaknesses and treacheries of human nature.

In framing our opinions of the human mind as manifested by individuals or by masses our obligation seems imperative to judge by the standards of the most exalted, the most powerful and most clear-visioned specimens of the race. Christ and Socrates, Paul and Plato, Shakespeare and Lincoln—such are the men by whose teachings we must judge ourselves and our fellows. If this be true, I think we are forced at once to the conclusion that the human mind is almost as far below the standards as it is possible to be and still remain in the class. In short, the human mind, as we have it to deal with practically, is a superlative failure—a failure which would be a joke were it not a tragedy.

As we consider the men with whom we are most familiar, it is at least disheartening to comprehend how soon the best of them arrive at the outer limits of their intelligence. Select the masters about you in all lines of activity and see how little they know of what is knowable. Experiment with the ablest of your acquaintances and see how little dependable for wisdom are the best of them outside the narrow limits of

CHARLES S. GLEED

SIR GEORGE FOSTER

FRANK L. MULHOLLAND

courses, pilings, fillings and footings—to whatsoever gives support to your structure. If you are neglectful of fundamental conditions in any respect it is probably, as with all high-class workers, within the realm of your own personal and professional welfare. That which means most to your personal and professional prosperity probably gets your last and your least attention. I cannot hope to tell you about this anything you do not already know. My only hope is that I may encourage you to give more attention than you hitherto have to a line of thought which I consider of paramount importance.

You have all acquired education from the books and from the teachers. You have all acquired the education which comes from practical undertaking—experience. You have all acquired the education which comes from watching others in their struggle for achievement. Armed with all this education, you naturally feel that you are fortified against the world, the flesh and the devil—that you know the way home. But there is at least one more river to cross. After all is said and done, after all your arduous preparation for usefulness, after you rightfully feel that you are masters of the situation, it still remains true that you are at the mercy of the human mind—the human mind as it actuates individuals and as it actuates masses—mobs, parties, communities, states, nations. The most skillful driver is never free from danger in that other drivers are stupid or careless. After taking every precaution which your own ingenuity can devise you are still their own specialties. The more an individual knows about his own specialty the less he seems to know about the specialties of others—about things in general. The more he knows about some things the less he knows about all other things. This seems an unjust law, but it is the law nevertheless. Time is of the essence of achievement. To fully master one line of knowledge requires more time than any man ever yet had. How, then, can one be expected to know much outside of his own field—his own tiny garden of truth? The man who knows the stars may not know the flowers in his wife's conservatory. The man with the legal decisions at his tongue's end may not know first base from third. The man who knows the pharmacopœia from cover to cover may not know "Louisiana Lou" from "Annie Laurie." The lady who knows Beethoven and Chopin may not know whether Wellington whipped Napoleon or Carranza. I knew a railroad president who solemnly assured me that any lameness could be cured, no matter what might be the cause or condition. I know a United States senator who is certain that he will never grow old, no matter how long he may live. I knew a college president who condemned railroad companies for issuing stocks and bonds because people were tempted to speculate in them. I asked him if he condemned farmers in the same way for raising grain and cotton. He said he had never heard of speculation in grain and cotton. Samuel Johnson's parents took him to the queen to be touched by her for his scrofulous disorder, and Johnson himself was so stupid as to despise the

people of Scotland. I knew a president of the United States who thought all the people could be fooled all the time. The wonderful Wendell Phillips was a fiat money man and our popular secretary of state came within sixteen to one of being another. I think we all agree that Napoleon Bonaparte had superlative strength of mind, and yet, as he built the vast structure of his ambition, he forgot his foundations. His head was as big as his genius, but it got turned as easily as if it had belonged to some silly school girl. Millions of people would have been happier if it had been turned two or three times around on his shoulders at a very early date. President Lincoln's favorite poem has the line, "Why should the spirit of mortal be proud?" There is no telling why, but there is no denying that it is. There is no disease more frequent among men of consequence than the disease known in Latin as caput elephantasis and in Anglo-Saxon as "big head." The big head is an indescribable vanity which prevents its victim from being considerate, sympathetic, amenable, approachable and teachable. It shuts all his doors for the ingress of knowledge and wisdom and for the egress of charity and sympathy. It involves an unreasonable estimate of one's own intelligence and ability and an absurd jealousy of the ability and intelligence of others. The time came when Napoleon could not tolerate information or advice. When his chiefs told him he would lose his army in Russia he plugged their mouths with the swab of his offended vanity. The deadly big-head had him. I knew a railroad official who spoke of his subordinates as being fools or they would not be his subordinates. My thoughts ran along the same line, though his meaning and mine were different. I knew another railroad official who declared his subordinates to be "a bully lot of fellows." The first official had the big-head; the second had the greatest of all power in an official, the power to do justice without malice and without envy. Most of the men with the big-head have more or less real merit on which to predicate their intemperate self-appreciation. How they can have strength of mind to be truly expert in certain directions and still consent to be victims of this peacockitis it is impossible to explain. If there is a man in this room who has not at some time suffered irreparable injury because his superior was really his inferior through the working of this malady then I miss my guess.

There is another mysterious mental disease sometimes called the pig head. It is like the disease which afflicts the balky horse—and his driver. The big head is often cured but the pig head is hopeless. Annihilation or abandonment are the only remedies. The law against murder stops us on one side and fear of cowardice on the other. All we can do in the presence of a real case of pig head is to watch and pray.

But unsatisfacory as the human mind appears in its individual aspects it is infinitely worse in its aggregations, its acts of co-operation.

A mass of human minds in action never comes up to the level of the best in the mass or even to the level of the average. The process of compromising differences seems to result in the best making far more surrender than the worst.

All history is an indictment and a conviction of the human mind in its aggregate acts. Whenever the people or a great body of the people have accomplished some great good it is always a good that should have been accomplished long before and in a better way. No man can credit the people with a single reform without admitting that it was long overdue when it came.

For the thirty or forty centuries of which we have knowledge history is one long, weary procession of horrors—horrors that never could have been but for the low mental condition of the peoples involved. A swift glance at the field in any direction shows this to be true. The persecution of the Christians by the Jews; the persecution of the Jews by everybody; the Goths and Vandals plunging southward like ravening wolves; Roman legions crashing through the jungles of the north with cruel feet and dripping blades; the long, horrid annals of Russian cruelty; the frightful story of the rise and fall of the Spanish Empire; the perpetual dance of death in Africa; the unspeakable degradations of India and China; the hells upon earth in France from Charlemagne to now; the melancholy story of the English-speaking people who have slaughtered and been slaughtered in every nook and corner of earth; worst of all, what is now happening in Europe and Mexico—all these go far to establish the identify of man and beast.

"But," says one, "this is the bad side or a bad side. Look at the work of religion in the world." The religious record of the world is indeed a bit more wholesome than the war record—though both are, much of the time in history, badly confused—but yet the record of formulated religious belief does not much more effectively sustain the claims of mankind to intellectual greatness than the war record.

In theory, at least, religion is not a matter of taste like the preference one may have for fruits and flowers or painting or music. A religious conviction must, nearly always, be right or it is wrong; correct or it is incorrect. If the billions of Buddhists are right the billions of Mohammedans are wrong. If the Jews are right, the Christians are wrong. If the adherents of the church of Rome are right, the Protestants are wrong. If the Calvanists are right, the Universalists are wrong. And so on. Through an endless list of comparisons one great mass is perpetually proving that itself or its antagonist is wrong. All may equally desire to be right, but if one realizes its desire and is right, the other, by the same token, fails of its desire and is wrong. Alas, how often is the latter verdict finally applied to both!

In politics, nearly all phases of politics, the people are almost always wrong. Lincoln is quoted as saying that you can't fool all the people all the time. This hardly seems true. All the people seem to get fooled all the time. Perhaps it is better to say that all the people fool themselves all the time. If this were not so all the conditions would certainly be different from what they now are. Through all history the people have tamely submitted to wrongs or have openly and affirmatively espoused them. In its last analysis African slavery in the United States was the work of the dear common people. The awful method of getting rid of it was the choice of the people. The people preferred the hellish eloquence of men like Toombs and Yancy to the wise counsels of men like Washington, Madison, Randolph, Lincoln, Lee and Stephens. Whenever the people do arrive at a right conclusion and a right determination, they are usually driven there by the hands of an angry God.

Almost every day one may read solemn newspaper demands that no court shall be permitted to declare unconstitutional any act of any state legislature or congress.

With all the million miles of written and spoken language about trusts as the word is used in modern political debate, no statesman and no party has ever yet described a trust any more precisely than scientific men have described the Snark and the Jabberwock.

There has been a copious flow of language and money to accomplish the physical valuation of railroads. Scarcely a man outside the railroad business tries to determine what that is. The physical valuation of a railroad is precisely the physical valuation of a farm. What is that? What would be the physical valuation of this hotel in the desert a hundred miles from any railroad? Masses of people all about us talk a lingo they do not understand and do not try to understand.

Every year the government of the United States spends a billion dollars for work and material which any well regulated railroad would get for half the sum.

Every year our people spend enough time and money on preliminary political processes which might well be dispensed with, to pay for putting their homes, their highways and all their public works in first-class order.

The people select their public servants because of importunity and because of promises impossible of fulfillment rather than because of ability, faithfulness and honesty. The man who begs most cravenly for any political place is the one who gets it. Who can imagine such a thing as the election of a man to office who would not go from door to door, man to man, begging votes? Ability, faithfulness and honesty are not demanded as necessary qualifications, though, thank God, we sometimes get them. No wonder that when a public servant does become fit he is usually kicked out to make room for a charlatan. Those who are able and fit are less likely to be retained than those who are tricksters and pretenders because the latter know how to appeal to the weaknesses of the people and are eager to do so.

I have referred to Lincoln's favorite poem and the line, "Why should the spirit of mortal be proud?" Lincoln knew that if he were as great and as good as his most ardent admirers believed him to be and in spite of all his limitless love for humanity the day would come when his fellow citizens would smite him—and it was so. If Booth and his coconspirators had spared his life no one doubts that in some twist of selfish, stupid passion his fellow citizens would have assaulted him as a blunderer or a villain.

The instinct of the assassin which makes men inclined to shoot every animal and slander every character lead them to use their ballots as they do their guns and their tongues.

If the letter carriers of the country were elected by the people the best men in the service could not long hold their jobs. Someone would lie about them and the people would gladly believe the lies. This popular affection for lies and liars makes it possible for a statistician like Lauck to put over the statement that there are $200,000,000 of water in Santa

Fe stock and that undue returns have been made on the investment in Chicago Great Western. It is the people's love of lies that causes most of the lying.

Any man is foolish to enter the service of the people unless his purpose is to rob the people or unless he goes in like a missionary to the cannibals content to carry on his work if need be inside the cannibals.

So in all other directions the people pursue humbug with flying feet and open arms. Barnum said so. Every other philosopher has said so. If all the members of this association were to be unanimous in advising a certain step in the engineering of the City of Chicago or any other city the advice would probably be overruled by the city government and by the people. On the other hand, the most ingenious member of the association could not construct a political, religious or social system so fantastic, so gross, so monstrous that great numbers of people would not at once become its ardent devotees. There is not an imaginable cult among men so unworthy as to be without its host of disciples.

If I were to select any set of men to be excused from this indictment it would be the members of the engineering profession. They are so in love with accuracy, correctness, fact, as to instinctively require to be "shown." Theologies have come and gone. Medical theories have endured for centuries to be upset in an hour. Legal practices have outlived the lives of nations only to be abandoned in a moment of reform. But the work of engineers, being rooted and grounded in accuracy, has never needed apology. Pyramids and aqueducts have remained and roads have endured. What has engineering not done for this day and generation? It has revolutionized transportation, dotted the land with magnificent bridges, harnessed the most unruly rivers to the uses of agriculture and the industries, tunneled the cities and the mountains, invaded the air, hunted out the lurking places of disease, opened up the mines, cut the great canals uniting lakes and rivers, oceans and oceans, and covered the land with the nerves of civilization so that Theodore Vail at Jekyl Island, President Wilson in Washington, Dr. Bell in New York and Thomas A. Watson in San Francisco could gossip together like so many friends at a single fireside. So, while my logic compels me to leave the engineers under the common charge of mental insufficiency, it is with the largest possible charitable reservation.

This line of thought may seem, at first, pessimistic and ill balanced. On the contrary it is intended to be optimistic and as good natured as a botanical analysis. It is a tearful yet entirely cheerful recognition of certain facts in the science of humanity and the history that man has made. One who says that the rattlesnake is, under certain circumstances, a vicious animal ought not to be called a pessimist. He is merely a reporter in natural history. No man is more unlovely and unloved than one who kicks against the pricks. The constitutional sorehead is disliked above all men. He is not a good sport. He sulks if he does not win. So this argument is intended to help you avoid the fate of the sulker and the sorehead. It is intended to fortify you, to arm you in advance, to give you the poise of the man who knows what to expect. Your own personal and professional prosperity depend on the thoughts and acts of others. They depend on what the people set for their standards generally. They depend on what the people permit to be done by those who directly furnish the money that supports your work. They depend on the individuals who dictate for you the course of events in detail. You are indeed at the mercy of the human mind with all its freezings and thawings, seepages and floods, slides and cleavages, quicksands and earthquakes. You need all the stoicisms of philosophy and all the consolations of religion.

THE MOBILIZATION OF HUMAN ENERGY

By SIR GEORGE FOSTER.

We are living in a day when the community of workers is being constantly and aggressively forwarded. And so we are living in an age of associations and conventions. If there is any one thing, looking at it from this point of view, which strikes one as differentiating this age from the ages long past it is that when we search through history we get very few records of associations and conventions of the workers and thinkers of the world. In this age we meet them every year and we look upon them almost every day.

All this means that we are making collections of knowledge in each one of the guilds and associations of workers and we are making it, not on the isolated plan, but on the plan of a community of interest. You work, each one of you in your own sphere and in your own locality, and then you come from every part of the United States and join in this great gathering every year and that knowledge that each one has gained and that experience which each one has had, and the results that he has worked out, are made common knowledge to you all and to the world as well.

It cannot be said that constructive engineering is the monopoly of any age or of any people. Go back as far as you please in history and there has been constructive work on more or less scientific principles, carried out by the engineer with skill and ability. You have beautiful palaces and temples; you have walled cities; you have works such as were developed in Egypt, the monoliths, the pyramids and the sphinxes; you have the splendid triumphs of Greece and of Rome in stone and marble, and there is hardly a country in the world where you cannot find the remains of great and wonderful engineering construction. There is just one characteristic which distinguishes between the constructive work of those ages and that of to-day, and that is that the work of those ages, it appears to me, had little respect for the utility, benefit and happiness of the masses. Those temples and palaces were built for the gods, for princes and for rulers. They lived in them during their lifetimes and they were buried in them after their deaths, or they were for the purposes of war, or they were for the commemoration of the wonderful things done by certain dynasties or commemoration of some great historical event, wrought out in those symbolical figures and signs that we find still remaining extant, but so far as having a direct tendency and purpose for the development of the world's resources, materially, mentally, intellectually and morally, they seemed to have little purpose.

To-day it is exactly opposite, and there is a very strong, distinctive characteristic between the work of to-day and then. Does not this show that the human mind has made some progress in the two or three thousand years that have intervened between that time and this?

This shows me that although the forces of the universe work slowly, they work surely, and to definite ends, and this community of knowledge, of resources, material, spiritual, mental and moral, this communizing of them, this spreading of them, this easy mobilization of them is what is doing the vast work of the world to-day. Then everything was fixed within narrow orbits. Thought, intellect, moral force, spiritual force, the fruits of nature and the products of industry, were all localized. To-day they are made as wide as the world, and through these benefits of constructive engineering and building skill the man who ten thousand miles away grows the fruits that we eat here in Chicago and in the cities of the West and of Europe, is enabled to transport the results of his labor from the far-distant sources of supply, and is benefited, and he benefits us. The world to-day is all working together. The world six thousand, four thousand, two thousand years ago worked in limited sections and to small purpose, compared with the work of the world to-day. So, this wonderful mobilization of the resources, the products and the forces of the world, taking them all together, is the distinguishing characteristic of to-day.

I take this as my philosopy: I can not well do my work if I simply keep my eyes on my own work and do not correlate it with two different things, correlate my individual work with the aim and purpose of that work, and then correlate my work along a certain line with the aim and purpose and work of workers of every other line. Neither do I think that railroad engineers, making a guild of themselves, bringing from all parts of the world their experiences, their results and their knowledge, and making it common and correlating it with that of all others, should stop there, because the railroad engineers, as a guild, are only a part of the working guilds of the world and other guilds in other lines must be correlated with you and you with them, and you must see with long, steady vision what all these are tending to, the uplift of humanity in the common work of the units and the associations of workers the wide world through.

So, I think the association of workers do their best when they correlate their work with the great purpose of all work. The works of to-day look toward the utility and the happiness and the comfort of the masses of people. Take those great works of irrigation which to-day in India are being carried out by the British government; take the works of irrigation in Egypt which add vast spaces of territory, convert them from the desert to fertility and give opportunity for work to those who work them, and opportunity for supply to those who need the supply. How different are those in their scope and their virtue from those great constructive works of the ancients that have no utility in them and confer no benefit upon the great masses of mankind.

We are more than carpenters and bridge builders; we are more than blacksmiths and machine builders; we are men. We are builders of character, builders of homes, builders of states, builders of nations, builders of empires; and when we rise to that thought and keep it with us, the smaller planes of work are ennobled and our own spirit grows and

our vision is made stronger and better as we show ourselves and feel ourselves niched in with every other man the wide world through, for the betterment of the race and the happiness of mankind.

BE GOOD FOR SOMETHING

By FRANK L. MULHOLLAND.

Do you know that every line of human activity is looking for the fellow who is good for something? In politics, in religion, in society, in business, in commerce; here and there and everywhere the cry goes out for more men who are good for something. Our fellow men do not care very much about what we have. But they are intensely interested in the question of what are we doing with it and how did we get it? Someone has said there is a readaptation of an old phrase, "The survival value"; not the survival value of those things we commonly call property, but the survival value of life, your survival value, my survival value. The worth of the individual today is measured by the question of whether somewhere, somehow, he has fathered some great thought, put into operation some splendid enterprise, stood for something for the common good that lives when he is gone.

I don't think that any man can be good for anything unless he has learned to smile. I have a wholesome respect for the influence of a smile. I used to live in a town in Michigan called Ausable. A fire visited that town a few years ago and burned up everything that could be burned. So we called together a lot of the old crowd, and proceeded to bury the town. About two years after that I thought I would stop off and see the old locality. I found to my surprise a station there, a bus running up town, a hotel, about 150 houses, a bridge across the Ausable river, and a new dock sticking out into Lake Erie. That night I picked up their little paper, and I saw a prominent exhibit of what I thought must have been the slogan that was adopted by the men who rebuilt my old town, and here is what it said: "Smile, you son-of-a-gun, smile!"

Now, the man who wants to be good for something and develop a survival value must, in my opinion, be optimistic. A friend of mine said that the real pessimist was the fellow, who, offered a choice of two evils, would grab them both.

I don't think a man can be good for anything or develop a survival value unless he is a booster. Somehow I don't believe that a man can be good for anything who is a knocker. I distinguish between a knocker and a kicker. It may be necessary to kick, but a knocker is a fellow who is born that way and who can't help it, and the only thing that you can do with that kind of an individual is to give him a hammer, turn him into a blacksmith's shop and let him work at his natural calling.

The place to develop a survival value is where you are, and in fact, the place to begin to clean up a community is in your own backyard. If you and I, and each of us, would just lay hold of a little sunshine, just get a good grip on optimism, see that our fellow men are worth while, this old world is a good place in which to dwell, we would make our respective communities a good place in which to live. I do want to challenge your attention, as I challenge my own, to the responsibilities that you and I owe to the community's interest. It is an old doctrine. It is a doctrine that as we give of ourselves we shall profit. The doctrine that the badge of service becomes the diadem of sovereignty, is the truest gospel that can be preached in my sermon, and it is a wonderful little doctrine. Here is the thought that I will close with: With optimism in our hearts, with the desire day after day to do something for the other fellow, we cast our bread upon the water and it will come to us another day.

RESULTS OF THE NICK-AND-BREAK TEST

Apropos of the nick-and-break tests on every ingot for open hearth steel rails about which much has been written in the last few years, it is interesting to cite some of the results obtained recently in testing according to the first specifications of this nature that have ever contained this requirement. It should be remembered that the fundamental feature of this specification is that if the regular drop tests as heretofore made on open hearth rail steel heats are successful a piece from the top end of each "A" rail from the heat shall be nicked and broken and, depending upon whether the fracture is free from interior defects, the remaining "A" rails of the ingot represented should be accepted or rejected. That is, if the fracture of the test piece is free from such defects or piping or evidence of segregation the "A" and remaining rails of the ingot are accepted. If the fracture shows an interior defect the "A" rail of that particular ingot is rejected and another test made on its bottom end to represent the "B" rail, etc. Thus the testing by nicking and breaking and close scrutiny of the fractures proceeds.

The difference between this specification and the A. R. E. A. specification is easily seen, for with the latter if any of the test pieces representing any heat show interior defects all the top or "A" rails of that heat are rejected and retests made on the "B" rails, etc.

Under the current Canadian Pacific specifications applied to rails now being rolled by the Algoma Steel Corporation the following chemical composition is specified:

Carbon—0.58 to 0.72 and a majority of the heats cast each day must have a carbon content of 0.63 or over.
Phosphorus—Not over 0.03.
Manganese—0.65 to 0.90.
Silicon—0.075 to 0.10.
Sulphur—Not over 0.055.

This in itself will be seen to possess difficult features, and further the drop test specifies that two pieces of three selected from the top ends of "A" rails of the first, middle and last full ingots shall stand a fall of a weight of 2,000 lbs. from a distance of 20 feet under the usual conditions for an 85-lb. rail section.

The first 161 heats cast and rolled gave two rejections under the drop test. On these there were 2,193 ingots cast, from which 154 "A" and "B" rails were rejected because of containing interior defects. Under a strict interpretation of the A. R. E. A. specifications 263 rails would have been rejected. There was, therefore, a saving to the mill of nearly 45 tons of rails, while the railroad obtained the benefit of having each ingot tested as a unit.

ATTENDANCE AT THE R. S. A. CONVENTION

In the issue of the Daily Railway Age Gazette of March 16, the registration of members of the Railway Signal Association was incorrectly stated as 163. The actual registration was 220 active, junior and associate members. At one of the sessions 260 attendants were counted so that it is certain that the actual attendance was considerably in excess of the registration.

OTHER MAINTENANCE OF WAY ASSOCIATIONS REPRESENTED AT THE CONVENTION

The presidents and secretaries of three of the other important maintenance of way associations have been in attendance at the convention the last two days: T. S. Stevens, president, and C. C. Rosenberg, secretary, of the Railway Signal Association; L. D. Hadwen, president, and C. A. Lichty, secretary, of the American Railway Bridge & Building Association, and J. H. Waterman, president, and F. J. Angier, secretary of the American Wood Preservers' Association. In addition, the Roadmasters' Association has a booth at the Coliseum and is holding forth there.

ATTENDANCE AT THE CONVENTION

Each year a good many members and guests at the A. R. E. A. convention are sufficiently impressed by the number of men in the Florentine room during the meetings or in the lobbies surrounding the meeting hall before or after a session, to express a belief that all previous records for attendance are being broken. As a matter of fact, the records show that up to the end of the second day of the convention two years ago 407 members had registered, that the corresponding figure last year was 475 and this year is 457. The attendance in the meetings and the interest taken, however, have been fully up to the standard of past years.

REGISTRATION—AMERICAN RAILWAY ENGINEERING ASSOCIATION

ACTIVE MEMBERS

Abbott, R. B., Div. Eng., P. & R. Ry., Harrisburg, Pa.
Andrews, Geo. W., Insp. of Maint., B. & O. R. R., Baltimore, Md.
Andrews, J. T., Eng. Dept., B. & O. R. R., Baltimore, Md.
Atwood, J. A., Chief Eng., P. & L. E. R. R., Pittsburgh, Pa.
Austill, H., Jr., Bridge Eng., M. & O. R. R., Mobile, Ala.
Bachelder, F. J., Consulting Eng., Madison, Wis.
Baldwin, Hadley, Asst. Ch. Eng., C. C. C. & St. L. Ry., Cincinnati, O.
Barrett, W. C., Division Engineer, Lehigh Valley R. R., Sayre, Pa.
Barry, H. B., Dist. Eng., St. L. & S. F. R. R., Chaffee, Mo.
Bates, Onward, Con. Eng., Chicago.
Beahan, Willard, First Assistant Engineer, L. S. & M. S. Ry., Cleveland, Ohio.
Bergen, W. J., Asst. to C. E., N. Y. C. & St. L. Ry., Cleveland, Ohio.
Billman, H. E., Gen. Roadmaster, Mo. Pac. Ry., St. Louis, Mo.
Blanchard, M. C., Office Eng., A. T. & S. F. Ry., Topeka, Kan.
Bond, W. McC., Asst. Eng., B. & O. R. R., Akron, Ohio.
Bouton, W. S., Eng. B. and B., B. & O. R. R., Baltimore, Md.
Brooke, G. D., Supt., B. & O. S. W. R. R., Chillicothe, Ohio
Brown, E. C., Chief C. E., Carnegie Steel Co., Pittsburgh, Pa.
Brown, H. C., Jr., Asst. Eng., I. C. R. R., Chicago, Ill.
Browne, H. L., Masonry Inspector, Rock Island Lines, Des Moines, Iowa.
Burke, James, Supt. Chicago Ter. Div., Erie R. R., Chicago, Ill.
Clift, A. E., Gen. Supt., I. C. R. R., Chicago, Ill.
Cochran, C. W., Eng. M. W., Big Four, Mt. Carmel, Ill.
Cook, C. C., Div. Eng., B. & O. R. R., Pittsburgh, Pa.
Coon, C. J., Eng., Grand Cent. Ter., N. Y. C. & H. R. R., New York, N. Y.
Corell, E. J., Div. Eng., B. & O. S. W. R. R., Chillicothe, Ohio.
Cunningham, A. O., Chief Engineer, Wabash R. R., St. Louis, Mo.
Didier, Paul, Prin. Asst. Eng., B. & O. R. R., Pittsburgh, Pa.
Dunham, Chas. A., Signal Eng., G. N. Ry., St. Paul, Minn.
Emerson, Raffe, Con. Eng., New York, N. Y.
Ferriday, Robert, E. M. W., Big Four Ry., Indianapolis, Ind.
Fitzpatrick, P. D., Div. Eng., S. N. E. Ry., Providence, R. I.
Flora, G., Insp. Track Val., Grand Trunk Ry., Durand, Mich.
Frame, J. T., St. Paul, Minn.
Forrester, Charles, Supt., G. T. Ry., Stratford, Ont., Can.
Gersbach, Otto, E. M. W., Ind. Harbor Belt R. R., Gibson, Ind.
Gilcreast, F. W., Eng. Maint. L. & N. E. R. R., So. Bethlehem, Pa.
Gordon, H. L., Div. Eng., B. & O. R. R., New Castle, Pa.
Grandy, A. L., Chief Eng., Pere Marquette R. R., Marquette, Mich.
Haggander, G. A., Asst. Bridge Eng., C. B. & Q. Ry., Chicago, Ill.
Hamilton, Paul, Eng. Tr. & Roadway, Big Four, Cincinnati, Ohio.
Hanna, John V., Ch. Eng., K. C. Ter. Ry., Kansas City, Mo.
Hoskins, P. L., Asst. Eng., W. & L. E. R. R., Brewster, Ohio.
Hotchkiss, L. J., Chicago, Ill.
Hoyt, C. B., Supt. Tr., N. Y. C. & St. L. R. R., Bellevue, Ohio.
Hughes, Wm. M., Consulting Bridge Engineer, Chicago, Ill.
Humphrey, Richard L., Consulting Engineer and Chemist, Philadelphia, Pa.
Hynes, M. V., Supt., C. H. & D. Ry., Dayton, Ohio.
Irving, T. T., Div. Eng., G. T. Ry., Chicago, Ill.
Johnson, J. E., Div. Eng., P. M. R. R., Saginaw, Mich.
Johnson, J. M., Con. Eng., Ill. Cent. R. R., Louisville, Ky.
Johnson, Noah, Asst. Eng., Wabash R. R., St. Louis, Mo.
Jonah, F. G., Ch. Eng., St. L. & S. F. R. R., St. Louis, Mo.
Kegler, W. C., Eng. M. W., C. C. C. & St. L. Ry., Mattoon, Ill.
Kellett, W. P., Gen. Man. and Chief Eng., L. E. & N. Ry., Brantford, Ont.
Kenly, R. G., Ch. Eng. M. & St. L., Minneapolis, Minn.
Khuen, Richard, Resident Engineer, Am. Bridge Co., Pittsburgh, Pa.
Kinsman, A. M., Eng. Con., B. & O. R. R., Cincinnati, Ohio.
LaFountain, N. H., Asst. Supt., B. and B., C., M. & St. P. Ry., Chicago, Ill.
Larsen, C. M., Ch. Eng., R. R. Com. of Wis., Madison, Wis.
Layfield, E. N., Chicago, Ill.
Loweth, C. F., Ch. Eng., C. M. & St. P. Ry., Chicago, Ill.
McCalman, D. S., Div. Eng., K. C. T. Ry., Kansas City, Mo.
McComb, R. J., Eng. M. W., W. & L. E. R. R., Canton, Ohio.
Maney, Thomas, Gen. Roadmaster, L. & N. R. R., Louisville, Ky.
Markley, A. S., Master Carpenter, C. & E. I. R. R., Danville, Ill.
Meade, J. M., Engineer E. L., Santa Fe Ry., Topeka, Kan.
Milburn, J. H., Chief Draftsman, B. & O. R. R., Baltimore, Md.
Miller, Crosby, Bridge Eng., C. & O. Ry., Richmond, Va.
Miller, C. H., Prest., Miller Eng. Co., Little Rock, Ark.
Minor, C. E., Asst. Eng., C. & W. I. R. R., Chicago, Ill.
Mordecai, Augustus, Consulting Engineer, Cleveland, Ohio.
Morgan, O. K., Office Eng., C. C. & O. Ry., Johnson City, Tenn.
Myers, J. B., Dist. Eng., B. & O. R. R., Baltimore, Md.
Owen, Alfred W., Asst. Eng., Q. & C. Route, Cincinnati, Ohio.
Pearce, R. M., Res. Eng., P. & L. E. R. R., Pittsburgh, Pa.
Petri, Philip, Div. Eng., B. & O. R. R., Cumberland, Md.
Pfleging, F. W., Sig. Eng., U. P. R. R., Omaha, Neb.
Porter, H. T., Chf. Eng., B. & L. E. R. R., Greenville, Pa.
Raymer, A. R., Asst. Ch. Eng., P. & L. E. R. R., Pittsburgh, Pa.
Rex, George E., Manager Treating Plants, Santa Fe System, Topeka, Kan.
Roof, W. R., Asst. Eng. Bridges, C. G. W. R. R., Chicago, Ill.
Selby, O. E., Bridge Eng., C. C. C. & St. L. Ry., Cincinnati, O.
Senter, S. S., Supt. B. & B., W. & L. E. R. R., Brewster, Ohio.
Sheldon, Chas. S., Eng. Br. & Str., P. M. R. R., Detroit, Mich.
Shipley, G. B., Con. Eng., Pittsburgh, Pa.
Sills, J. M., Dist. Eng., St. L. & S. F. R. R., Springfield, Mo.
Slifer, H. J., Con. Engineer, Chicago, Ill.
Smith, E. V., Div. Eng., B. & O. R. R., Newark, Ohio.
Spielmann, J. A., Dist. Eng., B. & O. R. R., Pittsburgh, Pa.
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Thrower, D. W., Dist. Eng., I. C. R. R., Memphis, Tenn.
Trabue, H. H., Asst. Ch. Eng., N. C. & St. L. Ry., Nashville, Tenn.
Trimble, A. F., Division Engineer, Erie R. R., Dunmore, Pa.
Van Houten, R. A., Chicago, Ill.
Wasson, J. H., Interstate Commerce Commission, Chicago, Ill.
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White, R. C., Eng. M. W., Mo. Pac. Ry., Little Rock, Ark.
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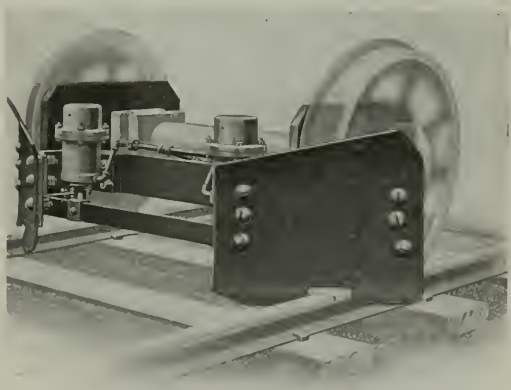
SCIENTIFIC RESEARCH IN THE UTILIZATION OF WOOD

The old method of judging lumber from personal experience has in a large measure given way to a selection on the basis of proven performance and adaptability. In order to help supply the scientific data necessary for engineers, contractors and architects to make such a selection the Southern Pine Association, formed in New Orleans last January, has made one of its primary purposes the carrying on of scientific research work. This association is composed of the manufacturers of yellow pine lumber in the southern states, its membership representing an annual production of approximately 5,000,000,000 ft. This research work will be under the supervisory charge of Dr. Hermann Von Schrenk of Von Schrenk & Kammerer, consulting timber engineers, St. Louis, Mo., and much of the work will be carried on in co-operation with the important national engineering and technical societies, including the American Railway Engineering Association, the American Wood Preservers' Association, the Master Car Builders' Association, the American Society for Testing Materials and the Western Society of Engineers.

The research work of this association will cover a wide field, taking up such scientific subjects as "Study of Fungi Attacking Yellow Pine Lumber," "Investigation of Failures of Yellow Pine Timber," "Investigation of Wood Fire Proofing Preparations," "Proper and Improper Uses for Yellow Pine," engineering subjects, such as "Plan for Various Types of Yellow Pine Construction," "Manual for Architects and Contractors," "Plans and Specifications for Ordinary Structures," chemical subjects, such as "Study of Utilization of Wood Waste," and various investigations of wood paving. The association invites engineers, contractors and others interested in yellow pine construction to consult it freely upon questions that may develop in connection with the utilization of this material.

THE RAY SELF-CONTAINED SNOW FLANGER

An important change has been made in the design of the lifting mechanism of the Ray snow flanger to make it automatic in action. In the former design the flanging blades were raised by the application of air to the operating cylinders and held in the raised position either by the continued



The Improved Ray Snow Flanger Applied to a Pony Truck.

air pressure or by holding rods. The flangers were lowered by releasing the air pressure, allowing them to drop under their own weight to a level ¾ in. to 1 in. above the top of the rail. In the improved design the flanger is forced to the lowered position by air pressure and is raised automatically by auxiliary springs within the operating cylinders as soon as the air pressure is released.

With the old equipment a break in the air line made it impossible to raise the flanger if it were lowered and allowed it to drop if it were in the raised position. Further, if the men in charge failed to hook up the flanger when not in use, it would drop to the lower position as the air pressure gradually decreased and, unknown to the operators, would remain in

that position until the engine struck a frog or crossing, damaging the blades and necessitating their removal for repairs. With the new type of cylinder the flanger is automatically raised if an air connection is broken, or if it is already in the raised position it becomes impossible for the engineer to lower the flanger for service until the break is repaired.

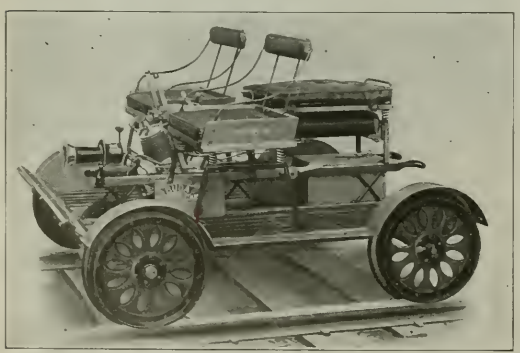
The complete weight of the moving parts of the improved flanger is about 500 lb. Each spring is designed to hold the flanger in the raised position without vibration and in addition to the spring a holding rod is furnished which can relieve the springs if desired. A forked piston rod in each cylinder straddles the cross-tie brace connecting the equalizers at the bottom, which in turn prevents the cross bar from dropping onto the rails when the flanger is lowered. The auxiliary springs are made from high grade spring steel, which is tested before assembling; the pistons are provided with a cast iron spring ring in addition to the cup leather packing and are designed to operate at 90 lb. air pressure.

The new type of lifting cylinder is interchangeable with the old and by furnishing a cross tie brace to join the two equalizers, the Priest snow flanger can also be transformed into the Ray improved type. This change eliminates all of the overhead lifting mechanism, such as the cylinder reach rod, axles, bearings, brackets, lifting rods. etc., and makes the flanger self-contained on the truck. The accompanying illustration shows the flanger applied to a standard pony truck. The assembled cross bar carrying the blade is of standard construction and can readily be changed from one engine to another, but it is generally necessary to make up new equalizer guide plates to suit the truck to which the flanger is to be attached. The lifting cylinders are arranged to exert the pressure directly over the center of gravity, thus reducing the wear on the equalizer guide slots to a minimum and causing the flanger to raise in a vertical line. These flangers have been successfully applied to all types of trucks on engine tenders, cabooses and freight cars.

This improved flanger was developed by the Railway Appliances Company and has recently been taken over by the Q. & C. Company, New York.

A THREE-PASSENGER INSPECTION CAR

In order to provide a more comfortable motor car for inspection purposes than those of the velocipede type and also to make it light enough to be operated without a train order the Buda Company, Chicago, has developed a new car



New Light Inspection Car for Three Passengers.

known as the No. 15-A. The frame is built up of square tubular steel with two seats facing forward and one lengthwise in the rear, all of these being mounted on coil springs and fitted with cushions. The engine is located between the two front seats bearing equally on the two sides of the car.

The engine is of the two-cylinder, four-cycle, air-cooled "V" type, developing seven horsepower. It is free running and is equipped with a muffler. The drive is of the multiple disc type, delivering power to the front axle through a roller chain and sprockets. A high tension Bosch magneto is provided, eliminating batteries. The engine is splash lubricated, the oil level being maintained by an automatic feed from the supply tank in the tool box. The timer, throttle, clutch, brake and muffler control levers are mounted over the engine in a position to allow them to be operated from any seat on the car. The car is braked by an external contracting band on the front axle.

The axles are 1½-in. in diameter, the wheels 17 in., with either a wood or a pressed steel center. The axle boxes are equipped with Hyatt roller bearings. The car weighs 530 lbs., so that it can be handled by one man if necessary. It has a rated speed of 5 to 35 miles per hour.

HYDRATED LIME FOR CONCRETE

Portland cement is dense and heavy, and when mixed with water and sand there is a tendency to segregate. This is especially true where unusually wet mixtures are used to facilitate placing the concrete.

As the durability of concrete depends upon the uniform distribution of cement, it follows that the separation of cement from the coarse aggregate would allow stone pockets and soft spots to form. It is at this point that hydrated lime exerts its physical influence and gives to the mass plasticity and uniformity, thus preventing the formation of such defects. It makes a fat, viscous mortar, which reduces to a minimum the possibility of segregation. This mortar adheres to each piece of the coarser aggregate and insures a uniform mixture of the aggregate.

In many large concrete operations it is customary to mix the concrete at a central point and elevate it, allowing it to run to place in the forms through chutes. To prevent sticking and clogging in the chutes it is quite usual to add more water to the mixture than usual to make it flow easily. This has the direct effect of causing segregation. The use of hydrated lime gives the mass sufficient plasticity to form a smooth-flowing, continuous stream, and the concrete falls into place, eliminating a large portion of the tamping and spading.

When moisture is allowed to penetrate concrete, it attacks the cement and causes this material to expand, and as the moisture dries out the cement naturally contracts. In order to prevent cracking from this cause the concrete should be a dense, impermeable mass. Hydrated lime increases the density of the concrete, as it has about 2½ times the volume of an equal weight of cement in its dry state. Being light and bulky, the lime fills up and closes all the minute voids in the concrete. This makes the mass so dense that it is rendered more nearly impermeable.

The consulting engineer on a large concrete dam in the West describes the use of hydrated lime as follows: "Fine and coarse crushed rock was stored in bins just above the mixing plant, from which 80 per cent of the concrete was poured down a spout or chute 400 ft. long to the dam site below. From numerous test results it was decided to use 10 per cent of hydrated lime, the mixture being 1:3:6. The concrete mixture without lime would not flow down the steel-lined chutes without mechanical aid, but by the addition of 10 per cent of hydrated lime, or approximately 40 lb. per yd., we literally transformed the physical appearance of the concrete. The concrete would leave the mixers, pass into the chutes and then onward without the slightest separation of the aggregate, and would arrive at the dam in a perfectly homogeneous mass, where it would flatten out to a level with but little shoveling and spading in the form. Without the use of hydrated lime in this work it was

actually demonstrated that it would have been impossible to secure satisfactory results without discarding the conveying of concrete in chutes and instituting a far more expensive method of handling the concrete."

COALING STATION WITH THREE STORAGE BINS

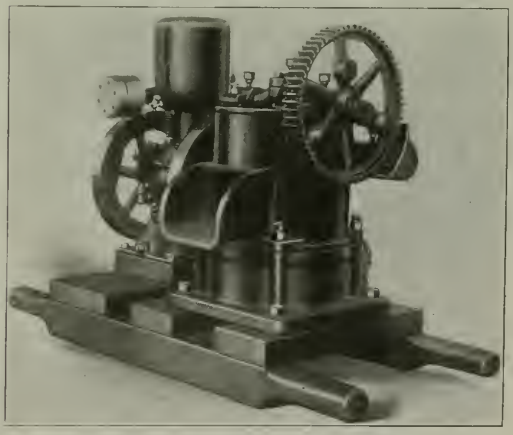
The Nashville, Chattanooga & St. Louis has recently completed a new locomotive coaling station at Hollow Rock Junction, Tenn., which is designed to handle separately three grades of coal coming from different mines and used

The N. C. & St. L. Coaling Station of Special Design at Hollow Rock Junction, Tenn.

by different classes of engines. The plant is of steel frame construction with steel storage tanks and an automatic balanced bucket elevating equipment. Two separate steel tanks are provided, one on either side of the elevating tower with capacities of 200 tons and 150 tons, respectively. The 150-ton tank is divided by a partition at right angles to the coaling tracks, separating it into bins of 75 tons capacity each. The coal which is dumped at the top of the elevating tower can be deflected to either of the storage tanks by a pivoted gate and if it goes to the divided tank it may be deflected to either side of the partition by another gate, both of which are controlled by a cable from the ground. The plant is arranged to deliver coal on two tracks, the 200-ton bin and one of the 75-ton bins serving one track and the other 75-ton bin the other track. Crossovers are conveniently located for placing locomotives on either side of the plant as desired. The entire plant was built on piling driven about 22 ft. to solid rock. The reinforced concrete hopper under the receiving track which is located between the coaling tracks was carried to solid rock. The steel frame structure is supported on concrete pedestals resting on piles. The elevating outfit has a capacity of 50 tons per hour, and is operated by a 16-hp. gasoline engine. As there was some question in the minds of the engineers as to whether Hollow Rock Junction would continue to be the best location for this plant, the design was worked out with great care in order to make as much of the equipment as possible available for use in single tank stations, if it should become advisable to change the method of operation or to move the plant to another location. The steel details are arranged to allow either tank to be used with the elevating tower if such a change is made so that by providing another tower and supporting frame, two separate plants could be built.

NEW POWER DIAPHRAGM PUMP FOR GAS ENGINE DRIVE

A convenient portable power pumping outfit has been placed on the market recently by the Goulds Manufacturing Company, Seneca Falls, N. Y., consisting of a diaphragm pump similar in design to those previously manufactured by this company, which is arranged for direct connection to any engine either by gearing or by belting. The old pump could not be driven by a gasoline engine except by the use of a pump jack made especially for that purpose. The new outfit



An Easily Portable Diaphragm Pump Direct Connected to Gasoline Engine.

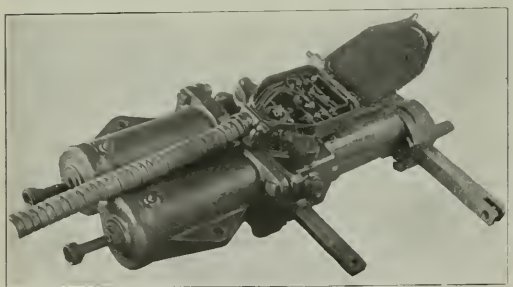
is carefully designed to make it as compact as possible so that it is easily portable.

The pump itself consists of two valves and a strong rubber diaphragm which creates suction by an up and down motion. It is fitted for side suction and has a rubber suction valve resting on an inclined seat, thus offering slight resistance to the passage of a liquid. The metal discharge valve seats on the diaphragm and is easily removable. The waterways are large and are designed to handle a large amount of liquid easily. A 1-h. p. engine is sufficient to drive this pump. The stroke is 2¼ in., a 3-in. suction pipe is used, and the displacement per revolution is 0.8 gal. It is recommended that the pumps be run at 35 to 50 revolutions per minute. The weight of the outfit exclusive of pulley or auxiliary gear-

ing is 210 lbs. The new pump is geared 5 to 1 and when furnished to belt drive is fitted with a single tight pulley 12 in. in diameter with a 3-in. face. When furnished for direct connection to the engine a second gear reduction is furnished. Any one of the eight sets of gears can be furnished to secure an over-all gear ratio varying between 6.1 to 1, and 16.6 to 1, so that the pump can be direct connected to practically any engine. The base of the pump is square and is provided with extra large holes for bolting it securely to the mounting.

RACK AND PINION ELECTRO-PNEUMATIC SWITCH AND LOCK MOVEMENT

The rack and pinion electro-pneumatic switch and lock movement is a new design developed by the Union Switch & Signal Company, Swissvale, Pa., employing two single-acting cylinders instead of one double-acting cylinder. Connected to the pistons are parallel racks which engage a pinion located between them. The shaft of the pinion terminates in a crank which is connected to the switch. The crank moves through an angle of about 220 deg., traveling 20 deg. past dead center at each end of the throw. This arrangement accomplishes a locking of the switch points in their final positions in addition to the locking of the lock rod by the ends of the racks, one of which bolt locks the adjustable lock rod in the normal, and one in the reverse positions of the switch. The switch movement has the advantage of a greater efficiency than the former type and will operate on much lower air pressure. There is also the advantage that it occupies but two ties and requires no removable covers. The circuit controller used with this switch movement is designed



"Twin-Cylinder" Switch and Lock Movement.

to give either direct battery or polarized indication. The model 13 switch valve is used which, in actual practice, is set upon a separate foundation and connected to the switch movement by armored hose.

AN IMPROVED BONDING DRILL

The "Chicago" bonding drill, embodying several improved features, has recently been placed on the market. This machine is held rigidly to the rail by means of an eccentric cam, which also serves to withdraw the bit from the rail without reversing the movement of the handle or changing into another gear. By pulling up the lever directly over the rail the bit is automatically withdrawn, and the drill can then be tilted backward on the hinged foot plate. This plate is easily removable, allowing a man to carry the drill without the foot plate striking his leg.

This drill is chain-driven and has a two-speed uniform feed and reverse, both speeds being controlled by a small lever under the operator's foot. The thrust bearing is an extra large ball bearing, all others being steel in bronze. The driving gears are enclosed in a housing, allowing them to be run in oil.

The drill can be furnished with one of three feed speeds: slow, for very hard rails; medium, for standard work, and fast, for drilling relatively soft steel. It is also furnished with three styles of chucks, one with a set screw to hold 9-32-in. standard track drills; another, an adjustable chuck

The "Chicago" Bonding Drill.

to take round shank or slabbed drills up to 3.8 in. in diameter, and a third, a special chuck to hold flat shank drills.

The machine is 26 in. high, which increases the convenience of operation, and weighs 30 lb. It is manufactured by the Chicago Railway Signal & Supply Company, Chicago.

FOUNDATION LOADING FOR A 150-TON TRACK SCALE

Many installations of track scales have failed to give satisfaction because the requirements in the design of the foundations were not thoroughly analyzed. A properly designed foundation will absorb all vibration of the scale mechanism and keep it in alinement, while a lighter foundation soon begins to settle in varying amounts, thereby giving incorrect weights before the losses are discovered. A distorted foundation may be temporarily leveled up, but the original error cannot be entirely overcome. In a paper read before the recent meeting of the National Association of Scale Experts in Chicago, Eugene Motchman, chief engineer of the Standard Scale & Supply Company, Pittsburgh, Pa., discussed the distribution of loads on a 150-ton, 50-ft., 4-section scale and emphasized the points to be considered in designing the foundation as shown in the following abstract.

Four cases of loading were considered: (1) a 50-ton gondola car on the center of the scale, 2) the same car with one truck over the second support, (3) two such cars coupled in train order with their coupling over the second support, and (4) a 2-8-0 locomotive weighing 195 tons, with the drivers centered over the second support. The assumed wheel loads were 20,000 lb. for the gondola cars and 27,500 lb. on each engine driver. The resulting reactions in the four main levers on each half of the scale for each of the four loadings are as follows: (One) 1, 15,241 lb.; 2, 24,759 lb.; 3, 24,

759 lb.; 4, 15,241 lb. (Two) 1, 3,224 lb.; 2, 33,541 lb.; 3, 12,754 lb.; 4, 30,481 lb. (Three) 1, 13,482 lb.; 2, 52,989 lb.; 3, 14,772 lb.; 18,757 lb. (Four) 1, 28,610 lb.; 2, 79,489 lb.; 3, 55,194 lb.; 4, 31,957 lb.

As shown in Fig. 1, these reactions are carried from the track rails through the I-beam supports to the main levers "M" at the points "b." These main levers transmit the load at their ends "c" to the upper system of levers "O" and "I." The main levers are supported at the points "a" on the piers "K," the length "a-c" being four times "a-b." On account of

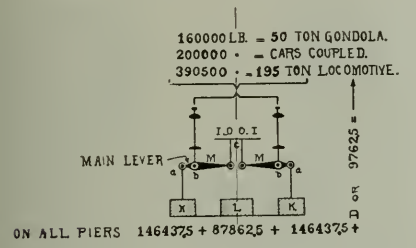


Fig. 1.

this multiplication in these levers, three-fourths of this load is carried by the piers "K" and one-fourth transmitted to the upper system of levers. The piers therefore must be designed for three-fourths of the maximum reaction in any main lever shown by the assumed loading. This maximum reaction occurs on the second support under the locomotive loading, amounting to 79,489 lb. The pier therefore carries 59,616 lb. This maximum loading could never be realized on the end piers, but by making them all uniform a desirable allowance for impact at the ends is provided.

The determination of the reaction on the center piers "L" is somewhat more complex. The load received by the longitudinal levers in the upper system is transmitted as shown in Fig. 2. The loads are applied at the points "b," the levers

15,241 lb. on the first support under the first loading when applied to the main lever causes a downward pull at "c" of one-fourth this amount or 3,810 lb. As the main levers from opposite sides act together on the upper levers, the pull at "b" of the outer lever "O" in Fig. 2, under the first loading, is 7,620.5 lb. as shown. These levers have a multiplication

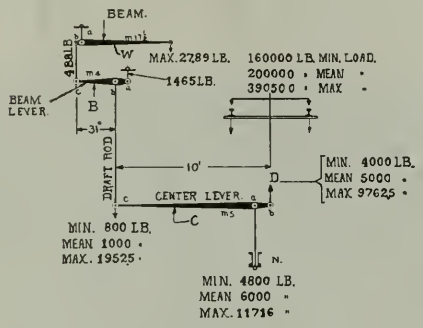


Fig. 3.

of 10, so that the end piers receive a maximum load equal to nine-tenths of the maximum pull at "b." The maximum loading, which occurs when the locomotive is on the scale, is 14,305 lb. for one end and 15,978 lb. for the other, resulting in pier reactions of 12,874.5 lb. and 14,380.7 lb., respectively. These are not the maximum loads to which these piers may be subjected, however, as the reaction would increase as the drivers approach the end of the scale. For simplicity and safety these end piers should be designed with the same section as the center piers on which the load is increased by the accumulation of the loads on the outer and inner levers being transferred to the center lever at "D." The maximum reactions on these center piers "L" as shown in Fig. 2 are 46,579.9 lb. and 33,552.4 lb. In cases where the span is more

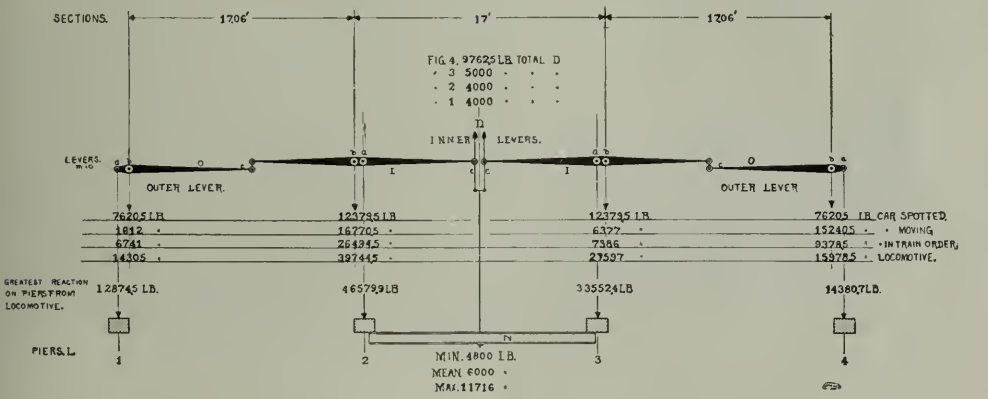
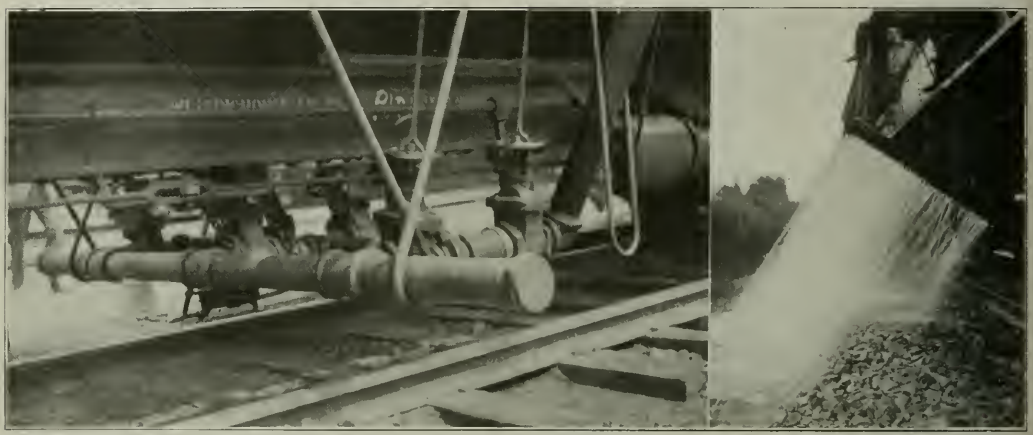


Fig. 2.

are supported on the piers "L" at the points "a" and the loads are transmitted at the points "c." The accumulation of the loads on the inner levers "I" is transmitted to the center lever "C" at the point "D." As shown in Fig. 3, this load "D" is transmitted to the draft rod, resulting in an upward pull on the channels "N" under the second and third piers equal to six-fifths of the load. Fig. 2 shows the load transmitted by the main levers to the upper levers for each of the four assumed cases of loading. For instance, the reaction of

than 17 ft., it may be more economical to set the channels "N" parallel to the center lever and imbed their ends under the surrounding wall and floor of the pit. In this case the total weight of the channels, floor and vertical walls should exceed the maximum upward pull. The surrounding wall carries the rigid deck upon which the dead rails are placed and should be designed to carry the maximum load to be placed on this deck and also to resist the action of frost and side pressure from adjacent tracks. A minimum wall thickness of

30 in. is recommended. The same thickness should be used for the end walls on account of the necessity for taking care of the impact. The use of 18-in. walls is considered good practice under the weigh house. The design of the floor of the foundation depends largely on the character of the soil. If solid rock is near the surface the piers may be built directly on it. In all other cases the bearing pressure of the soil must be determined and the piers dimensioned accordingly. The common practice at present in designing pits for heavy track scales is to design the floor as a concrete mat supporting the piers raised slightly above the level of the floor. In climates such as those in the United States south of Chicago and north of Oklahoma, the depth of foundations from base of rail to bottom of mat should never be less than 8 ft. and this dimension should be increased in northern climates and reduced in tropical countries if the scale mechanism does not require this depth.



Details of Latest Sprinkling Equipment, Showing Five Valves for Controlling Chemical and Adjustable Extension Arm for Spraying Ballast Shoulder.

IMPROVEMENTS IN ATLAS WEED-KILLING METHOD

Two important improvements have been made by the Atlas Preservative Company, New York City, in its method of applying the Atlas "A" chemical compound for killing track vegetation. The first of these is in the design of a sprinkling equipment to apply the compound in varying quantities across the track as it is needed. In many cases the center of the track is sterile or nearly so, while at the tie ends or on the ballast shoulders a considerable quantity of vegetation may exist. For the most economical treatment it is necessary, therefore, to use varying quantities both along and across the track. The sprinkling arms designed to accomplish this purpose can be made in any length and are divided into five sections, each controlled by an independent valve. These valves are operated from the running board by means of valve stems. The extension arm which sprays the portion outside of the rail is supported in the lowered position by a U-brace, and as it works on a loose thread it may be raised and lowered by a chain attached to its outer end. This is convenient in passing obstructions or in elevating the arms to force the mixture out over the ballast shoulder. The sprinkling equipment consists of one or more tank cars fitted with spraying apparatus and all necessary accessories for handling the chemical, the operation of the train being superintended by an employe of the Atlas Company. The size of the equipment is designed to spray from 8 to 20 miles, so that water for dilution may be obtained with a minimum train service. The speed of treating the vegetation is from 15 to 20 miles per hour.

A serious objection to the chemical method of treating vegetation in the early stages of the development of this system was the danger of cattle grazing on the treated area with fatal results. A compound to prevent cattle from eating vegetation so treated has been developed and in the early experiment was mixed with the Atlas "A". It was soon found, however, that the chemical action reduced the efficiency of the "cattle proofer" and to eliminate this action the special compound is now shipped and applied in a separate tank car. It is stated that the results with this new compound have been very satisfactory. The greater part of 743 miles of track on the Southern Railway was treated without harm to live stock and, in addition, 50 miles on the Seaboard Air Line and about 250 miles on the Chicago & North Western were treated with equally satisfactory results.

WESTERN AUTOMATIC DUMP CAR

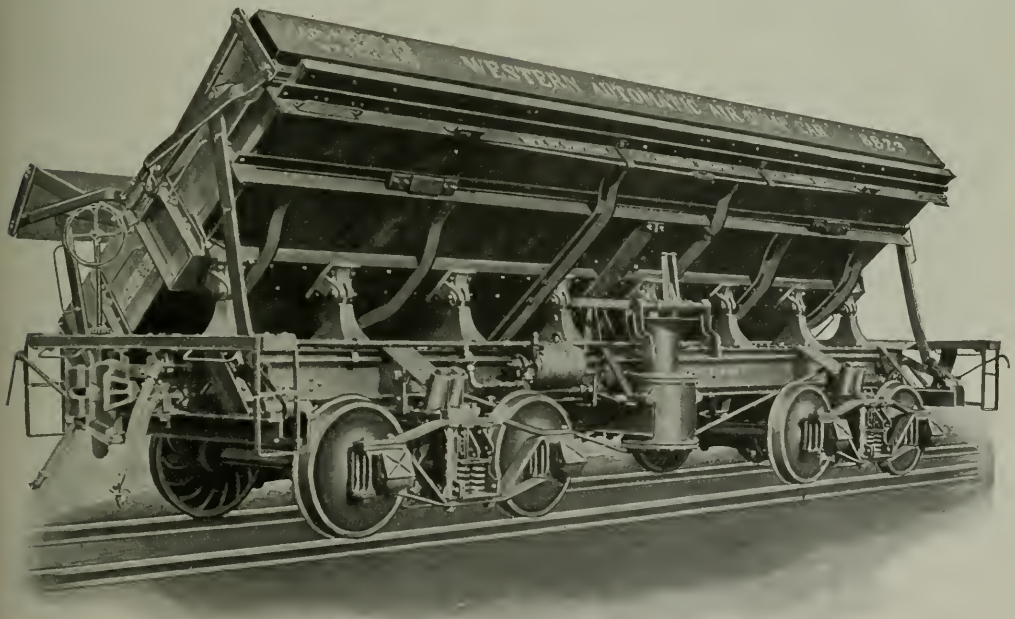
The Western Wheeled Scraper Company, Aurora, Ill., has perfected an automatic air dumping apparatus for application to the Western dump cars of standard design, and after thorough test the cars so equipped are now being placed on the market. As the use of side chains is strongly favored by some men, provision is retained on these cars for the application of such chains as on the other types of cars manufactured by this company. The new automatic device locks the bed in the upright position when loading and hauling the cars, and allows them to be dumped either by the engineer from the cab or by pulling a lever at each car. In the former case the engineer can unlock, dump, right and lock the entire train from the engine, effecting a saving in labor and time, as well as eliminating the chances for personal injury to the men.

The power for dumping these cars automatically is furnished by two vertical cylinders, one on each side, located centrally between the trucks, attached to the draft beams and supported by a truss rod fastened to the end of the bolsters. On the 20-yd. car the cylinders are 20 in. in diameter and have a stroke of 17 in., lifting about 16 tons at 100-lb. air pressure. By the use of this short stroke it is possible to place the apparatus so high on the car that

the possibility of obstructions on the track striking the mechanism is largely obviated and the chances for damage to the apparatus in case of derailment are reduced. The short stroke cylinder is made possible by the use of an extension on the upper end of the piston. The first movement of the piston throws this extension up against the car bed, and at the same time unlocks the bed, which is normally held in position by bars that lift the doors at the four corners of the car. The lower ends of these bars are attached to cranks fastened to the end draft beam cross sills, which are on dead centers in the locked position. These cranks are connected to a rocker shaft extending along the draft beams to the cylinders, so that the first 4 in. of the piston movement rocks this shaft and pulls the crank off the dead centers, thus unlocking the bed and permitting it to tilt and discharge its load. The same movement of the piston pulls the extension of the opposite piston in toward the draft beam, allowing the bed to descend without coming in contact with that piston extension. This inward movement of the opposite piston extension puts the automatic unlocking device on that side of the car out of operation, so that it remains locked. The continuation of the piston stroke performs the act of dumping the bed. To right the bed after dumping, air is admitted to the opposite cylinder, causing the roller in the upper end of the piston and at the lower end of the extension to come in contact with the car bed and move it half as far as when the piston extension is up against the bed. As this side of the bed remains locked, the movement is stopped when the bed has reached the carrying position. There is sufficient play to admit of slight oscillation when the car is in motion.

The air for dumping these cars is pumped directly into the train line from the engine, the system commonly known as "straight" air, in distinction to automatic air, the system used for air brakes. The advantages of straight air for operating this dumping mechanism are that the cars are not all dumped at one time, as would be the case with automatic air, and a saving in air is effected since a valve in the train line automatically cuts the air off when the piston has reached the dumping position. The distribution of the load over the bed of the car will rarely be the same on any two cars in a train, and the amount of power required to dump the car therefore varies with each car. With the Western automatic apparatus, if the car is loaded so that it will dump by gravity when unlocked, no air will be used. A car requiring a small amount of air will dump quickly and one requiring more air will dump later as the pressure increases. Thus the cars will dump in succession in accordance with the amount of air required, no matter where they are located in the train. This method of dumping greatly lessens the jar on the trestle as compared with the dumping of a complete train of loaded cars simultaneously.

The new automatic car has all of the features of the Western dump cars now in use. It is equipped with the automatic pivoted side doors which rise out of the way of the load as the bed is tilted and give a large opening for discharge of the material. The hinge sockets riveted to the draft beams are each provided with a slotted opening into which the flat connecting bar drops, which in turn is pivoted on the hinge casting attached to the car bed. The bed rests on the center castings, or pedestals, and not on the pins which hold the connecting bar in place. The hinge rocks on the pedestal, forming an ample bearing. The cars are equipped with the safety devices required by the Interstate Commerce Commission and conform with the M. C. B. specifications.



Sixteen-Yard Automatic Dump Car, with Steel Ends and Doors and Wooden Floor.

PROTECTION OF STEEL FROM LOCOMOTIVE GASES

The Chicago, Rock Island & Pacific has just completed the replacing of three spans of a highway bridge over its tracks near the Burr Oak yard, just south of Chicago, which, on account of limited clearance, necessitated careful attention to the method of protecting the steel in the lower part of the girders and in the floor beams and stringers from the destructive action of locomotive blasts and gases. In accordance with the almost universal practice at present under similar conditions a concrete encasement was adopted, the plans at first providing for the stringers to be enclosed by forms to make their encasement monolithic with the roadway and sidewalk slabs. As the main girders had a clearance of only 20 ft. 3 in. above the track and the floor beams 20 ft. 6 in., it was decided to encase the portion of these beams

COMPARATIVE WEIGHT AND COST OF CONCRETE AND GUNITE BEAM ENCASEMENT.

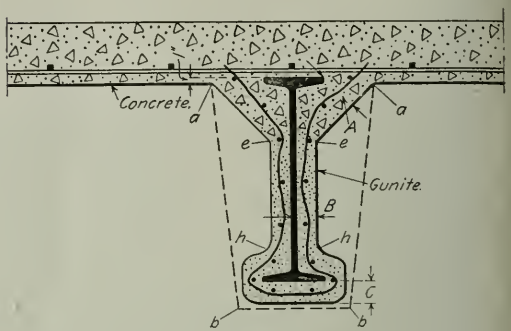
Size of beam.	Weight of poured encasement.	Weight of Gunite encasement	Per cent saved	Cost of poured encasement	Cost of Gunite encasement	Per cent saved	Dimensions A	B	C
8 in.	82 lb.	38 lb.	54%	$0.35	$0 33	6%	1½ in.	1½ in.	2 in.
10 in.	102 lb.	42 lb.	59%	.43	41	5%	2 in.	1½ in.	2 in.
12 in.	128 lb.	64 lb.	50%	.55	48	13%	2½ in.	1½ in.	2 in.
15 in.	187 lb.	89 lb.	52%	.81	67	17%	3 in.	1½ in.	2 in.
18 in.	228 lb.	94 lb.	59%	98	64	35%	3½ in.	1½ in.	2 in.
20 in.	260 lb.	122 lb.	53%	1 12	86	23%	3½ in.	1½ in.	2 in.

below the slabs with reinforced gunite on account of the greater density and impermeability of this concrete grout applied by the cement gun process. The contract for all concrete work was let to the Cement Gun Construction Company, Chicago, to be handled under the supervision of I. L. Simmons, bridge engineer of the Rock Island.

It was found that the building of the forms for encasing the stringers was a considerable part of the cost of the entire work, as 105 separate forms were required for the full length stringers in addition to a number of fractional lengths on the two skewed spans. At the suggestion of the contractor this difficult form work was eliminated by substituting gunite for the concrete around these stringers.

As shown in the accompanying cross section, the beams supporting the sidewalk slabs were encased in concrete

The following advantages are claimed by the Cement Gun Construction Company for this type of construction as applied to any floor beams or stringers subject to the direct action of blasts and gases. First, it forms a superior encase-

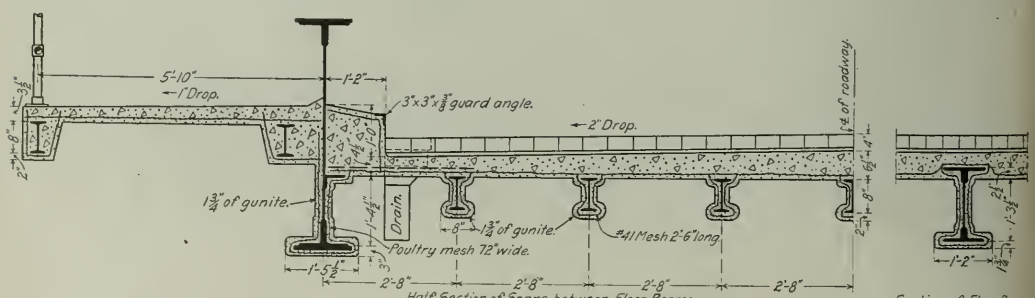


Gunite Encasement for a Typical Stringer Supporting a Concrete Slab.

ment, the gunite being at least 50 per cent more dense than concrete and to that extent better able to withstand the blast action. Gunite is also more impervious to gases, forming a better protection for the steel against rust than ordinary concrete. Second, a saving in cost can be effected and in addition economies in form work for slabs supported on these beams are possible through the use of the lower flanges to support the forms. Third, the dead weight of the floor system is materially reduced.

One of the accompanying illustrations shows a typical floor slab and stringer with gunite encasement of the supporting member and in dotted lines the usual concrete encasement. In the former design the gunite is carried up to "e e," where it is sloped in to the beam on approximately a 45-deg. angle. The concrete supported on this gunite is thoroughly bonded to it and is sloped outward at an angle of about 45 deg., so that the points "a a" are practically the same in either design, giving the slabs substantially the same support and the same clear span.

The advantages which this type of construction has over a poured concrete encasement in weight and cost are shown in



Details of Encasement of Girders, Floor Beams and Stringers of Chicago, Rock Island & Pacific Bridge at Burr Oak, Ill.

poured with those slabs because the simple design of the forms and the ease with which they could be supported on the sidewalk brackets made that method the least expensive. The floor stringers were first wrapped with poultry netting and then covered with 1¾ in. of gunite up to the bottom line of the floor slabs. When this had set, the flat floor slab forms were supported on the gunite-encased lower flanges of the stringers and the slabs poured in the usual way.

the accompanying table, computed by the above company, which compares these items per running foot for beams from 8 in. to 20 in. in depth, giving also the standard thickness of gunite. In this table the cost is based on the assumption that concrete for this type of construction costs $0.60 per cu. ft. and gunite $0.18 per sq. ft. 1½ in. thick. While these costs vary somewhat they are accurate enough for purposes of comparison.

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Contents

*Illustrated.

The new rule-book of the Buffalo, Rochester & Pittsburgh, noticed in another column, is one which deserves the attention of any railroad officer who is engaged in perfecting or improving his train rules—which appears to be a never-ending task on all roads. Not that the book is to be approved wholesale; many of the rules are susceptible of improvement; and, of the great multitude of divergences from the Association standard, many seem to be unnecessary. Moreover, it would be impossible in an editorial—or several editorials—either to praise or to criticize the whole book with adequate thoroughness. But in selection of subjects and phrasing of paragraphs there are valuable suggestions on nearly every page, suggestions the need of which is apparent in the rule books of many roads. The "General Notice," at the very beginning, contains good points which we have not seen anywhere else. The rules for giving instructions to flagmen in writing contain points which are neglected on many roads. Interesting novelties—novelties from the standpoint of rule-book fashions—are to be found in the rules for train despatchers. A part of the general impression created by an examination of this book is that a single master mind has had a good deal to do with its composition and arrangement; and that, often, is a good thing. Committee work is absolutely essential in this field, and its value must not be minimized; but a good many knotty points in language-tinkering never get settled in the right way except by giving one man—the right man—carte blanche in editing.

B. R. & P. Train Rules

The *Railway Age Gazette* finds it hard to decide what is the real attitude of the national administration toward the appeals of the railways for higher rates. Various utterances of President Wilson have indicated that he thinks rates ought to be advanced. In fact, it is suspected that he took a more than platonic interest in the deliberations of the Interstate Commerce Commission in the 5 per cent case. But the President has in his cabinet a gentleman who, besides being our greatest Secretary of State at present, and a Chautauqua attraction of the first magnitude, is also an editor and publisher; and we note that the tone of Mr. Bryan's Commoner is not friendly to increases in rates. These discrepancies between the utterances of the President and of the Secretary of State, if not corrected, are apt to give rise to fear and suspicion. They suggest the fear that there is serious want of harmony in the views of the President and his Polonius regarding the way the railways should be treated. They suggest the suspicion that maybe there is a good understanding by virtue of which the President looks after the votes of all who think the railways should be kindly dealt with, while Mr. Bryan looks after the votes of those who think they should be "soaked." If there is a real difference of opinion, and Mr. Wilson is for the railways and Mr. Bryan is against them, the railways are to be felicitated. Mr. Wilson has proved himself an almost invariable compeller of victory. Mr. Bryan, on the other hand, is the ablest architect of defeat in the country. If Mr. Bryan is against the roads, they hardly need anybody for them. It would be pleasanter, though, if the administration would not excite such suspicions as it sometimes does.

The Administration and the Railways

Congress threw a monkey wrench into the machinery of railway rate regulation at its recent session by passing, in its closing hours, a law forbidding carriers to make agreements with consignors limiting the liability of the carriers for loss or damage of freight. It looks very much as if Congress thereby unintentionally authorized the railways to make an advance of ten per cent in the freight rates ordinarily charged by them; for the bill of lading now in use, on which existing freight rates are predicated, provides that when the carriers take goods at their ordinary rates their liability shall be limited; and that when they accept unlimited liability they shall receive ten per cent more than the regular rates. The purpose of Congress was to further burden the roads by requiring them to accept their regular rates while assuming unlimited liability; but the law was so carelessly drawn, and was enacted on so little consideration that it looks as if, literally interpreted, it would authorize the railways, while assuming unlimited liability on all shipments, to also charge ten per cent more than their regular rates on all of them. To require the roads to assume unlimited liability and at the same time accept their regular rates is unjust; but, probably, if they should try to collect higher rates, as the existing bill

The Freight Liability Law

of lading provides, they would raise a storm. The Interstate Commerce Commission has called for a conference to determine in what condition Congress has actually left the matter. President Charles H. Markham, of the Illinois Central, has given out an interview in which he very justly cites the way in which this law was drafted and passed, as typical of the way in which railway legislation is being handled. "Obviously," says Mr. Markham, "it would have been far better for Congress to have considered the question deliberately and on its merits before acting; or to have left the entire matter to be handled by the commission. Public sentiment needs to be aroused so that it will demand, in the public interest, that in future the regulation of railways shall be dealt with in a different spirit and manner." Such legislation as this unlimited liability law is outrageous and disgraceful, and is largely responsible for the bad business conditions which continue to prevail. Business cannot thrive when Congress and other law making bodies deal with it in such an ignorant and reckless manner.

MUCKRAKING IN THE WAGE ARBITRATION

IN making their rebuttal in the arbitration at Chicago of the wage demands of the engineers and firemen of the western roads, Warren S. Stone, of the Brotherhood of Locomotive Engineers, and W. S. Carter, of the Brotherhood of Enginemen and Firemen, introduced a lot of testimony which the fair-minded and sensible majority of the members of their organizations do not seem likely to regard favorably. They ransacked the history of the western roads from the time their first mile was built to the time of the arbitration, for every piece of evidence the introduction of which might tend to bring into disrepute with the arbitrators and the public the managements of the railways. They tried to show that the railways had robbed the government in getting land grants and had misused the grants and the money derived from their sale. They put into the record all the details about the overcapitalization of certain lines, and sought to give the impression that all roads have been similarly mismanaged financially. They showed that some men prominently connected with railways have got rich, and tried to give the impression that they and many other men prominently identified with railways have got rich by abusing opportunities afforded by their fiduciary positions. They recited discreditable transactions in the past history of the railways, and tried to make it appear that because such things were done sometimes in the past they are being done universally at present. And they spared no effort to secure the widest publicity for every unsavory allegation they introduced, whether based on facts or on their own imaginings. The muckrakers and demagogues who for years have been assailing the managements of the railways in the magazines and from the stump were quite outdone.

The question which will doubtless arise in the minds of intelligent and reasonable railway employees is, What is the purpose of this testimony and what good will it do? It cannot be denied that some railways have been mismanaged. But the most conclusive demonstration that some railways have not been satisfactorily managed proves nothing in regard to the way in which other railways have been managed. And what was done in the management of railways in past years proves nothing as to what is being done now. Therefore, the attempt of Messrs. Stone and Carter to blacken the reputations of all the western lines by introducing testimony regarding the past mismanagements of some of them was entirely unjust.

But suppose they had been able to show that every railway in the West had dissipated its financial resources by mismanagement. What bearing would this have on the arbitration? If the ability of the railways to pay higher wages were an issue, and it were shown that they had all dissipated their financial resources, all this would prove would be that as a result of their mismanagement they have been rendered unable to pay higher wages. What good would this have done the case of the engineers and firemen?

As a matter of fact, however, whether the railways are or are not able to pay higher wages has never been an issue in this arbitration. It was agreed at the outset by the representatives of both the railways and the employees that the employees were entitled to receive reasonable wages, regardless of the earnings or financial condition of the railways as a whole or of individual railways. The employees had succeeded in getting this principle established in previous arbitrations over the protest of the railways, and in this particular arbitration the railways explicitly accepted it. It was expressly agreed that the only question to be determined was whether the wages being received by the engineers and firemen were reasonable, and, if not, what changes should be made to make them reasonable; and the employees contended and the railways conceded that the poorest road must pay the same wages as the richest, and that wages must be standardized throughout the entire western territory. We repeat, then what good could it do the case of the employees for their representatives to make sweeping, indiscriminate and, in the main, unjust and misleading attacks upon the financial management of the railways?

While it is impossible to see what good, from the standpoint of the employees, could be done by introducing this extraneous matter, it is easy to see how it is certain in the long run to do harm to both the employees and the railways. Every word of this kind of testimony tended to poison public sentiment against the railways. Most of it related to a comparatively few roads and to things done years ago. But the public often fails to distinguish between the way the railways were managed in the past and the way they are managed now, or between the way a few have been managed and the way a large majority have been managed.

Now, the public, through the legislatures and regulating commissions, determines what rates the railways shall be allowed to charge and, therefore, how much they shall be allowed to earn; and on how much they are allowed to earn depends, and always will depend, how much wages, in the aggregate they can pay. Arbitration boards can and do fix the wages *per employee* railways must pay, but, since the public determines how much the roads shall be allowed to earn, it evidently follows that the higher the arbitration boards fix the wages that must be paid the smaller is the number of men that the railways can employ *with any given amount of earnings*. It necessarily follows from this that in the long run every influence which tends to create a public sentiment that is hostile toward the railways, and which tends to limit the amount which they can earn, also tends to reduce the total amount of wages they can pay and the number of men they can employ. The testimony introduced by Messrs. Stone and Carter was necessarily adapted to inflame public sentiment against the railways. Therefore, it was necessarily adapted to prevent the railways from being allowed to earn enough money to pay as high wages and employ as many men as it is to the interest of their employees that they should. In other words, every word of the testimony in question was diametrically opposed to the selfish interests of railway employees themselves, including engineers and firemen. That it was opposed to the interests of the railways themselves goes without saying. These being the facts, it is plain that in injecting all this rubbish into the case, Messrs. Stone and Carter either were not trying to promote the interests of those they represented, or had a very erroneous idea as to how this could be done.

Mr. Stone intimated that while testimony of this kind might be familiar and uninteresting to the arbitrators it would make interesting reading for the thousands of men out on the lines whom he and Mr. Carter represented. We should think it would. But we should think that the interest taken in it by them would be of a very different nature from what Mr. Stone seemed to expect. We should think it would tend to arouse a suspicion, or even create a conviction, in the minds of the followers of Messrs. Stone and Carter that they have not been either very fairly or very intelligently represented in the arbitration proceedings.

The *Railway Age Gazette* does not believe that the course fol-

lowed by Messrs. Stone and Carter will be endorsed by the thoughtful and far-seeing members of their organizations. It is inconceivable that most of the members of the organizations can believe that their leaders are going to improve the condition of railway employees by blackening the reputations of the managements. Fundamentally, the interests of the railways and their employees are mutual; and whatever hurts the railways is bound to hurt the employees. One of the main reasons why hundreds of thousands of railway employees are out of work now and are receiving no wages at all is that the demagogues in politics and the misguided leaders of organized labor have been only too successful in creating a public sentiment which has made it impossible for the railways to get a square deal from the public. Whoever helps to foster a public sentiment that is hostile to the railways is an enemy not only to the interests of the railways but to the interests of every railway employee.

THE DECREASE IN EARNING POWER OF THE CHICAGO, ROCK ISLAND & PACIFIC, 1902-1914

THE operating income is the total amount of earnings of a railroad available to pay interest charges on the borrowed money invested in the property, rentals and a return on the investment made by the owners. It is arrived at by subtracting operating expenses and taxes from the total revenue received from operation of the railroad. It is a figure, therefore, that is unaffected by capitalization or the volume of stock or bonds issued by the company. It is the net result which the railroad obtains by charging its freight and passenger rates and paying for the labor and material *consumed* in performing the services necessary to earn the rates.

In the investigation which the Interstate Commerce Commission is making into the Chicago, Rock Island & Pacific Railway Company's affairs, the primary question involved is that as to (1) whether or not the managers of the railroad property have charged rates which, after the payment of expenses and taxes, would leave net operating income great enough to pay interest and dividends on an outstanding volume of securities obviously greater than the probable cost of the property would warrant; (2) whether or not the managers had charged rates sufficient to yield a net operating income, after the payment of expenses and taxes, to pay a fair interest rate on an obviously moderate volume of securities outstanding; or (3) whether or not the management had charged rates which would yield net operating income, after the payment of expenses and taxes, which would pay a fair rate of interest on a volume of securities obviously very much less than a conservative estimate of the cost of the property. In 1902 the operating income of the Chicago, Rock Island & Pacific, which then operated 3,910 miles of road, was $10,131,121. This would have been a return of 6 per cent on an investment of $168,852,017, or an investment in the railroad property of $43,185 per mile. In 1903, the first year in which the present management was in full control, the company earned $11,623,906* operating income. This would have been 6 per cent on $193,731,767. At the end of that year the company was operating 5,579 miles and the operating income, therefore, would have represented 6 per cent on an investment of $34,725 per mile.

In the fiscal year ended June 30, 1914, the operating income of the Chicago, Rock Island & Pacific, operating 8,328 miles of road, was $13,892,534. This would have been interest at 6 per cent on an investment of $27,803 per mile of road. The accompanying table shows the mileage, the operating income (total earnings remaining after the payment of operating expenses and taxes, and before the payment of any rentals or interest charges), the total amount on which this operating income would have paid 6 per cent, and the investment per mile of line operated at the end of the year on which the net income would have paid 6 per cent.

An average cost of $27,803 per mile for the Chicago, Rock Island & Pacific Railway property is obviously far below what could have been under any conceivable circumstances, the average cost per mile of such a property. This $27,803 would have been, of course, a total investment in road, terminals, shops and equipment. Take the question of equipment alone. In 1914 the Chicago, Rock Island & Pacific had 1,678 locomotives of all classes, with a total weight of 139,704 tons. A new locomotive cannot be bought for less than 10 to 11 cents per pound total weight. Taking, however, six cents per pound as a safely conservative figure, the Rock Island locomotives would have cost

	Mileage	Net operating income	6 per cent on	Capitalization per mile at 6 per cent
1902	3,910	$10,131,121	$168,852,017	$43,185
1903	5,579	14,524,883*	193,731,767†	34,725†
1904	7,259	11,657,020	194,283,667	26,765
1905	7,205	11,383,310	189,721,833	26,332
1906	7,426	14,538,909	242,315,150	32,631
1907	7,938	17,518,240	291,970,667	36,781
1908	8,004	14,365,554	239,425,900	29,913
1909	8,048	16,400,527	273,342,117	33,964
1910	8,024	15,274,509	254,575,150	31,727
1911	8,027	16,723,139	278,718,983	34,648
1912	8,042	15,200,498	253,341,633	31,502
1913	8,048	15,914,395	265,239,917	32,957
1914	8,328	13,892,534	231,542,233	27,803

*This is the total for 15 months.
†These figures are reduced to a per year basis.

$16,764,480. The company had in 1914, 989 passenger-train cars, exclusive of leased cars. This equipment, of course, includes coaches, chair cars, observation cars, dining cars, etc., and nine motor passenger cars. Again taking a figure that is conservative beyond question, this equipment would have cost at $2,000 per unit $1,978,000. There were in freight service, exclusive of leased equipment, 36,200 freight cars, including box, furniture, automobile, flat, etc. Again taking an unquestionably conservative figure, this equipment would have cost $22,340,000 at $700 per unit. The company had 4,500 work cars, cabooses, etc. Taking this equipment as having cost $300 per unit, its total cost would have been $1,250,000. The total cost of the equipment, therefore, would have been $42,332,480, or an average for equipment alone of $5,083 per mile.

Looking at it from another point of view. Since 1907 the Rock Island's accounts have been kept in accordance with the Interstate Commerce Commission's rules and the "investment since 1907" is, therefore, the actual cost of additions and betterments to the property. This amount since 1907, less total depreciation, was $60,763,427, or an average of $7,296 per mile. This is an investment of more than $1,000 a mile for additions and betterments per year. Here is $7,000 out of the total $27,000 capitalization on which the company is earning 6 per cent accounted for by additions and betterments of the last seven years. The remaining $20,000 is obviously entirely too low.

The conclusion, therefore, seems unavoidable that the rates charged have been inadequate to yield a fair return on anything like the actual cost of the property, leaving out of consideration entirely capitalization, credit and all other disputable questions.

NORTHERN PACIFIC

THE Northern Pacific was one of the parties to the recent order of the Interstate Commerce Commission in the transcontinental long and short haul decision, and will therefore share in the benefits of the commission's acquiescence in the railroad companies' contentions. The company's annual report for the fiscal year ended June 30, 1914, throws a rather interesting sidelight on the subject of transcontinental business and its importance to the railroads. The management says in the report in regard to the effect of the opening of the canal: "The Atlantic and Pacific coast will certainly be brought closer together by the canal, and some exchanges of commodities between them can hereafter be effected at a smaller cost than heretofore. However, the trade entirely through from coast to coast has never formed any large part, even of that minor proportion of the country's total trade arriving at or starting from coast points. . . .

"On lines serving a territory like that of the Northern Pacific the preponderating movement of traffic seems most likely

*The company changed the beginning of its fiscal year from April 1 to July 1 and the figures which the company reported were, therefore, for the 15 months ended June 30, 1903. To arrive at the operating income for the year we have taken four-fifths of the total operating income for the 15 months.

to be one local to the territories. . . . The Northern Pacific's main lines from the head of Lake Superior and the Mississippi river to Puget Sound towns are more than 1,900 miles in continuous length, but the average length of haul of a ton of commercial freight on the company's railways in the last business year was only 275.6 miles." In other words, the opening of the canal and the commission's recent decision will result in a smaller margin of profit on the through business; but the through business is very small proportionately.

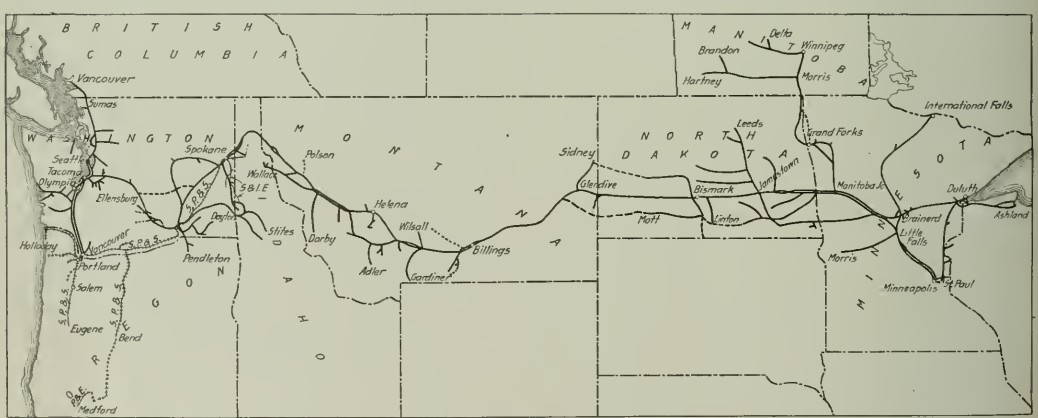
The Northern Pacific operated in 1914 an average mileage of 6,325 miles. Of this about 44.6 per cent was main line and 55.4 per cent was branch lines. Of the 20,422,419 tons of revenue freight carried 13,375,408 tons moved on branch line mileage. The branch line mileage of the Northern Pacific is an important factor in the security of the company's business from competition, and it is correspondingly an important factor in the development of the northwest.

The two important events in the fiscal year ended June 30, 1914, which stand out in the Northern Pacific's annual report are the arrangements made for permanent financing and the rather remarkable success which attended the management's efforts to reduce transportation expenses, in the face of a falling off in freight business and a lower passenger mile rate, without a decrease in passenger business.

Previous to 1914 the Northern Pacific had had two vehicles of permanent financing, the prior lien mortgage and the general lien mortgage. By January 1, 1914, all of the general lien bonds paid off, but the cash requirements for some time to come were very amply provided for.

Total operating revenues in 1914 amounted to $68,544,802, which is less by $4,131,337 than the revenues in 1913. Total operating expenses in 1914 amounted to $41,472,000, a reduction as compared with the expenses in the previous year of $3,201,000. Transportation expenses were $21,711,000 in 1914, a decrease of $1,858,000. It is this reduction of 7.88 per cent in transportation expenses, with a reduction of 9.67 per cent in ton mileage and an increase of 3.14 per cent in passenger mileage, that marks the success of the management's efforts toward more effective and economical operation of the property. It must be remembered that transportation expenses are incurred through the movement of trains, although revenue is earned through the carriage of ton-miles and passenger-miles. The total passenger train mileage on the Northern Pacific in 1914 was 12,015,000; the total revenue freight train mileage, 9,189,000. Whereas, therefore, the reduction in ton-miles appears to more than offset the increase in passenger-miles, as a matter of fact, as a potentiality of economy in transportation expenses, the decrease in ton-mileage was probably, if other things had been equal, much more than offset by the increase in passenger business. The saving in transportation expenses, therefore, was presumably due very largely to a more effective use of the plant. This presumption is strongly borne out by traffic and train mileage statistics.

The average number of freight cars per train-mile, exclusive



The Northern Pacific

which could be issued under the provision of the mortgage had been issued, and all but $4,000,000 of the prior lien bonds. A new refunding and improvement mortgage was made providing for the issue of bonds never to exceed three times the company's outstanding capital stock, the total of bonds, of course, including the amount of bonds outstanding under all prior liens.

The outstanding capital stock of the Northern Pacific is at present $248,000,000. The company now has outstanding $194,737,500 bonds. The provisions of the new mortgage, while conservative and restricting the issue of bonds, after the total aggregate outstanding has reached $500,000,000, to 80 per cent of the cost of new property or additions and betterments, provides a comprehensive method of future financing. There have been issued since the close of the fiscal year under this new mortgage $20,000,000 bonds, the proceeds of which paid off all of the outstanding short term notes and gave the company a very ample working capital. As of June 20, 1914, the company had outstanding $9,605,000 short term notes and had cash on hand of $6,596,000. With the receipt of something in the neighborhood of $20,000,000 cash the notes were not only

of caboose, was 38.67 as against 37.04 in 1913, a gain of 4.40 per cent. The percentage of empty cars to loaded was very slightly less—25.35—in 1914 than in 1913—25.95. The revenue trainload in 1914 was 567 tons as against 542 tons in the previous year, an increase of 25 tons, or 4.67 per cent. The average number of passenger cars in trains was 5.95 in 1914 as against 6.12 in 1913. This is a decrease of 2.78 per cent. Notwithstanding the increase of 4.40 per cent in the mileage of revenue passenger trains, there was a decrease of 4.04 per cent in the mileage of helper locomotives in passenger service, the total helper mileage in passenger service in 1914 being 594,000 and amounting to 4.95 per cent of the total revenue passenger train mileage. Even more notable is the fact that the mileage of revenue freight trains, amounting in 1914 to 9,189,000, was 14.87 per cent less than in 1913, while the mileage of helpers in freight service was 998,000 in 1914, a reduction of 27.10 per cent from the previous year. In other words, the percentage of helper to freight train mileage in 1914 was 10.05 as against 12.68 in 1913. Weather conditions may have in some instances been responsible for a part of this good showing, but only for a

part. There were no new locomotives added to either freight or passenger service, and nine in use at the beginning of the year were sold during the year.

Furthermore, smaller sums were spent on maintenance of equipment, and at the end of the year a quite considerably larger percentage of locomotives were at the shops than at the beginning of the year. At the end of the year 79.88 per cent of all locomotives were in good condition, as compared with 82.80 per cent at the beginning of the year, and 8.48 per cent were at shops, as compared with 7.17 per cent at the beginning of the year, the remainder in both cases being accounted for by locomotives in "fair" condition. The fact that 16.73 per cent of all locomotives were equipped with superheaters at the end of the year, as against 13.91 per cent at the beginning of the year, may have some significance in the good showing made in the reduction of helper mileage.

The total amount charged in 1914 for maintenance of equipment was $8,063,000, or 5.50 per cent less than the charge for 1913. It is interesting to note that the total amount charged to operating expenses for depreciation of equipment was $1,286,000, or slightly over 2 per cent on the book value of the equipment as carried on the balance sheet. Apparently the company charged between 2 and 2½ per cent depreciation on locomotives, about 2 per cent on freight cars and very considerably less than 2 per cent on passenger cars. The new requirements of the commission compel a company to charge a depreciation rate which will write down the total book value of equipment by the time it is renewed.

A total of $9,364,000 was spent in 1914 for maintenance of way and structures. This is less by $824,000 than the amount spent in 1913. The principal changes in the amount of maintenance work done was a much smaller mileage of main line relaid with 90-lb. rail—147 miles in 1914 as against 389 miles in 1913; a slightly smaller number of ties put in branch lines, and a larger mileage of branch lines relaid with rail—166 in 1914, as against 116 in 1913.

The following table shows the principal figures for operation in 1914 as compared with 1913:

	1914.	1913.
Average mileage operated	6,325	6,260
Freight revenue	$48,058,812	$52,270,686
Passenger revenue	15,707,000	15,808,036
Total operating revenues	68,544,802	72,676,139
Maint. of way and structures	9,363,824	10,188,054
Maint. of equipment	8,063,102	8,532,672
Traffic expenses	1,270,881	1,309,801
Transportation expenses	21,710,988	23,569,379
General expenses	1,063,258	1,073,392
Total operating expenses	41,472,053	44,673,298
Taxes	5,030,584	3,999,028
Gross corporate income	27,986,658	28,938,506
Net corporate income	19,655,247	22,313,518
Dividends	17,360,000	17,360,000
Surplus	2,295,247	4,203,518
Appropriated to cover passenger and freight refunds, etc.	.....	750,000

NEW BOOKS

Poor's Analyses (First Series). Published by Poor's Railroad Manual Company, 535 Pearl street, New York. Price $5.

This is a new volume published by Poor's Railroad Manual Company, presenting in bound form the weekly part of Poor's Manual Service for the nine months ending December 31, 1914. It contains an analysis of the operations of 41 corporations, railroad, public utility and industrial, giving the facts in such a manner that one may make estimates of the value of the securities. Only facts are given, without opinions or deductions as to values, but the matter is presented in a convenient form to enable and facilitate the formation of such estimates. The work is adapted to the needs of those requiring recent information to supplement that furnished by reference works, such as Poor's Manuals, and in addition to the analyses of the various corporations it includes a special introductory article, "Shall American Railway Credit Be Destroyed?"

Letters to the Editor

FAIR DEALING BETWEEN STATES AND CORPORATIONS

New York.

To the Editor of the Railway Age Gazette:

As is well known, this city has the best telephone service in the world. Some of the incidents of the recent investigations seem to indicate that perhaps we have the most reasonable telephone managers in the world. The New York Evening Post in a recent issue said:

> The soft answer of the New York Telephone Company in assenting to a just reduction of rates bears witness to a growing good will between the public and its public utility servants, displacing the old huffed spirit of menace on the one side, of obstruction on the other. In the broader field of interstate railway service we have heard much of this fairness for several months. It is time that States, and particularly cities, were learning that it is only on the basis of frank reasonableness that the civic regulation of such corporations can be successful. If the utilities refuse to do their part, public ownership will stare them in the face; if the public's commissions are tyrannical, the public shortly pays.

The Evening Post is a paper noted for far-sighted statesmanship and for its vigorous expressions of opinion on all economic subjects. Though you will, probably, call me an old pessimist, I want to tell you what I find in this editorial by reading between the lines.

1. Tyrannical commissions. Most commissions seem to be actuated mainly by a determination to please the voters. Voters being short sighted, the commissions must paint their pictures with bold strokes. Having, itself, little comprehension of its delicate task, the average commission almost invariably does crude work; and in endeavoring to be, or at least to appear, impartial, it hits wide of the mark; reduces rates too much. This is in effect tyranny, as this editor suggests.

2. It is time states learned, etc. This lesson was taught a third of a century ago in Massachusetts. Surely, "it is time." But in this as in other important lessons of statesmanship, the learning processes have to be repeated, apparently, in each generation, or oftener. Will it be the same in 1950, 1980 and A. D. 2015? The Massachusetts Commission was organized in 1869, the first intelligent, broad-minded and progressive state railroad commission in the country. After ten years its chairman, C. F. Adams, pioneer railroad publicist, retired; and as the columns of the *Railroad Gazette* will show, a most instructive chapter of history had been made.

But within the last few years, Massachusetts has followed Iowa, Texas and other radical communities in telling its commission to strike harder; in other words, to introduce more of tyrannical practice. Can we never get public servants who can be fair and also firm? Thus far the fair commissioners usually have been weak; the firm commissioners have not been fair. The Evening Post's postulate calls for strong men.

3. There is a difficult lesson for all of us to learn. The Evening Post's principles are all right; but the New York Telephone Company, making enormous profits, can comply with this ideal theory quite easily. A railroad, earning only 5 per cent or less, finds itself with a very different puzzle. The public asks about the same thing of the Erie Railroad, laboring under a burden of debt, as of the Telephone Company with its gold-bearing monopoly. "Growing good will" is a pleasant phrase; but to put it in practice in the railroad field still calls for an immense amount of patient study. The task of learning practical fairness is still a hard one, both for railroad officers and state commissions and legislatures. When a corporation releases to a city, in one year, five millions of profit, the people can, indeed, see what is done and they applaud. But if there is only a half million in all to divide, and when it will take perhaps five years to determine how the percentages should be apportioned, there is not so much éclat about it.

P. R. K.

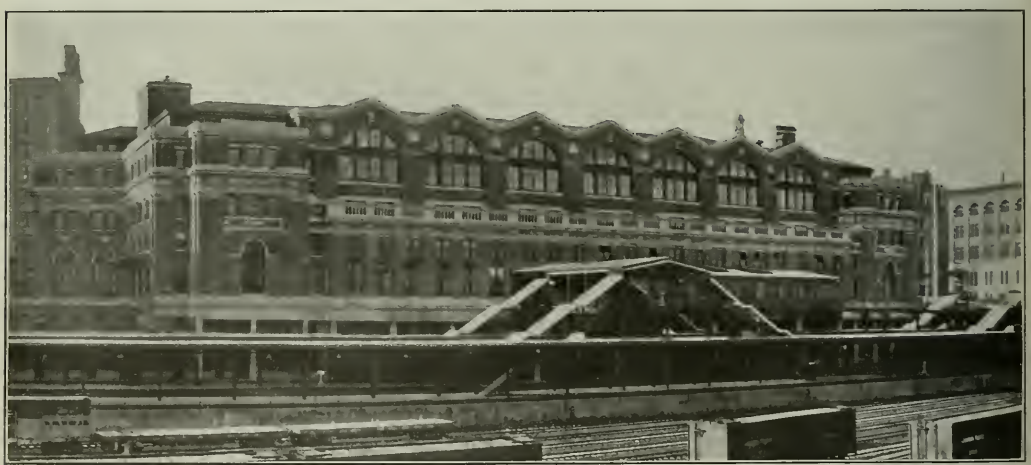
Canadian Pacific Terminal Improvements at Vancouver

A Passenger Station and Pier for Coast Steamships with Supplementary Facilities Were Completed Last Year

Owing to the rapid growth of traffic at the Vancouver, B. C., terminal of the Canadian Pacific, it became necessary about two years ago to undertake to provide increased facilities for handling both passenger and freight business. At this point is handled the trans-continental business of the Canadian Pacific, as well as its steamship traffic to the more important Pacific coast ports and its trans-Pacific business to and from ports in Japan, China, Australia and the Philippines, in addition to the interchange traffic with the various other steamship lines at Vancouver. This interchange of traffic between the railway and steamers, as well as between the city of Vancouver and other points necessitated terminal provisions of a somewhat unusual character.

The passenger station is located at the foot of Granville street, one of the principal thoroughfares in the city. This street has been extended over the passenger and freight tracks to a new steamship pier. To the west at Burrard street another viaduct has been constructed over the tracks to afford access to the steamship pier used for trans-Pacific service, built in 1908, and which has since been extended out to the harbor line to provide for the larger steamships which were put into service within the last two years. The site of the old passenger station was directly at the foot of Granville street, and the only means of access to the steamship piers before the improvements were made was by way of a grade crossing west of the old station. This crossing naturally was a source of danger and delay, and in the new plan the freight yard was re-arranged with connections to reach the present steamship piers as well as those which might be constructed in the future.

The passenger track layout provides four through tracks raised about 5 ft. above the old grade to reduce somewhat the vertical distance between the street level and the track level. Provision has been made for an extension of the trackage by leaving room for additional passenger tracks to the north over the site now occupied by freight tracks. The station building facilities are adequate to serve several times the number of passenger tracks built under the present plan.



View of New Canadian Pacific Passenger Station from the Harbor

RAILWAY PASSENGER STATION

Granville and Cordova streets are about 30 ft. above the track level. This condition necessitated the use of a two-level station with the principal public rooms on the street floor and railway facilities for baggage, express, etc., on the track level below. The plan also lends itself to providing a convenient means of access to the train platforms and shelters by a bridge over the tracks. Independent exits are provided so that passengers may go directly to the street without passing through the station. Electrically-operated baggage lifts are provided by which baggage may be raised from the platform level to the extension of Granville street, and thence carried to the steamship pier. On the street level of the station are the general waiting room, ticket offices, lunch room, women's waiting room, smoking room and baggage checking room, all conveniently located with relation to each other and with generous allowance for lobbies and corridors. The general waiting room is 212 ft. by 56 ft., including the east and west lobbies each of which measures 46 ft. by 28 ft. The women's waiting room and the smoking room are each 46 ft. by 36 ft. On this floor also are located the lunch room and its service pantry. The kitchen and refrigerating rooms are placed on a mezzanine floor below the street level. On the track floor are the baggage, mail and express rooms, also rooms for Canadian and United States customs, warerooms for the news and dining car departments and the power plant. Between the station building and Cordova street at the lower level is a large paved area used for baggage, mail and express trucks. Access to this area from Cordova street is had by a ramp descending by easy grades to the west of the station building.

The passenger station is a steel frame structure with pressed brick exterior walls and Indiana limestone trim. The main facade of the building consists of a colonnade of ten free standing Ionic columns, 35 ft. high, symmetrically flanked by pavilions or end wings. The track facade of the building is expressed by a series of large arched openings and occupies a very conspicuous position when viewed from the harbor. The main waiting room

is located immediately behind the colonnade and is approached by vaulted corridors from either end of the building. Ionic pilasters and engaged columns, artificial Caen stone, are used for the decoration of the walls of this room, with the walls tinted to match the stone work. The floors are of Terrazo, figured with a design panelled to match the arrangement of seats and wall columns. The ceiling is 40 ft. above the floor and of heavy beam and panel design. Illumination is by means of incandescent electric lamps, the ornamental ceiling fixtures and wall torches of special design being of cast bronze. The seats in the main waiting room and the woodwork around the ticket office are of oak. The smaller waiting rooms, dining room, etc., are treated in a very simple manner with oak wainscoting, plaster walls and plain panel ceiling.

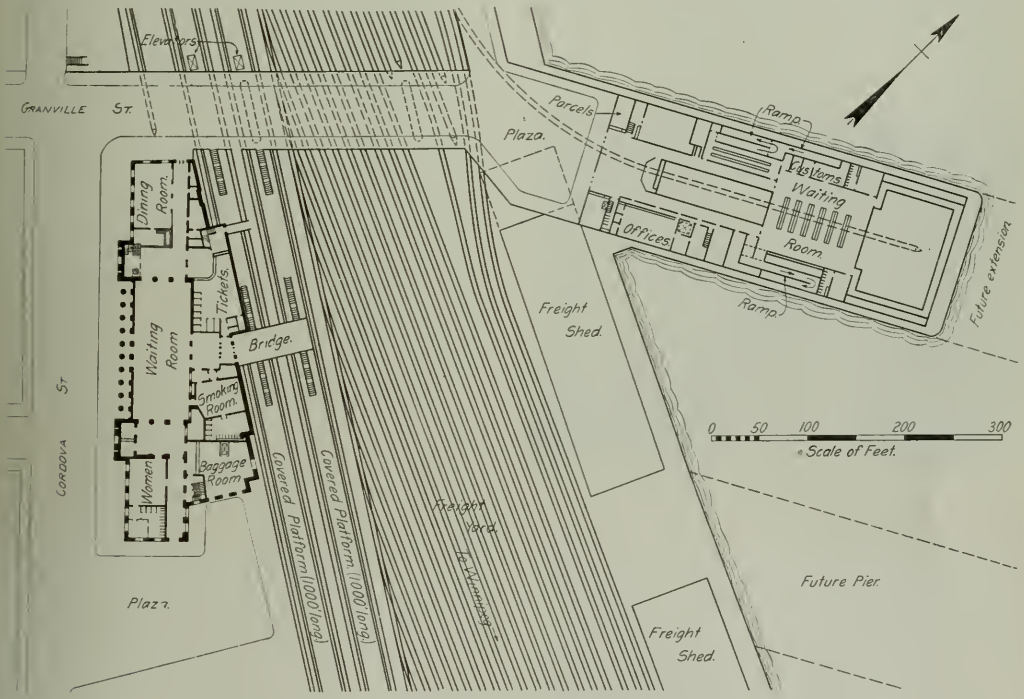
Above the ground floor are three floors devoted to offices for the use of the railway company. A large interior court affords natural lighting for the general waiting room and also for the interior office rooms. These offices are finished in natural wood with maple floors. Four passenger elevators serve the office quarters and the lower mezzanine and track level floors.

rooms are provided with an exhaust system. Vitreous china and porcelain plumbing fixtures are used throughout. For fire protection the lower floors of the building have a sprinkler system. The upper floors are served by standpipes and fire hose. A vacuum cleaning system consisting of a six-sweeper low suction machine operated by a direct connected motor serves all parts of the building above the track level.

Two tracks are provided for inbound and two for outbound passenger trains with separate platforms. There is also a platform adjoining the station used for baggage, mail and express only. While Vancouver is the end of the line, the station is arranged as a through station in order to secure the best use of the tracks and avoid blocking the approaches when the trains are backed out preparatory to shifting to the storage yards. Incoming trains proceed westward and back out over the thoroughfare in the freight yard, leaving the station tracks clear of all shifting movements.

STEAMSHIP PIER

The extension of Granville street by a viaduct over the tracks affords access to the upper level of the new steamship pier. This



Plan of New Canadian Pacific Terminal at Vancouver

The service plant, located on the track level floor, has a capacity of 450 hp. The boilers are of the horizontal return tubular type, designed for oil fuel, and supply steam for the forced circulation hot water heating system in the railway station, also for passenger and freight car heating and for the steamship passenger station which is heated by a direct steam system. A 12-ton refrigerating plant provides service for the lunch room and kitchens.

Alternating current, purchased from the public service company, is transformed and distributed throughout the terminal for electric lighting and for the operation of the elevators in the building and on the track level. Ventilation of the kitchen is accomplished by means of a supply and exhaust fan system. All toilet

viaduct is 80 ft. in width and is enlarged in front of the pier station to provide a plaza for public and private vehicles. Baggage and freight is received at the pier on the lower level to which access is had by ramps leading from Granville street and Burrard street viaducts.

The substructure of the pier is built largely of creosoted timber and presents a number of unusual features. Sea worms, the toredo navalis, are very active in the waters of Burrard inlet and untreated timber cannot be used safely for more than two years where called upon to bear heavy loads. The depth of water at high tide at the outer end of the pier prior to construction was over 60 ft., with a soft bottom, necessitating very long piles. The harbor was filled in at the site of the pier as high as prac-

ticable, and still not interfere with the draught of vessels which would use the pier and the piling was then driven through the filling. About 3,000 piles were driven in the substratum, these piles ranging in length from 80 to 110 ft. The substructure of the pier is well braced above the low water line and the filling referred to adds additional stiffness to the entire structure. Fenders of large logs chained together afford extra protection to the pier and distribute evenly throughout the structure any shock which may occur from a vessel striking the pier. A railway track, depressed to bring the floor of the cars about level with the pier floor, is carried through the center of the pier. The decking of the pier is of Australian hardwood, which has been found to give better wearing results with the class of traffic and atmospheric conditions existing in Vancouver.

The superstructure is slow-burning timber frame construction, covered with wood sheathing. The interior trim in the public rooms on the upper floor is of Douglas fir finished to show the natural grain and beauty of the wood, the exposed roof trusses in the main waiting room being dressed and chamfered. The waiting room is 83 ft. by 96 ft. A ladies' waiting room, a smoking room and rooms for the immigration and customs departments of Canada and the United States have been provided. There is a promenade overlooking the harbor, reached from the waiting room, on the outer end of the pier over the one-story freight structure. As one enters from the plaza the ticket office,

Interior of Main Waiting Room

parcel room and baggage checking room are conveniently reached on the concourse leading to the main waiting room.

Access to the steamships from the upper level is afforded by means of ramps leading from the concourse on easy grades to the landing on which the gang planks are placed. The landing is adjustable for different stages of the tide which has a range of about 16 ft. Passengers coming from the steamships use the ramps and go through the customs examining rooms, or, where examination is not necessary, they may be diverted directly into the concourse. On the lower level, which is used for baggage, express and freight, there are provided electrically operated lifts on each side of the pier to meet the vessel ports. These lifts are adjustable and may be used as sloping gangways or raised and lowered similarly to an elevator and are 10 ft. by 48 ft. in area, holding several trucks at one time.

The general designs and layout of this terminal were prepared, the terminal buildings constructed and the equipment installed by Westinghouse, Church, Kerr & Company, Montreal and New York, under the general direction of the engineering department of the Canadian Pacific, J. G. Sullivan, chief engineer. The architects for the passenger station were Barott, Blackader & Webster, Montreal. Work was begun early in 1912, and the station and pier were opened to the public in July, 1914.

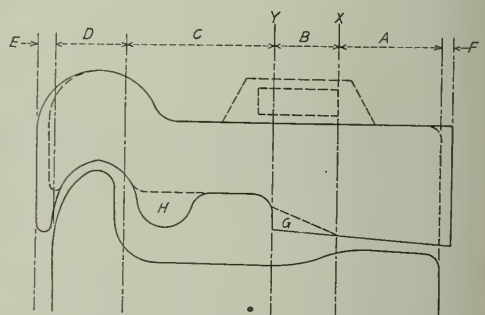
DRIVER BRAKE SHOES

By J. S. Sheafe

So many refinements in the design of locomotive details have been introduced during the past few years in an attempt to decrease weight and effect economies in maintenance that there now seem to be very few parts which have been overlooked. The contour of driver brake shoes, however, has remained for years practically unchanged while, by a few slight alterations from the present standard form, brake shoe service may be considerably improved.

The use of inserts in the face of the brake shoe to effect a more even distribution of tire wear has probably been somewhat overdone. Where the inserts are distributed over the entire length of the shoe its structure is weakened and there is an increased tendency to break before the shoe is worn out. By limiting the use of inserts to the ends of the shoe better net results would be obtained. In many cases chilling the ends of the shoe might give equally good results.

Driver brake shoes were originally made with solid faces, which wore the tread of the tire quite as much as the rim. The introduction of the groove along the center of the shoe was undoubtedly the means of effecting a large saving in tire wear, but the present standard groove is considerably narrower than that originally used, resulting in an increase in weight without a corresponding benefit to the service rendered. A



Present and Proposed Contour of Driver Brake Shoes

worn driving tire has a contour about like that shown in the sketch. The maximum brake shoe wear should take place on the rim and flange of the tire as shown at *A* and *D* respectively. Differential wear varying from a minimum at *Y* to a maximum at *X* should be provided for on the portion of the tire shown at *B* and the portion shown at *C* should receive no wear from the brake shoe. The contour of the average brake shoe is shown by the full lines. The metal at *F* and *E* on the sides of the shoe is superfluous and only adds to the weight in the scrap pile. The metal outside of the broken lines at *G* and *H* is not only superfluous, but is actually detrimental to the best service of the shoe because it produces wear on the tire at points where it would be preferable to eliminate all brake shoe wear. As shown by the sketch, *A* and *D* are acting against portions of the tire which otherwise receive no wear, while *G* and *H* are increasing the tire wear at *B* and *C*, which are subjected to wear from the rail.

The broken lines show a possible contour for the brake shoe by which useless metal is eliminated and undesirable tire wear reduced. The dimension at *E* need be only large enough to act as a guide for the shoe on the flange of the tire, and *F* may be considered as entirely unnecessary on a flanged shoe. Such a design would result in more brake shoes to the ton purchased with an equal service from each shoe, as well as in a reduction of tire wear and the resultant damage to frogs and crossings.

Hearings on Western Freight Rate Advances

Testimony by Railroad Men on Rates on Grain and Grain Products, Meat, Packinghouse Products and Fertilizer

The hearing before Commissioner Daniels at Chicago, on the application of railroads in Western Trunk Line and Southwestern Tariff Committee territory for advances in freight rates, during the past week was devoted to testimony of railroad officers, supporting their claim that increases asked for are reasonable as to individual rates. This followed the general testimony reported in last week's issue as to the financial needs of the carriers. Testimony on the rates on grain and grain products was presented on March 9 to 12, on livestock, fresh meat, packing house products and fertilizer materials on March 13 to 16, and on hay, straw and broom corn from March 17 to 18. This was to be followed by testimony on the rates on cotton piece goods.

RATES ON GRAIN AND GRAIN PRODUCTS

E. B. Boyd, chairman of the Western Trunk Line Committee, was the first witness for the railways on the rates on grain and grain products. Mr. Boyd was for several years manager of the transportation department of the Chicago Board of Trade, and, therefore, was able to testify as to the grain rates from experience on the side of the shippers as well as on that of the railways. His testimony showed how rate wars and repeated rate reductions by railway commissions have brought the present scale of freight rates on grain in the West to a point below that regarded as reasonable by the railways and that the increase of one cent was thought proper in comparison with the rates on other commodities, and because the Eastern roads have advanced the grain rates one cent. He said the roads would attempt to prove the reasonableness of the advance of one cent from points on and east of the Missouri river, and in the through rates from points west thereof built thereon, in comparison with rates approved by the Interstate Commerce Commission for similar distances, to Duluth, Minneapolis and Milwaukee, that the rates are based on the lowest rates west of the Illinois-Indiana state line. He said that they are also shown to be reasonable by comparison of the gross earnings per ton mile on a large number of other commodities, and by all the rules of reason that apply to the making of freight rates. Mr. Boyd said that with respect to other commodities grain is not paying its proportion of the transportation cost. It is a commodity given more consideration than any other one article of transportation in the way of privileges and facilities.

The rates today on grain are lower than, or as low as they were 10 years ago, although everything has advanced in price. Some years ago it took three bushels of grain to pay for a given unit of transportation, and today it takes less than one bushel.

Originally, Mr. Boyd said, the rates on wheat and corn from the Missouri river to Chicago were 21 and 19 cents, respectively. In one of the rate wars these rates were reduced to 6 cents, and finally rates of 17 and 16 cents were established in 1905. Since that time various rate reductions have carried wheat to 15¾ cents and corn to 14¾ cents. The one cent advance asked, therefore, would leave the rates lower than those prevailing in 1905. The proposed rates, he said, are lower than those prevailing in the Northwest, although the latter rates are based upon an unduly low scale through the effect of the unreasonably low distance tariff in Minnesota, which, he said, is lower than anything west of the Illinois-Indiana state line. They are lower also, he said, than the rates into Central Freight Association territory, which have already been pronounced unreasonably low by the Interstate Commerce Commission itself. These statements were supported by elaborate exhibits, one of which made a comparison of earnings per car mile and per ton mile, gross and net, on various carload commodities, with similar information on grain and its products, to and from Chicago, Ill., and various other points. This showed that for distances of 500 miles the proposed grain rates in the western territory are lower than the Central Freight Association rates.

Another exhibit accompanied by a map illustrated the effect of the first application on June 10, 1904, of proportional rates from Omaha and Council Bluffs to Chicago, which were on wheat 12 cents and on corn 11 cents. These rates applied to traffic originating beyond.

The rate from the first station west in Nebraska, Irvington, to Omaha was 5 cents. This rate added to the 12 cents and 11 cents proportional rates from Omaha and Council Bluffs made through local rates to Chicago from Irvington on wheat 17 cents and corn 16 cents. These became maximum rates from intermediate points. From Omaha and Council Bluffs the local rates to Chicago that were in effect before the proportional rates were established were wheat 20 cents and corn 18 cents. Examination shows that even the advanced rates are generally lower than the reductions originally made on account of the proportional rates.

In 1906 reduction in the proportional rates of 1¼ per cent per 100 lb. was made from all Missouri river points to Chicago because of the allowance of 1¼ per cent per 100 lb. for elevation, some roads preferring to reduce the rates and give the benefit to all shippers rather than pay elevation to a few. By the addition of the 5 per cent per 100 lb. to these reduced proportional rates the through local rates from Irvington, Neb., to Chicago were made on wheat 15¾ cents and on corn 14¾ cents per 100 lb. After the elevation question was finally settled by the Interstate Commerce Commission allowing an elevation allowance of ¼ cent per bushel the proportional rates were restored to 12 cents and 11 cents on wheat and corn respectively.

In the meantime, the lines operating from Council Bluffs and Omaha to the southwestern Missouri river points interpreted the term "originating beyond" as meaning from any origin, and therefore applied the proportional rates alike to both Iowa and Nebraska grain. This practice diverted considerable grain from Iowa through the back door gateway at Council Bluffs and Omaha to Kansas City and also to St. Louis and the East. The roads operating from Council Bluffs and Omaha eastward then did likewise. Because of the strongly competitive conditions with respect to Iowa traffic that developed under this method of applying proportional rates thereto, Iowa lines made no further advance in their local scale from Missouri river and Iowa to Chicago when the proportional rates were restored. The 15¾ cent rate on wheat and 14¾ cents on corn are in effect today, although the suspended rates make them 1 cent per 100 lb. higher.

Ordinarily, Mr. Boyd said, rates should be no lower on export grain than on domestic. The two cent increase to the gulf ports for export is proposed because there is already a one cent advance to Atlantic ports. The keen competition of gulf lines and the seaboard lines formerly resulted in a differential of one cent for grain for export, but on account of the expense of handling this traffic there is no reason why the rate should be lower.

"Car mile earnings on grain are excessively low compared to other commodities," said Mr. Boyd. "To bring grain up to equal earnings per car mile with other commodities, it is necessary to load to 70,000 or 80,000 lb. per car, while other commodities carry from 30,000 to 40,000 lb.

"We hear a great deal of talk about co-operation by shippers' associations, and there has been a great deal of co-operation toward economical loading of freight, but in the heavy loading of grain we have got nowhere. Millers are notoriously light loaders, yet they are the first to complain about car shortages."

Mr. Boyd was cross-examined at length by Clifford Thorne,

of the Iowa commission, and by A. E. Helm, of the Kansas commission. This involved a great deal of discussion as to the basis for making rates. Mr. Boyd said railroads no longer make rates, they change them, and he insisted strongly on the importance of the principle "what the traffic should bear." At various times Mr. Thorne asked questions about items of cost, to which Mr. Boyd invariably replied that rates were not made that way. He also made it clear that all of his figures related to the time prior to June 30, 1914, so that conditions caused by the European war in no way affected them, that the advance in rates had been decided upon before the war began, although he thought the high prices now prevailing for grain should be considered. Today the domestic consumer in this country, he said, is paying the price dictated by the warring nations of Europe on 85 per cent of the product, and the producers are reaping the benefit.

Judge Helm asked whether the carriers had reduced rates when corn was selling for 10 cents in Kansas and was being used for fuel. "Yes, they did," replied Mr. Boyd. "The governor asked the railroads to make an emergency rate and they did so, and inside of 10 minutes the price went down by the amount of the reduction in the Chicago market, because of the threatened movement, and therefore, no additional corn was moved on account of the lower rate." There was also a great deal of discussion as to whether or not the producer pays the freight rate, and Mr. Boyd said no one had ever succeeded in demonstrating to him that he did under all circumstances.

Mr. Boyd was followed by F. P. Eyman, assistant freight traffic manager of the Chicago & North Western, who showed how the rates on grain and grain products for a long term of years have shown a general downward tendency, while the market value in the same period has shown an almost unbroken advance.

"With the proposed increase of 1 cent per hundred pounds," he said, "the rate on wheat from the Missouri river would be 16¾ cents per hundred pounds against 21 cents in 1902, while that on corn would be only 15¾ cents against 18 cents in 1902.

"In that time there has been a conspicuous rise in the market value of these grains which had its inception long before. The Iowa price of corn, for instance, in the decade from 1870 to 1879 averaged 25 cents per bushel. Between 1880 and 1889 the average was 30 cents per bushel; between 1890 and 1899 it receded to 27 cents; between 1900 and 1909 the average was 39 cents, and on December 1, 1913, before the influence of the war sent the price higher, the Iowa price was 60 cents per bushel, while the Nebraska price was 65 cents per bushel.

"The effect of this decided rise in price, in conjunction with the decline in rates, is seen in the proportion of the market value consumed in the freight rate. In 1905 it took 204 bushels of corn in value to transport 1,000 bushels to Chicago based on the average rate and average price in 1905. Under the proposed advanced rate, it would take only 121 9/10 bushels to transport 1,000 bushels to Chicago, based on the December 1, 1913, price. In 1905 it took 234 7/10 bushels of wheat to bring 1,000 bushels to Chicago, while under the proposed rate it would take only 212 3/10 bushels to transport the 1,000 bushels."

The loss and damage claims per car of grain and grain products on the North Western, said Mr. Eyman, averaged 74.6 cents per car in 1913 and 77.1 cents per car in 1914. The average on all carload freight in 1913 was only 21 7/10 cents per car, while in 1914 it was 26 2/10 cents, only about one-third the average loss and damage per car involved in the grain traffic. In other words, the loss and damage per car of grain and grain products was 343 per cent of the loss and damage per car on all carload freight in 1913, and in 1914 was 294 per cent of the average loss and damage per car on all carload freight.

Judge Helm asked whether the railroads had ever tried to reduce the number of claims instead of increasing the rates. Mr. Eyman said that every effort had been made to reduce claims, particularly the claims for concealed losses, and that many of them had been litigated, but the roads had always lost.

B. E. Perkins, freight traffic manager of the Missouri Pacific and St. Louis, Iron Mountain & Southern, also spoke of the interference by state-made rates with interstate transportation.

Mr. Perkins paid particular attention to Texas and went at length into the history of grain rates. He showed that prior to December 15, 1902, there was a very unsatisfactory condition and no satisfactory rate basis. In 1902 the southwestern lines inaugurated a new system of rates, consisting of proportional or reshipping rates from primary markets. "The rates to Texas points," he said, "since then have been based upon the rate to Texarkana, on the state line, plus the rate from there to the point in Texas. The rate from Texarkana to the destination has been fixed by the Texas railway commission," he said, "and the volume of the rate obtainable for the interstate shipment to Texas has been largely controlled by the state rates controlled by the Texas commission. From 1902 to the present, by reason of reductions by the Texas commission in local rates within Texas, and the extension of the territory in Texas to which these rates apply have forced the carriers to reduce the rates for transportation of grain from all interstate points to Texas.

"In contrast with this descending grain scale the rates on class freight and commodities generally, including those now under consideration, have been advanced since 1902. The first class rates from St. Louis to Texas in 1902 was $1.30, whereas today it is $1.47. In 1908 substantial advances were granted by the commission on commodities generally, from interstate points to Texas, after an exhaustive hearing. Advances were granted on 127 commodities out of a total of 143 contained in the tariff."

Mr. Perkins then introduced exhibits comparing the earnings on grain to Texas with earnings on other commodities. He also gave a detailed history of rates in Louisiana, Arkansas and Oklahoma, bringing out the conditions peculiar to each, showing that the rates on grain for a number of years have remained either stationary or have declined, while rates on other classes of freight and commodities generally have advanced. His exhibits show that rates to Louisiana are even lower than those to Texas, themselves pronounced unreasonably low.

During the testimony on grain rates it was brought out that there had been a misunderstanding as to the dates set for the hearing, and it was announced that the railroads would be given the time originally set for hearings during March to present their evidence and arrangements would be made for rebuttal testimony on the part of the shippers after April 2.

Commissioner Daniels said he desired to reiterate some of the requests made by the commission in its circular calling for certain information which the railroads had not yet furnished. He said the commission desired statistics for 1913 and 1914 as to total carloads, average haul, total ton miles, total revenue, average revenue per net ton mile and gross ton mile, and average load per car on the commodities on which advances are proposed and on a number of other commodities also. He repeated a request for figures as to the comparative cost of terminal and line haul. C. C. Wright, general solicitor of the North Western and chairman of the committee representing the railroads, explained that only a few of the roads kept their figures segregated in the manner suggested by the commission, and that the method used by these was not uniform, but that the roads would furnish what information they could. As to the terminal and line haul comparison, he said it would be impossible to furnish anything that would be of the slightest value.

Mr. Wright said that if the advance of one cent per hundred were applied to all of the grain shipped from each county in Iowa, Kansas, Oklahoma, Nebraska and Missouri, according to government reports, the increase would only be $3,000,000 a year. This, however, is too large, because a very considerable portion of this grain is not moved to markets where the advances apply, while there is included also grain on which no advance is asked.

LIVESTOCK AND MEAT RATES

F. A. Leland, chairman of the Southwestern Tariff Committee, was the first witness for the railways on Saturday on the rates on packing house products, fresh meat, livestock and fertilizer. The advance on packing house products is from the various packing centers, such as Omaha, Kansas City, Fort Worth and

Wichita to Chicago, and is based upon an advance of 3½ cents per hundred pounds between Missouri river points and Chicago, with such adjustment of rates from other packing house points as shall continue the relation of rates heretofore maintained. The livestock rates are advanced from Missouri river points to the East and from southwestern points to the East, covering a portion of the territory which was not included in a case now before the commission.

"There has been severe competition between the carriers for this large tonnage," said Mr. Leland, "most of which is controlled by a half dozen large firms of packers, each of which maintains and has maintained a most efficient traffic organization, seeking at all times every advantage in rates or service. Any line failing to give preferred service on this traffic, both in movement of loaded and return of empty cars, has been deprived of it until ready to resume satisfactory schedules.

"In four years to December 31, 1914, a total of 321,539 cars of packing house products and fresh meats were shipped by these few shippers from Missouri river packing centers, of which about 250,000 consisted of fresh meat on which the normal rating is 13 cents higher than what we seek to get in these proceedings. If shipments from Wichita, Oklahoma City and Fort Worth are added, the total is probably 500,000 cars in four years. This represents about $4,000,000, or $1,000,000 a year which should have gone to the railways if the advances asked for are reasonable.

"The advance of 3½ cents per hundred pounds could not be reflected in the price of meat to the consumer. It amounts to only 1/33 of a cent per pound. Packers generally change the price of meat ⅛ of a cent per pound at a time, or 12½ cents per hundred pounds, almost four times the amount now asked in the freight rate. Therefore, the packer could not reflect the rate in the cost to the consumer, as the alteration is too small. Of course someone has to absorb the advance and the packer is the person who must and should do it."

Packing house products, he said, are regularly rated fifth class under present classifications, and fresh meat third class, the commodity rates on which advances are asked being considerably less. The advance would make both the same as fifth class, or 13 cents less than third class on fresh meat from Missouri river to St. Louis and Chicago. From Wichita to St. Louis the rate would be 23 cents less than fifth class and 30.5 cents less than third class, while from Oklahoma City to St. Louis it would be 27.5 less than fifth class and 52.5 cents less than third class, the respective classifications of packing house products and fresh meat.

"Present rates," said Mr. Leland, "are far below what they should be, considering the character of the traffic, the nature of the service and in relation to rates in effect on other carload traffic of similar classification. The traffic requires expedited service in cars provided by the shippers, weighing about 22 tons gross. The traffic is of perishable nature and about three tons of ice are carried as preservative, the cars being stopped often in transit for re-icing. The traffic, therefore, is of a very expensive nature, and the freight charges represent a very small portion of the value of the commodity transported."

The witness submitted numerous comparisons showing rates on this business as compared with fifth and third class rates established by the Interstate Commerce Commission in this western territory in recent cases. Figures were presented showing the gross ton mile earnings on this traffic as compared with the average of all commodity rates on other articles carrying the same classification.

"The present low level of rates," said Mr. Leland, "is due largely to stress of severe market and carrier competition. In the rate war from Omaha and Kansas City to the Mississippi valley and southeastern territory from 1897 to 1899, the rate on packing house products got down to 1 cent per hundred pounds, Omaha to Ohio river crossings. Another instance of severe competition was the gradual depression of rates from Wichita and the Kansas City market, in the effort to secure business to the east and southeast. As shown by the development of the packing industry at Fort Worth and later at Oklahoma City, there has been a gradual reduction of rates made to enable each of these new markets to compete with older markets. The element of market competition is one which cannot be divorced from rate adjustments on this traffic and its effect has always been to depress the rates."

The hearing on Monday was enlivened by a discussion of the newspaper reports of the case which Luther M. Walter, attorney for Morris & Co., declared were being influenced by the railways. Commissioner Daniels promptly shut off discussion of the subject, saying the case was not being tried in the newspapers.

E. B. Boyd, chairman of the Western Trunk Line Committee, and C. E. Spens, assistant freight traffic manager of the Chicago, Burlington & Quincy, testified on Tuesday as to the reasons for advancing live stock and meat rates.

THE STANDARD CODE ON THE B. R. & P.

The Buffalo, Rochester & Pittsburgh has adopted a number of changes in its train rules and has issued a revised edition of the whole book of rules for the operating department, to go into effect April 1. One of the principal changes is a requirement that conductors and enginemen at the beginning of each trip shall sign a report, to be transmitted to the despatcher, certifying that they have read all bulletins, naming the one last posted, and, on the same blank, that they have compared watches, specifying how much fast or slow each watch may be. The green glasses in the marker lights used on the rear of trains are to be abandoned, and yellow used in place thereof.

In the "General Notice" or introduction to the rules this code differs from the A. R. A. version in that there are two introductory paragraphs covering the conduct of employees in broader fashion than is common in cold official railroad rules. These two paragraphs are as follows:

The nature of the transportation business and its relation to the State and community require the services of men of active minds, good character and general ability. The employees of a railroad are at all times, both in the discharge of their duties as employees and as citizens, under the constant view of the public. Failure to be efficient parts of the transportation system, or valuable citizens in whatever place they are domiciled, brings reproach upon them and on the corporation with which they are connected.

There are corporate and private duties devolving upon each officer and employee that are not, nor can they be, expressed by fixed instructions or rules. A failure on the part of any one to perform such duties makes it the duty of the proper officer of the company to indicate to the person privately, in a proper way and place, his shortcomings. Subsequent failure to profit by the warning must sever the relations existing as employer and employee, notwithstanding the fact that there has been no literal violation of the printed rules.

A large proportion of the rules are in some respects different from those in the code as formulated by the American Railway Association. We note some of the more prominent differences.

The "General Rules," A to L, are amplified by the addition of others, extending to Z, and nine beyond Z. These added rules include all those matters in which all or many of the different classes of employees are interested and which in most codes are put into a chapter by themselves, following the numbered rules. One rule, H H, provides that on trains detoured over other lines the conductor and the engineman shall be equally responsible with the pilot for the safety of the train movement. Following the general rules are two short notices, one on applicants for employment and one on promotion. The code of definitions varies, in many small details, from the A. R. A. standard.

Rule 2a, requires watches to be shown to an inspector every two weeks or oftener. Rule 3 contains the usual injunctions about watches, and, in case of conductors and enginemen, both road and yard, requires them, when comparing, to assure themselves that watches are fully wound. Fusees, heretofore burning ten minutes, are changed; and flagmen will use five-minute red fusees and five-minute yellow fusees. Rule 11, forbidding a train to pass a red fusee, does not apply on a line where the

block system is in use; the train will stop and then proceed under control until a block signal is reached.

Rule 14, prescribing whistle signals for calling in the flagman names, on the branches, combinations different from those used on the main line. On double track, whistle signal 14c is to be used only when passing trains.

Following Rule 33 are four new rules regulating slow boards (or flags used for indicating that speed must be reduced) and another cautioning enginemen, when handling very long freight trains, to stop, if and whenever the hand signals cannot be seen.

Rule 90b requires the engineman, in the case of freight trains, when approaching a meeting point, to signal to the conductor by three blasts of the whistle, two long and one short; while in the case of passenger trains the conductor must be the first to act, sounding two long and one short on the air whistle.

The time interval specified in Rule 91, for trains of all classes, moving in the same direction, is five minutes.

A large portion of the lines of this company are equipped with automatic block signals; for other parts of the road the spacing of trains is covered in Rule 91a as follows:

Operators must block passenger trains a station apart, and all other trains a station behind passenger trains, unless it is otherwise provided.

Snow plows and engines equipped with flangers, in service, must be run in absolute manual block.

All other trains [freight following freight, etc.] must be blocked five minutes apart, unless otherwise provided.

Within yard limits trains do not have to flag, in clear weather, except when on the time of a first-class train. Rule 93 regulates practice in this respect; and requires that by night or in stormy or foggy weather proper signals must be displayed on all trains, cars or engines on main tracks.

Rule 99, the flagging rule, has four supplemental rules, a, b, c and d, the last of which reads: "Passenger trains making unusual stops in yard limits or standing an unusual length of time in yard limits must be protected by flagman."

Rule 100b requires that when, in the conditions named, flagmen are sent out they shall be given instruction in writing viz.: in the case of work trains, relief trains and section or bridge gangs; and when a conductor sends a flagman ahead on another train to hold the road. A flagman holding written instructions is to stop the train that he flags; and then hand the written instructions to the engineman; the engineman is to read them and then repeat them within the hearing of the flagman and the fireman. These instructions for flagging are to be issued by the conductor and engineman jointly, both signing. A flagman must not be sent out to flag only certain trains; he must flag all trains. This rule further reads: "Work and relief trains, running against opposing trains, must send out a second flagman when moving around all curves, and will not leave the regular flagman at an unreasonable distance from their work." A form is prescribed for the use of conductors in writing instructions to flagmen, and a carbon copy is to be kept by him.

Following Rule 104 are ten supplementary rules, dealing largely with the management of hand switches and with switching movements with passenger trains. Following Rule 105 are five supplementary rules on miscellaneous subjects.

Rule 208a contains elaborate precautions for the guidance of despatchers when sending a meeting order to a train at the meeting point. Rule 210 requires the conductor only to sign train orders. Orders on Form 31 must be delivered by the conductor personally to the engineman and he must read the order aloud to the conductor *before proceeding*.

The use of form 19 for orders restricting the superiority of a train is covered by Rule 211a, which is as follows:

Outside of territory covered by a block system, a "19" order must not be sent to a train, the superiority of which is thereby restricted.

Within the automatic block signal limits Form 19 train order may be issued to restrict the superiority of a train, except that Form 31 must be used as follows:

First: When orders are delivered at a non-train-order or closed train-order station.

Second: When necessary to restrict a train which has been cleared or the engine of which has passed train order signal.

Third: When issuing an order, Form G, example 3, or an order under any example of Form F.

Fourth: When giving any train right over all trains.

Fifth: When reducing a time order, where necessary that despatcher have signature of superior and inferior trains before completing order to superior train.

Within the manual block system limits, the "19" train order must not be used to restrict superiority, except that on single track when a copy of the order has been addressed to, and acknowledged by, the operator at the meeting or waiting point, Form A and examples 3 and 4 of Form E may be used.

Operators will fill out clearance card, designating thereon numbers of all orders, Forms 19 and 31, repeat to despatcher train and order numbers as they appear on clearance and obtain O. K. with time and despatcher's initials, writing same before delivery in blank space provided for that purpose. Operator will retain carbon copy of clearance.

Despatcher must write train and order numbers in his train order book as transmitted by operator from clearance, and must designate time clearance was made O. K. not transmitting O. K.'s unless operators repeat numbers of all orders to be delivered to the train to which clearance is addressed.

Conductor's and engineer's attention is called to the importance of approaching at a moderate rate of speed train order offices where orders are to be received; also to the necessity of carefully checking clearance card to ascertain positively that clearance is properly addressed, and that orders received are those called for by clearance.

Following the train rules are the manual block signal Rules 301 to 321, five pages, and next the automatic block signal rules, four pages. These last are preceded by three pages of explanatory notes. Neither the manual nor the automatic block signal rules correspond to those in the standard code as issued by the American Railway Association. The rules for interlocking signals differ from those in the standard code, although a larger proportion of them correspond with those in the standard.

Following the standard rules are eighty pages containing the rules addressed to different classes of employees; and following this part of the book are twenty pages containing rules regarding personal injuries; handling United States mail; train mail; uniforms; steam heat; air brakes; bulletins; tools required on engines, cabooses, baggage cars and passenger cars; and rules for the care of lamps.

Following are some of the instructions for despatchers:

720. . . . The train order signal should not be entirely depended upon to hold train for orders during a blizzard. Extra precaution must be used.

722. An even hour must not be used in giving time of day; that is, do not issue an order reading "10:00 a. m.," but make it read 9:59 or 10:01 a. m.

723. Before giving an extra its running orders, enter it on the train sheet, and carefully examine such sheet for opposing and work extras.

When practicable always run extras to their known destination; that is, avoid for temporary convenience, short running orders.

724. As far as possible avoid issuing round-trip orders; when necessary to give them, enter such extra on both sides of the train sheet. BEFORE ISSUING THE ORDER. Do not attempt to restrict such extra on its return trip by sending the order in advance of it; either get the signature of the conductor, or place the order affecting such train at a station which will be reached on its return trip.

725. A conspicuous circle should be drawn on train sheet around limits of any work trains on line.

Do not extend the limits or time of a work extra. Annul their former order and issue another as may be necessary under later conditions.

727. Meeting orders must not be issued except when the trains affected can see and identify each other at the meeting point.

730. When a train is to be detoured and its schedule annulled between certain stations, secure the acknowledgment of the conductor of the schedule which is annulled before issuing for other trains, or otherwise so place the annulment that an accident cannot result should the detoured crew regain their proper district at an unexpected point.

Railway Traffic in Morocco.—It is reported that a recent decree has sanctioned the use of military railways in the French zone of Morocco by private persons, whilst declining responsibility for their safety. Should this measure be further extended, it is stated, and the Rabat-Fez Railway be used for merchandise, there can be little doubt that goods imported from foreign countries destined for Mequinez, Fez, and the districts fed from those centers would be directed to Kenitra, the trade being thus diverted from Laraiche and Tangier.

RESULTS OF THE LOCOMOTIVE BOILER INSPECTION LAW*

By Frank McManamy

Chief Inspector, Locomotive Boilers, Interstate Commerce Commission, Washington, D. C.

A resume of the work of the locomotive boiler inspection service during the three years and eight months since the law became effective shows results for which we have not one word of apology to offer. The following table shows in concrete form the inspection work performed each year since the passage of the law; and the decrease in the percentage of locomotives reported defective indicates in a measure the improvement in conditions:

	1914	1913	1912
Number of locomotives inspected..	92,716	90,346	74,234
Number found defective.....	49,137	54,522	48,768
Percentage found defective.....	52.9	60.3	65.7
Number ordered out of service....	3,365	4,676	3,377

It does not, however, fully show the improved conditions resulting from the operation of the law, because, as pointed out in our 1913 report, our attention was first concentrated on the more serious defects, so that the number of fatalities might be reduced; therefore, the improvement is more accurately indicated by the reduction in the number of casualties, as shown by the following table:

	1914	1913	1912
Number of accidents.....	555	820	856
Decrease from previous year...per cent	32.3	4.2	...
Decrease from 1912.....per cent	35.1	...	...
Number killed	23	36	91
Decrease from previous year....per cent	36.1	60.4	...
Decrease from 1912.....per cent	74.7	...	...
Number injured	614	911	1,005
Decrease from previous year....per cent	32.6	9.3	...
Decrease from 1912 .....per cent	38.9	...	...

The data shown above is taken from the records up to July 1, 1914. A check of the first six months of the present fiscal year, that is from July 1, 1914, to January 1, 1915, in comparison with the corresponding period in the preceding year shows that during the period ended January 1, 1914, there was a total of 349 accidents which resulted in injury, with 15 killed and 385 injured thereby. During the period ended January 1, 1915, there was a total of 253 accidents which resulted in injury, with 6 killed and 271 injured thereby, or a decrease of 27.5 per cent in the number of accidents, 60 per cent in the number of killed, and 30 per cent in the number injured by the failure of locomotive boilers and their appurtenances.

Going back further and making a comparison with the corresponding period for 1912, we find that during the six months' period ended January 1, 1913, there were 470 accidents which resulted in injury, with 24 killed and 512 injured thereby. In other words, the number killed by failure of locomotive boilers and their appurtenances during the first half of our fiscal year which began on July 1, 1912, was 12½ per cent greater than for the corresponding periods in the two following fiscal years, with almost as great a decrease in the number injured and the number of accidents. Or, to state the whole matter briefly, in three years the number killed by failure of locomotive boilers and their appurtenances has been reduced from about 100 per annum to less than one-fourth that number, and the number injured from more than 1,000 per annum to less than one-half that number, with a corresponding decrease in the number of accidents.

These are the direct results of the operation of the locomotive boiler inspection law, and indicate the manner in which it is fulfilling the purpose for which it was enacted: namely, to promote safety. The question will no doubt arise as to just what the law has done to produce such results. The results are due to a number of reasons, among which are more careful inspection, more prompt repairs and attention to minor defects, investigation and classification of every accident that resulted in injury, with a view to determining the cause and remedying it, and giving publicity to the information collected.

No railroad man with a trace of honesty and a knowledge of conditions and practices prior to the passage of the law can question the fact that, generally speaking, inspections are now made more carefully and more regularly, and repairs are more promptly made, and further that the question of repairs is less apt to be determined by the number of loads in the yard awaiting movement, although unfortunately that is still occasionally considered to be the deciding factor; an illustration being a recent request by a master mechanic to operate a locomotive with 43 broken staybolts a distance of 312 miles, because they needed the power. It must be admitted, however, that such instances are becoming more rare, although we still occasionally find a superintendent or trainmaster who in spite of the fact that he is at the other end of the division considers himself a better judge of the condition of a locomotive than an inspector or foreman who is on the ground, and orders it into service regardless of its condition.

The importance of giving attention to minor defects can be shown by a single illustration. During the last fiscal year 18 persons were injured due to studs blowing out of firebox or wrapper sheets. The practice of repairing leaky studs by caulking, or permitting them to continue in service without repairs, should be discontinued.

I have recently had occasion to read very carefully statements made before Congressional committees at the time the boiler inspection law was pending, to the effect that all boiler explosions were really crown sheet failures due to low water; therefore, were man failures. In order to correct this misapprehension, attention is directed to the records of such accidents since July 1, 1911.

During the year 1914, as compared with 1912, accidents which are usually termed boiler explosions which resulted in injury have decreased 44 per cent, or from 97 in 1912 to 54 in 1914, and the number of killed and injured has decreased 64 per cent, or from 290 to 104. During the same period crown sheet failures due to low water decreased 48 per cent, or from 92 to 48. I am directing attention especially to this class of accidents, first to show that the class of accidents which were said to be unpreventable have been materially reduced, and also because our investigations have shown that by proper application and maintenance of boiler appurtenances they can be still further reduced.

Rule 42 provides that, "Every boiler shall be equipped with at least one water glass and three gage cocks. The lowest gage cock and the lowest reading of the water glass shall be not less than 3 in. above the highest point of the crown sheet." While it may be a compliance with the letter of the law to locate these appurtenances where they can be most easily applied, regardless of their convenience to the enginemen, it is manifestly not a compliance with the intent of the law, and is not conducive to safety, as an improper or inconvenient location may seriously interfere with their proper use. A certain type of locomotive has the water glass located directly behind the engineer and entirely out of sight of the fireman. In other instances glasses are found so obscured by other boiler appurtenances or by an improper shield that it is difficult, and under certain conditions impossible, to see the water level. A recent investigation of a crown sheet failure showed that the cab arrangement was such that the water glass and gage cocks were 9 in. above the engineer's head and that he regularly carried a small keg to climb upon to try the gage cocks. Can it be seriously questioned that such conditions cause accidents, particularly when operating in a busy terminal? Using a shield that obstructs the view of the water glass is also too common. The manner of application is also important, both as to water glasses and gage cocks.

We also find that the manner in which gage cocks and gage

*Presented at the March meeting of the Western Railway Club.

cock drippers are applied indicates that the purpose for which they were applied did not receive sufficient consideration. While the application of a dripper is important to prevent the discharge from the gage cocks from scalding anyone in the cab, it should not be located so close to the gage cocks that the nipples extend down into the dripper, preventing enginemen from seeing the discharge, as dripper pipes occasionally become obstructed and fill with water, in which event the sound of water and steam are identical.

Failure of injector steam pipes continues to be one of the most frequent causes of serious accidents, and is the only one which shows an increase during the present fiscal year over the corresponding period for the previous year. To bring out clearly the cause of these failures, the following is a complete list of all that have occurred since July 1, 1914, and which resulted in 1 killed and 15 injured, showing the cause of each:

Injector Steam Pipe Failures, July 1, 1914, to March 1, 1915

1. Collar broke on right injector steam pipe, due to old crack in collar.
2. Steam pipe to left injector blew off where brazed to collar.
3. Injector steam pipe blew off; union nut broke while being tightened under pressure, due to defective nut and use of improper tools for making repairs.
4. Threads stripped in injector steam pipe union nut while being tightened under pressure; nut too light and threads badly worn.
5. Injector steam pipe blew off; union nut broke while being tightened under pressure.
6. Union to left injector steam pipe blew off, fatally scalding fireman who was attempting to tighten it under pressure; spanner nut too large.
7. Steam pipe to left injector pulled loose at turret connection due to defective brazing and injector not properly braced.
8. Left injector steam pipe collar broke at injector throttle connection; old crack in flange of collar and wrapped with asbestos to stop leak.
9. Injector steam pipe collar broke; defective collar.
10. Injector steam pipe spanner nut broke while being tightened under pressure.
11. Spanner nut on injector steam pipe broke while being tightened under pressure. Nut had been badly damaged previous to accident by use of hammer and set.
12. Injector steam pipe pulled out of collar; improperly brazed.
13. Spanner nut on left injector steam pipe broke while being tightened under pressure; due to use of improper tools.
14. Injector steam pipe broke at brazing.
15. Right injector steam pipe collar broke; defective collar.
16. Injector steam pipe collar broke; defective collar.

The nine failures, four of which were due to poor brazing and five to collar or sleeve breaking, can, I believe, be prevented by extending the pipe through the collar or sleeve and flanging or beading it, thus reinforcing the collar and reducing the strain on it, as the end of the pipe itself will be solidly held in the joint; therefore, it will carry the load. If properly applied in this way, brazing is not necessary, although it can be done if desired. This method of application is at least as cheap as brazing, and defective or improper workmanship can be discovered by inspection, which is impossible with the brazed connection.

In view of the statements occasionally made relative to the expense to the carriers of complying with the Locomotive Boiler Inspection Law, it may be pertinent to inquire if proper entries are always made on the credit side of the ledger and a trial balance taken. I will confess that we do not feel ourselves competent to place a value on human life; but an estimate based on the average cost to the carriers of an accident resulting in the loss of a life multiplied by the decrease in the number of such accidents during the past three years will be at least as nearly correct as the average estimate of the cost of the law, and will give a substantial item to start with. As injured employees usually receive pay from the company or compensation from the relief department for the time lost, an estimate of the saving from this source based on the decrease in the number injured would be another important item.

There are other results, more or less indirect, but of substantial benefit to the carriers, among which are a reduction in the number of engine failures, as we have numerous records of locomotive performance which show an increase of from 200 to 800 per cent in the miles per failure since the law become effective, which it is admitted is largely due to improved conditions resulting from the stimulating effect of the law. A saving in fuel is another result of the improved conditions brought about by compliance with the requirements, among which are prohibiting the use of fire plugs and providing that boilers must be more carefully washed, and must have all scale removed when in shop for repairs, and that leaks both in and outside of firebox must be kept down to the minimum.

In this connection it is not out of place to state that few, if any, railroad men realized the extent to which the use of flue plugs had been carried prior to the passage of the law. It is true their use was admitted to be general, and our records of the hearings prior to the approval of the rules contains numerous statements made by prominent mechanical officers that a rule prohibiting the use of flue plugs would cripple their road. On one prominent road indifference to the rule was expressed, as they stated they were not using flue plugs; yet after the rule was in force they were the first to apply for relief from its provisions until they could prepare to meet its requirements, showing conclusively that they did not realize the extent to which they had been depending on flue plugs.

Failure to properly wash and scale boilers is another evil which had grown to alarming proportions, due perhaps to the fact that washing or scaling a boiler is among the most disagreeable tasks around a shop, and is too often performed by incompetent or indifferent labor not properly supervised. In addition to being one of the chief causes of leaking crown and staybolts, tests have shown that ⅛ in. of scale on heating surfaces results in a loss of approximately 15 per cent. of the value of the fuel; therefore, clean boilers mean in addition to increased efficiency a saving in cost of fuel as well as in the cost of repairs.

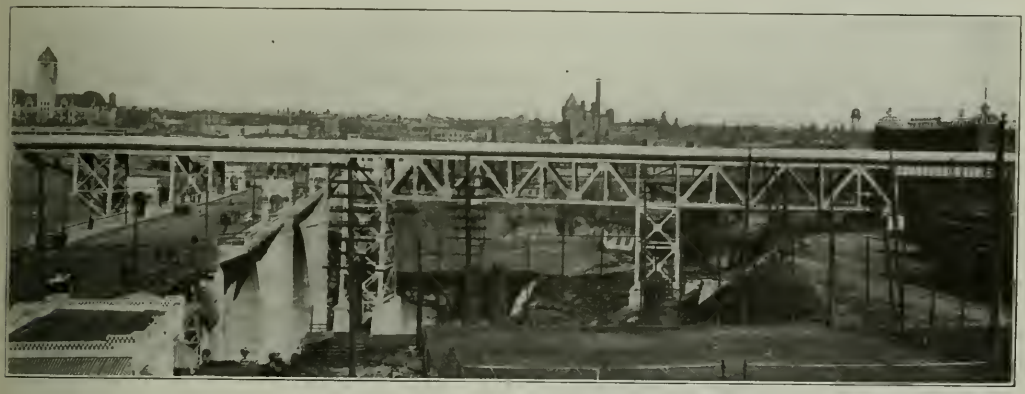
While it can not be doubted that the remarkable decrease in the number of casualties and the improved conditions noted, as well as many others, are a direct result of the operation of the law, I do not wish to be understood as claiming that those who are administering the law are entitled to all credit for the improvement shown. Such results could not have been accomplished without the co-operation of the railroad officers, which we have in a great measure received. However, co-operation does not mean that we should ignore defective conditions and permit locomotives to remain in service in violation of the law, and that will not be done; it does not mean that attempts should be made to conceal defects by making improper inspections or by certifying to reports which do not represent actual conditions.

Classes in the London Tubes.—On February 15 the Great Northern & City Railway of London introduced an innovation in the form of first class cars in the tubes. While the general tendency in recent years has been for the British railways to eliminate the second class, the tubes have been the only lines to conform with the democratic standards of the omnibus and the street car and provide one class only. Many objections were raised against this practice in the early days, but the opposition has now died down, the one-class system having worked so well in practice. The Great Northern & City desired to meet the special convenience of through season ticket holders who live on the Great Northern. In Paris it is customary to provide two classes on the street cars, as well as on the motor omnibuses and on the Metropolitan there are first and second but no third-class. The one-class system for short-distance traffic seems to suit the British public better than the French. It is the general opinion that such a division by classes would not pay in England, except in the case of a line like the Great Northern & City, which handles through season-ticket traffic to and from a main line, and is in a special position when it comes to catering for first class passengers.

Notable Structures On The Spokane-Ayer Cut-off

Some Interesting Problems Connected With Construction of Three Large Bridges on New O-W. R. & N. Line

A new cut-off 104 miles long was placed in operation on September 15, 1914, on the Oregon-Washington Railroad & Navigation Company, shortening the distance between Portland, Oregon, and Spokane, Washington, by 51 miles. The original distance was 419 miles. The grades were also reduced from a maximum of 3 per cent to 0.6 per cent, and the maximum curvature from 10 deg. to 3 deg. (except in some cases where special conditions govern speeds). The adverse grade was also very materially reduced.



The Completed Structure Over the Spokane River at Spokane

To maintain these low maxima it was necessary to build some very heavy and extensive structures at the Spokane terminal of the cut-off and through the rugged Palouse and Snake river canyons. All the steel structures are designed in accordance with the Common Standard Specifications of the Union Pacific system, with a live load of two 192.5-ton engines followed by 5,000 lb. per lineal foot of track. From the new station in Spokane to the city limits, a distance of 5 miles, all grade crossings are avoided and ideal operating conditions are obtained by means of steel girders with ballasted floors.

The Snake River Viaduct

THE SPOKANE RIVER AND MONROE STREET CROSSING

The Spokane river is crossed twice within the city, the first crossing being immediately at the head of the elevated passenger yard (see *Railway Age Gazette*, January 15, 1915) where the track is carried both over the falls of the Spokane river and

over the noted Monroe street arch bridge built by the city a few years ago. The height of the rails above the falls is about 160 ft. This structure, which was the closing link in the cut-off, is built for double track and is flared at the end to accommodate leads and crossovers for the head of the passenger terminal. It has a ballasted deck carried on reinforced concrete slabs supported on steel deck girders and trusses.

The entire structure is approximately 769 ft. long, consisting of one 195 ft. and one 160 ft. truss with tower and girder approaches on each end. The tower spans are 30 ft. long, and the intermediate girder spans vary between 50 and 110 ft. in length, a girder of the latter length being necessary to cross the Monroe street bridge properly. The towers vary in height from 42 ft. to 122 ft. The abutments are of the U type. The easterly one, adjacent to the station yard, is 65 ft. high and is reinforced concrete, with bottom slab and counterforts. The other abutment is of ordinary height, reinforcement being supplied only to take care of the effect of possible unequal settlement. It is supported on piles driven through the fill, which was thoroughly compacted with water previous to the building of the abutment.

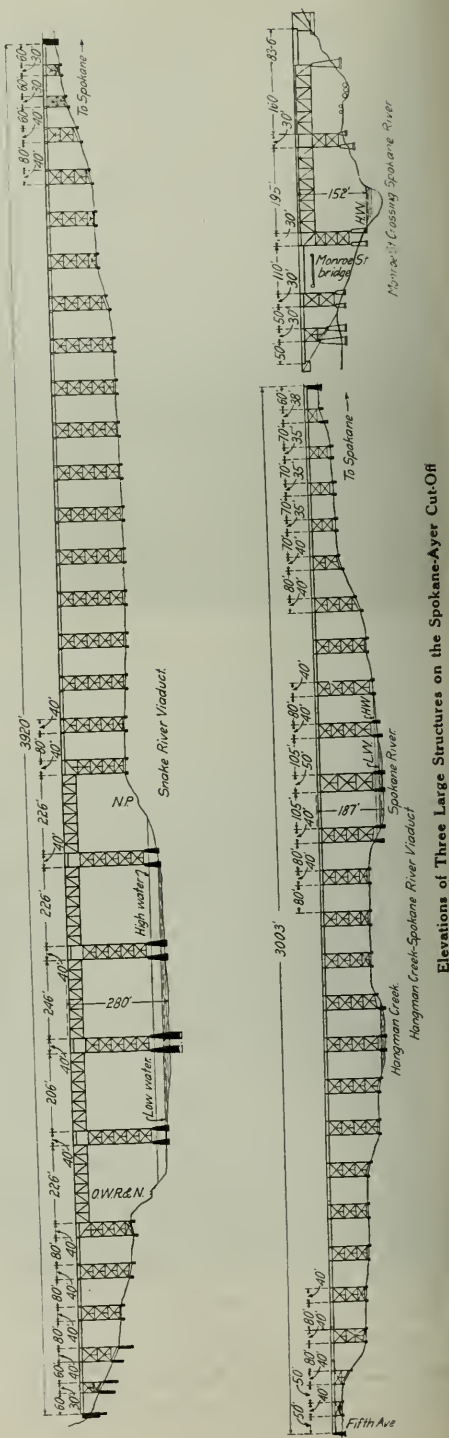
In order to take care of thrusts due to the fill, the pedestals which are subjected to such loads are connected by longitudinal walls, and where the effect of the falls during high water must

Erecting the Snake River Viaduct

be resisted the pedestals are connected by cross walls; otherwise they are of the usual independent construction. Local conditions involving protection against slides and facility in taking care of expansion details were considered sufficient reason for the adoption of a pier rather than a tower at the end of the 160 ft. truss span. The lengths of the spans and locations of the towers and piers were practically dictated in every case by right of way or other special conditions.

Good foundation material was encountered in all cases, either in the form of sand or basalt rock. Notwithstanding this fact, thorough investigations were made to eliminate the least doubt, as the igneous rock in this locality is often underlaid with clay or other soft material, or lacks continuity.

The erection of the structure proceeded from both ends simultaneously without falsework, except for the 160 ft. truss span, which was used as the anchor arm for the cantilever erection of the 195 ft. span. The anchor end of the 160 ft. span was counterweighted with 450 tons of rails. A tension member was placed over the top to the tower between the anchor span and the span to be cantilevered, this tie being 4¼ in. shorter than the length of the tower. The span to be cantilevered was in this way inclined upward to take care of the deflection due to the cantilever stresses. When the cantilever had been extended about



Elevations of Three Large Structures on the Spokane-Ayer Cut-Off

three-fourths of its length the bent which was to support its outward end was set in place from the span, it being impracticable to set it either from the shore or from the Monroe street arch. The cantilever was then continued out and over this bent. The anchor arm was jacked up to release the tie and to allow the 195 ft. span to be supported on its permanent bearings, the counterweight being gradually removed and the dead load transferred to the jacks. The anchor span was then lowered to its shoes. The derrick used in the work was assembled from four cars, two abreast, strongly tied together, and carrying two large booms, one 82 ft. and the other 92 ft. long. The heaviest single

Placing the Last Span in the Structure Over the Monroe Street Arch and the Spokane Falls

piece handled weighed 30 tons. The 110 ft. girders were placed last. They were extended over the Monroe street arch and were placed by means of an ordinary derrick and the large derrick described above.

The concrete slab rests directly on the stringer flanges and is divided by transverse expansion joints into divisions about 50 ft. long. These joints are waterproofed with sheet lead pockets filled with tar. Another joint was introduced along the center of the bridge on account of the deflection occurring with one track occupied with live load and the other unloaded. The center longitudinal joint was covered with waterproofing fabric. The slab was waterproofed with a mixture of coal tar, cement and kerosene, which has performed its function without giving any trouble. Drainage is taken care of where necessary by means of tile drains and downspouts.

The hand railings are reinforced concrete panels set into grooves in the curb. They were poured in place. A gray paint was used for the steel work to conform with the color of the city's concrete arch beneath. There are approximately 3,000 tons of structural steel and 10,000 cu. yd. of concrete in the structure.

HANGMAN CREEK VIADUCT

The line crosses the Spokane river a second time about three miles from the Spokane passenger station, at the confluence of Spokane river and Hangman, or Latah, creek. This structure is 3,003 ft. long and 180 ft. high, and is of the conventional tower and girder construction. The tower spans range between 35 ft. and 50 ft. in length, and the intermediate spans between 50 ft. and 105 ft. The pedestals in the river and on the low land adjacent to it are carried on wooden piles, while the others have bearing on sand or gravel. The river piers are 34 ft. high and were built in cofferdams.

Before the completion of the bridge, an extension to it involving a connection with one of the street crossings, and with a change of line, was decided upon. A concrete pier containing about 275 cu. yd., had already been built at the street crossing on the original location. This pier was jacked up, placed on rollers and moved about 50 ft. to the new line. The temporary supports were replaced with concrete, and wings being added, the pier was incorporated into an abutment. The cost of moving the pier was no greater than the probable cost of breaking it down, had this been done, so that the saving amounted to about the cost of the concrete entering into the pier.

There are about 5,700 cu. yd. of concrete and 3,900 tons of steel in this structure, which is constructed for single track.

THE SNAKE RIVER BRIDGE

The western portion of the Spokane-Ayer cut-off follows the Palouse river until this stream flows into the Snake river. The line is constructed high above the Palouse river, and at the confluence continues directly across the Snake river canyon about 270 ft. above low water, and on striking the left bank continues down to a connection with the older O.-W. R. R. & N. line which runs up the Snake river canyon. Incidentally the Northern Pacific tracks are crossed on the right bank.

The bridge across the Snake river is notable on account of its length, height and the problems involved in its construction. The structure is 3,920 ft. long and includes a viaduct approach 510 ft. long on one end and 2,040 ft. on the other, the tower spans being 30 and 40 ft., and the intermediate spans varying from 60 to 80 ft. The river channel spans proper consist of five riveted truss spans varying from 206 ft. to 246 ft. in length, supported on

False Work Tower and Girder Caps Used in Erection of Snake River Viaduct

steel towers. Each post of the towers supporting the truss spans is carried on an individual concrete pedestal, the height of the highest towers being 221 ft. above the masonry.

The foundations for the approaches presented no special difficulty, all being above the high water level. They were carried down to bedrock, and their dimensions are ordinary except where they run through loose material, in which case pedestals 65 ft. high were found necessary.

The sixteen pedestals in the river channel, however, presented many difficulties owing to the swift current of the stream, which

is the principal tributary of the Columbia, and to the sudden and rapid rise of the floods. The location of bedrock was found to be extremely variably in depth, and on this account the lengths of the spans were varied to obtain economy in the foundations.

The river pedestals were built by the pneumatic process, the deepest work being done 64 ft. below water surface, making the pedestal at this point 95 ft. in height. The abutments are of the U type of reinforced concrete.

On account of the lack of space available for storage close to the bridge site, the structural steel was unloaded at the railroad company's material yards at Hooper, Wash., 15 miles from the Snake river, whence it was hauled to the river as it was needed. At the bridge site the steel was unloaded by derrick in locations convenient to be handled to its final location in the bridge. The erection derrick, which was constructed at the site, was self-propelled and was capable of swinging the 80 ft. girders in place. The tower sections had to be outhauled because of their batter. This was accomplished by use of a timber outrigger projecting from the piers.

The westerly end of the bridge is on a 6 deg. curve, over which the large derrick could not be operated on account of its long wheel base. On this account, and to expedite the work, the steel for about 500 ft. of this end of the bridge was detoured 56 miles and handled to its place by a smaller derrick.

The first truss span crosses the Northern Pacific track on the right bank of the river. The first half of this span was erected on steel falsework supported on concrete piers. The falsework consisted of a tower and two 80-ft. girders of slightly special design to fit them for their use in erection; afterward these girders and the major portion of the temporary tower were removed and used as permanent portions of the bridge. The first half being in place, the remainder was erected as a cantilever and landed by means of sand boxes supported on the falsework.

The succeeding spans were built out as cantilevers, erection devices being used for this part of the work, which was at times rendered difficult and troublesome because of the very high and continuous winds. The erection devices consisted of the usual temporary compression members in the plane of the bottom chord and adjustable tension members in the top chords. The adjustment was accomplished by a wedge arrangement operated with screws between two bearings. The trusses are 21 ft. center to center and 36 ft. deep, while the girders in the approaches are 10 ft. on centers. The foundations contain 16,830 cu. yd. of concrete and 7,900 tons of steel were used in the superstructure.

COMMISSION'S CIRCULAR ON INCREASED REVENUES IN EASTERN TERRITORY

The Interstate Commerce Commission has sent to the carriers a circular calling for a report on the additions to revenue made by increases in freight rates authorized in the Eastern rate decision. An abstract of the circular follows:

You are required to prepare an estimate of the additions to your transportation revenues and incidental operating revenues accruing from the application of increased interstate and intrastate rates, fares and new charges, and of additions to revenues accruing under contracts or arrangements made subsequent to July 29, 1914, for May, 1915, and to report separately to this commission such additions to your revenues on or before July 1, 1915.

You are required to keep an actual account of the similar additions to your revenues for October, 1915, and April, 1916, to prepare an estimate of such additions to revenues for the 12 months ending June 30, 1916, and to report separately the additions to your revenues, herein described, such reports to be made on or before February 1, 1916, August 1, 1916, and September 1, 1916, respectively.

The actual account of the additions to revenue shall be based upon traffic or business included in the revenue accounts for October, 1915, and April, 1916.

The actual additions to freight revenue from increased rates and new charges must be based upon information appearing on the way bills and other records in which the details are kept. The actual amount of additions to revenues, other than freight, must be based upon records in which the details of the traffic or business are kept.

Additions to revenues from new charges include revenues accruing from services performed for which no charge was made prior to July 29, 1914.

The estimated amount of the additions to the revenues for the 12 months ending June 30, 1916, shall be based upon the aggregate actual additions to such revenues for October, 1915, and April, 1916, and upon a general review of the traffic or business for the 12 months. It is not expected that carriers will arrive at the estimate for the 12 months by merely multiplying by six the aggregate results for October, 1915, and April, 1916, unless the flow of traffic of a particular commodity or class or the volume of business is regular and constant throughout the 12 months, so that the results for the two months fairly represent one-sixth of the traffic or business for the 12 months.

Deductions from revenues, account of claims for overcharges, should not materially affect the amount of additions to such revenues resulting from the application of increased rates and new charges made subsequent to July 29, 1914. Such claims, therefore, need not be considered in compiling the statistics to be returned in this report, unless the carrier so desires.

The carriers also are required to keep, for each of the periods above specified, an account of the expenses incurred in compiling and reporting the information required to be returned in this circular, the report of such expenditures to accompany their reports on the additions to their revenues.

No methods for compiling the information to be returned in this report have been prescribed. Carriers are required to submit to the division of carriers' accounts of this commission, on or before April 1, 1915, for approval, a statement of the proposed methods of compiling the information required.

If carriers can more readily furnish the desired information by a system than by roads, they should so indicate to the commission, requesting authority to make the returns by a system and advising the names of the roads to be included in their system returns.

Australia's Interstate Strategic Railway.—At Melbourne recently, Mr. Fisher (the Commonwealth Prime Minister) stated that he would submit to parliament as soon as possible the question of constructing a strategic railway from Port Augusta to Brisbane. The probable cost of the railway will be £20,000,000.

Indian Coal.—The quantity of coal carried over the East Indian Railway in the six months ended September, 1914, was 5,317,982 tons. This total was made up as follows: Carried for other Indian lines, 1,015,117 tons; carried for the East Indian undertaking, 564,892 tons; carried for the public, 3,737,073 tons. The corresponding movement in the six months ended September, 1913, was 5,153,762 tons. The up-and-down coal traffic for railways and the public in the half-year ended September, 1913, was 4,752,190 tons, as compared with 4,620,229 tons. The outbreak of the war had an adverse effect upon Indian coal traffic, and crippled for a time export business from Calcutta docks. This caused a diversion of large quantities of coal for Bombay, and also of some for Karachi, to the all-rail route. The quantity of coal exported from Calcutta by sea during the half-year ended September, 1914, was 1,287,934 tons, as compared with 1,421,869 tons in the half-year ended September, 1913. Of the coal thus exported the East Indian carried 1,040,342 tons and 1,036,028 tons, respectively. The output of coal at the East Indian Company's collieries in the half-year ending September, 1914, was 332,919 tons (of which 265,206 tons were steam coal), raised at an average cost of 56 cents a ton at the pit's mouth.—*Engineering.*

CHARLES C. McCHORD

Charles C. McChord, who was appointed a member of the Interstate Commerce Commission by President Taft in December, 1910, at the same time that B. H. Meyer was appointed a commissioner, has become chairman of the commission. The chairmanship passes each year from one member to another in order of seniority. The most noteworthy point about Mr. McChord's work on the commission is probably the fact that he was one of the two commissioners who were in the minority in the 1914 eastern rate advance case as originally decided by the commission. He and Commissioner Daniels expressed the opinion that the railroads should have been granted the increase in rates asked for. In substance the majority of the commission on the rehearing of the case came around to agree with Mr. Daniels' and Mr. McChord's point of view.

The following quotations from Mr. McChord's dissenting opinion are of interest as showing his grasp of the rate situation:

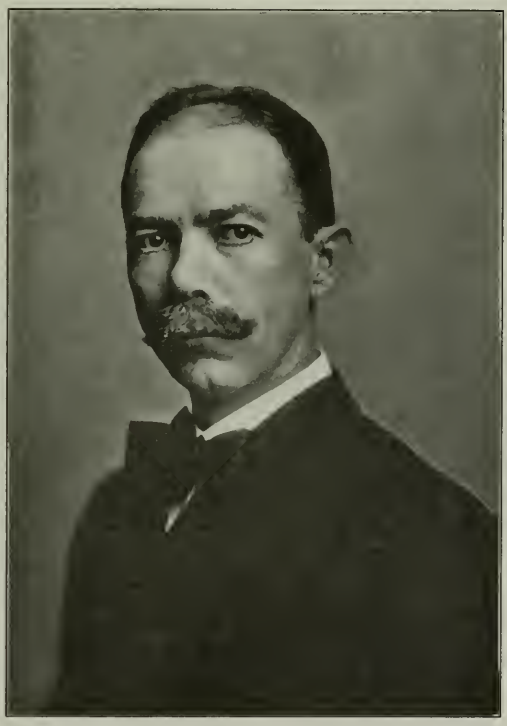
"To disallow an increase in the joint through rates and at the same time allow an increase in Central Freight Association territory to and from the Ohio river gateways would have the effect of allowing increased locals to Central Freight Association lines on this through traffic at the expense of their southeastern connections, who would be expected to shrink their earnings to the extent the Central Freight Association lines increased theirs. . . .

"Within each territory are some of the greatest commercial centers of the country, each in active competition with the other in the purchase and sale of raw materials and manufactured products. For many years the rates between these cities have borne a fixed and well understood relation each to the other. Commercial conditions have, to a considerable extent, come to be based upon this relationship, and insofar as is shown by this record, it appears to have given general satisfaction. It must follow that any general increase of rates within Central Freight Association territory alone will change the rate relationship as between cities in that territory and cities in trunk line territory, perhaps to the advantage of the latter.

"Viewed from a commercial, geographical, or transportation standpoint, and in the light of the facts of record, I am convinced that the reasons which impelled the commission to approve certain changes in Central Freight Association rates apply equally to trunk-line rates, and that the transportation conditions in the two territories are not absolutely so much unlike as to indicate the wisdom of dissimilar treatment of the rates proposed by the carriers in the entire official classification territory."

Before becoming a member of the Interstate Commerce Commission Mr. McChord had served as chairman of the Kentucky Railroad Commission. While a member of the Kentucky state senate, in which he served four years, Mr. McChord framed the bill popularly known as the McChord Railroad Law, which gives the Kentucky Railroad Commission the right to make reasonable freight and passenger rates for railroads. Mr. McChord is a democrat.

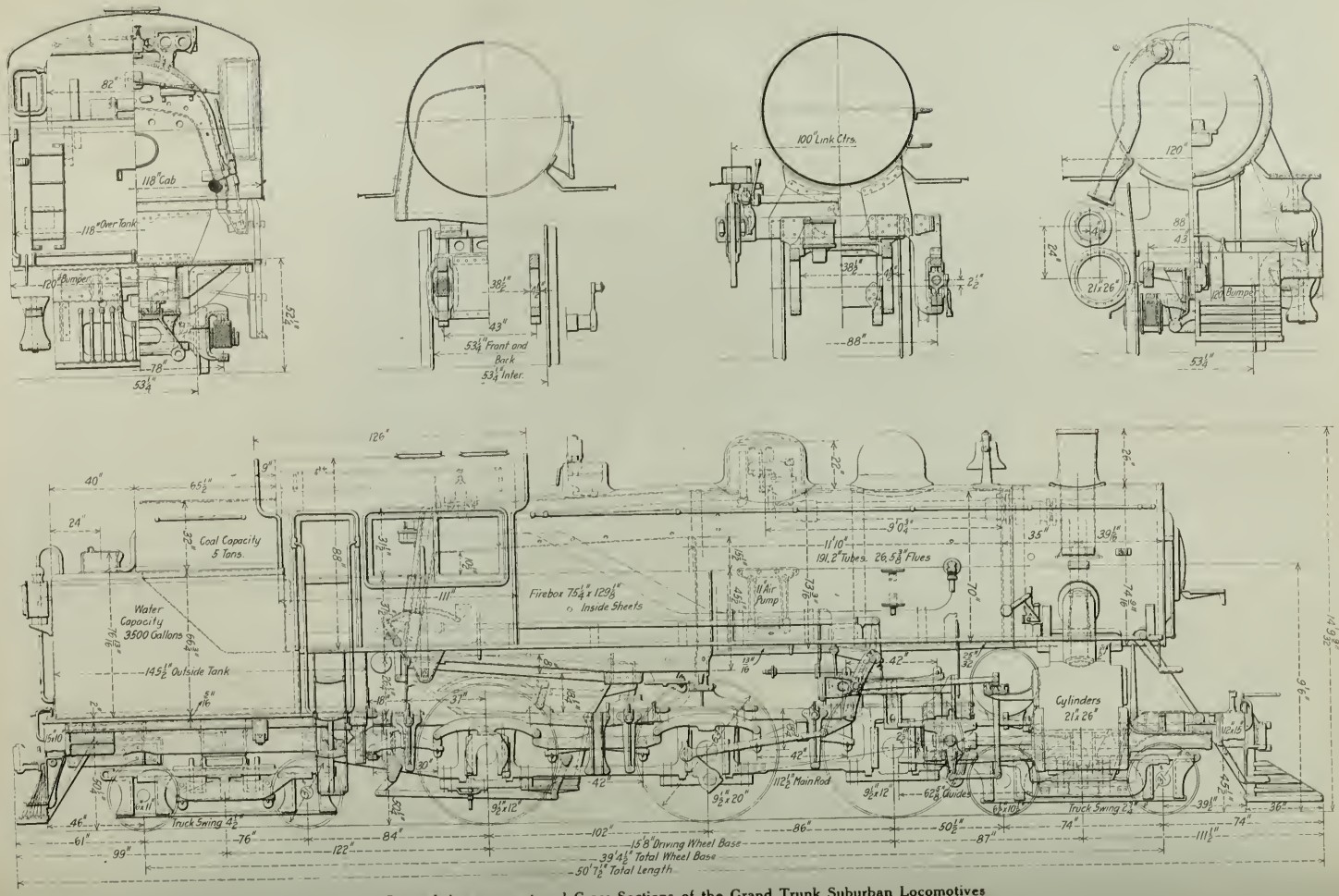
Charles C. McChord was born on December 3, 1859, at Springfield, Ky. He received his education at Center College, Danville, Ky. After graduation he became a member of the bar of Kentucky and practiced law in that state. He was made prosecuting attorney at Springfield, Ky., holding this office from 1886 to 1892. He was appointed a member of the Kentucky Railroad Commission in May, 1892, and was elected chairman of the board. He resigned in 1895 and was elected a member of the Kentucky state senate, serving for four years. In 1899 he was again elected a member of the state railroad commission and was again made chairman of the board. He was re-elected commissioner and chairman in 1903, and in 1910 was appointed by President Taft a member of the Interstate Commerce Commission.



Charles C. McChord

A New Central African Railway.—The Central Africa Railway is now approaching completion. The line extends from Port Herald in the British colony of Nyasaland to Chindio on the Zambesi river in Portuguese East Africa, a distance of 60½ miles, and is practically a continuation of the Shire Highlands Railway. This extension, together with the transport facilities provided by the British Central Africa Company's flotilla of steamers to Chindio, will considerably assist in accelerating the development of Nyasaland, where the soil is rich in agricultural and mineral wealth. The line is laid to the standard African gage of 3 ft. 6 in., with 60-lb. rail laid on steel ties. The contract for the construction of the line was let in April, 1913. No engineering difficulties were met with the exception of the bridge over the Zui-Zui river. This bridge consists of 38 through spans, the piers being 56 ft. apart center to center. The main girders are of plate girders and are carried on screw pile piers and abutments, each pier consisting of a cluster of six steel piles braced together. The successful construction of this bridge and other structural works, with the aid of the native labor, under climatic difficulties is a severe test of British engineering skill, endurance and supervision. At Chindo, arrangements for dealing with traffic to and from the river steamers, which consists largely of maize, cotton, sugar and tobacco, are being provided, including a passenger station building, sidings, freight houses, etc.

Hospital Trains in Germany.—Up to the present German private individuals and associations have established 75 hospital trains, which have been added to the medical corps of the army. These trains have an average capacity of 280 soldiers, cost approximately $25,000 each and are equipped in accordance with the latest achievements of the medical art.



General Arrangement and Cross Sections of the Grand Trunk Suburban Locomotives

Grand Trunk Locomotives for Suburban Service

Increased Traffic With Heavier Cars Resulted in Adoption of the 4-6-4 Type in the Montreal District

Six 4-6-4 type suburban passenger locomotives have recently been delivered to the Grand Trunk by the Montreal Locomotive Works. These engines have been placed in service between Montreal and Vaudrieul, a distance of 24 miles, and between Montreal and St. Hyacinthe, a distance of 37 miles. Where suburban traffic is frequent, locomotives of this type can be used to good advantage and delays caused by turning the locomotives are eliminated.

The suburban traffic out of Montreal on the Grand Trunk was formerly handled by 4-4-2 type tank locomotives having 17 in. by 22 in. cylinders and a total weight of 128,600 lb. As this traffic increased Moguls and ten-wheeders with 20 in. by 26 in. cylinders were also used. The new suburban cars recently placed in service on this road weigh 137,000 lb., as compared with 75,000 lb. for the older class of cars. As it was also desired to increase the number of cars in a train, it became necessary to design a more powerful locomotive. Experience with this traffic and the different types of engines used influenced the railway officers in deciding on the present type for the new power. These engines are now hauling an

Tractive effort	30,940 lb.
Weight in working order	262,000 lb.
Weight on drivers	146,000 lb.
Weight on leading truck	49,000 lb.
Weight on trailing truck	67,000 lb.
Wheel base, driving	15 ft. 8 in.
Wheel base, total	39 ft. 4½ in.

Ratios

Weight on drivers ÷ tractive effort	4.73
Tractive effort × diam. drivers ÷ equivalent heating surface*	836
Equivalent heating surface* ÷ grate area	50.8
Firebox heating surface ÷ equivalent heating surface,* per cent	7.44
Weight on drivers ÷ equivalent heating surface*	61.2
Volume both cylinders, cu ft	10.41
Equivalent heating surface* ÷ vol. cylinders	223.5
Grate area ÷ vol. cylinders	4.51

Cylinders

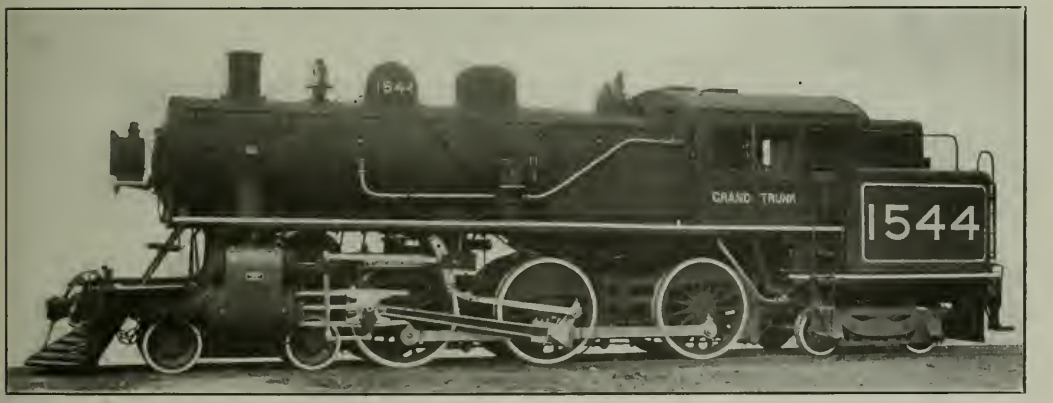
Kind	Simple
Diameter and stroke	21 in. x 26 in.

Valves.

Kind	Piston
Greatest travel	6 in.
Steam lap	1 1/16 in.
Exhaust clearance	3/16 in.
Lead	3/16 in.

Wheels

Driving, diameter over tires	63 in.
Driving, thickness of tires	3½ in.



Grand Trunk Locomotive for the Montreal Suburban Service

average train of seven cars, whereas trains of five cars were the average with the former power.

The design in general follows the standards of the builders. An interesting feature is the combination of the Gaines combustion chamber and a Security brick arch. This combination secures complete combustion, the back end of the firebox being more fully utilized with a resulting increase in the generation of steam; and the amount of smoke is reduced to a minimum, an important consideration in this kind of service. The leading truck is equalized with the drivers as it was not desired to have more than two systems of equalization. The Schmidt superheater is applied as well as outside steam pipes, self-centering valve stem guide, extended piston rod, the improved throttle lever bracket which has also been applied on the Mikado type locomotives for this road, long main driving box and vanadium steel main frames.

The principal data and dimensions are given in the following table:

General Data

Gage	4 ft. 8½ in.
Service	Suburban passenger
Fuel	Soft coal
Driving journals, main, diameter and length	9½ in. x 20 in.
Driving journals, others, diameter and length	9½ in. x 12 in.
Engine truck wheels, diameter	30½ in.
Engine truck, journals, diam. and length	6½ in. x 10½ in.
Trailing truck wheels, diameter	31 in.
Trailing truck, journals, diam. and length	6 in. x 11 in.

Boiler

Style	Straight
Working pressure	200 lb. per sq. in.
Outside diameter of first ring	71 9/16 in.
Firebox, length and width	129 in. x 75¼ in.
Firebox plates, thickness. Crown, ⅜ in.; tube, ½ in.; sides and back, ⅜ in.	
Firebox, water space	Front, 5 in.; back and sides, 4½ in.
Tubes number and outside diameter	191—2 in.
Flues, number and outside diameter	26—5½ in.
Tubes and flues, length	11 ft. 10 in.
Heating surface, tubes and flues	1,604 sq. ft.
Heating surface, firebox	173 sq. ft.
Heating surface, arch tubes	31 sq. ft.
Heating surface, total	1,808 sq. ft.
Superheater heating surface	347 sq. ft.
Equivalent heating surface	2,328.5 sq. ft.
Grate area	47 sq. ft.
Smokestack, diameter	15 in.
Smokestack, height above rail	14 ft. 9 in.
Center of boiler above rail	9 ft. 6 in.

Tender

Tank	Water bottom
Water capacity	3,500 gal.
Coal capacity	5 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

Supreme Court Decisions in Two State Rate Cases

The Court Holds That Each Class of Service Must Bear Its Share of Overhead Expenses and Yield a Return

The following is a very full abstract of the opinion of Justice Hughes in the so-called North Dakota coal case and West Virginia two-cent fare law case. The language of the opinion is preserved in the abstract:

By chapter 51 of the laws of 1907, the legislature of North Dakota fixed maximum intrastate rates, graduated according to distance, for the transportation of coal in carload lots. It was further provided that in case the transportation was over two or more lines of railroad it should be considered as one haul, the compensation for which should be divided among the carriers according to their agreement or, if they could not agree, as the railroad commissioners should decide subject to appeal to the courts. While the statutory rates governed all coal shipments, their practical application was almost solely to lignite coal.

The carriers refused to put the rates into effect, and claimed that the statute violated the commerce clause of the federal constitution, and also that it infringed the fourteenth amendment by fixing rates that were unremunerative, unreasonable, and confiscatory. The Supreme Court of the state, overruling these contentions. The Northern Pacific and the Minneapolis, St. Paul & Sault Ste. Marie have sued out these writs of error. The period to which the testimony relates is the fiscal year ending June 30, 1911.

THE FACTS TO BE CONSIDERED

The total revenue received by the Northern Pacific for the intrastate carriage of lignite coal for the fiscal year was $58,953. It was also deemed to be practicable to ascertain the amount of expense properly chargeable to this traffic.

With respect to the division of some of the items of expense (maintenance of way and structures, and taxes), there was no dispute, and, as to the others, the range of controversy was narrow. The company contended that the traffic in question produced at the statutory rates a loss of $2,254; the state insisted that it yielded a profit of $2,392. After a detailed analysis, the state court found the charges against the revenue received from the lignite traffic to be: (1) For train operation expenses, $30,850; (2) switching, $4,971; (3) station service, $4,183; (4) freight car repairs, renewals, and depreciation, $7,122; (5) traffic and general expenses (no loss and damage allowed), $1,456; (6) maintenance of way and structures, $7,120; (7) taxes, $2,424; making the total expenses, $58,126, and the surplus income, $828. The state court found that "such rate is slightly remunerative, but in fact non-compensatory, considering the volume of freight carried and the property of the railroad devoted thereto."

The state court regarded the statistics furnished by Minneapolis, St. Paul & Sault Ste. Marie as being in the main estimates without satisfactory bases. Still, on making an elaborate examination of the facts disclosed by the record—all the testimony adduced in the three cases being available in each one so far as pertinent—and on taking judicial notice of certain local conditions, the court was able to find sufficient proof to justify it in determining that under the statutory rates the intrastate transportation of lignite coal was conducted by this company at a loss. A large part of the traffic, after a short haul, was delivered to connecting carriers—the Northern Pacific and Great Northern lines—and the prorating of the statutory compensation for the entire haul operated injuriously. As to this part, said to be 'nearly half the lignite business,' this road was 'virtually a branch line of the other two railroads in accumulating for them their lignite traffic.' It was found, further, that the value of the railway property within the state had not been established, nor had the portion of value attributable to the intrastate business been determined; and, also, that the carriage of lignite coal increased 'the railroad expenses but 60 per cent of the usual statutory rate for the lignite haul,' that is, that this percentage of the rate covered the 'out-of-pocket cost' of the traffic, the remaining expenses in this view being such as would have been incurred had no lignite coal been transported.

The gross receipts from the intrastate traffic in question during the fiscal year were $83,670. The final results of the court's analysis in the case of this company are thus epitomized:

"Its total receipts amount to more than its actual out-of-pocket costs, or actual costs of transportation, but are from $9,000 to $12,000 less than the total costs including fixed and overhead expenses properly chargeable to the carriage of this commodity and against the earnings therefrom."

In answer to the contention of the state that the company could not be heard to complain with respect to the disadvantage of the prorating with connecting carriers, inasmuch as the basis was agreed upon without an appeal to the board of railroad commissioners, the court said that it was difficult to see what other basis could have been taken, and, further, that the result, in substance, would have been the same. The amount which could thus have been gained, it was said, would have been taken "from the net revenue of the Northern Pacific carrier principally," and would have been insufficient to have given to the Minneapolis, St. Paul & Sault Ste. Marie a net profit, so that "all the difference in fact would have been that both Soo and Northern Pacific would be then hauling this freight at less than the gross cost, including, of course, out-of-pocket and all fixed charges."

We understand that all the "fixed charges," to which the findings refer, are actual expenses which, while including taxes, do not include any return whatever upon the investment in the property whether by way of interest or otherwise.

The state court held that, after establishing the value of the property employed in the production of the net intrastate freight earnings, it must appear, in order to show confiscation, either (1) that such earnings are insufficient to yield a fair return upon that value and that the commodity in question is carried for less than what is sufficient to meet all expenses, including "out-of-pocket costs" and fixed charges, or (2) that the loss on the commodity under the rate attacked "reduces the balance of the net intrastate freight earnings" to a point where, including the loss on the commodity rate, they fail to yield such return.

And it was because their case failed to meet these tests that the plaintiffs in error were commanded to observe the rate.

DISTINCTION BETWEEN REGULATION AND OWNERSHIP

The general principles to be applied are not open to controversy. The railroad property is private property devoted to a public use. As a corporation, the owner is subject to the obligations of its charter. As the holder of special franchises, it is subject to the conditions upon which they were granted. Aside from specific requirements of this sort, the common carrier must discharge the obligations which inhere in the nature of its business. It must supply facilities that are reasonably adequate; it must carry upon reasonable terms; and it must serve without unjust discrimination. These duties are properly called public duties, and the state within the limits of its jurisdiction may enforce them. The state may prescribe rules to insure fair remuneration and to prevent extortion, to secure substantial equality of treatment in like cases, and to promote safety, good order and convenience.

But, broad as is the power of regulation, the state does not enjoy the freedom of an owner. The fact that the property is devoted to a public use on certain terms does not justify the requirement that it shall be devoted to other public purposes, or

to the same use on other terms, or the imposition of restrictions that are not reasonably concerned with the proper conduct of the business according to the undertaking which the carrier has expressly or impliedly assumed. If it has held itself out as a carrier of passengers only, it cannot be compelled to carry freight. As a carrier for hire, it cannot be required to carry persons or goods gratuitously. The case would not be altered by the assertion that the public interest demanded such carriage. The public interest cannot be invoked as a justification for demands which pass the limits of reasonable protection and seek to impose upon the carrier and its property burdens that are not incident to its engagement. In such a case, it would be no answer to say that the carrier obtains from its entire intrastate business a return as to the sufficiency of which in the aggregate it is not entitled to complain.

We have, then, to apply these familiar principles to a case where the state has attempted to fix a rate for the transportation of a commodity under which, taking the results of the business to which the rate is applied, the carrier is compelled to transport the commodity for less than cost or without substantial compensation in addition to cost. We say this, for we entertain no doubt that, in determining the cost of the transportation of a particular commodity, all the outlays which pertain to it must be considered. We find no basis for distinguishing in this respect between so-called "out-of-pocket costs," or "actual" expenses, and other outlays which are none the less actually made because they are applicable to all traffic, instead of being exclusively incurred in the traffic in question. Illustrations are found in outlays for maintenance of way and structures, general expenses and taxes. It is not a sufficient reason for excluding such, or other, expenses to say that they would still have been incurred had the particular commodity not been transported. That commodity has been transported; the common carrier is under a duty to carry, and the expenses of its business at a particular time are attributable to what it does carry. The state cannot estimate the cost of carrying coal by throwing the expense incident to the maintenance of the roadbed, and the general expenses, upon the carriage of wheat; or the cost of carrying wheat by throwing the burden of the upkeep of the property upon coal and other commodities. This, of course, does not mean that all commodities are to be treated as carried at the same rate of expense. The outlays that exclusively pertain to a given class of traffic must be assigned to that class, and the other expenses must be fairly apportioned. It may be difficult to make such an apportionment, but when conclusions are based on cost the entire cost must be taken into account.

It should be said, further, that we find nothing in the record before us, and nothing in the facts which have been set forth with the most careful elaboration by the state court, that can be taken to indicate the existence of any standard whatever by reference to which the rate in question may be considered to be reasonable. It does not appear that there has been any practice of the carriers in North Dakota which affords any semblance of support to a rate so low. Whatever inference may be deduced from coal rates in other states, as disclosed by the record, is decidedly against the reasonableness of the rate. And it may be added that, while the rate was found to be compensatory in the case of the Great Northern, this was distinctly shown to be due to the peculiar conditions of the traffic over that road, the differences with respect to which were fully detailed by the state court. Nearly 90 per cent of the total intrastate traffic in lignite coal upon the three roads was over the lines of the plaintiffs in error. It is urged by the state that the commodity in question is one of the lowest classes of freight. This may be assumed, and it may be a good reason for a lower rate than that charged for carrying articles of a different sort, but the mere grade of the commodity cannot be regarded as furnishing a sufficient ground for compelling the carrier to transport it for less than cost or without substantial reward.

The state insists that the enactment of the statute may be justified as "a declaration of public policy." In substance, the argument is that the rate was imposed to aid in the development of a local industry and thus to confer a benefit upon the people of the state. The importance to the community of its deposits of lignite coal, the infancy of the industry, and the advantages to be gained by increasing the consumption of this coal and making the community less dependent upon fuel supplies imported into the state, are emphasized. But, while local interests serve as a motive for enforcing reasonable rates, it would be a very different matter to say that the state may compel the carrier to maintain a rate upon a particular commodity that is less than reasonable, or—as might equally well be asserted—to carry gratuitously, in order to build up a local enterprise. That would be to go outside the carrier's undertaking, and outside the field of reasonable supervision of the conduct of its business, and would be equivalent to an appropriation of the property to public uses upon terms to which the carrier had in no way agreed. It does not aid the argument to urge that the state may permit the carrier to make good its loss by charges for other transportation. If other rates are exorbitant, they may be reduced. Certainly, it could not be said that the carrier may be required to charge excessive rates to some in order that others might be served at a rate unreasonably low. That would be but arbitrary action. We cannot reach the conclusion that the rate in question is to be supported upon the ground of public policy if, upon the facts found, it should be deemed to be less than reasonable.

The legislature, undoubtedly, has a wide range of discretion in the exercise of the power to prescribe reasonable charges, and it is not bound to fix uniform rates for all commodities or to secure the same percentage of profit on every sort of business. There are many factors to be considered—differences in the articles transported, the care required, the risk assumed, the value of the service, and it is obviously important that there should be reasonable adjustments and classifications. Nor is its authority hampered by the necessity of establishing such minute distinctions that the effective exercise of the rate-making power becomes impossible. The court, therefore, is not called upon to concern itself with mere details of a schedule; or to review a particular tariff or schedule which yields substantial compensation for the services it embraces, when the profitableness of the intrastate business as a whole is not involved.

But a different question arises when the state has segregated a commodity, or a class of traffic, and has attempted to compel the carrier to transport it at a loss or without substantial compensation even though the entire traffic to which the rate is applied is taken into account. On that fact being satisfactorily established, the presumption of reasonableness is rebutted. If in such a case there exists any practice, or what may be taken to be (broadly speaking) a standard of rates with respect to that traffic, in the light of which it is insisted that the rate should still be regarded as reasonable, that should be made to appear. As has been said, it does not appear here. Frequently, attacks upon state rates have raised the question as to the profitableness of the entire intrastate business under the state's requirements. But the decisions in this class of cases furnish no ground for saying that the state may set apart a commodity or a special class of traffic and impose upon it any rate it pleases, provided only that the return from the entire intrastate business is adequate.

It has repeatedly been assumed in the decisions of this court that the state has no arbitrary power over the carrier's rates and may not select a particular commodity or class of traffic for carriage without reasonable reward.

To repeat and conclude: It is presumed—but the presumption is a rebuttable one—that the rates which the state fixes for intrastate traffic are reasonable and just. When the question is as to the profitableness of the intrastate business as a whole under a general scheme of rates, the carrier must satisfactorily prove the fair value of the property employed in its intrastate business and show that it has been denied a fair return upon that value. With respect to particular rates, it is recognized that there is a wide field of legislative discretion,

permitting variety and classification, and hence the mere details of what appears to be a reasonable scheme of rates, or a tariff or schedule affording substantial compensation, are not subject to judicial review. But this legislative power cannot be regarded as being without limit. The constitutional guaranty protects the carrier from arbitrary action and from the appropriation of its property to public purposes outside the undertaking assumed; and where it is established that a commodity, or a class of traffic, has been segregated and a rate imposed which would compel the carrier to transport it for less than the proper cost of transportation, or virtually at cost, and thus the carrier would be denied a reasonable reward for its service after taking into account the entire traffic to which the rate applies, it must be concluded that the state has exceeded its authority.

The judgments, respectively, are reversed and the cases are remanded for further proceedings not inconsistent with this opinion.

THE WEST VIRGINIA CASE

In 1907, the legislature of West Virginia passed an act fixing the maximum fare for passengers on railroads, as described in the statute, at two cents a mile. After the rate had been tested by operating under it for two years, the plaintiff in error brought this suit to restrain its enforcement as being in violation of the constitution of the state, and also upon the ground that it was repugnant to the fourteenth amendment by reason of (1) its provision for penalties; (2) its classification of railroads, and (3) its alleged confiscatory requirements, through the reduction of the revenue from the traffic to less than a reasonable compensation. The validity of the statute, as construed by the state court, with respect to penalties and classification was upheld in *Chesapeake & Ohio* v. *Conley*.

The fundamental question presented is whether the validity of the passenger rate can be determined by its effect upon the passenger business of the company, separately considered. What has been said in the opinion in *Northern Pacific Railway Company* v. *North Dakota*, decided this day makes an extended discussion of this question unnecessary.

These considerations are controlling here. The passenger traffic is one of the main departments of the company's business; it has its separate equipment, its separate organization and management, and of necessity its own rates. In making a reasonable adjustment of the carrier's charges, the state is under no obligation to secure the same rate of return from each of the two principal departments of business, passenger and freight; but the state may not select either of these departments for arbitrary control. Thus, it would not be contended that the state might require passengers to be carried for nothing, or that it could justify such action by placing upon the shippers of goods the burden of excessive charges in order to supply an adequate return for the carrier's entire service. And, on the same principle, it would also appear to be outside the field of reasonable adjustment that the state should demand the carriage of passengers at a rate so low that it would not defray the cost of their transportation, when the entire traffic under the rate was considered, or would provide only a nominal reward in addition to cost. That fact, satisfactorily proved, would be sufficient to rebut the presumption of reasonableness; and if in any case it could be said that there existed other criteria by reference to which the rate could still be supported as a reasonable one for the transportation in question, it would be necessary to cause this to appear.

The passenger rate in question went into effect in May, 1907, and was observed by the company until about September, 1909, when under the terms of the interlocutory injunction in this suit the charge was increased to two and one-half cents a mile. There were, therefore, two fiscal years, June 30, 1907, to June 30, 1909, during which the company operated its road in West Virginia under the statutory rate. Evidence was introduced on behalf of the company showing the results according to its calculations. It was testified that the intrastate passenger receipts had been carefully ascertained. With respect to the operating expenses, it was said that for many years accounts had been kept for the purpose of separating the expenses incident to the freight and passenger traffic, respectively; that about 65 per cent of these expenses could be directly assigned, and that the remaining 35 per cent., consisting of items common to both sorts of transportation, were divided between the passenger and freight traffic on the basis of engine miles—this being deemed to be more equitable than the train-mile basis originally used, inasmuch as most of the freight was hauled by two engines. In practice, this method was assumed—in accordance with an early computation—to mean that 20 per cent of such items should be assigned to the passenger traffic; this, it was insisted, was a close approximation. Where a division of the road was partly in one state and partly in another the passenger expenses were apportioned according to track mileage. These expenses within the state having thus been ascertained, they were divided between the interstate and intrastate traffic upon the basis of the gross passenger earnings; that is, it was assumed that the cost of the interstate and intrastate passenger traffic was the same in relation to revenue. It was also testified that betterments were not included in expenses, and that the above-mentioned apportionment covered all the operating expenses, except taxes, the latter being apportioned to each class of business according to its share of the gross receipts.

It was stated that the intrastate passenger receipts which had been $362,998 in the fiscal year 1906-7* had fallen, notwithstanding a considerable increase in the number of passengers and passenger mileage, to $289,943 in the fiscal year 1907-8. The passenger expenses for the latter year, estimated according to the method above set forth, together with taxes, amounted to $275,520, leaving a net surplus of $14,423. In the following fiscal year, 1908-9, the intrastate passenger receipts were $281,865. This showed a reduction of $81,133, as compared with the fiscal year 1906-7, although there was a gain over that year of 1,567,374 in the passenger mileage. The expenses attributed by the company to the intrastate passenger traffic, including taxes, for the year 1908-9, amounted to $283,416.62, thus leaving a deficit in the passenger operations of $1,552.

In the receipts, as thus stated, there was omitted the revenue derived from the mail, express, news privileges and other items of passenger train earnings. Including this miscellaneous income, it appeared from the company's statement that the net return of the intrastate passenger business for the year 1907-8 was $18,355; in the year 1908-9, the inclusion of these items still left a deficit amounting to $616.

Criticizing the methods of apportionment adopted by the company, the state presented on its part elaborate calculations for the purpose of showing the effect of the rate. These calculations were based upon a painstaking analysis made by the state's expert accountant of the receipts and expenses disclosed by the company's records and accounts. For this critical study there were selected the months of November, 1909, and May, 1910, which the state's witness testified were typical with respect to the passenger business of the fiscal year ending June 30, 1910. The examination was made of the traffic on the Pocahontas and Kenova divisions of the road, which contained over 90 per cent of the total track mileage of the company in West Virginia, and the passenger traffic on which—according to passenger mileage—was stated to be over 97 per cent of the whole. The testimony was that the results of the analysis of the traffic on these divisions could be deemed to be fairly representative of the entire passenger business. The receipts of the intrastate traffic were adjusted to the two-cent fare basis; that is, according to the statutory rate as applied to the actual travel over the road. The state suggests that neither in its own calculations nor in those of the company was any account taken of the receipts from interstate passengers in West Virginia, but these were properly excluded. The company had kept on its books separate accounts

*Approximately eleven months of the fiscal year 1906-7 was under the former maximum fare of three cents a mile.

of the expenses of the freight and passenger business on the divisions above mentioned, but the state's expert did not accept the company's distribution. For example, on the Pocahontas division, the books showed passenger expenses in November, 1909, of $48,895; the witness for the state by his computations made these expenses $37,101. On the same division in May, 1910, the company's figures for passenger expenses were $51,886; the state's, $40,643. There were also similar reductions of considerable amounts on the Kenova division. It is not necessary to review in detail the methods thus used on the part of the state to apportion the various common items of expense—that is, after all items capable of direct assignment had been charged to the business to which they related. It is sufficient to say that instead of employing a general factor for the distribution of the outlays common to both kinds of traffic, freight and passenger, the state's witness divided each particular common item according to its character so as to make what was deemed to be a fair apportionment of that item. In this way, a variety of methods were employed which the witness described at length. After ascertaining the amount of the total expense considered to be attributable to the passenger traffic within the state, it was divided between the intrastate and interstate business; and for the most part—aside from the expenses of passenger stations—the division was made on the basis of passenger miles and without charging extra cost to the intrastate traffic.

By combining the results of the selected periods, it was shown that in the intrastate passenger business, according to the classification and apportionment adopted, the operating expenses and taxes consumed 97.4203 per cent of the total income.

This, in brief, was the result of the elaborate analysis presented by the state. There is no reason to suppose that either the periods chosen or the methods used were unfavorable to the rate. Included in the passenger business were the items of mail, express, excess baggage, etc.; the state did not present calculations as to the net return upon these items separately considered. When the state's expert who testified that he had undertaken to separate the cost of the express business, was asked on cross examination whether with these items omitted the actual cost of carrying intrastate passengers was not in excess of two cents a mile, he said that it would be difficult to answer without a separate analysis of the mail item, but added that "in rough computation" the cost was very close to two cents.

It is apparent, from every point of view that this record permits that the statutory rate at most affords a very narrow margin over the cost of the traffic. It is manifestly not a case where substantial compensation is permitted and where we are asked to enter the domain of the legislative discretion; nor is it one in which it is necessary to determine the value of the property employed in the intrastate business. It is clear that by the reduction in rates the company is forced to carry passengers, if not at or below cost, with merely a nominal reward considering the volume of the traffic affected. We find no basis whatever upon which the rate can be supported and it must be concluded in the light of the principles governing the regulation of rates that the state exceeded its power in imposing it.

The judgment is reversed and the case is remanded for further proceedings not inconsistent with this opinion.

Reduced Train Service in England.—The English railways have recently made considerable reductions in their train service because of the exigencies of war. These changes are expected to assist greatly in relieving the congestion and reduce the delays to ordinary traffic, which are caused by military movements. The modifications vary with the different lines and include important through trains as well as suburban trains. The reduced train service will save coal, about which one or two companies were becoming concerned. It is also reported that there was danger of a shortage of engines because work for the government is holding up repairs and because of the shortage of engine terminal forces.

ANTI-FULL-CREW LAW CAMPAIGN

R. L. O'Donnel, Chairman of the Executive Committee of the Associated Railroads of Pennsylvania and New Jersey reports that sentiment among business men of Pittsburgh is virtually unanimous for repeal of the excess man crew law, with amplification of the powers of the Public Service Commission to see that trains are properly manned, as proposed by the railroads. Many letters and petitions have been forwarded to Harrisburg bearing the names of influential men.

Among unemployed workers in the Pittsburgh section the figures issued by the railroads showing what the money now paid in wages to unnecessary trainmen would do in the way of giving employment, have created a distinct impression.

It is known, says Mr. O'Donnel, that a good many engineers and conductors employed by the Lehigh Valley and Jersey Central railroads have signed petitions asking for the repeal of the law. Such action is giving much concern to the trainmen's organization, and in several cases lodge officers have served notice on men who have so signed that unless they withdraw their signatures they will be expelled from the union. It is not believed that such harsh action will be actually taken.

An observer at Reading, Pa., reports that hot boxes, loose car doors and other out-of-order conditions which develop on freight trains are discovered more generally by signal tower operators than by the excess man in the train crew. For example, a signalman noticed and reported to the engineer that the twentieth car in a Reading freight train was being pulled with brakes set. Another case of a broken journal on a car ten back from the locomotive was similarly reported by a signalman, the trouble not being known to the train crew. These are but samples of the lack of attention on the part of the extra brakeman.

A few days ago a well-known business man of Reading took his station on an overhead bridge. He reports that a dozen freight trains passed beneath and that on not one of them was there a man visible except on the locomotive and in the caboose.

The Scranton (Pa.) Central Labor Union, upon motion by P. J. Shea appointed a committee to urge the editors of local papers to make no editorial comment against the law, the argument being that all the Scranton newspapers, with the single exception of the Scrantonian, a Sunday newspaper, of which S. J. McDonald, president of the Central Labor Union, is editor, were unfair to organized labor because they favored repeal of the law. The proposition to attempt to instruct the editors how to run their newspapers started a heated controversy and showed that the labor men are not in harmony on the question. Dennis Breslin made a heated reply to John A. Kane, of the Brotherhood of Railroad Trainmen, who suggested that labor should withdraw its support from the Daily News. Breslin asserted "that an editor has a perfect right to express an honest opinion on any question of moment." The trainmen have failed to make any effective answer to the statement of the full crew matter as being made by the railroads. Business men in Scranton are generally in favor of repeal of the law; though some are afraid to express themselves openly because of threats that union labor will boycott them.

One Pennsylvania senator says that he has two thousand letters and other communications, and that out of these only two were against repeal of the full crew law. A Philadelphia member of the House reports that when he went home last Sunday he found there about 1,500 letters which had been sent to his home address by constituents who wanted to make certain of reaching him. Some members are said to feel nettled at the mass of correspondence which has come upon them, but there is none who will publicly say that he has not been impressed by such expression and the unanimity with which it favors repeal of the law.

According to M. C. Kennedy, president of the Cumberland Valley Railroad, about half the entire number of voters of Franklin and Cumberland counties have signed petitions calling for repeal of the excess man crew law. In the state of Pennsylvania the Cumberland Valley employs, exclusive of those directly

engaged in train and yard service, 1,146 persons. After making the necessary allowances for employees under age and foreigners, 1,018 have signed this petition, being practically 100 per cent.

In addition to these employees, says Mr. Kennedy, 6,031 citizens of Franklin and Cumberland counties have so far signed the petitions. Mr. O'Donnel reports similar evidences of public sentiment in other parts of Pennsylvania.

F. M. Barker, assistant superintendent of the Lehigh Valley has given Chairman O'Donnel this little picture of real life: "To begin with, a through freight train is made up complete by the yard force, with air hose all coupled and tested.

"Then the engine backs down and the head trainman couples it to the train, while the rear trainman gets his markers and lights. The conductor in the meantime has checked his train and got his bills. The train starts.

"Then the only job the train crew has is to give some attention to running the train. This is usually done by the engineer from his side, the head trainman or fireman from the left side of the engine, while the conductor and rear trainman from opposite sides of the caboose give an occasional lookout. On arrival at end of the run, the head man cuts off the engine, the rear man takes care of the markers and locks the caboose, the conductor makes his reports.

"Ordinarily the extra trainman spends his time during the trip lounging in the caboose, there being no work for him to perform in the running of the train. It is contended that the extra man is of assistance when drawheads pull out. How infrequently this occurs appears in the fact that during January and February there were only nineteen such difficulties on our line between Coxton and Sayre. During that month there were 700 trains over that division."

F. R. Stevens, agriculturist of the Lehigh Valley, seeing on a helper engine a young fellow whom he had known as a farm hand getting $18 a month, asked him what he was doing there.

The man said, "I'm flagging." "What do you have to do?" Stevens asked. "O, just ride up and down the hill. When we get to the top, I turn the switch and let the helper in on the siding, set it again to let the train go by, then open it again for us to back out, close it, jump aboard and go back." "Well, that's not very hard work," Mr. Stevens said, and the flagman replied: "No, but it's easy money. I get $5 a day as a rule, and today I pulled down $7.50."

Figures prepared for use of Mr. O'Donnel's committee show that not one man in ten of the great army of railroad employees are trainmen. On June 30 last the Pennsylvania had in its service 110,686 men. Of these only 10,419, or 9.4 per cent were trainmen other than engineers, firemen and conductors. The average daily wage of these trainmen was $3.40; that of the whole body of employees, $2.82. The effect of the full crew laws is to give easy jobs to about one in each one hundred of present railroad employees.

DEBATE AT JERSEY CITY

The debate between a representative of the Pennsylvania Railroad and F. P. Boland, who is a member of the New Jersey legislature (and also is a brakeman of the railroad) which was announced in the *Railway Age Gazette* of March 5, page 400, came off on the evening of March 12, at Elks' Hall, Jersey City, N. J.; but neither side brought out any facts of importance not already well known. There was a large audience, which, judging by the applause, was in sympathy with Mr. Boland.

Each speaker was allowed 50 minutes, and each used his time in two installments. Mr. Boland, who spoke first, termed the railroads' campaign of publicity a campaign of misrepresentation. Mr. Fackenthall said that the law was an arbitrary one; that its operation was unfair to the railroads, and that it was enacted not in the interest of railroad employees but to provide jobs for a certain class of men. He compared the work now done by brakemen with that done in the days of the link and pin, and said that it was not right, after the employees had gone to the legislature and obtained laws requiring automatic couplers and automatic brakes, which decreased the work of a brakeman 75 per cent, to ask also for a law requiring an additional brakeman.

Mr. Boland, on continuing the argument, insisted that the law was for economic betterment. He said that under modern conditions brakemen had more work and responsibility rather than less. He mentioned certain cases in which he claimed that the additional members of the crew had prevented accidents. Mr. Fackenthall retorted that the full train crew law had no more to do with preventing some of the wrecks mentioned than had he himself. He condemned the practice of railroad employees going to the public service commissions or the legislature so often; the men would be in a much stronger position if they kept these matters out of the hands of the politicians and did the fighting themselves. Neither side was prepared with any accurate or full statistics, nor was there any effective marshalling of the weighty facts either for or against the law.

A good deal of the discussion consisted of irrelevant questions. For instance, Mr. Boland wanted to know why, in statement No. 1, issued by the Committee, it was stated that in the first half of 1914 two passengers were killed on the Pennsylvania Railroad, while in the bulletin previously issued by the road it was stated that 189,167,326 passengers were carried without any being killed. The answer is that the two passengers killed last year lost their lives falling from trains, a fact given in the statement. With equal clearness it was stated in the bulletin that no passenger was killed in a *train accident*. Mr. Boland also demanded an explanation of the statement that last year the laws forced a waste of $2,000,000 in Pennsylvania and New Jersey, when the Pennsylvania Railroad had given the figures as $1,702,407. The answer is that $2,000,000 was a general statement. There are now employed on eighteen roads in the two states 2,299 excess brakemen, whereas these same railroads, when the laws took effect, were compelled to add 2,819 men to train crews.

CRITICISM BY GOVERNOR FIELDER

Governor Fielder of New Jersey, replying to inquiries, says that he doubts the propriety of passing the repeal bill introduced by Assemblyman Stevens. He says: "I am receiving many letters on this subject (as well as petitions), making it apparent that the signatures therefor are being solicited. I suspect that many who sign them know little or nothing of the reason for the present law. . . . This bill provides that the Public Utility Commission shall have power to require any railroad doing business in this State, to determine the number of trainmen to be hired to operate such trains and that the commissioners may make rules and orders for the operating of such trains, as they may deem needful.

"If you will read the words carefully you will observe that the Utility Commission is not given the slightest power to specify the number of men necessary on trains. All that the bill proposes is to give the commission the foolish right to require the railroads to determine such number. Moreover, because the bill refers only to companies doing business in this State I am afraid it would not apply to those doing interstate business. . . ."

Chairman R. L. O'Donnel, replying to the Governor, says that the desire of the railroads is to amend the statutes so as to put in the hands of the Public Utilities Commissioners the power to fix train crews. The railroads reiterate their perfect good faith in this matter. They will welcome any suggestions from Governor Fielder which will result in making the terms of the bill clear and explicit. If he will suggest a better and fairer method the railroads will welcome that.

Swedish State Railways and Coal.—It is reported that owing to the scarcity of coal the administration of the Swedish state railways has been obliged to inform the private railways that it will no longer be in a position to supply them in case of emergency.

General News Department

The Canadian government, confronted with the continued refusal of the Grand Trunk Pacific to operate the National Transcontinental Railroad, which extends 1,500 miles from Moncton, N. B., to Winnipeg, Man., announces that to prevent the destruction of the road bed and track by flood and frost, preparations are being made to organize forces to take care of the property, and, probably, to establish a regular train service.

Governor Johnson of California has started a movement for the purchase of the Western Pacific, now in the hands of receivers, by the state of California. The governor is quoted as saying, "It is my idea that with California owning and operating a great transcontinental railroad the state will always be assured of commercial freedom." A memorial to Congress requesting it to take action toward the purchase of the road by the federal government has been introduced in both the House and Senate of the California legislature.

Patrick W. Mulligan, crossing watchman of the Pennsylvania Railroad at Norristown, Pa., is the recipient from the President of the United States, of the sixteenth medal, awarded under the act of Congress, providing for such medals, for heroism in the railway service. He saved the life of a little girl at his crossing August 19, 1914. The girl, three years old, ran beneath the gate in front of a train. Mulligan jumped for the child and pulled her off the track; but both were struck by the engine and somewhat injured.

Ralph Peters, chairman of the committee on railway mail pay, has issued a leaflet replying to newspaper reports emanating from Washington, and credited to Chairman Moon, containing misleading statements relative to the action of Congress in refusing to act on the appropriations for the post office for the next fiscal year. The Senate, says Mr. Peters, in refusing to pass the appropriation bill with the Moon rider attached, took a righteous stand against an almost undisguised effort at confiscation. The Moon amendment not only gave the postmaster general full power to reduce the payments made to the railroads, but provided a penalty of $5,000 a day for refusal on the part of carriers to perform mail service on the terms and conditions named by the postmaster general. Mr. Moon is quoted as saying that the information presented by his committee to Congress had cost the government $600,000; but Mr. Peters says that the total was not over $26,000, and this included other matters besides. At the same time the railroads, to furnish the information called for by the post office department, have spent approximately $250,000. Denying Mr. Moon's statement, Mr. Peters quotes the report of the Bourne committee to the effect that the mail earnings of the railroads, on the basis of car miles, are decidedly lower than from the express traffic. Mr. Bourne, in his report, added that there had been "an amazing amount of reckless assertion on this subject." Chairman Moon announces that he intends to introduce his railway mail pay bill again in the next Congress; but Mr. Peters, calling on all railroad officers to co-operate with his committee, declares that the efforts for a just and equitable basis of pay will be continued until the matter has been fairly adjusted.

New York Central Claim Department

The removal of the freight claim offices of the New York Central from New York City and from Cleveland to Buffalo where the two organizations are to be consolidated, is now going on, and after this week communications are to be sent to the new office. R. L. Calkins, freight claim agent, retains his office in New York City, and the office in Buffalo will be in charge of J. K. Lovell, assistant freight claim agent.

Coincident with the reorganization, the company will establish district freight claim agencies at New York, Albany, Syracuse, Rochester, Buffalo, Cleveland, Toledo and Chicago. The district agents will deal with claims where settlement can be better facilitated by prompt conference with claimants, and will have authority, within certain limits, to pay claims.

Claims on account of coal traffic are not sent to Buffalo, but, for the territory east of Buffalo, to the coal traffic manager, New York City, and for territory west of Buffalo to the general coal and ore agent, Cleveland.

Disastrous Train Wreck in Spain

A press despatch from Madrid, March 11, reports the derailment in the province of Asturias of a passenger train running from Vigo to Madrid, by a rock which had fallen on the track from a mountain. Eighteen persons were killed and a large number injured.

Proposed Railway Legislation

A bill before the New Hampshire legislature requires railroads in all cases to provide platform cars with stakes, when stakes are necessary, to hold loads of lumber. The bill has been passed by the lower House and is expected to pass the Senate.

The legislature of Michigan has under consideration a bill, introduced by Mr. Person, to transform the railroad commission into a public utilities commission, giving it authority over gas companies, electric lighting, and heating companies, and water power utilities.

The upper house of the Ohio legislature has passed by a unanimous vote a bill, introduced by Senator Winans, requiring railroads to file notices of proposed increases in freight rates thirty days before the new tariffs are to take effect; and authorizing the Public Utilities Commission to suspend increases pending investigations.

The New Jersey legislature has rejected a bill, introduced by Mr. Hunter, requiring railroads to protect grade crossings with a greater degree of care than at present by providing flagmen, gates and bells, and taking other precautions. One feature of the bill required that in any suit for injuries at a crossing the question of contributory negligence on the part of the person injured should, under certain conditions, be abolished as a legal defense for the railroad.

Damage-Suit Fraud Exposed

A unique phase of the "damage suit industry," which has worked great injury to the railroads of the south, was recently uncovered by the Morgan's Louisiana & Texas (Southern Pacific) in Louisiana; and the damage suit lawyers, ambulance chasers and jury fixers for once got a lesson. The case was tried in the Federal Court at New Orleans.

William Hoke, a negro of Birmingham, Ala., boarded a midnight train out of New Orleans for Morgan City, La. Apparently he was alone, but he had an accomplice, one Reynolds, who was afterwards used as his principal witness. Hoke slipped on the proverbial banana peel in the aisle of the colored coach, and the crash of his fall was immediately followed by groans of agony. Medical examination showed dislocation of the hip and subsequent history of the case marked a continuation of the injury and a permanent shortening of the limb by some three inches. The unlawful location of the banana peel in the aisle, the testimony of the witness and the apparently complex and permanent injury led his counsel, one of the ablest lawyers of the state, to file suit for $65,000. Hoke testified, denied, affirmed, etc., with great readiness, and his attitude during the trial stamped his as a most extraordinary negro.

But certain phases of the case had aroused the suspicions of the claim agent, and he collected evidence that Hoke was a professional in his line, and had victimized some eighteen railroads and accident insurance companies in the past few years, sometimes using a most remarkable and freakish ability to throw his right hip from its socket and thereby create a shortening of the limb, a condition not easily detected and deceptive even to those of the medical profession who examined him. Hoke on being confronted by seven or eight claim agents of companies

with which he had previously conducted similar negotiations, finally admitted having received various sums of money from them, in compromise. By the careful work of the claim agent these witnesses were produced unexpectedly and without the issuance of a subpoena.

Reynolds, Hoke's companion, had operated with him on several of his "accidents," in this particular case being personally responsible for the location of the banana peel in the aisle, and, of course, the only eye witness to the fall.

Following the entering of mistrial, the facts were reported to the United States Department of Justice, who caused Hoke's arrest. He was indicted on a charge of perjury January 23, and after trial was sentenced March 6 to eighteen months' imprisonment at Atlanta.

Operating Revenues and Expenses of Express Companies for November

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for November, 1914. (The express companies have three months in which to make reports.)

A—For the Month of November

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered (miles)	44,939.99	38,625.94	72,412.81	60,062.98	9,676.50	7,080.30	2,839.78	2,839.78	9,573.52	9,339.95
Charges for transportation	$2,824,757	$2,890,647	$3,703,699	$3,588,222	$252,264	$254,305	$51,689	$52,995	$249,437	$277,537
Express privileges—Dr.	1,484,101	1,530,732	1,870,199	1,794,842	124,940	123,873	26,145	27,191	151,470	168,634
Operations other than transportation	43,230	37,900	166,722	182,528	4,827	7,242	840	884	4,178	4,136
Total operating revenues	1,383,885	1,397,815	2,000,221	1,875,908	132,151	137,673	26,383	26,688	102,145	113,039
Operating expenses	1,538,677	1,425,278	2,053,699	1,969,274	128,240	143,257	28,108	30,216	88,138	92,432
Net operating revenue	154,792	27,463	53,477	10,633	3,910	5,584	1,724	3,528	14,007	20,606
Uncollectible revenue from transp'n	488	.....	67	.....	.....	.....	.....	.....	.....	.....
Express taxes	12,931	16,699	31,759	28,686	4,000	2,850	1,100	1,200	3,801	4,283
Operating income	168,211	44,162	85,324	18,052	89	8,434	2,824	4,728	10,205	16,322

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered (miles)	8,118.34	8,080.40	34,566.60	33,556.60	112,441.16	99,724.95	5,174.26	5,008.97	299,742.95	297,322.25
Charges for transportation	$207,873	$242,695	$1,107,341	$1,408,085	$3,105,841	$2,715,512	$100,921	$105,308	$11,603,827	$13,235,399
Express privileges—Dr.	112,445	132,690	566,375	716,052	1,582,703	1,349,210	56,007	61,107	5,974,391	6,749,874
Operations other than transportation	3,414	3,429	27,181	32,974	65,589	58,777	3,069	2,544	319,053	356,926
Total operating revenues	98,842	113,434	568,146	724,999	1,588,727	1,425,079	47,984	46,746	5,948,489	6,841,451
Operating expenses	87,595	90,226	515,212	626,013	1,524,851	1,264,835	54,814	50,417	6,019,338	6,590,153
Net operating revenue	11,246	23,208	52,934	98,985	63,876	160,244	6,830	3,671	70,849	251,298
Uncollectible revenue from transp'n	10	3	7	1	667	.....	16	.....	1,278	5
Express taxes	5,000	4,500	14,277	16,382	36,610	33,000	1,138	789	110,618	119,058
Operating income	6,236	18,705	38,649	82,601	26,598	127,244	7,984	4,460	182,745	132,335

B—For the Five Months Ending with November

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation	$14,566,500	$14,863,297	$19,869,305	$18,614,418	$1,439,028	$1,494,799	$341,316	$339,046	$1,462,646	$1,543,778
Express privileges—Dr.	7,546,738	7,735,176	9,894,419	9,255,633	726,355	705,498	170,955	169,568	887,677	939,918
Operations other than transportation	217,604	161,117	924,924	952,089	26,216	48,785	4,226	4,543	24,280	22,967
Total operating revenues	7,237,367	7,289,238	10,899,810	10,310,874	738,890	838,086	174,586	174,020	599,248	630,828
Operating expenses	7,745,207	7,135,331	10,745,466	9,893,481	675,248	733,992	150,440	157,163	455,721	462,231
Net operating revenue	507,840	153,907	154,344	417,393	63,642	104,093	24,146	16,857	143,526	168,597
Uncollectible revenue from transp'n	2,375	.....	703	67	.....	.....	.....	.....	.....	.....
Express taxes	95,131	81,319	177,790	150,017	20,000	14,150	5,500	6,000	20,803	21,096
Operating income	595,347	72,587	24,149	267,307	43,642	89,943	18,646	10,857	122,723	147,501

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation	$1,296,475	$1,466,707	$5,437,154	$6,141,699	$15,990,510	$13,840,010	$510,842	$563,650	$60,913,781	$67,733,437
Express privileges—Dr.	699,172	789,050	2,772,148	3,128,083	8,192,999	6,905,093	274,425	308,867	31,164,893	34,378,913
Operations other than transportation	17,700	17,700	129,750	138,182	311,436	285,225	15,487	12,328	1,671,629	1,775,253
Total operating revenues	615,004	695,357	2,794,756	3,151,798	8,108,947	7,220,143	251,904	257,111	31,420,517	35,129,777
Operating expenses	463,750	480,286	2,616,237	2,822,414	7,620,159	6,376,907	269,937	257,263	30,742,170	32,824,809
Net operating revenue	151,253	215,070	178,518	329,384	488,787	843,236	18,032	151	678,347	2,304,968
Uncollectible revenue from transp'n	63	14	169	29	2,420	.....	50	.....	5,783	112
Express taxes	25,000	22,500	73,672	72,349	186,058	162,000	5,656	3,922	599,613	582,847
Operating income	126,190	192,556	104,677	257,004	300,308	681,236	23,739	4,074	72,951	1,722,009

*Includes previous year's returns of United States Express Co.

The Seamen's Law

The "Seamen's bill," which became a law March 4, regulates the employment of men on ocean-going vessels and on those navigating the Great Lakes, but not those on bays; but even as it is it bears heavily on the lines traversing Long Island Sound and those between Buffalo and Chicago and Duluth. The operation of a large steamer on the Sound will cost, it is estimated, $2,000 a month more than at present. The manager of a lake passenger line estimates that the law will increase his running expenses 200 per cent. It will be utterly impossible for all lines to provide, in season, the additional equipment required. The law itself is confusing as to dates. It goes into effect eight months after its passage, yet another section says that the new equipment must be provided by July 1, 1915.

Senator Burton, of Ohio, is quoted as saying that if the European countries were not fighting among themselves they would be ready to go to war with us because of the breaking of treaties that will be necessitated if this law is carried out. While the bill, as adopted, is in some respects less drastic than when it was under discussion a year ago it still retains so many unworkable, not to say outrageous features that shipping interests are almost in a panic. The Department of Commerce is being flooded with letters and telegrams from ship owners asking how they are going to avoid the destruction of their business. A representative of the Pacific Mail Steamship Company is quoted as saying that his line will not be able to compete with Asiatic lines in the trans-Pacific trade. The number of able seamen required to man the life-boats is far beyond the number required for actual service on any modern steamship. A typical Sound steamer carries 70 life-boats and has 10 licensed officers. Ordinarily, she carries from 10 to 12 able seamen. Other boats are provided for by the use of firemen and waiters. There is no possible use, it is claimed, for more than a dozen seamen aboard such a vessel. Under the new law, however, this steamer must add to her crew 40 able seamen for whom there is no deck work whatever. Each able seaman will get about $40 a month.

At first, the ship owners figured that they could save the cost of many additional seamen or officers by enlarging the size of lifeboats, but there is the provision that no such auxiliary craft can be carried of a size larger than can be operated by hand.

The government is confronted with the task of examining, between now and July 1, some 30,000 employees aboard vessels

engaged in coastwise and foreign trade in order that they may be licensed as "certified boatmen."

The rigid regulations concerning lifeboats are relaxed somewhat in warm weather. Between May 15 and September 15, vessels operating on routes less than 20 miles off shore would be required to carry equipment in boats and rafts for only 70 per cent of the passengers. Of this equipment, 50 per cent may be in lifeboats and 50 per cent in rafts. Vessels on the Great Lakes using routes more than three miles off shore between May 15 and September 15, must have equipment in boats and rafts for 50 per cent of the persons on board, two-fifths of which must be in lifeboats. Vessels on the Great Lakes on routes less than three miles off shore are to remain, as at present, subject to regulations of the Department of Commerce regarding accommodations in lifeboats, etc. For each boat or raft an officer or able seaman, with a number of certified lifeboat men, i. e., men from any department of the crew holding certificates of efficiency from the Department of Commerce, varying from 3 to 7 and beyond that point in the ratio of one additional lifeboat man for every 50 persons would be required. Rafts carrying less than 15 persons need not be in charge of an officer or able seaman, but the number of rafts of this type could not exceed 50 per cent of the raft equipment of a vessel.

Arbitration of Engineers' and Firemen's Demands

W. J. Lauck, statistician for the engineers' and firemen's brotherhoods, and a number of engineers and firemen employed on Western roads, continued the rebuttal testimony of the enginemen before the board of arbitration at the hearing in Chicago throughout last week and the early part of this week. Mr. Lauck continued his statistical testimony, including the presentation of an exhibit showing that 837 engineers for 3,418 months received average monthly earnings of $143.17, but after cross-examination it was shown that he had omitted engineers in passenger service, whose average earnings are much higher. Another table purported to show what the earnings of engineers would have been had they worked the same number of hours as brick masons, plasterers, steam fitters or plumbers. This table showed that the skilled artisans earned much more per hour than the engineers. This exhibit was based on hourly rates of wages in large cities where the men are best organized and where the wage scales are high.

"I see by your table that W. J. Devlin, of Medicine Hat, a freight engineer on the Canadian Pacific, would have earned $2,223.36 in 1913 on the basis of his wages in October of that year," said Attorney Sheean. "How much would he have earned as a plumber at Medicine Hat?" Mr. Lauck admitted that his figures applied only to the large cities, which furnished the basis of his compilation.

A number of firemen were put on the witness stand to testify as to the amount of coal shoveled, to offset testimony introduced by the railroads earlier and based on actual stopwatch tests; but most of the testimony was not capable of comparison with the figures produced by the railroads.

Air Brake Association

The twenty-second annual convention of the Air Brake Association will be held at the Hotel Sherman, Chicago, on May 4-7, 1915. The following is a list of the subjects to be discussed at the meeting: Accumulation of Moisture and Its Elimination From Trains and Yard Testing Plants; Adequate Hand Brakes on Heavy Passenger Equipment Cars; Need of Efficient Cleaning and Repairing of Freight Brakes; What Shall We Do to Improve the Present Pneumatic Signal Device?; Difficulties the Railroad Companies Encounter in Endeavoring to Run 100 Per Cent Operative Brakes in Freight Train Service; M. C. B. Air Brake Hose Specification and Recommended Practice. The afternoon of May 6 has been set aside for a series of air brake lectures, delivered by representatives of the Pittsburgh Air Brake Company, Westinghouse Air Brake Company, New York Air Brake Company and possibly the Automatic Straight Air System, each speaker being limited to one hour. The practice inaugurated at the last convention of giving one afternoon to the manufacturers' representatives for exploitation of their devices will be followed this year also, and May 4 has been assigned for the purpose.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Demurrage Officers.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, 1915, Jefferson Hotel, Richmond, Va.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 21-24, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Society of Civil Engineers.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton, Bldg., Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

Railway Storekeepers' Association.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama Great Southern	309	$249,692	$69,585	$355,202	$42,376	$74,364	$14,666	$135,652	$3,034	$8,025	$278,116	$77,086	$15,170	$61,833	—$30,132
Arizona Eastern	367	111,613	21,955	145,461	34,513	18,430	2,102	45,617	1,630	10,945	103,236	32,225	8,601	23,591	—60,691
Atchison, Topeka & Santa Fe	8,514	4,440,711	1,912,451	6,963,286	815,776	1,318,846	184,223	2,298,344	.....	169,412	4,773,596	2,189,690	404,086	1,784,752	91,068
Atlanta & West Point	93	44,943	34,172	93,453	14,896	23,697	6,383	32,177	2,203	5,116	85,473	7,980	5,785	2,153	—15,721
Atlantic & St. Lawrence	167	132,811	20,462	164,710	12,115	26,643	4,285	72,896	.....	3,761	119,701	45,009	10,800	34,209	10,215
Atlantic City	170	50,568	39,250	97,759	17,656	32,216	1,887	80,390	118	1,143	132,551	34,791	13,500	—48,336	—2,370
Atlantic Coast Line	4,699	1,679,662	728,290	2,643,201	346,113	407,037	60,981	942,615	13,678	65,182	1,830,891	812,311	138,000	674,117	—139,804
Baltimore & Ohio—System	4,516	4,961,369	981,095	6,486,271	632,363	1,182,653	153,569	2,776,717	38,192	171,092	4,954,793	1,532,478	287,942	1,244,284	—34,413
Belt Ry. Co. of Chicago	24	.....	.....	277,729	13,418	26,552	703	114,127	.....	6,054	160,853	116,876	10,186	106,690	1,858
Bingham & Garfield	27	80,709	2,614	83,667	4,939	11,404	1,027	17,855	84	2,123	37,433	46,234	2,175	44,059	—47,220
Boston & Maine	2,302	2,001,988	1,022,271	3,371,584	399,706	513,912	33,617	1,706,765	14,987	97,191	2,766,178	605,407	155,000	450,407	286,055
Buffalo & Susquehanna Railway	91	9,156	5,072	16,419	3,346	6,034	851	10,765	41	2,333	23,369	—6,950	1,600	—8,551	—9,749
Canadian Pacific Lines in Maine	233	126,000	19,227	153,566	15,355	19,065	6,166	60,960	.....	4,378	105,925	47,642	12,000	35,642	27,342
Carolina, Clinchfield & Ohio	248	159,585	11,388	174,610	19,509	23,678	6,071	36,687	.....	9,567	94,277	80,333	14,250	66,066	—25,064
Carolina, Clinchfield & Ohio of S. C.	18	10,091	1,096	11,484	1,478	80	1,447	2,184	.....	630	5,819	5,665	750	4,915	—1,930
Central of New Jersey	678	1,553,078	379,872	2,056,134	156,949	454,596	31,024	803,909	12,743	51,183	1,510,376	545,757	145,451	400,306	—39,596
Central Vermont	411	187,761	62,956	271,369	24,290	55,431	7,807	145,013	2,391	6,792	241,725	29,644	15,960	13,185	40,413
Charleston & Western Carolina	341	109,566	23,869	140,153	26,692	28,890	3,553	54,583	.....	4,205	117,922	22,230	5,000	17,230	—12,206
Chicago & Alton	1,033	720,473	289,627	1,109,040	118,776	296,514	39,484	478,612	9,275	30,702	973,363	135,677	45,000	90,372	45,342
Chicago & Eastern Illinois	1,282	894,154	225,074	1,208,983	144,603	245,529	23,844	499,809	9,253	38,643	961,069	247,914	53,100	194,731	40,240
Chicago & Erie	270	387,327	42,492	512,050	57,016	65,341	21,842	245,357	2,366	11,986	403,648	108,402	20,500	87,902	170,595
Chicago, Burlington & Quincy	9,375	4,956,488	1,463,070	7,062,602	486,093	1,301,081	125,964	2,637,152	63,344	180,894	4,784,528	2,278,074	331,459	1,946,615	—91,753
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	48,020	13,725	74,896	4,368	10,285	1,398	47,111	.....	1,396	64,557	10,339	2,870	7,468	9,676
*Chicago, Indiana & Southern	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago, Indianapolis & Louisville	618	286,260	125,899	455,641	48,068	64,519	19,612	197,590	223	17,449	347,452	108,189	25,614	82,552	3,178
Chicago Junction	24	.....	.....	165,666	17,902	18,641	1,103	106,239	.....	4,637	148,522	17,144	2,290	14,770	—15,031
Chicago, Milwaukee & St. Paul	10,067	4,761,164	1,170,719	6,696,116	459,629	1,088,668	141,073	3,085,017	55,268	160,008	4,948,292	1,747,824	398,311	1,349,513	—532,794
Chicago, Rock Island & Gulf	477	213,236	52,011	285,252	26,221	35,951	9,736	102,337	1,457	8,210	183,913	101,339	8,094	93,207	19,323
Chicago, Rock Island & Pacific	7,852	3,709,478	1,309,089	5,420,469	513,144	870,040	147,455	2,447,490	36,198	139,377	4,151,841	1,268,628	268,891	999,344	—86,284
Chicago, Terre Haute & Southeastern	374	178,452	14,192	197,338	18,821	40,773	3,832	68,710	1,167	10,348	143,651	53,687	12,500	41,187	16,738
Cincinnati, New Orleans & Texas Pacific	337	552,732	174,584	776,557	62,021	156,693	26,269	257,469	9,102	19,069	531,622	244,934	31,000	213,735	—5,052
Colorado & Southern	1,089	465,877	93,046	606,265	53,136	143,735	10,600	205,700	2,991	20,904	437,067	169,199	35,600	133,615	13,227
Delaware & Hudson Co.—R. R. Dept	881	1,315,845	172,517	1,585,640	135,393	342,943	26,575	692,692	10,413	63,356	1,269,941	315,699	58,500	257,062	—155,712
Denver & Rio Grande	2,585	1,148,236	238,495	1,482,696	100,686	316,618	36,683	508,505	19,136	51,814	1,033,243	449,453	84,000	365,377	38,602
Denver & Salt Lake	255	100,392	15,805	121,704	13,515	26,044	2,526	53,691	.....	5,219	100,995	20,708	6,000	14,708	12,649
Detroit & Mackinac	400	48,248	21,302	75,476	8,992	14,845	1,935	34,396	.....	2,826	62,994	12,482	7,517	4,965	—563
Detroit & Toledo Shore Line	79	142,619	.....	143,121	10,585	9,299	1,971	47,662	.....	3,112	72,639	70,492	5,750	64,742	—8,143
Detroit, Grand Haven & Milwaukee	191	122,000	41,000	192,001	15,627	38,141	6,288	123,589	827	5,157	189,630	2,371	3,360	—1,112	—8,911
Detroit, Toledo & Ironton	441	104,118	10,958	122,702	13,299	35,054	4,795	91,412	.....	5,660	150,220	—27,518	6,000	—33,518	—3,611
Duluth & Iron Range	273	60,433	16,641	86,748	25,061	39,698	966	61,692	1,303	8,102	136,822	—50,074	4,228	—54,302	17,389
Duluth, Missabe & Northern	369	44,265	21,118	70,554	23,783	49,813	1,844	45,819	1,630	16,097	138,986	68,432	1,044	—69,476	—75,386
Duluth, South Shore & Atlantic	628	148,838	50,215	216,074	30,866	33,226	7,473	102,779	3,129	8,821	186,294	29,781	16,000	13,781	—24,735
Duluth, Winnipeg & Pacific	185	100,486	14,039	117,122	7,001	15,892	1,391	46,967	1,265	6,163	78,680	38,442	5,740	32,702	21,526
El Paso & Southwestern Co	1,027	473,020	143,715	657,799	76,142	81,337	21,324	171,896	5,465	22,989	379,153	278,646	34,890	243,756	—46,168
Erie	1,988	2,870,643	627,320	4,063,241	341,515	947,333	95,799	1,658,902	31,279	104,470	3,177,712	885,529	168,654	713,528	212,472
Fort Worth & Denver City	454	337,061	105,280	467,989	48,246	77,558	7,101	221,944	1,843	14,760	371,453	96,536	12,621	83,915	—37,544
Galveston, Harrisburg & San Antonio	1,350	563,409	231,714	860,979	115,571	140,377	30,437	458,610	8,222	33,600	785,745	75,234	39,624	35,519	—49,236
Georgia	307	150,772	55,539	222,557	25,640	43,735	12,443	101,236	528	7,109	190,691	31,866	3,629	28,043	—41,136
Georgia, Southern & Florida	395	97,915	57,799	175,705	22,753	33,237	6,899	79,084	764	10,960	153,699	22,006	10,122	11,799	—15,197
Grand Rapids & Indiana	575	250,000	111,315	387,286	52,760	72,528	10,463	193,116	—471	14,697	343,089	44,198	21,594	22,413	5,038
Grand Trunk Western	347	389,000	130,000	559,554	70,796	132,956	18,129	280,310	5,970	16,105	524,267	35,287	35,920	—694	—51,716
Great Northern	8,077	2,462,745	805,079	3,746,129	369,717	566,993	93,073	1,442,576	57,479	99,797	2,622,160	1,123,969	328,453	795,427	—146,859
Gulf, Colorado & Santa Fe	1,937	1,255,481	206,069	1,522,703	229,276	232,832	28,685	537,120	.....	35,743	1,057,369	465,334	49,162	416,027	175,663
Gulf & Ship Island	308	92,765	22,422	122,757	14,013	29,130	2,418	36,835	281	7,180	89,858	32,899	10,653	22,158	—16,814
Hocking Valley	351	319,111	61,642	400,909	32,186	78,897	10,630	158,693	.....	13,548	293,953	106,955	34,050	72,905	46,638
Houston & Texas Central	857	442,247	104,758	590,259	84,593	83,868	16,272	237,893	1,441	18,149	441,674	148,585	26,950	121,505	70,318
Houston, East & West Texas	191	88,441	20,390	115,267	14,867	21,430	2,002	49,912	.....	3,221	91,431	23,836	4,170	19,664	—9,196
Kanawha & Michigan	177	169,167	25,622	201,252	25,893	58,479	2,962	66,921	10	5,917	160,182	41,070	11,290	29,764	274
*Lake Shore & Michigan Southern	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh & Hudson River	97	131,014	9,396	141,235	13,890	20,386	1,409	55,765	.....	6,730	98,180	43,055	4,150	38,905	13,386
Lehigh & New England	294	143,242	1,001	155,884	19,728	28,354	1,803	49,877	.....	6,466	106,229	49,655	5,104	44,551	—25,340
Louisiana & Arkansas	279	117,426	15,619	136,709	20,050	22,728	3,149	40,079	.....	3,901	89,906	46,802	7,400	39,240	—5,833
Louisiana Ry. & Navigation	351	132,303	18,883	162,196	26,801	16,104	5,392	76,702	.....	5,147	130,146	32,050	7,500	24,550	—15,827
Louisiana Western	208	110,433	54,929	178,392	18,202	35,658	6,865	58,327	2,731	6,531	128,315	50,077	9,895	40,166	26,779

*Merged with the New York Central Railroad Co.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Louisville, Henderson & St. Louis	200	$74,842	$28,778	$109,215	$21,398	$16,415	$5,442	$43,496	.....	$3,307	$90,058	$19,157	$3,800	$15,352	—$7,754
Michigan Central	1,800	1,610,397	672,922	2,566,335	343,315	456,501	62,449	1,197,588	$50,863	65,447	2,176,164	390,171	125,000	265,115	110,302
Midland Valley	380	81,132	32,299	120,604	20,249	17,708	2,062	40,296	.....	5,733	86,049	34,555	6,583	27,956	16,999
Minneapolis & St. Louis	1,646	657,646	136,676	845,162	83,405	109,213	16,950	360,335	—114	23,547	592,336	252,826	39,279	213,547	—459
Minn., St. Paul & Sault Ste. Marie	4,102	1,313,849	424,531	1,911,137	179,615	316,647	53,073	794,763	12,182	40,178	1,373,125	538,012	78,088	459,924	—101,847
Missouri & North Arkansas	365	59,005	23,405	89,083	30,820	21,794	2,738	52,171	.....	5,705	113,228	—24,145	6,000	—30,199	—14,711
Missouri, Kansas & Texas System	3,865	2,012,376	618,783	2,827,793	383,532	360,948	53,204	1,132,766	23,259	83,762	2,036,410	791,382	111,675	678,663	—7,651
Missouri, Oklahoma & Gulf	334	87,876	16,524	108,394	28,363	19,179	4,292	53,089	111	6,405	111,439	—3,045	6,487	—9,594	1,124
Missouri, Oklahoma & Gulf Ry. of Texas	19	16,667	193	16,980	1,406	3,494	234	4,386	.....	561	10,080	6,900	140	6,760	1,818
Missouri Pacific	3,920	1,565,696	338,167	2,087,720	247,785	424,096	50,315	954,044	5,364	52,978	1,734,584	353,136	98,590	252,212	99,850
Morgan's La. & Texas R. R. & S. S. Co.	405	235,356	83,335	362,527	46,272	74,256	11,230	160,328	2,407	12,183	306,663	55,874	20,013	35,793	—54,627
Nashville, Chattanooga & St. Louis	1,231	569,775	192,085	846,897	104,446	176,778	43,601	372,495	10,497	29,744	737,560	109,337	27,213	81,819	—101,494
Nevada Northern	165	66,033	4,928	73,741	12,186	13,167	656	22,201	86	4,013	52,308	21,433	5,006	16,376	—45,543
New Orleans, Mobile & Chicago	403	114,802	19,818	141,855	29,218	18,029	3,714	52,415	—20	6,273	109,631	32,224	6,481	25,738	32,872
New Orleans, Texas & Mexico	286	86,805	18,468	114,291	21,725	18,271	3,694	53,716	.....	11,064	108,471	5,820	1,500	4,320	—21,025
†New York Central & Hudson River	5,984	9,764,690	3,437,437	13,103,848	1,365,576	2,862,769	232,109	5,066,896	217,324	355,959	10,100,633	3,003,216	795,770	2,206,757	.....
New York, Ontario & Western	568	471,310	73,395	634,389	58,507	132,046	6,851	293,575	.....	16,409	507,388	127,001	20,000	107,001	23,607
New York, Susquehanna & Western	140	194,494	38,671	263,988	19,846	30,200	1,622	128,337	.....	6,136	186,141	77,847	13,208	64,575	172
Norfolk & Western	2,044	2,560,439	333,406	3,033,771	328,514	626,594	51,321	1,023,569	8,577	74,798	2,074,217	959,554	168,000	791,508	—97,780
Northwestern Pacific	401	77,406	99,098	203,144	35,243	42,367	4,602	109,689	.....	8,076	197,974	5,169	16,068	—10,909	19,255
Oahu Ry. & Land Co	109	66,290	19,873	94,969	9,280	8,133	641	20,778	.....	3,488	42,328	52,641	6,970	45,671	6,006
Oregon Short Line	2,162	936,115	271,458	1,361,148	132,999	246,796	31,264	417,743	23,294	55,791	906,223	454,925	117,711	337,146	—43,509
Oregon-Washington R. R. & Nav. Co	2,028	661,561	277,224	1,046,017	120,212	162,810	36,801	418,458	10,725	61,437	809,753	236,264	99,755	135,984	—38,760
Panhandle & Santa Fe	668	242,881	53,109	310,632	59,857	66,529	3,964	107,218	.....	9,222	246,790	63,842	9,357	53,829	33,633
Pere Marquette	2,312	987,904	282,481	1,408,091	107,114	339,139	34,787	647,286	3,770	36,252	1,168,247	239,844	52,926	186,125	224,328
Philadelphia & Reading	1,120	2,810,451	474,678	3,481,482	282,955	682,268	31,645	1,403,233	24,342	73,081	2,491,991	989,491	99,326	889,550	—224,366
Philadelphia, Baltimore & Washington	717	629,298	643,056	1,437,281	237,452	319,689	20,617	699,750	13	46,097	1,323,620	113,661	54,682	58,935	—35,357
Pittsburgh & Lake Erie	225	731,906	113,729	892,738	108,326	259,443	13,449	302,861	3,237	30,056	717,372	175,366	49,500	125,866	—91,150
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	1,935,639	625,274	2,914,778	375,909	625,317	59,384	1,248,583	20,459	77,371	2,407,022	507,756	155,682	351,498	—292,917
Pittsburgh, Shawmut & Northern	294	154,337	8,501	164,750	13,067	39,997	1,719	58,834	.....	3,730	117,346	47,404	1,602	45,802	729
Port Reading	21	112,677	.....	137,422	9,747	7,520	48	56,252	.....	452	74,009	63,412	12,000	51,412	14,681
Richmond, Fredericksburg & Potomac	88	91,395	89,022	219,688	16,799	29,410	3,712	87,169	9,176	7,289	153,526	66,162	6,476	59,683	—16,340
Rutland	468	128,238	85,970	242,623	28,776	47,390	8,021	105,978	994	5,153	196,312	46,311	17,368	28,943	4,256
St. Joseph & Grand Island	258	69,731	23,159	102,687	10,978	17,458	4,674	45,600	.....	5,089	83,799	18,888	7,620	11,245	620
St. Louis & San Francisco	4,746	2,318,858	710,330	3,251,536	464,254	556,384	65,799	1,153,125	.....	85,406	2,324,968	926,568	98,341	825,244	306,576
St. Louis, Iron Mountain & Southern	3,365	1,835,213	387,266	2,409,019	337,331	467,900	62,753	810,506	7,074	70,006	1,755,570	653,449	111,032	540,283	—524,680
St. Louis Merchants' Bridge Terminal	9	.....	178	151,272	15,526	9,282	841	80,657	.....	6,145	112,451	38,821	6,540	32,278	4,325
St. Louis, San Francisco & Texas	235	66,691	21,198	94,215	20,931	20,311	2,499	49,414	.....	4,271	97,425	—3,210	1,269	—4,486	—10,575
St. Louis Southwestern	943	440,211	87,177	562,802	64,126	102,713	26,020	178,714	3,107	25,376	399,914	162,887	35,191	127,515	—120,093
St. Louis Southwestern of Texas	811	259,814	66,207	350,689	85,779	81,776	12,364	167,201	440	19,395	358,442	—7,753	15,011	—22,799	1,570
San Antonio & Aransas Pass	724	189,859	71,428	281,140	77,662	58,402	6,554	147,204	.....	12,178	301,815	—20,675	14,077	—35,048	—78,248
San Pedro, Los Angeles & Salt Lake	1,132	431,358	182,644	687,211	55,308	102,632	35,665	252,828	17,112	19,855	483,402	203,810	42,170	161,636	—41,300
Southern	7,036	2,974,464	1,246,466	4,653,002	670,139	867,308	159,607	1,862,597	27,443	166,564	3,730,349	922,653	215,186	706,724	—353,054
Spokane International	163	41,943	10,061	54,526	8,901	4,585	2,257	21,267	30	3,778	40,819	13,707	3,781	9,927	—10,050
Spokane, Portland & Seattle	556	173,689	84,728	288,513	43,492	34,552	5,630	85,353	3,042	13,503	186,572	101,941	53,400	47,283	16,387
Tennessee Central	294	76,244	27,239	110,873	25,520	14,413	5,254	49,783	.....	6,570	101,492	9,380	4,480	4,899	—12,450
Terminal R. R. Ass'n of St. Louis	35	.....	196	217,115	13,875	15,813	1,006	84,768	.....	5,992	121,455	95,660	30,329	65,331	13,588
Texas & New Orleans	469	202,816	77,712	316,451	46,979	89,999	8,523	135,933	9,057	11,416	301,870	14,581	15,305	—1,321	—12,285
Texas & Pacific	1,887	1,130,936	303,455	1,554,964	140,780	217,389	37,471	711,337	14,124	38,932	1,159,284	395,680	68,700	326,512	6,710
Toledo & Ohio Central	446	290,289	45,679	354,448	51,973	96,976	7,713	165,336	1,792	11,110	334,899	19,548	21,149	—1,606	2,909
Toledo, Peoria & Western	248	59,833	32,936	98,253	15,414	26,371	2,476	46,936	.....	3,700	94,896	3,357	6,100	—2,747	—10,078
Trinity & Brazos Valley	315	84,633	10,907	101,519	21,237	9,243	2,709	41,830	.....	8,208	83,227	18,292	4,605	13,646	823
Ulster & Delaware	129	24,011	12,943	50,406	7,660	19,059	1,107	31,201	79	3,018	62,123	—11,716	3,300	—14,961	6,397
Union Pacific	3,617	2,357,861	683,702	3,488,254	280,605	633,502	99,409	1,080,509	64,163	129,898	2,288,384	1,199,969	189,044	1,010,022	—137,624
Union R. R. of Baltimore	9	111,243	17,825	130,729	9,069	.....	.....	4,795	.....	2,366	16,230	114,499	5,941	108,558	19,626
Vandalia	910	577,075	179,682	857,519	118,043	192,046	24,527	391,683	9,466	23,459	759,224	98,295	34,152	64,143	—76,468
Vicksburg, Shreveport & Pacific	171	55,362	29,093	96,805	17,136	24,237	3,724	46,872	2,021	5,228	99,216	—2,412	7,100	—9,512	—43,470
Virginia & Southwestern	240	130,468	11,276	146,114	27,265	32,147	2,226	44,146	.....	3,568	109,353	36,761	7,083	29,678	—16,521
Virginian	504	435,375	27,714	493,397	56,099	82,322	5,359	114,009	7,736	10,739	275,982	217,415	20,000	197,409	—40,520
Wabash	2,519	1,574,524	438,602	2,231,074	202,841	429,110	75,812	1,059,944	12,985	57,488	1,837,692	393,383	83,657	309,319	150,160
Washington Southern	36	26,862	43,441	99,802	10,119	13,764	1,427	43,286	4,046	3,191	75,831	23,971	3,236	20,733	—1,472
Western Maryland	661	563,182	61,464	656,849	89,909	118,772	23,169	258,362	2,179	18,595	510,883	145,965	25,500	120,465	94,847
Western Pacific	943	242,823	49,204	312,205	42,987	56,868	21,304	139,823	8,085	19,068	288,136	24,069	28,731	—4,685	119,620
Western Ry. of Alabama	133	58,344	36,643	105,599	18,609	25,360	5,674	31,540	1,679	4,694	87,516	18,083	5,269	12,779	—9,987
Yazoo & Mississippi Valley	1,382	770,822	170,375	992,329	148,598	131,683	16,884	412,539	2,360	25,373	736,381	255,949	54,000	201,670	—194,764

†Includes Lake Shore & Michigan Southern and Chicago, Indiana & Southern.

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
Alabama Great Southern	309	$1,902,626	$654,862	$2,800,999	$325,337	$698,624	$97,598	$974,436	$22,360	$64,827	$2,183,182	$617,817	$108,172	$509,486	—$225,234
Arizona Eastern	367	901,673	183,715	1,175,444	197,484	164,280	14,797	328,217	6,920	71,229	782,904	392,540	91,450	300,769	—259,252
Atchison, Topeka & Santa Fe	8,514	38,479,587	13,912,040	57,133,287	8,074,371	9,866,946	1,182,358	16,076,631	.....	1,084,940	36,244,856	20,888,432	2,733,126	18,147,478	1,613,720
Atlanta & West Point	93	342,449	263,369	698,239	111,576	164,975	38,376	221,016	11,384	32,634	579,896	118,343	47,194	70,935	—81,681
Atlantic & St. Lawrence	167	672,647	206,504	965,522	138,264	145,606	28,606	399,475	.....	23,565	735,458	230,065	75,600	154,465	115,229
Atlantic City	170	461,353	995,415	1,533,907	262,031	170,078	17,660	751,700	649	10,332	1,211,590	322,317	94,500	227,684	—17,075
Atlantic Coast Line	4,699	11,642,847	4,588,351	17,650,699	2,776,140	3,278,117	405,524	6,573,211	56,227	528,053	13,577,414	4,073,285	966,000	3,104,210	—1,831,881
Baltimore & Ohio—System	4,516	40,655,728	8,904,741	53,624,706	5,493,196	9,948,196	1,112,978	20,951,634	321,989	1,238,316	39,065,102	14,559,605	1,887,794	12,664,223	—1,268,192
Belt Ry. Co. of Chicago	24	.....	.....	1,955,321	104,598	171,158	6,188	695,524	.....	42,971	1,020,439	934,882	75,858	859,023	290,289
Bingham & Garfield	27	636,413	25,686	666,157	66,146	89,213	6,516	124,969	572	13,246	300,662	365,495	13,804	351,691	—276,444
Boston & Maine	2,302	15,727,536	9,729,152	27,975,019	4,276,260	4,270,828	261,882	12,077,565	120,939	684,962	21,692,436	6,282,436	1,141,001	5,141,582	262,096
Buffalo & Susquehanna Railway	91	98,376	49,978	165,944	33,571	58,159	3,773	84,442	244	16,984	197,173	31,229	11,200	—42,431	50,430
Canadian Pacific Lines in Maine	233	484,528	142,808	678,419	153,816	109,185	41,210	313,837	.....	25,638	643,686	34,733	84,000	—49,267	80,435
Carolina, Clinchfield & Ohio	248	1,127,995	110,613	1,269,184	118,265	162,711	45,875	250,113	.....	63,296	631,924	637,260	99,750	537,295	—293,233
Carolina, Clinchfield & Ohio of S. C.	18	65,223	10,760	77,942	7,069	620	11,984	14,796	.....	4,276	38,746	39,196	5,250	33,938	—22,452
Central of New Jersey	678	12,408,844	3,695,109	17,028,209	1,470,291	3,053,019	213,750	5,873,573	92,996	344,427	11,045,690	5,982,520	852,153	5,130,329	—282,799
Central Vermont	411	1,526,761	557,491	2,259,621	308,009	380,511	56,275	1,045,768	18,839	48,623	1,858,025	401,596	110,320	290,568	209,317
Charleston & Western Carolina	341	780,360	202,259	1,035,092	210,969	203,089	26,966	386,153	.....	31,571	858,677	176,416	35,000	141,408	—123,627
Chicago & Alton	1,033	5,546,535	2,403,190	8,655,659	956,561	1,944,426	258,216	3,120,076	70,172	208,521	6,557,971	2,097,687	315,360	1,780,682	457,468
Chicago & Eastern Illinois	1,282	6,411,622	1,710,972	8,803,859	1,041,358	1,830,265	161,310	3,280,371	55,241	256,592	6,621,487	2,182,372	368,000	1,813,876	577,683
Chicago & Erie	270	2,705,503	360,118	3,407,566	552,975	139,262	136,895	1,626,493	16,113	89,780	2,514,559	893,007	100,493	792,472	1,126,303
Chicago, Burlington & Quincy	9,375	39,238,103	12,721,882	56,856,818	5,587,075	9,361,507	951,594	17,717,663	463,378	1,216,876	35,298,093	21,558,726	2,300,479	19,258,247	—85,963
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	374,493	111,166	562,919	75,828	86,032	11,748	305,433	.....	10,243	489,284	73,636	20,090	53,528	—30,327
*Chicago, Indiana & Southern	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago, Indianapolis & Louisville	618	2,502,745	1,029,294	3,863,056	434,346	732,805	144,915	1,442,963	1,251	124,145	2,878,389	984,668	185,707	798,621	—191,364
Chicago Junction	24	.....	.....	1,152,839	147,119	127,272	7,077	636,191	.....	31,911	949,570	203,269	14,438	188,684	—91,631
Chicago, Milwaukee & St. Paul	10,067	38,607,004	11,188,353	55,486,185	6,585,824	7,839,097	1,056,057	21,624,451	444,226	1,042,540	37,398,742	18,087,443	2,831,132	15,238,269	—1,747,087
Chicago, Rock Island & Gulf	477	1,370,089	366,803	1,871,118	220,859	264,875	67,640	708,664	12,257	54,280	1,328,575	542,543	53,119	489,103	38,456
Chicago, Rock Island & Pacific	7,852	28,293,045	10,859,489	42,069,161	5,933,529	6,829,188	1,021,726	16,603,766	284,525	963,363	31,605,103	10,464,057	1,871,076	8,590,324	—183,955
Chicago, Terre Haute & Southeastern	374	1,204,292	119,420	1,361,859	191,914	317,831	25,135	415,945	6,570	70,037	1,027,432	334,428	82,500	251,928	112,610
Cincinnati, New Orleans & Texas Pacific	337	4,138,240	1,082,610	5,539,251	561,806	1,486,187	177,185	1,748,707	43,671	145,557	4,163,113	1,376,138	217,000	1,158,756	—570,800
Colorado & Southern	1,089	3,557,692	899,720	4,800,241	576,215	1,039,031	75,723	1,481,297	29,174	137,339	3,338,779	1,461,462	245,041	1,216,079	186,522
Delaware & Hudson Co.—R. R. Dept	881	10,944,141	1,814,926	13,506,284	982,652	2,232,732	184,395	4,899,998	86,839	439,514	8,813,731	4,692,553	392,119	4,299,946	.....
Denver & Rio Grande	2,585	10,070,925	2,767,802	13,680,056	1,773,201	2,484,996	268,091	3,971,732	193,631	370,691	9,053,040	4,627,016	619,500	4,006,807	11,890
Denver & Salt Lake	255	799,901	218,620	1,075,177	124,549	183,729	17,040	357,721	.....	37,975	718,002	357,175	38,000	319,175	120,452
Detroit & Mackinac	400	387,274	196,630	634,993	82,357	109,233	15,888	236,950	1,021	19,090	464,540	170,453	44,828	125,625	—23,809
Detroit & Toledo Shore Line	79	878,210	.....	880,471	91,574	70,089	12,281	250,994	.....	19,613	444,552	435,919	41,950	393,969	—69,597
Detroit, Grand Haven & Milwaukee	191	960,089	395,349	1,572,324	241,117	239,932	48,441	787,035	6,749	34,156	1,357,431	214,893	23,520	190,450	—74,690
Detroit, Toledo & Ironton	441	989,906	111,776	1,169,390	160,862	191,461	28,091	701,570	.....	40,926	1,122,910	46,480	42,000	4,479	254,756
Duluth & Iron Range	273	2,573,994	133,510	2,817,610	512,734	453,867	7,469	653,022	19,415	60,872	1,707,378	1,110,232	143,398	966,833	—1,327,366
Duluth, Missabe & Northern	369	2,989,857	196,544	3,263,282	385,544	503,541	14,514	660,495	17,884	97,889	1,679,867	1,583,415	173,470	1,409,945	—1,437,881
Duluth, South Shore & Atlantic	638	990,257	561,569	1,717,827	324,008	248,676	57,010	673,607	27,408	73,311	1,404,021	313,806	111,969	201,768	—108,048
Duluth, Winnipeg & Pacific	185	613,788	129,868	763,479	133,949	139,939	16,452	286,859	7,666	42,145	627,010	136,469	38,058	98,411	—125,334
El Paso & Southwestern Co	1,027	3,330,560	770,267	4,438,289	544,226	627,356	129,161	1,199,356	39,954	161,657	2,689,485	1,748,804	226,297	1,507,294	8,129
Erie	1,988	23,762,742	5,575,006	32,384,433	3,678,277	7,769,235	652,653	11,831,817	227,121	698,590	24,777,742	7,606,690	750,442	6,839,014	—924,543
Fort Worth & Denver City	454	2,238,199	965,095	3,378,098	318,908	482,536	53,512	1,353,551	23,739	99,007	2,331,253	1,046,844	81,805	965,040	228,743
Galveston, Harrisburg & San Antonio	1,350	4,571,430	1,800,473	6,851,792	916,146	1,187,795	203,698	2,963,312	62,016	247,210	5,578,838	1,272,954	266,123	1,006,779	—104,333
Georgia	307	1,141,230	462,313	1,735,435	203,467	346,128	83,610	751,820	2,085	53,631	1,440,741	294,694	28,711	265,509	—161,346
Georgia, Southern & Florida	395	777,910	418,732	1,367,911	180,922	285,964	51,781	544,394	1,144	72,269	1,136,774	231,136	65,542	164,044	—65,642
Grand Rapids & Indiana	575	1,778,602	1,185,877	3,236,503	342,473	503,904	77,503	1,355,836	13,028	99,166	2,391,910	844,592	166,936	675,189	76,174
Grand Trunk Western	347	2,848,512	1,106,278	4,247,742	722,563	811,755	138,803	1,817,569	54,750	106,087	3,651,527	596,215	251,440	344,140	—163,552
Great Northern	8,077	31,372,945	8,509,305	44,026,205	4,144,392	4,328,064	689,545	11,307,189	511,881	736,608	21,671,638	22,354,567	2,670,223	19,682,749	98,101
Gulf & Ship Island	308	711,151	188,423	958,868	121,321	209,241	17,158	262,512	1,735	49,298	661,265	297,604	54,207	243,261	—153,110
Gulf, Colorado & Santa Fe	1,937	7,899,219	1,908,404	10,289,074	1,326,703	1,472,225	191,301	3,472,956	.....	241,438	6,698,338	3,590,736	334,644	3,253,549	1,509,595
Hocking Valley	351	3,133,360	531,832	3,940,560	479,042	766,143	67,844	1,259,315	.....	98,742	2,671,088	1,269,472	266,850	1,002,622	—310,626
Houston & Texas Central	857	2,894,007	941,737	4,094,161	700,296	566,211	107,649	1,616,687	11,407	123,644	3,123,136	971,025	172,221	797,997	51,327
Houston, East & West Texas	191	548,587	192,012	783,383	149,823	127,473	13,511	332,104	.....	22,247	644,906	138,477	28,762	109,586	—93,013
Kanawha & Michigan	177	1,524,014	214,374	1,786,849	247,933	438,752	18,154	529,540	28	47,074	1,281,481	505,368	80,800	424,534	—80,851
*Lake Shore & Michigan Southern	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh & Hudson River	97	963,200	69,774	1,046,180	148,175	140,103	9,461	384,489	.....	30,595	712,824	333,356	29,050	304,306	91,608
Lehigh & New England	294	1,445,729	9,198	1,524,740	198,113	216,104	12,349	378,890	.....	41,913	847,369	677,371	39,123	638,248	169,043
Louisiana & Arkansas	279	816,512	136,387	981,355	180,179	162,862	18,948	268,553	.....	29,568	659,669	321,686	44,900	276,623	—43,827
Louisiana Ry. & Navigation	351	934,607	153,993	1,161,693	220,063	124,413	39,493	481,747	.....	36,821	902,537	259,156	54,500	204,656	—20,740
Louisiana Western	208	826,684	407,404	1,316,602	134,394	238,926	47,319	404,159	20,435	45,078	890,209	426,393	73,302	353,013	38,312

*Merged with the New York Central Railroad Co.

Traffic News

The new rate for mileage tickets, 2¼ cents a mile throughout the state of New Hampshire, went into effect March 9.

The spring meeting of the National Industrial Traffic League will be held at the Hotel Chisca, Memphis, Tenn., on April 8 and 9.

The Michigan railroads have published page advertisements in the newspapers of the state, reprinting letters from the lieutenant-governor, secretary of state, state treasurer, auditor general and other state officers, stating that if the claims of the railroads are substantiated the legislature should allow them to increase passenger fares.

A committee of passenger officers, including H. J. Phelps, general passenger agent of the Illinois Central; F. A. Miller, passenger traffic manager of the Chicago, Milwaukee & St. Paul; L. M. Allen, passenger traffic manager of the Chicago, Rock Island & Pacific; C. A. Cairns, general passenger agent of the Chicago & North Western, and L. M. Wakely, general passenger agent of the Chicago, Burlington & Quincy, has been touring the state of Iowa making addresses before commercial clubs, urging an increase in passenger fares in that state.

The Southern Railway, quoting from the annual report of its agricultural agent for 1914, says that in the 12 months the field agents of the company have given advice to about 100,000 farmers. They received detailed reports from 3,512 farmers covering 33,466 acres in cotton, 24,287 acres in corn and 11,383 acres in miscellaneous crops. The average yield of cotton per acre on fields cultivated in accordance with their advice was 1,255 lb. of seed cotton, as compared with 513 lb. in other fields: Average yield of corn 40.8 bu., as compared with 18.4 bu. in fields where their advice was not followed. Even in boll weevil territory many farmers averaged a bale or more of cotton per acre. The agricultural development work of the Southern is carried on in co-operation with the United States government and the agricultural agents of the states and counties. The work heretofore done for the development of live stock, dairying and poultry raising has been consolidated with the general agricultural work under the direction of the industrial and agricultural commissioner.

Proposed Increase in Freight Storage Rates in New York

C. V. Burnside, examiner for the Interstate Commerce Commission, continued on March 11 the hearing of complaints at New York against proposed increases in charges for storage and lighterage, and for handling heavy articles. S. W. Baker, of the American Locomotive Sales Corporation, said that the proposed increase in the charge for loading heavy freight would add $40 to the cost of delivering an engine to ocean vessels at New York City. It takes from three to eight days to get the parts of a locomotive from Schenectady to New York, and ten days' free time for unloading and delivery is necessary.

Michael Cohen, dealer in rough stone in large blocks, said that instead of charging him for delivery of stone by lighter to his docks, the railroads ought to increase the transportation rates on finished stone, which are not high enough in proportion to those for rough. The Fruit Despatch Company presented testimony to the effect that the proposed unloading charge would increase the expenses of its business in bananas more than $20,000 a year.

Express Companies Seek Rehearing

In accordance with the permission granted by the Interstate Commerce Commission, the Adams, American and Southern Express companies, and Wells, Fargo & Co. have presented a petition for a rehearing and modification of the general order of the commission, dated July 24, 1913, which put in force on February 1, 1914, greatly reduced rates. The order allowed the companies to report on their first year's business, with a view to the modification of the rates, if necessary.

The express companies say that the rates have now had a fair test and that they have proved entirely inadequate. They say that they have made a conscientious effort to make the rates a success. They have endeavored to obtain authority to make the order applicable in the several states so that there might be a uniform system of rates; they were successful in obtaining such authority in 39 states.

The companies also present figures, showing that in the ten months from February, 1914, to November, inclusive, gross earnings for the five companies, including the United States Express Company, which went out of business in July, declined $11,875,998, or from $125,313,003 to $113,437,004. The railroads lost $6,339,646 by reason of this shrinkage, while the express companies lost $5,556,643. As a result of loss in transportation revenues the five companies operated at a net deficit of $1,861,118 for the ten months, whereas, in the corresponding period of the preceding year, there remained a surplus of $718,619. The reports for December, 1914, and January, 1915, are not yet available, but will be given later. It is further shown that the loss ascribed to the new rates is even greater than appears, since the revenues as shown include earnings from operations other than transportation. The companies estimate that for the ten months non-transportation revenue amounted to $3,843,243 on which the profits were $899,685, and that if the revenue and expenses from this business are eliminated from the gross earnings, the net deficit for the ten months from the transportation of packages would be increased to $2,780,084.

The companies say that every available means has been adopted to increase efficiency, and that economy has been strictly practiced; also that the companies have made every possible effort to develop and obtain new and additional business to offset the reduction in revenue, and that as a result of these efforts and the reductions in rates the volume of business handled has substantially increased.

Notwithstanding such economies and the increase in the volume of business, the gross revenues of the companies have not been and will not be sufficient to enable them to continue their present standard of service, which standard cannot be impaired without serious injury to the shipping public.

It is pointed out that the three elements composing the rate structure proposed by the commission and now in effect are, first, a terminal allowance of twenty cents per shipment, which does not vary with the weight or distance; second, a weight allowance of twenty-five cents per 100 lb., which varies with the weight, but not with the distance; and, third, a haulage allowance for each fifty miles carried, which varies both with the weight and distance.

The express companies request permission to increase the terminal allowance from twenty to twenty-five cents per shipment, and to reduce the weight allowance from twenty-five to twenty cents per 100 lb., and asked for such further relief as the commission may deem proper. The companies believe that the changes requested would result in an increase of the gross revenue of the express companies of approximately 3½ per cent.

War Bonus for Scottish Railwaymen.—Something was said in the *Railway Age Gazette* of March 12, page 447, relative to the war bonus recently awarded to English railway men. As the result of a conference held in Edinburgh on February 20 between the managers of the Scotch railways and the representatives of the National Union of Railwaymen and the Associated Society of Locomotive Engineers and Firemen, the war bonus arrangement has now been extended to Scotland. The same basis has been adopted as in the case of English lines, i. e., wage-earning employees of 18 years of age and upwards in the grades embraced in the conciliation scheme. A bonus of 3s. (75 cents) a week will be paid to those whose rate of wages is under 30s. ($7.50) per week and 2s. (50 cents) to those whose rate of wages is 30s. and over, and it will date from February 15. The arrangement is to remain in force during the continuance of the agreement with the government, but is subject to review at the end of three months. When the government terminates the agreement with the railways the latter will give not less than two weeks' notice to the railwaymen's trade unions of the cessation of the bonus. The Scottish railways have made no announcement as to whether a bonus will be paid to men outside the conciliation scheme. Several of the English railways have already made such concessions. The railway employees in Ireland are also asking for increased wages and the Great Southern & Western and the Great Northern have already sanctioned special allowances.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Distribution of Coal Cars

McCoa Coal Company v. Coal & Coke Railway. Opinion by Commissioner McChord:

At this supplemental hearing the coal operators and the railway have submitted a statement showing the mine ratings which shall form the basis for the distribution of coal cars during periods of car shortage, which agreement being satisfactory to all concerned, is accepted by the commission. The commission also finds: During periods of car shortage, the allotment due any particular one of the four mines of the Davis Colliery Company shall be used by that particular mine, and should such mine countermand its order for cars on any day, such cars shall revert to the general supply. Cars which are partially loaded and remain over until the next day to be fully loaded shall be charged against the mine loading the same, as if such cars were empty. (33 I. C. C., 128.)

Rates to Coffeyville and Independence, Kans.

Coffeyville Mercantile Company et al. v. Missouri, Kansas & Texas et al. Opinion by Commissioner Hall:

The commission finds that the rates on classes and certain commodities to Coffeyville and Independence, Kan., from St. Louis, Mo., and points taking the same rates, or rates based thereon, from Chicago, Peoria, and other points taking the Chicago rates, and from points east of the Indiana-Illinois state line, made by combination on St. Louis are unreasonable and discriminatory. It is held that the class rates from St. Louis should not exceed the rates to Chanute and Parsons by more than differentials ranging from five cents on first class to two cents on class E, nor the commodity rates by differentials of two and one cent, respectively, on the commodities named, including beans, canned goods, coffee, etc. The rates from Chicago, Peoria and points taking the same rates are to be the present differentials over the rates here established from St. Louis. (33 I. C. C., 122.)

Bituminous Coal Rates to Baltimore and Other Points

Opinion by Commissioner Meyer:

The commission finds that the carriers have not justified proposed increased rates on bituminous coal from mines in Pennsylvania, Maryland and West Virginia to Philadelphia, Wilmington and Baltimore for trans-shipment to points inside the capes of the Delaware and Chesapeake bays. At present the rates on coal delivered over the piers for trans-shipment to points inside the capes are 25 cents a gross ton less than the rates for track delivery to industries or coal yards in these cities. It is proposed to narrow this difference to 18 cents by increasing the "inside the capes" rates seven cents a gross ton. The rates to Philadelphia on coal for trans-shipment to points outside the capes are 35 cents less, and to Baltimore 42 cents less than the rates for track delivery at those points.

The "inside the capes" rates are made lower so that carriers may reach by water industries or coal yards on the lines of their competitors. They have shrunk their inside the capes rates by the amount of the cost of boat service and discharge, so that the consignee of coal trans-shipped over the piers at Philadelphia, Wilmington, or Baltimore may obtain it at the same total transportation charge as the consignee of all-rail coal. The carriers allege that because of a decrease in the cost of boat service and discharge the present inside the capes rates are discriminatory against consignees taking coal all rail, and say that it was mainly to remove this discrimination that the suspended tariffs were filed.

The commission finds that this is an attempt to equalize conditions that are unequal. The advantage of the cheaper movement to the piers should be safeguarded to consignees who receive their coal in that manner. Since the rates apply on coal for trans-shipment by water, it is of importance that in determining their reasonableness, full consideration be given not only to the cost of delivery at the piers as compared with the cost of track delivery, but also to the cost of the entire service from the mines to the piers; but if the rail carriers be permitted to establish their rates in connection with water carriers upon a basis which will equalize shippers at various points along the waterway, they will absorb the benefit which should accrue to the public on a lower cost of water transportation.

Commissioner Harlan dissents on the ground that the carriers have fully justified the proposed increased rates. (33 I. C. C., 307.)

STATE COMMISSIONS

The New Jersey Board of Public Utility Commissioners has notified the Central Railroad of New Jersey that it will proceed to compel the road to abolish 24 grade crossings in the city of Elizabeth. A hearing will be held in Newark, May 10.

The New Jersey Public Utility Commissioners announce that they will refuse to approve the increases in passenger rates made by the railroads in that state at the time that commutation fares to and from Philadelphia were advanced a few months ago.

Hearing Before Texas Commission on Proposed Rate Advance

The Texas Railroad Commission began a hearing at Dallas on March 4, on the application of the railroads of the state for authority to make a 15 per cent increase in passenger fares. H. M. Garwood, general attorney of the Sunset-Central Lines, made an opening statement for the roads, in which he said that for more than 10 years it has been apparent to all authorities that the intrastate freight rates of Texas have been abnormally low and insufficient to yield a reasonable return upon either the amount invested or the actual value of the property by any known method of valuation, and that "the appalling spectacle is presented to the business world that for more than 20 years no investor in the capital stock of railroad property in the state of Texas has received one cent of return on his investment." For the year ending June 30, 1914, he said, the Texas carriers incurred a net corporate loss of $8,144,597, and that the net loss for the last seven years is $13,943,263, and that certainly the deficit for the year ending June 30, 1915, will be not less than $10,000,000. Several of the more important lines in the state are in receiver's hands and railway building in the state has ceased.

It would be shown, he said, that the bonded debt of the railways of Texas is the lowest in the world and less than half the average for the United States, and that the return on the valuation has been less than 2 per cent. Mr. Garwood said it was proposed to go more accurately into the cost of conducting the intrastate freight business than has ever yet been done, and that, using the Oklahoma plan, all of the operating expenses will be divided, first between the line expenses and the terminal expenses, and then the line expenses will be divided upon a basis of use between the passenger and freight expenses and the terminal expenses will then be divided between the two classes of service in the same manner. The total freight expense will then be divided between interstate and intrastate service upon the basis of use, and the value of the property devoted to the several services will also be divided. On account of the expense incident to this work this division has been made only by the Gulf, Colorado & Santa Fe and the Houston & Texas Central.

COURT NEWS

The Supreme Court of the United States announces that suits for reparation for overcharges on freight, when taken to the courts, must be presented within two years, which is the time prescribed by the Interstate Commerce Commission in its rules regulating the presentation of claims to the commission. The court makes this rule in the interest of uniformity.

The United States Circuit Court of Appeals, sitting at New Orleans, has affirmed the decision of the district court at Savannah, Ga., imposing a fine of $5,000 against Harvey C. Miller, a grain dealer of Philadelphia, for accepting a rebate of $5,000 on shipments of grain from Philadelphia to Jacksonville, Fla. The case was tried in February, 1913. It appears that the Merchants' & Miners' Transportation Company has paid a fine of $20,000 for its part in the same offence. Formerly there had been in effect a through rate on grain from western points, by

rail to Philadelphia, thence by water, in connection with which the steamship company's proportion was ten cents; but the Miller concern continued to enjoy the ten cent rate after this arrangement had expired, and the legal rate from Philadelphia to Jacksonville was fifteen cents.

Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific, testified at San Francisco on March 10 and 11 in the suit of the federal government to separate the Central Pacific and the Southern Pacific railroads from each other. Mr. Kruttschnitt is quoted as saying that the Southern Pacific signed an agreement with the Union Pacific to sell the Central Pacific to the latter at a price of $104,000,000, under the compulsion and coercion of former Attorney-General Wickersham, who, he said, threatened him with a forced sale of the line if it were not sold to the Union Pacific. The California Railroad Commission, he said, prevented the conclusion of this agreement by refusing to approve the plan. Mr. Kruttschnitt said that the separation of the two roads would demoralize the Southern Pacific System and compel it to reproduce terminals which would cost $85,000,000. On the subject of government regulation he is quoted as saying "the government is a great big man wielding a great, big stick and the stick is growing bigger and being used oftener. The Interstate Commerce Commission is one man choking another man to death. Government management of enterprises is a failure."

In the United States District Court at Trenton, N. J., March 11, the Central Railroad of New Jersey was convicted, on 185 counts, of paying illegal rebates on shipments of coal made by the Lehigh Coal & Navigation Company. The suit was based on charges by the government that payments to the coal company of 23 cents a ton, in connection with trackage rights, amounted to a rebate on the transportation rate, which rebate was not specified in the published tariffs. All of the acts charged were committed in 1911, 1912 and 1913; but it is said that only a small part of the alleged offences discovered in the records were charged in the complaint. The attorney for the government estimates that these payments by the road to the coal company amounted to $500,000 a year. The indictment formed a book of 1,200 pages. The defense of the company was based primarily upon the agreement or contract entered into in 1871, under which the road acquired control of certain tracks then owned by the coal company. Under this contract the coal company was to receive a stipulated sum for each ton carried over the tracks in question. The road contended that such payments did not constitute rebates, but were, in fact, the payment of a rental to the navigation company. In its tariffs the road described the payments as "lateral allowances."

Costs of Successful Defendant

In an action against two railroad companies for injury to live stock where the plaintiff recovered against only one of the defendants, the Texas Court of Civil Appeals held that the costs of the successful defendant must be assessed against the plaintiff.—San Antonio U. & G. v. Storey (Tex.), 172 S. W., 188.

Injury to Passenger in Pullman Car Not Paying Extra Fare

The Missouri Court of Appeals in an action for injury by derailment, holds that a passenger who, for a temporary purpose of his own (in this instance, to wash his hands), enters a Pullman car forming a part of the train, without paying the extra fare for riding therein, he remains a passenger, and is entitled to protection as such.—Siegel v. Illinois Cent. (Mo.), 172 S. W., 420.

Personal Injuries—Excessive Damages

An engineman was injured by jumping from his engine to avoid a collision. He rolled about 35 feet and was stunned and badly scared. He called a physician the next day and said he was hurt about the back and shoulders, but not much. He consulted another physician who examined him, but did not prescribe, finding only a condition of nervousness, which might or might not have been caused by the accident. Osteopaths treated him for several weeks and relieved the soreness and stiffness. He made no claim for damages before bringing suit against the company. The Texas Court of Civil Appeals held that a verdict for $12,500 was so excessive as to show passion or prejudice of the jury and justifying the court in remanding the case.—Galveston H. & S. A. (Tex.), 172 S. W., 180.

Duty to Stop Train for Passenger

The greater weight of authority supports the rule that where a passenger, by reason of incorrect information of the carrier's employees, boards a train not scheduled to stop at the station for which he has a ticket, the carrier has a right to correct the mistake, and to require the passenger to alight at a regular stopping place, which is a suitable place, from which he may take the next regular train that does stop at his destination, and that it is the duty of the passenger to stop off at such place and wait for such train. This the Kentucky Court of Appeals, citing cases, considers a sound rule of law.—Louisville & N. v. Gaddie (Ky.), 172 S. W., 514.

"Turntable Cases" Doctrine

A railroad maintained a water reservoir just within the corporate limits of a city and permitted grass to grow on the strip between the reservoir and the fence surrounding it. Two or three boards had been torn from the fence and a child passed through, and fell into the reservoir and was drowned. In an action for his death the Texas Court of Civil Appeals held that there could be no recovery on the theory that the reservoir was unusually attractive to children, and that the company failed to exercise reasonable care for the safety of children. The court said that ponds or reservoirs are not to be classed with turntables, and that the doctrine of the "turntable cases" should not be extended.—M. K. & T. v. Moore (Tex.), 172 S. W., 568.

Duty Toward Passengers on Freight Trains

While passengers on freight trains assume the discomforts and risks necessarily attending that mode of conveyance, the Minnesota Supreme Court holds that the carrier is required to exercise as high a degree of care for their safety as is consistent with the proper operation of the train. A railroad company which receives passengers for transportation on freight trains must provide a reasonable and sufficient opportunity for them to enter and leave such trains in safety. The passengers do not go on board at their peril, but the carrier owes them the duty to guard against all dangers which reasonable prudence could foresee and avoid. Where the question as to whether the company negligently caused a train to be started while the plaintiff was in the act of boarding it, was submitted to the jury, which found against the company, the latter was held liable for the plaintiff's injuries sustained thereby.—Doran v. Chicago, St. P. M. & O. (Minn.), 150 N. W., 800.

Right of Action Against Terminal Carrier—Effect of Carmack Amendment

In an action against the last carrier of a shipment of apples, for shortage in weight, the question arose whether the right of action against the initial carrier given by the Carmack amendment is an exclusive remedy. The Wisconsin Supreme Court holds that the remedy is additional to and concurrent with any other existing federal remedy, and does not, of itself, prevent an action in a state court against the terminal carrier of an interstate shipment for a loss occurring on its line.—Judgment of dismissal was therefore reversed.—Bichlmeier v. Minneapolis, St. P. & S. S. M. (Wis.), 150 N. W., 508.

Liability for Baggage in Baggage Room

Mary M. Doyle, starting from Denver, over the Denver & Rio Grande, for Clifton, Colo., got a check for her suit case and then went to the Pullman office for a berth; but the berths had all been taken; and as she did not feel well enough to travel all night in a day car, she waited until the next morning and then went to Colorado Springs. There she tried to secure a berth to Clifton and was again informed that all were sold. She finally reached destination about two days late and found that the station had been burglarized, the night before, and her suit case stolen.

In the Colorado Supreme Court she has lost her suit against the railroad, the court holding that as a matter of law the baggage had not been called for within a reasonable time after its arrival;

and the company's liability was only that of a warehouseman. No negligence was proved. The court said: "If plaintiff had used ordinary care, thoughtfulness and prudence, it must have occurred to her that if she waited until a few minutes before train time she might have difficulty. She allowed her baggage to go on when she could easily have checked it for the train on which she was to travel. There was no delinquency on the part of the company in transporting either plaintiff or her baggage which would extend the reasonable time for its removal after its arrival." Denver & R. G. v. Doyle, 145 Pac. 688.

"Any Statute" in Federal Employers' Liability Act

Following the ruling of the United States Supreme Court in Seaboard A. L. v. Horton, 233 U. S., 492, 34, Sup. Ct., 635, the Washington Supreme Court holds that the phrase "any statute enacted for the safety of employees" occurring in the federal employers' liability act, declaring that an employee shall not be held to have been guilty of contributory negligence, or to have assumed the risk where a violation by the carrier of any statute enacted for the safety of employees contributed to the injury, is limited to federal statutes, and does not include a state statute enacted for the safety of employees.—Lauer v. Northern Pac. (Wash.) 145 Pac. 606

Federal Employers' Liability Act—Switchman

A switchman, who was regularly assigned to a switching engine in his employer's yard, was killed while crossing the tracks in the yard on his way to work. In an action by his administratrix, the proof showed that the engine was used indiscriminately in interstate and intrastate commerce. The New York Appellate Division held that, to establish liability under the federal employers' liability act, the plaintiff was bound to establish, either that this locomotive was used exclusively during that shift, which began at midnight and ended at 8 a. m., in interstate commerce, or that it was thus used at the very outset of the shift. The evidence being insufficient to show this, judgment for the plaintiff was reversed.—Knowles v. N. Y. N. H. & H., 150 N. Y. Supp. 99.

Regulation of Rates—Mileage Books

The New Hampshire Supreme Court holds that laws 1913, c. 92, requiring the sale by railroads of 500-mile mileage books for two cents a mile is not invalid as fixing an arbitrary rate, without regard to reasonableness, though under laws 1911, c. 104, Section 11a, the Public Service Commission is authorized to determine just and reasonable maximum rates, with the proviso that the commission shall not allow an increase above any rate prescribed or limited by statute. The reason given is that the act of 1913 was not enacted as a limitation upon the rate-making power conferred on the Public Service Commission, but as a legislative judgment of the reasonableness of the particular rate prescribed, especially as it merely amends an act of 1909 requiring the issuance of 1,000-mile mileage books.—State v. Maine Central (N. H.), 92 Atl. 837.

Scope of Employment

In an action in the Kansas courts under the federal employers' liability act, brought against a railroad company by a brakeman of a freight train to recover for injuries, it was shown that the conductor directed the brakeman to go forward and act as fireman while he himself took charge of the locomotive for the purpose of allowing the regular engineer and fireman to go to the caboose and eat their dinner. It was shown that while obeying the conductor's order, the plaintiff received injuries, resulting from the conductor's negligence in managing the locomotive. The Kansas Supreme Court held that in the absence of any rule of the company prohibiting the conductor from giving, or a brakeman from obeying such an order, the conductor had authority to order the plaintiff to act as fireman, and in obeying such order the plaintiff was acting within the scope of his employment. The railroad company was held liable for the conductor's negligence in the management of the engine. The evidence was held sufficient to sustain a finding that the plaintiff had not assumed the risk, and that he was not guilty of contributory negligence.—Martin v. Atchison, T. & S. F. (Kan.), 145 Pac., 849.

Railway Officers

Executive, Financial, Legal and Accounting

C. S. Runnells has been appointed assistant to the president of the Pullman Company, with headquarters at Chicago, succeeding Le Roy Kramer, promoted.

The officers of the St. John & Quebec, a new Canadian government railway are A. R. Gould, president; H. N. Crandall, treasurer, and S. B. Wass, secretary, Fredericton, N. B.

F. H. Silvernail has been appointed assistant to the president of the Lehigh Valley, with headquarters at New York. Mr. Silvernail entered the service of the Lehigh Valley in 1903, and since that time has served in the office of President Thomas.

Le Roy Kramer, assistant to the president, and Richmond Dean, general manager of the Pullman Company, have been elected vice-presidents, with headquarters at Chicago. Mr.

Le Roy Kramer

Kramer was born on August 19, 1875, at Wichita, Kan. He received a high school education and began railway work in December, 1897, with the St. Louis & San Francisco as stenographer and clerk. Until July, 1907, he held various clerkships in the division office, also the position of chief clerk to the general superintendent of transportation, general manager and vice-president, and assistant to vice-president. He was then promoted to superintendent of the Kansas division, and in September, 1908, was transferred to the superintendency of the Central division. In December, 1909, Mr. Kramer left the Frisco to become assistant to the vice-president in charge of purchases and stores of the Chicago, Rock Island & Pacific, and the following May he was appointed assistant to the second vice-president of that road. In June, 1912, he became assistant to the president of the Pullman Company, and has now been elected vice-president, as above noted.

Richmond Dean

Mr. Dean was born at St. Louis, Mo., November 2, 1862, and was educated in the public schools. In 1875 he entered the service of Boatmen's Bank in St. Louis, and subsequently until 1882 he was with the Missouri Pacific Railway. He then became connected with the Pullman Company and for six years was located at St. Louis, being transferred to the Chicago headquarters in 1888. He left that company in 1894 and became assistant to the vice-president of the Missouri, Kansas & Texas Railway. Five years later Mr. Dean re-

turned to the Pullman Company as assistant to the vice-president, and in 1905 he was made general manager, which position he held until his recent election as vice-president.

M. L. Crowell, assistant secretary and assistant treasurer of the Toledo, St. Louis & Western, with headquarters at Toledo, Ohio, has been retired under the pension rules of that company. He has been connected with that road and its predecessor, the Toledo, St. Louis & Kansas City, since 1886.

Operating

L. S. Hungerford, general superintendent of the Pullman Company, has been appointed general manager, with headquarters at Chicago.

W. C. Hamilton has been appointed trainmaster of the Copper Range at Houghton, Mich., and the office of chief train despatcher is abolished.

U. B. Williams, general superintendent of the Wheeling district of the Baltimore & Ohio, at Wheeling, W. Va., has been appointed general agent, and W. H. Averell, assistant general superintendent at New York succeeds Mr. Williams.

W. A. Hamler, trainmaster of the New York Central, at Corning, N. Y., has been appointed trainmaster, Buffalo division, with office at Buffalo. W. M. Corbin, trainmaster at Jersey Shore, Pa., succeeds Mr. Hamler. M. J. Quigley, assistant trainmaster at Rochester, N. Y., has been appointed trainmaster, succeeding Mr. Corbin, and H. J. Avery succeeds Mr. Quigley.

John McMillan, general superintendent of telegraph, western lines, of the Canadian Pacific at Winnipeg, Man., has been appointed manager of telegraphs, with headquarters at Montreal, Que., succeeding James Kent, who has for many years served as manager of telegraphs and, at his own request, has been allowed to relinquish those duties, and has been given leave of absence for an extended period.

W. H. Averell, who has been appointed general superintendent of the Wheeling district of the Baltimore & Ohio, with headquarters at Wheeling, W. Va., was born on May 13, 1879, at Ogdensburg, N. Y., and graduated from Yale University in the class of 1900. In September of the same year he began railway work in the accounting department of the Great Northern; two years later he entered the service of the Southern Pacific as statistical clerk, and was then consecutively trainmaster at Tucson, Ariz.; assistant superintendent at Bakersfield, Cal.; superintendent at Tucson, Ariz., and superintendent of the same road at Los Angeles, Cal., until February, 1911. The following May he was appointed assistant to general manager of the Baltimore & Ohio; in July, 1912, he was promoted to assistant general superintendent at Pittsburgh, Pa., and on May 1, 1913, was appointed assistant general superintendent of the New York division and general superintendent of the Staten Island lines, which position he held at the time of his recent appointment as general superintendent of the same road as above noted.

Engineering and Rolling Stock

J. W. Johnson has been appointed master mechanic of the Arkansas, Louisiana & Gulf, with office at Monroe, La., succeeding J. T. Tadlock.

J. O'Conner, assistant roadmaster of the St. Louis Southwestern at Mount Pleasant, Tex., has been appointed roadmaster at that point, succeeding J. J. Hughes, deceased.

R. J. McQuade has been appointed master mechanic of the St. Louis & Kansas City Terminal divisions of the Rock Island Lines, with office at Armourdale, Kan., vice O. C. Breisch, resigned.

Traffic

R. W. Stinson, contract agent, foreign freight department, of the Wabash, has been appointed import agent at Chicago.

C. A. Hayes has been appointed general traffic manager of the St. John & Quebec, a new Canadian government railway, and H. H. Melanson has been appointed general passenger agent, both with offices at Moncton, N. B.

H. N. Kennedy has been appointed general freight agent of the Great Northern Steamship Company, and A. B. C. Denniston has been appointed general agent of the passenger department, with headquarters at San Francisco, Cal.

E. H. Dow has been appointed general baggage agent of the Delaware & Hudson, the Champlain Transportation Company and the Lake George Steamboat Company, with office at Albany, N. Y., vice C. E. Durkee, resigned.

Owing to the consolidation of the freight and passenger departments of the Fort Worth & Denver City and the Wichita Valley, A. A. Glisson, general passenger agent of those roads, has been appointed traveling passenger agent, with headquarters at Fort Worth, Tex.

Purchasing

J. H. Conley has been appointed purchasing agent of the Georgia & Florida, with office at Augusta, Ga.

J. E. Mahaney has been appointed general storekeeper of the Norfolk Southern, with office at Norfolk, Va., succeeding W. J. Luke, resigned.

W. G. Humphrey has been appointed chief clerk and purchasing agent for the receivers of the Missouri, Oklahoma & Gulf, with office at Muskogee, Okla., and H. P. Abbey, who was purchasing agent at Muskogee, has been assigned to other duties.

OBITUARY

George H. McDevitt, commercial agent of the Lehigh Valley at Detroit, Mich., died on March 13 at that place, at the age of 37.

Eugene B. Cook, superintendent of the Toledo division of the New York Central at Cleveland, Ohio, was struck by a train while walking on a freight track at Cleveland on March 14, and was killed.

William McIntosh, formerly superintendent of motive power of the Central of New Jersey at Jersey City, N. J., died on March 15, at his home in Plainfield, N. J. He was born on August 20, 1849, at Franklin, Que., and began railway work in 1864 as locomotive fireman on the Chicago, Milwaukee & St. Paul; and he served as machinist and engineer on that road for seven years, or until 1871. He then went to the St. Paul & Pacific, now a part of the Great Northern at St. Paul, Minn., where he was employed as machinist. From August, 1872, to November, 1877, he was locomotive engineer on the Chicago & North Western and then for about ten years was foreman of locomotive repairs on the same road at Waseca, Minn., and at Huron, S. D. In July, 1887, he was appointed master mechanic at Winona, Minn., where he remained about 12 years. On March 1, 1899, he was appointed superintendent of motive power on the Central of New Jersey, from which position he retired in 1909. He was a prominent member of the American Railway Master Mechanics' Association and in 1908 served as president of that association. Mr. McIntosh was the inventor of a number of well known locomotive and car appliances. He was a member of the American Society of Mechanical Engineers.

W. McIntosh

Chinese Railroad Concessions.—Press reports state that at a recent conference between representatives of Japan and China concerning the demands recently made upon China by Japan, the Japanese made slight concessions from the letter of their demands as previously presented. A compromise was reached in the matter of the railroad and mining concessions in South Manchuria, but it was agreed that Japan should have the preference in future railroad loans and the right to prospect for mines for a fixed period and operate a large proportion of the mining properties so discovered.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Maine Central is reported to be in the market for tenders. This item has not been confirmed.

The Bethlehem Steel Company has ordered one switching locomotive from the American Locomotive Company.

The Missouri, Kansas & Texas has ordered 10 Pacific and 30 Mikado type locomotives from the American Locomotive Company.

The Denver & Salt Lake is reported to be considering the purchase of 6 Mikado type locomotives. This item has not been confirmed.

The Ogden, Logan & Idaho has ordered one 50-ton electric locomotive from the Westinghouse Electric & Manufacturing Company.

The Public Belt Railroad of New Orleans is in the market for 6 locomotives, to be used on an extension of the road to the cotton warehouse of the Dock Board.

CAR BUILDING

The Grand Trunk is in the market for 60 100,000-lb. capacity tank cars.

The Delaware, Lackawanna & Western is in the market for 2 postal cars.

The Missouri Kansas & Texas is in the market for 2 dining, 10 baggage and 3 postal cars.

The Grand Rapids & Indiana has ordered 6 coaches from the Pressed Steel Car Company.

The Pennsylvania has ordered 100 flat cars from the Altoona shops for 1914 replacement purposes.

The Prudential Oil Corporation, New York, has ordered 200 tank cars from the American Car & Foundry Company.

The Denver & Salt Lake is reported to be in the market for 200 coal and stock cars. This item has not been confirmed.

The Central Railroad of New Jersey is in the market for 15 coaches, 5 combination baggage and mail cars and 10 combination passenger and baggage cars.

The New York, Philadelphia & Norfolk has ordered 76 ventilated box cars from the American Car & Foundry Company, and 2 coaches from the Pressed Steel Car Company.

The Baltimore & Ohio has ordered 200 underframes from the South Baltimore Car Works, 200 from the American Car & Foundry Company and 200 from the Ralston Steel Car Company.

The Alberta and Great Waterways Railway, Winnipeg, Man., has ordered two 55-ft. all-steel, 200-h.p., combined passenger and baggage gasoline motor cars from the McKeen Motor Car Company.

IRON AND STEEL

The Boston & Maine has ordered 11,000 tons of rails from the Lackawanna Steel Company.

The Russian Government is reported to have ordered 40,000 tons of light steel rails from the United States Steel Products Company. This item has not been confirmed.

The Maine Central is reported to have ordered 8,500 tons of steel rails from the Pennsylvania Steel Company. This item has not been confirmed.

The French Government is reported to have ordered 8,000 tons of girder rails and 12,000 tons of portable track from the United States Steel Products Company. This item has not been confirmed.

The Chicago, Burlington & Quincy has ordered an additional 6,000 tons of rails, as follows: 1,000 tons from the Bethlehem Steel Company; 3,000 tons, from the Lackawanna Steel Company; 1,000 tons, from the Cambria Steel Company, and 1,000 tons from the Pennsylvania Steel Company.

Supply Trade News

The Railway & Traction Supply Company, Chicago, Ill., is equipping 20 tracks for the Pressed Steel Car Company at Pittsburgh, Pa., and 14 tracks for the Michigan Engineering Company at Kalamazoo, Mich., with its Little Giant type bumping posts.

The Locomotive Pulverized Fuel Company has obtained a charter in Delaware to manufacture patented fuel saving devices. The incorporators are Joel S. Coffin, Englewood, N. J.; John E. Muhlfield, Scarsdale, N. Y.; H. F. Ball and Samuel G. Allen, New York, and LeGrand Parish, Mountain View, N. J.

After March 22 the Chicago office of the Terry Steam Turbine Company, Hartford, Conn., will be in charge of A. W. de Revere, and located in the Peoples Gas building. The company has also opened an office in the Michigan Trust building, Grand Rapids, Mich., in charge of A. L. Searles, who will cover the southern peninsula of Michigan.

The Stark Rolling Mill Company, Canton, Ohio, has appointed the Dearborn Steel & Iron Company, with offices in the Peoples Gas building, Chicago, Ill., as its selling agent in Chicago, northern Illinois and Wisconsin. H. C. Perrine and E. L. Lyon will represent the company. Special interest will be given to the sale of the Toncan metal products of the Stark mill.

W. W. Rosser, manager of western sales of the T. H. Symington Company, Rochester, N. Y., has been appointed vice-president of the company, with office at Chicago. Mr. Rosser was born at Hutchinson, Minn., on November 4, 1877. He attended the Hamline University at St. Paul, Minn., and was for four years with the Minnesota Malleable Iron Company. In 1903 he left the company to take the position of superintendent of the Washburn Coupler Company, and two years later became sales agent of the T. H. Symington Company at Chicago. In 1910 he was appointed manager of western sales of that company, and now leaves that position to take up the duties of vice-president, as above noted.

W. W. Rosser

The Horne, Dole, Brown Company, with offices at 545 W. Washington Boulevard, Chicago, has recently been incorporated for $5,000 as Western sales managers for various eastern concerns. J. J. Dole, formerly sales manager of the Celfor Tool Company, Buchanan, Mich., is president; R. C. Brown is vice-president, and J. W. Horne, formerly manager of the Norton Company, Chicago, is secretary and treasurer.

The Russian government is negotiating with the New York Air Brake Company and the Westinghouse Air Brake Company for an order of 2,000,000 shrapnel. The Russian government has already established a credit in this country to meet payment for one-fourth of the order, which, it is said, will have a total value of $36,000,000. The same government recently placed a large order for shrapnel with the Canadian Car & Foundry Company.

At a meeting on March 11, the stockholders of the Yale & Towne Manufacturing Company authorized the issue of 5,000 additional shares of capital stock, or $500,000, substantially all of them waiving their rights of subscription thereto in order to place the stock so surrendered in the hands of the directors

and to enable the latter to arrange for its acquisition, in proper proportions and on equitable terms (at not less than par), by those of the officers and employees on whom will rest the chief responsibility for the further development of the business. The company has an authorized capital stock of $10,000,000, of which, excluding the above, $4,500,000 has been issued, $1,500,000 on January 2, 1914, in the form of a stock dividend.

The Southwark Foundry & Machine Company, Philadelphia, Pa., has secured the exclusive United States license to manufacture the Harris Valveless Engine, Diesel principle, which will hereafter be known as the Southwark-Harris Valveless Engine. The engine will be built in sizes from 75 B. H. P. to 1,000 B. H. P., for both marine and stationary service. With the company there will be associated as consulting engineer and naval architect Leonard B Harris, the inventor of the Harris Valveless Engine, so that the company will have the benefit of his extensive experience in power engineering, especially in the marine field. J. P. Johnston, who has been interested in and connected with the Harris Valveless Engine, will also be associated with the company in charge of oil engine sales. The Southwark Foundry & Machine Company also manufactures a full line of steam turbines, generators, turbine pumps, hydraulic pumps and presses, condensers, etc.

Henry R. Towne, for 46 years president of the Yale & Towne Manufacturing Company, New York, having signified his desire to retire from the duties of that office, has been elected chairman of the board. Mr. Towne was born in Philadelphia, Pa., August 28, 1844. He attended the University of Pennsylvania, but he left before graduation to enter business, receiving, however, the honorary degree of M. A. in 1887. He was first employed as a mechanical draftsman in the Port Richmond Iron Works at Philadelphia. In 1866 he made an extensive tour of the leading engineering establishments in England, Belgium and France, spending six months in Paris where he studied at the Sorbonne. Upon his return he worked for some time in the shops of William Sellers & Company, Philadelphia. In October, 1868, he formed a partnership with Linus Yale, Jr., and the Yale Lock Manufacturing Company was established at Stamford, Conn. Mr. Yale died shortly after and in 1869 Mr. Towne became the president of the company which at that time had a factory with 30 employees at Stamford and a salesroom in New York. To sketch Mr. Towne's career from that time is to sketch the growth of his company. At first it made bank locks and the Yale pin-tumbler locks. Later there were added safe deposit locks, mortise locks, the Yale time lock, etc. The company also had an important business in complete post office "equipments." In 1873 it added a bronze department, and in 1882 it established an art department. The company secured the American rights for the Weston differential pulley block. It was also one of the first, if not the first, in America, to build cranes, but the crane business was later sold to the Brown Hoisting Machinery Company, Cleveland, O. It being felt that the name Yale Lock Manufacturing Company was not sufficiently inclusive the title was changed in 1883 to the Yale & Towne Manufacturing Company. The company took many steps to broaden its activities. In 1878 it absorbed the United States Lock Company and the American Lock Company; in 1894 the Branford Lock Works and in 1895 the Blount Manufacturing Company, in each case adding new lines. Mr. Towne has been an active member of the American Society of Mechanical Engineers for many years and served as its president in 1888-89. He has been president of the Merchants' Association of New York and has been treasurer of the National Tariff Commission Association since its organization in 1909.

H. R. Towne

Walter C. Allen, vice-president and general manager of the Yale & Towne Manufacturing Company has been elected president and general manager to succeed Henry R. Towne, who has been elected chairman of the board. Mr. Allen has been in the service of the company for 23 years. He entered the works in 1892 as a truck boy and two years later obtained a position in the office. He then spent three years acquiring the tool trade and three more to obtain a knowledge of drafting, both of which he thought were essential to his advancement with the company. He was later made assistant to the general superintendent in the works at Stamford and then became general superintendent. In 1909 he was appointed general manager of the company at New York, and in 1914 became vice-president and general manager. Mr. Allen is a member of the American Society of Mechanical Engineers, the Republican Club of New York, the Stamford Yacht Club, and others.

W. C. Allen

Henry H. Sessions, vice-president of the Standard Coupler Company of New York, died at his residence, Chicago, on March 14. Mr. Sessions was born in Madrid, N. Y., on June 21, 1847. He entered the railway service on March 1, 1862, and until January 1, 1870, he acted as apprentice and journeyman in the car and machine shops of the Central Vermont at Northfield, Vt. From January 1, 1870, to November 1, 1878, he was master car builder for the Rome, Watertown & Ogdensburg, and from then to April 1, 1880, for the Sioux City & St. Paul, now a part of the Omaha. On April 1, 1880, he was made master car builder for the International & Great Northern, and on May 10, 1881, and September 1, 1882, he was appointed to a similar position with the Texas & Pacific and the St. Louis, Iron Mountain & Southern, respectively, acting in this capacity until 1885, when he was made manager of the Pullman Car Works. This position he held until 1892 and for four years he was chief mechanical engineer in an advisory capacity for the same company. During this time he invented the passenger car vestibule and later designed the standard steel platform for passenger cars which went into general use at once. This led to his becoming associated with the Standard Coupler Company as vice-president and director in 1896. Mr. Sessions also designed the Sessions friction draft gear and in the course of his active life left a strong impression of his inventive genius in railroad operations in many ways. He also showed his remark-

H. H. Sessions

able personality outside of his business and was most widely read and an unusually well informed man.

At the annual meeting of the stockholders of the Union Switch & Signal Company, held March 9, in the Westinghouse building, Pittsburgh, Pa., the following directors were elected: J. D. Callery, J. J. Donnell, William McConway, J. R. McCune, J. R. McGinley, M. S. Rosenwald, T. W. Siemon, W. B. Uptegraff and H. H. Westinghouse. The newly elected directors later went into executive session and chose the following officers for the ensuing year: President, Mr. Uptegraff; vice-president and treasurer, Mr. Siemon; secretary and assistant treasurer, Thomas S. Grubbs; assistant secretary, G. F. White. The new executive committee that was appointed is composed of Messrs. Callery, Donnell, McCune, Siemon and Uptegraff.

Union Switch & Signal Company

In the year ended December 31, 1914, the Union Switch & Signal Company had net income from sales of $911,281. There was also net income from other sources of $105,243, whereby the total income was $1,016,525, as compared with $1,763,995 in 1913. Deductions from this totaled $183,176, including amounts written off patents, depreciation of plant, tools, patterns, etc., and taxes. The net profit carried to surplus, therefore, was $833,348. The company on December 31, 1914, had real estate and buildings valued at $1,224,043; machinery, tools and fixtures worth $910,305; patents having a value of $1,000,000 and investments worth $406,527. On the same date the inventory was $1,042,300; the accounts and bills receivable $1,031,970, and the amount of cash on hand $2,371,103. The company's capital stock is now $6,662,758, of which $500,000 is preferred. The balance sheet shows that on December 31 there were accounts payable of $105,038, reserves for depreciation of $60,953, and a dividend payable of $199,743. The surplus on December 31, 1913, was $2,691,976. From this there was deducted the stock dividend $1,665,983, declared in March, 1914, leaving $1,025,992. The net profit for the year as noted above was $833,348. Cash dividends of $748,961 were paid during the year and there were also other deductions of $62,824, so that the balance on December 31, 1914, was but $1,047,556.

Lackawanna Steel Company

E. A. S. Clarke, president of the Lackawanna Steel Company, in his report to the stockholders states that the results of the year 1914 are the worst the steel trade of the United States has known since the company was formed. This condition he lays to the new tariff, which has tended to influence prices downward, to the uncertainty as to the effect of existing and proposed legislation which has impaired confidence and to the war. He expresses the hope, however, that 1915 will show an improvement over 1914.

The shipments of the Lackawanna Steel Company in 1914 totalling 579,742 tons, were the lowest in its existence with the exception of 1908, when 476,850 tons were shipped. The average price of $28.08 received per gross ton, however, was $2.26 less than in 1913, and $3.55 less than in 1908.

The company's gross earnings for the year were $16,281,639, as compared with $29,879,275 in 1913. The manufacturing and producing costs and operating expenses were $14,057,189, making a total net income of $2,224,450. There was also other income of $338,489. The net earnings after a deduction of administrative, selling and general expenses, taxes, commercial discount, etc., were $1,581,378 as against $6,605,762 in 1913. From this, deductions were made of interest and rentals and royalties of $2,167,186, so that there was a deficit for the year of $585,808, as against a surplus of $3,023,084 in 1913. There were also appropriations of $226,848 for the extinguishment of mines and mining investments, and of $839,789 for depreciation and accruing renewals, a total of $1,066,637, which with other deductions of $84,975 reduced the surplus of $7,514,877 on January 1, 1914, to but $5,777,457 on December 31, 1914.

The capital assets of the company at the end of the year totaled $68,939,362. The capital stock is $34,750,000, of which but $6,000 is preferred. There was also bonded debt on the Lackawanna Steel Company totaling $25,000,000, subsidiary companies' bonds of $6,319,000 and debentures due in 1915 totaling $9,994,000. The current liabilities were $2,589,256, and the current assets $19,130,193, of which $9,139,674 was in inventories and $2,261,088 in cash.

Railway Construction

Balsam Lake & Eastern.—This company has applied to the Wisconsin Railroad Commission for permission to build a standard gage railroad between Balsam Lake, Wis., and Centuria, a distance of six miles. It is stated that grading will amount to about 12,000 cu. yd. per mile, and that the maximum grade will be 1 per cent, with a maximum curvature of 6 deg. It has not yet been definitely decided whether steam or electric motive power will be used, or when construction work will begin. No contracts have been let. No bridges will be required, but two small depots will be erected. W. R. Taylor, Balsam Lake, Wis., is president; R. H. Sublette, Minneapolis, Minn., is chief engineer, and C. S. Roberts, Balsam Lake, is secretary.

Chicago & North Western.—Contracts for the season's bridge work on the various parts of the road were recently awarded to the Widell Construction Company, Mankato, Minn., the Koss Construction Company, Des Moines, Iowa, and the Cleary-White Construction Company of Chicago. The total expenditure for this work is estimated as $150,000.

Flint River Railroad & Navigation Company.—A contract has been given to Ricks & Company, Lilly, Ga., to build a line from Hawkinsville, Ga., southwest via Unadilla and Byromville to Albany, about 80 miles. There will be one 250-ft. steel bridge and three trestles, each 500 ft. long on the line. Track has already been laid on ten miles. The company expects to develop a traffic in lumber, coal and farm products. J. S. Morton, president, Byromville; J. W. Hawkins, chief engineer, Atlanta.

New York Subways.—The New York Public Service Commission, First district, has approved the recommendation of the New York Municipal Railway Corporation, that the contract for building Section No. 1 of the Jamaica avenue elevated extension about 2.3 miles long in the borough of Brooklyn be let to Post & McCord, Inc., the lowest bidder, who offered to do the work for $734,340.

Northern Pacific.—The report of this company for the year ended June 30, 1914, shows that the Duluth Transfer Railway track from Fifty-ninth avenue, Duluth, Minn., west to the Minnesota steel plant at Spirit Lake, 2.82 miles is being rebuilt, and the work is about 60 per cent finished. The Cayuna Northern branch built an extension to the North Line of 2.6 miles, to reach the mines of the Duluth-Brainerd Iron Company at a point north of Deerwood. A spur was also constructed 1.6 miles long from Loerch southerly to the Canadian mine in Crow Wing county, and a connection with the Minneapolis, St. Paul & Sault Ste. Marie at Cedar Lake to be 4,504 ft. long has been authorized, and is now under construction. The Minnesota & International has completed work on a change of line on the Leaks cut-off 5.84 miles, and the new line is now in operation. The grading and culvert work for proposed second track from Rice's to Little Falls, 14.61 miles, is about 75 per cent completed, and the remainder of the work has been deferred. On the West Dakota branch grading from Stanton, N. D., west on the Spring Creek line for a distance of 62 miles was finished last fall, and track has been laid from Stanton to Golden valley on 34.88 miles. The line is being extended to mile post 68.25. A line has been located southerly from Beach, N. D., into the Golden valley, and contract has been let for grading 25.50 miles. In connection with the replacing of a timber trestle over Fish Creek, Montana, by a new steel viaduct, a change of line was made on 0.5 miles, reducing the curvature 44 deg. The second track work and change of line between Lester, Wash., and Easton have been continued, and work was carried out on the Point Defiance line from Tacoma, Wash., to Tenino, and on a change of line and grade on the Interbay to Ballard line in the suburbs of Seattle, also on various grade changes and revisions north of Seattle.

Oklahoma & Interstate.—Extensive engineering work is being done by the W. K. Palmer Company, Kansas City, Mo., on the proposed extension of the Oklahoma & Interstate line in Kansas and Oklahoma. Definite plans for this project are not yet forthcoming.

Public Belt.—This company will build about 15 miles of track, it is said, in connection with an extension to the new cotton warehouse of the Dock Board at New Orleans, La.

Regina North Western.—Application has been made to the Canadian Parliament by this company for an extension of time in which to build a projected railway from Regina, Sask., to Tuxford on the Canadian Pacific, thence northwesterly to Red Deer, Alta. Also to build a branch to Battleford, Sask., and to Ft. McKay. The provisional directors include G. L. Kavanagh, O. L. Brunelle, J. Ehitesell, J. Clyma and G. Bordeau, Montreal, Que.

St. John & Quebec.—This new Canadian government railroad has been opened for traffic from Fredericton, N. B., northwest to Centreville, 88 miles.

Savannah & Northwestern.—This company, which operates a line from Savannah, Ga., to St. Clair, 108.6 miles, has asked for permission, it is said, to build a branch north to Augusta, about 27 miles.

Simcoe, Grey & Bruce.—This company has applied to the Canadian Parliament for an extension of time in which to build a projected line from Southampton via Owen Sound and Meaford to Collingwood. Also to build from Southampton via Port Elgin and Tiverton to Kincardine, Ont. The company was incorporated in 1911 and the provisional directors included C. M. Bowman, Southampton; J. B. Tudhope, Orillia; H. Pedwell, Thornburg; H. Clenand, Meaford, and A. G. McKay, Owen Sound, Ont.

RAILWAY STRUCTURES

Coeur d'Alene, Idaho.—The Northern Pacific has awarded a contract for the construction of a combination passenger and freight depot at Third street and Lakeside avenue, to Peter Van Laken, of Coeur d'Alene, Idaho. This depot will be 30 ft. and 9 in. wide, 146 ft. and 3 in. long and 12 ft. and 8 in. high. The foundation will be of concrete, and the exterior walls of brick, while the interior partitions and roof construction will be of wood and covered, with a prepared roofing material. The foundation has already been completed. The estimated total cost is $9,070.

Kansas City, Kan.—The Union Pacific and the Chicago, Rock Island & Pacific are now making arrangements with this city for the construction of a viaduct at the company's yards at Eighteenth street. The bridge will be about 1,500 ft. long, with an estimated cost of $150,000.

Lewisburg, Tenn.—Work is now under way, it is said, on a new station to be of brick construction for the Lewisburg & Northern.

Multnomah County, Ore.—An appropriation of $1,800,000 has been made by Multnomah county, Ore., and Clarke county, Wash., for the construction of a bridge over the Columbia river, which will carry highway, foot and street car traffic. On February 23, bids were received by the Columbia Interstate Bridge Commission and the commissioners of the two counties interested, 24 contractors bidding on this work. Bids were based on unit pieces and were compared with approximate quantities furnished in the specifications. As complete plans had been prepared, the bids were received on a bridge including a swing span and one including a lift span as the movable span. A comparison of the bids received on the two types of movable spans shows that the manufacture of steel for the lift would cost $23,237, or nearly 6 per cent more than the swing span, but on the other hand they also indicate that the lift span could be erected for $46,977, or about 32 per cent less than the swing span, resulting in a net saving for the lift span of $23,739, or 4.4 per cent. A further possible saving in the selection of the lift span was shown in the reduced estimated cost of the substructure. The bids for the substructure of the lift being $46,270, or about 12.6 per cent less than for the swing span. The lift span was finally adopted with an estimated total saving over the swing of $70,013, or about 7.7 per cent. Harrington, Howard & Ash, of Kansas City, Mo., are the consulting engineers.

Wagontown, Pa.—The Philadelphia & Reading has given a contract to the Reading Contraction Company, Reading, Pa., to build a concrete and steel bridge over Brandywine creek north of Wagontown. The bridge is to have six spans, each 15 ft. 3 in. long.

Railway Financial News

Boston & Maine.—The following statement was given out on March 12 by the chairman of the Massachusetts Public Service Commission:

"The commissions of Maine, New Hampshire and Massachusetts have spent two days in conference over the proposed legislation for reorganization of the Boston & Maine Railroad and have adjourned, having appointed a sub-committee consisting of Commissioners Benton of New Hampshire, Cleaves of Maine and Eastman of Massachusetts, with Mr. Anderson as attorney for the Massachusetts commission, to draft legislation as soon as may be and submit it to the other members of the joint conference for approval.

"A tentative understanding has been reached that the new bill will proceed among the general lines of authorizing the Boston & Maine and leased lines to consolidate as they may agree, but strictly within the limits of outstanding capitalization and without increasing the income accruing under present agreements to leased line stockholders.

"The bill will also provide for an alternative plan of reorganization either on voluntary or receiver's sale through a new corporation, but any plan of reorganization, before the same becomes valid, will be required to be submitted to, and approved by, each of the commissions of the three states in joint conference.

"The provisions of the bill are to be so framed as to contain such modifications of the bill presented by the trustees as seem to the commissions to be fully adequate to protect the interests of minority stockholders of the Boston & Maine, and of the stockholders of the leased lines and also to properly conserve the public interests involved."

Canadian Pacific.—The Dominion House of Commons has passed almost unanimously an act permitting the Canadian Pacific to transfer its steamships to a corporation to be known as the Canadian Pacific Ocean Services, Ltd. (March 5, p. 428.)

Erie.—A new issue of $10,000,000 one-year 5 per cent notes has been sold to J. P. Morgan & Co., New York, and associates. The proceeds of this sale, together with the proceeds of the recent sale of the Erie & Jersey and Genesee River Railroad bonds, will provide funds to pay for all obligations maturing in 1915. The Guaranty Trust Company is offering $6,000,000 Genesee River Railroad first mortgage 6 per cent bonds, due 1957, which they bought from the Erie, at 103¾, yielding about 5.76 per cent on the investment.

New York, New Haven & Hartford.—The number of stockholders on January 1, 1915, was 26,544, as compared with 26,240 in 1914, 22,716 in 1913, and 22,106 in 1912. Foreign holders of the stock own but 8,791 shares. Of the total number of stockholders 45.9 per cent hold from 1 to 10 shares.

Southern Railway.—Directors have announced that no dividend on the preferred stock will be paid in April of this year. Regular semi-annual dividends at the rate of 5 per cent per year were paid in 1913 and the first half of 1914. In October, 1914, a 2 per cent dividend, payable in 5-year 4 per cent interest bearing scrip, was declared.

New Railway in Asiatic Turkey.—Evidently for the purpose of expediting the movement of troops toward her eastern frontiers, Turkey began in January the construction of a new railroad from Angora for a distance of about 200 miles in the extreme northern district of Asia Minor. The new railroad will bring Sivas within three days of Constantinople and will open up a promising section, traversing the fertile Bozouk plain and touching the mines of Donek Madeni and Ak Dagh Madeni. It will make more accessible the many towns and cities in the neighborhood of Yozghad and will enable the tourist to reach the ancient Hittite cities at Boghaz Keuy and Euyuk by traveling a short distance overland. It is also possible that after the war the eastern terminus of this line will be the starting point of the railway, which eventually will open up the Turco-Persian frontier.

[ADVERTISEMENT.]

ANNUAL REPORT

NORTHERN PACIFIC RAILWAY COMPANY—EIGHTEENTH ANNUAL REPORT

OFFICE OF THE
NORTHERN PACIFIC RAILWAY COMPANY,
34 NASSAU STREET, NEW YORK,

September 16, 1914.

To the Stockholders of the
NORTHERN PACIFIC RAILWAY COMPANY.

The following, being the Eighteenth Annual Report, shows the result of the operation of your property for the fiscal year ending June 30, 1914.

INCOME ACCOUNT.

	1913	1914	Increase or Decrease
REVENUE FROM TRANSPORTATION:			
Freight	$52,270,685.94	$48,058,811.54	—$4,211,874.40
Passenger	15,808,035.75	15,707,000.40	—101,035.35
Other revenue from transportation	3,546,575.88	3,568,383.51	21,807.63
Totals	$71,625,297.57	$67,334,195.45	—$4,291,102.12
REVENUE FROM OPERATION other than transportation	$1,050,841.15	$1,210,606.29	$159,765.14
Total operating revenue	$72,676,138.72	$68,544,801.74	—$4,131,336.98
Per mile (average)	$11,609.88	$10,836.68	—$773.20
OPERATING EXPENSES:			
Maintenance of way and structures	$10,188,053.94	$9,363,823.91	—$824,230.03
Maintenance of equipment	8,532,671.74	8,063,101.83	—469,569.91
Traffic expenses	1,309,800.81	1,270,880.88	—38,919.93
Transportation expenses	23,569,379.23	21,710,988.18	—1,858,391.05
General expenses	1,073,392.43	1,063,257.90	—10,134.53
Totals	$44,673,298.15	$41,472,052.70	—$3,201,245.45
Per mile (average)	$7,136.48	$6,556.58	—$579.90
Net operating revenue	$28,002,840.57	$27,072,749.04	—$930,091.53
Per mile (average)	$4,473.40	$4,280.10	—193.30
OUTSIDE OPERATIONS:			
Sleeping, parlor, observation, dining and cafe cars and restaurants	$308,820.28	$304,819.65	—$4,000.63
Total net revenue	$28,311,660.85	$27,377,568.69	—$934,092.16
TAXES ACCRUED	$3,999,028.08	$5,030,584.01	$1,031,555.93
Per mile (average)	$638.84	$795.32	$156.48
Operating income	$24,312,632.77	$22,346,984.68	—$1,965,648.09
OTHER INCOME:			
Dividends and interest on securities, interest on deposits and miscellaneous	$2,077,682.81	$2,421,288.32	$343,605.51
Rentals received	2,232,902.32	2,353,811.25	120,908.93
Hire of equipment	315,288.14	864,574.22	549,286.08
Gross income	$28,938,506.04	$27,986,658.47	—$951,847.57
DEDUCT:			
Rentals paid	$537,303.22	$611,894.69	$74,591.47
Interest on funded debt and notes	6,837,685.00	7,563,449.16	725,764.16
Other interest and commissions	.....	156,067.26	156,067.26
Dividends on stock	17,360,000.00	17,360,000.00	.....
Totals	$24,734,988.22	$25,691,411.11	$956,422.89
Surplus	$4,203,517.82	$2,295,247.36	—$1,908,270.46
Less amount appropriated to cover sundry claims	$750,000.00	.....	—$750,000.00
Net surplus for the year	$3,453,517.82	$2,295,247.36	—$1,158,270.46
Ratio of operating expenses to total operating revenue	61.47%	60.50%	—.97%
Ratio of taxes to total operating revenue	5.50%	7.34%	1.84%

MILEAGE OPERATED.

Changes have taken place in the mileage operated during the year as follows:

There were added:

			Miles
Oct.	1, 1913.	Minneapolis Branch in Minnesota, constructed.	.51
Dec.	1, 1913.	Roslyn Branch in Washington, transferred from spurs	1.84
March	1, 1914.	Spring Creek Branch in North Dakota, constructed	34.88
March	1, 1914.	Oregon-Washington Railway & Navigation Co. in Washington leased	4.27
June	1, 1914.	Main line in Washington, transferred from side tracks	1.97
June	1, 1914.	Cuyuna Northern Branch in Minnesota, constructed	2.60
		Total additions	46.07

Deductions:

Oct.	1, 1913.	Red River Branch in Minnesota, track taken up	.42
Feb.	1, 1914.	Elkhorn Branch in Montana, track taken up	4.07
March	1, 1914.	Peninsular Branch in Washington, track taken up	.47
June	30, 1914.	Corrections in rechaining, etc	.05
		Total deductions	5.01
		Net additions	41.06
		Mileage operated June 30th, 1913	6,312,54
		Mileage operated June 30th, 1914	6,353.60
		Average mileage operated during the year	6,325.26

EARNINGS.

FREIGHT BUSINESS.

Freight revenue was $48,058,811.54, a decrease of $4,211,874.40, or 8.06 per cent. compared with the previous year.

5,629,351,427 tons of revenue freight were moved one mile, a decrease of 602,817,210 tons one mile, or 9.67 per cent. less than the previous year.

The average earnings per ton mile increased from .00839 to .00854.

The revenue train load increased from 541.62 to 566.91 tons. The total train load, including company freight, increased from 637.11 to 665.76 tons.

The number of miles run by revenue freight trains was 9,189,372, a decrease of 1,605,135, or 14.87 per cent.

PASSENGER BUSINESS.

Passenger revenue was $15,707,000.40, a decrease of $101,035.35, or 0.64 per cent. compared with the previous year.

Mail revenue was $1,043,720.46, an increase of $59,172.67, or 6.01 per cent.

Express revenue was $1,312,177.22, a decrease of $43,440.93, or 3.20 per cent.

Excess baggage and miscellaneous passenger revenue was $298,214.57, a decrease of $35,836.35, or 10.73 per cent.

Total revenue for persons and property carried on passenger trains was $18,361,112.65, a decrease of $121,139.96, or 0.66 per cent as compared with the previous year.

The number of passengers carried was 9,860,223, an increase of 747,066 over the previous year, and the number of passengers carried one mile was 682,271,430, an increase of 20,754,033, or 3.14 per cent.

The number of miles run by revenue passenger trains was 12,015,138, an increase of 506,357, or 4.40 per cent.

The average earnings per passenger per mile was .02302, and .02390 last year.

OPERATING EXPENSES.

CONDUCTING TRANSPORTATION.

The charges for transportation expenses were $21,710,988.19, a decrease of $1,858,391.05, or 7.88%, as against a decrease in total operating revenue of 5.68%.

MAINTENANCE OF EQUIPMENT.

The charges for maintenance of equipment were $8,063,101.83, a decrease of $469,569.91, or 5.50%.

LOCOMOTIVES.

Total number of locomotives on active list June 30, 1913		1,366
From which should be deducted:		
Engines withdrawn from service during the year	6	
Engines sold during year from active list	3	9
Total on active list June 30, 1914		1,357
In addition to the engines on active list there were on hand from previous year	123	
Withdrawn as above	6	
	129	
Less sold and dismantled	6	
Leaving on hand engines withdrawn from service, some of which may be sold	123	

HAULING CAPACITY.

Active List.	Number.	Tractive Power. (Pounds.)	Total Weight on Drivers. (Pounds.)	Total Weight of Engines. (Pounds.)
Assignment, June 30, 1913	1,366	45,687,700	205,065,173	260,604,108
Added during fiscal year*	.....	*59,460*	49,200	91,900
Total	1,366	45,628,240	205,114,373	260,696,008
Sold and permanently retired	9	231,300	1,085,900	1,287,900
Total	1,357	45,396,940	204,028,473	259,408,108

*Account compound engines changed to simple, engines having superheaters applied, and engines having cylinders bushed and steam pressure increased.

The following statement shows the character and condition of the locomotives of the Company on June 30, 1914.

Wheel Arrangement	Owned June 30, 1913	Sold or Permanently Withdrawn from Service	Added	Owned June 30 1914	Average Weight of Locomotives without tender Tons of 2000 lbs		Average Tractive Force—Lbs
					Total.	On Drivers	
0-0	1			1	28.50	28.50	8,300
0-0	1			1	20.25	17.00	7,900
0-0-0	172	2		170	66.95	66.95	28,596
0-0-0	14		..	14	66.71	66.71	26,264
0-0-0	106	1	..	105	54.39	45.17	18,582
0-0-0	121	3	..	118	88.14	78.50	37,717
0-0-0-0	2		..	2	72.51	65.27	34,800
0-0-0-0	61	1	..	60	46.58	29.77	14,340
0-0-0-0	270	2		277	80.56	60.51	26,858
0-0-0-0	4	....	.	4	93.00	75.00	38,500
0-0-0-0	6	.		6	84.39	43.85	21,453
0-0-0-0	142	..		142	113.09	71.50	31,169
0-0-0-0	130			130	102.25	76.75	35,500
0-0-0-0	270		....	270	153.60	105.42	49,411
0-0-0-0-0	22		.	22	170.70	130.72	64,936
0-0-0-0-0	13		.	13	225.80	200.78	89,300
Total	1,366	9		1,357	95.58	75.16	33,454

Changes in weights and tractive power are due to engines being simpled, engines having superheaters applied, and engines having cylinders bushed and steam pressure changed.

Condition.	Number.	Per Cent.
Good	1,084	79.88
Fair	158	11.64
At Shops	115	8.48
	1,357	100.00
Number of oil burning locomotives	55	4.03
Number of locomotives equipped with superheaters	227	16.73

PASSENGER EQUIPMENT.

On June 30, 1914, the company owned 1,160 passenger train cars, including 130 sleeping cars owned jointly with the Pullman Company, a decrease of 2 cars. The number and kind of cars owned is shown in table on page 42.

Of the 1,160 cars owned 866 were not due in shops for two months or more.

FREIGHT EQUIPMENT.

Comparative number and capacity of freight cars:

	1913.		1914.		Increase or Decrease.	
	Number.	Capacity (Tons of 2000 lbs.)	Number.	Capacity (Tons of 2000 lbs.)	Number.	Capacity (Tons of 2000 lbs.)
Box	24,957	929,365	26,358	994,930	1,401	65,565
Furniture	817	28,650	747	26,850	*70*	*1,800*
Refrigerator	3,462	108,365	4,080	130,320	618	21,955
Stock	2,490	56,125	2,702	65,285	212	9,160
Flat	8,396	293,225	8,654	305,195	258	11,970
Oil	76	2,935	62	2,555	*14*	*380*
Coal	5,745	266,415	5,336	255,990	*409*	*10,425*
Ballast and Ore	1,045	43,505	1,035	43,105	*10*	*400*
Totals	46,988	1,728,585	48,974	1,824,230	1,986	95,645
Percentage					4.23%	5.53%
Average capacity per car		36.8		37.3		

NOTE—Figures in italics denotes decrease.

Of the total number of freight cars June 30, 1914, 2,072 or 4.23% were in need of repairs costing $5 or more per car.

In addition to equipment shown as on hand June 30, 1914, the following have been authorized and will be purchased or built at Company's shops during the current year:

PASSENGER TRAIN CARS.	
Passenger-Freight refrigerator cars	23
FREIGHT TRAIN CARS.	
Flat cars—35 ton capacity	42
Steel ore cars—50 ton capacity	250
	292
Total	315

DEPRECIATION OF EQUIPMENT.

In accordance with the rules of the Interstate Commerce Commission the following amounts have been charged to operating expenses on account of estimated depreciation of equipment, viz.:

Locomotives	$411,047.34
Passenger cars	87,734.71
Freight cars	760,189.08
Work cars	24,948.87
Floating equipment	2,123.04
	$1,286,043.04

MAINTENANCE OF WAY AND STRUCTURES.

The charges for Maintenance of Way and Structures were $9,363,823.91, a decrease of $824,230.03, or 8.09 per cent.

The table in the Report of the Comptroller (page 30) shows the distribution of this decrease under the respective accounts.

The following statements give particulars of the work done and show that the property has been well maintained.

PERMANENT WAY.

	1913.	1914.
New second track laid with 90 pound rail miles	9.67	....
New second track laid with 85 pound rail "	....	2.31
New branch lines laid with 85 pound rail "	....	38.41
New branch lines laid with 72 pound rail "	199.85	6.58
New branch lines laid with 56, 60 or 70 pound rail "	12.08	1.21
Main line relaid with 100 pound rail "	47.23	....
Main line relaid with 90 pound rail "	388.96	147.05
Main line relaid with 85 pound rail "	....	34.16
Main line relaid with 66, 72 or 85 pound rail "	6.05	....
Second track relaid with 90 pound rail "	4.42	7.75
Second track relaid with 85 pound rail "	....	2.46
Branch lines relaid with 90 pound rail "	51.54	3.21
Branch lines relaid with 56, 66, 72 or 85 pound rail "	96.74	166.09
Sidings and spurs constructed "	115.63	112.58
Track ballasted "	304.82	379.32
Embankment widened "	79.30	194.92
Cross tie renewals, main line ties	2,103,476	2,140,758
Cross tie renewals, branch lines "	1,021,332	990,700
Timber bridges replaced by permanent structures and embankments	55	67
Equal to miles	3.17	3.38
Timber bridges renewed	84	89
Timber culverts replaced	106	172
New stock fence constructed miles	76.23	143.97
New snow fence constructed "	4.30	3.15

RAIL IN MAIN, SECOND AND THIRD TRACKS.

	Miles. 1913.	1914.
100 pound steel	47.23	47.23
90 pound steel	1,691.82	1,836.83
85 pound steel	1,563.03	1,557.81
80 pound steel	2.26	2.26
76 pound steel	5.14	5.14
72 pound steel	1,155.01	1,272.82
70 pound steel	43.86	43.86
66 and 67 pound steel	589.67	536.73
60 pound steel	209.35	176.05
56 pound steel	1,407.71	1,277.94
Other weights	11.10	11.00
	6,726.18	6,767.67

BRIDGES.

During the year 160 bridges were replaced, of which 89 bridges 14,579 feet in length were replaced by timber structures, and 4 permanent and 67 timber structures were replaced in permanent form as follows:

Replaced by embankment	58 bridges, 16,846 lineal feet.
Replaced by steel truss, girder, I-beam and reinforced concrete trestle	13 bridges, 1,253 lineal feet.
Total	71 bridges, 18,099 lineal feet.

In addition to changes referred to above, 4 permanent and 128 temporary bridges were abandoned by line changes, and 7 permanent and 125 temporary structures were added on old and new lines. 172 timber culverts were rebuilt, 45 in temporary and 127 in permanent form.

There are now under construction on operated lines 1,400 lineal feet of steel girders and I-beam spans for single track, 111 lineal feet of steel girders and I-beams for double track, 1,390 lineal feet of single track and 540 lineal feet of double track trusses, one 256 foot double track draw bridge, 576 lineal feet of single track and 84 lineal feet of double track steel viaduct, 484 lineal feet of single track and 160 lineal feet of double track reinforced concrete trestles, and two overhead highway viaducts of steel and concrete 3,800 feet in total length.

BRIDGES AS THEY EXISTED JUNE 30TH, 1914.

Description.	No.	Aggregate Length. Lineal Feet.	Miles.
Steel, iron, stone and concrete permanent bridges	632	107,714	20.4
Timber and combination iron and timber structures	2,735	420,291	79.6
Totals	3,367	528,005	100.0

Total length of timber structures replaced by steel bridges, embankment or other permanent form, from July 1st, 1885, when work was commenced, to June 30th, 1914, has been 130.71 miles.

BUILDINGS AT STATIONS.

New buildings and structures, or increased facilities have been provided at the following stations:

Minnesota.	*North Dakota.*	*Montana.*	*Washington.*
Ironton	Valley City	Cranesville	Roslyn
Center City	Alfred	Hysham	Everett
Barrows	Hesper	Logan	Fremont
Clitheral	Tenvik	Edgar	Auburn
		Roberts	Sumner
		Waterloo	Puyallup
		Avon	Hoquiam
		Paradise	Lebam
			Raymond
			Buckley

SHOPS, ENGINE FACILITIES AND YARDS.

Buildings, tracks, turntables or increased facilities have been provided at the following points:

Minnesota.	*North Dakota.*	*Montana.*	*Washington.*
Duluth—Rice's Point	Pembina	Logan	Parkwater
Carlton	Jamestown	Whitehall	Ellensburg
Brainerd	Mandan	Mrntana Union	Easton
White Bear	Dickinson	Transfer	Lester
St. Paul—Mississippi St.		Elkhorn	Seattle
St. Paul—Como Shops.		Helena	West Seattle
Stillwater		Garrison	South Tacoma
East Minneapolis		Missoula	Centralia
Staples	*Idaho.*		Hoquiam
East Grand Forks	Lewiston		
Dilworth			

FUEL STATIONS.

Additional or increased facilities have been provided at the following points:

Minnesota.	*North Dakota*	*Montana*	*Washington.*
Sartell	Mandan	Forsyth	Ellensburg
	Glenullen	Helena	Tacoma
	Dickinson	Garrison	
		Idaho.	
		Lewiston	

WATER SUPPLY.

Additional or increased facilities have been provided at the following points:

North Dakota.	*Montana.*	*Montana—Contd.*	*Washington.*
Sims	Pompey's Pillar	Stuart	Pullman
Richardton	Young's Point	Hamilton	Kiona
Gladstone	Springdale	Noxon	Wymer
	Rekap		Lamar
	Louisville	*Idaho.*	Kanaskat
	Emigrant	Lewiston.	Auburn
	Sappington		

BLOCK SIGNALS.

Block signals have been installed and placed in service at the following points:

Wisconsin and Minnesota.	*Minnesota.*
Superior, Wis.-Carlton, Minn.	St. Paul-West Duluth
Montana.	*Washington.*
Huntley-Billings	Alfalfa-Cle Elum
	Lester-Auburn

In addition to the above, installations of automatic block signals are now in progress on—Montana Division between Livingston and Toston—Idaho Division between Paradise and Sand Point and Athol and Hauser—Pasco Division between Pasco and Alfalfa—Seattle Division between Cle Elum and Easton.

On June 30, on 2,485 miles of important main line there were 894.60 miles protected by automatic block signals and 566.70 miles protected by manual block.

INTERLOCKING PLANTS.

Interlocking plants have been installed and placed in service at Hannaford and New Rockford, North Dakota, and at Seattle, Aberdeen, and Hoquiam, Washington.

An all electric interlocking plant is being installed for protection of Bascule Bridge over Salmon Bay, Ballard, Washington.

DOCKS AND WHARVES.

Duluth, Minnesota, Dock 6 portable conveyor—completed.

Seattle, Washington, Pier No. 1—electric wiring has been re-arranged and extended and heating system has been re-arranged.

Tacoma, Washington, part of the bins in coal bunker No. 4 have been re-arranged to facilitate the handling of coke through the bunkers.

BRANCH LINES PURCHASED FROM SUBSIDIARY COMPANIES.

Titles to the following named branch lines were acquired from subsidiary companies, for the respective amounts which appear below:

Clearwater Short Line Railway	$12,035,301.22
Missouri River Railway	8,542,687.98
Western Dakota Railway	4,980,403.10
Connell Northern Railway	2,291,286.49
Shields River Valley Railway	747,226.90
Camp Creek Railway	296,774.50
Cuyuna Northern Railway	258,597.86
Big Fork & International Falls Railway	999,886.49
Washington Central Railway	561,589.43
North Yakima & Valley Railway	1,290,690.28
Port Townsend Southern Railroad (Southern Division)	375,000.00
	$32,379,444.25

Except in the instance of the Port Townsend Southern Railroad (Southern Division, 15 miles long), which was acquired at the flat price of $25,000 per mile, free from liens, the above amounts represent advances made in this or prior years to the subsidiary company owning the property, for its creation, together with interest to date of conveyance to Northern Pacific Railway Company. No part of such interest has been taken into Income Account. Direct ownership of these properties by Northern Pacific Railway Company, will considerably simplify accounts, and save expense in connection therewith.

CHARGES TO CAPITAL ACCOUNT.

Upon requisition of the Executive Officers, approved by the Board of Directors, expenditures for additions to and betterments of the property have been made during the past fiscal year for:

REAL ESTATE, RIGHT OF WAY AND TERMINALS:		
Superior, Wisconsin, real estate	$387.85	
St. Paul, Minnesota, real estate	37,250.50	
Minneapolis, Minnesota, real estate	106,241.30	
Tacoma, Washington, real estate	234.52	
Credits account of property sold, etc.	*410,881.46*	
		Cr.$266,767.29
BRANCHES, LINE CHANGES, GRADE REVISIONS, AND SECOND MAIN TRACK:		
Superior, Wisconsin, right of way and track to ore dock	$87,351.31	
Grassy Point Bridge, Minnesota-Wisconsin (reconstruction)	10,679.61	
Duluth Transfer Railway, Minnesota (reconstruction)	40,434.52	
Edgeley, Missouri River Line, North Dakota (construction)	782.61	
Pingree West Line, North Dakota (construction)	*Cr. 659.60*	
Bitter Root Branch, Montana (extension)	13,664.57	
Elkhorn Branch, Montana (removal of line)	*Cr. 19,096.98*	
Flathead Valley Line, Montana (survey)	4,136.95	
Glendive-Helena cut-off, Montana	3,725.69	
Lake Basin Branch, Montana (right of way and survey)	15,560.94	
Ballard to Interbay, Washington (construction)	4,555.75	
Fremont-Ballard Line and Draw Bridge, Washington (construction)	128,876.52	
Gray's Harbor & Columbia River Railway, Wash. (right of way)	1,854.10	
Edgecomb to Kruse, Washington (construction)	42,000.47	
Lines in Seattle, Washington	46,464.46	
Point Defiance Line, Tacoma to Tenino, Wash. (construction)	2,502,365.20	
Sunnyside Branch, Washington (extension)	2,185.06	
Spokane, Washington (grade separation)	44,745.91	
Vancouver to North Portland, Oregon (interlocking and block signals)	5,333.72	
Cuyuna Northern branch, Minnesota (extensions)	10,489.20	
Western Dakota branches and extensions, North Dakota	342,999.01	
Missouri River branch extensions, North Dakota	97,720.37	
Missouri River branch extensions, Montana	71.54	
Kooskia to Lo Lo Line, Montana and Idaho	466,585.91	
St. Cloud to Little Falls, Minnesota (second main track)	27,646.19	
Bloom to Jamestown, North Dakota (second main track)	*Cr. 5,123.83*	
Bozeman to Logan, Montana (second main track)	8,947.56	
Tenino to Vancouver, Washington (grade revision and double track)	114,518.20	
Lester to Easton, Washington (grade revision and double track)	630,546.73	
Mile Post 72 to Yardley (Spokane) Washington (second main track)	*Cr. 3,394.68*	
Sundry expenditures and adjustments	1,005.94	
		$4,626,962.95
ADDITIONS AND BETTERMENTS:		
Right of way and station grounds	$112,926.86	
Real estate	317,597.77	
Widening cuts and fills	296,234.66	
Protection of banks and drainage	76,266.62	
Grade reduction and change of line	858,904.74	
Tunnel improvements	188,398.63	
Bridges, trestles and culverts	584,378.10	
Increased weight of rail	424,275.27	
Improved frogs and switches	39,958.68	
Track fastenings and appurtenances	445,768.01	
Ballast	647,547.02	
Additional main tracks	42,770.84	
Sidings and spur tracks	601,196.70	
Terminal yards	448,691.15	
Fencing right of way	24,796.89	
Improvement of crossings, under and over grade	132,463.11	
Elimination of grade crossings	123,631.87	
Interlocking apparatus	44,735.44	
Block and other signal apparatus	641,481.53	
Telegraph and telephone lines	68,144.54	
Station buildings and fixtures	289,479.91	
Roadway machinery and tools	7,520.83	
Shops, enginehouses and turntables	170,576.99	
Shop machinery and tools	64,577.52	
Water and fuel stations	115,242.96	
Dock and wharf property	12,737.12	
Snow and sand fences and snowsheds	2,884.83	
Other additions and betterments	146,855.72	
		$6,930,034.31

NEW EQUIPMENT:	*Total Expenditure.*	*Less used from Reserves.*	*Charged Capital.*	
Locomotives	$102,684.41	$50,164.75	$52,519.66	
Passenger train cars	234,766.87	41,612.85	193,154.02	
Freight train and work cars	4,130,045.04	337,474.90	3,792,570.14	
	$4,467,496.32	$429,252.50		$4,038,243.82
Total additions and betterments for the year				$15,328,473.79

RESERVE FOR ACCRUED DEPRECIATION OF EQUIPMENT.

Credit balance, reserve for accrued depreciation July 1, 1913.		$12,163,011.93
Credits during year ending June 30th, 1914:		
From charges to operating expenses and outside operations:		
Maintenance of equipment, depreciation	$1,286,043.04	
Maintenance of equipment, renewals	51,450.07	
Outside operations, depreciation of cars used in	104,418.80	
From salvage	281,404.12	
From equipment sold	34,736.30	
		1,758,052.33
		$13,921,064.26
Less equipment retired:		
Locomotives	$50,164.75	
Passenger cars	41,612.85	
Freight cars	304,637.44	
Miscellaneous equipment	32,837.46	
		429,252.50
Credit balance June 30, 1914		$13,491,811.76

CAPITAL STOCK AND DEBT.

There has been no change in the amount of capital stock outstanding during the year, viz: $248,000,000.00.

Changes in bonded debt were as follows:

Prior lien bonds issued in this and preceding calendar year under Article One, Section 4 of Mortgage	$3,000,000.00	
Deduct Prior Lien bonds purchased and cancelled under Article Eight, Section 2 of Mortgage	403,000.00	
		$2,597,000.00
Deduct:		
St. Paul & Duluth Railroad Company, Taylors Falls & Superior R. R. Mortgage bonds matured and cancelled	$210,000.00	
St. Paul & Northern Pacific Railway Company Mortgage bonds purchased by trustee and cancelled	2,000.00	
		212,000.00
Net increase in mortgage debt		$2,385,000.00
Notes issued July 9, 1913, for one year	$10,000,000.00	
Less—amount purchased and cancelled	395,000.00	
Outstanding June 30th, 1914	$9,605,000.00	

(These notes were paid at maturity, July 9, 1914.)

During the year bonds held as treasury securities (including Prior Lien bonds issued as stated above), were sold to provide funds for general construction purposes, viz:

Prior Lien bonds, (sold for $3,728,625.45)	$3,927,000.00
General Lien bonds, (sold for $2,319,525.00)	3,430,000.00
	$7,357,000.00

SPOKANE, PORTLAND & SEATTLE RAILWAY COMPANY.

The results of the operation of the Spokane, Portland & Seattle road (including the Astoria & Columbia River R. R., merged March 1, 1911), for the years ending June 30, 1913 and 1914, as shown by the accounts of those Companies have been as follows:

	1913. 556.15 Miles Operated	*1914. 556.15 Miles Operated*
Operating revenue	$5,341,465.67	$4,901,740.24
Operating expenses	2,696,545.21	2,808,642.54
Net operating revenue	$2,644,920.46	$2,093,097.70
Outside operations	1,695.74	*5,843.14*
Total net revenue	$2,646,616.20	$2,087,254.56
Less taxes	640,800.00	640,800.00
Operating income	$2,005,816.20	$1,446,454.56
Other income	1,389,844.81	1,498,660.19
Gross income	$3,395,661.01	$2,945,114.75
Rents, interest, hire of equipment, etc.	879,523.63	874,887.60
Balance	$2,516,137.38	$2,070,227.15

The gross earnings of the above company on business exchanged with the Northern Pacific Railway Company for the fiscal year approximated $1,840,000.00.

OREGON ELECTRIC RAILWAY COMPANY.

The results of the operation of this property for the year as shown by the accounts of that Company, compared with the previous year were:

	1913. 132.07 Miles Operated	*1914. 154.19 Miles Operated*
Operating revenue	$1,108,421.76	$1,181,804.13
Operating expenses	720,798.08	804,636.70
Net operating revenue	$387,623.68	$377,167.43
Less taxes	51,453.36	56,033.36
Operating income	$336,170.32	$321,134.07
Miscellaneous income	1,069.13	552.57
Gross income	$337,239.45	$321,686.64
Interest on bonds and notes	144,336.68	363,995.14
Balance	$192,902.77	*$42,308.50*

The Oregon Trunk Railway, The United Railways Company and the Pacific and Eastern Railway are operating the same mileage as shown in the last annual report, viz.: 222.62 miles.

These properties together with the Oregon Electric Railway Company are controlled and managed by the Spokane, Portland & Seattle Railway Company, the securities of which are owned one half by your Company and one half by the Great Northern Railway Company.

THE MIDLAND RAILWAY COMPANY OF MANITOBA.

The operation of the line of this Company (owned jointly by your Company and the Great Northern Railway Company) has been continued by the owners.

To June 30, 1914, the joint owners have advanced, with interest $4,527,660.19. Your Company's one half, $2,263,830.09, is included in the balance sheet, under the head of "Securities of Proprietary, Affiliated and Controlled Companies—unpledged" $2,150,000.00, and the balance, $113,830.09 in "Advances to Proprietary Companies."

TERMINALS AT VANCOUVER, BRITISH COLUMBIA.

Up to June 30, 1914, your Company has invested in the purchase and improvement of these terminals $1,525,513.67 which amount is carried on the books under the head of "Miscellaneous Investments."

NEW LINES, GRADE REVISIONS, LINE CHANGES, ETC.

MINNESOTA.

Duluth.

Duluth Transfer Railway track from 59th Avenue West to the Minnesota Steel Plant at Spirit Lake, a distance of 2.82 miles is being rebuilt. It is sixty per cent completed.

Cayuna Northern Branch.

An extension to the North Line of 2.6 miles was constructed to reach the mines of the Duluth-Brainerd Iron Company located north of Deerwood in section 32, township 47, range 29 west. A spur was also constructed 1.6 miles long from Loerch southerly to the Canadian mine located in section 13, township 45, range 30 Crow Wing County. A connection with the Minneapolis, St. Paul and Sault Ste. Marie Railway at Cedar Lake, 4504 feet long, has been authorized and is under construction and will be completed this fall.

Minnesota & International Railway—Leaks Cut-off, 5.84 miles.

This change of line has been completed and put into operation.

Rice's to Little Falls, 14.61 miles.

The grading and culvert work for proposed second main track from Rice's to Little Falls, a distance of 14.61 miles, has been seventy-five per cent completed, the remainder of the work being deferred.

Saint Paul.

The Company's business having outgrown the present General Office Building at St. Paul, a new office building has been authorized and work is now in progress.

NORTH DAKOTA.

Western Dakota Branch.

Grading for the line from Stanton, N. D., west, (Spring Creek line) a distance of 62 miles, was completed last fall and track laid from Stanton to Golden Valley, 34.88 miles.

The line is being extended this season to Mile Post 68¼ and track will be laid from Golden Valley to that point by November 1st.

Line South of Beach.

A line has been located southerly from Beach, N. D., into the Golden Valley and contract let for grading 25.50 miles.

MONTANA.

Fish Creek Line Change.

In connection with the replacing of timber trestle over Fish Creek by a new steel viaduct, a change of line was made so as to bring the new viaduct on correct alignment. The change is 0.5 miles long and reduces curvature 44 degrees.

WASHINGTON.

Lester to Easton.

The second track and line change in progress at the date of the last report have been continued. Grading will be completed early this fall and tracklaying before the end of the year.

Point Defiance Line—Tacoma to Tenino.

This line will be completed this fall.

Interbay to Ballard (Suburbs of Seattle). Change of line and grade.

The work in progress at the date of the last report has been completed.

Grade Revisions and Line Changes North of Seattle.

Work on the various grade changes and revisions referred to in last year's report has been continued and should be completed this fall.

THREE YEARS' PROGRESS IN DEVELOPMENT OF THE COMPANY'S TRANSPORTATION FACILITIES.

In the three-year period from June 30, 1911, to June 30, 1914, additions to and improvements of the system's road and equipment were made, at cost as follows:

Branches, line and grade revisions, additional main tracks		$11,136,889
Other additions and betterments		16,139,133
Advances to proprietary companies of money used by them for additions to and betterments of their respective properties		3,161,426
New equipment:		
Locomotives	$1,371,578	
Passenger train cars	253,973	
Freight train cars	10,279,361	
		11,904,912
Total		$42,342,360

These expenditures have brought the company's facilities up to a capacity for handling, with economy and promptness, a volume of freight traffic considerably larger than any heretofore enjoyed by it, and have amply provided for a satisfactory growth of that traffic during a number of years to come.

Toward meeting the outlays consequent on these additions and betterments, the company sold during the three-year period treasury securities, including Prior Lien and General Lien bonds of its own issues, aggregating $22,453,000, principal, producing net $20,703,122.93.

In addition, on July 9th, 1913, the company made and sold $10,000,000 of its one-year six per cent. notes, producing net $9,950,000. Before their maturity, $395,000 principal of these were redeemed and cancelled, leaving outstanding on June 30, 1914, $9,605,000, principal.

THE REFUNDING AND IMPROVEMENT MORTGAGE.

As part of the arrangements for reorganizing the stock and debt upon the properties, the present Northern Pacific Railway Company, in the year 1896, made its Prior Lien mortgage to secure future bond issues maturing in 1997, and limited to $130,000,000, and its General Lien mortgage to secure future bond issues maturing in 2047 and limited to $190,000,000, the latter to bear interest at a rate not exceeding three per cent. per year. Of these General Lien issues, $130,000,000 were reserved for retiring the bonds issued under the Prior Lien mortgage.

For additions to and betterments of property, the Prior Lien mortgage authorized a total issue of bonds under it of $25,000,000, at the rate of $1,500,000 per calendar year.

For like purpose, the General Lien mortgage authorized a total issue of $4,000,000. By January 1, 1914, all of the General Lien bonds under this provision, had been issued, and all the Prior Lien bonds under the like provision had been issued, save $4,000,000. The limitation of the interest on General Lien bonds to three per cent. per year, manifestly has made them unsuitable for refunding purposes. Therefore, by January 1, 1914, a point was reached, where existing arrangements for procuring money on bond issues were practically at an end, and the time for making new arrangements on a basis suited to the company's future financial needs had arrived.

With prior consent of a substantial majority of the company's stockholders, given at a meeting of stockholders held for the special purpose, the Board of Directors on June 29, 1914, authorized a new mortgage to bear date July 1, 1914, to be called this company's Refunding and Improvement mortgage, and to run to Guaranty Trust Company of New York, and William S. Tod, Esq., of New York, as Trustees; and which, at about the date it bears, was executed by all parties thereto and went into effect.

This mortgage covers the Northern Pacific system of railways, their appurtenances and equipment; but not the company's granted lands, its treasury holdings of bonds, the bonds or stock of the Northwestern Improvement Company, or the stocks of the Northern Pacific and Northern Express Companies. Of the bonds issuable under the mortgage, $421,492,500 are reserved for refunding purposes. The total authorized issue is limited, so that the amount thereof, at any one time outstanding, together with all outstanding prior debt of the company as defined in the mortgage, after deducting therefrom the amount of all bonds reserved under the provisions of the mortgage, to retire debt at or before maturity, shall never exceed three times the company's outstanding capital stock; but if, at any time the amount of bonds outstanding, when added to the aggregate amount then reserved to refund prior debt, shall be $500,000,000, no additional bonds shall thereafter be issued, in respect of work or property, in any amount exceeding 80 per cent. of the cost thereof, certified to the Corporate Trustee pursuant to provisions of the mortgage regulating the issue of bonds for future acquisitions by the company. Of the bonds in excess of the $421,492,500 reserved for refunding, $20,000,000 were by the mortgage immediately issuable at the company's request, and by the mortgage were appropriated, one-half to paying the company's outstanding one-year notes, due July 9, 1914, and the remaining half to reimbursement of the treasury to that amount for moneys previously advanced by it for capital purposes, without having been in any form repaid or capitalized.

The remainder of the bonds are issuable only to pay for work or property adding to or bettering the mortgaged estate, and coming under the lien of the mortgage. The bonds are to mature July 1, 2047; but the Board of Directors is authorized, in respect to any special series to provide at time of issue for their redemption at the company's election before maturity.

Bonds are issuable in series, and those in any series may, by the Board of Directors, be made payable in money of the United States, or in that of another country.

The interest rate to be borne by any series of bonds is to be fixed by the Board of Directors, at time of its issue, and is in the Board's discretion.

The Directors feel that the new mortgage will suitably cover all the company's legitimate needs for money, during a long future period, and will enable it to obtain what money it can profitably use, upon terms at least as favorable to borrower as those at the time enjoyed by the generality of large concerns.

Soon after the execution of the mortgage, the $20,000,000 of bonds authorized to be issued forthwith were all issued and sold at prices satisfactory to the company. Out of the proceeds the $9,605,000 one-year notes then outstanding were paid off and cancelled. The remainder of the proceeds of the bonds has come into the company's treasury as money usable by the company for any lawful corporate purpose.

THE BRANCH LINES.

Of 6,353 miles of railway operated by the company in the year, 2,837 miles, or around 44.6 per cent., were operated as Main Lines, and 3,516 miles, or around 55.4 per cent., were operated as Branch Lines.

During the year, on all operated lines, the company moved 20,422,419 individual tons of commercial freight. Those moved during the year, on the Branch Lines, aggregated 13,375,408. Part of these were local to the branch on which they moved, but by far the most moved to or from the main lines, and made their chief mileage on the latter. The average haul on the system of all commercial tons was 275.6 miles. While the major part of this, upon the average, was performed on the Main Lines it is manifest that without the tons contributed by the Branch Lines the volume of business on the Main Lines would have been greatly reduced, operating cost per unit of traffic movement very much increased, and net earnings diminished to a corresponding extent.

THE PANAMA CANAL.

A large event of this calendar year, in the world's transportation and commercial business, has been the opening of the Panama Canal. The new route may be expected considerably to affect some trade currents now established. It may diminish some now of relative importance, and swell others to larger volume. Nevertheless, to holders of the stocks of the transcontinental railways, and especially to the holders of those of the railways running from the Great Lakes across the northernmost tier of states, to the Pacific Coast, the important question is, the probable effect of the new route upon the traffic of these lines.

The Atlantic and Pacific Coasts will certainly be brought closer together by the canal, and some exchanges of commodities between them can hereafter be effected at smaller cost than heretofore. However, the trade entirely through, from coast to coast, has never formed any large part even of that minor proportion of the country's total trade arriving at or starting from coast points.

The bulk of traffic moving into and out of the ports on either ocean, starts from, or is destined for, the country's great interior, which the Panama Canal can never reach. The larger part of the country's transportation movements seems likely to an increasing extent to be between points in its interior.

On lines serving a territory like that of the Northern Pacific, the preponderating movement of traffic, seems most likely to be one local to the territory. Figures printed elsewhere in this report show such to be the fact now. Northern Pacific's main lines, from the head of Lake Superior, and the Mississippi River, to Puget Sound towns, are more than 1,900 miles in continuous length; but the average length of haul of a ton of commercial freight on the company's railways, in the last business year, was only 275.6 miles.

For a time, the Panama Canal route may give manufacturers located on or near the Atlantic Coast some advantage over their competitors of the interior for the Pacific Coast trade; but that question must be, and must remain, one quite as much "up to" the interior manufacturer as to the railways.

The report of the Comptroller gives further details of the transactions of the company.

The Board of Directors especially desires to extend to the company's officers and employes as a body, its consideration and thanks for the fidelity and intelligence with which their respective duties have been performed throughout the year. By order of the Board of Directors,

W. P. CLOUGH,
Chairman.

JULE M. HANNAFORD,
President.

PASSENGER AND FREIGHT STATISTICS.

	1912-1913. Miles, Tons, etc.	1912-1913. Amount, Rate, etc.	1913-1914. Miles, Tons, etc.	1913-1914. Amount, Rate, etc.	Increase.	Per Cent.	Decrease.
Average mileage for year	6,259.85	.....	6,325.26	.....	65.41	....	.....
PASSENGER TRAFFIC.							
Number of passengers carried	9,113,157	.....	9,860,223	.....	747,066	8.20	.....
Number of passengers carried one mile	661,517,397	.....	682,271,430	.....	20,754,033	3.14	.....
Average miles traveled by each passenger	72.6	.....	69.2	.....	.....	4.68	3.4
Passenger revenue	.....	$15,808,035.75	.....	$15,707,000.40	.....	0.64	$101,035.35
Other passenger train revenue	.....	2,674,216.86	.....	2,654,112.25	.....	0.75	20,104.61
Total passenger train revenue	.....	18,482,252.61	.....	18,361,112.65	.....	0.66	121,139.96
Average amount paid by each passenger	.....	$1.73	.....	$1.59	.....	8.09	.14
Average rate per passenger per mile	.....	.02390	.....	.02302	.....	3.68	.0088
Passenger train revenue per mile of road (average mileage)	.....	$2,952.51	.....	$2,902.82	.....	1.68	$49.69
FREIGHT TRAFFIC.							
Number of tons revenue freight carried	21,285,527	.....	20,422,419	.....	.....	4.05	863,108
Number of tons revenue freight carried one mile	6,232,168,637	.....	5,629,351,427	.....	.....	9.67	602,817,210
Average distance haul of one ton	292.8	.....	275.6	.....	.....	5.87	17.2
Freight train revenue	.....	$52,270,685.94	.....	$48,058,811.54	.....	8.06	$4,211,874.40
Other freight train revenue	.....	1,118,042.04	.....	1,171,187.20	53,145.16	4.75	.....
Total freight train revenue	.....	53,388,727.98	.....	49,229,998.74	.....	7.79	4,158,729.24
Average receipts from each ton of freight	.....	$2.46	.....	$2.35	.....	4.47	.11
Average receipts per ton per mile revenue freight	.....	.00839	.....	.00854	.00015	1.79	.....
Freight train revenue per mile of road (average mileage)	.....	$8,528.76	.....	$7,783.08	.....	8.74	745.68
TOTAL TRAIN TRAFFIC.							
Revenue from freight and passenger trains	.....	$71,870,980.59	.....	$67,591,111.39	.....	5.95	$4,279,869.20
Revenue per mile of road (average mileage)	.....	11,481.27	.....	10,685.90	.....	6.93	795.37
Revenue per train mile	.....	3.12	.....	3.08	.....	1.25	.04
Expenses per train mile	.....	1.94	.....	1.89	.....	2.58	.05
Net traffic revenue per train mile	.....	1.18	.....	1.19	.01	.85	.....

NORTHERN PACIFIC RAILWAY COMPANY.

GENERAL BALANCE SHEET, JUNE 30, 1914.

ASSETS.

ROAD AND EQUIPMENT, ETC. (Northern Pacific Estate):		
Cost to June 30, 1907—		
Road, lands, etc. $318,333,961.80		
Equipment 37,295,670.07	$355,629,631.87	
Cost since June 30, 1907—		
Road (less Land Department net proceeds) $93,962,524.07		
Equipment 23,113,772.39		
Land Department current assets 7,327,032.44	124,403,328.90	
	$480,032,960.77	
Less reserve for accrued depreciation of equipment	13,491,811.76	$466,541,149.01
SECURITIES:		
Securities of proprietary, affiliated and controlled companies—pledged, viz.:		
This company's one half of $107,613,500 stock of the Chicago, Burlington & Quincy Railroad Company to secure $215,227,000 joint bonds made and issued by this Company and the Great Northern Company to pay for said stock, costing	$109,114,809.76	
Securities of proprietary, affiliated and controlled companies—unpledged	44,685,526.00	153,800,335.76
OTHER INVESTMENTS:		
Advances to proprietary, affiliated and controlled companies for construction and equipment	$958,701.37	
Miscellaneous investments, physical property	2,004,810.89	
Miscellaneous investments, securities	227,100.00	3,190,612.26
Total Capital Assets		$623,532,097.03
WORKING ASSETS:		
Cash	$6,595,904.14	
Securities issued or assumed—held in treasury	9,203,500.00	
Marketable securities (other than those issued or assumed)	12,069,079.54	
Loans and bills receivable	5,499,240.92	
Traffic and car service balances due from other companies	985,222.03	
Net balances due from agents and conductors	918,965.02	
Miscellaneous accounts receivable	3,999,153.12	
Material and Supplies	8,829,571.43	48,100,636.20
ACCRUED INCOME NOT DUE:		
Unmatured interest, dividends and rents		569,671.85
DEFERRED DEBIT ITEMS:		
Advances and working funds	$28,546.27	
Other deferred debit items	104,854.51	
Special deposits (with Trustees of Mortgages)	1,415,818.38	
Cash and securities in Insurance Fund	5,803,205.98	7,352,425.14
		$679,554,830.22

LIABILITIES.

CAPITAL STOCK—Common		$248,000,000.00
MORTGAGE, BONDED AND SECURED DEBT:		
Mortgage Bonds	$194,737,500.00	
Collateral Trust Bonds (Northern Pacific-Great Northern Joint) Total issue $215,227,000.00		
Less, Great Northern Railway Company's proportion 107,613,500.00	107,613,500.00	302,351,000.00
Total Capital Liabilities		$550,351,000.00
WORKING LIABILITIES:		
Loans and bills payable	$9,605,000.00	
Traffic and car service balances due other companies	1,006,125.35	
Audited vouchers and wages unpaid	5,088,460.23	
Miscellaneous accounts payable	2,536,813.56	
Matured interest, dividends and rents	1,229,338.25	
Other working liabilities	410,631.38	19,876,368.77
ACCRUED LIABILITIES NOT DUE:		
Unmatured interest, dividends and rents payable	$5,139,232.56	
Taxes accrued (partly estimated)	2,351,311.00	7,490,543.56
DEFERRED CREDIT ITEMS:		
Other deferred credit items		5,134,629.63
APPROPRIATED SURPLUS:		
Invested in other reserve funds (Insurance Fund)	$5,803,205.98	
Reserve for payment of sundry claims	483,422.00	
Accrued interest on lines purchased	5,643,200.48	11,929,828.46
PROFIT AND LOSS		84,772,459.80
		$679,554,830.22

Railway Age Gazette

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WE GUARANTEE, that of this issue 6,330 copies were printed; that of those 6,330 copies, 5,640 copies were mailed or delivered by messenger to regular paid subscribers; 407 copies were distributed among members and guests of the American Railway Engineering Association and at the Coliseum; 133 copies were mailed to advertisers; and 150 copies were set aside for office use.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations

CONTENTS

Cost Of Yard Operation

The Committee on Yards and Terminals presented a comparison of the costs of operation of one hump and two flat yards which is highly interesting. From this comparison it would seem that the cost of operating a flat yard is considerably below that of a hump yard. This has been a disputed point for many years, and although numerous attempts have been made to collect data of this nature, direct comparisons have been difficult if not impossible to make because of the widely varying bases upon which data have been compiled. This deduction of the relative cost of operating the two types of yards must be considered as only tentative, as the committee submitted the data only as information, not having sufficient statistics, and the investigation covering too small a number of yards to enable any definite conclusions to be drawn. One point emphasized by the chairman which deserves special emphasis is that the cost per cut of cars should be computed as well as the cost per car, for the latter figure depends directly upon the former.

Reduction In Engineering Forces

There has been a great deal of informal discussion outside of the convention hall regarding the very general reduction in engineering forces during the past year, and the effects of this form of retrenchment on the organization of this department as well as on future maintenance expenditures. The chief engineer of one road reports that his monthly pay roll of $40,000 one year ago has been reduced to $15,000, and his forces were formerly on a purely maintenance basis. The engineering organizations on many roads are now considerably below the 1907 basis. Every engineering officer feels strongly that such radical reductions in forces remove much needed supervision which cannot fail to be reflected in increased expenditures in other ways. Also, an organization once destroyed is exceedingly difficult to rebuild or replace. We do not believe that executive officers are unaware of this condition or that they are requiring such reductions without serious consideration of the results. With the continually increasing cost of operation and the severe slump in business and unaccompanied by sufficient increases in rates the problem is an exceedingly complicated and serious one. But we do believe that in some cases the line of present as well as ultimate economy, viewed from this standpoint, has been crossed.

Adopting Recommended Practices

At each recent convention there has been an undercurrent of opinion that the present method of adopting recommended practices is faulty in that standards of much importance are adopted by the vote of a very small proportion of the membership. Furthermore, many of those voting have not previously given the subject careful consideration. For instance, the proposed clearance diagram was rejected by the narrow margin of five votes, with less than 100 members voting. In spite of the fact that the American Railway Engineering Association bears no official relation to the railways, its recommendations carry much weight and are taken to represent approved practices, as should properly be the case. While the higher officers realize more directly their responsibilities in many of these matters, they are out-voted frequently by others whose positions do not entail such responsibilities and who, therefore, view these subjects from a somewhat different angle. One member's vote should, of course, have equal weight with that of any other member. The problem is to present the recommendations before the entire membership in such a manner that the decisions may represent the desires of the entire membership. It is questionable if a letter ballot will secure such a result any more closely than the present system, for while it will require the individual attention of the members, those not in attendance at the convention do not have the opportunity to hear the arguments on both sides unless they are presented in a statement accompanying the ballot. Such a procedure also delays action and involves a vast amount of clerical work. This problem is one of importance for the association.

Evidences of Business Improvement

The view has been expressed on all hands by railway men and railway supply men attending the conventions in Chicago that while business is improving much more slowly than could be wished, there are numerous evidences that it is getting better and that it will continue to do so. This view is given emphatic support by a statement made by President Fahey of the Chamber of Commerce of the United States, which was published in the newspapers yesterday morning. Mr. Fahey was in Washington attending a meeting of the board of directors of the Chamber of Commerce, and expressed the consensus of opinion of the directors, who come from all parts of the United States. "The resumption of business activity is con-

tinuing steadily," said Mr. Fahey, "and the movement should quicken now. The consensus of all expressions is that in almost all directions things are mending rapidly. As a result of the war it is inevitable that there be slowness in some lines, but more men are being put to work every week, and the industrial output is increasing." These assurances, coming from the highest authority in the commercial world, are highly encouraging. Whatever increases business activity in general increases railway traffic and earnings; and whatever increases them stimulates railway purchases and helps the railway supply business. It is a long lane of bad business that the railways and railway supply concerns have been traveling; but it's a long lane that has no turning, and the worst part of the difficult period of readjustment caused by the war appears to be behind us.

AN ACROSTIC ON THE ASSOCIATION

Ability
Reliability
Endurance
Action

A. S. T. M. COMMITTEE MEETING

Committee D-7 of the American Society for Testing Materials will hold a meeting at 9:30 this morinng in the French room of the Blackstone Hotel.

PHILADELPHIA ELECTRIFICATION IN SERVICE

The Pennsylvania placed in service yesterday the first section of the electrified suburban lines between Philadelphia and Paoli, 20 miles.

THE GRADING OF LUMBER COMMITTEE MEETING

Chairman von Schrenk of the special committee on Grading of Lumber has called a meeting of that committee for 9:30 this morning at the Blackstone hotel.

CHANGES ON KANSAS CITY TERMINAL RAILWAY

E. P. Weatherly, engineer maintenance of way; A. H. Stone, assistant engineer, and J. Tuthill, engineer of buildings, of the Kansas City Terminal Railway, have resigned and those positions have been abolished.

C. E. LINDSAY A DIRECTOR

C. E. Lindsay, division engineer of the New York Central at Albany, N. Y., was elected a director of the American Railway Engineering Association at the meeting of the board after the close of the convention yesterday, to fill the vacancy created by the election of J. G. Sullivan to the second vice-presidency.

CANADIAN NORTHERN HALF-INTERLOCKING PLANT

The Canadian Northern has asked for bids on a half-interlocking plant at the crossing of the Winnipeg Electric and the Canadian Northern, at Portage avenue, West side Winnipeg. The installation also provides protection for a bridge and a stretch of track used jointly by street cars and railway cars.

PENNSYLVANIA ENGINEERS

The Maintenance of Way Association of the Pennsylvania Lines held its semi-annual session Tuesday and Wednesday at the offices of the Pennsylvania Lines in the Insurance Exchange, considering general matters of interest to this department. About 35 division engineers and other maintenance of way officers were present. F. Watts, division engineer, Pittsburgh division, is president and D. M. Craig, assistant engineer, is secretary of this association.

ELECTRIC RAILWAY ASSOCIATION MEETING

The Illinois Electric Railway Association will hold its regular quarterly meeting at 10 a. m. to-day, at the New Morrison hotel. After the meeting the members will attend the regular association luncheon.

AMONG THE VISITORS

Morgan K. Barnum, superintendent of motive power and W. Malthaner, superintendent of shops of the Baltimore & Ohio, were visitors at the Coliseum yesterday.

J. W. Kreitter, superintendent of the Duluth, Missabe & Northern, was also a visitor at the Railway Appliance show.

OGLE COALING STATION

In the description of the coaling station of the Nashville, Chattanooga & St. Louis at Hollow Rock Junction, Tenn., for which a special design with three storage bins was prepared, published on page 603 of yesterday's Daily, the fact that this design was prepared by the Ogle Construction Company, Chicago, was unintentionally omitted.

VALUATION MEETING POSTPONED

The conference between the representatives of the railways and the division of valuation of the Interstate Commerce Commission, which was called by Director Prouty to be held in Washington on March 22 for the purpose of considering a number of questions in connection with the federal valuation, has been postponed until April 19.

SOUTHERN PINE SPECIMENS

The Forest Products Laboratory, Madison, Wis., furnished several specimen cases of Southern yellow pine which were on exhibit yesterday in the corridor of the Congress hotel adjacent to the convention hall. These specimens were examined with interest by many of the members as illustrating grades of lumber which would be accepted and rejected according to a proposed grading rule which in the essentials follows closely the rules which were used by the Isthmian Canal Commission in the purchase of lumber for the construction of the Panama Canal and were published as an appendix to the report of the committee on Grading of Lumber.

B. & O. OFFICIALS TO BEGIN DETAILED INSPECTION

A number of officials in branches of the operating department of the Baltimore & Ohio were in Chicago yesterday attending the convention and visiting the exhibit. Today they will start on a detailed inspection to determine their programme for improvements and maintenance during the coming months. The party is headed by A. W. Thompson, vice-president in charge of operation, and includes C. S. Galloway, general manager eastern lines; J. M. Davis, general manager western lines; E. A. Peck, general superintendent; F. H. Clark, general superintendent motive power; M. K. Barnum, superintendent motive power; Paul Didier, principal assistant engineer; Earl Stimson, chief engineer maintenance of way; John Spielman, engineer maintenance of way; H. R. Talcott, engineer of surveys; G. A. Small, district superintendent motive power; J. R. Kearney, general superintendent of transportation, and a number of others.

The annual luncheon of B. & O. officials attending the convention was abandoned this year because of depressed business conditions.

Proceedings of Railway Engineering Association

Abstracts of Eight Reports Including Masonry, Wood Preservation, Bridges and Trestles and Electricity

The Thursday morning session of the American Railway Engineering Association was called to order at 9:30 a. m. by President Storey in the Florentine Room of the Congress Hotel, Chicago.

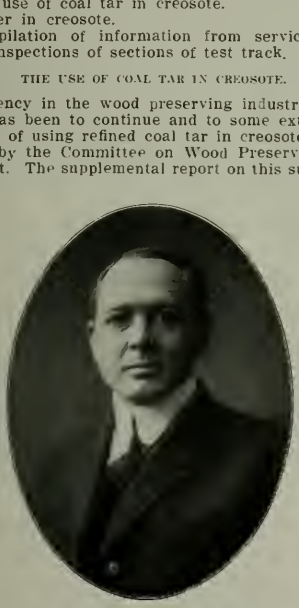
WOOD PRESERVATION

Of the subjects assigned by the Board of Direction, report is submitted on the following:

(1) The use of coal tar in creosote.
(2) Water in creosote.
(3) Compilation of information from service tests and reports of inspections of sections of test track.

THE USE OF COAL TAR IN CREOSOTE.

The tendency in the wood preserving industry during the past year has been to continue and to some extent increase the practice of using refined coal tar in creosote, which was considered by the Committee on Wood Preservation in last year's report. The supplemental report on this subject, which



EARL STIMSON,
Chairman Committee on Wood Preservation.

was presented by Dr. Hermann von Schrenk last year, covered the general situation, and there are as yet no new specific data available, although it may be stated that the practice of using a solution of refined coal tar and creosote has become more permanently established.

The commercial and economic conditions make advisable the conservation of the creosote supply. One of the feasible means of augmenting the available output of domestic creosote is by the proper addition of refined coal tar. This practice has been followed for some years, and there is every indication that it will be increased in the future. It follows, therefore, that a thorough mutual understanding between the treating plants and the consumer is desirable.

The best results are obtained from a solution of refined coal tar in creosote, which is filtered after being properly mixed. The filtration process removes much of the free carbon and reduces the viscosity of the fluid, with the result that the oils are thoroughly incorporated into an entirely homogeneous product. Such a solution is superior to and will give better penetration than one unfiltered and improperly mixed, and in tests under certain conditions (see pages 1074 to 1088, Vol. 15) did not reduce the penetration as compared with straight creosote. In cases where satisfactory penetration can be obtained the use of such a solution encourages the preservation of certain timbers which would otherwise be used untreated, and makes for economy where the supply of creosote is inadequate and the cost is higher than that of the solution.

The committee last year recommended certain precautions in case a creosote-coal tar solution was used, but made no recommendations as to the advisability of the refined coal tar addition. We are still unprepared to recommend regarding the advisability, nor can comparative service results between straight creosote and that to which refined coal tar has been added, be stated. The fact remains, however, that the practice is firmly established and widely followed. Hence, the committee feels justified in making recommendations which will protect the railway companies as fully as possible against unsatisfactory material or improper mixtures.

To this end we recommend for adoption and insertion in the Manual the following specification for a creosote-coal tar solution, and would emphasize that, while it is not a specification which is strictly accurate in a technical sense, it meets all practical requirements:

"The oil shall be a pure coal-tar product, consisting only of coal-tar distillates and oils obtained by the filtration of coal tar. It shall contain no admixture of crude tar.

"Water shall not exceed 2 per cent.

"Specific gravity at 38 deg. C. shall not be less than 1.03, nor more than 1.10.

"Matter insoluble on hot extraction with benzol shall not exceed 2 per cent.

"The specific viscosity (Engler) at 82.3 deg. C. (180 deg. F.) shall be not more than 1.170 for 200 cc. No variation above this standard shall be allowed. The term, 'Specific Viscosity,' in this case shall mean the number of seconds found for the sample tested, divided by the number of seconds for water at 20 deg. C. given in the official certificate for the viscosimeter used.

"On distillation by the standard method of the American Railway Engineering Association, it shall yield the following fractions based on dry oil:

"Not more than 1 per cent at 170 deg. C.
"Not more than 5 per cent. at 210 deg. C.
"Not more than 30 per cent at 235 deg. C.
"The residue at 355 deg. C. shall not exceed 26 per cent."

The quality of the coal tar used is an important factor, and as a further protection to the consumer, the committee recommends for adoption and insertion in the Manual the following.

(1) That the refined coal tar used be subject to inspection or analysis by the railway company at any time, such examination to be permitted upon request prior to the mixing of the solution. This is for the reason that determination of the quality of the coal tar after its addition to the creosote is difficult, if not impossible.

(2) That in case the railway companies makes its own solution of coal tar and creosote, using crude tar for this purpose, it specify clearly as to the quality of the tar.

In last year's report, the committee submitted for the information of the Association six precautions to be followed in the use of coal tar in solution with the creosote. The committee desires to modify these precautions so that they will read as follows:

(1) That there be a distinct understanding between all concerned that a mixture is specified and used.

(2) That the coal tar may be added to the creosote at treating plants when suitable facilities for properly mixing the solution are available otherwise the solution should be mixed by the manufacturer, but subject to the inspection or supervision of the railway company.

(3) That under no circumstances should the coal tar added constitute more than 25 per cent of the mixture.

(4) That the coal tar and creosote be thoroughly mixed at a temperature of approximately 180 deg. F. before being applied to the timber, and that the mixing be done in tanks other than the regular working tanks, and that the tanks containing the mixture shall be heated and agitated thoroughly each time before any oil is transferred to the working tanks.

(5) That only low-carbon coal tar be used, the amount of free carbon not to exceed 5 per cent.

(6) That in treating with the mixture the temperature of the solution in the cylinder be not less than 180 deg. F.

The committee recommends the adoption of these precautions as modified, and that they be inserted in the Manual.

WATER IN CREOSOTE.

One of the most important questions which arises almost daily in connection with the treatment of timbers with creosote is the question of admixture with certain percentages of

water. The committee has thought it advisable to present the following information with reference to this subject:

How does water get into creosote? A certain amount of water becomes mixed with creosote during the process of manufacture. During the distillation of the tar, where steam is sometimes used for agitating the stills, some of this steam vapor is condensed with the creosote in the condensing coils, and goes with the oil through the receiving tanks into the collecting tanks, and finally into the storage tanks there being no possible way of separating the water from the oil during its progress to the storage tank, as water present in small quantities does not separate by gravity except on long standing.

When steam is not used for agitation, air is generally used, and this air, of course, carries some moisture which condenses in the oil, although the amount of water introduced in this way would be much less than where there is steam agitation. In this connection, we might say that the use of steam agitation is limited, and most of the plants are now using air.

All coal tar contains water in greater or less degree. This usually is removed with the light oil and does not ordinarily constitute a source of water in creosote oil, although if the water is present in the tar in an unusual amount, it may not be entirely removed during the early stages of distillation and some may remain in the creosoted oil.

Water may enter the condensing worm where the vapor pipe passes through the condensing tank. Should any serious leak develop, it would be soon detected, but minor leaks would not be. Sometimes the lines leading from the stills to the storage tanks and from the storage tanks to the shipping point are equipped with inside steam pipes to prevent choking or blocking of the pipes with naphthalene in cold water. Of course, this steam pipe is apt to leak, and such a leak would not be detected until it became serious. The storage tanks in which the oil is kept from the time it is made until the time it is shipped, are almost always equipped with steam coils, and it is customary to keep the oil warm during cold weather. These heating coils sometimes develop leaks.

Where creosote oil is shipped in tank cars, water may get into the oil in the cars through leaky steam coils. Where it is transferred in vessels, a certain amount of sea water may get in through leaky seams or bulkheads.

At the treating plant water may get into the oil during the process of treatment, either through leaky steam coils in the cylinders or storage tanks, or from the timber itself. While the data concerning the actual quantities of water which may get into the oil during treatment from the timber itself are meager, it is a matter of general observation that, particularly during the early months of the year (especially in northern states), when timber is wet due to winter exposure, or, as is frequently the case, covered with snow, the water percentage in the oil, as used in treatment, rises. So, for instance, in 1913, at one of the northern plants, the average sample of oil for April had 5 per cent water in it. During the next two weeks, or early in May, the water percentage in the average sample dropped to 1.4 per cent, and during the last two weeks in May it dropped to 1 per cent. There was a very heavy rainfall during April, and early in May there were seven days of rain. As soon as a number of days of good, sunny, dry weather occurred, the water percentage in the oil, as actually used in treatment, dropped immediately. There was no leakage in the steam coils, and in no case was live steam admitted into the cylinder.

Where ties or timbers are steamed as a part of the treating operations, a certain amount of water may get into the creosote from the condensed water forming on the timbers and from some of the water which comes out of the timbers during the pressure and vacuum periods.

Another point at which water comes into creosote is in storage tanks which have no roof. Such storage tanks usually have to be provided with what is known as a water seal. Experience has shown that no distinct dividing line forms between water and creosote, and the result is that the upper 2 or 3 ft. of oil in the storage tanks are more or less mixed with water.

The actual determination of the percentage of water contained in a tank car or storage tank is a comparatively simple matter after a sample has been obtained. The accuracy of the determination will depend largely upon the method with which the sample is taken. Where it is possible to obtain a drip sample, this method is to be preferred, providing the sampling continues for the entire period of the emptying of a tank car. This is, however, frequently impossible, particularly where a considerable percentage of water is suspected, and where it is not desirable to empty the tank car. It is also impossible to use the drip sampling in the case of storage or working tanks.

Various schemes have been used for obtaining an average sample where the drip sample is not possible. One of these consists in constructing a thief, composed of a long tin or zinc tube 3 or 4 in. in diameter and 18 to 24 in. long, weighted at the bottom. This tube has a cover in which a small round hole is cut. The tube is dropped rapidly to the bottom of the tank car and then is pulled up slowly through the oil at such a rate of speed that when it reaches the surface of the oil it is full. A little practice will enable the operator to gage the rate of filling with a fair degree of accuracy.

Another method consists in taking a cross-section. For this purpose a glass or metal tube about 2 ft. long is usually used, set in metal collars, with a valve at the bottom. The tube is lowered into the oil with the valve open, and when in position the valve is closed and the tube pulled out. An exact measurement is made of the depth of the immersion. The per cent of water is determined in this column and the actual amount of water for the number of gallons represented by the section is determined.

Where water has gotten into the oil beyond a certain limit, every effort should be made to reduce the quantity. This may be accomplished by allowing the oil to settle in the tank car or storage tank, and, after standing for a number of days, the water should be syphoned off. If an examination of the oil still shows excessive water, the oil should be heated and allowed to stand for a further period. It frequently happens that, in spite of long standing, much of the water cannot be separated in this manner. In some cases the boiling-out process has been adopted, that is, the oil is put into the treating cylinder and heated until most of the water has been boiled away. Where an efficient condenser system is used there will be only a minimum loss of oil.

A third means of separating water from oil has recently been suggested, namely, the use of centrifugal pumps, after the pattern of the centrifugal apparatus used in sugar mills. Unfortunately, the capacity of these machines is as yet very small, not exceeding 300 gallons per hour.

While it is desirable to use as water-free oil as possible, the committee finds that this is not always possible. There should be a number of well-defined rules in connection with the water allowance, however, and the committee recommends the adoption and insertion in the Manual of the following as indicative of good practice:

(1) *Allowable Limits of Water.*—The use of creosote in treatment containing up to 3 per cent water is permissible. Where the quantity exceeds 3 per cent, proper allowance shall be made, but under no circumstances shall timbers be treated with oils having more than 6 per cent water.

(2) *Measurement of Oil.*—In all cases where water separates from the oil in the tank or car, the water should be taken off to as great an extent as practicable and the oil measurement then should be made from the point of separation between the remaining water and oil as nearly as this can be determined. This refers to the physical process of measurement.

(3) *Sampling of Oil for Water Content.*—In sampling oil a drip sample should be used in taking samples from cylinders during treatment, and an approved cross-section tube should be used for taking samples from tanks or tank cars.

(4) *Storage Tanks.*—All storage tanks should have a watertight roof.

RECORD OF SERVICE TESTS.

The tabulated record of the service of the ties in the several sections of test track on the railroads reporting such tests, which has become a permanent feature of this committee's yearly report, was again presented, revised to show the status of the tests at the latest inspection.

As some of the service tests covered by this tabulation are now of considerable age, it seemed desirable to supplement the tabulation with a more detailed history of these tests. With this in view inspections were made by members of the committee of such of these tests as are of eight or more years' duration.

Most of the tests are not yet complete and final conclusions cannot be reached.

Dr. Irving W. Bailey, of the Bussey Institution of Applied Biology, Harvard University, presented a paper, entitled "The Effect of the Structure of Wood Upon Its Permeability," which was presented as an appendix.

CONCLUSIONS.

It is recommended that the following be adopted by the Association and inserted in the Manual:

(1) The Use of coal tar in creosote:

(a) The Specification for a Creosote-Coal Tar solution.

(b) Paragraphs 1 and 2, referring to the quality of the coal tar to be used in the solution.

(c) The six precautions to be followed in the use of coal tar in solution with creosote.

(2) Water in Creosote:

The four rules relating to the water allowance in creosote.

OUTLINE OF WORK FOR 1915.

The committee recommends:

(1) Continue the study of the relation of water to creosote.

(2) Derive conclusions from the results of exposure tests of material tested with water gas tar oil.

(3) Report on methods of accurately determining the absorption of creosote.

(4) Continue the compilation of service test records, with detailed reports of inspections by members of the committee of ties in track treated by the various processes.

(5) Study the relations of amount of preservative and depth of penetration to the resistance of the material against decay.

Earl Stimson (B. & O.), chairman; E. H. Bowser (I. C.), vice-chairman; H. B. Dick (B. & O. S. W.), C. F. Ford (C. R. I. & P.), Dr. W. K. Hatt (Purdue Univ.), V. K. Hendricks (St. L. & S. F.);, George E. Rex (A. T. & S. F.), E. A. Sterling (Cons. Engr.), C. M: Taylor (P. & R.), C. H. Teesdale, Dr. H. von Schrenk (Cons. Engr.), T. G. Townsend (Southern).

Discussion on Wood Preservation

The report was presented by Chairman Stimson.

The President: The specifications on the use of coal tar in creosote as submitted, without objection, will be taken as adopted for insertion in the Manual, with the understanding that there is to be a note attached that will express the views of the committee on the use of the specifications.

The remaining suggestions under this subject were also accepted.

The four rules relative to water in creosote were adopted.

BALLAST

The following subjects were assigned for investigation:

(1) Continue the investigation of the proper depth of ballast of various kinds to insure uniform distribution of loads on roadway, conferring with other committees.

(2) Continue study of subject of ballast sections, with particular reference to the use of a sub and top ballast.

Specifications for Gravel Ballast.

Class A Roads: Bank gravel, which contains more than 2 per cent. of dust or 40 per cent. of sand, should be washed or

H. E. HALE,
Chairman Committee on Ballast

screened. Washed or screened gravel should contain not less than 25 per cent., nor more than 35 per cent. sand. Class B Roads: Bank gravel, which contains more than 3 per cent. of dust or 60 per cent. of sand, should be screened or washed. Washed or screened gravel should not contain less than 25 per cent or more than 50 per cent. of sand. Class C Roads: Any material which makes better track than the natural roadbed may be economically used.

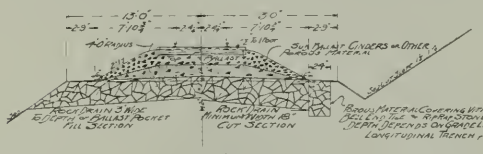
Specifications for Burnt Clay Ballast.

KIND OF MATERIAL.—Good ballast clay should be heavy and plastic, free from sand, gypsum or other impurities; must not crumble when exposed to air or brought in contact with heat.

LOCATION.—The pit must be located on level or moderately sloping ground, not subject to overflow. A water supply is desirable and it must be borne in mind that the sulphurous and carbonaceous gases liberated during the burning period damage the surrounding vegetation and make habitation in the near vicinity very disagreeable.

TEST.—The location site should be thoroughly tested to determine the quality of clay, the depth and uniform consistency of the deposit and small quantities should be burned in test kilns to show the quality of ballast to be secured.

BURNING.—Fuel should be fresh, clean slack and arrangements should be made to secure a constant supply. One ton of slack coal is sufficient for the perfect burning of four



Proposed Ballast Section for Single Track on Tangent.

cubic yards of acceptable ballast. From 1 to 1½-in. layer of slack are alternated with from 10 to 12-in. layers of clay, a new layer of slack and clay being applied to the fire every five or six days. Fires once started must be kept steadily and uniformly burning. To insure thorough and proper burning of the clay, the top and face of the first must be frequently raked down, to avoid clinker or black spots, caused by too much or too little air. When fully burnt a proper ballast clay becomes red in color, due to its high percentage of iron compounds; when underburnt the clay will show a yellow color.

SIZE.—Burnt clay ballast should be crushed or broken, if necessary, so that the largest piece will pass through a 4-in. ring.

DENSITY.—The finished product should absorb not to exceed 15 per cent. of moisture by weight.

STUDY OF BALLAST SECTIONS, WITH PARTICULAR REFERENCE TO THE USE OF SUB AND TOP-BALLAST.

This subject was first referred to the Ballast committee in 1913 and a sub-committee was appointed. In the 1914 report standard plans of ballast sections of various railroads in the United States and Canada were given in the report, and a proposed Class A section was submitted for consideration only, in the form of a progress report. During the year this proposed section has been compared with similar sections in service, and also studied and compared with standard plans of ballast sections of various railroads.

The committee made several changes in the proposed section and added a system of drainage which has been tried out and found to be very successful. The diagram of the proposed ballast section hereto attached shows a roadbed 26 ft. wide for single track. This width is considered necessary for a depth of 24 in., with a slope of 2 to 1 on the side and a path 2 ft. 9 in. wide. The committee wishes to call particular attention to the fact that with this depth of ballast the 2 to 1 slope on the side and the 2 ft. 9 in. path, the width of the sub-grade will have to be greater than 26 ft. on curves.

The committee recommends that this ballast section, with 24 in. of ballast under the tie, and roadbed 26 ft. wide on single tracks on tangents, be adopted as recommended practice for "Class A Track."

The committee further recommends that the slopes be sodded up to the top of the slope, but not beyond, as the application of sod on slopes shown in the present Manual lacks uniformity.

THE PROPER DEPTH OF BALLAST OF VARIOUS KINDS TO INSURE A UNIFORM DISTRIBUTION OF LOADS ON THE ROADWAY.

The committee again unanimously recommends that the test outlined in the 1913 report and 1914 report be made under regular traffic. The committee further recommends that continued efforts be put forth to secure the recommended test on one or more railroads, conferring with other committees. The corroborative results of comparing this test with others will, in the opinion of your committee, be extremely valuable.

BALLAST COMMITTEE'S WORK FOR NEXT YEAR.

(1) Continue investigation of proper depth of ballast of various kinds to insure uniform distribution of loads on roadway, conferring with other committees.

(2) Report on the best methods and cost of applying ballast, including the advisability of applying ballast by contract, and the organization of the most economic ballast gang if applied by railroad forces. Also the use of the pneumatic tamper, and the use of the spreader for forming the ballast shoulder and the path.

(3) Report on the comparative merits of different stones used for ballast, and gravels which disintegrate when exposed to the atmosphere.

H. E. Hale, chairman; J. M. Meade, vice-chairman, (A. T. & S. F.); L. W. Baldwin (I. C.), D. P. Beach (P. L. W.), W. J. Bergen (N. Y. C. & St. L.), T. C. Burpee (Cons. Eng.), O. H. Crittenden (I. & G. N.), J. M. Egan (I. C.), T. W. Fatherson (C. G. W.), H. L. Gordon (B. & O.), Geo. H. Harris (M. C.), C. C. Hill (M. C.), S. A. Jordan (B. & O.), William McNab (G. T.), S. B. Rice (R. F. & P.), E. V. Smith (B. & O.), D. L. Sommerville (N. Y. C.), F. J. Stimson (G. R. & I.), D. W. Thrower (I. C.), R. C. White (M. P.).

Discussion on Ballast

The report was presented by Chairman Hale.

The changes up to the specifications for Burnt Clay Ballast were adopted.

Chairman Hale: The committee recommends a new specification for burnt clay ballast. The entire specification is changed.

J. G. Sullivan (Can. Pac.): One of the clauses here reads, "When fully burnt a proper ballast clay becomes red in color." That is true, if there is iron in it. I think it might be well to add, "when the clay contains iron."

J. L. Campbell (E. P. & S. W.): In referring to the kind of material, I think the first line should read, "good ballast clay is heavy and plastic," rather than, "should be heavy and plastic."

The President: The committee accepts both suggestions.

A. M. Van Auken: There is quite a difference in the amount of coal needed to burn this clay into ballast in the different parts of the country.

The President: The committee suggests the insertion of the word "generally" before the word "sufficient" in the third line of the paragraph on "Burning" to cover this criticism. If there are no other comments on the specifications for burnt clay ballast they will be considered as adopted.

Chairman Hale: The study of ballast sections, with particular reference to use of sub and top ballast, has been given consideration for two years by the committee. The ballast sections are recommended for adoption.

C. E. Howard (Con. Eng.): I think you will find in some cases of deep rock cuts that the cost of cutting a wide roadbed over the narrowest one you could reasonably get along with would probably amount to more than the entire cost of the maintenance of a mile of track.

C. F. Ford (C. R. I. & P.): Has the committee given consideration to the fact of the tendency to increase to 14 ft. centers?

Chairman Hale: The committee did give consideration to this center distance of 13 ft. and 14 ft., and endeavored to select one which would show about the average conditions on the railroads, and also the committee did not like to add another foot to the roadbed if they could avoid it. The 24 in. of ballast is based on the two tests printed in the previous proceedings. Twelve inches of ballast is considered by your committee as too small an amount for heavy traffic. We had that in view when we recommended the 13 feet between centers in the two tracks.

Hunter McDonald (N. C. & St. L.): I have always felt that there was no necessity for banking the ballast up against the end of the ties. On the other hand, I think it is a detriment to the track. As the ballast at the end of the tie becomes clogged with any dirt it begins to act as a pump and pumps the clay up through the bottom of the ballast and fouls the ballast. The sections which are proposed here, it seems to me, could only be carried out on roads having sufficient tracks, to enable them to shift the traffic while this section was being introduced. On single track roads it is an impossibility. I believe a great deal of the foul ballast is due to the fact that it has been tamped too much. I have recently found a limestone paste that will pass through a number two hundred sieve, which, when mixed together, without any cementing whatever, will pull eighty pounds. Under these conditions it seems to me that if we continue to powder our limestone dust under the ties by tamping we will produce a paste which will cause churning, especially so if the border is clogged.

Mr. Ford: We have used a 12-in. ballast with the first 8 in. of coarse rock resting on the cinders and the last 4 in. resting on the crushed gravel, and the results have been surprising. I do not believe we thoroughly understand the action of ballast on the sub-grade. I do not think that we are in position to say what the proper depth of ballast should be, so much depends on the sub-grade. But certainly the distribution of the load on the sub-grade is better secured by using very much coarser ballast for a portion of the way than it is by putting a classified material, such as specified in the Manual, for the entire distance. In connection with this matter of clogging the sub-grade, I think there is a good deal of misapprehension. Mr. McDonald is undoubtedly correct. On the other hand, other roads can bring up the same objection in rebuttal. I think the trouble is due to the way of placing the material on, and the selection of the material. In some cases, to my certain knowledge, the ballast has extended down to at least five feet, but it is no longer ballast. It becomes part of the roadbed, due entirely to the clogging which Mr. McDonald has spoken of.

Chairman Hale: The usual form of providing ballast in the case of a new track is to make the ballast of gravel or cinder, and on top of that it was assumed would be placed the stone ballast at a later date. This section was selected in this form, so that that could be done. With regard to the shoulder or boxing in the object your committee desired in that was not so much for holding the track in line, although that is essential, but also to thoroughly support the end of the tie and to prevent the ballast from kicking from under the end of the tie. One railroad, the officers of which understood they had six inches of ballast, found that they had from one foot to two feet, and their plan, after they found that, instead of adding ballast, which they themselves were prepared to use, was to scrape off the shoulder, and give the ballast which was there a thorough drainage.

J. M. Meade (Vice-Chairman): We have had a great deal of trouble with the ditching machines digging the tile out of the point of the ditch, and they started the plan of putting it near the center of the track, but out of the point of the ditch. The plan which we have presented shows it both ways.

Hunter McDonald: In answer to Chairman Hale's statement about the necessity for maintaining the shoulder ballast at the tie. If a border 10 in. wide is left from the end of the tie at a level with the bottom of the tie it will hold the ballast in there just as well.

Earl Stimson (B. & O.): Our experience on the Baltimore & Ohio supports the statements of the chairman, namely, that it is necessary to have the ballast pretty well banked at the end of the ties in order to properly support the ties.

A. S. Baldwin (I. C.): It seems to me that the question of shoulder in the ballast is largely dependent on the character of the sub-grade. I think it cannot be denied that the shoulder does furnish an excellent brace to the tie so far as maintenance of line is concerned. At the same time there are some sub-grades so soft that it is almost impossible to maintain it. In my experience I found it a good plan to keep the shoulder where it could be kept without an unreasonable amount of churning.

C. E. Lindsay (N. Y. C.): Mr. McDonald is entirely right in saying that ballast that has become so foul as to retain the water around the end of the tie is very objectionable, and where that condition exists we clear away the ballast down to the level of the bottom of the tie. Anyone who will examine the bed disclosed by the removal of an old tie will find it packed full almost to a glazed surface in many cases and almost impervious to water. The drainage in that case must be into the ballast at the side, and where we clean the ballast we clean it as deep as we can go between the ties clear across the track so that we get a drainage in that way from the bed of the tie into the space between the ties and then out to the side. We find that clean ballast, either stone or gravel, at the end of the tie of decided benefit in maintaining the line. Everybody knows the proper place to support the tie is a space three feet equally distant from each side of the rail.

John R. Leighty (Mo. Pac.): I notice the drawings show a drain filled with coarse rock. I would say that in a good many cases the effective life of that drain can be materially lengthened by mixing cinders with the rock. If the character of the sub-grade is such that it carries a great deal of earth with the water it will clog the interstices between the rocks in a comparatively short time, whereas if cinders are put in they act as a sort of filter and will not materially, if at all, deteriorate the drain and the result is a long life.

Mr. Meade: I will say that the centers, in the course of a few years, will rot and will clog the French drain. As a substitute for this we have been using crushed rock on top of coarse rock.

Mr. Baldwin: I tried putting drain tile vertically below the end of the ties and found it a very excellent way for draining out the water holes. For a few years it gave excellent results, but the pressure from the roadbed and the fine dust caused it to fill up almost invariably. Finally we got a good deal better results by using a large tile.

Chairman Meade: We tried that for six or eight years.

Mr. Safford: We have placed in the past too high a value on the qualities of the farm tile, which permitted water to be absorbed through it. I think the bulk of the water that gets into the tile comes through the joints. We are bound now to use the bell-shaped harder burnt tile, under most conditions, to a much greater extent than we did in the past, due to the fact that our wheel loads are much heavier. I think our trouble has been in the past that we have not been able to tamp the material over the tile hard enough to resist the lateral action due to the heavier loads. My experience has been that we get equally good results from drainage standpoints from bell tile as from farm tile.

Mr. Campbell: Referring to these ballast sections, I notice that the sub-grade is sloped from the center of the roadbed.

Chairman Meade: The committee discussed that point. The man dealing with the sub-grade, seeing it washed out after it had been in service for a while, realizes that the top of the sub-grade has not been disturbed very much, and it is ridiculous to suppose that any such line as recommended here could be maintained, but your committee thought it was a step in the right direction, and therefore recommended greater height in the middle, and drainage outside if possible.

J. B. Jenkins (B. & O.): I wish to ask if the committee would not consider calling this clause on roadbed Clause AA, so as to preserve our former classifications, A, B and C.

Mr. Meade: The committee is heartily in sympathy with the suggestion that other revisions are necessary, but this was such a step from what we had in the Manual to the proposed one that we wished to recommend this to the Association first for consideration, and then at a later date to revise the remaining sections in line with the wishes of the Association.

J. R. W. Amhrose (Tor. Term.): I think we are making a mistake if we adopt this section at this time, because, in a way, you are tying the hands of other committees that are now investigating this question. I think very few of us would recommend the construction of a 25-ft. roadway for single track to-day.

Mr. Meade: The committee is working in harmony with the other committees. The Roadway Committee was notified of our meetings and we have been in conference with them. We did not have time to get their approval of the 26-ft. roadway, although we have taken it up with them. In regard to the width, it all depends on the depth of ballast. If the depth of ballast is assumed to be 24 inches, the other will follow. We hear of roads considering 125-lb. rail. The weight of the coal cars is increased over the old coal cars, and the committee feels that something ought to be done now to have a section which is practically, as nearly as we can get it, the recommended practice of the railroad. It may be revised in the future. We don't say it will not be, but it is the best practice that we know of at the present time. We find two roads already making proposed sections, and we feel the others would be helped by having something of this sort.

The President: The committee has moved the adoption of sections for insertion in the Manual.

(A rising vote was taken on the motion, which was lost, and it was referred back to the committee for further investigation.)

Mr. Meade: The committee has one further recommendation in regard to the track section. (Reading the last paragraph under the Study of Ballast Sections.)

The President: The recommendation will be taken as having been approved by the convention.

Mr. Meade: The committee had also referred to it the proper depth of ballast on the roadway. What the committee wanted was about $3,000, and it was suggested that we try to get that amount from thirty railroads. We would like to hear from the convention as to the possibility of getting $100 each from different railroads. If we can get the $3,000 we can make this experiment, and I think the whole thing depends on this experiment.

The President: This recommendation of the committee has been before the Board of Direction in the past. Funds did not seem available with which to carry on the work. I can think of no action that the convention can take at the present time except to refer it to the Board for further consideration.

J. B. Jenkins (B. & O.): I would suggest, if the ballast committee applied to the different railroads of the country to make this test on a 10-ft. section of track, perhaps several 10-ft. sections for each railroad, that it could be done at very low expense, and I have no doubt a number of the railroads would be willing to make the test at their own expense. By having a number of 10-ft. sections and different classes of material, they would get much more data than they would by making the test for which they want the $3,000.

STRESSES IN RAILROAD TRACK

The special committee on Stresses in Railroad Track was formed by action of the Board of Direction November 20, 1913. A similar committee was created by the Board of Direction of the American Society of Civil Engineers November 12, 1913. By action of these two bodies the two committees have the authority to co-operate, and this co-operation is being carried on. The Board of Direction of the American Society of Civil Engineers made an assignment of funds for the work of the Committee March 4, 1914, and a contribution toward the expenses of the tests was later received by the American Railway Engineering Association from the United States Steel Corporation. It has been decided that the first work shall include the development of instruments and methods for tests on track, and that the preliminary tests on track shall include observations of the equilibrium depression curve of the track

A. N. TALBOT,
Chairman Committee on Stresses in Railroad Track.

under static load (the measurement to include rail, ties, ballast and roadbed); and also measurements of the distribution of strains in the rail.

During the summer and fall plans have been developed and a beginning made. The work has included (a) a study of the problem; (b) development of instruments and methods of carrying on the tests and trying these out in field and laboratory, and (c) static tests on railroad track with heavy locomotives and with single concentrated load. These tests were made on the track of the Illinois Central, near Champaign, Ill. A test party was organized and a start was made on the field tests, and these tests were carried on until unfavorable weather interfered with the work. The work of computation, making records and developing apparatus has since been continued. Enough experience has been gained to show that the methods used are practicable. During the winter it is expected that some laboratory tests will be made on ballast and on rail joints. Preliminary arrangements have been made for tests on the Baltimore & Ohio and on the Delaware, Lackawanna & Western. It is planned to carry on the test work during the coming season.

The Engineering Experiment Station of the University of Illinois is co-operating with the committee on this work through the use of its laboratories and its staff, especially through the assistance of Prof. H. F. Moore, in the development of apparatus and methods of tests. It is expected that this co-operative work will be of great assistance to the committee.

A. N. Talbot (Univ. of Ill.), chairman; W. M. Dawley (Erie), vice-chairman; A. S. Baldwin (I. C.), J. B. Berry (Cons. Engr.), G. H. Bremner (I. C. C.), John Brunner (Ill. Steel Co.), W. J. Burton (M. P.), Chas. S. Churchill (N. &

W.), W. C. Cushing (P. L. W.), P. H. Dudley (N. Y. C.), H. E. Hale, Robt W. Hunt (Cons. Eng.), J. B. Jenkins (B. & O.), Geo. W. Kittredge (N. Y. C.), P. M. LaBach (C. R. I. & P.), C. G. E. Larsson (Am. Br. Co.), William McNab (G. T.), G. J. Ray (D. L. & W.), A. Reichmann (Am. Br. Co.), E. Stimson (B. & O.), F. E. Turneaure (Univ. of Ill), J. E. Willoughby (A. C. L.).

Discussion on Stresses in Railroad Track.

The report was presented by Prof. Talbot.

Prof. Talbot: Work is to be done with different types of locomotives, to determine the effect of wheel loads and wheel spacings. It is to be done at different rates of speed to endeavor to determine the effect of speed upon the stresses. The measurements of the stresses in the rail will be made by strain gages at different points along the roadbed. The committee has been working with different depths of ballast, with different sizes of ties. Some thought has been expressed as to different tie spacing. An instrument has been developed to measure the pressure in the ballast, that is, the distribution of the vertical load produced at any point through the depth of the ballast. In addition to that, I want to say that this is preliminary work, rather elementary in some respects; an endeavor to find some of the laws which may be used for planning other work, and for analyzing and drawing conclusions from the tests. That gives a general notion of what we have in mind for this season.

MASONRY

The subjects assigned by the Board of Direction were:

Complete the report on principles of design of plain and reinforced retaining walls and abutments. (No report.)

Collect data concerning the cost and methods of constructing concrete piles, and make recommendation as to their use. (Reports progress only.)

F. E. SCHALL,
Chairman Committee on Masonry.

Report on the cost, appearance and wearing qualities of various methods of surface finish for concrete. (Reports progress only.)

Joint committee on Standard Specifications for Cement.

Joint committee on Concrete and Reinforced Concrete.

JOINT COMMITTEE ON CONCRETE AND REINFORCED CONCRETE.

The committee held two meetings during this year, at which the reorganization of the joint committee was thoroughly discussed and the financial aspect of the committee considered. At the meeting held June 3, 1914, sub-committees for the investigation of certain phases of reinforced concrete work were appointed. By instructions from the Board of Direction, further attendance at the joint committee meetings is not desirable.

COMMITTEE C-1, STANDARD SPECIFICATIONS FOR CEMENT, AMERICAN SOCIETY FOR TESTING MATERIALS.

Meetings of this committee were held on April 28 and July 1, 1914; at the first meeting, special committees on "Accelerated tests of the consistency of volume of cements" and on standard screen scale and method of standardizing sieves were appointed. At the meetings of this committee reports were received that the Conference committee on "Standard Specifications for Cement" was making progress and expected to reach a satisfactory conclusion at an early date, but so far this has not been accomplished.

The sub-committee on Accelerated Tests met on July 1, 1914, and discussed the question of these tests from various points of view; the committee expected to obtain some valuable information on this subject from abroad, but by reason of the disturbed conditions of the European countries little information may be expected from that source; the committee so far has not undertaken to make any tests.

NEXT YEAR'S WORK.

It is recommended that the subjects of cost and method of constructing concrete piles, and the cost, appearance and wearing qualities of surface finish of concrete be reassigned for further examination and report.

It is also recommended that the subject of certain typical designs of foundations for piers, abutments, retaining walls and arches in various soils and depth of water (not including pneumatic foundations) be assigned for investigation and report.

F. E. Schall (L. V.), chairman; F. L. Thompson (I. C.), vice-chairman; R. Armour (G. T.), J. C. Beye (C. R. I. & P.), C. W. Boynton, H. A. Cassil (B. & O. S. W.), T. L. Condron (Cons. Engr.), J. K. Conner (L. E. & W.), L. J. Hotchkiss, Richard L. Humphrey (Cons. Engr.), J. H. Prior, R. A. Rutledge (A. T. & S. F.), G. H. Scribner, Jr. (Contr. Engr.), Job Tuthill (K. C. T.), J. J. Yates (C. R. R. of N. J.).

APPENDIX A.

CONCRETE PILES, COST, METHOD OF CONSTRUCTION AND RECOMMENDATION FOR THEIR USE.

The concrete piles generally used are of the reinforced type, though in several cases plain concrete piles have been used.

They are usually of 16-in. short diameter, whether square or octagonal. The Santa Fe varies the short diameter, using the formula $D = 7$ in. $+ \frac{1}{4}$ in. L, where L equals length of pile in feet. Concrete piles are used with both a tapered and a straight section, the latter type being more commonly used.

A large variance is shown in the amount of steel reinforcement used, both longitudinal and transverse. The greater portion of the piles have $\frac{1}{4}$-in. rods for transverse reinforcement, whether spiralled or hooped. Steel mesh is used in a few cases and in one case additional steel reinforcement is used in the head of the pile. The Burlington is one of the roads that uses steel mesh for reinforcement.

The cost of the concrete piles at the point of manufacture varies considerably, probably due in a large measure to the method of bookkeeping, or as to what is considered a proper charge against the actual cost of the piling; the number of piles manufactured and the available plant and labor for manufacturing the piles are also factors that may influence the cost.

The variation in the cost per linear foot of pile is also due to the use of different quantities of steel reinforcement, some roads using a design providing considerably more steel than others. For instance, the cross-sectional area of steel used by the Burlington runs 4.25 lbs., of the Illinois Central 12.5 lbs., and of the Milwaukee 17.5 lbs. per linear foot.

The cost of driving the piles also varies considerably, but this should be expected, as the nature of the soil, the accessibility of the work, the traffic conditions and the number of piles driven at a given structure affect the cost of driving to a certain extent. Thirty-five cents per linear foot, however, seems to be a fair average cost under ordinary conditions. This cost includes handling costs, which vary from 10 to 12 cents per linear foot.

Several of the answers received to a circular request for information show that it costs little more to drive concrete than wooden piling.

The general opinion seems to be that in cases where there is permanent moisture and no danger of future drying out, wooden piling is the cheaper; where the line of permanent moisture is low, concrete piling is the most economical. No Eastern railroads seem to have used concrete piling for bridge bents. Several of the Western railroads have used this to a considerable extent and found it to be good and permanent construction. In many cases concrete piling has been used for supporting small abutments, where placed on embankments, as this type of construction is more economical on account of the saving in the cost of expensive high abutments.

The foregoing, in conjunction with the two summaries of replies, are submitted as a progress report, understanding that the subject will be continued for next year, for the further investigation of the different designs of piles, and to

submit a complete report with certain typical designs of concrete piles, their cost and recommended use.

APPENDIX B.

COST, APPEARANCE AND WEARING QUALITIES OF VARIOUS METHODS OF SURFACE FINISH FOR CONCRETE.

A careful review of the current literature on this subject was made and the committee found a marked lack of reliable information. A circular letter of inquiry was therefore sent to the members of the Association and others interested. Fifty-two replies were received, many of which contain excellent information. A summary of these is made a part of this report, and a number are quoted that contain information covering generally the methods in use and specifications and typical recommendations. The sub-committee feels, however, that the subject requires further study, and that it is not in a position to make final recommendations. The committee presents this report as information.

A review of the answers received gives the following methods as most generally used. Each method has been numbered for reference, the same as in the tabulated summary of replies.

Spading, to Work the Coarse Aggregate Away from the Form to Bring the Mortar Against It.

This method is the one generally used, and where decorative treatment is not necessary furnishes the best finish at the least expense. The surface is generally smooth and nearly impervious to moisture, and its wearing qualities are equal, if not superior, to those of any other method.

Coating with a Wash of Cement.

A wash of usually one part of cement and one part of sand is applied with a brush after the forms are removed. This fills up the pores and covers the small inequalities and wood grain marks and gives a smooth surface of even finish and uniform color. This film of mortar, however, is liable to become checked and hair-crack and often scales; for this reason it is not generally used.

Rubbing.

There are several methods of treatment, as follows:

(a) The forms are removed as early as practicable, prominent joint marks chipped off, and the surface thoroughly wet and rubbed with a cement mortar or carborundum brick.

(b) After the forms are removed the surface is rubbed with wooden floats, keeping the surface well flushed with water during the rubbing and thoroughly washing after the rubbing is completed. The earlier the rubbing is done the better the results. The rubbing removes most of the inequalities, fills the pores and small cavities, and gives the surface a uniform finish and appearance, and does not flake or scale.

Removing the Outside Mortar to Expose the Coarse Aggregate.

There are several methods of accomplishing this result, all dependent on the use of a surface finish or coating at least one inch thick, composed of prepared aggregate, which coating is deposited as the placing of the concrete proceeds.

(a) Wash the surface immediately after the forms are removed, exposing the aggregate, which is usually done by scrubbing with stiff brushes of either bristle or wire, and water, rinsing the surface clean, keeping it moist and protected from the sun for about three days.

(b) Treat the surface with an acid, usually commercial hydrochloric and nitric. The acid attacks the cement and exposes the aggregate. The amount of dilution of the acid is usually obtained by experiment and varies with the age of the concrete.

(c) Removing the outer skin by means of a sand blast: This method has not generally proven successful, as it is very difficult to obtain a uniform surface.

Tooling the Surface of the Concrete, After the Forms Have Been Removed, by Means of Crandall, Bush-Hammer or Other Tools.

This method, applied to the extent of cutting slightly into the aggregate, produces a very attractive surface, and it is the experience of many engineers that for work in which the best possible appearance is desired, bush-hammering provides the desired results at a minimum cost. The best results are produced with spaded surfaces or those composed of special aggregate.

Scoring.

Scoring the surface by means of a system of horizontal and vertical "V" shaped battens placed on the forms to break up the flat appearance, to make a line designating the completion of the day's work, to indicate expansion joints or to produce the effect of courses.

Metal Forms.

Forms of metal or wooden forms lined with metal give a smoother surface than bare wood. The spading is done in the same manner as with wooden forms to push the aggregate back from the face. In doing this an excess or thin skin of rich mortar is brought to the surface of the concrete, and is liable later to develop checks and hair-cracks and become unsightly.

Abstracts of some of the replies received in answer to the circular letter issued by the committee are given below:

C. H. Cartlidge, bridge engineer, C. B. & Q:

"In the beginning of our concrete work in 1889, it was our practice to face the concrete against the form boards by working the grout against the forms. A great deal of rough lumber was used in the early work, and as we enlarged the use of concrete, we tried to improve its appearance by depositing the mortar against the form and filling in back of it with concrete. Another method was to leave the concrete rough and plaster it. In the 25 years that have elapsed since these experiments, it has become evident that the original method is by far the best of the three, and that the more nearly homogeneous the concrete can be maintained the better will be the wearing qualities of the surface and even of the concrete itself. In later work we have adopted the same principle, but have used surfaced forms, even lining them with sheet steel to obtain a smoother surface. This gives the best results for the cost, but at the same time a thin skin of rich mortar or grout is formed against the form and on the outer surface of the work. This checks with minute cracks and in the end will probably be more or less unsightly. It is true that these cracks are very small and there is not the tendency for the film of rich mortar to scale off, which is exhibited in every case in the thicker mortar facing used in earlier work. In 1900 an experiment was made with bush-hammering some concrete which had been faced in the most careful manner by spading against the form; a portion only of the work done at that time was bush-hammered, so that there is an excellent chance to judge of the relative merits of the two finishes. As the result of this it is the writer's opinion that for work in which the best possible appearance is desired bush-hammering provides the desired result at a minimum cost. In a good deal of the work finished by spading against the forms improvement on the surface obtained was made by rubbing with carborundum brick; this gives a good surface and a pleasing appearance temporarily, but it has been found that it is difficult to obtain a uniform texture by this means and that, while exposure does not affect the material itself, it causes the washing away of the fine particles of concrete ground off by the carborundum, so that the work is really not very much better than ordinary spade finish work, unless the grinding is carried to an extreme.

"The cost of the spade finish is practically nothing; it takes little more labor to confine the greater part of the puddling to the concrete on the outside than it does to have the same men do all the puddling in the middle of the mass. The cost of bush-hammering will run from ¾ cent to 2 cents per sq. ft., depending on the age of the concrete, amount of work, accessibility of work, etc.

"It is evident that the rougher the completed surface, the darker it will naturally become by exposure, smoke and weather, as every indentation must receive and retain some coloring matter from the smoke. On the other hand, such a thing as an absolutely plain surface is a practical impossibility. There will be slight waves, small ridges, etc., left by the seams in their forms and their slight distortion, and where a spade finish alone is used the contrast between the dark markings in the seams and the lighter places in the smooth surface is disagreeable in effect, while by bush-hammering an effect of uniformity of texture is obtained, which is much more pleasing to the eye. The bush-hammering has also the effect of cutting away the rectangular markings of the face, which are particularly objectionable from the standpoint of appearance.

"The writer believes that the best and most economic finish for concrete is obtained by bush-hammering, and where the process is carried to such an extent as to expose the aggregate and slightly to cut into it, very beautiful results may be obtained."

George W. Kittredge, chief engineer, New York Central:

"The cost of finishing surfaces with a wooden float while concrete is green is about one cent per square foot. After the concrete has hardened somewhat, and the use of a cement or a carborundum brick is necessary, the cost is increased to about two cents per square foot. The cost of troweling and using a dot roller on walks and platforms is about 1½ to 2 cents per square foot. The above average prices are for all labor and material, including any scaffolding required. I have

no record of actual prices of other methods of finishing surfaces.

"As a general proposition, I think the best manner of finishing a concrete structure is by the wooden-float method, as it leaves the concrete in a more natural state, is cheaper and has a better appearance in the long run. Application of cement on the surface or the use of a cement brick generally makes a white finish, which is more susceptible to discoloration and liable to wear away unevenly.

"Concrete surfaces should be finished in above manner whenever they are exposed, or where it is desired to obtain as much density as possible for waterproofing purposes. I do not think surfaces should be tooled, scraped or treated with an acid, except where the surfaces have been specially prepared and artistic finishes are required. Concrete walks and platforms troweled and surfaces roughened where they are exposed to weather, I think, give the best result. Floors usually require special consideration.

"Surfaces finished smooth are less susceptible to discoloration from smoke and the weather than when untreated. However, tooled surfaces, I think, have the opposite effect."

L. D. Hadwen, engineer of masonry construction, Chicago, Milwaukee & St. Paul:

"In addition to the ordinary surface obtained by spading, we have used a surface finish obtained by using a sand blast, as was done at the Columbus depot; a treatment of the surface with dilute acid to remove the surface mortar, as was done in the Missoula depot foundation; a brushed surface to remove the mortar and show the rough aggregate; removal of the mortar skin by bush-hammering; and treatment of the mortar surface obtained by spading, chiseling off board marks and rubbing the entire surface with emery.

"A special mortar surface was formerly obtained by the use of a steel gage with angle-irons fixed to create a space about 1½ in. deep between the form surface and the body of the concrete. This space was filled in with mortar and the gage removed. This method is unnecessary, as an equally good mortar surface can be obtained by spading the aggregate back.

"In building the Miles City depot foundation, the forms were lined with building paper with a view to getting a smooth finish, free from all board marks. The wrinkling of this paper caused a wavy finish and the surface approximated that of bridge stone, producing a freak appearance and is not a desirable finish.

"Whitewashing surfaces with a liquid grout, or with a cement wash, is contrary to our practice and undesirable. It is only a matter of time before any such wash will check and scale. Some experiments have been made with coloring matter, both lampblack and ochre, with the idea of getting a surface of a definite tint. The addition of any coloring ingredient to an aggregate is to be deprecated, because it is very difficult to insure uniformity in the mixture, and the result is liable to be a surface that is blotchy.

"For wearing surfaces, such as floors with heavy trucking, the use of a special aggregate may be desirable. On some of our shop floors, granite screenings have been used for this purpose to give a granitoid surface. We have also used finely divided iron in some experimental sections of freight house, and a hard-wearing surface seems to be obtainable by incorporating such material or other patented preparations in the wearing coat. Except where especially dustless floors are desired, it does not appear necessary to go to additional expense for this purpose."

Discussion on Masonry.

Chairman Schall: In regard to the change in the Manual the committee recommends one change as to the stress in the reinforcement to loads from 17,000 to 16,000 lbs. so as to agree with the requirements in the specifications for iron and steel structures.

The President: The change will be made. If there is no objection to the definitions the addition will be made.

Chairman Schall: For several years the question of getting a revised specification for cement has been under consideration by a joint committee of the engineering societies. However, conditions have arisen that have put this matter back further and the committee is not willing at this time to recommend striking out the old specifications. We prefer to work along those lines until we can get something better. In regard to the committee on reinforced concrete, the workings of that committee have not been as harmonious as you might expect, more particularly due to a misunderstanding about the representation of certain organizations with the American Society for Testing Materials. This so-called difference has been adjusted to a considerable extent, but for a number of reasons the Board of Direction has felt that it is not desirable for this committee to meet with the joint committee. Another point on the reinforced concrete work that was assigned to the Masonry Committee, was to complete the work on reinforced concrete structures. This matter is tied up with the financial capacity of the organization to furnish funds to make tests of earth pressures, and for that reason this sub-committee has not presented a report. It is hoped that every man that has any facilities to furnish any data will furnish it to the Masonry Committee, and the committee in turn will get in contact with the American Society of Civil Engineers so as to get information on this important subject.

R. L. Humphrey (Con. Eng.): The Board of Direction accepted the invitation to become a member of the joint committee, and they have been co-operating in joint action. That committee has sub-committees at work and they are drafting further modifications of the report already prepared, with the hope of finishing their work at an early date. This matter of re-enforcement is under consideration by that joint committee, which is composed of committees of the American Society of Civil Engineers, the American Society for Testing Materials, and of this Association. It would seem to me that it would be desirable that the Board of Direction be asked to reconsider the action that it was undesirable to further co-operate. I would suggest the desirability of referring this matter of re-enforcement of concrete and the continuation of the representation on the joint committee on concrete and re-enforced concrete to the Board of Direction for their consideration.

The President: It will be handled in that way.

WOODEN BRIDGES AND TRESTLES

The following subjects were assigned:

(1) Continue study of relative economy of repairs and renewals of wooden bridges and trestles.

(2) Report on design of docks and wharves.

E. A. FRINK,
Chairman Committee on Wooden Bridges and Trestles.

(3) Report on developments in practice of ballast deck trestles since previous report.

(4) Report on use of lag screws for fastening guard timbers.

RELATIVE ECONOMY OF REPAIRS AND RENEWALS OF WOODEN BRIDGES AND TRESTLES.

During the current year the sub-committee sent to various railroads letters containing questions bearing upon the method of repairs and renewals of wooden bridges and trestles. Numerous replies to these have been received, showing a varity of information and practice. The committee has given these replies proper consideration, and as a final report, recommends the following conclusions:

It is good practice to repair wooden bridges and trestles by parts until such time as the general condition of the structure requires entire renewal.

DESIGN OF DOCKS AND WHARVES.

During the past year the committee has collected considerable material showing many forms of docks and wharves, and much variety of practice. It is the intention to carry this

study still farther and attempt to develop a type or types of structures that may be recommended as suitable for general use; recommendations to be confined to sub-structures or up to the dock or float level, and to consider both all-timber and combinations of timber and concrete designs. The committee therefore reports progress and recommends continuing this subject for the following year.

DEVELOPMENTS IN PRACTICE OF BALLAST DECK TRESTLES SINCE PREVIOUS REPORT.

No important developments have occurred since the filing of the committee's report in 1908. The oldest creosoted timber ballast deck trestles in service have not yet begun to fail, nor have other than very minor renewals been necessary, notwithstanding the fact that some structures have been in service 18 years. The consensus of opinion of railway officers having most extensive experience with this class of bridges indicates that the serviceable life will doubtless extend over a period of 20 or 25 years, depending on soil and climatic conditions. These officers are unanimous in conceding the advantages of these structures, while some consider the disadvantages unduly magnified, especially with reference to the difficulty of securing properly treated timbers. Two general designs of structures of this type continue prevalent, viz., the solid stringer-floor design and the open stringer-floor plank design. In certain districts where it is economical to use deep stringers with correspondingly long spans, the open stringer and floor-plank deck requires less material than the solid-stringer floor and possesses the advantage of less expensive renewal of bents should the deck outlive the substructure. Two of the largest users of ballast deck wooden trestles have changed their standards so as to provide for an open stringer and floor-plank deck in lieu of the solid stringer deck. Both these railways operate in districts where deep stringers are readily obtainable. In certain other districts it is impossible to obtain large timbers at a reasonable price and therefore it is imperative to use shallow stringers and short spans, thus making the solid-stringer floor economical. The next few years should determine with fair accuracy the actual length of life and the annual expense of maintenance of these structures.

While only a limited number of inquiries were sent out, the replies received indicate the cost of ballast deck wooden trestles to be from 40 to 50 per cent of that of reinforced concrete trestles, from which fact it would appear that the construction of reinforced concrete trestles might not be entirely justified in all cases. The committee therefore begs to recommend that for next year's work it will report on the relative merits of ballast deck wooden trestles as compared with reinforced concrete trestles, and at the same time be relieved from further work in connection with the subject at hand, since no important developments in practice of ballast deck wooden trestles are likely to occur within the next few years.

USE OF LAG SCREWS FOR FASTENING GUARD TIMBERS.

In July, 1914, the committee issued a circular to the various railroads making inquiry regarding the present practice of the use of lag screws in fastening guard timbers to ties on wooden and metal bridges. One hundred and five replies were received, but of this number, only 19 per cent had ever used lag screws for this purpose on wooden deck bridges and 16 per cent on steel bridges. Almost without exception, the roads or systems using them reported satisfactory results from their use. Generally, where objections were offered, the reason was assignable to a faulty application, such as boring the hole only a small distance or not boring at all; depending on driving the lag screws and expecting them to remain tight. Too small sizes and spacing at too great intervals was another reason, in the opinion of the committee.

On October 31, 1914, at a meeting of the committee in Chicago, the data obtained from the circular was discussed, and it was decided to continue the investigation regarding the use of lag screws. Another circular was prepared and submitted to the various railroads throughout the country on January 2, 1915.

Seventy-five replies were received in answer to this second circular. Thirty-three roads replied they had never used lag screws at all for the purpose named, 13 had used them with success, 3 had used them without success, and 21 did not state definitely what experience they have had with them. Thirty-eight of the replies indicated that the subject was worthy of a trial, 9 stated it was not worthy, and 25 did not express any opinion on the matter. Thirty-three expressed their willingness to give them a trial upon the recommendation of the committee, 10 were doubtful, and 15 stated they would not make further trial.

The committee now recommends and urges that a further trial be made of the use of lag screws to fasten guard timbers to ties on wooden and steel bridges by such roads as have signified their willingness to give them a further trial.

The committee would recommend in this test that ties and guard timbers be sized one dimension at the mill and that the dapping of ties and guard timbers be omitted; that alternate ties be fastened to the stringers, and a lag screw be used to fasten the guard timber to each tie. Holes should be bored full depth and lags screwed into place.

The committee recommends that this subject be continued.

E. A. Frink (S. A. L.), chairman; W. H. Hoyt (D. M. & N.), vice-chairman; H. Austill, Jr. (M. & O.), J. E. Barrett (L. & H.), H. C. Brown, Jr. (I. C.), E. A. Hadley (M. P.), F. G. Hoskins (B. & O.), H. S. Jacoby (Cornell Univ.), A. O. Ridgway (D. & R. G.), I. L. Simmons (C. R. I. & P.), D. W. Smith (H. V.), W. F. Steffens (N. Y. C.).

Discussion on Wooden Bridges and Trestles.

The report was presented by Chairman Frink.

The first subject was adopted to be printed in the Manual.

The second subject was accepted as a progress report and the subject was continued.

Chairman Frink: We find that no developments have been made in the design of ballast deck trestles. They are still of the two principle types, the solid floor structure, made of stringers, packed tight against each other, and what you might call the open floor structure, with stringers separated and floored over with plank. During the investigation we have developed information which leads us to think that it would be well to investigate the comparison of cost and the justification of the building of concrete trestles as compared with ballast decked trestles. With the permission of the Board of Direction the committee would like to pursue this inquiry along these lines during the following year.

The President: The Board of Direction will take cognizance of the report of the committee and it will be considered.

Chairman Frink: The fourth subject has been given more investigation and study during the year than any of the other subjects. We find the vast majority of the roads that have used lag screws report in favor of their use. It would appear that there is little benefit to be expected from adopting lag screws as against bolts; but one of the principal reasons for using lag screws is that combined with their use you do no dap over your guard rail or your ties.

The President: The report of the committee will be received as progress.

G. H. Gilbert (C., N. O. & T. P.): As I understand it the use of lag screws eliminates the cost of dapping. The Queen & Crescent has not within the last few years dapped the guard rail, but uses $\frac{5}{8}$-in. bolts for each tie.

Chairman Frink: With the use of lag screws every tie is held in place and every fourth tie is held in place by drift bolting. If the road wishes to spike every tie to the stringer that will make them so much more secure, but in the experience of the last eight years that we have on the Seaboard, we never had a case of derailment on a trestle that bunched the ties.

Hunter McDonald: For the past twelve years on our line we have never dapped any guard timbers. We have applied them creosoted and sized, used lag screws, and we have never had a case of bunched ties, that I know of, in the case of a derailment.

The President: The report will be received as a progress report and the subject will be continued.

H. S. Jacoby (Cornell Univ.): I am unfamiliar with the reason which led the committee to recommend that the principles of pile driving, Paragraph 15, be omitted. There is a recommendation to omit the words, "the weight or," and to change the word "weight" to "size." It seems to me in view of the fact that we have concrete piles instead of timber piles, that we ought not to drop out that part of the principle which certainly must be recognized, that the weight of a hammer has some relation to the weight of the pile. I think without question that until in recent years the tendency was to use hammers which were too light; but now, with the increased use of concrete piles, we ought not to close our eyes to that important principle involved.

Chairman Frink: The reason that the committee made that change is as follows: Change the word "weight" of drop to drop, because we believed the drop automatically covered that, and we changed the "weight of pile" to "size of pile," because we thought it was a better way to determine the factor governing the length of the drop of the hammer.

J. R. W. Ambrose (Tor. Term.): This clause has become more or less of an axiom. If it is in order, I move its elimination entirely.

J. C. Nelson (S. A. L.): I wish to second Mr. Ambrose's motion to eliminate Paragraph 15. Another important feature is the character of the pile that you are driving. Our expe-

rience is that a pile of less weight, diameter or length, on certain classes of work, can be driven with much less drop of the hammer than another class. We use almost exclusively in our plain piles cypress, and we find that we can't drop a hammer anywhere nearly as high on a cypress pile as heart pine. Therefore, I think that clause ought to be eliminated entirely.

(The motion was carried and the other recommendations approved.)

GRADING OF LUMBER

The work this year has been devoted to an investigation of the grading rules of pine and hemlock lumber. The committee finds that the rules for northern pine and hemlock, which were adopted several years ago, are no longer standard. It has been found wholly impracticable to purchase lumber under the rules as they are at present printed in the Manual, and the committee is unanimously of the opinion that these rules should be rescinded. With the co-operation of the Northern Hemlock and Hardwood Manufacturers' Association, a new set of rules has been drawn up for hemlock, which the committee presents herewith for study and criticism during the coming year.

In addition to the work of the grading rules, the committee has considered the investigations which are being conducted for the purpose of more definitely standardizing the nomenclature of the southern pines. The committee has co-

H. VON SCHRENK,
Chairman Committee on Grading of Lumber.

operated with similar committees of the American Society for Testing Materials and manufacturers of yellow pine. It has been generally recognized for a number of years that the grading rules for southern yellow pine do not sufficiently define the quality of the wood. It has been generally acknowledge that there is no practical means for definitely distinguishing between longleaf pine, shortleaf pine, loblolly pine, etc., after timbers have once been manufactured from the trees. It is furthermore recognized that it makes little practical difference from what species of pine a structural timber is cut, so long as certain density requirements are met. With these considerations in view, a number of the pine manufacturing organizations and the United States government have been purposing revised rules for grading yellow pine timbers. These rules involve the omission of the terms "longleaf," "shortleaf," etc., and call all the pines "Southern pines." They then define the different grades of yellow pines according to density.

The committee also presented the three rules which have been suggested. It will probably be another year or so before the details concerning definite specifications can be worked out, but much active work is now being done by the Committee on the Grading of Timbers of the American Society for Testing Materials and the various manufacturing organizations interested.

We recommend that the present rules for white and Norway pine and hemlock, printed in the Supplement to the Manual, 1912, be rescinded. The committee suggests as subjects for investigation during the coming year:

(1) Further investigation of grading rules for white and Norway pines.

(2) The continuation of work on specifications for southern yellow pines, to be carried on in co-operation with the American Society for Testing Materials and other similar organizations.

(3) The formulating of specifications for timber to be treated, in co-operation with the Committee on Wood Preservation.

Dr. Hermann von Schrenk (Cons. Engr.), chairman; B. A. Wood (M. & O.), vice-chairman; W. McC. Bond (B. & O.), D. Fairchild (N. P.), A. J. Neafie (D. L. & W.), W. H. Norris (Me. C.), J. J. Taylor (K. C. S.).

APPENDIX A.

GRADING RULES FOR HEMLOCK LUMBER.

TO COVER HEMLOCK LUMBER PRODUCED IN WISCONSIN AND UPPER MICHIGAN.

General Instructions.

The principal objects to be sought in the formulation of these rules are to establish grades that will blend the slight characteristics incident to different localities in such a manner as to produce grades of equal quality and value, and so constructed as to be best adapted to the principal purposes for which hemlock lumber can be utilized.

1. The face side of the lumber is the side showing the best quality or appearance.

2. Defects in lumber should be distributed in proportion to the size of the piece. Long or wide pieces of the same grade may contain more and greater defects than shorter or narrower pieces. The same percentage should be observed in both long and short, wide and narrow.

3. Wane in lumber is a defect which cannot be described by rule with satisfaction, and therefore must be left to the judgment of the grader. The lowering of grade on the face side on account of wane should be governed by grade, width and defects in the piece.

4. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or mill work will prohibit an inspection for the adjustment of all claims, except with the consent of all parties interested.

5. Mixed width boards do not necessarily require as good edges as shiplap or dressed and matched stock of the same grade.

6. Planing mill work should be taken into consideration in all grades of dressed lumber, and its effect on a piece must be left largely to the judgment of the inspector.

7. The grade of partition shall be determined from its poorer side only, when the order specifies partition.

8. Lumber when worked shall be graded the same as the respective grades when in the rough.

9. Unless otherwise provided for, lumber worked two sides shall be graded from its better face; lumber worked one side shall be graded from its surfaced face.

Definitions of Defects.

Knots shall be classified as pin, small and large or coarse, as to size, and round or spike, as to form, and as sound, loose, encased, pith and rotton, as to quality.

A pin knot is sound and shall not exceed ½ in. in diameter.

A small knot is larger than a pin knot and shall not exceed 1½ in. in diameter.

A large or coarse knot is one of any size over 1½ in. in diameter.

A round knot is oval or circular in form.

A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

A sound knot is one solid across its face; is as hard as the wood it is in, and is so fixed by growth or position that it will retain its place in the piece.

A loose knot is not firmly set, but still retains its place in the piece.

A pith knot is a sound knot with a pith hole not more than ¼ in. in diameter.

An encased knot is one surrounded wholly by bark or pitch.

A rotten knot is one not as hard as the wood it is in.

Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

A small pitch pocket is one not over ⅛ in. wide.

A standard pitch pocket is one not over ⅜ in. wide, or 3 in. in length.

A large pitch pocket is one over ⅜ in. wide, or over 3 in. in length.

A pitch pocket showing open on both sides of the piece ⅛ in. or more in width shall be considered the same as a knot-hole.

Wane is bark, or the lack of wood, from any cause, on edge.

White or bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

In hemlock will often be found streaks or patches of red or brown discolorations, sound and firm, the presence of which does not weaken the wood, nor detract seriously from its utility. Water stain should not be confused with rot, being firm and strong, while rot is soft and decayed wood.

STANDARD SIZES FOR HEMLOCK.

Rough Lumber.

Piece Stuff.—Standard lengths for rough piece stuff are 4, 6, 8, 9, 10, 12, 14, 16, 18, 20, 22 and 24 ft. Standard widths are 4, 6, 8, 10 and 12 in. The standard thickness is 1⅞ in.

Boards.—Standard lengths for rough boards are 4, 6, 8, 10, 12, 14, 16, 18 and 20 ft. Standard widths are 4, 6, 8, 10 and 12 in. The standard thickness is 15-16 in.

Dressed Lumber.

Piece Stuff.—Standard sizes for piece stuff S1S1E are: 1¾x3¾, 1¾x5¾, 1¾x7¾, 1¾x9¾, 1¾x11¾.

Boards.—The standard thickness for inch lumber S1S is ⅝-in.

Flooring, Ceiling, Shiplap, Drop Siding.—Standard widths are: 3¼, 5¼, 7¼, 9¼ and 11¼ in. face. Standard thickness is ⅝-in.

Estimated Weights of Hemlock Lumber.

Per M Feet, Shipping Dry.

3-in. plank rough	3,000
3-in. plank and 4x4 to 8x8 S1S1E	2,700
3-in. plank, S4S or D&M	2,500
4x10 to 12x12, rough	3,500
4x10 to 12x12, S1S1E	3,200
4x4 to 8x8, rough	3,000
Thick D & better, S1S	2,500
Thick D & better, S1S1E	2,200
2-in. piece stuff, S1S1E	2,200
2-in. piece stuff, rough or S1E	2,500
2-in. piece stuff, S4S or D&M	2,000
1-in. boards, rough	2,400
1-in. boards, S1S or S2S	2,000
1-in. clear and select, S1S	2,000
Shiplap, D&M or drop siding	1,800
1x6 well tubing beveled edges	1,800
Sheathing lath	1,500
Lath	500
32-in. lath	300

Grading Rules.

Thick D and Better.—1. Thick D and Better shall be 4 in. wide and wider, 1¼ in., 1½ in. and dimension thickness.

2. This grade shall have sound, square edges, and be of the grade of Inch D Stock and Better on the face side, and not below the grade of Inch No. 1 Common on the back of the piece.

Boards and Strips.—There are six grades made in Boards and strips: Inch clear and select, inch D stock, No. 1 common, No. 2 common, No. 3 common and No. 4 common.

Inch Clear and Select.—1. Inch clear and select should be 4 in. and wider, and 8 ft. long and longer, not to exceed 10 per cent 8 ft. long.

2. This grade is especially adapted for interior finish and only the face, or best side, is expected to show, although some attention should be given to the back of the piece.

3. The face shall show no wane, but the back may show such an amount of wane or other defects as will not interfere with the use of the piece for finishing purposes.

4. No shake or season check shall be allowed on the face side, but a very little tight shake and checks that are not deep may appear on the back of the piece.

5. This grade will admit on the face side several tight pin knots not over ⅜-in. in diameter. In a 4 or 6 in., 12 ft. and longer piece, not more than three knots are admissible, and proportionately more in a wider piece.

6. A 10 or 12 in. piece, 12 ft. and longer, will not admit of more than three sound, firmly set knots, not to exceed ¾ in. in diameter. Narrower and shorter pieces will admit of fewer large knots, but not a combination of large knots and other defects.

7. Pieces 12 ft. and longer are admissible that will, with not more than 10 per cent of waste, produce two clear cuts each 4 ft. long or longer.

Inch D Stock.—1. Inch D stock shall consist of boards and strips below the grade of clear and select 4 in. and wider, and 8 ft. long and longer, not to exceed 10 per cent 8 ft. long, and must be of a sound and water-tight character.

2. All knots must be sound and firmly set. Red knots must not exceed 1¼ in. in diameter, and spike knots must not exceed in length one-fourth the width of the piece. Black knots must not exceed ¾ in. in diameter, and must be specially well set.

3. A 6-in. strip 12 ft. long shall not contain more than three defects of the extreme sizes. A wider or longer piece may contain relatively more of these defects; and narrower and shorter pieces relatively less. The general appearance of the piece must be taken into consideration.

No shake shall be allowed in this grade, but slight season checks and water stain shall not be considered defects.

5. This grade shall be suitable for sound drop siding, ceiling and flooring, and shall have a smooth appearance, especially on the edges.

Inch No. 1 Common.—1. The grade of No. 1 Common in boards or strips includes stock of a generally sound character.

2. Some shake is admissible.

3. Numerous knots, whether red or black.

4. Some water stain of a firm character.

Inch No. 2 Common.—1. Boards or Strips will admit of considerable shake.

2. Black, unsound knots.

3. Two or three good-sized knot holes, or more of small ones.

4. Streaks, or patches of discoloration, showing partial decay.

5. This grade can be safely recommended for general building purposes.

Inch No. 3 Common.—1. The defects may consist of excessive shake.

2. Very coarse, unsound knots.

3. Some soft rot.

4. Some cross checks.

Inch No. 4 Common.—4 In. and Wider, 4 Ft. and Longer. This grade includes all serviceable lumber below the grade of No. 3.

Piece Stuff or Dimension.—1. The grade of No. 1 Dimension will admit of shake that will not materially affect the strength of the piece.

2. Also knots, either black or red, that are well located and fairly sound.

3. Or some slight cross checks or sound water stain.

4. This grade, while admitting the above defects, must at the same time retain the element of strength required for any building purposes.

1. The grade of No. 2 Dimension includes stock not good enough to be classed as No. 1, and the defects admissible are of the same general character as the defects found in No. 1, except that they are more pronounced.

2. Considerable shake, large unsound knots, loose knots, knotholes and cross checks are all admissible in this grade, but not a serious combination of these defects in any one piece.

The grade of Merchantable is a combination of No. 1 and No. 2, consisting of approximately 50 per cent of each.

1. The defects of No. 3 Dimension are excessive shake, numerous knotholes, coarse, rotten knots or considerable rot.

2. This grade can be recommended for cheap, light construction.

No. 4 Dimension, 2x4 and wider, 4 ft. and longer, includes all serviceable dimension below the grade of No. 3.

Discussion on Grading of Lumber.

The report was presented by Chairman Von Schrenk.

The recommendation that the present rules for white and Norway pine and hemlock be rescinded was adopted.

Chairman Von Schrenk: The committee presents Appendix A as information, Appendix B is an extremely important matter, and these rules are suggested for the grading of southern pine lumber.

The President: The action proposed will be approved and the rules will be received as tentative rules. The committee is excused with the thanks of the convention.

ELECTRICITY

The following work was assigned:

(1) Continue the study of the subject of clearances.

(2) Report on the effect of electrolytic action on metallic structures and the best means of preventing it.

(3) Continue the preparation of a standard specification for overhead transmission line crossings.

(4) Continue the study of electrolysis and insulation and its effect upon reinforced concrete structures.

(5) Report on maintenance organization with relation to track structures.

CLEARANCES.

The sub-committee has been working in conjunction with the joint committee of the American Railway Association,

American Railway Engineering Association and American Electrical Railway Association on the subject of Clearances, and has submitted the following report, which was accepted by your committee and the recommendations concurred in:

G. W. KITTREDGE,
Chairman Committee on Electricity.

In the report of this sub-committee to the Electricity committee, and in the Electricity committee's report to the Association for 1913, it was stated that sub-committee on Clearances proposed to continue the study, in conjunction with other associations, and to make a recommendation changing the clearance line on Diagram "A," modifying the limiting clearance line FE for rolling equipment, to give additional space for automatic train stops or other permanent way structures.

We have investigated this question during the year and compiled information received from 196 railroads as to existing conditions of rolling equipment encroachment within the space under consideration. One hundred and forty of these replies show no encroachment.

This information was laid before the Joint committee, and the following resolution was adopted:

"That the limiting clearance line for rolling equipment, as adopted by the American Railway Association, should be changed so that the points FE2½/15 and GE O/15 become FE 2½/6 and GE O/6."

TRANSMISSION LINES AND CROSSINGS.

There has recently been organized a standing "National Joint Committee on Overhead and Underground Line Construction" composed of representatives from 14 associations and companies as follows: American Railway Association, American Railway Engineering Association, Railway Signal Association, Association Railway Telegraph Superintendents, American Electric Railway Association, National Electric Light Association, American Institute of Electric Engineers, American Electric Railway Association, American Telephone & Telegraph Company, United States Bureau of Standards, Independent Telephone Association of America, Western Union Telegraph Company, Postal Telegraph Company and the National Fire Protection Association.

Sub-committees have been appointed on (1) Underground and Undergrade Crossings, (2) Crossings of Electric Wires Over Electric Railway Tracks, and (3) Crossings of Trolley Contact Wires.

The sub-committee on Transmission Lines and Crossings has been working through its representation on the National Joint Committee to the end that uniform action may be ob-

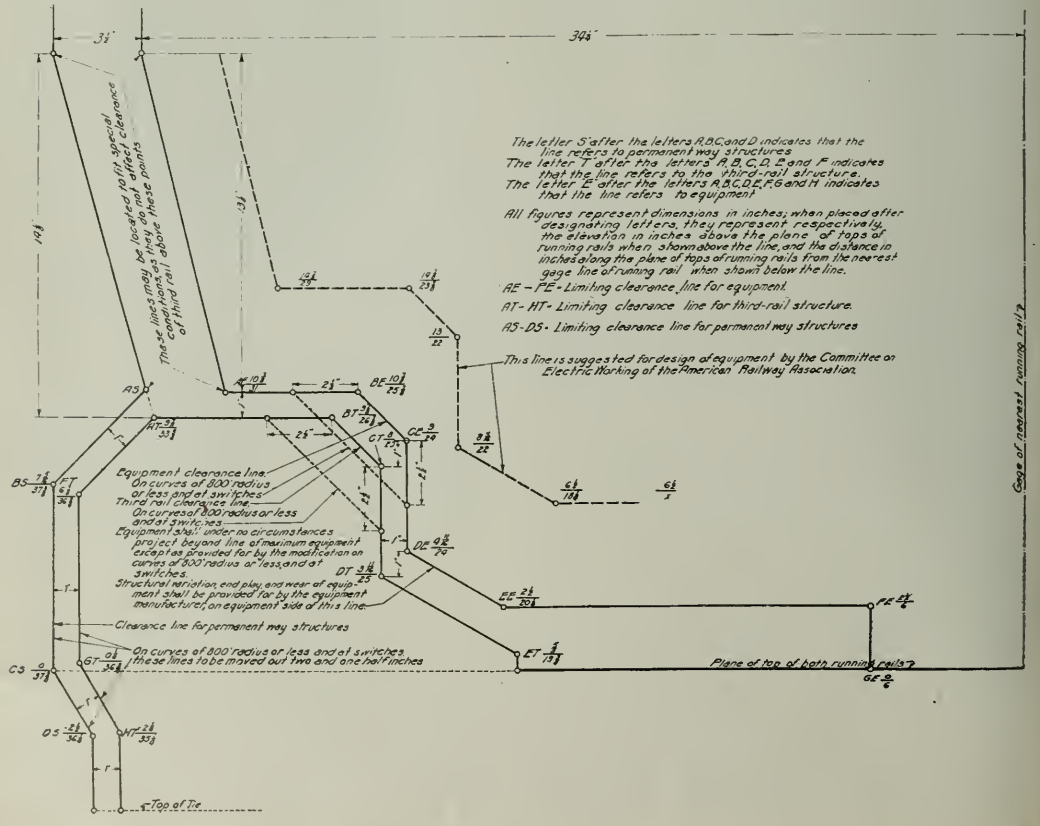


Diagram A, Showing Recommended Clearance Line for Equipment and Structures Adjacent to Third Rail.

tained by all associations on the present, as well as all future specifications. It is the hope and intention to submit new specifications when and after their adoption by the National Joint Committee.

The sub-committee recommends the adoption, as a new specification, of the "Specification for Crossings of Wires or Cables of Telegraph, Telephone, Signal and Other Circuits of Similar Character Over Steam Railroad Rights-of-Way, Tracks, or Lines of Wires of the Same Classes." This specification has already been adopted by the Association of Railway Telegraph Superintendents, the American Railway Association, the Western Union Telegraph Co., the Postal Telegraph Co. and the American Telephone & Telegraph Co.

The sub-committee recommends the substitution of the revised edition of the "Specifications for Overhead Crossings of Electric Light and Power Lines," in place of that adopted in 1912. The changes, while rather numerous, are not of great moment, but since this revised edition has already been accepted by the American Electric Railway Engineering Association and the American Railway Association, it is advisable that uniform action be maintained.

The joint committee, as a whole, is working on the revision of the wire crossing specification.

RECOMMENDATIONS.

(1) The committee recommends for adoption by the Association and publication in the Manual Diagram "A," "Recommended Clearance Lines for Equipment and Permanent Way Structures Adjacent to Third Rail and for Third-Rail Structures."

(2) The adoption of the "Specification for Crossings of Wires and Cables of Telegraph, Telephone, Signal and Other Circuits of Similar Character Over Steam Railroad Rights-of-Way, Tracks, or Lines of Wires of the Same Classes."

(3) The adoption of the revised edition of the Specification for Overhead Crossings of Electric Light and Power Lines, with the understanding that the National Joint Committee will take up the question of the additions or changes in this specification previously suggested by this Association at its 1912 convention.

The committee recommends that representatives continue to serve on the National Joint Committee on Electrolysis and on the National Joint Committee on Overhead and Underground Line Construction.

It is also recommended that the statistical data furnished by the sub-committee on Clearance be added to from year to year and kept up to date, and that consideration be given any new information that may develop in reference to maintenance organization and relation to track structures, and asks for such other instructions as seem necessary or desirable.

George W. Kittredge (N. Y. C.), chairman; J. B. Austin, Jr. (L. I.), vice-chairman; D. J. Brumley (I. C.), R. D. Coombs (Cons. Engr.), A. O. Cunningham (Wabash), Walt Dennis (C. R. I. & P.), J. H. Davis (B. & O.), George Gibbs (Cons. Engr.), G. A. Harwood (N. Y. C.), E. B. Katte (N. Y. C.), C E. Lindsay (N. Y. C.), W. S. Murray (Cons. Engr.), W. L. Morse (Jacksonville Terminal), J. A. Peabody (C. & N. W.), Frank Rhea (I. C. C.), J. W. Reid (C. & A.), A. E. Robinson (A. T. & S. F.), J. R. Savage (L. I.), A. G. Shaver, Martin Schreiber (P S. R.), H. U. Wallace.

Discussion on Electricity.

The report was presented by E. B. Katte.

E. B. Katte: The report of the committee is largely one of progress. The first recommendation relates to the clearance diagram for third rail, and the committee recommends the adoption of the recommendation by the association for publication in the Manual.

The President: If there is no objection the recommendation will be published in the Manual.

E. B. Katte: The second recommendation is in a way new matter. It relates to specifications for crossings of wires and cables over steam railroad rights-of-way, etc.

J. C. Nelson (S. A. L.): Are these specifications for crossings those adopted recently adopted by the American Railway Association?

Mr. Katte: Yes.

The President: If there is no objection, this recommendation will be approved.

Mr. Katte: The third recommendation pertains to certain revisions and modifications in the existing specifications for overhead crossings of electric light and power lines, for overhead transmission line wires of higher voltages. They have already been approved by the American Railway Association, and by the American Electric Railway Engineering Association.

The President: There is a modification of the specification apparently contemplated in the future, and the chair would ask the committee as to the intent of its recommendation—is it intended to take the revised portion of the specification as submitted without change, and have that incorporated in the Manual, with the idea that it will be changed in the specification before it goes into the Manual?

E. B. Katte: The committee does not recommend this publication in the Manual.

The President: If there is no objection, this revised edition of the specifications will be approved. The other two recommendations will be referred to the Board of Direction, which will decide what is to be done in both cases. I hardly think they are subjects for the convention itself to pass on.

(The committee was excused.)

YARDS AND TERMINALS

The Board of Direction outlined the work for 1914 as follows:

(1) Report on typical situation plans of passenger stations, of both through and stub types, with critical analysis of working capacity, and include a review of the different methods of estimating their capacity.

E. B. TEMPLE,
Chairman Committee on Yards and Terminals.

(2) Report on developments in the handling of freight by mechanical means.

(3) Report on developments in the design and operation of hump yards.

(4) Continue study of track scales.

REVISION OF MANUAL.

Definitions.

COACH YARD—A yard in which passenger cars are assembled, separated or prepared for service.

INTERCHANGE TRACK—A designated track on which cars are delivered and received, as between railroads.

General Requirements of Yards and Terminals.

SCALE TRACKS—Scale tracks should be so located that weighing can be done with least delay and without drilling over same; where many cars are to be weighed they should pass separately over the scale by gravity, being weighed while in motion.

REPAIR TRACKS—These tracks should preferably be connected at both ends and have a maximum capacity of about 15 cars each, spaced alternately 16 ft. and 24 ft. center to center and be connected conveniently to bad-order tracks.

Hump Yards.

(2) T hump yard is a desirable form of yard for receiving, classifying and making up trains because a greater number of classifications can be made in less time and at less cost than through any other form of yard.

"(7) Rider track should, if possible, be provided through center of classification yard running to summit of hump, independent of other yard movements, thereby avoiding hazard of personal injury to car riders and reducing the number of car riders to a minimum."

Yard Lighting.

(1) For yard lighting the use of nitrogen lights of 1,500 watts capacity, equivalent to about 2,200 candlepower, is recommended.

TYPICAL SITUATION PLANS OF PASSENGER STATIONS.

The work of the Committee on this subject was devoted to a study of the newly-completed passenger terminal at Kansas City, Mo., and the methods of studying the capacity and train movements at this station were described.

DEVELOPMENTS IN THE HANDLING OF FREIGHT BY MECHANICAL MEANS.

The main work of the committee has been an inquiry as to improved methods which have been or might be introduced to increase the capacity, rapidity, or efficiency of the work, and to effect a reduction in its cost. This includes both hand trucks and motor trucks, the latter, of course, being one system of mechanical handling.

Two things appear to be evident: (1) More attention is being given to the efficiency of freight-house operation; (2) there is a growing opinion in favor of the use of motor trucks.

The question of improved methods and trucking at any particular freight house must be considered in relation to the other facilties and the local conditions. While the freight house should be of sufficient size for the handling of its tonnage, it should be compact to avoid unnecessary length of trucking. In general, for an outbound freight house, a short house with several tracks tends to economy and rapidity of work (as compared with a longer house and fewer tracks), since it reduces the length of trucking distance. For an inbound house, a wide house, giving plenty of floor space, tends to economy and rapidity of trucking, as it avoids the necessity of piling the freight high and allows quicker location of freight for delivery.

It has been suggested that new freight houses should be planned with a view to the eventual use of mechanical handling. But it is not easy to see how this can be done, except by providing a minimum of column supports which might be obstructions to motor trucks or converyors. As noted later, clear space for movements is essential to good service with motor trucks.

In regard to mechanical conveyors for freight, it may be noted that the municipal wharf on the Missouri river at Kansas City, Mo., has a shed 300 by 40 ft., with two telpher tracks carried by the roof trusses and extending laterally through the building near each end. Along the front of the wharf is a track for an electric locomotive crane, which can take freight from the steamers or barges and deposit it at any point, or place it within reach of the telpher carriers.

This telpher equipment has not proved satisfactory and it is not believed that any such equipment could reduce the cost of handling the freight when it has been landed on the wharf in front of the doors of the warehouse. The house is narrow (40 ft.), with a continuous line of doors on both sides, and it is found simpler and cheaper to take the freight into the warehouse and across to the wagon side by hand trucking than by any form of telpher. In a warehouse of larger area and with packages of uniform size the telpher might be economical.

The equipment has been handled enough to thoroughly test it, but it is now used only when large and heavy pieces are moved from the wharf side of the warehouse directly through the house and loaded onto a wagon, as there is no crane equipment which will do this work. The equipment works satisfactorily, but it is thought that a lighter and speedier telpher would be used more frequently. The greatest cost in unloading barges and boats is in getting the freight from the boat onto the wharf, and this seems to be accomplished very easily by means of the locomotive crane. It is probable that an inclined chain package conveyor will be installed to handle small pieces and miscellaneous freight at this wharf.

The electric motor truck is increasing in favor and is of special advantage under proper conditions. As a freight carrier it is of use particularly where the commodities come in large lots, and where the freight house is so constructed as to give ample running room. A good and even floor is important also.

The electric freight trucks are adapted to the work at transfer houses as well as at ordinary freight houses. One point for consideration is as to their comparative advantages in freight houses where wagons deliver at a single doorway, and houses where they deliver at numerous doorways along the side of the house. Another point is that the increased speed of the trucking, with power trucks, tends to speed up the work of loading, unloading and stowing freight.

A particular point of interest in regard to these trucks is that some men consider them of most value when used as motor cars to haul trailer cars, rather than when operated as single independent units. This gives greater flexibility and facility of distribution. For the most efficient operation of motor trucks when thus used as tractors, it is necessary to have a sufficient equipment of four-wheel or six-wheel trucks to be used as trailers.

Some figures as to the cost of operation with electric trucks are given below.

A road operating 50 electric trucks states that an actual test by its electrical engineer indicates the following expense for maintenance and current consumption for these trucks

STATEMENT SHOWING COMPARISON OF OPERATING CONDITIONS IN ONE HUMP YARD AND TWO FLAT YARDS.

Month of August, 1914

Questions Asked	Yard A (Hump) Eastbound hump-double track Westbound hump-double track	Yard B (Flat)	Yard C (Flat)
(1)—Percentage of south or east bound traffic ..	64 per cent. loads. .... 36 per cent. empties .	69 per cent. loads.. 31 per cent. empties	87 per cent. loads. 13 per cent. empties.
(2)—Percentage of north or west bound traffic...	71 per cent. loaded 29 per cent. empties.	55.8 per cent. loads. 44.2 percent empties	65 per cent. loads. 35 per cent. empties.
(3)—Character of south or east bound loads ..	Fresh meat, live stock, live poultry, fruit, dairy and other food products, machinery, merchandise, grain, mill products, raw and finished coal and coke.....	Fresh meat, perishable merchandise, grain, flour, stone, coal, coke, etc...	Fruit, potatoes, sugar, vegetables, asphalt, cement, coal, flour, grain, hay, lumber, live stock, etc.
(4)—Character of north or west bound loads ..	Live stock, fruit, vegetables, merchandise, mill products, raw and finished machinery, coal, coke, limestone and ore.....	Perishable groceries, merchandise, lumber, sling, etc.	Automobiles, beer, furniture, machinery, fresh meat, merchandise, cement, coal, etc.
(5)—Number of loaded cars handled during the month.....	102,734 loaded cars (a)	96,903 loaded cars (b).....	43,341 loaded cars (e)
(6)—Number of empty cars handled during the month.....	53,692 empty cars (a).	68,720 empty cars.	13,037 empty cars (e).
(7)—Number of cars weighed during the month.....	10,852 cars weighed ..	2,696 cars weighed	6,275 cars weighed.
(8)—Maximum number of cars handled during 24 hours.....	4,998 cars (3,962 over humps) (h).....	2,976 cars (h).....	1,537 cars (h).
(9)—Maximum number of cars handled during any one hour.....	632 cars.....	450 cars.....	316 cars.
(10)—Number of cars classified	211,760 cars (c)	79,081 cars	83,832 cars (e).
(11)—Cost per car	23.76c per car (d).....	21.34c (d)	63.01c per car.
(12)—Rental of engines.....	$1.64 per hour (f).....	$1.09 per hour (g)..	$1.09 per hour (g)..
(13)—Cost of air.....	$258.77	$4.51	$523.73.
(14)—Cost of lighting.....	$ 76.39	$97.08	$361.88.
(15)—Cost of supplies.....	$96.00.....	$33 45.....	$148.70.
(16)—No. of cars damaged..	78 cars	60 cars	31 cars.
(17)—Cost of damage to cars	$1,854.59	$241.29.....	$359.50.
(18)—Are trains departing from yard made up in station order ..	With exception of 2 divisions set off trains are not made up in a station order—all trains are made up to embrace districts affording the longest haul to the break up point.....	Yes.....	All trains are made up in station order, except drag trains which handle dead freight exclusively and empties.
(19)—Estimated cost of duplicating yard, exclusive of grading, bridges and buildings	$750,000.00.	$329,200.00.....	$554,180.96.

EXPLANATORY NOTES.

(a) These cars are counted only on entering the yard—cars departing from yard are not counted

(b) 53,737 loads entering and leaving yard; 43,166 loads switched to and from local industries; total, 96,903.

(c) Report showed 105,880 cars entering Yard A from either east or west, and were counted but once. For comparative purposes this amount was doubled, as cars switched in Yard B were counted on entering as well as leaving the yard.

(d) These figures include cost of yardmasters and assistants, switchmen, towermen, clerks, car riders, car inspectors, switch tenders, weigh masters, engineers, firemen, engine rental, cost of supplies, including power, air, light, heat, etc. General office or administration expense not included.

(e) Cars are counted entering as well as leaving yard.

(f) At Yard A the cost of engine rental is made up as follows:

Cost per 100 locomotive miles run for repairs of locomotives, including replaced locomotives.....	$18.29
Cost per 100 locomotive miles run for fuel yard locomotives.....	5 26
Cost per 100 locomotive miles run for lubricants for locomotives (yard and road)	.29
Cost per 100 locomotive miles run for other supplies for locomotives (yard and road)	.40
Cost per 100 locomotive miles run for engine-house expenses (yard and road)....	3.07
Total cost per 100 locomotive miles run	$27 31
Average per mile.....	.2731
Average per hour, based on 6 miles per hour for yard engines.....	1 64

(g) Cost of engine rental at Yard B was figured at $5.00 per day, and Yard C at $24.00 per 24 hours.

For comparison purposes committee figured it as follows:

Cost per 100 locomotive miles run for repairs to locomotives including replaced locomotives.....	$18.29
Average per mile.....	.1829

Figuring 6 miles per hour for yard engines makes the cost 1 09 per hour as shown

Fuel, lubricants, other supplies and engine house expenses are not included in engine rental, as they have been included in general expense.

(h) These cars counted but once.

NOTE—The comparatively high cost of handling cars in Yard "C" is accounted for by the fact that wages paid in Yard "C" are higher than in Yard "B."

Also due to the fact that extra expense, was incurred in Yard "C" handling cars to and from other railways and the stock yards

Comparison of Yard Operation

working in the aggregate 48,000 hours in an approximate period of 12 months:

Labor and material	$3,630.90
Cost of current, 48,000 hours at 3.3 cents per hour	1,613.70
Cost per truck	104.89
Cost per truck per month	8.74

A report by the same road on the operating cost for handling freight with electric trucks, as compared with hand-truck operation, is as follows:

Eastbound.	Tons Handled by Electric Trucks.	Electric Trucks (Cts. per ton).	Hand Trucks (Cts. per ton).
Vessel to dock	24,050	19.25	29.23
Dock to car	12,383	11.38	13.15
		30.61	42.38
Westbound.			
Car to vessel	2,452	21.15	30.30

The 50 trucks were not in operation during all the working hours of the 12-month period. In addition to this, labor trouble was experienced at this point during this time, which compelled the employment of labor unfamiliar with the work. It is evident that if the work had been done under more favorable conditions, the cost per ton would have been reduced further.

The costs shown above include only the expense of foremen, truck operators and laborers. The figures show also the tonnage handled at these costs during October, November and December, 1912. On account of the short period the electric trucks were in operation and the small amount of tonnage handled, it is considered that it would not be fair to the electric truck operation to include all the items of expense incurred at the time of their installation and during their brief use at this point as a basis for the average cost per ton of handling freight.

The electric trucks were transferred to a transfer station in February, 1914, and the average results, based on the first seven months' operation (February-August, inclusive), are as follows:

	Average per Month.
Maintenance and repairs, including labor and material	$ 480.71
Cost of current	487.99
Labor expense, including foremen, checkers, truck operators, freight handlers, sealers and coopers	5,496.58
Interest on investment and depreciation of property	778.13
Total average expense per month	$7,243.41
Average number of tons handled per month	17,010 tons
Average cost per ton	42.58c
Average number trucks in use per month	47

In regard to electric trucks, the committee has the following statement from C. E. Taylor, secretary of the Local Freight Agents' Association of Chicago:

"All of the lines entering Chicago are still trucking freight by hand with the exception of the Chicago & Eastern Illinois and the Chicago, Burlington & Quincy. The former has three electric motors in use in the outbound house at Clark and Twelfth streets. The latter has seven electric motors in use in the outbound house at Harrison and Canal streets. Both lines are using these motors with trailers for trucking a large percentage of the l. c. l. freight which they handle at Chicago, but they als handle considerable quantities of freight with hand trucks. Each of these lines has demonstrated that the electric motors when used with a sufficient number of trailers, and when used in houses or on platforms which are adapted to their use, will result in a decrease in the cost of trucking freight as compared with the expense incurred in trucking exclusively by hand.

"It is generally conceded by freight agents who have given the subject much thought that the greatest benefit from electric motors as a means of trucking freight will be secured, not from the loading of freight on the motor, but by using the motor as a locomotive to pull trains of trailers. Under favorable conditions one of these motors can pull from six to ten four-wheel or six-wheel trucks heavily loaded, and by using the motors in this manner a very satisfactory decrease in average cost per ton for trucking freight can be secured."

DEVELOPMENTS IN THE DESIGN AND OPERATION OF HUMP YARDS.

Former reports have dealt more directly with the design of hump yards. This year it was thought desirable to obtain data covering the operation of a typical hump yard, as compared with a typical flat yard, preferably with a similar character of traffic.

One hump yard and two flat yards were selected for purposes of comparison. In the report the hump yard is referred to as "Yard A," and the flat yards as "Yards B and C." Statements were attached showing a comparison of the various features of the three yards. The figures were for the month of August, 1914, and represent the actual operating conditions and costs for each of these yards.

At yard A cars were counted only on entering yard. Cars leaving yard were not counted. At yards B and C cars were counted entering, as well as leaving the yard. On this account 211,760 cars are shown as handled in yard A at a cost of 23.76 per car, instead of 105,880 cars (actual) at a cost of 47.43 cents per car.

The committee thought it desirable to show cost of switching each cut of cars, as well as each car. The value of this information is apparent in making comparisons between two yards, as one road might average two cars per cut, and another road five cars per cut.

It was also thought desirable to itemize the cost per car for salaries of yardmasters, assistants, engineers, firemen, switchmen, towermen, clerks, car riders, car inspectors, switchtenders, weighmasters, etc., as well as cost of supplies, power, air, light, heat, etc., the total cost of each item per car to equal the total cost of switching per car. The cost of switching per cut of cars is shown for Yard A.

In this report, however, the committee was unable to distribute each item of expense on a car basis, but hopes to be able to do this in the future, as well as to show the cost of switching each cut of cars.

This year the committee also considered typical plans of turnouts on ladders. A member of the committee submitted plans of different track layouts over humps and ladders. The subject will be carried over and a further study made next year.

The committee suggests that the engine employed on the approach to the hump be of sufficient power to handle from a start the maximum train received in the yard.

TRACK SCALES.

Progress has been made on this subject, and the committee has under consideration the report adopted by the American Railway Association in 1913. A few important changes and several minor ones have been suggested. It is the desire of the committee, before making final recommendations on this subject, a very careful and full discussion shall be indulged in, and, with the approval of the Board of Direction, this committee will confer with the proper committee of the American Railway Association on an approved set of track scale specifications and rules.

SUGGESTIONS FOR NEXT YEAR'S WORK.

(1) Continue study of typical situation plans of passenger stations and approaches and methods of operating same.

(2) Report on handling of freight in double-deck freight houses, with cost of operation.

(3) Continue study of classification yards:

(a) Unit costs of operation of typical hump and flat yards.

(b) Yard lighting.

(c) Power vs. hand-operated switches in hump yards —advantages and disadvantages.

(4) Continue study, and, if possible, make report on track scales.

E. B. Temple, chairman (P. R. R.); B. H. Mann, vice-chairman (M. P.); W. G. Arn (I. C.), H. Baldwin (C. C. C. & St. L.), G. H. Burgess (D. & H.), A. E. Clift (I. C.), L. G. Curtis (B. & O.), H. T. Douglas, Jr. (C. & A.), A. C. Everham (K. C. T.), R. Ferriday (C. C. C. & St. L.), G. H. Herrold, D. B. Johnston (P. L. W.), H. A. Lane (B. & O.), L. J. McIntyre (H. P.), A. Montzheimer (E. S. & E.), H. J. Pfeifer (T. R. R. or ST. L.), S. S. Roberts (Cons. Eng.), W. L. Seddon (S. A. L.), C. H. Spencer (I. C. C.), E. E. R. Tratman (Engineering News), E. P. Weatherly (K. C. T.), W. L. Webb (C. M. & St. P.), C. C. Wentworth (N. & W.), J. G. Wishart (C. R. I. & P.).

Discussion on Yards and Terminals.

The report was presented by B. H. Mann, vice-chairman. The reports on "typical situation plans of passenger stations," "developments in the handling of freight by mechanical means," and "developments in the design and operation of hump yards" were received as information and the report on track scales was referred to the Board of Direction.

The revision of the Manual was then taken up, changes being made in the following items:

C. Dougherty: With regard to the definition of an interchange track, will the committee make that "delivered or received"? The committee accepted the suggestion.

C. E. Lindsay: With respect to scale tracks, I suggest that in the second line it read, "drilling over scale."

B. H. Mann: The committee will accept that.

C. E. Lindsay: I repeat a request for the committee to study the subject of poling yards.

The President: That will be referred to the Board of Direction.

REGISTRATION—AMERICAN RAILWAY ENGINEERING ASSOCIATION

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Tordella, J., Div. Eng., B. & O. R. R., Garrett, Ind.
von Schrenk, Hermann, Dr., Con. Timber Eng., St. Louis, Mo.
Ziesing, A., President, American Bridge Co., Chicago, Ill.

GUESTS

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Buck, A. W., Div. Eng., Santa Fe Ry., Topeka, Kan.
Brandon, G. R., Whiting Foundry Equipment Co., Harvey, Ill.
Crawford, C. H., Asst. Eng., Nashville, Tenn.
Chamberlin, C. H., Ch. Eng., Texas & Pacific Ry., Dallas, Tex.
Dickson, G. H., Eng., T. & N. O. Ry., North Bay, Ont.
Gallary, John D., Supt., N. Y., N. H. & H. R. R., New Haven, Conn.
Lazenby, P. H., Engr., Chicago Plan Commission, Chicago, Ill.
Lozier, W. L. Res. Eng., D. L. & W. R. R., Kingsley, Pa.
McConnell, Elmer, A. T. & S. F. Ry., Marceline, Mo.
Neptune, W. M., Asst. Engr., Missouri Pacific Ry., St. Louis, Mo.
Nelson, W. O., Dist. Bridge Insp., B. & O. R. R., Wheeling, W. Va.
O'Connor, John A.
Olson, O. M.
Reasoner, Mark H., Asst. Supv. Stations, M. St. P. & S. S. M. Ry., Minneapolis, Minn.
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Swartwout, W. B., Contracting, Milwaukee, Wis.
Thomson, W. B., Val. Eng., Wheeling & Lake Erie R. R., Cleveland, O.
Thorp, J. N., Jr., Eng. of Tests, Erie R. R., Jersey City, N. J.
Worley, John S., Member Engineering Board, Interstate Commerce Commission, Kansas City, Mo.
Wait, B. A., Asst. Engr., Chicago, Rock Island & Pacific Ry., Estherville, Iowa.

CHICAGO & NORTH WESTERN ROADMASTERS' MEETING

A meeting of the roadmasters of the Chicago & North Western—one of their regular meetings—was held yesterday at the general offices. A number of questions relating to track maintenance were reported on and discussed. The time of meeting and the location made it possible for the roadmasters to attend the convention and exhibit. In the past it has been customary for the assistant general manager to act as chairman of this meeting, but in this case one of the roadmasters was elected temporary chairman. The gathering took the form of an experience meeting, and labor problems, spring and summer work and other maintenance topics were discussed.

HIGHWAY CROSSING SIGNALS WITH MOVING ARMS AND LIGHTS

Many of the visitors at the exhibit commented on the large number of highway crossing signals with moving lights or moving arms which were exhibited this year. In all, there were 48 highway crossing signals shown by six companies, of which 18 had either moving arms, moving lights or both. The rest of the signals were standard types with crossing bells. This is a large increase in the number of these signals over any previous year.

RESOLUTIONS

The following resolutions were adopted in the closing business session of the convention yesterday afternoon:

Resolved, That the Board of Direction be requested to consider a working plan by which the conclusions of certain other associations working along the same lines of research as ours may receive the endorsement of this association without discussion in detail by its conventions.

Resolved, By the members of the American Railway Engineering Association, in convention assembled, that we desire to place on record our appreciation and extend our hearty thanks to Mr. Charles S. Gleed, Sir George Foster, Mr. Frank L. Mulholland and Mr. Benj. Baum, for their admirable and instructive addresses at the annual dinner; to the National Railway Appliances Association for the instructive and comprehensive exhibit of devices used in the construction, maintenance and operation of railways; to the technical press for the daily reports of the convention and useful information made available to the members; to the official reporters, Messrs. T. E. Crossman and G. W. Burgoyne, for their accurate and painstaking reports of this and previous conventions; to the tellers for their arduous labors in counting and tabulating the ballots for officers for the ensuing year, and to committee No. "23" on arrangements, for the highly successful arrangements made for the comfort and entertainment of the members and guests attending this convention.

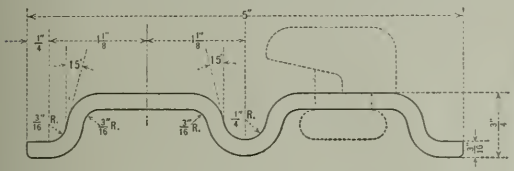
A LIGHT STEEL TIE

A steel tie designed for mine and industrial railroads and for light construction tracks has recently been placed on the market by the Cambria Steel Company, Johnstown, Pa. This tie is a rolled steel section, illustrated in the accompanying drawing, which is calculated to combine light weight with sufficient strength. The section illustrated, which is intended to carry 40 to 60 lb. rails, is 5 in. wide, ¾ in. deep and weighs 4 lb. per lin. ft. Two lighter sizes are also made, one for 16 to 45-lb. rail, which is 4 in. wide, ½-in. deep and weighs 2.16 lb. per ft., and one for 12 to 20-lb. rail, which is 2¼ in. wide, ½-in. deep and weighs 1.12 lb. per ft. The ties can be furnished for all gages from 30 to 54 in.

The rails are attached by flanged buttons permanently connected to the ties. These buttons are adjusted before shipment so that the friction will hold them in any position to which they may be turned. Solid wrenches are furnished for turning these fastening buttons in laying or removing rails, although ordinary adjustable or solid wrenches can be used equally well. A quarter turn with the wrench clamps each button on the rail, eliminating the driving of spikes and the adjustment of nuts. The fixed position of the button on the tie also automatically gages the rail. The fact that these

buttons are attached permanently to the tie avoids the possibility of loose or missing parts.

The light weight of these ties makes it possible to shift sections of track easily. A medium weight tie for 36-in. gage with fastenings complete will weigh about 10 lb., and short sections of track laid with such ties can be rapidly assembled and transferred, effecting a considerable saving in time for temporary light track work. The life of these steel

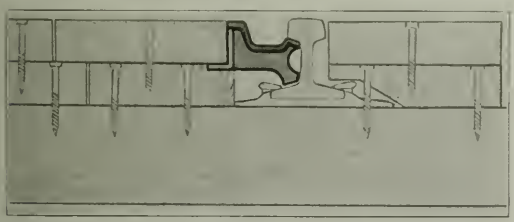


Section of the Slick Steel Tie.

ties depends largely, of course, on the conditions under which they are used, but in any event is doubtless greater than that of a wooden tie. The life of the ties may be further increased by a treatment with coal tar, asphaltum or similar coating applied by dipping the tie and fastening. The company is prepared to furnish ties so coated if desired.

A FLANGEWAY GUARD OF IMPROVED DESIGN

The Newhall flangeway guard, which is manufactured by the Cleveland Railway Supply Company, Cleveland, Ohio, is now being tested on a number of roads. This guard is so designed that when in place one side fits against the crossing plank or the pavement and the other side under the head of the running rail. It is held in position by the rail and the



Cross Section of Newhall Flangeway Guard with Planks.

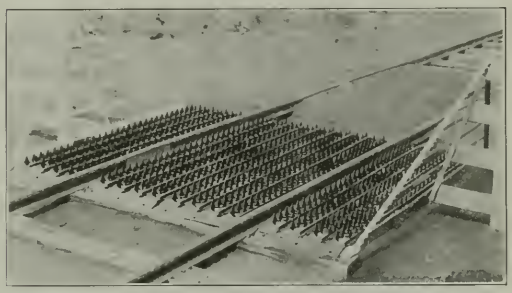
plank or pavement, no bolts or spikes being required. This rail is made of malleable iron in 4-ft. sections, which are securely interlocked. The flangeway provides the standard vertical clearance and the minimum longitudinal clearance necessary to avoid guard-rail action when the gage of track is ½ in. wide. The guard will not wear to a sharp edge, which is likely to cut automobile tires, nor can a horse's hoof be caught in it. The illustration herewith shows the general design and method of installation.

MASTER TRACK GAGE AND LEVEL

A new gage combining in one a standard track gage and level and a master gage for testing foremen's gages has recently been put on the market for the convenience of engineers, roadmasters and supervisors in checking up the gages of their men. This gage is made of seasoned hard maple finished in the natural color with brass caps on the ends forming the contact points. The standard gage includes a guard rail attachment and a graduated scale for measuring wide gage on curves and on the uppper side of the instrument are located the master gage and the level with adjustable bulbs and elevation slides. This device is manufactured by the Kalamazoo Railway Supply Company, Kalamazoo, Mich.

IMPROVED SURFACE CATTLE GUARD

The National Surface Guard Company, Chicago, manufactures a metal surface guard with high points punched from heavy plate, making it unusually severe on stock attempting to cross it and strong enough to prevent bending under the weight of an animal. This guard, shown in the accompanying illustration, is made of a high grade of open hearth steel, which is given a heavy coating of oil asphaltum paint. On account of the treatment given the metal and the ample

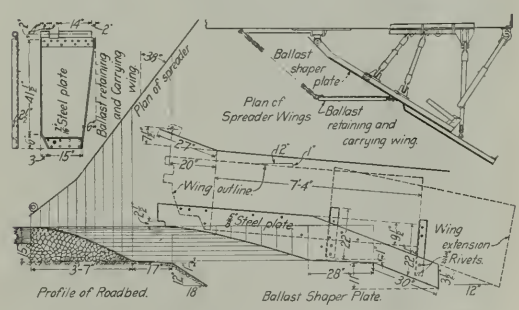


An Installation of the No. 10 National Surface Guard.

provision for drainage the liability to corrosion is greatly decreased. The points are approximately 2½ in. high and are assembled by so-called "thimbles," which raise the guard 2½ in. above the tie, forming a slight pit. In addition, it is recommended that one-half of the ballast be removed directly under the guard before its installation to provide a certain amount of oscillation under a load, considerably increasing its effectiveness.

SPECIAL WING FOR MANN-McCANN SPREADER

An attachment designed to spread the ballast to the standard roadbed section of the Chicago, Milwaukee & St. Paul has been developed and applied to a Mann-McCann ballast spreader in use on this company's lines in Montana. By the use of this wing the gravel ballast unloaded along the track has been spread and properly shaped at the rate of one mile in 20 minutes. This wing is also equipped with a ballast retaining and carrying wing with a capacity of 2½ cu. yd., which picks up the excess ballast and automatically feeds it out under its lower edge at points where there is an insufficient quantity. Such points are ordinarily



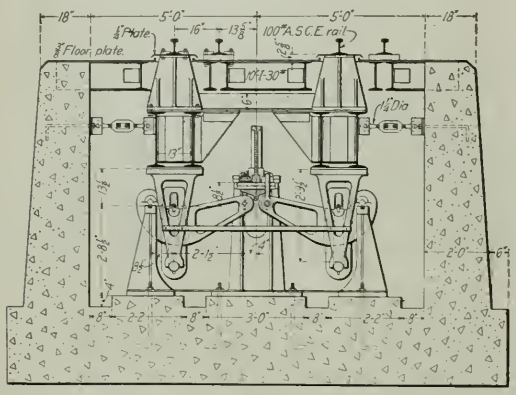
Details of the Ballast Shaper Plate and the Retaining and Carrying Wing Used with the Mann-McCann Spreader on the C. M. & St. P.

found at regular intervals corresponding to the spaces between the cars from which the ballast was dumped. This spreading wing is operated by compressed air in the same manner as the other side and center spreaders on this

machine, allowing it to be folded or unfolded almost instantaneously. This spreader is manufactured by the Mann-McCann Company, Chicago.

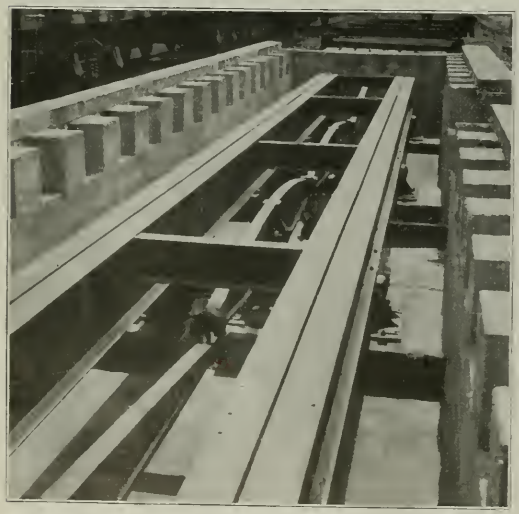
A SUSPENSION-BEARING CENTER-CONNECTED TRACK SCALE

A new single-link center-connected suspension-bearing railroad track scale has recently been designed by the Buffalo Scale Company, Buffalo, N. Y., and several successful in-



A Typical Cross-Section Through the Pit of the Suspension Bearing Track Scale, Showing the Details of the Main Lever Bearing.

stallations of the design have been made. The noteworthy feature of this design is in the bearing by which the load on the platform is transferred to the main levers. The main levers resting on chairs and the load is suspended from them



One of the Recent Installations of the New Suspension Bearing Center Connected Track Scales.

by a bearing consisting of only five parts. The platform girders bear directly on a steel yoke spanning the main lever and extending down to 24 to 28 in. below the bearing point on the upper surface of this lever. The sides of the yoke rest on the ends of a steel pin which extends through a heavy square-topped steel link passing up through a vertical slot in the main lever and over the heavy bearing block resting on the pivot on the upper edge of the main lever. In a four-section scale the load is carried by eight of these bearings, permitting free oscillation of the platform in all directions. In addition to this, the scale has a center connection which eliminates the use of an equalizer or rocker bar and adapts itself to any spring or slight irregularities in the platform girders.

The arrangements of levers conforms to the type of construction previously used by this company. The cross lever is furnished in 9-ft. or 10-ft. lengths and pivots wherever possible are heavily reinforced by the lever casting. The suspension links are made long to allow free, easy motion of the weighing platform in order to absorb thrust and impact in a transverse as well as a longitudinal direction and to avoid friction of the platform. These links are made of annealed cast steel. The chairs are of gray iron, the yoke of annealed cast steel and the yoke pins, which are 3½ in. in diameter, are made of steel with an ultimate strength of 84,000 lb. per sq. in. All metal exposed to moisture, with the exception of the bearing surfaces and the weigh beam, is coated with rust-resisting material and all parts are arranged for easy access for inspection and cleaning.

THE CONCRETE ATOMIZER

A new process of mixing and placing concrete in which the materials are heated to a high temperature after mixing in order to increase the hydration of the cement has been used with satisfaction on the Delaware, Lackawanna & Western and several other roads during the past two years. The quality of the concrete is said to be greatly improved by the application of heat and pressure as used in this system, the density being increased from about 137 lb. to 170 lb. per cu. ft., which is greater than granite, and the strength increased to three or four times that of average concrete. Microphotographs have disclosed no holes or cracks in this material, and one chemist who examined a specimen reported that no trace of unhydrated cement could be found.

The apparatus used for mixing and curing the concrete is known as a concrete atomizer. The process is described by the inventor, Harold P. Brown, 120 Liberty street, New York City, as consisting of thoroughly mixing measured amounts of cement, sand, broken stone and water in a cylinder, which is then filled with a hot gas or vapor under high pressure, the plastic concrete being then dropped into a superheated stream of rapidly moving gas or vapor, which separates the particles from each other and carries them in a rubber-lined hose to the point of deposit, projecting the stream against the work at high speed through an expansible nozzle. The blow struck by the material tamps it thoroughly and also jars out a portion of the water, the high temperature and the sudden reduction of pressure causing rapid evaporation of the remaining moisture so that quick setting is obtained. The process of building up the concrete on the surface of a wall or form by the deposit first of a layer of cement and then the imbedding in the cement of the particles of sand and later of the larger particles of crushed stone is similar to that which has been made familiar by the use of the cement gun, although the atomizer process differs from that of the gun in the use of crushed stone. The two processes also differ, of course, in the use of a preliminary mechanical mixing and the application of heat in the atomizer.

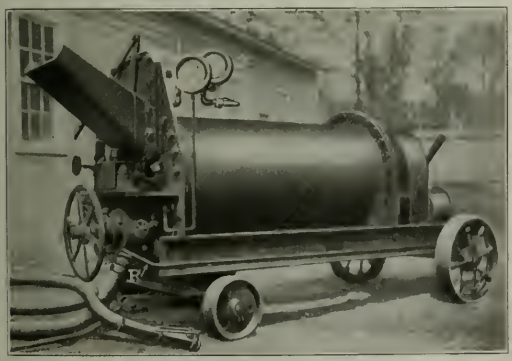
The No. 2 atomizer consists of a mixing cylinder with a charging door either at one end or in a dome on the top and containing a central driving shaft of square section which carries a series of mixing paddles and scraping devices for keeping the inner surface of the cylinder clear.

The necessary connections and valves for admitting steam to the cylinder and the discharge opening connecting with a 1¾-in. hose are located at one end of the cylinder. The mixing paddles are driven by a steam engine, the speed of which automatically increases as the load decreases during the discharge of the material, so that the rate of discharge can be kept uniform. When the cylinder is nearly empty the steam supply is shut off, the remainder of the work being performed by the expansion of the steam through the hose. The piston of the outlet valve is made to clear all material from its path when closing, so that the concrete cannot set in the pipe.

The No. 3 atomizer is similar in construction, having a mixing tank 5 ft. long and 3 ft. in inside diameter. It is designed to mix about 20 cu. ft. of loose materials at one batch and has a rated capacity of 150 to 180 cu. ft. of concrete per hour. This machine is designed to handle crushed stone up to 1 in. in size. An engine of special design is used to operate this machine, as the service requirements are unusual. This engine has a splash lubrication system and is self-contained. It can be operated with compressed air when the machine is used in tunnels or caissons and in this case the air can, if necessary, be superheated, giving the combined advantages of heat and pressure.

A special grade of rubber is used for lining the hose through which the concrete is placed, and it has been found that this hose is worn very slightly, since the wet cement lubricates the surface as soon as the stream is turned through it. Several lengths of this hose which have been in service for more than a year are said to show very little wear. Special couplings are used which have no metal parts exposed to the concrete. As an ordinary conical nozzle would be clogged frequently by stones, an expansible rubber nozzle was designed, the size of which is controlled by a lever in the hand of the operator. In case a pebble blocks the flow a slight movement of this lever opens the passage to the full diameter of the hose, allowing the obstruction to be blown out. The pressure at the nozzle is about 45 lb.

The concrete atomizer can be operated with one man at



The No. 2 Concrete Atomizer.

the nozzle, one at the machine and two or three laborers for handling the material. The accompanying photograph, illustrating its use on the Lackawanna retaining walls, shows two men at the nozzle, the duty of the second man being simply to keep a lookout for the flagmen who signaled the approach of trains. About 250 cu. ft. of fre air per minute at 40 to 50 lb. pressure is required when the machine is operated at full capacity on compressed air, and when steam is used the mixing is done at a pressure of 75 to 80 lb., with sufficient superheat to prevent condensation. By increasing the amount of superheat to the proper degree, the steam issuing from the nozzle is kept in gaseous form so that the work deposited can easly be seen by the operator. This stream is kept flowing from the nozzle continuously during the work in order to keep the surface on which the concrete is being deposited warm enough to prevent unequal contraction during the setting of the concrete. When the boiler is operated at 180 to 200

Repairing Retaining Walls on the D. L. & W. with the Concrete Atomizer Taking Steam from the Work Train Engine.

lb. pressure, a reducing valve placed close to the machine and set for 85-lb. pressure can supply the mixer, thus obtaining the required superheat. For use along an operated line, a machine can be connected to the steam dome of a locomotive and all other auxiliary apparatus eliminated.

At one point at which the small atomizer has been used a 60-hp. boiler was used to supply steam for a compressor furnishing air for the atomizer, this boiler consuming about 400 lb. of No. 3 buckwheat coal per hour, using forced draft, the output of concrete amounting to about 1 cu. ft. per minute. When steam was used direct instead of air the same amount of work was accomplished with natural draft on the boiler and a consumption of less than 100 lb. of coal per hour. The cost of the fuel for mixing, pouring and placing 1 cu. yd. of concrete with the No. 2 machine has been not more than $0.10 and the cost of fuel and labor less than $0.80 per cu. yd. With the larger machine this cost is reduced to less than $0.50 per cu. yd.

One of the early uses of this machine was in coating more than 6,000 sq. ft. of structural steel with 2 to 6 in. of concrete in the Grand Central Terminal improvements in New York City. Both compressed air and steam were used in this work, all of which has proved to be unusually hard, and it is said that no cracks or faults have developed in it. The Lackawanna rented one of these machines for several months to repair defective and honeycombed concrete subject to tidewater at its Hoboken terminal. Compressed air was used in this work, but for the repair of retaining walls, such as that illustrated herewith, steam was taken directly from the locomotive of the work train. This road has recently purchased this apparatus for further repair and construction work.

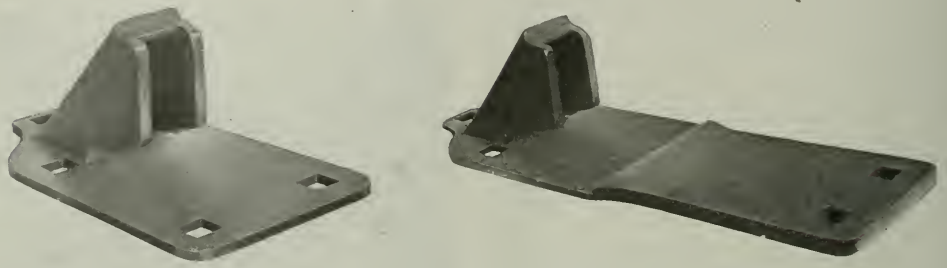
A CASE OF EXCESSIVE RAIL CREEPING

A very unusual instance of rail creeping is reported by the M. W. Supply Company, Philadelphia, Pa., manufacturers of the Vaughan rail anchor. A section of track near

Goshen, N. Y., is laid over very soft marshy ground commonly known as "meadows." It has seemed almost impossiple to get a solid foundation for this track, as much as 30 ft. of filling material having been put in in some places without changing the elevation of the track. A train passing over this section produces waves in the rail and in the surface of the ground near the track which are plainly visible. As a natural result creeping is a very serious matter, the spikes being pulled out of the joint ties by the moving the danger incident to those that involve a large proportion of benzine.

A COMBINED RAIL BRACE AND TIE PLATE

The Millies Railway Appliance Company, Hammond, Ind., has developed a combined rail brace and tie plate which has been on the market about one year and is in service on the Indiana Harbor Belt and several other roads. This device consists of a plate 6 in. wide, 11 in. long ½ in. thick under



The Millies Combination Rail Brace and Tie Plate and a Special Switch Point Brace and Plate.

slots in the splices, the ties being split and the splice bolts very frequently being sheared. The rails at one point were marked and during one summer were found to have moved ahead more than 80 ft. This necessitated the frequent use of switch points and constant attention on the part of the section gang as the joints were constantly opening. The application of rail anchors to practically every tie on this section has very greatly reduced the amount of creeping but has not entirely stopped it as the anti-creepers are pushing the ties ahead with the rails. While as a general thing 14 to 18 in. of creepage a year is considered excessive this company states that from 4 to 6 in. a year makes the use of anti-creepers an economy.

BARRETT SPECIFICATION ROOFS, FLOORS AND PAINT

The Barrett Manufacturing Company, New York, has recently laid much stress upon a more systematic inspection of the laying of Barrett specification roofs. An inspection sheet is now made a part of the specification, which includes full directions as to identifying the correct materials when they are delivered on the job. It gives methods of ascertaining that the contractor has used these materials in the requisite amounts to comply with the specifications. It also includes methods approved by the National Association of Master Gravel and Slag Roofers of America for cutting a slit in the roof at right angles with the way the felt is laid so as to exhibit a cross-section of the roof.

Another interesting field of development has been in the formation of practices and the preparation of specifications for the use of tar in sub-floors where a wooden floor is required at the ground level or below. Sleepers and heavy timbers are dispensed with and the planking laid directly on the mixture while it is still soft. The mixture hardens to a tough, solid base, which affords effective protection against dampness. These "Tar-Rok Sub-Floors," as they are called, are a sufficient foundation for any self-contained machinery.

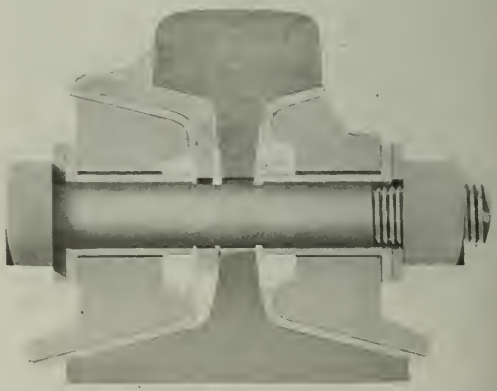
Other recent research work done by the Barrett company has been the development of "Hydronon," a damp-proofing paint adapted for use on interior surfaces of walls that are exposed to dampness. It will penetrate well into a wall of concrete or brick and will retain its effectiveness against considerable usage. Whitewash, cold-water paint, or plaster may be applied directly over this. It is less volatile than other paints made for this purpose and has a high flash point, re-

the outer edge of the rail base and ⅜-in. thick under the inner edge, with which is cast integrally a double-ribbed brace that can be made with a contour to fit any rail section. The details as to the size of plate, thickness and the use of ribs on the bottom surface can be varied to suit the requirements on different roads.

This device is made of malleable iron and weighs from 6 to 9½ lbs., depending upon the rail section with which it is used. By placing the inner spike holes slightly under the base of the rail the spikes serve to draw the brace firmly against the rail head. A special plate for use at switch points is shown at the right in the accompanying illustration. This plate is 9 in. longer than the standard, this extension being raised ¼ in.

KEYSTONE INSULATED RAIL JOINTS

New features recently embodied in Keystone insulated rail joints are continuous divided insulation, bakelized fabric as a substitute for fiber, and heat-treated bolts. The insulat-



Keystone Insulated Joint with Improved Insulation and Heat-Treated Bolts.

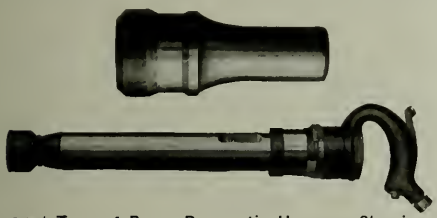
ing fiber is divided horizontally instead of vertically as heretofore, being continuous for the length of the rail joint. This makes all insulations the same size and interchangeable, and independent of the spacing of the bolts on all joints of a

given length, while providing a better insulation on account of being continuous. The insulation on the gage side of the joint under the head of the rail is bakelized fabric, the other three insulations being fiber. This new material has several times the wearing qualities of fiber and is impervious to moisture, maintaining its dielectric strength until it is worn out. The joints are equipped with bolts which have been given a special heat treatment, increasing their elastic limit over 40 per cent.

The Keystone insulated rail joint is manufactured and sold by the Union Switch & Signal Company, Swissvale, Pa.

AN IMPROVED PNEUMATIC HAMMER

The latest form of Boyer pneumatic hammer is the No. 11, illustrated herewith, which has just been placed on the market by the Chicago Pneumatic Tool Company, Chicago, Ill. It has a piston diameter of 1 3-16 in. with an 11-in. stroke, striking 700 blows per minute. It weighs 3½ lb. and is capable of



Improved Type of Boyer Pneumatic Hammer, Showing Also Parker Rivet Set.

driving 1½-in. rivets. Owing to the severe service required of the rivet sets in this hammer, the so-called Parker set is used, which has a wide tapering shoulder, enabling it to better absorb and withstand the effects of the blows.

In common with the standard form of the Boyer hammer, the No. 11 is divided into three distinct parts—handle, cylinder and valve—which allows quick examination and economical upkeep and repairs. In each of these members there is a moving part subject to wear, but in varying degrees. It is frequently possible to replace one of these parts and thereby render the tool comparatively new. All parts are made interchangeable on jigs and templates.

IMPROVEMENT IN THE GOSSO BED

An improvement has been made in the Gosso bed, since its appearance on the market a year ago as described in the *Railway Age Gazette*, of March 19, 1914, that will greatly

Improved Spring in Gosso Bed.

facilitate its installation in railway bunk cars and its removal when not in use. As originally installed there was some little difficulty experienced in expanding the small springs which are used to keep taut the perpendicular chains in which the beds are hung. There was also the possibility that an inexperienced workman might overstrain the small spring and "kill" it.

These beds are now equipped with an expander, which is opened until the chains are attached to the floor and the ceiling, when it is closed by a simple push and the small springs are stretched exactly one inch. This is sufficient to keep the chains taut and guards against the danger of overstraining the spring. When it is desired to take the beds down, the expander can be opened in an instant, releasing the tension on the spring and allowing the "S" hook to be disengaged from the eye in the floor. By means of this improved device, the two chains at the front of the beds can be taken down in a moment and the beds folded up and pushed against the side of the car, thus leaving the space available for other purposes, if that is desired. These beds are made by the Gosso Company, Chicago.

A HIGHWAY CROSSING ALARM WITH FOUR INDICATIONS

In order to eliminate as far as possible the chances for the warning indication to be overlooked a highway crossing signal has been developed and satisfactorily used on several roads which combines a ringing bell, flashing red

Highway Crossing Signal and Alarm Fitted with the Chicago Electric Flag.

lights and a waving red flag for warning highway traffic, with flashing green lights to indicate to approaching trains that the signal is properly working. The signal shown in the accompanying illustration is mounted on a 4-in. steel pipe equipped with four pressed steel pole steps and a standard crossing sign, the pipe being supported on a combination battery and relay box to accommodate batteries.

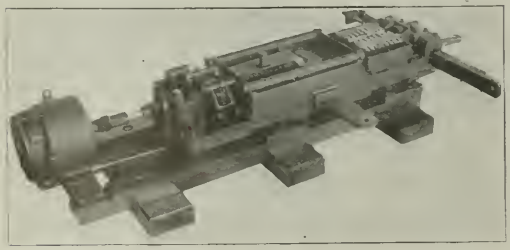
relays, terminals, etc., used in the highway crossing alarm circuit. The electric flag, as the apparatus mounted at the top of the post is called, can also be furnished with bracket mountings which project it 3 ft. or 8 ft. over the highway, these brackets being built up of 3-in. steel pipe.

The bell is 14 in. in diameter at the mouth and made of heavy bell steel, copper plated, or of genuine bell metal or crucible steel, if so specified, and is operated by an electric motor through a set of reduction gears and a cam. No contact trip or springs are used. The flag is 18 in. by 24 in., and is made of heavy sheet steel enameled red, with the word "danger" or "stop" painted in white across both faces in 6-in. block letters. The flag moves up and down through an arc of 45 deg. when the device operates, without jerks or stops. The operation of the flag is also accomplished by reduction gears and a cam from the same motor. The night signal is given by the flashing of two electric lamps at the proper focal points behind two 5⅜-in. red lenses mounted in the case, one on each side facing the highway. The flashes follow each other at evenly timed intervals as the lamp circuit is made and broken at large carbon contact blocks. These blocks are easily removed, and are of such proportions as to carry current up to 10 amperes at any voltage up to 650. Two green lenses are also mounted on the sides of the case visible from approaching trains, and similar flashing signals are given them.

The case which encloses the operating mechanism is water, dust and bug proof and includes an ample space for mounting resistance units, lightning arresters, terminals, etc. The motor is of standard design and can be furnished to operate on any voltage from 10 to 650 direct current, or 110, 220 or 440 volts, alternating current of any cycle. The operating mechanism is mounted on a base within the case, making it easily removable for inspection or repairs. The gears and pinions are bronze against steel, minimizing the friction losses, and the entire mechanism is machined and jig drilled to insure smooth operation, durability and interchangeability. All bearings are provided with easily accessible oilers. This highway crossing alarm is manufactured by the Chicago Railway Signal & Supply Company, Chicago.

A LOW-VOLTAGE SWITCH-OPERATING MECHANISM

The new model 5 low-voltage switch machine of the General Railway Signal Company, Rochester, N. Y., is designed to afford a convenient means of operating outlying switches



G. R. S. Model 5 Low-Voltage Switch Machine, with Cover Removed.

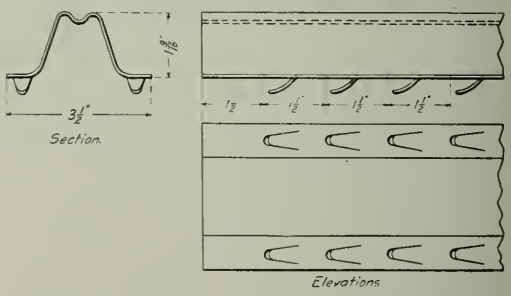
situated, for example, at the entering ends of passing sidings. With the exception of the motor, the switch machine is much the same as the high-voltage type and the a. c. and d. c. designs are an evolution of the model 2 and model 4 switch machines manufactured by this company. The model 5, however, is long, narrow and shallow and is placed parallel to the track where it affords maximum clearance. The machine can be installed in difficult locations and being light in weight, is easily handled. The old model 2 machine was placed at right angles to the track and cannot very well be installed in subways or on elevated structures, etc., where clearance is limited.

This machine, as stated above, permits the operation of outlying switches by power and therefore it eliminates the stopping of heavy trains at passing siding and other switches, which may cost for each stop anywhere from 50 cents to one dollar or more. It eliminates a delay of several minutes in the case of each train entering or leaving the switch, and this facilitates train movements; it serves as an efficient switch lock and insures a stop indication unless the switch points are in the proper position.

The company states that the elimination of one freight train stop per day would more than offset the fixed charges, interest on investment, depreciation and maintenance on an installation comprising switch machine, single-track circuits and control appliances and accessories.

A GALVANIZED METAL FENCE POST

Steel fence posts with a number of distinctive features are being manufactured by the Metal Post & Culvert Company, Niles, O. The line post consists of a rolled steel shape designed with a view to offering the greatest possible resistance



Cross Section and Part Elevations of the T. & T. Metal Post.

against bending or breaking at the ground line. Numerous small lugs are punched from the two plain surfaces which form the face of the post and bent up to serve as fasteners for the line wires. This construction makes the fastening device a part of the post itself and eliminates the necessity of handling separate pieces or complicated fastenings. Each strand of wire is caught by two of the lugs and the wires when applied serve to strengthen the post by their support.

About five times as many of these steel posts can be placed in a given storage space as wooden posts, the nestable feature of the steel post making it easy to store and to ship. The posts are furnished in lengths ranging from 5 to 12 ft., weighing from 7 lb. to 16.6 lb. They can be driven in ordinary ground, a malleable driving cap being recommended to eliminate any bending of the top of the post. In stony ground a 2-in. auger hole will make it possible to drive the post and such a hole can be driven much cheaper than a 6-in. post hole. In driving the posts it is recommended that they be so placed that the greatest strain will come against the post itself rather than against the fastening lugs, which, however, are designed to have strength enough to withstand any strain ordinarily encountered.

Two types of end and corner posts are made for use with these line posts. One consists of a No. 9 gage seamless cold drawn tubing 4 in. in diameter, galvanized inside and out, set in a concrete base at the end or the corner and reinforced by a brace or braces of tubing anchored to concrete blocks under

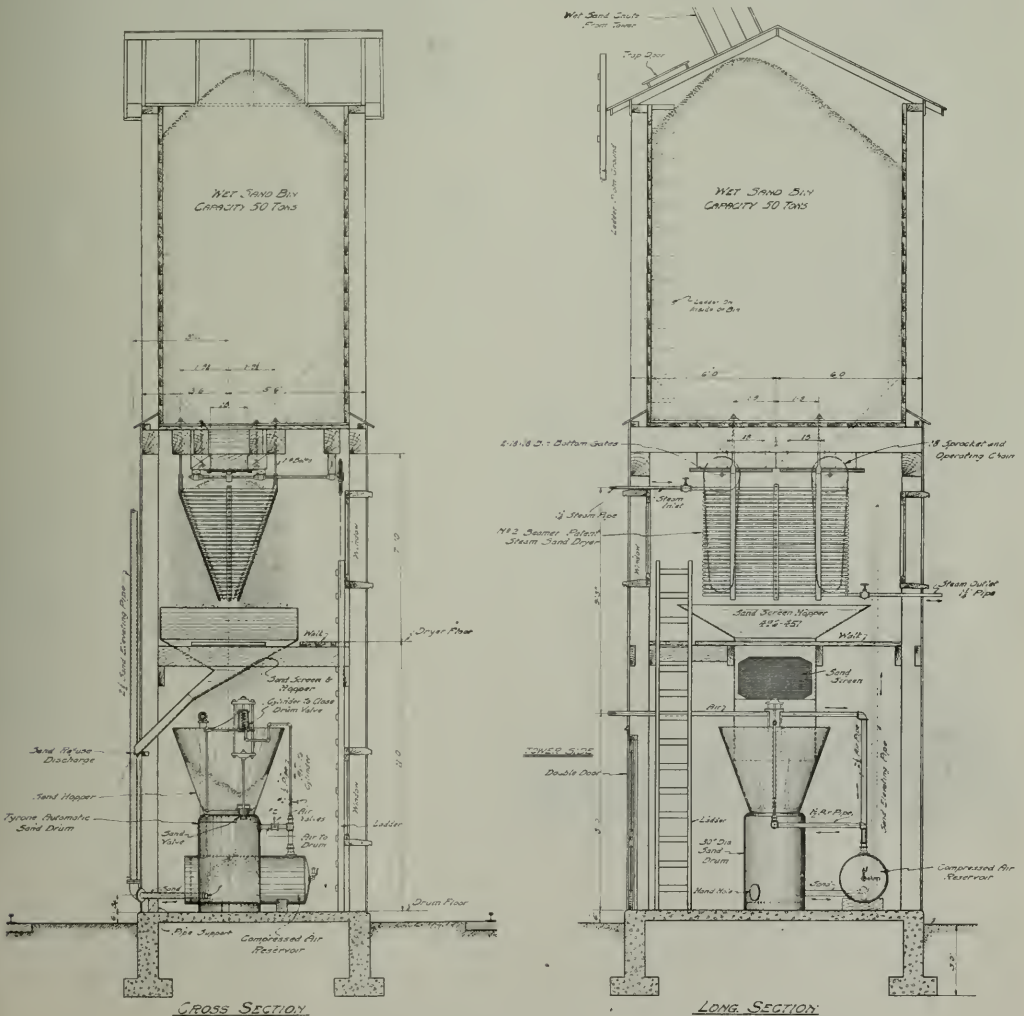
the fence lines. The other type of end and anchor posts consists of an 8-ft. diagonal post through which the line wires are strung and a 5-ft. rod connected to a malleable anchor buried 5 ft. in the ground, the line wires being brought together to fasten to the upper end of the anchor rod at the ground surface.

In addition to the advantages mentioned, this post can be easily painted, as there are no enclosed parts, the fence line can be burned with the remainder of the right of way, the posts serve as electrical grounds in storms, and are said to be free from heaving.

THE "RANDS" GRAVITY SAND PLANT

A new type of plant for handling and drying sand which eliminates sand-shoveling and coal-fired driers has been designed recently and has been installed in connection with locomotive coaling plants at a number of points including Cape Charles, Va., on the New York, Philadelphia & Norfolk; Nashville, Tenn., on the Louisville & Nashville; Trenton, Ont., and Capreol, Ont., on the Canadian Northern, and Henderson, Ky., on the Louisville, Henderson & St. Louis.

This sand plant occupies an area of only 9 ft. by 12 ft., allowing it to be installed between the receiving track and the coaling track of any locomotive coaling station. It can be built of reinforced concrete or frame construction as desired. A car of sand is dumped in the receiving hopper of the coaling plant in the same manner as coal and hoisted in the elevating bucket, from which it is discharged into a chute leading to a 50-ton wet-sand bin in the top of the sand plant. It has been shown that sand can be handled very successfully in this manner, but if the plant is isolated a malleable bucket elevator can be used for handling the green sand. A slide gate at the bottom of the wet-sand bin controls the flow into the "Beamer" patent steam sand drier. This drier is made of 1¼-in. pipe in continuous lengths without joints which are bent to form circular or rectangular receptacles for the sand. The openings are so regulated that the wet



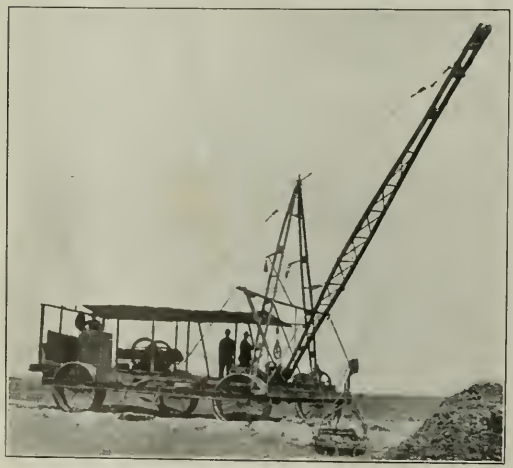
Two Sections of the "Rands" Continuous Sand Drying and Elevating Plant.

sand cannot pass through, but as soon as the sand is dried by the heat of the steam in the pipes it flows through the heater continuously into the hopper of the "Beamer" hand drum below. At the side of this drum is located an air reservoir with two air valves by which the pressure can be applied to the sand in the drum, elevating it to the dry-sand storage bin. A drum full of sand may be elevated in 75 seconds.

The drier is made in the circular shape when a capacity of approximately 7½ tons per 24 hours is desired and for larger capacities 15 tons per 24 hours can be secured by the rectangular shape, which is 8 ft. long and 3 ft. wide. This type of drier has been in service for a number of years on the Pennsylvania, where it has been demonstrated that sand may be dried for about one-seventh the cost for drying it with coal-burning driers, considering the cost of fuel, labor and repairs on the sand stove. The openings between the pipes allow the moisture to escape, thus preventing rusting of the pipes and baking or caking of the wet sand. The action of this drier is continuous and automatic, eliminating the labor required for keeping up fires, removing ashes, feeding the drier and shoveling sand. If steam is not available at the site, the other features of design in the plant may be utilized with coal-burning driers. The Roberts & Schaefer Company, Chicago, is the exclusive licensee of the "Beamer" sand drier, and the designs for the plant described above were prepared by this company.

THE ECONOMY LIGHT EXCAVATOR

A light excavator of the drag line type, known as the "Economy," has been in the use on a small scale for two or three years and has demonstrated its adaptability to a wide range of excavating work, such as throwing up small embankments, loading excavated material into wagons, stripping gravel pits and digging and back-filling trenches of all kinds. This machine is equipped with a bucket of



The "Economy" Excavator Handling Material with a ⅝-yd. Bucket.

⅝-yd. capacity, is driven by a gasoline engine, weighs only 12 tons, and is operated by one man.

The main frame work of the excavator is built up of I-beams and in the standard size is 24 ft. square, although these dimensions can be varied if desired. This frame is mounted on four steel wheels 5 ft. high, having a tread 3 ft. wide. The main frame supports a platform 12 ft. by 30 ft., which may be housed if desired, and which supports the operating machinery and all accessories. A rigid steel "A" frame and a 40-ft. boom are mounted on the front of the main frame and the hoisting, swinging and digging lines are arranged to properly connect these members with the engine. The swinging cable is attached directly to the side of the boom, giving a positive and rapid action and eliminating the necessity for a turntable. The excavator is

The Bucket Used with the "Economy" Excavator.

equipped with a 40-hp. gasoline engine of the 4-cycle type, a special carburetor being furnished to permit the use of either gasoline or kerosene for fuel. The amount of gasoline used is stated to vary between 20 and 25 gallons for a 10-hour run under heavy duty. A special scraper and bucket shown in the accompanying illustration is used with this excavator.

It is stated that an operator can swing the loaded bucket from four to six times per minute, and that on the average the machine can handle 500 cu. yds. in a 10-hour shift. During the past summer a contracting firm, Murphy & Engberg, Minneapolis, Minn., handled the material for a 5-ft. fill, with the Economy excavator taking all the dirt from one side. The ground surface was under more than a foot of water during the work, but in spite of this condition the machine handled 1,000 cu. yds. of earth per day. Another machine used for making a large fill behind a bridge on the Chicago & North Western, near Green Bay, Wis., loaded dump wagons at a rate of 500 yds. in a shift. The soil in this case was hard pan mixed with medium sized boulders. Another machine has been used for stripping and cleaning gravel pits on the Chicago & North Western at different points in Iowa throughout the last season, and also for loading gravel cars.

The machine has a number of incidental advantages. Only one operator is required, this man being able to control all movements of the excavator and to see all working parts of the machine from his operating position. The large steel wheels enable the machine to travel over soft ground that would be impossible for any other type. The wheel can be set to make any turn or curve. The machine can be moved ahead by means of a "dead man" or stake without interrupting the use of the bucket or can be moved in the opposite direction with the bucket. The control of the boom enables the operator to pick up the loaded bucket at any point within its radius and swing it to the dump. This eliminates the necessity of dragging the bucket up close to the machine before it is lifted, with a resulting saving in time. The machine complete weighs about 12 tons and is designed to be readily taken down or set up. It can be loaded on one flat car for transportation. This machine is manufactured by the Economy Excavator Company, Iowa Falls, Iowa.

Railway Age Gazette

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Volume 58 March 26, 1915 Number 13

Contents

*Illustrated.

We publish in another column an interesting letter on the proposed standard box car from President Ripley of the Santa Fe, which was written in reply to an article on the same subject by W. R. Burnett, master car builder of the Canadian Pacific, published in the *Railway Age Gazette* of March 5. Mr. Ripley is the father of the movement for the standardization of freight car equipment, and is the chairman of the committee on Standard Freight Car Equipment of the American Railway Association. This is a very strong committee, the other members being President Harrison of the Southern, President Rea of the Pennsylvania, President Smith of the New York Central, Chairman Kruttschnitt of the Southern Pacific, Chairman Elliott of the New Haven and President Markham of the Illinois Central. With such a committee in charge of the general investigation of the subject and a capable sub-committee of manufacturers working out the details, the question of standardization is sure to be vigorously dealt with. Just how far the movement will be carried it is now impossible to predict, but one thing appears to be predictable with considerable certainty, and that is that it will result in the adoption of some methods or principles which will cause individual lines to pay more regard than they have in the past to the interests of the railways as a whole. As freight cars move almost as freely over foreign lines as over the lines of the companies that own them, it is the right and duty of the railways as a whole to exercise reasonable supervision over the way in which the cars of individual companies are built and maintained.

The Proposed Standard Freight Car

Of the passing of foolish and unjust railway legislation there is no end. It has long been customary for railways to give free passes to shippers of live stock to enable them to accompany and care for the stock. The legislature of Kansas has decided that shippers of live stock are entitled to an additional special dispensation, and has therefore passed an act to provide that "whenever any railroad company or corporation doing business within the limits of this state shall receive and ship any live stock by the carload and the shipper shall desire, either in person or by employee, to accompany such stock for the purpose of looking after and caring for it in transit, or if such shipper or his employee desires to ride on a passenger train from place of shipment to point designated in contract or from any intermediate point to destination, the charge for such shipment shall be held to include the passage of the shipper or his employee." It is further provided "that in all cases where more than one carload of stock is shipped at the same time the railroad company or corporation shall be required to pass one additional person for every carload or major fraction thereof in addition to the first carload, and one additional person for every six carloads or major fraction thereof after the first four carloads, provided, further, that not more than four persons shall be passed with any train load of live stock shipped by one shipper." Just how the shipper or his employee, or his four employees if he has so many, is to care for the live stock when it goes on a freight train and he or they go on a passenger train, the law does not indicate. The effect of the law, therefore, is to require the railways, for no good reason whatever, to throw in a certain amount of free transportation with every shipment of live stock. Why discriminate thus in favor of the shipper of live stock? Why not require a free pass to be issued with every carload shipment of grain or of coal or of any other commodity? Hardly ever is a session of certain state legislatures held without some such law being enacted. Are the men who pass such laws just plain fools or are they morally what they must be held to be if it be conceded that they have any intelligence?

Free Passes For Stock Shippers

The operating figures of the New York, New Haven & Hartford are beginning to indicate the results of the improvements in methods which have been and still are being introduced by the new management. The statistics for the year ending June 20, 1914, showed a marked improvement over those for the preceding calendar year, but the effects of the work of the new management became even more manifest during the first seven months of the present fiscal year, this being because during the fiscal year 1914 the management was in a difficult situation because of its negotiations with the government and because it has been profiting during more recent months by the work done during the preceding year. Some of the percentages of increase and

Operating Results on the New Haven

decrease in the operating figures during the fiscal year 1914 and the first seven months of the fiscal year 1915 are as follows:

	Year ending June 30, 1914	Seven months ending January 31, 1915
Tons one mile (revenue)...	9.4 per cent dec.	9.38 per cent dec.
Freight train miles (revenue)	13.2 per cent dec.	14.81 per cent dec.
Passengers one mile.....	0.3 per cent dec.	7.90 per cent dec.
Passenger train miles.....	1.8 per cent dec.	9.93 per cent dec.
Tons per train mile (revenue)	304, or 4.5 per cent inc.	322, or 6.38 per cent inc.
Revenue per train mile (frt.)	$4.30, inc. .387	$4.53, inc. .316
Revenue per train mile (pass.)	$1.91, inc. .003	$2.03, inc. .106
Transportation expense ...	1.2 per cent dec.	10.5 per cent dec.
Maintenance equip. expense	8.2 per cent inc.	3.8 per cent dec.
Maintenance of way expense	11.9 per cent inc.	8.4 per cent dec.

It will be seen that in both periods there was a decrease in both the passenger and freight traffic, but that the management succeeded in reducing the freight train miles and the passenger train miles still more, so that there were good increases in the earnings per train mile, both passenger and freight, and substantial reductions in transportation expenses. The maintenance expenses in the fiscal year 1914 could not be reduced with propriety, but largely owing, probably, to the heavy reduction in traffic there have been reductions during the present fiscal year both in the maintenance of equipment and maintenance of way. The figures given are a sufficient indication of the energetic efforts being made to increase efficiency and reduce expenses.

THE RAILWAYS AND THE STEEL COMPANIES

THAT the action of the Illinois Central and other railways in the United States in buying rails from the Algoma Steel Company, a Canadian concern, should excite criticism was inevitable. The Iron Trade Review for March 18 contains a long article denouncing both the tariff policy which enables a Canadian mill to underbid United States mills in this country, and attacking the managements of the railways that have bought rails from the Algoma company. The Birmingham (Ala.) Herald also has published an editorial criticizing the Illinois Central. The *Railway Age Gazette* does not intend to discuss at this time the tariff policy involved. The question of railway policy involved is another matter.

We believe that it would be a mistake for the railways of the United States to adopt the practice of buying equipment and supplies abroad merely to secure the benefit of small differences in prices. What they would gain by the lower prices would be largely or wholly offset by their indirect losses in traffic and earnings. But there are a number of points besides these general considerations which must be weighed before it can be decided whether our railways may be justified in buying rails from the Canadian mills.

It is asserted that the low price which the Algoma Steel Company is making in the United States is merely a "dumping" proposition, and this is assigned as one of the reasons why the railways of the United States should not take advantage of it. But the steel companies of the United States have sold rails all over the world for lower prices than they have made the railways of the United States. President Farrell of the Steel Corporation testified before the Stanley Committee that the average price received by it for export rails was only $24.74. If the steel companies are justified in selling rails abroad cheaper than at home, why are not the railways of the United States justified in buying rails cheaper abroad than they can get them at home? We are not criticizing the dumping policy of the steel companies; but it is a poor rule which does not work both ways. Furthermore the Algoma Steel Company is reducing the price of rails in Canada, as well as in United States.

It is intimated that because the steel companies of the United States are such good customers the railways should be willing to pay them more than they need pay foreign manufacturers. But the railways are the best customers of the steel companies. Do the steel companies, therefore, patronize the railways when they can get cheaper transportation elsewhere? Far from it. They never hesitate to take traffic from the railways and give it to steamship lines on the Great Lakes and in the coastwise service, or to build and operate railways and steamship lines of their own and compete with the railroads. Furthermore, some of the steel companies are buying ore in Cuba and Chili because they can get it cheaper there than in the United States. If it is the duty of the railways to patronize home industries regardless of price, why is it not the duty of the steel companies to patronize home industries regardless of price?

While the spokesmen of the steel companies are charging the railways with discriminating against home industries by buying rails in Canada at lower prices than they can purchase them in this country, the record clearly shows that for years the steel companies of the United States have been discriminating against the railways right in the domestic market. The price of other iron and steel products have fluctuated from year to year according to business conditions. The price of steel rails also fluctuated prior to the organization of the United States Steel Corporation, but after the Steel Corporation was organized the basic price was fixed at $28 a ton and regardless of all changes in conditions it has stayed there ever since. It is desirable to have the price of rails stable. But there is a strong suspicion that by pursuing the policy they have the steel companies have made larger profits in proportion out of rails than out of their other products. Such good customers as the railways are entitled, it would seem, to the protection of a "most favored nation" clause. There is no evidence that they have received such protection.

While we are on this question of price it should be added that the steel companies of the United States undoubtedly could have got every order for rails which has been placed if they had been willing to come somewhere near meeting the price of the Algoma Steel Company. If they had got the business by concessions in prices, such as all other classes of railway supply concerns have had to make within recent years, they could have put men to work and got such profits from the business as it yielded. Therefore, all the talk about the responsibility of the railways for failing to do what they can to put the unemployed of this country to work is buncombe. In this connection it might be added that no question of the "pauper labor of Europe" comes in here. Labor certainly costs at least as much at the Algoma plant as it does at any plant in the United States.

There are other points of great importance to be considered which those who are criticizing the Illinois Central for buying rails in Canada have been remarkably unanimous in failing to mention. One is that the Algoma company agreed to make rails according to specifications which the American steel companies refused to accept. The railways of the United States have been struggling for years with the rail makers to get them to make better rails. The steel companies of the United States refused to make the Illinois Central's rails according to the American Railway Engineering Association's specifications, including the nick-and-break test, while the Algoma company agreed to do this. The United States mills lost this business not only because they refused to meet the Canadian mill's prices, but also because they persisted, as they have for years, in refusing to make rails according to specifications drawn up and approved by the railways. Another point is that the Algoma company gave a five year guarantee on its rails, while the mills in this country some years ago discontinued giving such guarantees.

In view of all these facts criticism of the action of certain railways in buying rails in Canada comes with poor grace from spokesmen of the steel companies of the United States. If the steel companies of this country want all the rail business of this country let them do business with the railways as they expect the railways to do business with them. If they want the railways to favor them let them favor the railways. The steel makers have abused the power their position of practical monopoly has given them both in fixing prices and in negotiating regarding the specifications according to which rails should be made. They will have no difficulty in controlling their home market if they will deal with the railways in somewhat the same

spirit in which their spokesmen are demanding that the railways shall deal with them. If the railway worm has at last turned and the steel makers of the United States are in consequence losing business, they have only themselves to blame for it.

THE INCREASE IN VOLUME OF SERVICE RENDERED BY THE ROCK ISLAND 1902-1914

In nearly every manufacturing business the greater the output the lower is the cost per unit, and also generally the lower is the percentage of profit on each article manufactured. On the other hand, however, as a manufacturing business grows the owners may rightly expect to receive a greater total profit, despite the fact that they make a smaller profit on each article manufactured.

The units which measure the service which a railroad renders to the public are passenger miles and ton miles. The performance of these units of service is analogous to the manufacture of articles by a factory. Up to a certain point the law of decreasing cost of manufacture per unit, which is generally found in a manufacturing business, is applicable also to the performance of units of service of transportation. Beyond a certain point, however, recent railroad history has shown that an increased volume of services performed entails an enlargement of plant and facilities which at one stroke increases the unit cost of performing each service. Leaving aside, however, the rather complicated question of when any individual railroad company reaches this point where the law of decreasing cost per unit is superseded by the law of increasing cost per unit, the owners of all the securities of a given railroad have a right to expect that a larger total profit will be earned by their property, as the volume of business increases. Twice as much business could not be expected to yield twice as much profit, but it ought to yield a certain percentage of larger profit.

The Chicago, Rock Island & Pacific is under fire. It is therefore worth while to consider the real reasons for its present situation. In 1902 it rendered passenger service amounting to 372,313,683 passenger miles, and freight service amounting to 1,839,127,297 ton miles. In that year the operating income, which is the total amount of revenue received from the performance of the service rendered to the public, less taxes and the cost of rendering the service, exclusive of any return to the creditors of the company or to the owners, was $10,131,121. In 1914 the Chicago, Rock Island & Pacific's passenger service totaled 980,051,132 passenger miles, and its freight business 5,123,579,107 ton miles. The operating income for 1914 was $13,892,534. Whereas, therefore, the increase in total amount available for all security

	Net operating income	Passenger mileage	Ton mileage
1902	$10,131,121	372,313,683	1,839,127,297
1903*	14,524,883	438,703,832	2,452,729,874
1904	11,657,020	514,108,832	3,250,750,267
1905	11,383,310	552,903,897	3,171,456,832
1906	14,538,909	646,116,553	3,715,621,556
1907	17,518,240	725,233,506	4,281,228,365
1908	14,365,554	881,991,344	4,019,704,681
1909	16,400,527	952,679,666	4,160,828,170
1910	15,274,509	1,016,385,259	4,567,089,384
1911	16,723,139	1,010,037,752	4,718,460,846
1912	15,200,498	939,391,981	4,599,242,133
1913	15,914,395	983,696,182	5,203,973,087
1914	13,892,534	980,051,132	5,123,579,107

*15 months' figures for both earnings and service.

holders and for rentals was only 37 per cent greater than the corresponding amount available in 1902, the total volume of service rendered to the public in passenger business was two and a half times as great (an increase of 160 per cent) and in freight business more than two and a half times as great (an increase of 178 per cent).

The accompanying table shows the operating income and the passenger mileage and ton mileage in each year, 1902-1914. It will be seen that there has been a large increase, with certain exceptions, each year in the volume of service rendered by the Chicago, Rock Island & Pacific to the public. The security holders, however, have not benefited to anywhere near the extent which they might fairly have expected to benefit from the growth of their business *even if they had not put in any additional investment*. Since there may be some doubt as to the way in which the accounts were kept previous to July 1, 1907, it is safer to deal only with the additional investment since 1907.

In 1907 the railroads were prosperous, but they were not earning an exorbitant profit even at that time. Disregarding entirely the company's figures for capitalization, and capitalizing the operating income for 1907, which was $17,518,240, at 6 per cent, the property investment of the Rock Island would have stood July 1, 1907, at $291,970,667. This is the amount on which the company in the previous year earned 6 per cent. The accompanying table shows (1) the new investment in each year

	Additional investment	Total investment	Per cent on cumulated investment	Per cent on total
1908	$10,089,944	$302,060,611	—31.24	4.75
1909	3,642,373	305,702,984	— 8.87	5.36
1910	19,152,202	324,855,186	— 6.82	4.70
1911	2,456,438	327,311,624	— 2.25	5.11
1912	3,449,580	330,761,204	— 5.97	4.59
1913	9,537,862	340,299,066	— 3.32	4.67
1914	20,532,445	360,831,511	— 5.26	3.85

since 1907; (2) the total investment, taking the figure arrived at by capitalizing at 6 per cent the operating income of 1907 and adding to it each succeeding year's additional investment; (3) the per cent which has been earned each year on the *new* capital invested since 1907, which it will be seen is in each case a minus figure; and (4) the per cent of operating income to total investment as shown in column 2.

To get some adequate idea of the importance of the part which the decline in earning power of the Rock Island has played in the partial destruction of the company's credit it is worth while to study this table showing the failure of the new investment not only to earn anything for itself, but to prevent the decrease in earnings on previous investment from the point of view of the man who is asked to put new money into a railroad property. The table is like an inverted bond circular. And it must be remembered that we are dealing now not with the issue of securities, not with holding companies, not with inflated balance sheet assets, but with the actual return which the operation of 8,000 miles of railroad is making on new money spent only on additions or betterments to the property as defined by the Interstate Commerce Commission's accounting rules.

THE NEW YORK CENTRAL AND THE LAKE SHORE

The New York Central & Hudson River was able to save, almost dollar for dollar, in expenses in 1914 what it lost in revenue during that year. The combined system—Lake Shore & Michigan Southern and New York Central & Hudson River—did not, however, quite succeed in earning the total dividends paid to the public. This was due partly to the fact that the Lake Shore was not able to offset decreases in revenue through savings in expenses as effectively as was the New York Central, and partly to the loss in other income due to the reduction of dividends on other New York Central Lines.

The accounts and statistics for the entire calendar year 1914 for the New York Central & Hudson River, which operates 3,774 miles of road—the New York Central Lines East of Buffalo—and the Lake Shore & Michigan Southern, which operates 1,852 miles of road, have been kept separate, and the two tables at the end of these comments show the results of operation of the two properties separately. The tables do not show, however, the 1¼ per cent dividend declared in December by the new company, the New York Central Railroad, which took over the two heretofore separately owned properties. This fourth quarterly dividend called for approximately $2,784,000, whereas the combined surplus of the Lake Shore and the New York Central was but $1,330,000.

The loss in revenue for the New York Central system was due to general business conditions and was not any more serious than

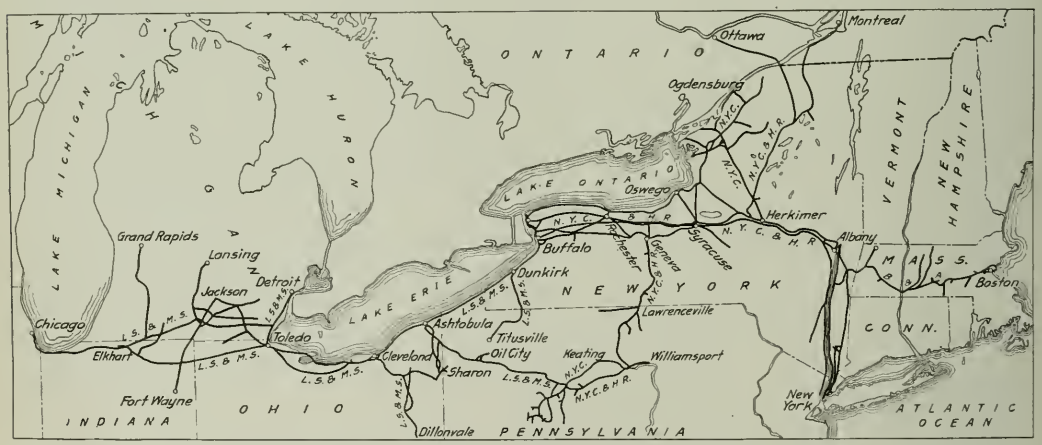
had been foreseen some time before the end of the year and predicted in the hearings before the Interstate Commerce Commission in the eastern rate advance case. On the other hand, the New York Central's ability to save a dollar in expenses for every dollar lost in revenue was a result even more favorable than had been generally hoped for. It is an augury for the future of far more moment than might at first appear.

Total operating revenues for 1914 for the New York Central & Hudson River amounted to $112,741,000, a decrease as compared with the previous year of $9,943,000, or 8.1 per cent. Total operating revenues amounted to $84,033,000, a decrease of $9,381,000, or 10 per cent. It will be noted from the table showing the results of operation that the loss in freight revenue was greater proportionately than the loss in passenger revenue. This fact, of course, was to a certain extent a help in holding down transportation expenses, since it is easier to cut down freight-train mileage to correspond with the loss in business than it is to cut down passenger-train mileage. Even so, however, there was a loss of $2,766,000 in passenger business, to offset which expenses in some department had to be cut.

Transportation expenses in 1914 amounted to $41,846,000, a decrease as compared with the previous year of $3,718,000. The greatest saving which has been made in railroad transportation expenses in recent years has, of course, been through the increase in average trainload of freight. In 1914 the New York Central's total trainload, including company freight, was 633 tons, an increase over 1913 of 28 tons, or 4.7 per cent. It has been an almost universal rule that along with an increase in trainload there has gone an increase in train-mile expenses. But the distinguishing feature of the New York Central's economies in transportation expenses in 1914 was that train-mile expenses were held down even below 1913, despite the heavier freight-train load and exactly the same average number of passenger cars per passenger-train. Thus, the total train mileage in 1914 amounted to 45,929,000, which was less by 6,624,000 miles, or 12.6 per cent., than in 1913, while train enginemen's wages amounted to $4,246,000, a decrease of $709,000, or 13.8 per cent., as compared with the previous year, and fuel for train locomotives cost $6,469,000, a decrease as compared with 1913 of $957,000, or 12.9 per cent. The wages of trainmen cost $5,182,000, a decrease of only $130,000; but the full-crew law, which went into effect in September, cost the company in trainmen's wages approximately $350,000, so that there would have been a corresponding saving in this item had it not been for circumstances beyond the control of the management.

The reasons why the New York Central was able to make these economies in transportation expenses are numerous. The most obvious one was that the management, with the falling off in business, was able to store the lighter engines which it had in service at the beginning of the year and only use its best power. This made better time possible, even with the increased trainload, and helped to offset the effects of the very severe weather in January and February and part of March, 1914. While this is the easiest explanation of the saving in transportation expenses, and to this fact may be ascribed a larger percentage of saving than to any other one single fact, it is not by any means as important as the bulk of the saving made by a multitude of other items not so easy of description.

For three years the New York Central has now had in effect a system of daily reports for the performance of each train on each division, which reports are made by the superintendent to the general manager and to the vice-president in charge of operation. It is quite impossible to say just when an improved system of supervision begins to show results, but it is safe to say that a part of the good showing in 1914 was due to the effectiveness of this method of supervision. The New York Central also has a system by which operating officers make out a budget, which is sent to the vice-president's office by the first of each month. By means of this budget, the daily telegraphic report of carloading and the daily report of train performance, it is possible to get a close, effective supervision over transportation expenses that would have been undreamed of a few years ago on the New York Cntral.



The New York Central & Hudson River and the Lake Shore & Michigan Southern

A reflection of this close supervision is to be found in yard expenses. Wages of yard conductors and brakemen amounted to $2,153,000 in 1914, a decrease of $262,000. The wages of yard enginemen amounted to $1,451,000, a decrease of $238,000, or over 14 per cent. With the general manager's office in such close touch with carloading, switch engines could be laid off before they had begun to eat their heads off in fuel and enginemen's expenses.

The saving in cost of fuel for train locomotives is worth noting. The average cost of coal per ton in 1914 was $1.82 as against $1.91 in 1913. The installation of improvements to locomotives, such as the superheater and brick arch and better types of valve gear, has made it possible to get as good results out of a cheaper coal as were heretofore gotten from more expensive coal.

Loss and damage to freight cost $1,321,000 in 1914, or $248,000 less than in 1913, and injuries to persons cost $604,000, or $252,000 less than in 1913. At least a part of the saving in loss and damage to freight is probably directly attributable to

the work of the ten supervising agents who have this matter directly in charge. These supervising agents occupy a position in regard to station agents somewhat analogous, insofar as authority goes, to the position of master mechanic or roadmaster in their departments. The supervising agents, however, act both as traveling inspectors and as superior officers to the agents. The saving in injuries to persons is in part due to the campaign for safety first which the New York Central has been carrying on, and in part to the success which has been met with in getting the co-operation of magistrates and town authorities in the suppression of the trespassing evil.

Maintenance of way cost $13,870,000 in 1914, a decrease of $3,394,000 as compared with 1913, and maintenance of equipment cost $21,598,000, a decrease of $1,726,000. The smaller maintenance of equipment charges are almost exactly proportionate to the smaller mileage and are the result of the reduction in cost of repairs of locomotives and of freight-train cars and to a reduction in the charges for retirements of locomotives, fewer engines being scrapped in 1914 than in 1913.

The reduction in maintenance of way expenses looks large. It is, however, the result of two distinct factors. One of these is the smaller expenditure for what may be called maintenance proper, that is, renewals of rails, ties and ballast, made necessary to maintain the same standard, and the wages of trackmen engaged entirely in maintenance of roadbed and the temporary discontinuance of the general program for the betterment of the property, part of which representing renewal in kind being chargeable, of course, to maintenance. It is estimated that the amount of the reduction in maintenance proper in 1914 as compared with 1913 was about $1,700,000, and that the remainder of the reduction is accounted for by the suspension of betterment work involving charges to maintenance. Thus, a saving of $394,000 in the maintenance charge for station and office buildings is largely accounted for by the charges in 1913 necessitated by the improvement work and replacement work at Utica, N. Y., and Rochester. The saving of $342,000 in maintenance charges for signals and interlocking is largely due to the fact that in 1913 a large mileage of lock and block system was replaced with automatic block, necessitating extraordinary charges to maintenance. Much of the saving in charges for rails and for other track material is due to the suspension of the programme of relaying branches and yards with heavier rail to bring up the average standard of the whole system.

In 1914 the New York Central spent a total of $15,442,000 for additions and betterments chargeable to capital account. Of this, $7,886,000 was on account of equipment and $7,556,000 on account of road and structures.

THE LAKE SHORE.

The Lake Shore & Michigan Southern earned total operating revenues in 1914 of $51,524,000, a loss as compared with 1913 of $7,829,000, or 13.19 per cent. As was the case with the New York Central, the loss in freight revenue was proportionately larger than in passenger revenue, the total freight revenue in 1914 amounting to $31,980,000, or 16.94 per cent less than the freight revenue in 1913. The total tonnage of freight carried amounted to 33,818,000, or 21.52 per cent less than in the previous year, and the average haul was slightly shorter in 1914 than in 1913, being 162 miles as against 163.6 miles. The total ton mileage, therefore, was less by 22.59 per cent. The average revenue trainload was 698 tons as against 689 tons the year before, and the total trainload, including company freight, was 743 tons as against 735 tons the year before. The saving, therefore, in freight-train mileage was a little greater than the loss in ton mileage, being 23.5 per cent. The accompanying table shows the percentage of each class of operating expenses for both the Lake Shore and the New York Central to total operating revenues.

	1914		1913	
	N.Y.C.	L.S.	N.Y.C.	L.S.
Maint. of way and structures	12.30	10.80	14.07	12.84
Maintenance of equipment	19.16	21.11	19.01	21.08
Traffic expenses	1.65	1.86	1.86	1.81
Transportation expenses	37.12	35.49	37.14	34.96
Miscellaneous expenses	1.86	1.14	1.80	1.12
General expenses	2.45	2.77	2.26	1.86
Total	74.54	73.17	76.14	73.70

Operating income for the New York Central in 1914 amounted to $22,543,000, or but $369,000 less than in 1913, and operating income for the Lake Shore amounted to $11,421,000, which is less by $2,073,000 than in 1913. The Lake Shore paid $6,000,000 in dividends in 1914, which, of course, went to the New York Central, as against $9,000,000 in 1913, and had a surplus of $1,125,000 as against $3,488,000 in 1913. The loss, therefore, in total profit was $5,363,000. The loss in profit (net corporate income) on the New York Central, exclusive of the $3,000,000 less received from the Lake Shore, was $1,555,000, making a total decrease in the amount available for dividends for the combined system of $6,918,000.

At the end of the year the Lake Shore & Michigan Southern had cash on hand amounting to $6,591,000 and loans and bills payable of $52,805,000. The New York Central has cash amounting to $16,079,000, and loans and bills payable of $60,510,000. Since the close of the year the new company—the New York Central Railroad—sold $100,000,000 6 per cent convertible debentures (see *Railway Age Gazette*, February 12, page 253). The proceeds of this sale, therefore, were nearly sufficient to pay off loans and bills payable.

The following table shows the principal figures for operation for the New York Central & Hudson River in 1914 and 1913:

	1914	1913
Mileage operated	3,774	3,753
Freight revenue	$62,384,617	$69,138,506
Passenger revenue	33,309,634	36,075,364
Total operating revenue	112,741,051	122,683,809
Maint. of way and structures	13,869,996	17,263,640
Maintenance of equipment	21,598,429	23,324,676
Traffic expenses	1,864,687	2,284,421
Transportation expenses	41,846,479	45,564,015
Miscellaneous expenses	2,094,827	2,201,031
General expenses	2,758,688	2,776,653
Total operating expenses	84,033,106	93,414,436
Taxes	6,162,220	6,356,546
Operating income	22,542,846	22,912,827
Gross income	36,674,325	39,581,056
Net income	8,688,672	13,243,558
Dividends*	8,458,890	11,243,021
Appropriations	24,347	.....
Surplus	205,435	2,000,537

*The last quarterly dividend on the New York Central & Hudson River stock was not declared by the old company but was declared by the new company and therefore is not included in the dividends in 1914.

The following table shows the principal figures for operation for the Lake Shore & Michigan Southern in 1914 and 1913:

	1914	1913
Mileage operated	1,852	1,853
Freight revenue	$31,979,888	$38,490,184
Passenger revenue	12,735,522	13,426,215
Total operating revenue	51,524,286	59,353,110
Maint. of way and structures	5,561,823	7,623,194
Maintenance of equipment	10,877,317	12,510,549
Traffic expenses	960,220	1,074,108
Transportation expenses	18,284,602	20,748,911
Miscellaneous expenses	589,774	664,501
General expenses	1,425,615	1,124,133
Total operating expenses	37,699,351	43,745,396
Taxes	2,413,900	2,126,438
Operating income	11,406,063	13,481,276
Gross income	19,012,176	23,954,488
Net income	7,124,874	12,488,340
Dividends	6,000,000	9,000,000
Surplus	1,124,874	3,488,340

NEW BOOKS

Poor's Summary of Investment News. Compiled by Poor's Railroad Manual Company, 535 Pearl street, New York. 558 pages, 6 in. by 9 in. Bound in cloth. Price $5.

This is a reprint of the news items that have appeared in Poor's Daily Summary from April 1 to December 31, 1914, inclusive. The book is made up of a large number of news items pertaining to matters affecting the financial condition of the principal investment corporations, taken from financial and daily papers

all over the United States and Canada, presented in condensed form in alphabetical order for quick reference. Under the names of the various companies the items are presented in chronological order. This book is intended to supplement the information given in Poor's railroad and industrial manuals, for the benefit of those who desire recent information in connection with the information given in reference books. It also, of course, gives a record of rumors, newspaper reports and other news that never gets into the reference books.

Proceedings of the American Railway Bridge & Building Association. Compiled and published by the association, C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Size 6 in. by 9 in., 312 pages. Bound in paper and cloth. Price $1.

This volume contains the proceedings of the twenty-fourth annual convention of this association held at Los Angeles, Cal., October 20-22, 1914, and includes reports and discussions on the subjects of Railroad Ice Storage Houses; Warnings for Overhead and Side Obstructions; Reinforced Concrete Bridges; Mechanical Coaling Stations; Care of Traffic and the Construction of Bridges to Eliminate Grade Crossings; Water Pipe, and Concrete Posts, Poles and Signs. The report on Railroad Ice Storage Houses is specially complete and forms a valuable addition to the literature on this important subject.

The Arguments For and Against Train-Crew Legislation. Bulletin No. 73, issued by the Bureau of Railway Economics, Washington, D. C. 44 pages, 6 in. by 9 in. Bound in paper.

In 1913 the Bureau of Railway Economics issued Bulletin No. 53, entitled "The Arguments For and Against Train-Crew Legislation." There has been a large demand for the bulletin, and whereas such legislation continues to be sought by the Brotherhood of Railroad Trainmen, the bulletin has been revised and the information has been brought up to date in Bulletin No. 73. Following the repeal of the train-crew law in Missouri by referendum vote, the brotherhood has been advocating in some states train-limit bills as substitutes for or in addition to train-crew bills. The bulletin states that practically all of the arguments advanced against train-crew legislation apply with equal or greater force to bills to limit the number of cars in a train or the length of a train, and that there are also strong arguments against train-limit legislation which do not apply to train-crew legislation. The bulletin gives the history of train-crew legislation, and discusses the various arguments for and against it under the following chapter headings: Changing Conditions of Train Operation; Train Crews Under Present Conditions; Effect of Train-Crew Legislation; Issues Involved in Train-Crew Legislation; Train Crews and Accidents; State Action on Train-Crew Legislation and Train-Crew Legislation Vetoed by Governors.

Information. Compiled by the publicity department of the Pennsylvania Railroad. 200 pages 6 in. by 9 in. Bound in cloth.

Under this title the Pennsylvania Railroad has bound in book form a series of leaflets issued during the year 1914 by the Pennsylvania Railroad System in the interest of improved service, increased efficiency and a better understanding by employees and the public of railroad problems. The following articles are included in these leaflets: Address by R. H. Newbern on "The Pennsylvania System for Preventing Personal Injuries"; address by George D. Ogden on "How This Railroad Helps the Farmer"; an address by Ivy L. Lee on "What Can We See Ahead in Railroading?"; an address by President Samuel Rea on "The Necessity for Constructive Policy in the Practice of Public Regulation"; and articles on "What the Pennsylvania Railroad Does for Safety"; "The Paramount Cause of Deaths on American Railroads"; "How This Railroad Safeguards Its Employees and the Public"; "Digging the Railroad Out of the Snow"; "Some Incidents in This Railroad's Daily Task of Serving the Public"; "Cleaning up the Railroad's Front Yard"; "A Description of the Annual Track Inspection in 1914"; "Moving a 720-ft. Bridge Into Its Permanent Abode," and "Improving Pennsylvania Freight Service by Providing All-Steel Box Cars."

Letters to the Editor

PRESIDENT RIPLEY ON THE STANDARD BOX CAR

Santa Barbara, Cal.

To the Editor of the Railway Age Gazette:

In the *Railway Age Gazette* of March 5 appears an article by W. R. Burnett, master car builder of the Canadian Pacific entitled: "The Standard Box Car—A Negative Viewpoint."

It is my belief that Mr. Burnett is wrong in many, if not most, of his conclusions. Our principal trouble—and perhaps the one which made everybody anxious for the establishment of a standard car—is exactly the reference to the "traffic department" that Mr. Burnett advocates. The pressure brought by shippers has resulted in cars of all sizes and sorts for the benefit of individual industries, and has been destructive of standards.

Doubtless it is desirable to combine the maximum of strength with the minimum of weight, and that is what our committee wants and is trying to do, but at present we have the extreme idea of lightness at the expense of strength, and vice versa. Moreover, most of us are not as fortunate as Mr. Burnett in being able to use our cars on our home road 90 per cent of the time. Without present access to figures, I should say that in the cases of some of our principal roads the percentages would almost be reversed. On some roads, I believe that certainly more than half the cars seen moving in trains are "foreign."

Steel framing is desirable, and perhaps may soon be universal, but it is not universal yet. Meantime wooden cars are being turned out, and their owners are collecting just as much per diem as for a better car, and we have to repair them—ergo, they should be standardized. There may be some roads so isolated or otherwise fortunate to the extent that they have nothing to gain by standardization, but I believe it will redound greatly to the benefit of most of us.

E. P. Ripley,
President, Atchison, Topeka & Santa Fe.

"STATISTICS"

Chicago, Ill.

To the Editor of the Railway Age Gazette:

Chapter II.—(With apologies to "C. C." and reference to the *Railway Age Gazette* of February 12.)

It was something more than a year later. The superintendent of the Uppannattit division walked into his office with the confident air of one who knows. The old misleading statistics were ancient history. Picking up the daily statement of freight train operation, compiled in his own office from the train sheets and wheel reports, he quickly noted in turn the performance of fast freight, local and tonnage trains, with the movement of each, the overtime in money and the potential and actual tonnage with the explanation of failure to handle full rating.

One case not fully explained was discussed with the chief despatcher, who came in answer to the buzzer. The chief scribe also came in. "Overtime showing is fine," he said. "With more business and worse weather we are showing less overtime than we did either last month or a year ago." The superintendent glanced at the neat loose-leaf book which was handed to him, placed it in his pocket, dropped its counterpart into the basket to be brought up to date on the morrow and laughed comfortably. "Yes," he said, reaching for a small blueprint. "Yes, and wage cost per hundred train-miles and per thousand gross ton-miles wasn't so bad last month, either, and train haul and car loading are both showing the results of our campaign, too." "Great business, this of knowing where you are all the time. Watch the car sheet, Billy, the empty mileage looks a little high," and tossing a cigar to each he walked out.

"The old man looks ten years younger," remarked the c. t. d., as he struck a match. "He sure was one worried man." The c. s. chuckled. "He wasn't the only man who was worried," he replied. "I guess the g. m. and I got a new lease on life about the same time."

E. H. DeGroot, Jr.

Operating Results of Canadian Railways in 1914

Falling Off in Railway Earnings and Traffic Tell a Plain Story of the Commercial Depression in Canada

By J. L. Payne
Comptroller of Statistics, Ottawa

The great European war is, incidentally, emphasizing the intimacy between trade and traffic. Railway earnings are barometric in their reflection of the commercial activities of a people. They go up or down with the fluctuations of trade. This is not generally understood. It cannot be, or there would be a better and saner appreciation of the functions of our great carrying agencies. When earnings are on the ascendant there are many who fail to see in that fact the throb of national strength and success. They are apt to cry out that the railways are wringing too much from the people and must be restrained; but in the day of adversity, when earnings come tumbling down, they are not sympathetically disposed toward the hard-hit railways. There seems to be lacking that judicial view of the case, which recognizes the soundness of balancing good years against bad years.

The railways of Canada did not earn quite as much in 1914 as they did in 1913, and in 1915 they will inevitably run considerably below the record for 1914. This loss will fall upon the people at large with just as much severity as upon the railways. There is no industry, not even agriculture, which makes such a wide distribution of its prosperity as does the railway industry, and it is equally true that the pinch of railway poverty is as quickly diffused among all classes of the community. We shall have to learn a new lesson. For more than thirty years, with the single exception of 1909, we have seen railway earnings in Canada mount upward. During the past ten years in particular they have made sensational leaps. It comes, therefore, as somewhat of a shock, a disturbing departure from what was accepted as the established order, to find that for the year ended June 30 last there was a decline of $13,619,164, or from $256,702,703 in 1913 to $243,083,539 in 1914. Operating expenses, on the other hand, were reduced by only $3,036,431; so that net earnings, as represented by the difference between gross earnings and operating cost, fell off by $10,582,733 for the year. This result created a serious jump in the ratio of operating expenses to gross earnings. That ratio in 1912 was 68.7; in 1913 it rose to 70.9, and in 1914 to 73.6.

Of course, this setback happened, as has been pointed out, after a long period of really remarkable progress. That progress is strikingly demonstrated in the following statement of gross earnings per mile of line, which has not heretofore been published:

1899	$3,608	1909	$6,018
1904	5,158	1914	7,894

The decline for 1914 was equal to $866 per mile. The story is told succinctly in the following comparison of the sources of earnings in 1913 and 1914:

	1913	1914
Passenger service	$74,431,994	$72,564,203
Freight service	177,089,373	165,753,731
Station and train privileges	1,566,721	1,044,737
Telegraphs, rents, etc	3,614,615	3,720,868
Total	$256,702,703	$243,083,539

The principal falling off was in earnings from freight service, which was due to the hauling of 5,598,721 tons less than in 1913. The number of passengers carried was actually some 471,515 more than in the preceding year, yet the volume of earnings from ticket sales declined by $2,429,134. The reason for this is found in the fact that the average passenger journey fell from 71 miles in 1913, a comparatively high average, to 66 miles in 1914. That little five miles seems to have cost the railways nearly two millions and a half of dollars.

At this juncture a few condensed facts with respect to the public service of Canadian railways may illuminate the whole traffic situation in 1914:

Tons hauled	101,393,989
Passengers carried	46,702,280
Tons one mile per mile of line	716,359
Passengers one mile per mile of line	100,309
Receipts per passenger per mile, cents	2.007
Receipts per ton per mile, cent	.742
Average receipts per passenger	$1.328
Average receipts per ton	$1.614
Passengers per train	59
Tons per freight train	353
Tons per loaded car	19.18
Cars per freight train	18.4
Average freight haul, miles	217

The tendency to centralize railway interests in Canada continues. Last year, for example, 79 per cent of all traffic and earnings attached to three corporations—the Canadian Pacific, the Canadian Northern and the Grand Trunk. The Grand Trunk Pacific is counted in with the Grand Trunk. If seven other units be taken in, the ratio rises to 92 per cent, leaving but 8 per cent for all remaining lines, nearly ninety in number. This work of absorbing the carrying trade into relatively few hands has been proceeding for a number of years, and has not aroused serious opposition. The conviction obtains in the communities more or less directly affected that it has made for better service, without in any degree causing higher rates. In the western provinces, particularly in Manitoba, there has existed for some time a hostile feeling against the Canadian Pacific, resulting in urgent appeals for lower rates. This hostility, strange to say, is not directed at all against either the Canadian Northern or the Grand Trunk Pacific, which serve the same territory and have precisely the same rates as the Canadian Pacific. The officers of the latter allege that their company is paying the penalty of prosperity. The Canadian Pacific has voluntarily made concessions, and the railway commission has dealt with the whole matter judicially; and yet the great pioneer road of the prairie provinces, of which Canadians are justly proud, has not entirely turned some of the agitators into positive friends.

The foregoing observations, apropos of the case of the Canadian Pacific, quite naturally suggest the broad question of freight rates in Canada. The average receipts per ton per mile by all the railways of the Dominion in 1914 were 0.742 cent. There has not been any material change in this fundamental factor during the past eight years, and information back of that period is not available. The tendency in rate adjustments has for a long time been downward, and while earnings were rising steadily, as the result of swelling traffic, it would perhaps have been unpopular to permit increases. Happily, Canada escaped the two cent per mile passenger rate agitation which overwhelmed so many of the state legislatures across the boundary, and carried in its train a mass of admittedly meddlesome and restrictive legislation affecting railways. The situation on this side of the line might be summed up in this conclusion: While freight rates have not in any direction been increased, there have been numerous specific reductions and also changes of classification; so that, on the whole, there has been a slight impairment of earning power. This was not resisted by the railways while the tide of prosperity was running high; but the whole matter may assume a different complexion, and properly so, in the face of serious reverses. Since the outbreak of war there have been heavy declines in earnings, and no one may say when the trend will turn upward. Of course, the productive potentialities of the Dominion cannot be destroyed,

and the return to normal conditions is obviously a matter of time; but, without reference to how and when the volume of traffic will be restored to former levels, fair play demands that the persistent rise in the cost of operation should be recognized in its full bearing on rates.

In 1899 it cost 77.9 cents to run a train one mile in Canada. In 1914 it cost $1.66—an advance of 113 per cent. During the same period earnings per train mile increased by precisely 89 per cent. Such a disparity could only be endured by the railways under very favorable conditions. Should the very unfavorable conditions which have been created by the war and other causes persist for a term of years, it is clear that the railways will be compelled to take broad and comprehensive measures for either the betterment of earnings or the reduction of operating expenses. Indeed, there are signs that steps in the latter direction have already been taken. The larger roads have not only begun the cutting down of their working staff where possible, coupled with the elimination of certain trains and other services, but they have announced the imperative need for a recasting of the scale of compensation to employees.

Speaking broadly, railway corporations in Canada have been on good terms with the various brotherhoods with which their employees are identified. They have been able to meet the demands for higher pay out of buoyant earnings. It must not be assumed that the brotherhoods, representing a high standard of intelligence, will be disposed to ignore the force of economic conditions; but it is contrary to both human nature and considerations of policy to submit to a break in the movement for larger remuneration, which has continued almost uninterruptedly for twenty years, without resistance in some form. At this stage it would be impolitic to indulge in surmise, and nothing else is possible. The issue should turn upon conditions, as to which employee and employer will be well informed; for we live, happily, in time when the operations of railways are carried on in the open.

The vitality and soundness of a large group of railways may properly be tested by the same standards which are applicable to any one of the units. That is to say, a railway would be regarded as strong and prosperous if its operating expenses fell sufficiently far below gross earnings to leave a fair balance after fixed charges had been met, provided always—and this is absolutely vital—that the balance to profit had not been realized at the expense of physical property. The railways of Canada as a whole would not shrink from such a test. Indeed they appear to advantage when it is applied. In 1914 the ratio of operating expenses to gross earnings was 73.63 per cent, and that result was achieved after more than ordinary expenditures had been made for the upkeep of roadbed and equipment. In other words, net earnings have not been the result of an unsound policy with respect to operating conditions. During the past five years the outlay for maintenance of way and structures and for equipment has averaged 21.02 and 20.42 per cent, respectively, of total operating expenses, and that is somewhat better than the average of United States railways during the same period. In 1914, for example, $35,292,227 was expended on way and structures, and $36,375,331 on maintenance of equipment, these outlays being equal to $1,146.07 per mile of line in the first case, and $1,181,121 in the second. It can be fairly said that there has been a persistent movement toward the best standards in all service conditions, and Canadian railways do not in any respect fall below those of the United States in all that makes for general efficiency and comfort.

During the past three years the railways of Canada have made the following additions to rolling stock: Locomotives, 1,228; passenger cars, 1,489, and freight cars, 77,032. The betterment is strikingly shown in the following comparison:

	Per 1,000 miles of line	
	1907	1914
Locomotives	156	176
Passenger cars	162	194
Freight cars	4,783	6,636

Quite as important as numbers has been the rising scale in capacity of both hauling and carrying units. For example, the average capacity of a car in freight service in 1907 was 27.6 tons. In 1914 it was 33.2 tons. Likewise, the average trainload has been raised from 260 tons in 1907 to 353 tons in 1914. The direct effect of recent large additions to equipment has been to completely silence the general outcry against car shortage which had been heard for many years; but, owing to perhaps unavoidable, but nevertheless wasteful, marketing conditions, this has been achieved at the expense of loading the railways with a heavy surplus of cars during at least four months in the year. Some of this new rolling stock came from the United States. The official return of imports from across the line for 1914 shows that Canadian railways brought in 166 locomotives, 208 passenger cars, 4,596 freight cars and 4,113 other cars from the American side, which made up a total account of $7,987,877.

Canada has been taking giant strides for a number of years in railway construction. In 1914 the addition to operative mileage was 1,491 miles, bringing the total up to 30,795. This is considerably more than the mileage of the United Kingdom, and raises Canada to fifth place among the nations of the world in the matter of railways. The increment during the past ten years amounts to 11,364 miles of line. While the distribution of this new mileage has affected all the provinces, the west has had over 70 per cent of it. That is where the need has existed, and still exists, as the result of rapid settlement. It should also be mentioned, and perhaps with warranted emphasis, that during the year under review 309 miles were added to second track, making the total 2,293, and 583 miles to yard track and sidings, the aggregate of which was thereby brought up to 7,518 miles.

Perhaps more striking than the additions to operative mileage are the facts with regard to lines under construction. The situation on June 30, 1913, and 1914 was as follows:

	1913	1914
Surveyed	6,558	11,472
Under contract	8,591	5,521
Completed	2,956	3,417
In operation	542	2,443
Total	18,648	22,853

The mileage "in operation" refers to mileage which had not on June 30 last been officially taken out of the "under construction" classification. It is quite a common thing for the Railway Commission to permit parts of new lines to handle traffic pending the completion of the whole, and also to allow completed railways to be operated for a limited period by the contractors. It is reasonable to assume, however, that at least 10,000 miles of new line now in various stages of construction will be added to official operative mileage within the next four or five years. Of course, at this juncture no one may say what effect the war in Europe will have on the whole railway situation, especially with respect to availability of capital.

Building railways nowadays is an expensive proceeding, and it should not therefore be regarded as surprising that the capitalization of the Canadian system was increased by $276,950,000 during 1914. This increment consisted of bonds, $169,145,686; common stocks, $97,794,137; and debenture stock of the Canadian Pacific, $10,050,246. By these additions the aggregate liability was brought up to $1,808,820,761. In addition there were stocks amounting to $64,637,500 and bonds totalling $88,669,809 attached to lines officially regarded as being under construction; so that the final total would be $1,962,128,070. It was definitely ascertained that the interest on all outstanding bonds was paid. Dividends for the year ran up to $30,434,601, as compared with $27,333,373 in 1913. The force of these figures is accentuated by the fact that seven years ago the aggregate of dividends was $12,760,435. Funded debt in 1914 amounted to $23,481 per mile of the lines affected, which cannot be regarded as high. Stocks had an average of $30,138 per mile.

The policy of aiding railway construction continues, and in 1914 the largest expenditure for that purpose was made since

subventions were begun. Direct cash subsidies amounted to $16,583,059, of which all but $523,260 came from the federal treasury. That, however, fell far short of the contributions which were made by the Dominion and the provinces in the form of guarantees of bonds. Parliament voted $45,000,000 of guarantees to the Canadian Northern in May last, following very much larger assistance to that company in subsidies and endorsements in preceding years. The total account for guarantees having legislative authorization reached $406,259,165 on June 30 last, of which $188,965,063 stood in the name of the Dominion. The western provinces are chiefly involved in connection with the remainder, and as these guarantees are precisely like the endorsements made in everyday life of promissory notes, it will be seen that the situation would be exceedingly serious if default should be made by the railways concerned. However, these obligations represent two things: The optimism of the west and the need for transportation facilities. Under normal conditions nothing more will happen than happens when one friend endorses for another. The west will get its railways—has, in fact, already got thousands of miles of new line by that process—and the railway corporations will pay principal and interest. The emphasis is on the word "normal." It must also be borne in mind, before the attitude of the Canadian people in respect of transportation is understood, that the Dominion government is building the eastern section of the Grand Trunk Pacific, and has expended on that account $150,000,000; that it has guaranteed the bonds of the Grand Trunk Pacific for the construction of the western section, and had actually purchased $33,116,000 worth of these bonds up to June 30 last in order to secure par value for the company.

The war, following closely upon a lull in high pressure traffic conditions—a lull which might have been wholly temporary—has disturbed the fundamentals of commerce in Canada. One does not, however, see the effects very plainly. Production seems to be proceeding. There are not many industrial establishments idle. Business is apparently being carried on as usual. But the railway barometer tells a plain story of depression, and it is infallible, as has been said. The pinch here and the slackness there are reflected from ocean to ocean in lowered freight earnings. There may not be discouragement—you certainly would not hear anything pessimistic in Canada at this time of trial—but everybody realizes that economy is necessary. At the foundation of nearly all great commercial upheavals one may find uncertainty, and that word expresses the situation just now in Canada. So far as the railways are concerned, they cannot possibly escape the constriction; and the hard part of it is that, while many begrudged them a reasonable share in the prosperity of the past decade in particular, they will look in vain for general sympathy in any distress which the great European war may force upon them. War is not like any other disturbing influence. Neither its duration nor its consequences can be gaged. Under such abnormal conditions no one may say what will be the position of Canadian railways six months hence. Everything depends on what happens in Europe.

There was one element of relative novelty in the railway situation in Canada last year which is worthy of attention in a concluding paragraph. For a number of years past the railways have been experimenting with the despatching of trains by telephone. These tests must have been satisfactory; for on June 30 last, as was definitely ascertained, 7,297 miles of line were operated wholly by means of the telephone. In addition, 5,068 miles were operated by the joint use of telephone and telegraph. Although the introduction of the telephone to this extent must represent an important change so far as telegraph operators are concerned, it is understood that an adjustment has taken place without either serious friction or hardship.

Work on the Berlin Subway.—In spite of the war, work is being pushed on an extension of the Berlin subway. At the present time work is in progress on the tube along Friedrichstrasse, Berlin's principal thoroughfare.

A ROLL OF HONOR FOR TRAINMEN

Andrew Keiser, superintendent of the Conemaugh division of the Pennsylvania Railroad, Pittsburgh, Pa., has established in the train service of his division a "roll of honor"; that is to say, he has reversed the common practice of publishing information about the bad conduct of those employees who have to be disciplined, and instead publishes a list of the names of those men who have performed their duties satisfactorily for a year without any occasion for censure or punishment.

Mr. Keiser's primary motive appears to have been the hope of reducing the number of cases of discipline. In the railway service the object in giving prominence to punitive discipline is to warn other employees and give them the information, instruction or incentive which shall make them avoid the errors which are shown up; and Mr. Keiser hopes that equally satisfactory warnings can be given by publishing the evidence of satisfactory service rendered. The hope of reward—and a place on the roll of honor is a reward—should be as strong an incentive as the fear of punishment.

Concerning the operation of the new plan Mr. Keiser writes:

"In carrying out the idea there was prepared an "honor roll" containing the names of all employees who had been in active train service during the entire year 1914 without being disciplined; and the list contains the names of a very gratifying majority of a total of 709 employees in active service the entire year. The rosters show a total of 1,145 such men in that service during the year, but only 709 of these were in active service during the whole period, and it was necessary to use the smaller figure in preparing the statement in order that it might be on an equitable basis. It would not be fair to compare a man in this respect, who had been in the service, for example, only a month or two, with one who had served the entire year.

"In connection with the 'honor roll' the superintendent issues the following appeal:

"This HONOR ROLL is to be issued annually. You are all earnestly requested to assist in making subsequent honor rolls still larger, thereby individually reaping the benefits as well as increasing the efficiency of our work.

"To keep up the interest in the scheme it was deemed advisable to issue a monthly supplement, briefly placing before the men anything in the way of good results obtained because of their satisfactory service, and the January supplement reads:

"The discipline found necessary to impose on train employees during the month of January, 1915, as compared with January, 1914, shows a decrease of 73 per cent, and the value of time so lost to employees concerned and their families, a reduction of $1,340.24.

"This favorable showing is very gratifying to the management and one which train employees should be proud of.

"The record for the month of February will compare very favorably with those shown in January.

"The honor roll and the monthly supplements are posted under glass in the offices of superintendent, trainmaster, assistant trainmasters, road foreman of engines and engine house foreman.

"No change has been made in the manner of considering and applying discipline in the usual manner. It is believed that this is necessary as a means of properly controlling a small percentage of the men involved, usually the younger element. . . ."

American Foreign Commerce.—An analysis of the foreign commerce of the United States in the American fiscal year 1914 shows that vessels flying the British flag carried 53.45 per cent of the imports and exports of the United States during that period. The corresponding proportion carried by German shipping was 13.79 per cent; by American shipping, 9.26 per cent; by French shipping, 4.64 per cent; by Dutch shipping, 4.10 per cent; by Norwegian shipping, 3.49 per cent; by Japanese shipping, 2.14 per cent; by Italian shipping, 1.94 per cent; by Austrian shipping, 1.57 per cent; by Belgian shipping, 1.27 per cent; and by all other shipping, 4.35 per cent. The analysis extending in the fiscal year 1914 to American imports and exports represented an aggregate value of $3,785,469,000.

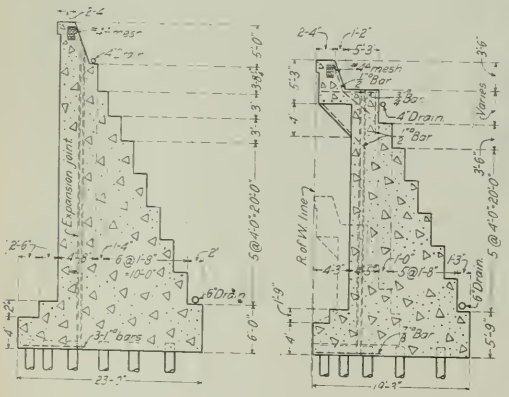
Rock Island Track Elevation Work at Chicago

Unusual Progress Made in First Year's Work on an Eight-Year Program Involving an $8,000,000 Expenditure

Although the track elevation project which the Chicago, Rock Island & Pacific now has under way in Chicago involves unusual difficulties in the size and complicated character of the structures and the amount of traffic to be handled, the first two tracks on the first section of this project were placed in service on the upper level before the close of the first season of active work. To do this it was necessary to build one line of retaining

Looking South Over the Seventy-Ninth Street Crossing Before the Elevation of the Tracks of Either Road Showing Temporary Diversion South of Crossing

wall and seven street subways in addition to a three-level structure at the crossing of the Chicago & Western Indiana and Seventy-ninth street, involving a total concrete yardage of 73,000, and to place 231,000 cu. yd. of filling material without interruption to the heavy main line freight and passenger traffic of ten roads on the two lines, aggregating over 500 movements with

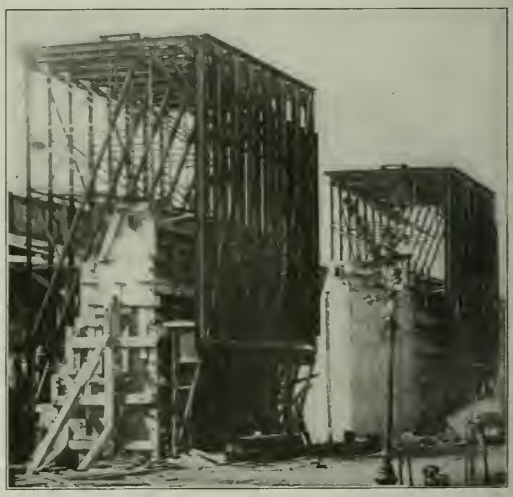


Cross Section of the Standard and Cantilevered Retaining Walls

about 7,000 cars in 24 hours over the Seventy-ninth street grade crossing.

As outlined in a description of the organization for this project in the *Railway Age Gazette* of March 13, 1914, this section including the main line between Seventy-second and Eighty-fourth street is the first item in a construction program covering about eight years' time and requiring an expenditure of over $8,000,000 to elevate the main line south to Ninetieth street and the South Chicago and the suburban branches. With the exception of the concrete pile driving and some portions of the steel erection, the work thus far has been handled by company forces under the chief engineer through a track elevation department and the program laid out at the beginning of the year was carried out with very little change. The remainder of the fill and subways and the west wall will be completed during the coming season and from then on short sections of the remaining lines that are under ordinance will be taken up in succession to complete the whole project in the specified time.

The first section was made exceptionally difficult by the presence of the Western Indiana crossing which required the design of a complicated structure, increased the necessary elevation considerably, involving high retaining walls, abutments and subway columns and added to the problem of handling the company's own traffic during the work, that of keeping trains moving over a very busy cross line and of changing both lines to



Two Sets of the Traveling Steel Forms Used in Construction of High Retaining Walls

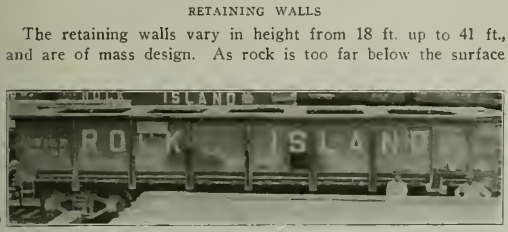
temporary locations where interference with the work would be avoided.

Although some preliminary work had been done before, the work was not actively pushed until March 31, 1914, when the three main tracks of the Rock Island were shifted west a maximum distance of about 80 ft. at the Western Indiana crossing. A construction trestle was driven along the east side of the right of way, the fill placed from this trestle being kept from encroaching on the operating tracks by tie cribs which reached a maximum height of 18 to 20 ft. At the completion of the first track over the new grade in November the northbound traffic was turned over it, and a short time later the second track was put in service. The fill was made wide enough for a third track which is to be used in widening the fill and handling materials for completing the subways and building the west wall. At the time of the first shift of the Rock Island tracks, the four Western Indiana tracks were shifted south to make pos-

sible the construction of the footings for the north abutment and three of the four piers for the structure which carries the Rock Island over the Western Indiana and the latter over Seventy-ninth street. As soon as the work on the north end of the bridge had advanced far enough the four tracks were shifted back to the bays between the new piers and the south end of the bridge was then finished.

RETAINING WALLS

The retaining walls vary in height from 18 ft. up to 41 ft., and are of mass design. As rock is too far below the surface



One of the Steel Gondola Cars Fitted with Improved Runways Leading to the Mixer

to be reached, all walls over 20 ft. high are founded on concrete piles. The footings for the walls, piers and abutments required 350,000 ft. of Raymond piling. These piles were loaded with 21 to 25 tons.

All telegraph, telephone and signal wires will be carried in a six-way vitrified clay duct which was embedded in the wall near the top. Two tile drains were provided, one 4-in. line on the first offset from the top and one 6-in. line approximately at the ground surface. These lines were laid with burlaped joints to accurate grade and were covered by coarse material. In addition, the back of the walls was waterproofed.

Where the width of right of way prevented the use of the ordinary section of wall on account of the extended toe, a special "gooseneck" section was adopted. The lower portion of this wall has the same section as the standard design, but on this gravity wall is carried a cantilevered top with the face of the parapet extending 1 in. beyond the extreme edge of the toe and 4 ft. from the vertical face of the body of the wall. This cantilevered section is of 1:2:4 concrete reinforced and supported at intervals of 12 to 13 ft. by concrete brackets. About 800 ft. of this type of wall was built.

In an effort to reduce the cost of concrete in these high walls and also to hasten their completion, movable forms supported on gallows frames were experimented with and proved so successful that they were used for about 60 per cent of the yardage. One set of timber forms and one of steel were provided, the principle of both being the same. With each of these forms it was possible to pour a complete section each day amounting to as much as 300 yd. in some cases. The wooden forms were designed for building 24-ft. sections, the set including two forms, one with bulkheads and one without, these being used alternately so that the sides of the latter could lap over the finished section at each end. The forms were suspended from a wooden gallows frame spanning the wall and running on rails on each side. The steel gallows frame was 35 ft. 3 in. high and the forms provided for a section length of 35 ft. The front and back sections of the frame were connected by a sliding joint to allow a variation in the distance between running rails from 13 ft. 3 in. to 20 ft. 6 in. The forms are tied together by rods running through tin tubes which were allowed to remain in concrete after the wall was finished, the ends of the holes on the outer face being filled with cement. The steel forms were made by the Blaw Steel Construction Company, Pittsburgh, Pa.

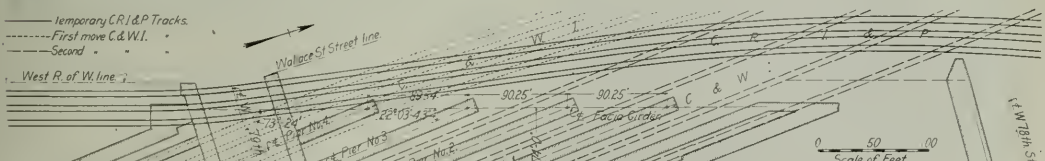
In studying methods to reduce the cost and increase the speed of the portable mixing plants used for the walls and abutments it was found that a considerable saving could be made by the use of a special runway on the gondola cars in which the concrete aggregate was shipped. With the separate side and cross planks previously used on these cars for wheeling it required from 40 min. to 1 hr. to remove the runways from one set of cars and replace them on another when loaded cars were

A Portion of the Slab Yard

switched in, the cost for this change amounting to $10 or $11. The improved runways which can be handled as a unit for each car were built up of three 3-in. planks 30 in. wide on each side with similar cross planks at frequent intervals on which the barrows are loaded. This equipment cost about $50 per car but resulted in an average saving in the cost of concrete of $0.07 per yd. through the decrease in the time of changing the runways and increased speed of the men in wheeling. It was sometimes necessary to wheel over five cars, the average time for a round trip of this length being about 3½ minutes.

SUBWAYS

Although the Rock Island main line was previously elevated to Seventy-sixth street the change in grade had to be carried back to Seventy-second street to secure the necessary elevation over the Western Indiana at Seventy-ninth street. This involved the reconstruction of the Seventy-fourth, Seventy-fifth and Seventy-sixth street subways, and in addition the grade crossings at five streets were eliminated by the construction of new bridges. The steel girders in the three old bridges were removed, the abutments raised or new ones built back of the old, and new steel-encased columns supporting reinforced concrete cross girders and slabs erected. This concrete slab and ballasted deck type was also used for four of the new structures, the fifth—



General Plan of the Three-Level Structure at Seventy-Ninth Street, Showing Temporary Track Locations

Seventy-ninth street—being carried under the Western Indiana bridge. Curb and center supports were provided at all streets.

The steel columns are carried on concrete pedestals supported by concrete piles and are encased in concrete, making them 2 ft. 6 in. square at the bottom, 2 ft. 1 in. under the capital and 3 ft. at the top. Horizontal braces were provided to stiffen the columns when necessary on account of the unusual height. The intermediate columns and all cross girders and slabs were cast in a yard in order to avoid the almost prohibitive cost of building falsework for such high structures. The end columns and facia girders and the braces were encased after erection.

General View of the Five-Span Structure Carrying the Rock Island Over the Western Indiana at Seventy-Ninth Street

placing the concrete around the assembled steel columns the encasement was poured up to the bead of the capital at one operation and this was allowed to set until the shrinkage was taken up before pouring the capital. The lifting hook pockets in the upper ends of the columns were filled with concrete after erection. The concrete encasing the braces was extended 1¼ in. into recesses in the sides of the columns.

The slab yard which is located adjacent to the material yard

The Three Levels at Seventy-Ninth Street—Rock Island Above. Western Indiana in the Middle and the Street Partially Excavated Below

near Eighty-ninth street, was operated from about March 1 to October 1, during which time 3,972 yd. of concrete was poured. The mixer outfit was operated on two tracks reaching three rows of forms. The concrete was mixed by a ½-yd. Marsh-Capron mixer operated by a gasolene engine. With the exception of the subway cross girders wooden forms were used for all parts cast in the yard. The erection of columns, girders and slabs was handled with a derrick car rated at 75 tons which was able to handle one of the 50-ton slabs at a radius of 20 ft. A total of 2,800 cu. yd. of concrete was placed during the season in this way.

ROCK ISLAND-WESTERN INDIANA CROSSING

In connection with the elimination of grade crossings with streets on both the Rock Island and the Western Indiana in the vicinity of Seventy-ninth street crossing of the two roads, it was mutually agreed to separate the railway grades by carrying the Rock Island overhead, although the cost of the work was increased by this decision an estimated amount of $1,000,000. While the Rock Island had three tracks and the Western Indiana four on the ground level, provision was made in the plans for the new structure to carry five Rock Island tracks and 10 Western Indiana tracks. The two roads cross at an angle of about 17 deg., and the Western Indiana intersects Seventy-ninth street at an angle of about 85 deg.

In considering the substructure for this bridge it was found

One Span of the Seventy-Ninth Street Structure Showing Main Girders, Floor System, One Abutment and One Pier Before Concrete Encasements Were Placed

that a mass abutment of the required height would contain over 3,000 cu. yd. of solid concrete in the intersection angle. To reduce this quantity and the resultant bearing pressure and the number of piles and also to provide space for a temporary Western Indiana track during construction, a shell abutment was adopted consisting of two rows of concrete columns with arched openings between, the space between the rows being spanned by concrete slabs. The wing walls are of similar construction, allowing the fill to spill through the opening. Reinforced concrete piers are used between the tracks with a minimum width of 3 ft. at the top and spread at the bottom to secure the necessary bearing on the concrete piles. Two of the piers at the south abutment could not be carried continuously for the full width of the bridge on account of the location of Seventy-ninth street under the Western Indiana tracks. The support for the upper

deck was made continuous over this street by locating steel columns in line with these piers and the abutment and also in line with the curb and center of street columns of the Western Indiana bridge extending down to footings below the street level. The maximum load on these columns is 848 tons. made it necessary to use caissons extending down 40 ft. to rock in four cases. Provision was made for the Western Indiana to connect the members of its steel structure to these columns wherever this arrangement was advantageous. The columns support concrete encased girders and are connected by concrete fenders.

The type of superstructure was adopted only after careful

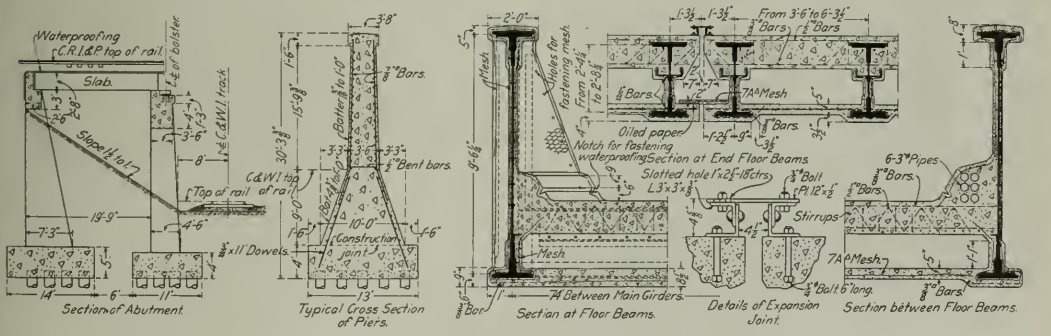
The New Suburban Station Located Under the Elevated Tracks

consideration of a number of designs. The allowable street depression, the required street clearance of 13½ ft., and the specified clearance of 17 ft. over the Western Indiana limited the elevation of the two upper decks of the structure very closely and in fixing the grade of the top deck it was estimated that every additional inch of elevation would cost $6,000.

The first type considered was a through girder structure with I-beam floor, the girders spanning two Western Indiana tracks, making them about 90 ft. long. The depth of floor in this design trough floors and one with floor beams and concrete slab deck. The floor beam and stringer designs had a floor depth of 5 ft. 2 in. In comparing their estimated cost, with the first through girder type, therefore, it was necessary to include $6,000 for each additional inch of floor thickness in excess of 3 ft. 11 in. On this basis the cost for a structure with beams perpendicular to the piers was estimated to be 4 per cent greater, and for one with the beams perpendicular to the main girders 6 per cent greater than the first design. The skewed floor beams also would have had the disadvantage of difficulty in detailing and erecting.

One of the trough floors had a depth of 4 ft. 9 in. and the other 5 ft. 3 in. Again including the cost of the additional elevation these designs were estimated to cost 7 per cent and 10 per cent more, respectively, than the through girder bridge. The floor beam and concrete slab deck with a depth of 4 ft. 10 in. was shown to have an estimated cost of only 2 per cent more than the original design and less than any of the other types. This structure was finally adopted on the basis of first cost, absence of obstructions above the deck and ease of fabrication and erection.

The assumed live loading was Cooper's E-55. The floor beams have a depth back to back of angles varying from 2 ft. 4¼ in. to 2 ft. 8¼ in. and the spacing between beams varies from 3 ft. 6 in. to 6 ft. 3½ in. The reinforced concrete floor slab encasing the tops of these beams is 15 in. thick and is supported on Z-bars riveted to the web of the beams. These Z-bars were used in preference to angles, as they serve as stiffeners and also have a greater tendency to hold the concrete close to the girder web. The top of this slab is waterproofed with a five-ply coating covered with a layer of mastic. The expansion joints are located at right angles to the girders with an offset of one floor beam over the piers. These joints consist of a 2-in. open space covered by a plate with slotted holes supported on two angles bolted to the concrete on each side of the opening. The structure carries a minimum depth of ballast of 6 in. As a protection against the gases and locomotive blasts under the bridge a reinforced concrete slab with a minimum depth of 5 in. was provided, the reinforcing bars in this slab being supported on the lower flange angles of the floor beams and the concrete covering these flanges continuously. This slab was placed with cement guns and all exposed steel work was coated by the same process. While it is impossible to foretell how long this "gunite" will protect the



Details of Design of the Seventy-Ninth Street Bridge

was only 3 ft. 11 in., but the girders required were so deep that their tops would have come above the car windows. A similar structure with 51 ft. 6 in. girders was designed with the same floor thickness and a girder depth that would eliminate this objection but the estimated cost was increased by 7 per cent, and the use of the maximum rolled sections which was necessary would have required the driving of field rivets 6 in. long through the flange of the girder. Five types without intermediate girders were considered, two having floor beams and stringers, two with steel under the severe conditions existing, it is estimated that it can be replaced at less cost than a coat of paint.

The design of this bridge had to be pushed at utmost speed. Given the strain sheet in February, the fabricated steel was delivered June 15. The detailed plans were prepared in the office of the American Bridge Company, which had the contract for fabrication, at its Gary, Ind., plant under the supervision of an experienced designer from the Rock Island bridge department who was given charge of the squad assigned to this work and

who personally checked all important details on the sheets. As an example of the class of work required in this design, only 8 field rivets per ton of steel were driven. The bridge department also had a representative in the field during the erection of the bridge who kept in constant touch with the man at the mill so that each car of steel was loaded with the pieces in the order needed in erection. In addition to the time saved in erection this eliminated the rehandling of steel which usually must be unloaded from cars for temporary storage and picked up again when needed. The bridge was erected under contract by the Ketler-Elliott Erection Company, Chicago, using a locomotive crane which also switched the cars in and out. The heaviest girder weighed about 43 tons. Under the system in use this contractor was able to erect 1,100 tons of steel in six days.

STATION

The track elevation work made necessary the construction of a new suburban station at Auburn Park, just north of Seventy-ninth street. This station is one of the best originating points for suburban traffic on the main line and it was essential that the new building be convenient and adequate in its facilities. As the right of way on this section is fully occupied by the elevated line and a suitable site adjacent to the desired location would have been difficult to secure, a somewhat novel plan was adopted, the bnilding being located at the street level under the tracks facing on the Seventy-eighth street subway and the street paralleling the east retaining wall. The accompanying photograph of this station shows how the tracks are supported over the building. Stairways from the Seventy-eighth street subway and from a special foot passageway at Seventy-seventh street lead up to the two island platforms between the tracks and a baggage elevator connects the station baggage room and the track level.

COST DATA

Detailed cost records on this work were unusually important on account of the division of expense between the roads, and in order to make the cost data of immediate value in directing operations a system was developed by which the books could be closed every night. The unit costs of all classes of work were computed every day, making possible a comparison of results at once and tending to check waste and reduce costs without interference with the progress.

Daily labor and material reports were filled out by each foreman and were received in the field construction office on the following morning. Seven of these sheets were furnished to each foreman in a paper binder each Monday morning for use during the following week. These reports showed the location and description of work, rates and hours worked, work done, material received and used, from which the labor cost, additional cost, total cost and unit cost were computed in the office and entered on the same sheet. From these daily reports monthly summaries were prepared showing the date, cost of labor, cost of material, additional charges, total cost, work done and unit cost, these sheets being indexed in a loose leaf folder according to the class of work. The final report on ledger sheets shows the date, item, work done, unit cost and debit, credit and balance, divided between additions and betterments and operation.

This work is being handled under the supervision of C. A. Morse, chief engineer, by R. H. Ford, engineer of track elevation, the bridge and masonry designs being prepared under the direction of I. L. Simmons, bridge engineer, and the station details by A. T. Hawk, architect.

Railway from Kem to Kola in Russia.—It is reported from Petrograd that the Russian cabinet has allocated the credit of $1,800,000 to the preliminary works for the construction of a railway from Kem to Kola on the Arctic ocean. It has also authorized a credit for preliminary works in connection with the building of lines from the region north of the Archangel-Vologda Railway to a point which will be selected as a port in the Government of Archangel.

LOCOMOTIVE SMOKE IN CHICAGO

The department of smoke inspection of the city of Chicago has adopted a new method of inspecting locomotive smoke in that city. Heretofore it has been the practice to assign several men to the specific duty of inspecting locomotive smoke at various times of the year. Under the new system the smoke inspectors are required to watch for locomotive smoke wherever they may be at all times. This eliminates any possibility of the railroads making special preparations during the period of inspection. Following is a list of the railroads in the Chicago district and their standing for the six months, from September, 1914 to February, 1915, inclusive:

Department Smoke Inspection, City of Chicago

	Railroad	Number of observations	Engine minutes	Smoke units	Per cent density
1	C. & N. W.	4,064	5,233.5	1,613.75	6.17
2	N. Y. C.	720	691.5	218	6.35
3	A. T. & S. F.	302	373.5	125.25	6.77
4	C. G. W.	321	435.5	149.5	6.86
5	C. B. & Q.	1,563	1,599	598.5	7.49
6	I. C.	2,199	2,256.5	953	8.44
7	N. Y. C. & St. L.	192	222.5	94	8.46
8	C. M. & St. P.	2,054	2,550.5	1,123	8.77
9	Pennsylvania	1,327	1,815.5	800.25	8.82
10	M. St. P. & S. S. M.	174	201	90.25	8.98
11	M. C.	249	295	135	9.15
12	Grand Trunk	387	545	263.5	9.67
13	C. & E. I.	257	286.5	139.5	9.72
14	B. & O. C. T.	379	617.5	309.75	10.03
15	C. I. & L.	175	187	94.75	10.14
16	B. & O.	197	306	175.5	11.47
17	C. R. I. & P.	1,077	1,091.5	637	11.67
18	I. H. B.	29	43.5	26	11.95
19	Ill. Northern	71	87.5	55.5	12.69
20	C. & A.	586	641	419	13.07
21	C. & W. I.	521	642.5	422.5	13.15
22	Pere Marquette	114	121	82.25	13.59
23	Erie	220	257	186.5	14.57
24	Wabash	403	555.5	406.5	14.64
25	C. & O.	34	31	23	14.84
26	Belt	178	232	195.5	16.85
27	C. I. & S.	29	28	29.5	21.07
28	C. J.	810	1,097.5	1,219.25	22.22
29	C. R. & I.	97	132	157	23.79
	Total	18,729	22,576	10,742.75	9.52

It will be noted that the average density for all the locomotives is 9.52 per cent. This compares favorably with the other seasonal readings, and goes to show how thoroughly the railroads in Chicago have the smoke problem in hand. The average is lower than in the summers of 1912 and 1913, and the autumn of 1912, and is higher than the autumn reading of 1913 and the summer reading of 1912, they being 5.79 per cent and 6.30 per cent, respectively. The Chicago & North Western Railway has the best performance for the first time since 1911. In previous inspections it held third, second and fourth places, respectively, and previous to 1913 it was about at the middle of the list.

Military Traffic on English Railways.—Some idea of the vast movement of troops and naval and military stores may be gathered from the remarks of the chairmen at the recent annual meetings of some of the English railways. First place is given to the London & South-Western, which company ran, up to December, 4,913 loaded specials, necessitating about 15,000 extra trains. The Great Western had run 6,684 special military trains, and the Great Eastern, up to the end of December, 2,793 special trains. The Great Central had carried upwards of 250,000 soldiers, in addition to those on short leave, more than 16,000 horses and some 1,400 service vehicles. The London, Brighton & South Coast has run over 4,400 specials and carried nearly 500,000 tons of government stores and supplies. The Metropolitan has conveyed 2,738 troop trains, and when the first expeditionary force was being moved, passed 58 troop trains on one day over the line, in addition to all the ordinary traffic. During the first fortnight in February, 2,935 goods trains were passed over the Widened Lines. The Great Southern & Western, when the first expeditionary force was being moved, ran 172 special trains, containing 60,000 men, 10,000 horses, 200 trucks of baggage and 1,100 cars of guns.

Troublesome Problems of Terminal Operation*

Necessity for Studying Conservation of Equipment, Proper Carding of Cars, Selection of Freight Solicitors

THE CONSERVATION OF EQUIPMENT

By J. E. Campbell
Freight Agent, Pittsburgh & Lake Erie, Bessemer, Pa.

The terminal expense consumes a very large part of every railroad's revenue and in some cases, such as short haul business between adjacent terminals, the operating expense is nearly all terminal expense. A careful study of terminal costs and a determination to reduce them to the lowest possible figure will probably tend more towards the prosperity of the carrier than any other effort that may be made. As traffic conditions are continually undergoing change the terminal problems are also presenting new features. Those methods which would have been the most efficient possible in a given yard ten years ago would not meet the requirements of the company and public in that yard today. This is true of every yard in the country.

The superintendent of terminals, or yardmaster, should strive to secure the largest possible results from each crew or unit of service under his jurisdiction. There should be a careful adjustment between day and night work, for the more evenly the work is divided between the two periods the fewer locomotives will be required. There is much work that can be done to the best advantage at night. Warehouse sidings, team tracks and private and industrial sidings should be switched and put in shape at that time. They will then be ready for business the first thing in the morning and much undesirable friction will often be avoided. If owners of private sidings, and industrial tracks, and agents in charge of warehouse and team tracks are educated to plan their work for a whole day it will often be unnecessary to switch such tracks until the next night. At least, by careful planning the day work on such tracks can be reduced to a minimum. Switch orders or a switching list for such tracks should be furnished each evening by the person in charge. In case of industries operating night shifts a similar work order can be furnished each morning. Much can be accomplished by educating patrons to plan their work so that unnecessary shifts will not be required.

Each crew should have its own routine work and should be trained to do that work quickly and promptly. The men should also distinctly understand that their work is not done when a particular routine has been accomplished, but that they should be ready to relieve the pressure in any other part of the yard where it may be unusually heavy. Efficiency does not result when one crew is idle and another overcrowded with work.

All work should be carefully planned. If it is necessary to switch a siding do not take out the loads, then come back and take out the empties, and a little later return a third time to place other loads and empties. Each crew should be taught how to do its work with the fewest number of moves and switches, for needless switching requires time and costs money. Empty cars should be placed upon the proper storage tracks when unloaded, and likewise loaded cars should be placed on the proper tracks for outbound trains. If the yards are of sufficient size outbound trains should be made up as cars are loaded and weighed, or otherwise brought into the yard. It is needless work to have such loads all placed in a storage yard and then switched by another crew to classification yards.

Whenever it is possible inbound loads should be delivered direct to the unloading tracks. Much can be accomplished in this direction where large consignments of bulk freight are arriving, such as ore, coal and coke for furnaces, grain for elevators, and freight for vessels at docks. Where yards are of a character that will permit, incoming trains can just as well deliver cars where they will be unloaded without additional expense by the company as to place them on a storage track for a yard crew to handle a second time. Pick-up locals can place many cars on arrival within the terminal district, and cars for connections can often be delivered direct to interchange tracks without extra handling.

It should be the aim of the yardmaster to forward every outbound load in the first train possible. This means much for his company. It gives the patrons of the road better service, it saves per diem on foreign cars, earns per diem sooner on home cars going to connecting lines and above all helps to keep the yards clear. The importance of keeping all loaded and empty cars moving cannot be overestimated. A congested yard multiplies expense rapidly and a few hours will sometimes disorganize the best managed yard if cars are not moved out when they should be. In yards where a large number of cars of a particular class, such as grain cars, coal cars, ore cars, etc., are made empty, they should be forwarded as quickly as possible. This not only is necessary to prevent congestion but to secure the greatest car efficiency possible.

The conservation of equipment is a very important function of the man in charge of any freight terminal. This is not a matter to be left in the hands of the superintendent of car service or car distributor. It is very largely a matter for the local yardmaster to regulate. While this part of the work may not show up in the expense account directly connected with his yard, and it may often be necessary to do work for which no direct credit will be received, yet it is work that greatly tends to the prosperity of the company. Foreign cars under per diem should be moved without delay. These cars often come to the road in switching territory and the per diem paid while the empty car is delayed in terminal yards consumes all or more than all the revenue derived from the shipment loaded in the car when received. In these days when there is a great demand for first-class box cars, such cars should not be loaded with rough freight when other cars are available. It often happens in time of scarcity of equipment that they are loaded with rough freight and shipments of high class freight are lost through the inability to furnish cars.

All foreign cars should be loaded and handled in accordance with general per diem rules so far as it may be advisable under conditions existing at any particular time. Where there is sufficient room empty cars should be classified on different tracks and held ready for prompt loading when required. All shop cars should be disposed of promptly; and if under load moved to the shop track promptly in order that shipments may not be unreasonably delayed. Where it is necessary to secure special equipment for outbound loading or to bring supplies from other parts of the road the requirements of patrons should be anticipated in order that there be no delay in furnishing cars. At competitive points the failure to furnish cars promptly when required often results in business moving by competing lines. Good judgment in this matter is a prime requisite as in all other matters relating to the conducting of the yard.

An important adjunct of every yard is a corps of well-trained clerks who will keep a correct check upon its operation. They should be taught that it is not sufficient to take the numbers and initials of cars in the yard but that they should know why the cars are there. No-bill cars should be investigated promptly and the necessary billing should be secured without delay. In case of hold cars the person ordering cars held should be communicated with frequently in order that they may not be lost sight of and that their release may be secured quickly. Errors in numbers, routing, and other details should be watched for and the proper corrections secured at once. The yard clerks

*Abstracts of several of the papers presented in the contest on Operation of Terminal Yards.

should see that the person in charge of the yard has every detail of the yard at his command on a moment's notice. A large accumulation of no-bill or hold cars, and cars with erroneous billing can soon develop if all of these details are not followed up with system and despatch.

ATTENTION TO THE DETAILS

By J. R. Hamilton

Terminal Trainmaster, Delaware, Lackawanna & Western, Buffalo, N. Y.

A yardmaster must work enough power to do all the important work each day. In this connection the unimportant work is hard to designate. As an illustration, the man in charge of the ash-pit may ask to have the loads pulled out and empties set in. Apparently this is an unimportant job, but he may have neglected to order the work done at the proper time. It is not done, the assistant yardmaster saying, "We will do that tomorrow." During the night the ash-pit becomes blocked, engines are delayed waiting to have fires cleaned, trains are probably held waiting for engines. The night yardmaster must take one of the regularly assigned engines from important work, and go and look up empties. Not knowing where to find them as promptly as the regular day man, he loses time with the engine. Hence the unimportant job becomes important.

All business offered by connections should be moved from the regular interchange tracks with little delay and placed on the classification tracks, where the cars should be handled in their turn as they arrive. Some of the worst delays come on account of the assistant yardmaster in charge of the classification yard clearing tracks which will be to his greatest advantage, while neglecting business that arrived at an earlier hour. All business, except that coming from connections, should be gathered up after the day's loadings have been completed. It is not economical to run after one car at a time, unless it be to get into a train which, if missed, would cause a bad delay and possibly be the cause of the company losing the next shipment to the same point. In these days, when the traffic department has nothing to offer except service, it might be considered good judgment to make special movement of an old car of scrap, wood or iron, as the party controlling such a shipment might be in position to give or withhold important business.

Trains should be made up properly classified through to destination, and when business will not suffer more than 24 hours' delay, I believe, making up full trains to one destination is an economical way to handle business.

Yard clerks are important factors in the proper handling of any terminal, and the right kind are scarce. A yard clerk should be a chap who is constantly looking for things, not a fellow who sits around waiting to be told what to do.

Car records, if properly kept, are money savers, and if not properly kept up they should not be kept at all. Interchange reports should receive considerable attention and the yardmaster should see the clerks who do this work as often as possible. Call them together at least once a month for a conference, and in order not to have the night men lose any time or rest invite them to breakfast with you at some nearby restaurant at the company's expense. It will be worth more to the company than if the same amount was added to their pay, and the benefit derived from such gatherings cannot be overestimated. It has been proved that such gatherings are beneficial for other classes of help, hence, why not for yard, interchange and car record clerks? You should be just as close to the despatcher and agents, who must depend upon you wholly, as you are to the roundhouse or general shop foreman, upon whom you must depend.

Don't refer anything to the superintendent which you are paid to look after. There will be enough matters referred to him to keep him busy. Educate those around you, such as agents, roundhouse foreman, car foreman, bridge and building foreman and general track foreman, to come to you first when they want cars moved. Don't put them off until the next day too often or they will go to some one else and you will be compelled to do what was requested. Give them the same reason for not moving their cars that you will give the superintendent when he asks regarding the delay.

All who have to do with writing orders, which will require the use of a switch engine, should be familiar with conditions, and also realize that a switch engine cannot be kept standing around waiting for something to show up. Foremen of different departments frequently do not figure ahead; hence, when they want anything it must be *rush*. A very large portion of such orders could be eliminated with proper attention on the part of those in charge.

CLASSIFYING INDUSTRIAL TRAFFIC FOR DELIVERY

By Z. Middlebrook

Trainmaster, Atlantic Coast Line, Florence, S. C.

The successful and economical operation of a large terminal is due in a large measure to the character of the man in charge. He should be affable as well as capable; should know the terminal and the patrons, and should pay the patrons a friendly call periodically. Such calls will keep him in touch with patrons as well as with his force and will quite often avoid a complaint which would sound quite ugly by telephone or mail. It is much easier to pacify a patron by discussing his troubles personally with him than to remain in the office until he has taken a strong position by mail.

To operate a large terminal successfully and economically, it is necessary to divide the industrial section into districts, each district to embrace as much territory as can be handled by one engine, and to have a schedule for each engine to work by so that shippers and consignees will be ready for the necessary shifts when the engine reaches its place of business. This schedule should be followed as closely as for a main line train.

The inbound yard should have tracks assigned for each district and men working engines in that yard should know each district and classify cars so that cars for each industry or consignee will be together and in the order in which they may be reached by the industrial engine, so that they may be placed promptly, as a great deal of industrial work has to be done on or across streets and the less switching done the better. In terminals where business warrants, it expedites the work to use an interchange engine to handle cars between the yard and the several districts. When such an engine is used it should run on a regular schedule and interchange with district engines at designated points.

Railway Construction in Peru.—The ambitious scheme once entertained by the Peruvian government, of constructing 3,000 miles of railway, and thereby bringing up the total mileage of the country to something over 5,000 (the present length does not much exceed 1,870 miles), is now said to have been put aside for the time being, owing to severe financial stringency. Some new construction is being proceded with nevertheless. The Amazon-Pacific line is getting along slowly. This line starts from a point on the Cerro de Pasco Railway, running thence to the port of Pucalpa, on the Ucayali river. Its length will be about 280 miles. When completed, it will open up the department of Loreto, and afford an outlet for the rubber, timber, tropical products, and extensive deposits of coal which are found in the neighborhood. The government has promised to subsidize the railway to the amount of $9,735,000, but the uncertain position of the national treasury and frequent changes in the industry make it seem improbable that this agreement will be carried out in its entirety. A new Transandine railway has also been surveyed, the contract for construction having been let to connect the Pacific port of Payita with points on the Maranon and Huallaga rivers, which are tributaries to the Amazon.

Locomotive and Train Supplies on the Frisco

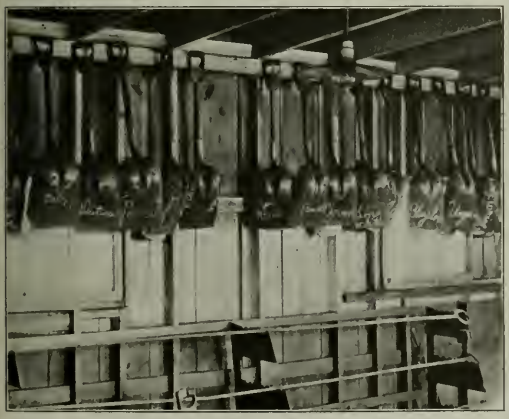
Standardization and Systematic Attention Have Improved Service and Reduced Expenses for These Accounts

The cost of locomotive supplies forms such a comparatively small proportion of the operating expenses, and these supplies are scattered over such a wide territory, that on many roads they have been overlooked in the handling of more important matters. However, systematic attention to this feature pays well not only in the resulting economy, but also because of the time and labor which may be saved in emergencies and in

Interior View of Engine Supply House

break-downs on the road due to having a complete and first class tool and supply equipment at hand.

In approaching this problem the St. Louis & San Francisco found that the cost of engine supplies during the past few years had averaged about 27 cents for every 100 locomotive miles. This is about the average for all of the railroads in the United States, but it was predicted on a basis of thorough investigation



Scoops Stored in Engine Supply House

and study that it could be materially reduced by standardizing the locomotive supplies and systematically checking and keeping the equipment on each locomotive complete and in good condition. Within a period of less than a year since the system was inaugurated the costs have dropped 25 per cent, and it is confidently believed that within another year it will be possible to reduce them to an average of 18 cents per 100 locomotive miles.

The steps which were taken to accomplish this result are of more than ordinary interest. Day and night supply men were appointed to look after the engine and train supplies at each engine terminal. The night man reports to the day man, but is also under the direction of the night roundhouse foreman. All employees who fill grease cups and lubricators and look after the drying of sand also report to the day supply man.

Typical House for Storing and Repairing Engine Supplies

Tools and oil cans which had been discarded were gathered together and it was found possible to repair and place a great number of them in good condition at a small expenditure. Steps were then taken to standardize the equipment on each locomotive and see that tool boxes were provided in which the various items of equipment could be arranged in a systematic

Engine Supply Box Under Tender Tank

manner and so that they could be checked over rapidly and accurately by the supplyman or tool checker at each terminal. Not only does this checker see that a full complement of tools is maintained on each engine, but he is expected to keep these tools in good repair. Supply houses have been constructed at the principal terminals, in which the locomotive equipments are stored when not in use and which the repairmen use as work shops and for carrying surplus stocks. These houses are cheaply but substantially constructed of scrap lumber and discarded metal car roofs. The illustrations give some idea

ST. LOUIS AND SAN FRANCISCO RAILROAD
JAMES W. LUSK, W. G. NIXON, W. B. BIDDLE, Receivers

STANDARD CABOOSE EQUIPMENT LIST

ARTICLES		Total Value	Allowed	On Hand	Surplus	Shortage
Axe and Handle		.67	1			
Bar, Steel Jack		.45	1			
Bar, Pinch		.53	1			
Barrel, Water with Cover		3 25	1			
Basin, Wash		.23	1			
Block, Jack		.10	1			
Brasses, 7" No. 10	10 lb	2 55	2			
" 8" No. 11	13 lb	3 32	2			
" 9" No. 12	20 lb	5 10	2			
" 10" No. 13	25 lb	6 38	2			
" 6" No. 30	9 lb	1 15	1			
" 7" No. 31	8 lb	2 04	2			
" 8" No. 32	8 lb	1 02	1			
" 7½" Pullman	19½ lb	2 49	1			
Broom		.21	1			
Bucket, Galv.		.24	1			
" Dope		2 03	2			
Burners, Cupola		.18	2			
" Marker		.13	2			
" No. 2 Side Lamp		.21	2			
" Lantern		.10	3			
Case for Fusees		.25	1			
Chains, Switch		6 16	2			
Chimneys, Cupola		.06	1			
" Side Lamp		.11	3			
Chisel, Cold		.15	1			
Cushion, Short		2 00	2			
" Long		11.00	4			
Flags, Red		.19	2			
Fusees, For Main Line 10 min.		1 63	24			
" " Branch " 5 min.		.85	12			
Filler, Lamp		.20	1			
Gaskets, Air Brake, For Main Line		.10	6			
" " " Branch Line		.05	3			
Globes, Lantern, White—Extra		.26	3			
" " Red "		.34	2			
Hooks, Cotton, in Cotton Ty.		.18	2			
" Packing		.04	2			
Hose, Air	13½"	4.50	3			
" Dummy	13½"	2.40	2			
" Tail		.080	1			
Irons, Packing		.08	2			
Jack, 5"		2.25	1			
Keg, Water		.60	1			
Keys, A. C. Draft		2.00	2			
Knuckles, Standard		12.12	6			
" Emergency, For Main Line		7.00	2			
" " " Branch Line		3.50	1			
Lamp, Cupola		3.04	1			
" Tail		9.00	2			
" Side		2.17	3			
Lanterns, White, Complete		2.25	4			
" Red, "		1.96	2			
Matches, Box		.01	1			
Mop and Handle		.17	1			
Nails, 8D	Lbs.	.02	1			
" 20D	"	.02	1			
Oil, Headlight	Gals.	.13	2			
" Signal	"	.28	1			
Pins, Knuckle, Standard		1.32	6			
Poles, Cotton, in Cotton Ty		1.75	2			
Rope, Switch (wire)		10 12	3			
Saw, Hand		.56	1			
Shovel, Fire		.12	1			
" No. 2 Track		.54	1			
Torpedoes, For Main Line		.21	24			
" " Branch Line		.10	13			
Waste, Cotton	Lbs	.03	½			
Wicks, Cupola and Stencil Lamp		.02	6			
" Lantern and Marker		.02	12			
" Bracket Lamp		.01	6			
Wrench, Monkey		.67	1			
Total Value, Main Line		122 45				
" " Branch Line		111 86				

July 1st, 1914. E. D. LEVY, General Manager

In the intelligent and economical use and use of tools and supplies, as well as other company property intrusted to their charge employees are furthering their own interest and advancement

Standard Equipment List Which Is Posted in Cabooses

of their construction and the arrangements for repairing and storing the material.

The supplyman meets each locomotive on its arrival at the cinder pit and checks the equipment which it carries with a standard tool list, which is reproduced in one of the illustrations. The crew is asked for an explanation as to any missing articles. The light equipment, including the engineer's tool kit, oil cans and scoops, is removed and placed in the supply house, where it is cleaned and repaired if necessary. The heavier tools and such supplies as are designated as permanent equipment are locked or sealed in tank boxes to prevent their removal from the engine while it is in the engine house. The hit-and-miss method of carrying jacks and heavy tools on the top of the tank back of the coal space has been done away with and a box opening outward has been placed under the tender side sill near the middle for the storage of these heavy and infrequently used articles, including switch chains, jacks, frogs, brasses, air hose, etc. As the box containing this equipment is sealed, and this seal is only broken when occasion arises for using some of the contents, it does not have to be checked and inspected after each trip. The location of the box makes these heavier supplies easily accessible when they are needed and allows of their being so easily replaced that there is little likelihood of their being left behind after use. The supplyman replaces the light equipment on the locomotive as it passes the cinder pit on its way to the train.

The scoops are always maintained in first class condition, as the supplyman examines them carefully after each trip and

ST. LOUIS AND SAN FRANCISCO RAILROAD
THOS. H. WEST, W. G. NIXON, W. B. BIDDLE, Receivers

Supply Foreman's Check Sheet
STANDARD TOOL EQUIPMENT FOR LOCOMOTIVES

Engine No. _____ Terminal _____ Date _____

	Permanent Equipment.	Out	In
	Water glass		
	Water glass guard		
	Shaker bar		
	Slash bar		
	Clinker hook		
	Coal pick		
	Scoop shovel		
	Emergency scoop		
	Gauge lamps		
	Water glass lamps		
	Lubricator glass guard		
	Bell cord (cotton)		
	Back curtain		
R	Classification lamps		
R	Green flag		
R	White flag		
	Red flag		
	Broom		
	Arm rests		
	Ice box		
	Water jug		
	Squirt hose		
R	Hot-box hose		
S	Push pole		
	Permanent Supplies.	**Out**	**In**
R	Tender truck brass		
	Six fusees		
	Six torpedoes		

	Permanent Tools to be Carried in Tank-box.	Out	In
	Pinch bar		
	Ratchet jack		
	Switch chain		
	Derailing frogs		
R	Wood block for grades		
R	Wood block for crank pins		
R	Wedge for raising wheels		
	Engineer's Kit.	**Out**	**In**
	Two-pound wedge peen hammer		
	Packing hook		
	Packing iron		
	12-inch monkey wrench		
	18-inch monkey wrench		
	18-inch pipe wrench		
	Double-end open wrench		
	Rod set-screw wrench		
	Coal chisel		
	Cape chisel		
	Tinware.	**Out**	**In**
	Water bucket		
	Two one-half gallon fillers		
R	Two-gallon can		
	Two hand oilers, one-quart		
	Boiler compound bucket		
	Two trenches		
	Two drinking cups		
	Red lantern		
	White lantern		
	One-gallon can headlight oil		

"R"—Articles for Road engines, only.
"S"—Articles for Switch engines, only.

Engineer.

Supplyman.

Fireman.

Form for Checking Engine Supplies

trims up the edges if they are worn or damaged. One of the illustrations shows the way in which these shovels are stored in the supply house, and it will be noted that each one has a name on the scoop. This is because the firemen find that they can do better work when they have the same shovel on every trip and they insist upon the supplymen keeping them separate. If the supplyman notices an oil can, a marker or a lantern slightly damaged he immediately repairs it, thus greatly decreasing the expense of maintaining these articles and adding to their life.

It was noticed in visiting the supply houses that each supplyman had accumulated a stock of spare parts, in good condition, of one kind or another from discarded or badly damaged devices. These extra parts are used to great advantage in making minor repairs, such as those mentioned above. The supplyman must issue the requisition for new material, which is kept in the storeroom rather than in the supply house in order that the old material may in all cases be used first.

The supplyman is required to report promptly to the general

foreman all cases of neglect on the part of enginemen properly to care for equipment. Supplymen are also expected in their leisure time to pick up any neglected supplies, serviceable or scrap, which may be noticed in the vicinity of the supply house or in making trips over the company property. Serviceable material should be returned to stock; and at the end of the month, any surplus of the various items that have accumulated during the month should be turned back to the store with the regular form of credit to the supplymen's operating accounts. By handling in this way, not only is an asset created, but supplies are made available for some other part of the system where they are actually needed.

At the end of each month reports of what has been accomplished by each supplyman are distributed to all interested. These show the total cost at each terminal, the total credits and the actual net cost for supplies, with special mention of those making the greatest savings for the month.

TRAIN SUPPLIES

Supplies carried in the caboose are handled in the same way as the engine supplies and by the same men. The only exception is that the supplies are not removed at the terminals; instead a standard list (see illustration) is posted in the caboose for the information of the trainmen as well as the supplymen, and the supplyman periodically checks the equipment, showing the amount on hand, the shortage and the surplus, returning the surplus, if any, to the store stock with a form of credit to the caboose equipment account.

It will be noted that the cost of each of the items is shown on the train supply check list. This is in accordance with the general campaign of education on the Frisco, the fundamental idea being to promote a more intense interest on the part of every employee in the operation and welfare of the property. The supplymen, in particular, are thoroughly posted as to the cost of all of the materials which they handle, and the way in which they apply this knowledge in the more efficient and economical handling of these supplies is specially noticeable.

The scheme for handling caboose supplies has been in effect for three or four months, with good results, and it is expected that as favorable a showing will be made as in the case of locomotive supplies.

All of this work is carried on under the jurisdicton of the chief purchasing officer, N. M. Rice, who has charge of stores as well as purchases.

THE FEDERAL VALUATION OF JOINT FACILITIES

By Richard J. McCarty
Chairman, Valuation Committee, Kansas City Southern

The purpose of this inquiry is to determine whether the federal valuation of the property of a subsidiary terminal company should be treated as a separate and independent thing or whether it should be distributed to the proprietary carriers in proportion to the interest of each. To place the problem in a clear light, the well known causes and conditions which lead to the use of a subsidiary terminal company will be set forth in general terms.

In order to meet the demand for minimum delay and expense to the public in receiving, shipping and transferring freight as well as the public demand for more comfort, greater convenience and less expense in traveling, it is often necessary for two or more connecting carriers jointly to construct, maintain and operate the suitable facilities. This naturally requires that the interest of each carrier shall be clearly defined; that the cost of construction and equipment shall be kept separately; that the expense of maintenance and operation shall be accurately determined and apportioned and that all conflict and confusion from joint use shall be avoided. The most practicable way of meeting all these conditions is to organize a subsidiary company to take title to the joint facilities, then to define the interests of the carriers by ownership of its capital stock and cause the subsidiary company to maintain and operate the facilities for the benefit of all concerned.

As a rule, the principal services rendered by the subsidiary company are performed for the proprietary carriers at cost and its total net returns from station privileges, switching and other public services rendered as an independent company is negligible when compared with a fair return upon the investment. Consequently, the subsidiary company generally shows a deficit which the proprietary carriers must make good.

Considered as an independent carrier, the subsidiary company is entitled to a fair return upon the so-called "fair value" of the facilities. For reasons stated, however, its operating resources are limited to its small net returns, plus the payments at cost by the proprietary carriers for services rendered to each plus their contributions for making good the amount necessary to meet taxes and fixed charges, the total of which is naturally less than a fair return. Moreover, if the subsidiary company is treated as an independent carrier, each proprietary carrier would be entitled to earn with its own property, with respect to the facilities in question, only sufficient to pay at cost for the services rendered by the subsidiary company and make good its own proportion of the deficits. As a result, nobody would receive a fair return upon the amount invested in the terminal facilities.

The only practicable remedy for this condition is for each proprietary carrier to add to its own valuation its undivided interest in the valuation of the joint property; to include in its net returns its proportion of the net returns of the subsidiary company and to treat the interest on the bonds of that company guaranteed by it as fixed charges.

As against this it might be held that should the amount invested in the joint facilities be represented principally by the bonds of the subsidiary company, the amount invested by each proprietary carrier in the capital stock would be comparatively small and the return upon that amount would be too great. The answer is that the principal and interest of all bonds of the subsidiary company must then be guaranteed by the proprietary carriers, in some cases both jointly and severally, so that the liability of each carrier would be as great if not greater than with respect to its own outstanding bonds. The objection, therefore, can be no more valid than if urged against including in the valuation of any railroad property all proceeds of bonds invested therein.

It might also be objected that to add to the valuation of proprietary carriers the valuation of a subsidiary terminal company would be a duplication. The answer is that every such duplication may readily be avoided by disregarding the subsidiary company in so far as valuation is concerned and making a record to that effect.

There are, no doubt, other specious objections to including in the valuation of a carrier its undivided interest in the valuation of a subsidiary terminal company, but none that might stand in the face of the following facts and considerations:

1. The subsidiary company is used to meet a public demand for better and less expensive service and is the best means available for that purpose.

2. Towards meeting this demand a carrier may enlarge and improve its own terminals even though this means may not be the best. In this case the right of the carrier to the valuation of the enlarged and improved facilities would be unquestioned.

3. The use of the best means to meet a public demand cannot impair any rights which a carrier has through the use of inferior means to meet the same demand.

In view of all that has been set forth it seems clear that the valuation of the property of a subsidiary terminal company should be divided among the proprietary carriers in proportion to the respective interest of each.

Railway Service in Belgium.—Through train service, with sleeping and dining cars, has again been established between Berlin and Brussels.

Hearing on Western Freight Rate Advances

Testimony on Rates on Meat Packing House Products, Livestock, Hay, Cotton Piece Goods, Coal and Coke

Testimony of railroad officers as to the reasonableness of the proposed advances in freight rates on livestock, fresh meats, packing house products, hay and cotton piece goods occupied the hearing before Commissioner Daniels at Chicago last week on the application of the western railways for advances in a number of their freight rates, and this was followed on Tuesday, Wednesday and Thursday of this week by testimony on the advances in coal and coke rates.

MEAT AND PACKING HOUSE PRODUCTS

E. B. Boyd, chairman of the Western Trunk Line Committee, testified on the advance on meat and packing house products of 3½ cents per hundred pounds. With this advance, he said, the rates on these commodities would still be far below what has been approved by the Interstate Commerce Commission as a reasonable relationship between class rates on similar commodities in the West as compared with the East.

Mr. Boyd made this showing on third class traffic and fresh meats, and between fifth class traffic and packing house products from western points to Chicago, with the actual rates applying for equal distances east of Chicago, where the rates already have been approved by the Interstate Commerce Commission. Mr. Boyd introduced similar figures showing that the same discrepancies in favor of packing house products and fresh meats in the West and Southwest existed when the rates charged for hauls west and southwest of St. Louis were compared with those charged on the even more densely moving traffic eastward from St. Louis. As a result of these excessively low rates on packing house products and fresh meat, Mr. Boyd showed that the earnings accruing to the railways from the handling of this expensive traffic are among the lowest of all the commodities hauled by these railways belonging to similar classifications.

"Using an average distance of 325 miles, as approved by the Interstate Commerce Commission in a previous case," said Mr. Boyd, "the gross revenue per ton mile, not including empty car haul, on packing house products, is only .549 cent, while with the empty car haul included the gross revenue per ton mile sinks to .372 cent. Against these figures a few other commodities in the same class as packing house products return a gross revenue per ton mile, including and excluding, respectively, the empty car haul, as follows:

	Excl. Empties	Incl. Empties
Iron and steel articles	.825 cent	.743 cent
Petroleum oil	.613 cent	.548 cent
Pickles	.687 cent	.603 cent
Other articles, fifth class	.687 cent	.603 cent

"The same discrepancy in earnings is shown if we compare the gross earnings per ton mile on fresh meats with other articles properly belonging to third class. Not including the empty car haul, fresh meats return a gross revenue per ton mile of .477 cent, while if the empty car haul is included, the gross revenue per ton mile is only .314 cent. This compares with other commodities of the third class as follows:

	Excl. Empties	Incl. Empties
Agricultural implements	.766 cent	.665 cent
Oil cloth	.795 cent	.712 cent
Other articles, third class	.994 cent	.863 cent

Mr. Boyd's testimony applied to conditions prevailing on the railways operating west of Chicago and was corroborative of testimony introduced by F. A. Leland, chairman of the Southwestern Tariff Committee, as to conditions in the Southwest.

The present rates, it was further contended, are far below what they should be, considering the character of the traffic, the nature of the service and the rates in effect on other carload traffic of similar classification. The traffic requires a very expedited service, and therefore the train tonnage must be low, while the cars are much heavier than those used in other traffic, in addition to about three tons of ice per car, while the cars must be stopped often in transit for re-icing. Because of the high value and perishable nature, the damages are high. The traffic, therefore, it was contended, is of a very expensive nature and the freight charges represent an unusually small proportion of the value of the commodity transported.

C. E. Spens, assistant freight traffic manager of the Chicago, Burlington & Quincy, testified on livestock rates. The advance asked on livestock rates is generally a maximum of 2½ cents per hundred pounds, grading from that down to a fraction of one cent.

"Livestock tonnage in the United States is practically standing still," said Mr. Spens, "so there is no increase in the industry to be looked for and no hope of increasing the revenue from a growing traffic. The department of agriculture estimates as to livestock on farms, all stock yards records, and the loading figures of the railways, tell the same story. The Burlington handled less livestock in 1914 than in any other year for 10 years, except 1910, when the traffic was practically the same as in 1914. In our opinion this commodity does not contribute its proper proportion to our revenue, based on the cost of transportation, the value of the service to the shipper, or in comparison with other carload freight. A special livestock car can be used for little other traffic, special facilities are required, as stock yards, chutes, side tracks and other facilities, not required for other freight. Livestock requires greater care in transit, and there is greater hazard connected with its transportation. Free transportation must also be given to caretakers.

"The loading of livestock is greatly below the average of other carload freight and the cost of transporting freight depends largely upon the loading that can be secured. The percentage of empty to loaded mileage also is much greater on stock than on closed cars. Trains, moreover, cannot be loaded so heavily as with dead freight, which fact, coupled with the greater expedition required, makes an increased cost. Cars must be cleaned and frequently disinfected and federal statutes as to stopping in transit to feed and water entail additional expense.

"The value of livestock has increased greatly in recent years and the greater the value of the property, the greater the value of the service to the shipper. While it may be urged that the cost of producing livestock has increased, the cost to us of the service performed has increased also, but so far without any increase in our compensation. On the contrary there has been a decrease."

Mr. Spens submitted figures covering receipts for 15 years at the Chicago stock yards, showing the average prices received per head of cattle in each of three 5-year periods. "The third period, compared with the first," said Mr. Spens, "shows an increase in the price of cattle per head of 38.78 per cent; of hogs, 42.91 per cent; of sheep, 24.82 per cent, and of horses, 43.85 per cent.

"In 1914," he said, "the Burlington furnished free transportation to 79,484 carctakers of livestock. The total value of their transportation was $419,093, or 7.8 per cent of the freight earnings on the traffic. In the same year the damages paid on livestock were $243,951, and damages for injuries to caretakers $29,028. Claims on livestock were 5.09 per cent of the revenue from the traffic, while on other freight the proportion was only 1.4 per cent.

"How light loading increases the expense is shown by the fact that while livestock traffic furnished 5.62 per cent of our total freight tonnage, it required 14.34 per cent of our freight equipment. No commodity on the entire list requires so big a proportion of equipment to handle it in proportion to its tonnage

as does livestock. On no other commodity is our net loading so light, except poultry, eggs and furniture."

Mr. Speus showed that on few commodities is the revenue per gross ton mile or per car mile so small as on livestock. Some of the comparisons are as follows, including loaded and empty mileage:

	Per gross ton mile	Per car mile
Livestock	.375 cent	8.1 cents
Fresh meat	.277 cent	8.2 cents
Dressed poultry	.694 cent	20.2 cents
Beer	.456 cent	15.1 cents
Butter and cheese	.531 cent	15.2 cents
Agricultural implements	.527 cent	15.0 cents
Total manufactures	.416 cent	18.4 cents
Household goods	.435 cent	14.1 cents

The total revenue expected by the Burlington from this advance on livestock is only 2.54 per cent of the present revenue on the traffic, and only 22 per cent of the traffic is affected.

The testimony on livestock rates was not completed on Thursday, and a question arose as to whether livestock testimony should be continued on the following day or whether the schedule, which called for testimony on cotton piece goods, should be followed on Friday. The railroads wish to continue the livestock testimony at a later date, because their witness on cotton piece goods, S. H. Johnson, of the Rock Island Lines, desired to complete his testimony and leave town on account of the sickness in his family. Clifford Thorne and S. H. Cowan, attorney for the Texas livestock interests, insisted on continuing with the livestock testimony, and said that the railroads wished to postpone it to avoid cross-examination by Cowan, who also had an engagement that would require him to leave town. Their insistence brought forth a sharp rebuke by Commissioner Daniels, who asked that more consideration be given to what is due the commission, saying, "you have no charter to be a universal nuisance." There was some speculation as to whether the remark applied both to Thorne and Cowan or to Cowan alone, as he had been the last to interrupt the commissioner.

HAY

F. P. Eyman, assistant freight traffic manager of the Chicago & North Western, said that the western railways are asking for an increase in rates on hay from western and southwestern states to Chicago, in order to complete a readjustment, the beginning of which already has been approved by the Interstate Commerce Commission in a previous case. Advances of 2 cents per 100 lb. from Wisconsin, Minnesota and South Dakota to Chicago already have been approved, but no similar adjustment of rates was made from Iowa, Missouri, Kansas and Nebraska, on account of an unexpired order of the commission, which prevented the changing of the rates on hay between the Missouri river and Chicago.

"The proposed rates from Iowa and Missouri points," said Mr. Eyman, "are no higher than the rates approved by the commission in this previous case, setting rates from Minnesota, Wisconsin and South Dakota. A comparison of rates also shows that the proposed changes on hay from western territory to Chicago are not higher, but are practically the same as rates for similar distance from Chicago eastward, although the density of the traffic east of Chicago is much greater. Thus from Watertown, S. D., to Chicago, 593 miles, the proposed rate is 25 cents per 100 lb., while from Sandusky, Mich., to Albany, N. Y., 599 miles, where the traffic is denser, the present rate is 27.8 cents. The car mile earnings on hay on the North Western were only 11.50 cents against 18.18 cents on all other carload freight in the fiscal year 1914. Hay and its related products and excelsior are the only articles in the western classification with a minimum as low as 20,000 lb. which take the Class C rating.

"There has been a decided rise in the price of hay in recent years, the Chicago price on No. 1 timothy going from $11.85 per ton in 1900 to $22.38 in 1912, though receding to $16.79 in 1914. The farm prices in Missouri rose from $6.89 in 1902 to $13.60 in 1914, and in Iowa from $6.80 in 1900 to $10.10 in 1914.

"A very small proportion of the car capacity is used for hay as compared with other commodities. Hay occupies only 39 per cent of the car capacity, while for all products of agriculture the proportion is 59 per cent. Another factor increasing the cost of handling hay is the situation at terminals, where hay is handled as a peddling proposition and sold from team tracks to small buyers. This causes greater detention of cars on team tracks than on any other commodity. The total amount of increased revenue on hay for all railroads under the proposed rate would be only $175,000."

C. C. P. Rausch, assistant general freight agent of the Missouri Pacific-Iron Mountain system at St. Louis, took the stand later to justify the increase in rates on hay from territory west of the Missouri river and from southwestern and southern territory. He testified that the advance generally is 2 cents per 100 lb., and discussed the terminal situation at St. Louis, Memphis and New Orleans. By comparison of rates he showed that the proposed charges are not relatively high, as compared with the rates from St. Louis and Memphis to the Southeast. On broom corn, he testified, the advance proposed is 5 cents per 100 lb. from eastern Colorado, western Kansas, Oklahoma, northern Texas and eastern New Mexico to the Missouri River, the East and Southeast.

D. R. Lincoln, assistant general freight agent of the Missouri Pacific Railway, discussed the advances asked on hay from the standpoint of the Kansas City terminal situation. "Hay, to a very great extent, is reconsigned," said Mr. Lincoln. "The cars must be put on team tracks for inspection, which entails a great deal of extra switching service. The average detention on hay is over four days. It must be inspected for grading purposes and special tracks must be assigned for the commodity for this purpose. At one time recently we had over 1,100 cars at Kansas City, crowding our terminal, waiting for disposition or to get on team tracks. No demurrage can be charged on these cars until they reach the team tracks."

COTTON PIECE GOODS

S. H. Johnson, assistant freight traffic manager of the Rock Island Lines, testified as to the abnormally low rates prevailing on cotton piece goods and the unusually expensive nature of this less-than-carload merchandise traffic. The readjustment on cotton piece goods comprises, first, an advance of 5 cents per hundred pounds uniformly from such points as Chicago, St. Louis and Minneapolis to Western Trunk Line territory, Kansas and Nebraska; secondly, an advance of 5 cents from Texas producing points to the Missouri river and points west thereof, 10 cents to points east of the Missouri river and west of the Indiana-Illinois line, 20 cents to territory east of Chicago, and 10 cents to the seaboard via the Gulf.

"The average value of cotton piece goods is over 60 cents per pound or $60 per hundred," said Mr. Johnson. "The first class rate from the Mississippi to the Missouri river, 300 miles, is 60 cents per 100 lbs., or less than 1 per cent of the value. The proposed advanced commodity rate is only 40 cents, or less than 6/10 of 1 per cent. On a consignment of cotton piece goods valued at $65.45 the freight rate for 300 miles, even under the advanced rate, would be only 40 cents, or 6/10 of 1 cent for every dollar."

Mr. Johnson showed by an exhibit comparing 60 commodities moving between the Mississippi and the Missouri that the ratio of freight rate to value on 58 of the 60 was greater than on cotton piece goods even under the proposed advance, the average for the 60 being 9.04 per cent against 0.6 per cent on cotton piece goods.

"Cotton piece goods," said he, "is practically the only article which moves in less-than-carload quantities which is given a commodity rate. Less-than-carload business generally does not yield as adequate compensation as does carload business generally, which is one reason why the exception from class rates in the shape of a lower commodity rate on cotton piece goods should be minimized as proposed. The relatively low earnings on less-than-carload business is shown by the fact that the rev-

enue per gross ton mile on less-than-carload merchandise is 4.23 mills, as compared with 4.55 mills on carload shipments of manufacturers. The reason is that the average load on carload manufactures is 17.43 tons, while the average load on less-than-carload merchandise is only 3 tons. On one road last year the number of cars containing less-than-carload merchandise was 445,968, which paid only $8,131,843, whereas 126,920 carload shipments of manufacturers paid $7,574,965. In other words, it took about four times as many cars of merchandise as of carload shipments to earn about the same revenue.

As to the reasons why less-than-carload shipments are more expensive to handle, he mentioned the relatively larger use of local freight train service, the cost of handling and rehandling less-than-carload freight, whereas carload freight is loaded and unloaded by the shipper, and the fact that the ratio of loss and damage claims to revenue on less-than-carload freight is more than double that on carload shipments. There is also an immense increase in the cost of accounting.

Cotton piece goods in Western Classification territory is rated as first class freight, the same as dry goods. In Western Trunk Line territory the commodity rates on cotton piece goods are generally only third class. While believing the first class rate justifiable, the roads propose to retain the commodity rate to avoid too radical an advance. The proposed change, without restoring the rate to the normal first class basis, gets nearer to that basis to the extent of the advance.

Cotton piece goods, as indicated by the various decisions of the Interstate Commerce Commission, Mr. Johnson said, have been subjected to unusual stress of competition by reason of production in such widely separated producing sections as New England, the Southeast and Texas. These three producing sections meet in strong competition in the great markets of the Middle West. In addition to this influence, there has been vigorous competition between jobbing communities tending to depress rates.

GRAIN

On Monday of this week some additional testimony to show that a number of the tariffs filed by the railways would result in actually lower rates on grain than now prevail in some localities was given by F. B. Townsend, traffic manager of the Minneapolis & St. Louis. Mr. Townsend's testimony dealt particularly with the effect of the advances on traffic from South Dakota, Minnesota and Iowa as applied to the Minneapolis & St. Louis. The total grain tonnage handled by this road in the three states in 1913, he testified, was 35,894 cars.

"The increase asked," he said, "would give practically no increase on grain in South Dakota and Minnesota, as all moves to Minneapolis, Duluth, Chicago and Milwaukee, where no increase in rates is asked from these states. Thus there is a very heavy tonnage there which would feel no increase. On Iowa grain the proposed advance would yield an increased revenue to the Minneapolis & St. Louis and the lines connecting with it to the markets where advances are made, of approximately $75,000 per year."

An elaborate analysis of the present and proposed rates from all three states to the various grain markets was presented, which showed that to many no advance would be effected, while to others present rates would actually be reduced because of the inauguration of commodity rates on grain where at present no commodity rates apply, the grain being hauled under class rates.

Export grain has lost any features of desirability it may have had in 1907 when the commission found this traffic a desirable one from a railway standpoint, said N. D. Ballantine, assistant to second vice-president, Chicago, Rock Island & Pacific. "None of the factors mentioned then," said he, "holds good today. Far from entailing no excessive cost for delivery, last season we had 2,000 cars held back on account of the embargo and congestion on export grain. Cars were held as far back as 1,000 miles from the ports. The grain heated and it was necessary to inspect all of it and transfer and elevate a large portion. We had over $2,000,000 worth of perishable grain on our hands and it entailed a large expense.

"There is an excessive empty haul on these export cars, and they are not loaded to capacity, as the commission found in 1907. The load is not more than to within 15 to 20 per cent of the capacity of the car. There is a great added expense and delay to other freight trains where side tracks are filled with empty cars, stored for export grain loading."

L. E. Wettling, statistician for the roads, submitted detailed figures showing that the total increased revenue on grain for all roads would be $2,252,493, or only 1/3 of 1 per cent of their total freight revenue.

MISPLACED RESPONSIBILITY

By J. L. Coss.

The train despatcher is held responsible for the movement of trains over his territory and in many cases for delays which are caused by conditions over which he has no control; but if he writes up the facts in their true light the men on the road will complain of "rawhiding" and the local officers may look on him as a chronic kicker. Such officers should consider some of these obstacles:

A train is called for 5 p. m. and does not get out until 5:30 or 6. The delay report shows engine not out of house in time, or waiting for way bills; or some member of the crew received a short call, etc.

A train is called out of a terminal in the face of several incoming trains so as to avoid showing a delay of power in the roundhouse.

A conductor reports ready to go at a certain station at 3 p. m. and is cleared with a handful of meet orders; but he goes to the far end of the yard and does not get out for 30 minutes.

Officers out on the line change instructions to trains, or give them some work to do without notifying the despatcher's office.

Absence of consists of incoming or outgoing trains. The despatcher does not know what he has to set out or where.

Overloading of engines, making it necessary for them to double hills and run for water.

Trains are allowed to drag along until close to the 16-hour limit; then there is anxiety to get them into the terminal and opposing trains have to be killed to do it.

Switch engines that attend to industries outside of yard limits will pop up at all times of day, with but little advance notice, sometimes without any. If you ask them how long it will take them the reply, in most cases, is "Don't know."

Late notice of advice from connecting lines of passenger reports and for which trains are held a specified time.

Side tracks which will not accommodate the length of trains handled and positive instructions that certain trains must not be sawed at these points. Often this makes it necessary to hold other trains back.

Indifference on the part of train and engine crews to the duty of advising if anything is irregular on the run, such as engine not steaming, hot boxes, etc.

Local freights holding through trains at stations while doing their work; also trains which are delayed by engine trouble or something similar holding trains behind them to avoid being run around.

There are many other things that figure to the detriment of the despatcher. Officers, in studying delays, should not confine themselves to the train sheet.

Railway Extension in Spain.—The official publication is announced in Spain of a royal order, opening a new competition for the construction of the direct railway from Madrid to Valencia. This railroad, if built, will make Valencia the undisputed seaport of Madrid, as the line will be 240 miles in length as against 306 miles as at present. The Spanish government will guarantee 5 per cent interest on the net capital investment.

"The Railroads and the Public"—A National Problem*

Essentials of Sound Public Regulation. Nothing to Be Gained and Much to Be Lost by Government Ownership

By Daniel Willard
President of the Baltimore & Ohio

The railroad is not a manufacturer or a merchant, although it may be said that it manufactures train miles and sells ton and passenger miles. It is not a producer but in a large way is rather the servant of others—the servant of the *public*. Without the public there would be no need for the railroad; without the railroad or some equally good substitute, there would be an entirely different public, as well as an entirely different state of civilization. This view of the railroad as regards its function and relation to the public seems not to have been generally held at first, and much confusion of thought resulted therefrom.

Partly because of the rapid construction of new railroads in response to the great and insistent demand for such facilities, abuses and unwise practices developed in connection with railroad management, just as they have developed in all other kinds of human endeavor.

In 1876 the Supreme Court of the United States in the leading case of Munn vs. Illinois, held that "When the owner of property devotes it to a use in which the public has an interest, he in effect grants to the public an interest in such use, and must, to the extent of that interest, submit to be controlled by the public for the common good, as long as he maintains the use." The principles announced in this decision, and in an early English one, together with the constitutional right of Congress to regulate interstate commerce, may be said to constitute the foundation of our national policy of railroad regulation.

While the government might have constructed, owned and operated the railroads had it decided to do so, as a matter of fact the government did not build the railroads, but instead invited private capital to discharge for it this public function, upon the assurance—supported by the common law—that capital so invested should be allowed to receive a fair compensation for its use, and as Commissioner Prouty has well said, "Nothing can be more unjust than to deny to this capital that right." Under our system of private ownership with government regulation, the American railway system has grown to the total of 258,000 miles of operated main lines.

The *owned* mileage with no duplications is 249,803.

REMARKABLE USE OF OUR RAILROADS

The people of the United States make greater use of their railroads than is the case in any other important country, as the following table shows:

Number of Tons Moved One Mile per Capita per Annum

United Kingdom	286
Austria-Hungary	318
France	365
Germany	582
United States	2,737

This is partly because of the greater area and rich natural resources of the United States, but chiefly because the freight rates here are so low that the difference in cost of transportation may be and often is more than offset by the natural advantages of certain regions or localities, thus making it more economical to procure our coal, ore, lumber, grain, etc., where the superior natural advantages or conditions give the lowest initial cost, disregarding largely the element of distance.

The American railway system, taken as a whole, during the fiscal year ended June 30, 1913, carried 2,058,035,487 tons of freight an average distance of 146.59 miles, and received for so doing $2,198,930,565, equal to 7.29 mills per ton mile. During the same year 1,033,679,680 passengers were carried an average distance of 33.58 miles each, for a total sum of $695,987,817, or 2.008 cents per mile. The aggregate earnings of all the railroads for the year above mentioned were $3,125,135,798 and the total operating expenses for the same period were $2,182,769,000. More than 1,800,000 men and women are employed by these carriers with an annual payroll of $1,373,000,000. The total cost of these roads as represented by "property investment" account on June 30, 1913, was approximately $16,000,000,000.

NOT OVERCAPITALIZED

The following table shows comparative cost per mile of railways in leading European countries and the United States:

United Kingdom	$277,346 (1912)	Switzerland	$120,950 (1911)
Belgium	190,914 (1911)	Germany	116,662 (1912)
France	148,625 (1911)	Austria-Hungary	96,033 (1911)
Italy	126,886 (1911)	United States	65,681 (1913)

Notwithstanding the statement so often made in the past, but much less frequently at present, that our American railroads are over-capitalized, it will be seen from the figures just given that the average capitalization or cost per mile of the roads in the European countries mentioned, is more than double what it is in the United States. This is due largely to the fact that it has been the general custom in this country to make many additions to the properties from current earnings—that is to say, from the surplus earnings from year to year that might otherwise have been distributed to the stockholders as dividends.

The railroads now pay more than $130,000,000 per year as taxes, equal to 4.3 per cent of their gross earnings, a sum, by the way, more than two and one-half times as much as the government pays all the railroads for carrying the mails.

PROBLEM OF REGULATION

The figures quoted indicate to some extent the magnitude of the undertaking which has been built up with private capital and is now devoted to public use, and on that account subject to public regulation. A policy of regulation dealing wisely and well with such a problem must, in the broader interest of all, give just consideration to the rights of all. A selfish policy, were it possible, either in the interest of the 1,500,000 security holders or of the 1,800,000 employees of the American railroads would soon cause general dissatisfaction, which in turn would find expression in laws framed to punish as well as to correct. A policy intent only or chiefly upon securing lower and still lower rates, as is sometimes urged, regardless of the rights of those whose money has made the roads possible, will inevitably fail because new capital could not be obtained under such conditions, railroad growth would stop and all industry would suffer. The Interstate Commerce Commission has said truly that "The means of transportation are fundamental and indispensable agencies in our industrial life and for the common weal should be kept abreast of public requirements."

It is the function of regulation to so evenly balance the conflicting claims of the many that the just rights of all shall be properly conserved. Certainly this presents a most intricate problem, but in my opinion one by no means impossible of solution. Since the Interstate Commerce Commission has been in existence, it has handed down a large number of opinions or decisions, and in these decisions may be seen the gradual unfolding of our federal policy of railroad regulation. I shall discuss chiefly federal regulation, because the steam locomotive and the electric telegraph and telephone have in effect eliminated state boundaries in a commercial sense, and state regulation of

*From an address to the students of Dartmouth College, Hanover, N. H., March 22, 1915.

the agencies of commerce must on that account yield largely to federal regulation and control.

FEDERAL POLICY OF REGULATION

The two decisions of the Interstate Commerce Commission in the so-called Five Per Cent Rate Case contain the essentials of a bill of rights for the roads. In these decisions and in support of what I have just said is to be found the following language:

> The proceeding before us may therefore be described as, in some sense, a controversy between the consuming public which pays the rates, and the investor who furnishes the facilities for moving the freight; and our duty is to ascertain from the record before us what are their respective rights. That, in fact, is the real railroad question—the just balancing of the mutual rights of the public and of the carriers under a national policy that permits and invites the performance of this public function by private interests. From that point of view the problems and difficulties of our railroad become public problems of great national concern. . . .
>
> The public interest demands not only the adequate maintenance of existing railroads, but a constant increase of our transporation facilities to keep pace with the growth and requirements of our commerce. If, however, that development is to be accomplished with private capital, in conformity with our traditions, nothing can be more certain than that the facilities will not be provided except under such a system of regulation as will reasonably permit a fair return on the money invested.

In harmony with the policy indicated in the general statements just read, the commission, after considering all the testimony presented, said further—

> In view of a tendency towards a diminishing net operating income as shown by the facts described we are of opinion that the net operating income of the railroads in official classification territory, taken as a whole, is smaller than is demanded in the interest of both the general public and the railroads; and it is our duty and our purpose to aid, so far as we legally may, in the solution of the problem as to the course that the carriers may pursue to meet the situation.

Speaking more definitely in the same connection the commission also said:

> There can be no doubt upon the record that the carriers in central freight association territory ought, in the public interest, to have as much additional revenue as would be produced by a five per cent increase, as modified herein, and possibly more. . . . The traveling public is giving expression to its demands for better service, better accommodations, and for the adoption by carriers of all the devices that make for safety. A public that demands such a service can not reasonably object to the payment of a reasonable compensation therefor.

The commission also suggested certain reforms and changes of practice which it was thought would tend to augment net revenues.

In the decisions or opinions in the Five Per Cent Case from which I have just quoted, may be found not only a clear statement of the railroad problem of today as defined by the commission, but also a recognition of the principles essential to and sufficient for its satisfactory solution. The commission concedes and asserts:

That there is in this country a fundamental need of adequate transportation facilities.

That such facilities during the continuance of present economic conditions can only be had by means of private capital, combined with private enterprise.

That private capital can only be obtained by the hope and realization of fair and reasonable return.

That to produce such return, freight rates may be raised, when it is shown that existing rates as a whole yield inadequate revenue, and that the higher rates proposed would be reasonable.

That such reasonable passenger fares may be charged as will yield a fair return on the property devoted to passenger use, and further—that in general each class of service, including the mail and express, should contribute its just proportion to the total economic cost of operation.

By economic cost of operation I mean all costs, including the interest or dividends paid for the use of capital invested in the plant.

The foregoing principles have been contended for by the carriers; they have been clearly and freely admitted by the commission in the Five Per Cent Rate case, and I believe when the matter is clearly understood will be just as freely granted by the general public, because I believe the public when correctly informed will be fair.

THE LABOR PROBLEM

The relations between the railroad and the shipper have, as I have shown, been very clearly defined and established, but no authoritative word has yet been spoken concerning the relations between the railroad and its employees, or between railroad employees and the public. When it is recalled that the total number of railroad employees in the United States is roundly 1,800,000, or about one-tenth of the entire voting population, and that 44 cents out of every dollar earned by the railroads, equal to $1,373,830,589 per annum, goes directly to pay labor, the magnitude of this phase of the railroad question becomes apparent.

I shall not enlarge upon this particular matter, but any discussion of the railroad question which ignored this feature would be incomplete, and any forecast of the future of the railroads which fails to take this matter fully into account will also be incomplete and unreliable. Railroad employees or many of them are required to perform duties of a more or less hazardous nature, and they are also called upon frequently to think and act quickly and to use good judgment. As a whole there is, in my opinion, no better or more worthy class of men to be found anywhere or in any employment. They are semi-public servants and as a rule serve the public well, and deserve well of the public. All this, however, should not blind the public to the fact that all elements of cost, including wages, must finally be reflected in the freight and passenger rates which the public must pay. The railroad has no other source of revenue.

ENLARGE AND REORGANIZE THE I. C. C.

If the principles established in the Five Per Cent case be generally accepted, and actually made the basis of our national policy of railroad regulation, I feel confident that the problem of how best to provide adequate service at reasonable rates will be satisfactorily worked out under the present plan of private ownership with government control, but I also believe that before this result can be fully realized, the interstate commerce law must be amended. The Interstate Commerce Commission should be enlarged and reorganized and its powers so broadened that it may be able to deal promptly and effectively with the various matters under its jurisdiction. It is not able to do so at the present time. The interstate commerce law as it is today reflects the influence in the past of a nation-wide demand upon Congress to enact a law or laws which should primarily be sufficient to protect the public from the assumed greed of the railroads, and to that end the commission has been given the power among other things to order rate reductions and to prevent rate advances.

It is right that the people should be protected from the selfishness of the railroads, but it is equally important that the railroads be protected from the unreasoning demands of the public. The commission should be given the power to fix the minimum as well as the maximum rate which the railroads may charge. It should be kept in mind that the demands of the growing commerce in this country make necessary an annual expenditure by the railroads for additions and betterments of not less than $750,000,000. If those having money to invest lose confidence in the stability of railroad securities that fact is immediately reflected in reduced railroad expenditures for additions, betterments and equipment. Such expenditures at the present time I believe are at the lowest point reached in the last fifteen years, and much below the amount necessary to maintain the existing standards of facilities and service, and while the European war has had some effect, the situation was very serious before the war broke out and reflected in no small degree the results of our general policy of railroad regulation, particularly during the last ten years.

The policy referred to has found expression not only in the acts of commissions but in the laws as well—both state and federal. In the year 1913, 1,395 bills, designed to regulate the

details of practical railroad operation, were introduced in the legislatures of the various states then in session, and 230 of those bills were enacted into law. The increases in operating expenses and taxes of railroads, due to the causes just mentioned and to wage advances, have more than counterbalanced the economies derived from additional traffic and increased transportation efficiency, leaving no increased income to apply on the enlarged property investment. No industrial undertaking can thrive, or even continue to exist, under such conditions. If the present plan of private ownership with government regulation should fail because of unwillingness on the part of the public to invest further in railroad securities, it will be no less the fault of those responsible for the policy of regulation than of those responsible for the management of the railways.

ADEQUATE SERVICE VS. CHEAPER RATES

The most serious question before the people today is not whether they are going to have cheaper freight rates in the future, but rather will they be able in the future to obtain *adequate service* at any rate. The railroads may be depended upon to furnish adequate transportation for the growing commerce and at reasonable rates, providing only they feel assured that reasonable rates will be permitted, and providing also that the cost of operation be not unnecessarily augmented by unwise legislation, as has been the case in the past, or by forced wage increases not justified by existing conditions.

The total railroad mileage of the world as last reported was 683,000 miles, of which 258,000 or about 37 per cent are in the United States. Of the total world mileage, it is estimated that about 205,000, or less than one-third, are at present owned and operated by the several governments, and there are those who urge that our railroads also should be owned and operated by the government, instead of being privately owned as at present but regulated by the government.

GOVERNMENT OWNERSHIP

Those who advocate government ownership assert that because of its high financial credit the government would be able to obtain the necessary capital at rates lower than are paid under the existing plan, but no one knows how much lower, or what the actual saving in that respect might be, or how long that condition might continue. The price of government bonds under existing conditions is not a fair measure of what the government might have to pay for money in large amounts and under open competitive conditions. The advocates of government ownership also claim that all special privileges and discriminations would be abolished. That can be as easily accomplished under the present plan—in fact, has been. They claim that the government by operating all of the roads as one system could save the unnecessary expense involved in the large number of employees now engaged in soliciting freight and passengers for the different lines. This is true, but it does not necessarily follow that the public would be the gainer thereby. The fact that our freight rates are already the lowest in the world is due very largely to the stimulus of competition, and competition would, of course, cease to exist under the plan discussed.

Beyond question, the railroads in Germany and particularly in the Kingdom of Prussia, are well maintained and well operated, but the freight rates which obtain in that country are much higher than they are in the United States. It is more difficult to make a comparison of passenger rates because the conditions of the passenger service in this country are so unlike the conditions in Continental Europe. However, when consideration is given to the different classes of service and the character of the equipment used, together with the fact that baggage is not carried free on any of the European roads as is the case in this country, I am convinced that passenger fares upon the average in the United States are no higher than they are upon the average for similar service in Europe. In no country outside of Germany, in my opinion, are the railroads operated and managed as prudently or efficiently under government ownership as is the case in the United States under private ownership with governmental control, and freight rates in the United States are upon the average much lower than those charged in Continental Europe.

Under normal conditions and with present mileage, about 2,000,000 employees would be needed for our railways, with a payroll of approximately $1,500,000,000 per annum. I doubt seriously the wisdom of placing that additional number of men upon the civil list of the government. I submit that so far the government has not demonstrated its ability to carry on large industrial undertakings better than can be done by private enterprise, and until we have tangible evidence of such superior managerial capacity on the part of the government, I think it would be a most unfortunate mistake to make the change. I do not believe government ownership of railroads in the United States is impending. I do not believe any considerable portion of the people desire it, and I do not expect to see it come unless the present plan should break down because of the unwillingness of investors to put more money in railroad investments.

However, if the principles enunciated in the "Five Per Cent Rate Case" be made the actual basis of our future national policy of railway regulation, and if the powers of the commission be so broadened as to enable it to protect the railways as well as the public, I believe railroad investments will in time become so well established that the necessary new capital can be obtained from private investors at rates, upon the average, not more than one and a half or 2 per cent above the amount which the government would be required to pay. The average rate (interest and dividend) paid in 1913 was 4.3 per cent. As against that, if the people in this country were required to pay the higher freight rates which are charged today by the government-owned railroads of Europe, the increase in freight charges would be more than three times the amount which would be saved by the lower interest rates I have suggested. An increase of only one mill per ton-mile above our present average freight rate would mean a difference of more than $300,000,000 per annum, a larger amount, I believe, than the government could possibly save by lower interest rates due to its superior credit.

The general claim is also made that, for the reasons already mentioned and others, the government could operate the roads better and more cheaply than the present owners and managers, and consequently give still lower freight and passenger rates. Undoubtedly the government could, if it desired, give lower freight and passenger rates because if the total charges collected under government ownership fell short of the amount necessary to pay operating expenses and interest on money invested in the plant, the government could, by the exercise of its power to tax, raise in that way sufficient funds to meet the deficit. We have the example of a similar case in our neighboring country on the north. For the last two years, 1913 and 1914, the Intercolonial Railway of Canada, which is owned by the Canadian government, has failed to earn its operating expenses, and of course has contributed nothing towards the interest upon the $97,000,000 which that system has cost.

Our post office has been managed in a similar way; that is to say, if there is a deficit, it is taken care of from the general fund raised by taxation.

It should be kept clearly in mind that it is the "economic cost" of transportation which the public is most deeply interested in, rather than the specific rates which may be charged. It is of primary importance that the total economic cost of transportation shall be made as low as is compatible with good service, for while the total cost may be paid wholly in the form of passenger and freight rates, or partly in the form of rates and partly in the form of taxes, in the long run it must all be paid in some form, and in whatever form it is paid, it is a burden on the people, the industry and the commerce of the country which they cannot escape. Rates, of course, may be made as low under government ownership as the people through

their government may decide, but the total economic cost of transportation, all of which the public must pay in one form or another, depends upon the manner in which the railways are managed, and not upon the question of ownership.

Now that it has come to be generally recognized that there is a very distinct and intimate relationship between the total economic cost of transportation and the rates which must be paid, the public should be furnished all of the information that is necessary to enable it to judge whether the railroads are being prudently and wisely managed. Full publicity concerning all matters of policy and management, including the raising and expenditure of new capital, will go far to insure honesty and to prevent discrimination, and no stronger motive for efficiency can be found than the natural desire for larger profits which, of course, will obtain, and properly so, with private ownership, but will be entirely lacking under government ownership.

Those who manage the railroads should realize, as I believe they do, that they occupy a dual position—that of semi-public officer and also that of trustee for the owners of the property of which they are in charge, and that in the end they will best fulfill the function of trustee by giving adequate and satisfactory service to the public.

There is no reason why we should be ashamed of our railroads as a whole. Professor Ripley says, in his recent book on Railroads: "Never in our history, and probably nowhere else in the world, has the standard of probity, the quickened sense of responsibility, both public and private among American railroad men, been more pronounced than it is at the present time." He also says: "American railways are avowedly among the best in the world."

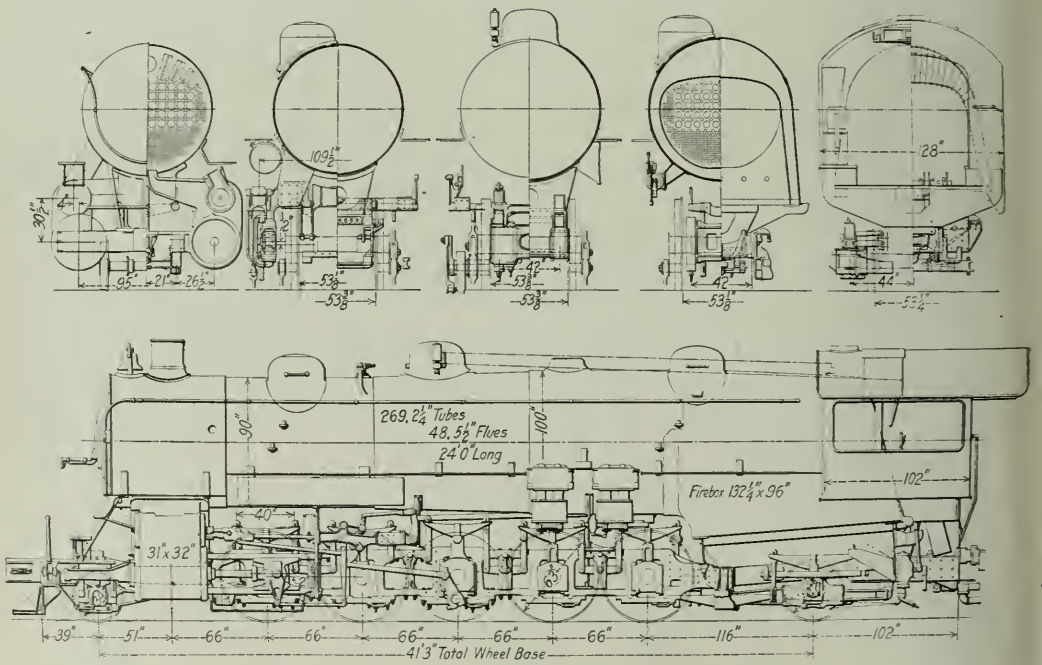
To my mind if there is any one thing distinctively American of which we should all be justly proud, it is our railway system, because, notwithstanding all that may be said against it, the fact remains that it has paid the highest wages, and sold its output—that is, transportation—at the lowest price, and at the same time has furnished more transportation per dollar invested in facilities than any other country in the world; a record, I repeat, of which we should all be justly proud.

ERIE 2-10-2 TYPE LOCOMOTIVE

The Erie Railroad has recently received from the Baldwin Locomotive Works a large locomotive of the 2-10-2 type, which is slightly heavier than the engines of this type built last year for the Baltimore & Ohio, and described on page 242 of the August 7 issue of the *Railway Age Gazette*. The new locomotive has 63-in. drivers, the largest yet to be placed on an engine of the 2-10-2 type, and by using 31-in. cylinders the tractive effort has been maintained very nearly to that of the Baltimore & Ohio locomotives. In the following table is a comparison of the leading dimensions of these locomotives:

Road	B. & O.	Erie
Tractive effort	84,500 lb.	83,000 lb.
Weight on drivers	336,800 lb.	327,250 lb.
Weight, total engine	406,000 lb.	407,700 lb.
Drivers, diameter	58 in.	63 in.
Cylinders, diam. and stroke	30 in. by 32 in.	31 in. by 32 in.
Steam pressure	200 lb.	200 lb.
Evaporating heating surface	5,573 sq. ft.	5,801 sq. ft.
Superheater heating surface	1,329 sq. ft.	1,377 sq. ft.
Grate area	88 sq. ft.	88.1 sq. ft.

The boiler of the Erie locomotive is similar in construction to that of the Baltimore & Ohio locomotive illustrated in the description above referred to. The difference in the heating surface is due almost entirely to an increase in the length of tubes, which are 24 ft. long as compared with a length of 23 ft. in the boilers of the Baltimore & Ohio locomotives. The tubes are welded into the back tube sheet. The new boiler has a conical ring in the middle of the barrel which increases the shell diameter from 90 in. to 100 in. The main dome is of pressed steel in one piece and is mounted on the connection ring, while the auxiliary dome is forward of the firebox on the



Longitudinal and Sectional Elevations, Erie 2-10-2 Type Locomotive

third ring and is placed over a 16-in. opening in the shell. The boiler contains a combustion chamber 28 in. long. The equipment includes a Schmidt superheater, Security brick arch, Street stoker, Talmage ash-pan and blowoff system, Franklin grate shaker and firedoor and Chambers throttle valve.

The cylinder castings are simple and massive in design, and are secured to the frames by 12 horizontal 1½-in. bolts each. Both the cylinders and steam chests are fitted with bushings of Hunt-Spiller gun iron and the same material is used for piston and valve packing rings. In designing the cylinders special attention has been given to the exhaust passages which are unusually direct and of liberal section area. Steam distribution is controlled by a 16-in. piston valve driven by the Baker gear and set with a lead of 3/16 in. The locomotive is equipped with the Ragonnet power reverse gear.

The reciprocating parts are comparatively light for an engine of this size. Forged and rolled steel pistons of Z-section are used. The guides are of the alligator type with a vertical distance of 20 in. between the bars. The crossheads have steel bodies with bronze gibs 32 in. in length and weigh 785 lb. apiece; this weight, although large in itself, may be considered low for the size required. The front and back main rod stubs are of the Markel type with removable brasses, the cast steel filling blocks in the main stub being cored out to remove as much weight as possible. Owing to the comparatively large diameter of the wheels and the relatively light reciprocating weights it has been possible to balance the locomotive satisfactorily without resorting to the use of auxiliary counterweights on the main axle, and lead has been used in the counter weights of the main wheels only.

The frames are Vanadium steel castings with rear sections of forged iron. The main frames are 6 in. in width and are spaced 42 in. between centers. The single front rails are cast integral with the main sections and in front of the cylinders they are bolted to a combined deck plate and bumper casting furnished by the Commonwealth Steel Company, in which is housed the Miner draft gear. Wherever possible this casting has been cored out to remove superfluous weight.

The driving wheels have a total lateral play in the boxes of ¼ in., and the first and fifth pairs have ¼ in. more play between the flanges and rails than the second and fourth pairs. The main wheels have plain tires, and in spite of the long rigid wheelbase the locomotive will traverse 16-deg. curves. The engine has the Woodard leading truck and the Cole trailing truck and the running gear details include Cole long main driving boxes.

Wherever practicable, details have been made interchangeable with corresponding parts of the Erie's latest Mikado type locomotives. Such parts include the tender trucks complete, the pilot, frame-crossties, brake shoes and heads, and the following parts except for the main wheels: driving boxes, axles, tires and shoes and wedges. Flange oilers are applied to the leading wheels and a speed recorder is operated from the rear truck.

The tender is of the Vanderbilt type, having a water capacity of 10,000 gal., and a coal capacity of 16 tons. The trucks have cast steel side frames and solid rolled steel wheels manufactured by the Standard Steel Works Company.

The 2-10-2 type, although not yet generally in use has met with marked success in heavy freight service and the large boiler capacity, together with the comparatively large driving wheel diameter of the Erie locomotive indicates the possibility of further development in this type toward sustained capacity at higher speeds.

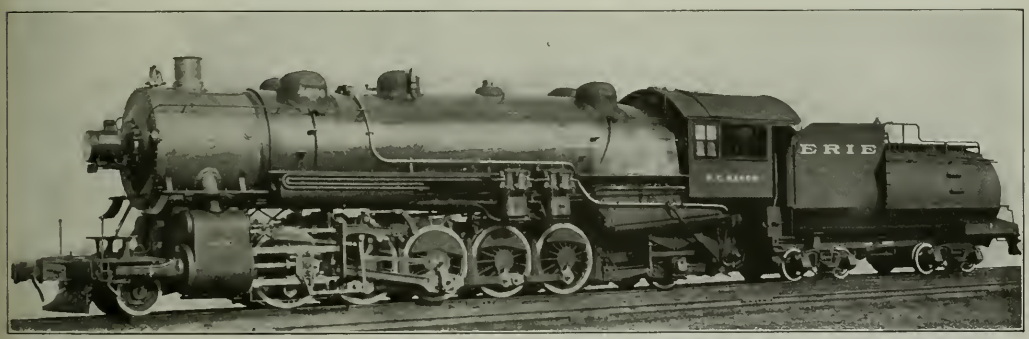
The following are the principal dimensions and data:

General Data

Gage	4 ft. 8½ in.
Service	Freight
Fuel	Soft coal
Tractive effort	83,000 lb.
Weight in working order	407,700 lb.
Weight on drivers	327,250 lb.
Weight on leading truck	24,450 lb.
Weight on trailing truck	56,000 lb.
Weight of engine and tender in working order	586,300 lb.
Wheel base, driving	22 ft.
Wheel base, total	41 ft. 3 in.
Wheel base, engine and tender	77 ft. 4½ in.

Ratios

Weight on drivers ÷ tractive effort	3.94
Total weight ÷ tractive effort	6.18
Tractive effort × diam. drivers ÷ equivalent heating surface*	664.72
Equivalent heating surface* ÷ grate area	89.29



Erie 2-10-2 Type Locomotive for Heavy Freight Service

Firebox heating surface ÷ equivalent heating surface,* per cent	3.28
Weight on drivers ÷ equivalent heating surface*	41.60
Total weight ÷ equivalent heating surface*	51.83
Volume both cylinders	27.95 cu. ft.
Equivalent heating surface* ÷ vol. cylinders	281.45
Grate area ÷ vol. cylinders	3.15

Cylinders

Kind	Simple
Diameter and stroke	31 in. by 32 in.

Valves

Kind	Piston
Diameter	16 in.

Wheels

Driving, diameter over tires	63 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	13 in. by 22 in.
Driving journals, others, diameter and length	11 in. by 13 in.
Engine truck wheels, diameter	34 in.
Engine truck, journals	6 in. by 12 in.
Trailing truck wheels, diameter	42 in.
Trailing truck, journals	9 in. by 14 in.

Boiler

Style	Conical
Working pressure	200 lb. per sq. in.
Outside diameter of first ring	90 in.
Firebox, length and width	132¼ x 96 in.
Firebox plates, thickness, sides, back and crown ⅜ in., tube ⅝ in.	
Firebox, water space	6 in.
Tubes, number and outside diameter	269—2¼ in.
Flues, number and outside diameter	48—5½ in.
Tubes and flues, length	24 ft.
Heating surface, tubes	5,443 sq. ft
Heating surface, arch tubes	37 sq. ft.
Heating surface, firebox	258 sq. ft.
Heating surface, total	5,801 sq. ft.
Superheater heating surface	1,377 sq. ft.

Equivalent heating surface*	7,866.5 sq. ft.
Grate area	88.1 sq. ft.

Tender

Weight	178,600 lb.
Wheels, diameter	33 in.
Journals, diameter and length	6 in. by 11 in.
Water capacity	10,000 gal.
Coal capacity	16 tons

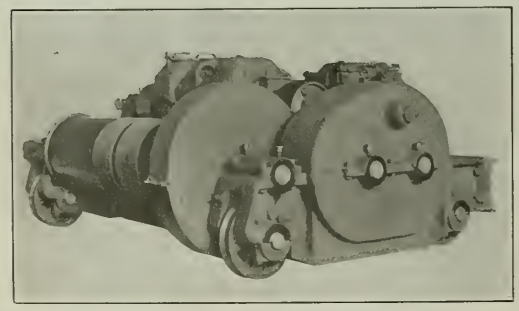
*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

ELECTRIC CRANE TROLLEY

The trolley shown in the photograph embodies a number of recently made improvements but is of the same general form as one which has been on the market for some time. It is built by the Northern Engineering Works, Detroit, Mich., and in the present form embodies the most recent crane engineering practice.

A primary consideration in the altered design has been safety, both in the way of strength and in the perfection of working parts. Durability of gears and other moving parts has been secured by enclosing and running them in an oil bath, thus protecting them from dust and grit. The construction is such that the covers of the gear cases must be in place before the gearing can be run, thus preventing carelessness in operating the trolley with gear covers removed.

Each train of back gears is rigidly mounted in a single frame, the bearings of which are bored in line, bronze lined and capped, through bolts instead of studs being used throughout. The hoisting gear train between the armature and drum gear is in a single rigid casting which insures permanent alinement. The drum gear is enclosed in a case of the same general type that is used for the hoisting gearing. All gears bear in the frame and are capped on top, no overhung bearings being used. All gear covers are castings and the joints are planed so that they are perfectly tight, thus preventing the leakage and dripping of oil from the trolley to the floor of the plant. The covers may be easily lifted, but for inspection and lubrication large manholes are provided in each cover. It has been found in



Electric Crane Trolley with Enclosed Gear Cases

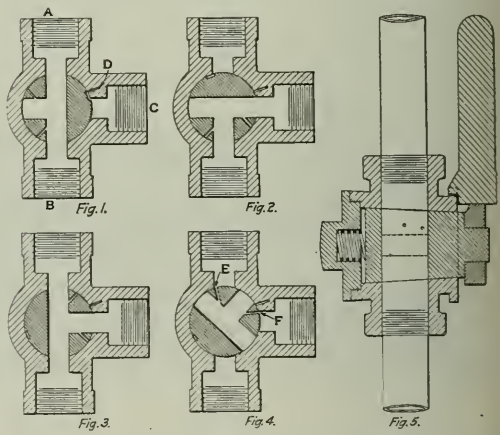
practice that a set of gears in a trolley of the enclosed type running alongside a crane having a trolley with exposed or partially protected gears lasts more than three times as long as the gears in the old type of trolley and the operation is almost noiseless. The hoisting gear box is made an integral part of the main trolley frame, thus securing permanency of alinement of all gears and their shafts.

A double system of electrical and mechanical brakes is used and the trolley is also equipped with an effective limit stop. Interchangeability has been insured by the use of standard gages and templates. The trolley is wired throughout in steel conduits. For mill service it has axle bearings either of the vertical or horizontal cast M. C. B. type. It is made in capacities from two tons to 125 tons.

SAFETY CUT-OUT VALVE

G. H. Wilson, a locomotive engineer on the Atchison, Topeka & Santa Fe, has invented a cut-out valve to replace the ordinary cut-out valve now used in the train line directly under the engineer's valve for the purpose of cutting out this valve when two or more engines are coupled to one train. The special features of the new valve are that it can be used in emergency if there is an accident to the engineer's valve; it is provided with a warning port which gives assurance that there is no train line stoppage between the rear engine and the leading engine as soon as the leading engine is cut in; it permits the rear engineman to instantly assume full control of the brakes in double-heading service, provided he finds it necessary to do so, and lastly, it is so designed that it will not be possible for the helper engine to cut off from the train until the second engineman takes control of the brakes, without the brakes being set throughout the entire train. Its use will eliminate the necessity of having a cut-out cock on the train line leading to the front end of the locomotive.

This valve is a three-way cock with the openings *A* leading to the engineer's valve, *B* to the main train line and *C* to the



Safety Cut-Out Valve for Locomotives

locomotive train line leading to the front end. Warning port *D* leads to the atmosphere, and when double-heading informs the engineman on the second engine that the engineman of the leading engine is ready to assume control of the brakes. Fig. 1 shows the valve in position for operating the train under ordinary conditions. In Fig. 2 the valve is shown in the position used on the second engine when double-heading. Fig. 3 shows the position used by the second engineman when he desires to assume control of the brakes while double-heading. In picking up cars on the head-end of the engine, the train line of these cars is chargd without disturbing the pressure of the main train line, by placing the valve in the position shown in Fig. 4. When a pusher engine is used on the rear of the train, the cut-out valve is operated in the same manner as on the second engine when double-heading. Further information regarding this valve may be obtained from Thomas Ogden, Box 252, Rawlins, Wyo.

Coal in Austria.—The congestion from lack of rolling stock in the Ostrau-Karwin district of Austria, is reported to have been somewhat alleviated, and the mines have been better able to satisfy their customers. The construction of the second line on the Kaschan-Oderberg Railway makes considerable progress in spite of the war, and the last portion of the Orlan-Oderberg section is expected to be ready in the spring.

General News Department

Mayor McMullen, of Norwich, N. Y., is engineer of a passenger train on the New York, Ontario & Western, and W. H. Kirkby, conductor of the same train, has just been elected president of the village of Sidney.

James Julian Carter, a brakeman on the Canadian Pacific, has been awarded the Albert medal, by the King of Great Britain, in recognition of his heroism is rescuing a little girl from in front of a railroad train at Tweed, Ont., some months ago.

The number of employees of the Grand Trunk Railway of Canada who have enlisted for service in the European war is about 600. These men or their families receive full pay from the railroad company for six months, and it is understood that probably the names will be kept on the payroll, at half rate, indefinitely.

The New York, New Haven & Hartford announces that a second dining car will be run on its "Merchants' Limited," the 5 p. m. train between Boston and New York, whenever the train consists of more than five parlor cars. Eastbound the second diner will be run between New Haven and Boston, and westbound between Boston and New Haven. This train now consists, on the heaviest days, of ten cars.

J. E. Long, safety engineer of the Canadian Government Railways—the Intercolonial—reports that during the first year of his incumbency, January 1, 1914, to January 1, 1915, fatal injuries to employees have fallen off from 19, in 1913, to 7, in 1914; injuries have been reduced from 695 to 523, and the number of trespassers killed dropped from 22 to 13. Mr. Long, who was formerly in the claim department of the New York Central, at New York City, is also editor of the Canadian Government Railways Employees' Magazine.

Peter M. Hoffman, coroner of Cook county, Illinois, has addressed a circular letter to various clubs and organizations in the county giving statistics of railroad accidents and pointing out the large preponderance of accidents to trespassers on railroad property. He encloses a copy of a bill which is before the Illinois legislature to prohibit trespassing and urges efforts on the part of the organizations to secure its passage. He shows that in 1914 there were 282 people killed in Cook county by railroads or on railroad tracks. Of these 13 were passengers, 100 were employees and 169 were trespassers. For the 10 years, 1905 to 1914, his records show that 80 passengers, 1,399 employees and 1,922 trespassers were killed.

"Welfare Work" is the title of a little pamphlet which has been issued by the Grand Trunk Railway of Canada, for the benefit of its employees, telling in brief compass about the superannuation, pension, provident and other beneficial funds maintained by the road, or by the road in conjunction with employees. The superannuation fund, for indoor employees, was established more than forty years ago, this company being the first in America to start such a fund on a comprehensive scale. The employees, as a rule, contributed one-half the money necessary to maintain the fund. Each employee paid 2½ per cent of his pay, monthly, and membership was compulsory on all who entered the service after October 1, 1874. Recently the contribution has been reduced from 2½ per cent to 1½ per cent; but since 1908 the company has paid pensions regularly so that the superannuation fund will be terminated. The pension fund now has on its rolls 730 employees, exclusive of those who had retired from service under the superannuation plan. The pension fund is maintained wholly by the company. The provident fund pays benefits in case of sickness and of death, and during 1914 disbursed about $100,000 for death benefits, and more than that sum for sick benefits. The pamphlet notices briefly the railroad Y. M. C. A. and its facilities for recreation, the safety-first movement, the plans for instruction in first aid to the injured and the schools maintained by the company for training apprentices. About 550 apprentices are now taking instruction.

New Railroad Laws in Texas

The legislature of Texas has concluded its session of two months and a final review shows that it has passed only a few general laws affecting railroads. The most important, perhaps, is that requiring employees to be paid twice a month. Another one provides that employees of railroads (and of certain other concerns as well) shall be free to choose the company from which they shall get surety bonds. The railroads now provide bonds without cost to the employee.

The railroad commission is authorized, by one of the new laws, to require railroads to make track connections with industries.

There was a full crew law but it died on the calendar as did the bill to require sheds to be built at all points where there are ten or more car repairers at work.

On the whole it appears to many careful observers that the anti-railroad spirit among the Texas law makers is very much abated.

Safety First in New Mexico

R. P. Kyle, safety supervisor of the El Paso & South Western, has issued a circular addressed to new employees in which he says:

"You will note that this railroad is active in SAFETY FIRST. The management is doing everything possible to make working conditions safe, and the present employees—the men with whom you will work—are proud of their record. . . .

"If you are with the road, there may be conditions that can be improved that you will notice at once, which have been overlooked by men working with the road for some time. The Safety Bureau invites you to make all suggestions for safety that you can, and it is your duty as an employee to do so. . . .

"To look out for your own safety is not all. You are working with many other men and in this brotherhood of men we treat our neighbor as ourself. . . . Be sure that the other man [as well as yourself] is safe.

"When you get to work, look around and see the men who are thought most of by the company, who have been here the longest, and who get along the best. They are the safe men, the workers, and the polite men. . . ."

Anti-Full Crew Law Campaign

The joint committee of the New Jersey legislature held a hearing on Monday of this week on the bill to repeal the full crew law. The speakers supporting the repeal were marshalled by M. A. Beeman, secretary of the New Jersey State Chamber of Commerce. Arguments were made by J. E. Reynolds of the Central of New Jersey, and George S. Patterson of the Pennsylvania. Testimony was given by C. H. Stein, superintendent of the Central division of the Central Railroad of New Jersey. The railroads presented a great mass of testimony in the shape of resolutions of chambers of commerce and other bodies, and editorials from newspapers; petitions were presented signed by great numbers of voters.

The legislature of Pennsylvania has held hearings at Harrisburg this week to listen to the arguments for the repeal of the full crew law, and next week will listen to those opposed to repeal.

R. L. O'Donnell, chairman of the committee representing the railroads of New Jersey and Pennsylvania continues to send out additional evidence of the unjust workings of the full crew laws of those states, and of the interest among the citizens, now constantly spreading, in the repeal or amendment of the law so as to put the regulation of train crews by the state in the hands of the Public Service Commissions. A number of railway surgeons report that injuries among trainmen are more numerous since the addition of the extra man to the train crew; and that the newer men are most likely to be found among the injured.

REVENUES AND EXPENSES OF RAILWAYS

SEVEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
Louisville, Henderson & St. Louis	200	$547,269	$240,183	$840,181	$171,790	$121,837	$37,482	$286,390	.....	$21,946	$639,445	$200,736	$26,600	$174,088	$22,600
Michigan Central	1,800	11,911,588	5,485,207	19,769,016	2,150,894	3,089,952	453,325	8,103,956	$356,748	393,563	14,548,438	5,220,578	925,350	4,291,833	921,957
Midland Valley	380	572,057	255,658	880,775	171,927	153,440	14,392	286,029	.....	39,297	664,985	215,790	40,076	169,420	13,346
Minneapolis & St. Louis	1,646	4,617,969	1,196,931	6,162,055	692,695	872,701	124,450	2,315,942	376	145,167	4,151,331	2,010,724	275,767	1,734,956	171,860
Minn., St. Paul & Sault Ste. Marie	4,102	12,262,122	3,801,206	17,371,370	1,969,163	2,461,833	337,317	5,504,371	104,762	343,502	10,668,639	6,702,731	714,102	5,988,629	—84,526
Missouri & North Arkansas	365	452,657	228,398	732,949	205,653	153,030	24,750	361,093	.....	39,996	784,526	—51,572	42,000	—93,899	—147,144
Missouri, Kansas & Texas System	3,865	13,478,818	5,145,422	20,030,005	2,628,211	2,790,496	390,453	7,197,076	185,803	614,234	13,715,115	6,314,890	765,999	5,545,228	707,003
Missouri, Oklahoma & Gulf	334	560,691	140,937	735,555	157,804	118,879	28,922	333,963	745	38,751	679,064	56,491	45,302	10,718	—11,723
Missouri, Oklahoma & Gulf Ry. of Texas	19	75,927	2,312	79,532	11,443	13,111	1,572	30,748	.....	3,737	60,611	18,921	1,320	17,601	9,106
Missouri Pacific	3,920	13,183,325	2,916,149	17,506,541	2,205,586	3,262,425	423,452	6,695,928	51,212	422,508	13,061,111	4,445,430	690,130	3,746,806	1,455,913
Morgan's La. & Texas R. R. & S. S. Co.	405	1,886,034	635,402	2,757,724	329,131	501,330	79,341	1,062,304	17,754	83,443	2,072,837	674,887	138,868	532,690	—86,044
Nashville, Chattanooga & St. Louis	1,231	4,385,840	1,567,906	6,511,797	861,716	1,327,013	311,091	2,652,553	64,915	207,407	5,424,694	1,087,103	190,491	895,901	—514,329
Nevada Northern	165	518,046	57,364	599,898	114,187	95,323	3,309	136,545	451	26,940	396,955	202,943	35,246	167,645	—299,391
New Orleans, Mobile & Chicago	403	819,678	182,909	1,060,381	206,465	145,172	26,711	370,433	23	46,939	795,696	264,686	43,885	220,706	—242,025
New Orleans, Texas & Mexico	286	728,548	140,942	915,505	194,448	110,676	26,692	369,259	.....	64,483	765,558	149,947	11,583	138,364	—36,659
†New York Central Railroad Co	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New York, Ontario & Western	568	3,715,849	1,088,420	5,574,024	730,326	1,009,740	56,889	2,130,299	.....	108,893	4,036,147	1,537,877	138,824	1,399,021	49,097
New York, Susquehanna & Western	140	1,280,441	313,388	1,777,913	178,567	209,793	13,757	807,878	.....	38,878	1,248,743	529,170	18,062	499,643	99,826
Norfolk & Western	2,044	20,610,477	2,876,383	24,480,169	3,348,684	4,816,803	410,939	7,395,662	66,066	486,309	16,181,747	8,298,422	1,038,000	7,260,308	—533,452
Northwestern Pacific	401	882,574	1,118,132	2,250,273	394,257	285,554	33,018	833,765	.....	60,529	1,575,708	674,565	112,061	562,419	—64,198
Oahu Railway & Land Co	109	543,161	156,878	747,966	74,863	62,591	4,535	150,819	.....	30,591	323,399	424,567	50,187	374,380	19,121
Oregon Short Line	2,162	8,835,244	2,713,893	12,602,019	1,721,989	1,682,194	212,007	3,097,685	190,671	386,152	7,222,018	5,380,001	742,601	4,636,153	—913,418
Oregon-Washington R. R. & Nav. Co	2,028	6,056,815	2,671,592	9,541,656	1,085,505	1,124,810	270,448	3,141,500	89,186	400,030	6,050,834	3,490,722	657,908	2,831,715	204,989
Panhandle & Santa Fe	668	1,817,345	401,110	2,329,215	418,105	452,594	26,453	738,174	.....	61,088	1,696,414	632,801	62,152	569,634	345,157
Pere Marquette	2,312	7,319,970	2,524,977	10,758,799	957,430	2,125,937	227,615	4,166,429	34,235	307,203	7,815,862	2,942,937	370,951	2,570,433	1,724,414
Philadelphia & Reading	1,120	21,964,476	3,973,984	27,264,770	2,597,988	5,009,747	299,598	9,803,594	100,613	486,502	18,290,359	8,974,411	700,543	8,270,224	—1,436,282
Philadelphia, Baltimore & Washington	717	5,786,110	4,956,739	11,975,916	1,841,840	2,231,460	177,330	5,109,686	93	310,341	9,670,751	2,305,166	403,724	1,900,554	159,140
Pittsburgh & Lake Erie	225	7,128,668	1,001,193	8,494,526	1,156,011	1,919,431	102,471	2,345,441	23,904	195,939	5,743,117	2,751,409	360,096	2,391,188	—1,505,911
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	15,352,515	4,866,145	22,887,197	2,992,097	4,417,751	461,586	8,542,088	168,958	549,474	17,131,955	5,755,243	1,148,623	4,604,887	—46,695
Pittsburgh, Shawmut & Northern	294	1,036,704	76,315	1,127,780	221,859	304,774	10,914	371,992	.....	28,481	938,019	189,761	11,415	178,346	21,622
Port Reading	21	734,680	.....	891,693	104,743	60,082	271	303,414	.....	2,654	471,163	420,530	84,000	336,530	558
Richmond, Fredericksburg & Potomac	88	806,030	547,154	1,567,420	144,273	211,799	24,800	606,516	28,756	50,031	1,066,175	501,244	49,974	451,117	—31,638
Rutland	468	1,128,423	704,887	2,088,667	259,306	356,311	57,298	818,908	8,566	40,939	1,541,327	547,340	120,219	427,121	—86,348
St. Joseph & Grand Island	258	697,888	184,901	953,142	163,726	141,802	33,228	342,467	.....	37,506	718,728	234,414	57,163	177,197	76,707
St. Louis & San Francisco	4,746	16,678,457	6,324,877	24,591,713	3,404,970	3,903,685	454,216	8,271,711	.....	606,688	16,641,270	7,950,443	712,224	7,226,911	—11,113
St. Louis, Iron Mountain & Southern	3,365	13,590,926	3,244,186	18,218,364	2,618,261	3,250,109	403,618	5,791,124	59,356	434,411	12,556,878	5,661,486	789,224	4,864,150	—1,829,034
St. Louis Merchants' Bridge Terminal	9	.....	1,295	1,085,806	141,664	48,491	5,443	549,299	.....	46,775	791,672	294,134	50,489	243,637	100,848
St. Louis, San Francisco & Texas	235	518,888	194,081	760,110	176,419	124,058	16,333	338,129	.....	32,597	687,537	72,573	8,917	63,626	—163,073
St. Louis Southwestern	943	3,244,866	746,968	4,241,057	528,544	741,127	181,456	1,197,944	23,494	184,249	2,855,456	1,385,602	220,955	1,164,095	—693,298
St. Louis Southwestern of Texas	811	1,530,951	594,963	2,300,049	551,157	579,606	85,953	1,070,706	6,010	125,674	2,387,837	—81,788	102,109	—184,573	—245,297
San Antonio & Aransas Pass	734	1,611,143	680,962	2,446,002	465,093	452,328	46,642	1,148,665	.....	81,172	2,193,713	252,289	86,079	165,706	—500,318
San Pedro, Los Angeles & Salt Lake	1,132	3,408,522	1,451,565	5,360,300	559,450	836,430	228,345	1,773,722	96,461	128,578	3,622,986	1,737,314	288,526	1,448,282	—195,525
Southern	7,036	23,757,531	10,303,697	37,418,578	5,132,926	6,697,395	1,295,419	13,796,627	236,238	1,201,364	28,268,686	9,149,893	1,490,281	7,650,505	—3,518,279
Spokane International	163	346,336	106,558	476,418	81,737	34,181	15,751	154,811	30	25,260	311,769	164,649	32,257	132,354	—120,523
Spokane, Portland & Seattle	556	1,665,658	898,591	2,820,724	329,629	248,369	53,838	636,113	24,293	94,148	1,386,319	1,434,405	373,800	1,058,999	—205,500
Tennessee Central	294	583,324	237,916	877,605	205,204	118,662	38,603	350,719	.....	47,116	760,165	117,440	31,326	86,012	—143,339
Terminal R. R. Ass'n of St. Louis	35	.....	1,289	1,601,996	131,262	85,208	6,441	561,805	.....	37,782	822,498	779,498	201,470	578,028	204,609
Texas & New Orleans	469	1,464,544	641,117	2,238,575	390,180	572,604	55,241	972,031	75,524	74,956	2,139,747	198,829	111,519	85,854	—128,970
Texas & Pacific	1,887	7,626,274	2,610,749	11,089,527	1,112,674	1,698,152	261,807	4,591,099	104,095	272,226	8,032,317	3,057,210	490,036	2,564,596	—264,964
Toledo & Ohio Central	446	2,653,746	379,941	3,229,124	458,194	589,579	56,453	1,191,911	12,425	70,654	2,379,215	849,908	158,354	689,797	133,120
Toledo, Peoria & Western	248	413,021	273,808	731,969	112,743	188,374	17,537	315,462	.....	25,206	659,322	72,648	42,700	29,943	31,466
Trinity & Brazos Valley	315	509,228	130,025	688,635	140,322	71,911	22,415	320,926	.....	57,351	612,925	75,709	30,135	45,367	—7,436
Ulster & Delaware	129	311,614	235,330	648,905	100,372	112,163	10,758	297,662	409	27,130	548,494	100,411	23,100	76,586	—59,722
Union Pacific	3,617	23,396,196	6,005,382	32,777,824	3,808,795	4,408,274	638,165	8,053,633	505,363	861,094	18,262,793	14,515,031	1,332,124	13,179,797	—19,089
Union R. R. of Baltimore	9	781,182	155,862	949,716	90,915	.....	.....	32,345	.....	17,334	140,594	809,122	39,782	769,340	—48,515
Vandalia	910	4,485,111	1,448,916	6,673,407	934,861	1,305,527	165,570	2,592,837	68,259	151,503	5,218,556	1,454,851	223,425	1,231,275	—325,864
Vicksburg, Shreveport & Pacific	171	464,457	287,489	843,018	144,493	191,125	25,002	329,938	16,664	35,446	742,668	100,350	50,107	50,243	—184,347
Virginia & Southwestern	240	987,121	101,305	1,121,409	171,299	255,249	17,191	326,115	.....	27,214	797,168	324,241	45,416	278,825	—44,847
Virginian	504	2,978,468	241,519	3,435,685	434,053	610,633	37,632	795,433	69,369	77,274	2,004,023	1,431,662	152,500	1,278,924	—446,059
Wabash	2,519	12,053,022	3,888,562	17,504,416	1,974,841	3,139,228	587,055	7,062,167	104,810	428,039	13,278,612	4,225,805	571,519	3,652,638	—40,509
Washington Southern	36	243,285	267,890	697,298	84,029	107,897	9,508	291,208	12,139	21,153	525,935	171,363	22,989	148,355	—16,041
Western Maryland	661	4,014,902	607,728	4,857,045	704,981	810,678	148,981	1,809,798	12,829	135,469	3,617,439	1,239,606	174,500	1,065,106	435,237
Western Pacific	943	2,517,475	681,067	3,399,428	733,948	446,002	176,217	1,137,781	77,581	147,167	2,718,697	680,730	202,712	476,934	—101,173
Western Ry. of Alabama	133	403,524	266,402	738,744	135,377	178,725	40,984	226,233	10,662	31,375	623,055	115,689	38,460	76,809	—134,287
Yazoo & Mississippi Valley	1,382	5,227,973	1,428,793	7,044,660	1,053,280	1,000,518	119,194	2,633,982	11,379	165,494	4,976,883	2,067,777	354,000	1,712,535	—658,332

†No cumulative figures reported, due to merger of N. Y. C. & H. River Railroad, Lake Shore & Michigan Southern and Chicago, Indiana & Southern.

Federal Valuation

Thomas W. Hulme, general secretary, announces that the conference with the division of valuation, of the Interstate Commerce Commission, scheduled for this week, has been postponed to a date yet to be fixed; probably April 19.

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for December, 1914, are as follows:

Railways operating 228,604 miles of line are covered by this summary, or about 90 per cent of all steam railway mileage in the United States. Their operating revenues for the month of December, 1914, amounted to $226,318,739. This amount includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail and auxiliary operations. Compared with December, 1913, these operating revenues show a decrease of $26,062,485. Total operating revenues per mile averaged $990 in December, 1914, and $1,116 in December, 1913, a decrease of $126, or 11.3 per cent.

Operating expenses, which include the cost of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to $166,484,716. This was $19,073,260 less than for December, 1913. These operating expenses per mile of line averaged $728 in December, 1914, and $821 in December, 1913, a decrease of $93 per mile, or 11.3 per cent.

Net operating revenue, that is, total operating revenues of rail and auxiliary operations less operating expenses, amounted to $59,834,023, which was $6,989,225 less than for December, 1913. Net operating revenue per mile of line averaged $262 in December, 1914, and $296 in December, 1913, a decrease of $34 per mile, or 11.4 per cent.

Taxes for the month of December amounted to $10,090,035 or $44 per mile, a decrease of 12.1 per cent from December, 1913.

Operating income, which is net revenue from rail and auxiliary operations, less uncollectible revenues and taxes, averaged $217 per mile of line, and in December, 1913, $245, thus decreasing $28, or 11.4 per cent. Operating income for each mile of line for each day in December averaged $7.01, and in December, 1913, $7.91. Operating income is that proportion of their operating receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and for dividends.

The railways of the Eastern district show a decrease in total operating revenues per mile of line as compared with December, 1913, of 11.8 per cent, those of the Southern district a decrease of 18.3 per cent, and those of the Western district a decrease of 7.3 per cent.

Operating expenses per mile decreased 11.5 per cent in the East, decreased 15.3 per cent in the South, and decreased 8.8 per cent in the West. Net operating revenue per mile decreased 13.1 per cent in the East, decreased 24.8 per cent in the South, and decreased 4.1 per cent in the West.

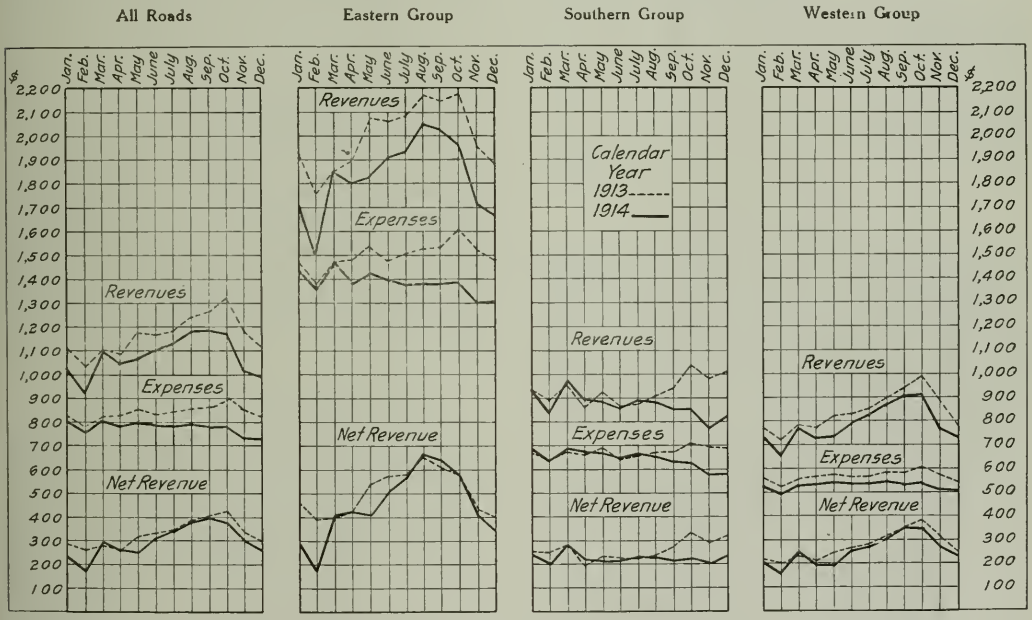
Taxes per mile show a decrease of 14.7 per cent in the East, a decrease of 9.6 per cent in the South and a decrease of 10.4 per cent in the West. Operating income per mile decreased 12.8 per cent in the East, decreased 27.0 per cent in the South, and decreased 2.9 per cent in the West.

The operating ratio for December, that is, the per cent of total operating revenues absorbed in operating expenses, was 73.6 per cent, which is comparable with 73.5 per cent in December, 1913, and 69.0 per cent in December, 1912. The operating ratio in the Eastern district for December was 79.2 per cent, as compared with 79.0 per cent in 1913; was 71.1 per cent in the Southern district, as compared with 68.6 per cent in 1913; was 68.6 per cent in the Western district, as compared with 69.6 per cent in 1913.

Comparison of returns for six months of the current fiscal year with the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 8.6 per cent, a decrease in total operating expenses per mile of 9.8 per cent, and a decrease in net operating revenue per mile of 5.9 per cent.

This net operating revenue per mile decreased 1.1 per cent in the East as compared with the corresponding period of the previous year, decreased 19.7 per cent in the South, and decreased 5.4 per cent in the West.

Total operating revenues for the calendar year 1914 amounted to $2,935,018,985. This was a decrease from the previous year of $210,756,597, which is equivalent to $1,065, or 7.6 per cent, per



Monthly Revenues and Expenses per Mile of Line in 1914

mile of line. Operating expenses amounted to $2,124,918,955, which was a decrease of $137,165,191, equivalent to $703, or 7.0 per cent, per mile. Net operating revenue amounted to $810,100,030, a decrease of $73.591,406, equivalent to $362, or 9.3 per cent, per mile. Operating income per mile of line decreased $382, or 11.5 per cent.

The railways of the Eastern district show a decrease in operating income per mile of 12.5 per cent, the railways of the Southern district a decrease of 15.9 per cent, and the railways of the Western district a decrease of 8.9 per cent. All three districts show decreases in total operating revenues per mile and in operating expenses per mile, but in no district did the decreases in operating expenses overcome the decreases in revenues. Taxes per mile decreased 0.3 per cent in the East, increased 7.9 per cent in the South, and increased 5.6 per cent in the West.

The following table shows the per cent of operating revenues consumed by such class of expenses:

Per Cent of Total Operating Revenues

	December, 1914				Six months of the
	United States	Eastern District	Southern District	Western District	fiscal yr. 1915
Freight revenue	68.3	67.3	70.8	68.3	68.3
Passenger revenue	22.0	22.0	21.2	22.4	22.6
Mail revenue	2.1	1.8	1.8	2.6	1.9
Express revenue	2.7	2.8	2.9	2.6	2.3
All other revenues	4.9	6.1	3.3	4.1	4.9
Maint. of way and structures	11.2	11.7	11.7	10.6	12.7
Maintenance of equipment	17.9	20.0	18.0	15.6	16.9
Traffic expenses	2.2	1.9	2.7	2.2	2.0
Transportation expenses	38.8	41.9	35.7	36.9	34.5
General expenses	2.9	2.9	2.9	2.8	2.4
All other expenses	0.6	0.8	0.1	0.5	0.5
Total operating expenses	73.6	79.2	71.1	68.6	69.0

Mail Pay Controversy

In a statement given to last Monday morning's papers, Postmaster General Burleson attacked the railroads for their activity in getting the Senate to reject the post office appropriation bill on the closing day of the last session of Congress, declaring that they had carried on their propaganda by means of one-sided, prejudiced and biased statements, designed to mislead the public mind. That the deficit in the operations of the post office department during the current fiscal year is to be attributed to the parcel post is, says Mr. Burleson, an absurd falsehood. "Were it not for the parcel post the coming postal deficit would be much larger than it will be," says Mr. Burleson. He continues:

"Notwithstanding the equitable and liberal character of the legislation (proposed by the department), it was bitterly fought throughout its several legislative stages by the so-called railway mail pay committee, an organization representing certain of the railroads. This committee's emissaries were kept almost constantly in Washington, and, through an expensively maintained press bureau, the country was flooded with a propaganda in which the attitude of the Post Office Department and the action of the House of Representatives were grossly misrepresented. . . . The railroads are saying that the Post Office Department's attempt to remedy the present situation was an attempt at railroad confiscation. No! It was, and is, a determined, well considered effort to end a system under which the postal authorities are compelled to stand helplessly by while the railroads loot the postal revenues.

"Although the railways contend that they are underpaid for carrying the mails, the facts are that they are overpaid and that they are receiving from the government amounts which, for hauls of any considerable length, exceed by about two to one the amounts they receive from the express companies for like and similar service. . . . The proposed change to the space system at the rates granted in the legislation which failed March 4 last, while giving the railroads fully as much per car-mile as they are now getting, would place the transportation facilities paid for by the government more completely under the control of the postal authorities."

Senator John W. Weeks, of Massachusetts, at once replied to Mr. Burleson, calling attention to the extraordinary feature of the bill presented by the department, giving the postmaster general unheard of power in regulating the rates for transportation of mails by the railways. Senator Weeks resents the charge that a "railroad lobby" had anything to do with the action of the Senate. Thoughtful senators felt compelled to take a stand against the passage of an ill-advised measure, in the closing days of the session, without adequate debate. (Mr. Weeks was a member of the Bourne committee, whose report was noticed in the *Railway Age Gazette*, September 4, 1914, page 435.)

Ralph Peters, chairman of the railways' committee on mail pay, also replied to Mr. Burleson. Referring to the statement alleging the "looting" of the government revenues, he called attention to the report of the Bourne committee, in which an increase of pay for the railroads was recommended. "Was Senator Bourne's committee duped by the railroads, or did his committee become a party to the conspiracy to steal? . . . The fact is that Mr. Burleson, through lack of understanding of the postal service and through reliance upon advisers who were accused by the joint bi-partisan commission of Congress [the Bourne committee] of ignorance of their duties and greed for arbitrary power, is himself permitting the government of the United States to rob the railroads of at least half what is due them for carrying the parcel post. The railroads defy the postmaster general to point to a single act of their railway mail pay committee, in its efforts to present the facts in this case to the people, which has not been absolutely legitimate. . . ."

Mr. Peters has issued a circular quoting a dozen newspapers in condemnation of the policy of the Post Office Department in this matter. In this connection he reprints an article from the Ogden (Utah) Standard of February 2, which says:

"No one trouble of the railroads is more perplexing than that of the parcel post. The mail trains are being delayed while postmasters supervise the loading of this new mail matter, and cars are being added to those trains without extra compensation. Over at Wells, Nev., the agent of the Southern Pacific, without wishing any one bad luck, is hoping the warehouse burns down where eighty tons of grain are held for shipment, sack by sack, through the parcel post. One day last week a fast mail train was delayed by the loading of two tons of wheat as parcel post, and early in the same week a carload of potatoes was mailed from Deeth, Nev., to Halleck. . . ."

Evidence in Enginemen's Arbitration Concluded

The introduction of evidence in the hearing at Chicago before the board of arbitration on the wage demands of the engineers and firemen of the western railroads was concluded on March 18. The hearings were begun in Chicago on November 30, and its sessions have been continuous, having been held every day except Saturday and Sunday, except for brief intermissions during the holidays. It was announced that the board would continue to hold executive sessions daily until March 29, when it will hear the final arguments on behalf of the railroads and the enginemen. The briefs will be submitted to the board and the oral arguments will be made by President W. S. Carter of the Brotherhood of Locomotive Firemen and Enginemen, W. S. Stone, grand chief of the Brotherhood of Locomotive Engineers, and James M. Sheean, attorney for the Conference Committee of Managers. Three days will be allowed for argument and the board will render its decision not later than April 20.

The representatives of the enginemen concluded their rebuttal testimony on March 17, and J. H. Keefe, assistant general manager of the Gulf, Colorado & Santa Fe, was the only witness called in rebuttal by the railroads. In refutation of allegations made by the representatives of the brotherhoods that the original exhibit of the railways as to earnings of all engineers and firemen was incorrect in specific cases, Mr. Keefe produced the actual pay rolls and pay checks endorsed by the employees. He also presented figures as to the financial condition of the roads for the seven months of the present fiscal year ending January 31. The statement made by the railroads early in the case that many engineers earned larger salaries than the governors of some states, which was derided by the brotherhood officers during the hearing, was proved by Mr. Keefe in an exhibit showing that 344 engineers received more than $3,000 a year. The extreme illustration was the case of one engineer who earned $366.66 in October, 1913, or at the rate of about $4,500 a year.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except, June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Storekeepers' Association.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kantzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Annual meeting in January. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

The Chicago, Milwaukee & St. Paul has announced that a traffic arrangement has been made with the Oregon Short Line, giving the St. Paul passenger trains an entrance into Yellowstone Park from Butte, Mont. Direct connections will be made with the limited trains, the Olympian and the Columbian.

The Boston & Maine has filed new passenger rates in Massachusetts, to go into effect April 1, following the suggestions of the Public Service Commission of the state which, in its report issued February 27, approved new tariffs of the New Haven road, but disapproved those of the Boston & Maine and Boston & Albany. The principal change, now made, as compared with the tariffs which were disapproved, is the addition of family tickets, good for 25 rides, which are to be sold at two cents a mile and to be valid for three months only. These take the place of tickets on which passengers now ride at about 1½ cents a mile. The general basis of rates on the Boston & Maine in Massachusetts will henceforth be: for single tickets 2½ cents a mile; mileage tickets 2¼ cents; family tickets two cents; monthly tickets, good for a round trip each day, at the existing rates of from 1¼ cents down to ½ cent a mile. There are other special tickets in use to a limited extent, in the territory near Boston, these having been introduced, in most cases, to meet the competition of street car lines.

State Fare Laws and Other Proposed Legislation

The bill to increase the state passenger fare in Illinois from 2 to 2½ cents a mile was introduced in the Illinois legislature last week. The railroad committee in charge of the Illinois campaign has compiled a pamphlet of 32 pages containing editorials and articles from the leading Illinois newspapers regarding the 2½ cent fare campaign, and copies have been mailed to each member of the general assembly at Springfield and to each newspaper publication in the state. The committee has received a letter from the Illinois division of the Travelers' Protective Association of America, protesting against any increase in the passenger fare unless the railroads will agree to reinstate the interchangeable mileage book which was discontinued on December 7, 1914; but with a promise to assist the roads in obtaining the increase if the roads will definitely agree to provide a 2,000 mile interchangeable mileage book at two cents a mile.

The Illinois railroads have sent to the Illinois legislature a petition signed by 80,000 people of the state favoring an increase of the state passenger fare to 2½ cents a mile.

The Nebraska legislature has killed the bill to increase intrastate passenger fares to 2½ cents a mile.

A committee of officers of railroads operating in Iowa appeared before a joint session of the House and Senate committees on railroads of the Iowa legislature on March 18, and asked for an increase of the state passenger fare from 2 to 2½ cents a mile. C. H. Markham, president of the Illinois Central, who has acted as spokesman for the railway men, said that the net earnings of the seven principal railroads of the state for the year 1914 represented a return of 7 per cent. on a valuation of only $29,254 per mile, while the same roads were valued for the purpose of taxation at $31,816 per mile.

A committee of railroad men, including James J. Hill, of the Great Northern; W. A. Gardner, president of the Chicago & North Western, and Edmund Pennington, president of the Minneapolis, St. Paul & Sault Ste. Marie, appeared before a committee of the Minnesota legislature on March 18, and presented arguments and statistics in favor of an increase of the state passenger fare to 2½ cents a mile. Mr. Hill told the committee that it cost more money per train mile to operate passenger trains than the railroads received.

Daniel Willard, president of the Baltimore & Ohio; G. L. Peck, vice-president of the Pennsylvania Lines, and M. R. Waite, general counsel for the Cincinnati, Hamilton & Dayton, spoke before the Public Utilities Committee of the House of the Ohio legislature last week in behalf of the request of the roads for an advance in state passenger fares from 2 to 2½ cents a mile. Another hearing was held before the committee on March 23.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has announced that the carriers have submitted a new plan for making rates from eastern defined territories to intermountain territory. Hearings on this plan will be held before Examiner Thurtell on April 12.

In response to the recent petition of the express companies alleging that the schedule of rates which went into effect on February 1, 1914, is not adequate, the commission has granted a rehearing of the case. No date has as yet been set for the presentation of evidence.

The commission has suspended from March 25 to July 23 Erie tariffs proposing increased ferry rates for automobiles, wagons, etc., between New York and Jersey City. The commission believes that this ferry as part of the Erie is doing an interstate business and that it is as much subject to the act as the railroad itself.

The commission has suspended from March 27 to July 1 proposed advances in lake and rail, rail and lake and rail, lake and rail rates. The filing of the tariffs grew out of the decision in the Five Per Cent case. The commission declined to permit the 5 per cent on these particular rates and the carriers filed the tariffs making them the subject of a separate proceeding.

Lumber Rates to Eastern Territories

In re lumber rates to central freight association and trunk line territories. Opinion by the commission:

The commission finds that carriers' proposed cancellation of through routes and joints rates on lumber from points in Louisiana and Arkansas to central freight association and trunk line territories via East St. Louis, Ill., and the Toledo, St. Louis & Western and via Flinton, Ill., and the Illinois Southern is justified. (33 I. C. C., 322.)

Class Rates to Beloit, Wis.

H. Rosenblatt & Sons et al. v. Ann Arbor Railroad et al. Opinion by Commissioner McChord:

The commission finds that the class rates from central freight association and trunk line territories to Beloit, Wis., are not unreasonable or prejudicial in that they exceed the class rates from the same points of origin to Rockford, Ill. The fact that the rates to Beloit are made on combination through Chicago or Milwaukee, while the rates to Rockford are stated in percentages of the New York-Chicago rates, is not in itself proof of discrimination. (33 I. C. C., 324.)

Rates on Apples from Virginia

Eastern Fruit Growers' Association et al. v. Baltimore & Ohio et al. Opinion by Commissioner Clark:

The commission finds that defendants' rates on apples in carloads from producing points in Virginia, West Virginia, Maryland, Delaware and southern Pennsylvania to various sections of the country are not unreasonable nor discriminatory as compared with rates from New York and New England producing points. (33 I. C. C., 343.)

Divisions Determined by the Commission

In re rates on lumber and other forest products from points in Arkansas and other states to points in Iowa, Minnesota and other states. Opinion by Commissioner McChord:

The commission in this second supplemental order modifies its first supplemental order so as to prescribe that the rates on lumber from points on the St. Louis Southwestern to Des Moines, Ia., via the Wabash, shall divide 17¼ cents to the St. Louis Southwestern and 7¾ cents to the Wabash. The previous order allowed divisions of 16.5 cents to the St. Louis Southwestern and 8.5 cents to the Wabash, whereas the Wabash only wished 8 cents. (32 I. C. C., 484.)

Lumber Rates from Helena, Ark.

In re lumber rates from Helena, Ark., and other points to Omaha, Neb., Des Moines, Iowa, and other destinations. Opinion by Commissioner Hall:

The commission finds that the carriers have not justified proposed increased rates on yellow pine, cypress and hardwood lumber from southwestern points and points in Mississippi and eastern Louisiana to the Omaha group and various points in Missouri, Iowa, Kansas, Nebraska and South Dakota. (33 I. C. C., 297.)

Track Storage Charges at New York

Murphy Brothers v. New York Central. Opinion by Commissioner Clark:

The commission finds that carrier's rule relating to the assessment at New York of track-storage charges, and stating that time will be computed from first 7 a. m. after car is placed, is unjust in that it does not provide that time will be computed from the first 7 a. m. after placing cars on public delivery tracks, and after the day on which notice of arrival is sent to consignee. Reparation awarded. (33 I. C. C., 355.)

Import Rates Properly Applied

National Dock & Storage Warehouse Company v. Boston & Albany, et al. Opinion by Commissioner McChord:

The complainant, operating a public warehouse at East Boston, Mass., for the storage of all kinds of traffic, whether foreign or domestic alleges that there is discrimination against it in carrier's rule relating to import traffic shipped from Boston which reads as follows:

> Rates named herein apply only on property coming from foreign ports (other than ports in the maritime provinces and Newfoundland) into the United States and delivered to the rail carrier direct from ship's side or dock of the vessel bringing such property to Boston, or on such property received by the rail carrier from custom bonded warehouses or appraisers' stores (not internal revenue stores).

The commission finds, however, that the tariff is neither discriminatory nor prejudicial. (33 I. C. C., 330.)

Class Rates Between Stations in Louisiana

Opinion by Commissioner Daniels:

The complainant, the Lafayette Chamber of Commerce, attacked the joint class and commodity rates from St. Louis and defined territories to Lafayette, La., as being greater than the aggregate of the intermediate rates on interstate traffic via Baton Rouge, La. Morgan's Louisiana & Texas thereupon attempted to close the Baton Rouge gateway by cancelling the interstate application of the mileage rates from Baton Rouge to Lafayette and other points on its line. The tariff making this cancellation was suspended, whereupon the carrier also cancelled the tariff carrying the interstate application of a mileage scale of rates from Baton Rouge. The commission finds that the proposed closing of the Baton Rouge gateway is not justified. The former mileage rates from Baton Rouge are required to be restored, except that 20 miles may be added for Mississippi river transfer. The joint class and commodity rates from St. Louis and defined territories to Lafayette are not found on the record to be unlawful, but the case is held open for further investigation. (33 I. C. C., 302.)

STATE COMMISSIONS

The Illinois Public Utilities Commission has again suspended, until September 15, the proposed general increase of 5 per cent in intrastate freight rates in Illinois.

The Michigan Railroad Commission has given an estimate to the legislature that an increase in the state passenger fare to 2½ cents per mile would increase the annual passenger earnings of the Michigan roads by $3,815,390.

The Arkansas Railroad Commission has granted the application of the Jonesboro, Lake City & Eastern Railroad to be allowed to increase its passenger fares to 3 cents a mile. This was made possible by a bill passed by the recent legislature authorizing the commission to grant the increase if the road should satisfy the commission of the reasonableness of the advance.

Bills to make important changes in the public service company law of Pennsylvania were introduced in the legislature Tuesday

by Representative James O. Campbell, of Butler. One bill would take away the exclusive jurisdiction of the court of Dauphin county (Harrisburg) in appeals, and allow appeals to be taken to the common pleas court of any county. Another would divide the state into three districts for convenience of hearings and taking action on complaints. The districts would be left in the hands of the commission, but the law would fix the places where sittings are to be held—Philadelphia, Pittsburgh and Harrisburg.

Commissioner Mayfield of the Texas Railroad Commission has sent a telegram to J. W. Everman, general superintendent of the St. Louis Southwestern of Texas, protesting against the recent closing of the company's shops at Tyler, Tex., which threw out of employment some 300 or 400 men. The commissioner says in his telegram that the company's business is better than it has been for some time, requiring, as he is advised, "an extra switch engine to adequately handle the traffic," and that the road should be getting its equipment in condition to handle the large business expected this spring and summer. He says that unless the shops at Tyler are reopened and the men put back to work he will consider it his duty to move that the commission suspend further action on the application for an increase in freight rates pending investigation into the reason why the shops were closed. Mr. Everman said it was found absolutely necessary to close the shops at Tyler because of the decrease in earnings.

The State Corporation Commission of New Mexico, in reply to a resolution by the New Mexico legislature requesting information as to what steps the commission had taken, if any, in the matter of fixing a fare of three cents a mile to be charged by railway companies in the state, says that since the election of the first members of the commission in 1911, it has never received from any citizen, taxpayer, individual, firm or corporation any written complaint, either formal or informal, protesting against the passenger fare of four cents a mile, now charged locally by the majority of the railroads. The commission further states that if any verbal complaints were ever made to the commission it does not recall them. Although no complaints had been lodged with the commission it had instituted an investigation on its own motion in July, 1912, of the entire passenger situation in the state which covered a period of several months, and it was deemed advisable to allow the matter to rest, at least pending the clearing up of financial conditions throughout the United States. The pamphlet reply gives the results of the investigation of the conditions not only in New Mexico but in other states, which led the commission to the conclusion that a reduction was not justified.

The Rate Hearing Before Texas Commission

At the hearing last week before the Texas Railroad Commission on the application of the Texas railroads for a general advance in freight rates, Frank Kell, of Wichita Falls, told the commission that he shipped annually 15,000 carloads of freight and that he is in favor of a general advance in rates, not only on the commodities which he ships but on those affecting interests in which he is a stockholder. He said he had no interest in any railroad in Texas, but thought that their condition ought to be improved in order to promote the development of the state. Other testimony regarding the financial condition of each of the Texas railroads was introduced by officers of the various roads, who gave the commission figures showing the great increases in the cost of labor and the increased expenses caused by legislation and commission orders. F. B. McKay, general freight and passenger agent of the Texas Midland, testified that the road had lost money for years, but that it had kept out of the courts because it had a "fairy godmother" in the person of Mrs. Hetty Green, mother of the president of the road. I. A. Cottingham, assistant general manager of the Sunset-Central Lines, offered in evidence figures covering a revaluation of all the Sunset-Central properties in Texas. J. W. Terry, counsel for the Santa Fe Lines in Texas, presented a statement outlining the history and condition of the Gulf, Colorado & Santa Fe, saying that had it not been for the parent company the Texas lines of the Santa Fe system would have been in the hands of receivers "as often as the International & Great Northern." James Peabody, statistician for the Atchison, Topeka & Santa Fe, testified regarding the division of expenses between freight and passenger service and state and interstate service for some of the lines, based on the Oklahoma plan. George H. Schleyer, receiver and general manager of the St. Louis & San Francisco in Texas; A. B. Warner, vice-president of the Rock Island lines in Texas; J. A. Brown, general freight agent of the New Orleans, Texas & Mexico, W. B. Scott, president of the Sunset-Central Lines, and F. G. Pettibone, vice-president of the Gulf, Colorado & Santa Fe, were also among the witnesses who testified.

The hearing of the railroads' evidence was concluded on March 18. Hearings will be set later to allow the shippers to present their views.

COURT NEWS

One hundred and sixty-four shippers have filed suits against the receivers of the Wabash in the United States district court at St. Louis for claims aggregating $335,658, for alleged overcharges on freight by the road, between 1905, when the maximum freight law in Missouri became effective, and February, 1914, when an injunction restraining enforcement of the rates was dissolved.

The Oklahoma passenger fare case, in which the railroads are seeking to have the three-cent passenger fare restored, was begun before Judge Youmans of the United States district court at Oklahoma City on March 15. The roads party to the suit are the Atchison, Topeka & Santa Fe; St. Louis & San Francisco; Chicago, Rock Island & Pacific; Missouri, Kansas & Texas and Kansas City Southern. The first day of the hearing was devoted to testimony regarding the formula for the division of expenses, which was described by A. L. Conrad, assistant general auditor of the St. Louis & San Francisco. This formula divides expenses between freight and passenger service, state and interstate service and line haul and terminal expense. This was followed by testimony by representatives of individual roads applying the formula to their own accounts.

Right of Way—Acquisition

Under the Indiana statute authorizing railroad corporations to secure rights of way by condemnation or by purchase or by voluntary grants or donations, and in no other way, the Indiana Appellate Court, following previous decisions of that court and the Supreme Court, holds that such a right of way may also be acquired by estoppel, adverse possession, or license.—New Point v. Cleveland C. C. & St. L. (Ind.), 107 N. E., 560.

Time Limit for Claims for Loss or Damage to Freight

The Georgia Court of Appeals holds that where a shipper signs and accepts a bill of lading containing a clause stipulating that "claims for loss or damage shall be made in writing to the agent at point of delivery promptly after arrival of the property, and if delayed for more than ten days after the delivery of the property, or after due time for the delivery thereof, no carrier hereunder shall be liable in any event," it constitutes a binding contract. The clause is not void on the ground that the carrier seeks thereby to limit its liability, and does not give as consideration therefor extra service or monetary consideration to the shipper, or that it is contrary to the public policy of the state. Such a clause, when applied to shipments of perishable products, such as turnips, is not an unreasonable limitation as to the time in which the claim is to be presented. W. H. Mitchell & Co. v. Atlantic Coast Line (Ga.) 84 S. E. 227.

Unloading Freight Not Intrinsically Dangerous

A boy 14 years of age was allowed by the conductor of a freight train to ride in the caboose in consideration of his services in unloading light freight. While between two stations one or two cars immediately in front of the caboose were derailed and the boy, becoming frightened, jumped off the caboose and broke his leg. In an action by his father for the loss of his services it was alleged that the work the boy was allowed to do was dangerous and arduous, and the defendant and its agents were negligent in permitting him to ride upon the train. It was held by the Kentucky Court of Appeals that it is neither intrinsically hazardous nor obviously dangerous for a youth 14 years of age to assist in unloading light freight from a freight car and placing it on a station platform; nor is it necessarily

hazardous or dangerous for such youth to ride on the caboose of a freight train, or to be permitted to do so. Judgment for the plaintiff was therefore reversed. Chesapeake & O. v. Smith (Ky.) 172 S. W. 1088.

Liability of Delivering Road

The Louisiana Supreme Court holds that, in the case of an interstate shipment of live stock, which was delivered in bad condition, owing to delays in transportation, the delivering carrier will not be held responsible in damages to the shipper, where the evidence shows that said carrier was not responsible to any appreciable extent for delay in transportation, and not at all for want of proper attention to the animals. Duvall v. Louisiana Western (La.) 67 So. 354.

Authority of Station Agent

In an action where the plaintiffs claimed to own a building which they had put up on the defendant's right of way, and for the alleged conversion of which they sought damages, it was held by the Nevada Supreme Court that the fact that a station agent and car foreman of a railroad assume to manage, in a general way, the company's business in the vicinity, does not warrant an inference of authority to lease or permit the construction of private dwellings on the right of way or to give away materials belonging to the company. Judgment for the plaintiffs was reversed, and a new trial ordered.—Mirodias v. Southern Pac. Co. (Nev.), 145 Pac., 912.

Improper Loading of Live Stock by Shipper

The Kentucky Court of Appeals says that it is well settled by the almost unanimous authorities that where the carrier furnishes a car to the shipper for the purpose of shipping live stock therein, and the latter loads the live stock himself, and in doing so he overcrowds the animals, or places in one compartment animals of different kinds, the risk of loss or injury is upon the shipper, being caused by his own act, or by his own act in conjunction with the inherent nature, propensities, and qualities of the animals themselves; and this whether the defective manner of loading be discoverable by the carrier or not, if it has not been actually discovered by it.—Illinois Cent. v. Rogers & Thomas (Ky.), 172 S. W., 948.

Knowledge of Danger—Assumption of Risk

A car inspector went between cars which he, erroneously, thought were coupled and would not be moved, without setting the warning lights required by the rule. It was the custom of switchmen to give notice before moving the cars or to refrain from moving them when they knew inspectors might be between them. In an action for his death it was alleged that the members of the switching crew were guilty of negligence in failing to notify him that they intended to make a second attempt to couple. The Texas Court of Civil Appeals held that it was negligence for the switching crew to move the cars, although the inspector did not set the warning light, and that there was no room for the operation of the doctrine of assumption of risk by the deceased; he having no reason to assume that the switchman would be negligent on this particular occasion.—Texarkana & Ft. S. v. Casey (Tex.), 172 S. W., 729.

Bonds by Shippers and Consignees

The Arkansas act of May 23, 1907, authorizes a shipper or consignee to execute to the carrier a bond conditioned that the "shipper" or "consignee" shall deliver to the carrier the original bill of lading, etc., and authorizes the carrier, on delivery of the bond, to deliver the goods to the shipper or consignee, without requiring surrender of the bill of lading. The Arkansas Supreme Court holds that the statute embraces all persons with whom a carrier deals in the receipt and delivery of goods transported by it. A consignor of freight which was consigned to itself, with direction to notify a milling company, notified the carrier that the shipment was intended for an elevator company, and authorized a substitution of that company for the milling company. The carrier in good faith made delivery to the elevator company. The delivery was held to be within a bond given by the elevator company, it being a "consignee" within the statute, though it subsequently developed that the elevator company was not legally entitled to delivery.—Chicago R. I. & P. v. Title G. & S. Co. (Ark.), 172 S. W., 263.

Injury Near Track—Unforeseen Result

A farm hand was plowing about 50 feet from a railroad track, when, just as a freight train passed at an unusually rapid speed, he was struck on the side by something which turned out to be an iron spike. This had presumably been picked up and hurled into the field by the passing train. In an action for his injuries the Texas Supreme Court held that, the spike being negligently permitted to be upon the track, or loose in the ties, the railroad would be responsible for injury proximately caused by such negligence as, in the exercise of reasonable diligence, the company might have foreseen the result therefrom. If the plaintiff had been lawfully on or near the track in discharge of a duty, and had received the injury, there might have been liability. But the occurrence, as stated, would be so rare that it could not be anticipated by the defendant, and the road therefore was held not liable. Trinity & B. V. v. Blackshear (Tex.), 172 S. W., 544.

Safe Appliances—Contributory Negligence

In an action by a fireman for injuries the negligence complained of was that the engine was not equipped with handholds for use by the fireman in going to light the headlight; that the plaintiff used the pilot light to steady himself; that the top of it broke off, and he fell to the ground. The Georgia Court of Appeals held that the injury must be attributed to the fault of the fireman. Ordinary diligence requires a master to furnish to his servant appliances reasonably suited for the uses intended; but the law does not exact extraordinary diligence by requiring of the master that instrumentalities intended for one use should be usable for every unintended use to which they might be casually or unexpectedly applied. And the master is not chargeable with negligence either because an appliance fails to serve a purpose not intended, or because the instrumentality was not inspected so as to discover that it was not suited for such unexpected and unintended use.—Williams v. Alabama G. S. (Ga.), 84 S. E., 149.

Hours of Service Law—"Employee"

The Hours of Service Act provides that it shall apply to any common carrier or carriers, their officers, agents, and employees engaged in the transportation of passengers or property by railroad from one state to another, and that "employees," as used therein, means persons actually engaged in or connected with the movement of any train. Following B. & O. v. Interstate Commerce Commission, 221 U. S. 612, 31 Sup. Ct., 621, the federal district court of Idaho, N. D., holds that the act did not apply to the engineer of a work train operated wholly within one state, though upon a line of railroad constituting a part of the company's through highway of interstate commerce, and though the train was engaged in hauling materials for the repair of the track over which interstate trains ran. United States v. Chicago, M. & P. S., 218 Fed., 701.

Interstate Commerce—Fuel for Interstate Traffic

The Kansas Supreme Court holds that an interstate railroad, when engaged in hauling cars of coal over its line from one point to another in the same state where their bulk was to be broken and some portions thereof afterwards used for fuel on engines running into other states, is not, by virtue thereof, engaged in interstate traffic. In an action for personal injuries the court held that the plaintiff, a fireman on a switching engine, which was, at the time he sustained his injuries by a derailment, hauling a train of cars loaded with such coal, was engaged in hauling coal which at a later date might become a part of interstate commerce, but that his work had no real and substantial connection with interstate commerce. The court said that the situation would be no different if, instead of coal, the shipment had consisted of articles intended to be used in the repair of a locomotive running from a point within the state to a point in another state. In such a case the mere fact that the consignee intended to attach the articles to a locomotive engaged in interstate commerce would not make the shipment within the state interstate in character. Barker v. Kansas City, M. & O. (Kan.), 146 Pac. 358.

Railway Officers

Executive, Financial, Legal and Accounting

L. E. Abbott has been appointed general claim agent of the Oregon Short Line, with headquarters at Salt Lake City, Utah, succeeding E. M. Bagley, resigned.

E. J. Pearson, first vice-president of the Missouri Pacific, has been elected vice-president of the Texas & Pacific, with headquarters at New Orleans, La., succeeding E. F. Kearney. He will be in charge of operation and will direct the construction of large terminals at New Orleans.

Operating

F. J. Hawn, superintendent of the Fort Worth division of the Texas & Pacific, has been appointed superintendent of transportation, with headquarters at Tyler, Tex., succeeding W. Mosby, assigned to other duties. H. D. Earl, superintendent of the Waco division, with headquarters at Tyler, Tex., has been transferred to Mount Pleasant, Tex., as division superintendent.

J. H. Clark, superintendent of floating equipment of the Baltimore & Ohio, at Baltimore, Md., has been appointed also assistant general superintendent of the New York division and general superintendent of the Staten Island lines, with headquarters at St. George, Staten Island, N. Y., succeeding W. H. Averell, promoted, and F. C. Syze, trainmaster at St. George, has been appointed assistant superintendent of the New York division and of the Staten Island lines.

Traffic

J. M. Beer has been appointed general freight agent of the Centerville, Albia & Southern, with office at Centerville, Iowa.

C. A. Blood, freight traffic manager of the Lehigh Valley, at New York, has been appointed traffic assistant, with office at New York.

Horace Booth, general freight agent of the International & Great Northern, has been appointed traffic manager, and L. M. Hogsett, assistant general freight agent, has been appointed general freight agent, both with headquarters at Houston, Tex.

F. B. Hillebrand, commercial agent of the Lehigh Valley at Toledo, Ohio, has been transferred in the same capacity to Detroit, Mich., succeeding G. H. McDevitt, deceased, and E. H. Schuttenberg, soliciting freight agent at Cleveland, has been appointed commercial agent at Toledo, succeeding Mr. Hillebrand.

James Horsburgh, Jr., general passenger agent of the Southern Pacific at San Francisco, Cal., has been transferred to Los Angeles, in a similar capacity, succeeding F. E. Batturs, who takes the place of Mr. Horsburgh at San Francisco. Eugene W. Clapp, assistant general freight agent at Tucson, Ariz., has been appointed general freight agent, with office at Los Angeles, Cal., succeeding J. G. Stubbs, who has been transferred to San Francisco as general freight agent. R. J. Smith, district freight and passenger agent at Philadelphia, Pa., has been transferred to Sacramento, Cal., in a similar capacity, in place of James O'Gara, who has been appointed freight and passenger agent at San Francisco. J. K. Butler has been appointed assistant general freight agent at San Francisco, and Blake D. Myers has been appointed district freight agent at that point.

Engineering and Rolling Stock

N. S. Airhart has resigned as master mechanic of the Missouri, Kansas & Texas at Denison, Tex.

William J. Tyers has been appointed general supervisor of the Grand Trunk, with headquarters at Montreal, Que., vice G. Dyson.

L. B. Wickersham, assistant engineer of the Spokane, Portland & Seattle, with headquarters at Portland, Ore., has resigned to engage in general engineering work.

The position of supervisor of track in the Louisville district of the Baltimore & Ohio Southwestern has been restored and the following supervisors have been appointed supervisors of track: T. Mahoney, with headquarters at Storrs, Ohio; D. Cassin and W. M. Downey, with headquarters at North Vernon, Ind., and T. Rowland, with headquarters at Seymour.

OBITUARY

W. B. McLoughlin, engineer of maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis, at Indianapolis, Ind., was injured in a motor car accident near Lawrenceburg Junction, Ind., on March 12, and died at St. Mary's hospital in Cincinnati on March 15.

John C. Breedlove, assistant engineer of the Northern Pacific at Tacoma, Wash., died suddenly on March 10 at St. Paul, Minn., aged 39 years. Mr. Breedlove was graduated from Cornell University in 1901, and was employed there for a year as instructor before entering railway service. About 10 years ago he left the position of assistant engineer of the Chicago, Rock Island & Pacific to go to the Northern Pacific, where he was in charge of much heavy grade reduction and improvement work, including the low grade cut-off from St. Regis, Mont., to Paradise. For the past four years he has had charge of the building of the Point Defiance low grade line between Tacoma, Wash., and Tenino, which was placed in operation a short time ago.

Charles Francis Adams

Charles Francis Adams, LL.D., the well known former chairman of the Massachusetts State Railroad Commission, president of the Union Pacific Railroad for six years, and prominent in other railroad affairs; a notable publicist and historian, died at his winter home in Washington, D. C., March 20, after an illness of a week.

C. F. Adams

Mr. Adams was born in Boston, May 27, 1835, son of Charles Francis Adams, minister to Great Britain during the time of the civil war; grandson of President John Quincy Adams and great grandson of John Adams, second president of the United States. He was graduated from Harvard College in 1856, and in 1858 was admitted to the bar in Massachusetts. He was a soldier in the civil war, rising to the position of colonel, and just before the close of the war was brevetted brigadier general. He was a member of the Massachusetts Railroad Commission ten years, 1869-1879, and was chairman for the last seven years of that time. In the years 1879-84 he was a member of the board of arbitration of the Trunk Line Association, and he was a Government director of the Union Pacific from 1877 to 1890. He was president of that road from 1884 to 1890.

Mr. Adams was a man of independent means, and devoted himself to the interest of the public all his life, a true "friend of the people." He was chairman of the committee which planned the metropolitan park system in Boston and vicinity, and an overseer of Harvard University from 1882 to 1907. He was prominent in political discussions, though he never sought public office, being always independent. In a speech delivered at Richmond, Va., in 1908 he said: "The people are governed too much. As to government regulation of monopolies, I don't believe in it. If a so-called monopoly is contrary to correct principles it will burst of itself. If it survives without governmental aid, it does so because it is in accord with economic truths. It then needs no regulation."

In October last Mr. Adams sent a long letter to President

Wilson showing facts justifying the request of the eastern railroads for authority to make a general increase in their freight rates. He told the President that the properties were deteriorating, that new capital could not be obtained to keep them up, and that eastern New England lines alone needed $100,000,000.

Mr. Adams was known as one of the foremost historians of the country, and he continued his studies up to the time of his death. A biography of his father, including a review of the diplomatic negotiations between the United States and Great Britain over civil war problems, is considered one of his notable books. His "Chapters of Erie" (1869) was a bold exposition of the evil management of that road. Other railroad books were "Railroads, Their Origin and Problems" (1878) and "Notes on Railroad Accidents" (1879). In 1913 Mr. Adams lectured at Oxford University, England, on American History. He was president of the Massachusetts Historical Society for many years, and a member of the American Academy of Arts and Letters and of many other societies.

Mr. Adams lived for years at Quincy, Mass., the ancestral home of the Adams family, but for several years past his home had been at South Lincoln, seventeen miles west of Boston. His last public appearance was at the town meeting in Lincoln, March 8, when he spoke at some length, advocating economy in civic expenditure. His wife, who survives him, was Mary Hone Ogden, of Newport, R. I. He leaves, also, two sons and three daughters.

By railroad men Mr. Adams will be best remembered by his work as a pioneer railroad commissioner. During his incumbency, as noted above, Massachusetts was a leader among the states. There had been state railroad commissions before, but he was the first man to make a national reputation in that field. And he made it by the normal method of dealing with the complex problems of his office in the broad spirit of true statesmanship. He informed himself fully as to facts; he exercised always an independent judgment and he looked at the conflicting interests of the railroads and the people with impartiality. Not the least element in his worth as a representative of the state was his ability as a writer, which enabled him to set situations before the people in such a way that they could appreciate them in their true light. His "Chapters of Erie," which, in a later time, might have been called "muckraking," effected its purpose in a similar way. It was forceful writing, backed by an independent and courageous character.

Lower Ganges Railway Bridge in India Completed.—The Viceroy of India on March 4 opened the Lower Ganges bridge at Sara Ghat, the eastern terminus of the meter-gage section of the Eastern Bengal Railway, thus inaugurating direct railway passenger communication across the river. It is expected that as a result of the opening of the bridge there will be a great development in the railway facilities of Northern Bengal and Assam, and the hope is expressed that the new lines to Gauhati and in Assam will form part of the trunk railway to Burma.

Progress of the Amur Railway.—The Russian state treasury has been authorized to spend $2,708,000 during 1915 for the temporary operation of the Amur Railway. Through communication along the whole length of the line will possibly be opened on January 1-14, 1917, and this year small credits only will be asked for, sufficient to cover expenditure which has been incurred in excess of estimates, and to construct a bridge across the River Amur. It is estimated that the total cost of construction of the railway, exclusive of expenditure in connection with the water supply, will amount to about $161,250,000.

Indian Railway Finance.—The railway program of the government of India for 1915-16 contemplates an expenditure of $40,000,000, which is proposed to be distributed as follows: $34,735,000 on open lines, including rolling stock; $3,598,500 on lines under construction; and $1,666,500 on new lines. The government's revised financial statement for 1914-15, which has recently been presented, when compared with the budget estimated published in March, 1914, shows a decrease of $10,330,000 in the revenue from state railways, and the budget estimate for 1915-16 compared with the revised estimate for 1914-15 shows a decrease of $1,294,500 in the net revenue from state railways.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Idaho & South-Eastern is inquiring for 1 light Mogul type locomotive.

Frazar & Company, New York, have ordered one locomotive from the Baldwin Locomotive Company.

The Remington Arms-Union Metallic Cartridge Company, New York, has ordered one 4-wheel saddle tank switching locomotive from the American Locomotive Company.

The California Western Railroad & Navigation is reported to have ordered one saddle tank switching locomotive from the Baldwin Locomotive Company. This item has not been confirmed.

CAR BUILDING

The International & Great Northern is contemplating the purchase of 1,000 freight cars.

The Interborough Rapid Transit is reported to have ordered 478 all-steel subway car bodies from the Pullman Company, subject to the approval of the Public Service Commission, First district.

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction has ordered 45 80,000-lb. capacity box cars, 12 trailer passenger cars and two electric motor cars from the J. G. Brill Co.

The Illinois Traction System, reported in an unconfirmed item in the *Railway Age Gazette* of March 12 as having ordered 50 cars from the Haskell & Barker Car Company, has ordered 50 50-ton hopper bottom wooden coal cars from that company.

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for 100 60,000-lb. capacity second hand box cars, several cabooses, one short passenger coach, one cheap passenger coach to be converted into a camp car and one cook car or cheap box car.

IRON AND STEEL

The Philadelphia & Reading has ordered 2,500 tons of steel rails from the Carnegie Steel Company.

The International & Great Northern has ordered 1,500 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Rhode Island Company has ordered 1,600 tons of girder rails from the Pennsylvania Steel Company and the Lorain Steel Company.

The Northern Ohio Traction Company recently ordered 500 tons of rails from the Algoma Steel Company, Sault Ste. Marie, Ont.

The Chesapeake & Ohio has ordered 16,000 tons of steel from the McClintic-Marshall Company for its bridge over the Ohio river at Sciotoville, Ohio.

The Virginian Railway has divided an order for 3,500 tons of steel rails among the Pennsylvania Steel Company, the Lackawanna Steel Company and another company.

The Interstate Bridge Commission has awarded a contract for 7,700 tons of steel for the truss spans for the Interstate bridge over the Columbia river, near Portland, Ore.

The New York Municipal Railways have ordered 800 tons of rails from the Pennsylvania Steel Company, and 1,600 tons of girder rails from the Lorain Steel Company.

The Keystone Construction Company, Kansas City, Mo., has ordered 9,000 tons of 70-lb. rails from the Illinois Steel Company. These rails will be used on a new road to be known as the Salina Northern, which the company is building in Kansas.

Supply Trade News

George Hills, an expert on electric welding, has been made head of the arc welding department of the Burke Electric Company, Erie, Pa.

Frederick A. Hall, formerly head of the chain hoist department of the Yale & Towne Company, died at his home in Passaic, N. J., on March 16.

G. Haven Peabody, western representative of the Lima Locomotive Corporation, Lima, Ohio, has resigned, effective April 15, to accept a position with the Lackawanna Steel Company.

W. C. Chapman, who for several years has been connected with the sales force of the Philadelphia branch office of Manning, Maxwell & Moore, Inc., has been appointed manager of that office.

Frederick Winslow Taylor, originator of the modern scientific management movement, died suddenly in Philadelphia on March 21 from pneumonia. Mr. Taylor was born at Germantown, Pa., on March 20, 1856. He attended Phillips Exeter Academy, but left before completing the course because of impaired eyesight. In 1883, however, he graduated from Stevens Institute of Technology with the degree of Mechanical Engineer. In 1878 he entered the employ of the Midvale Steel Company, with which company he was successively gang boss, assistant foreman, foreman of the machine shop, master mechanic, chief draftsman and chief engineer. He left the company in 1889 and began his special work of reorganizing the management of manufacturing establishments. Mr. Taylor was an inventor of considerable ability. Among his numerous inventions was the Taylor-White process of treating modern high-speed tools for which he received a personal gold medal from the Paris Exposition in 1900 and the Elliott Cresson medal of the Franklin Institute. Mr. Taylor was a member of the American Society of Mechanical Engineers, and served as its president in 1905 and 1906. He was the author of a number of technical books and articles, among the best known being "The Principles of Scientific Management," and "Shop Management," both published in 1911.

F. W. Taylor

E. L. Leeds, who since 1907 has been manager of the railroad equipment department of the Niles-Bement-Pond Company, New York, has been appointed general manager of sales of that company and the Pratt & Whitney Company, Hartford, Conn.

Frank N. Grigg, with offices at 1201-2 Virginia Railway and Power building, Richmond, Va., has been appointed sales agent for the Harlan & Hollingsworth Corporation, Wilmington, Del., and the car seat department of the Heywood Brothers & Wakefield Company, Wakefield, Mass.

H. C. Hopson, who for the last six years has been at the head of a department of the New York State Public Service Commission, Second district (Albany), has opened an office at 61 Broadway, New York City, where he is prepared to advise concerning financing, rates, reorganizations, accounting and valuations of railways and other public utilities. At Albany, Mr. Hopson had charge of the examinations of the accounts and records of corporations, in connection with the investigation of capitalization, rates and reorganizations.

Western Electric Company

In spite of the quiet condition of business, the Western Electric Company was able in its fiscal year ended December 31, 1914, to pay its usual dividends and earn a considerable surplus. Its sales for the year were $66,408,000 as against $77,532,860 in 1913, and $71,727,329 in 1912. There was also other income of $948,509, making a total of $67,356,993. From this there were deducted: cost of merchandise, $57,360,541; expenses, $5,472,944 taxes, $490,041 and an appropriation of $500,000 for the reserve for contingencies, leaving $3,533,467 available for dividends. Interest was paid of $862,507, and the usual dividends of $1,500,000, leaving $1,170,960 to be carried to surplus, as compared with $1,671,695 in 1913 and $1,067,410 in 1912. The total surplus on December 31, 1913, was $22,840,459, and on December 31, 1914, $24,011,419. The company's orders on hand on January 1, 1915, were $4,309,000 less in value than on January 1, 1914.

The Western Electric Company manufactures the telephone apparatus used by the Bell companies, and also does a general telephone and electrical manufacturing business. It is the largest manufacturer of telephonic apparatus in the world, and the largest distributor of electrical supplies in this country. On December 31, 1913, the company's real estate, buildings, equipment and machinery had a total value of $19,217,809. There were sundry investments valued at $9,349,059, which value may have to be reduced because of the war, and current assets of $44,902,342, of which $5,242,421 was cash. The capital stock outstanding is $15,000,000, a majority of this being owned by the American Telephone & Telegraph Company. There are also bonds outstanding of $15,000,000. The accounts payable on December 31, 1914, were $3,210,970. There were also reserves for depreciation of $11,449,912, for employees' benefit fund of $1,000,000, and for contingencies of $3,796,909, the surplus, as noted above, being $24,011,419.

TRADE PUBLICATIONS

Multiport Valve.—Cochrane Multiport Valves is the subject of a booklet of 72 pages just issued by the Harrison Safety Boiler Works, Philadelphia, which describes the multiport valves introduced by that company for back pressure relief and vacuum service, flow service in connection with mixed flow turbines, and check valve service with bleeder or extraction turbines. The essential idea of the multiport valve is the use of a number of small discs instead of one large disc, in order to secure greater safety, quietness, lightness or moving parts and tightness.

Electric Hoists.—The Link-Belt Company, Chicago, in its bulletin No. 207 sets forth the special features of the Link-Belt electric hoists. These are of the monorail type, having a capacity up to four tons and are built with either a plain trolley, a geared trolley propelled by a hand chain, a motor driven trolley with pendant cords for operation from below, or with an operator's cage suspended from the hoist. These hoists may also be provided with shackle or hook suspension in place of the trolley, making them suitable for stationary work.

Engineering Calculations.—This is the title of a 23-page booklet issued by Felt & Tarrant Manufacturing Company, Chicago, which deals with the application of the comptometer to calculating work in the drafting room and the estimating department for a variety of calculations involving addition, multiplication, division and subtraction. It is well illustrated and contains numerous examples of the operations for which the machine is being used. The booklet will be of interest to those in charge of engineering offices and drafting rooms generally.

Lehigh Valley.—The Lehigh Valley has issued a booklet calling attention to its service in connection with the Panama Pacific Exposition. The booklet, which is intended to offer "First Aid to the Fair Goer," gives in concise form information relating to travel to and from the exposition, including fares, hotel rates, tours, etc., but it contains no description of the fairs themselves, since they will be described elsewhere. One of the features of the booklet is a map with all the railroads except the line of Lehigh Valley and Grand Trunk from New York to Chicago omitted, on which the intending traveler may mark the points of interest which he wishes to visit and which he may then take to the nearest Lehigh Valley agent, who will give him routes, rates and other necessary information.

Railway Construction

Alabama Roads.—The Perdido Lumber Company of Gateswood, Ala., is building a railroad, it is said, from Hollinger creek, south to a point on the Gulf of Mexico.

Arkansas Valley Interurban.—Efforts are now being made by this company to vote $30,000 in terminal aid bonds in the city of Hutchinson, Kan. It is said that if these bonds are voted the construction of the extension from Halstead, Kan., to Hutchinson will be started immediately.

Atlanta & Carolina Interurban.—According to press reports plans are being made to carry out the work on the line from Atlanta, Ga., east to Augusta, about 160 miles. In June, 1914, Ronald Ransom was appointed receiver, and up to that time, it is said, that about 30 miles had been graded and three miles of track laid.

Charleston-Isle of Palms Traction.—An officer writes that work will be started soon on an extension of this road. The company now operates an electric line from Mt. Pleasant, S. C., east to Isle of Palms, about 7.5 miles, and also operates a three-mile ferry line from Mt. Pleasant to Charleston. The extension work will be carried out by the company's forces. About two years ago extensions were projected from Isle of Palms east to McClellanville, about 30 miles, and from Mt. Pleasant to the Cooper river, thence over a concrete bridge, to be built over that river, to a terminal in the city of Charleston.

Fellsmere Railroad.—Work is now under way, it is said, building an extension to Broadmoor, Fla., 3.5 miles. This company now operates a railroad from Sebastian to Fellsmere, 9.94 miles.

Florida Roads (Electric).—According to press reports plans are being made to build an interurban line to connect Lakeland with other towns in Polk county, Fla. A. J. Holworthy, secretary, and G. C. Rogan, W. F. Sneed, M. F. Hetherington, S. F. Smith and A. J. Holworthy, members of the Board of Trade, at Lakeland, are back of the project.

Lula-Homer.—About 70 per cent of the grading on the proposed new line between Homer, Ga., and Lula, has been completed, according to a recent report from an official of that company. The line is to be 14 miles long, with a maximum curvature of 16 deg., and a maximum grade of 3 per cent. No bridges will be required. In connection with this road three depots will be built. S. S. Carter of Lula, Ga., is president, and D. G. Zeigler of Lula, is chief engineer.

North Carolina Roads.—Contracts are reported let to S. S. Royster and to O. Elan, Shelby, N. C., to build a railroad from Shelby north to Casar in Cleveland county, about 21 miles.

New York Roads (Electric).—Plans are being made by residents of Middletown, N. Y., and Walden, it is said, to build an electric line from the Wallkill Transit Company's line at Goshen north about 15 miles to a connection with the Orange County Traction Company's line at Walden.

Right of way has been secured and franchises are being asked for, it is said, to build an electric line from Jamestown, N. Y., north via Gowanda to Buffalo, about 70 miles. J. B. Anderson, Ellington, and F. E. Ward, Gowanda, are said to be interested in this project.

New York Roads.—Plans are being made by the MacIntyre Iron Company, it is said, to build a railroad from Sanford lake north of Tahawus, N. Y., east to Fort Ticonderoga, which is on the Delaware & Hudson and the Rutland Railroad, about 60 miles. The line is to be built to provide an outlet from ore fields owned by this company at Sanford lake.

New York Subways.—Bids are wanted, April 20, by the New York Public Service Commission, First district, for building Section No. 2 of Route No. 12 of the Eastern Parkway subway in the borough of Brooklyn. This section is from Prospect Park Plaza, under Eastern Parkway, to a point east of Nostrand avenue. The subway will be constructed on the double-deck plan.

The commission has approved the form of contract submitted by the Interborough Rapid Transit Company for the construction of a section of the West Farms subway connection. This section is to be built from the Third avenue elevated road, at a point near One Hundred and Forty-First street, through Willis and Bergen avenues in the borough of the Bronx, to a point near One Hundred and Forty-Ninth street, thence to a connection with the Lenox avenue branch of the existing subways.

Ocilla Southern.—Surveys are now being made at Macon, Ga., it is said, for an entrance of the Ocilla Southern into that city. The company now operates a line from Nashville north to Rochelle, 62.3 miles, and is building an extension from Rochelle north to Pope City, 7.3 miles. A further extension is projected north to Macon, about 73 miles and trackage rights may be secured over existing lines for part of the way. (February 26, p. 390.)

Ocmulgee Valley.—Work is to be started next month to complete a line from Lumber City, Ga., southwest to Jacksonville, about 20 miles. The construction work will probably be carried out by company forces, about 7 miles of track has already been laid. The line is to have maximum grades of 1 per cent, with a maximum curvature of 4 deg. The promoters expect to develop a traffic in lumber and farm products. The line will traverse a fine farming and timber land section, and the work will involve handling about 40,000 cu. yd. C. S. Smith, president; J. C. Work, chief engineer, Lumber City, Ga.

Pennsylvania Lines West.—Terminal tracks are now being laid to the new temporary freight shed of the Pennsylvania, located just south of Taylor street, near the Chicago river, Chicago, Ill., and preliminary work has been started on the new permanent freight terminal, which will be located between Polk and Taylor streets and near the Chicago river. The work of relocating the sewers incident to the construction of the new freight terminal is also being actively carried out.

Pennsylvania System.—The record of the mileage of the road on December 31, 1914, shows that the total length of main line on lines east of Pittsburgh, Pa., and Erie is 5,377 miles of first track, with 1,911 miles of second track, 559 miles of third track, 483 miles of fourth track, and 4,745 miles of company's sidings, a total of 13,075 miles. There was an increase of 28 miles of first track, 4 miles of second track and 54 miles of company's sidings, a total increase of 86 miles. On the Pennsylvania lines west of Pittsburgh and Erie the mileage is 3,108 miles of first track, 1,367 miles of second track, 222 miles of third track, 134 miles of fourth track and 2,672 miles of company's sidings, a total of 7,503 miles. During the year there was an increase of 14 miles of first track, 2 miles of third track, 5 miles of fourth track, and 43 miles of company's sidings, and there was a decrease of 6 miles of second track, making the total increase 58 miles. Mileage of the Vandalia Railroad is: first track 851 miles, second track 61 miles, third track 8 miles, and sidings 441 miles, a total of 1,361 miles. The grand total of all lines, including those in operation by and associated in interests with the Pennsylvania Railroad is 11,794 miles of first track, 3,734 miles of second track, 822 miles of third track, 636 miles of fourth track and 9,433 miles of company's sidings, a total of 26,419 miles. Of this 6,462 miles of first track are east and 5,332 miles are west of Pittsburgh and Erie.

Southern Railway.—This company is installing passing tracks of the lap type at Vantine, Archdale, Mt. Zion, Fair Forrest, Taylor, and Gaffney, between Charlotte, N. C., and Greenville, S. C., on the Washington-Atlanta line. Each of the sidings will accommodate four of the largest freight trains handled on this division. At each of these points an interlocking plant is being installed with distant signals, so that trains will not have to stop before entering the sidings. The passing tracks are being built to main line standards so that they can be later used as a part of double track.

Texas Roads.—Plans are being made to build a 28-mile railroad from Sierra Blanca, Tex., to new coal fields, which are to be developed. J. Shelby, El Paso, is said to be back of the project.

Valley & Siletz.—The Valley & Siletz Railway is building a line from Independence, Ore., to Newport, a distance of about 45 miles. This line will connect with the Southern Pacific at Airlie, Ore., about 10 miles southwest of Independence. Grading will require the moving of about 25,000 yd. per mile. Nine Howe trusses, and 6,000 ft. of trestle work will be required. The maximum curvature on the line will be 10 deg., and the maximum grade 2 per cent. About 25 per cent of the grading work has been completed. The company's offices are in the Northwestern Bank building, Portland, Ore.

RAILWAY STRUCTURES

Carbondale, Pa.—The Public Service Commission of Pennsylvania has approved plans, it is said, for the construction of a viaduct over the tracks of the Delaware & Hudson near Simpson. The estimated cost of the structure is $75,000, and is to be paid for jointly by the railway company and Lackawanna county.

Chicago, Ill.—The Atchison, Topeka & Santa Fe is completing plans for a petition to the city council for permission to build a fruit terminal on its property between Eighteenth and Twenty-second streets, and Wentworth avenue and the Chicago river. The terminal is to include an auction house, a banana house, a cold storage plant and team tracks to accommodate approximately 1,000 cars per day. If the council passes upon this petition favorably, construction work will be begun at once. A number of short streets will have to be closed and some grading done, as well as relocating old tracks and laying new ones. The value of the land on which this improvement is to be made is estimated at $3,000,000.

Hamilton, Ont.—Plans are being made by the Toronto and Hamilton Highway Commission to build a steel bridge across the inlet of Burlington bay at Hamilton. The proposed structure will probably carry tracks for the operation of electric railway cars, and is to cost about $300,000.

Harrisburg, Pa.—A contract has been given by the Cumberland Valley to the Robert Grace Contracting Company, Pittsburgh, Pa., to build the new arch bridge over the Susquehanna river at Harrisburg, to replace the present steel deck truss bridge. The new bridge will carry two tracks; it will have 46 spans, and will be 4,000 ft. long. The cost of the new structure will be about $750,000. (February 26, p. 390.)

New Orleans, La.—The Trans-Mississippi Terminal Railroad is making financial arrangements to build terminals for the Gould lines at New Orleans. The contract is reported let to J. W. Thompson, St. Louis, Mo.

Ottawa, Ont.—The city officers of Ottawa will build a steel and concrete bridge over Rideau canal at Pretoria avenue, Ottawa. It will be a Strauss type, direct-lift structure, with three spans, and will carry double tracks for the operation of cars of the Ottawa Electric Railway Company. The estimated cost of the work is $80,000.

Electrification in Great Britain.—The London, Brighton & South Coast practically stopped all work on capital account on the outbreak of war, but has been obliged to proceed with the equipment of the suburban lines for electrical operation, not only because contracts were made and certain orders given, but because a considerable quantity of material had been delivered which would have seriously deteriorated if not used. The work of electrification on the London & South-Western Railway was stopped when the war broke out, but new financing last October was so successful that the work was then resumed. Owing, however, to scarcity of labor the progress is slow, and it will be three or four months before the first section, i. e., the lines from Waterloo to Kingston via Twickenham and via Malden can be ready for service. The report of this company states that the main powerhouse at Wimbledon and the substations at other places are practically completed, and the machinery is being erected. Several of the new electric trains have been constructed. Good progress has also been made with the placing of conductor rails, the bonding of track rails, and the laying of high-tension cables on the first section.

Railway Financial News

Boston & Maine.—The bill for the reorganization of this road, which has been agreed upon by the Public Service Commissions of Maine, New Hampshire and Massachusetts has been laid before the legislatures of the several states. This bill was outlined in this column last week. It provides for the capitalization of the present floating indebtedness, but leaves it to the Public Service Commissions to provide for a gradual amortization of the deficit of income in preference to dividends on common stock, the provisions of this section to continue until July 1, 1916. There are provisions for taking over the Hampden Railroad and for demanding payment from Boston & Maine stockholders of a substantial assessment or its equivalent. There is a clause providing that any mortgage issued on the railroad property shall include all outstanding indebtedness.

The Vermont legislature has already discussed the bill, and it has been acted on favorably in the Senate, after being amended so as to require the new company, if one be organized, to be incorporated under Vermont law and to be specifically amenable to the Vermont Public Service Commission.

Chicago, Rock Island & Pacific.—John J. Quinlan and F. L. Forbes, vice-president and transfer agent, respectively, of the Chicago, Rock Island & Pacific Railway Company, have been charged in the criminal proceeding which had been brought by Warren C. Crane, a stockholder, to hold them amenable to the penal law for refusing access to the railway company's stock books. Forbes was discharged on the ground that it had not been proved that he was in control of the stock books, and Quinlan is held not guilty of wilfully refusing to allow the books to be inspected. The decision leaves Mr. Crane, as a member of the Amster committee, which is seeking to oust Quinlan and all the other Rock Island directors at the annual meeting of the stockholders on April 12, free to get the names, addresses, and the amount of the holdings of each stockholder of the Chicago, Rock Island & Pacific Railway. A vigorous canvass for proxies will now be made.

Pennsylvania.—In the whole Pennsylvania Railroad System there are now 11,794 miles of road and 26,419 miles of track; lying in thirteen states and the District of Columbia. The company issues a statement to the effect that more than half of its 92,225 stockholders live in the states served by the railroad. There are more owners of Pennsylvania Railroad stock today than ever before in the history of the company. On the first of March 31,865 people who live in Pennsylvania—1,799 more than on March 1, 1914—were shareholders; in New York, 15,712; in New England and the rest of the country, 32,726. Despite the European war, the road on March 1, had 190 more foreign stockholders than it did a year before. The average holding is 108.27 shares, or 3.53 shares less than a year ago. The number of women shareholders is 44,469, and their average holding is 63 shares.

Texas & Pacific.—At the annual meeting of the stockholders in New York, March 17, nine new directors were chosen; but the Gould interests continue to be represented. Most of the new members, however, represent the new Missouri Pacific interests. The new directors are Charles H. Sabin, president of the Guaranty Trust Company; B. D. Caldwell, president of Wells, Fargo & Company; John I. Waterbury; Henry Ickelheimer, of Heidelbach, Ickelheimer & Company; Seward Prosser, president of the Bankers' Trust Company; N. S. Meldrum, of Blair & Company; T. L. Chadbourne, personal counsel of George J. Gould; Henry A. Bishop and William Church Osborne, who represents the Phelps-Dodge interests in the stock of the road. The members re-elected are George J. Gould, R. M. Gallaway, Benjamin Nicoll, R. C. Clowry, Kingdon Gould, Dunlevy Milbank, Henry E. Cooper and Howard Gould. Members of the old board not re-elected are: John P. Munn, Frank J. Gould, Edwin Gould, E. T. Jeffery, J. L. Slocum, Finley J. Shepard, O. B. Huntsman, Thomas J. Freeman and E. F. Kearney.

[ADVERTISEMENT.]

ANNUAL REPORTS

NEW YORK CENTRAL AND HUDSON RIVER RAILROAD—ANNUAL REPORT

To the Stockholders of

THE NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY:

The following report, covering the operation of the New York Central & Hudson River Railroad and leased lines, the Boston & Albany Railroad and the St Lawrence & Adirondack Railway for the entire year ended December 31, 1914, is submitted by the Board of Directors elected April 15, 1914, whose term of office expired December 23, 1914, on the consolidation of the company with several allied organizations into a new corporation named The New York Central Railroad Company, to which your interests, as stockholders, were transferred.

The statements and tables contained in the report are in accordance with the new classification promulgated by the Interstate Commerce Commission. For the purpose of comparison the figures representing the transactions of the year 1913 have been revised.

The mileage embraced in the operation of the road is tabulated as follows:

	Miles
Main line and branches owned	1,835.55
Proprietary line	.18
*Leased line	1,583.97
Line operated under contract	71.59
Line operated under trackage rights	282.66
Total road operated	3,773.95

*The Dunkirk Allegheny Valley and Pittsburgh Railroad, 90.51 miles, is also leased by this company, but its mileage and operations are not included in this report. Separate accounts are kept and independent returns prepared in its behalf.

This figure shows an increase of 20.83 miles, as compared with the mileage reported December 31, accounted for as follows:

INCREASES DURING THE YEAR.

	Miles	
New branch from tower 34 to Charles Street, in the city of Rome	4.19	
Extension of Rome Branch on account of Rome improvement	4.04	
On Terminal Railway of Buffalo: track formerly classified as siding	.54	
On Beech Creek Railroad: a gauntlet track over Pine Creek	.11	
On Beech Creek Extension Railroad: by inclusion of the Hooverhurst & Southwestern Railroad and consequent change in terminals	3.90	
Trackage rights from Saranac Lake to Lake Placid	10.08	22.86

DECREASES DURING THE YEAR.

	Miles	
By change of line and connections and sundry adjustments	.67	
By abandonment of a portion of the Beech Creek Railroad	.80	
By abandonment of a portion of the Cherry Tree & Dixonville Railroad over which this company has trackage rights	.56	2.03
Making a net increase of		20.83

The capital stock outstanding on December 31, 1913, including the amount of the convertible value of capital stock of the companies consolidated on April 16, 1913, was $225,581,066.00 and no change has occurred in this amount during the year.

The mortgage, bonded and secured debt outstanding on December 31, 1913, was $378,644,052.45

This has been added to as follows:

Refunding and improvement bonds of 1914 bearing interest at the rate of four and one-half per cent per annum	$40,000,000.00		
This company's pro rata liability in connection with equipment trust certificates of 1913, bearing interest at the rate of four and one-half per cent per annum	2,600,823.97		
This company's liability in connection with B & A equipment trust certificates of 1912	2,128,000.00		
There has been included in this account the amount of a loan from the New York New Haven and Hartford Railroad Company in connection with the Grand Central Terminal Improvement	$1,310,000.00		
Reduced by annual payments amounting to	157,200.00	1,152,800.00	45,881,623.97
			$424,525,676.42

and has been decreased as follows:

Three year gold notes of 1911 paid March, 1914	$30,000,000.00	
Mortgage on real estate in city of Utica paid off	2,500.00	
Payments of installments falling due during the year on this company's pro rata liability in connection with the certificates issued under equipment trust agreement, as follows:		
Trust of 1907, installment due November, 1914	793,660.12	
Trust of 1910, installment due January, 1914	433,964.42	
Trust of 1912, installment due January, 1914	477,116.10	
B & A Trust of 1912, installment due October, 1914	500,000.00	
Trust of 1913, installment due January, 1914	303,630.59	32,510,871.23
Outstanding as shown on balance sheet of December 31, 1914		$392,014,805.19

The New York Central and Hudson River Railroad Company

(including Boston & Albany Railroad, for which separate statistics will be found at end of report)

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME

	1914	1913	Increase or Decrease
OPERATING INCOME	3,773.95	3,753.12	20.83 *miles*
RAILWAY OPERATIONS	*miles operated*	*miles operated*	
Revenues	$112,741,051.22	$122,683,809.35	—$9,942,758.13
Expenses	84,033,105.56	93,414,436.04	—9,381,330.48
NET REVENUE FROM RAILWAY OPERATIONS	$28,707,945.66	$29,269,373.31	—$561,427.65
Percentage of expenses to revenues	(74.54%)	(76.14%)	—(1.60%)
Railway taxes accrued	$6,162,219.76	$6,356,545.91	—$194,326.15
Uncollectible railway revenue	2,877.49	.....	2,877.49
RAILWAY OPERATING INCOME	$22,542,848.41	$22,912,827.40	—$369,978.99
MISCELLANEOUS OPERATIONS			
Revenues	$2,133.67	$2,402.39	—$268.72
Expenses and taxes	2,171.65	3,449.08	—1,277.43
MISCELLANEOUS OPERATIONS LOSS	$37.98	$1,046.69	$1,008.71
TOTAL OPERATING INCOME	$22,542,810.43	$22,911,780.71	—$368,970.28
OTHER INCOME			
Joint facilities rents	$2,436,499.85	$2,283,363.39	$153,136.46
Miscellaneous rents	742,449.96	702,493.98	39,955.98
Net profit from investments in physical property	353,033.12	118,074.06	234,959.06
Separately operated properties, profit	4,895.09	.....	4,895.09
Dividends on stocks owned	9,115,759.71	12,168,536.78	—3,052,777.07
Interest on funded debt owned	579,454.50	450,181.03	129,273.47
Interest on other securities, loans and accounts	705,295.97	652,588.69	52,707.28
Contributions from other companies	144,246.27	260,359.34	—116,113.07
Miscellaneous income	49,880.18	33,677.84	16,202.34
TOTAL OTHER INCOME	$14,131,514.65	$16,669,275.11	—$2,537,760.46
GROSS CORPORATE INCOME	$36,674,325.08	$39,581,055.82	—$2,906,730.74
DEDUCTIONS FROM GROSS CORPORATE INCOME			
Rentals of leased lines	$8,004,145.48	$8,518,856.66	—$514,711.18
Hire of equipment, debit balance	557,192.34	1,010,113.65	—452,921.31
Joint facilities rents	588,277.20	567,853.29	20,423.91
Miscellaneous rents	792,247.84	714,082.12	78,165.72
Miscellaneous tax accruals	84,936.31	38,120.61	46,815.70
Separately operated properties, loss	.....	39,281.33	—39,281.33
Interest on bonds and other long-term debt	12,263,736.00	10,603,317.10	1,660,418.90
Interest on gold notes of 1911 and 1912	1,125,000.00	2,250,000.00	—1,125,000.00
Interest on equipment trust certificates	1,434,038.18	1,347,411.57	86,626.61
Other interest	3,057,430.06	1,170,832.75	1,886,597.31
Maintenance of investment organization	1,031.20	.....	1,031.20
Income transferred to other companies	31,936.35	67,543.75	—35,607.40
St L & A Railway: rental of leased line	10,000.00	10,000.00	.....
Other deductions	35,681.75	84.58	35,597.17
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME	$27,985,652.71	$26,337,497.41	$1,648,155.30
NET CORPORATE INCOME	$8,688,672.37	$13,243,558.41	—$4,554,886.04
DIVIDENDS DECLARED: four in 1913; three in 1914*	$8,458,890.00	$11,243,021.25	—$2,784,131.25
MISCELLANEOUS APPROPRIATIONS OF INCOME	24,347.04	.....	24,347.04
SURPLUS FOR THE YEAR CARRIED TO PROFIT AND LOSS	$205,435.33	$2,000,537.16	—$1,795,101.83

Balance to credit of profit and loss (free surplus) as shown in report of December 31, 1913		$12,965,794.15
Additions for year:		
Surplus from operations	$205,435.33	
Sundry deferred credits and adjustments	938,561.05	$1,143,996.38
		$14,109,790.53
Deductions for year:		
Discount and expenses account of Refunding and Improvement mortgage bonds	$3,101,875.52	
Discount, commissions and expenses account N Y C Lines equipment trust of 1913	103,708.07	
Commissions, brokerage and expenses on various short term loans	74,922.19	
Cash advances to Clearfield Bituminous Coal Corporation	445,000.00	
Charging off value of abandoned facilities	213,396.30	
Adjustment of accounts with Pullman Co. July 1, 1910, to December 31, 1913	200,000.00	
Adjustment of amount paid in connection with land for Grand Central Terminal Improvement	210,227.65	
Charging off various uncollectible accounts, settlement of suits and sundry adjustments of accounts	324,918.72	4,674,048.45
BALANCE TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS), DECEMBER 31, 1914		$9,435,742.08

*The fourth quarterly dividend at the rate of 1¼ per cent on its outstanding capital stock was declared December 23, 1914, by the successor company, The New York Central Railroad Company, payable February 1, 1915.

The decline in operating revenues which commenced in October, 1913, continued throughout the whole of the year 1914, causing a net decrease of $9,942,758.13, equal to 8.1 per cent.

The decrease in freight revenues, $6,753,888.35, was 11.6 per cent. Almost every commodity in the list shows a loss in volume and the consequent decrease in the density of freight traffic per mile of road was 381,215 ton-miles.

The decrease in passenger revenue, $2,765,729.79, was in both local and interline business. The decrease in mileage amounts to 142,118,913 passenger-miles. The average amount received from each passenger decreased a little over three cents and the density of passenger traffic per mile of road decreased 43,038 passenger-miles.

The revenue from express business decreased $649,931.06, due to decrease in the volume of business and reduced rates. Mail earnings increased $468,440.38, due to more mail transported.

Rail operating expenses decreased $9,381,330.48 or 10.04 per cent. The decreases by groups were as follows:

Maintenance of way and structures decreased $3,393,644.22. There was less improvement work conducted and a lighter traffic sustained. The property was maintained to its standard.

Maintenance of equipment decreased $1,726,246.57, due to decreased mileage made by equipment.

Transportation expenses decreased $3,717,536.64, due to decrease in volume of business and the benefits in the form of increased efficiency resulting from previous investments.

Traffic expenses decreased $419,733.85.

Miscellaneous operations decreased $106,204.18.

General expenses decreased $17,965.02, notwithstanding an increase of $52,347.24 in expenditures on account of the Government Valuation requirements. The Government has not yet undertaken the actual work of valuation of your property and this expenditure represents what has been done to organize for the work and assemble the large amount of records and data which will be required by the authorities when they start the work.

The Pension Department retired and placed upon the pension rolls 186 employees during the year; 104 of these were authorized because of the attainment of seventy years of age and 82 because of total and permanent physical disability; 94 pensioners died during 1914. The total amount paid in pension allowances was $238,011.51.

Operating income shows a decrease of only $368,970.28. Non-operating income shows a decrease of $2,537,760.46, due to less dividends having been received on some of the company's investments, principally in Lake Shore & Michigan Southern Railway Company and Michigan Central Railroad Company.

Deductions from corporate income show an increase of $1,648,155.30, due to increased carrying charges on the company's unfunded debt, resulting from the financial conditions which existed at the time when unfunded obligations had to be issued or extended.

During the year there was expended for additions and improvements to the property $7,555,914.69 and for similar items on lines of leased railroad companies, $4,761,835.28. These represent the continuance or completion of work authorized and commenced in previous years. There was expended for additional equipment $7,886,284.04, mainly for new deliveries of trust equipment.

During the year additional equipment trust certificates were issued under the New York Central Lines Equipment Trust agreement of January 1, 1913, to the amount of $6,944,000, so there is now outstanding a total of $22,438,000 of these certificates. Of the equipment bought with these certificates there has been allotted to the New York Central and Hudson River Railroad $8,628,836.92.

Under the refunding and improvement mortgage described in last year's report, the Public Service Commission of the State of New York has authorized the issue of $70,000,000, of which $40,000,000 has been issued and sold. The proceeds have been used to retire the three-year gold notes of 1911 and some of the notes maturing in 1914 which had been theretofore issued to pay for additions to the property. The balance of the amount authorized, $30,000,000, has been deferred because of the radical changes in the money situation which have developed since the authority was obtained.

The agreement between this company and the New York New Haven & Hartford Railroad Company for the establishment of through routes, etc., via the Boston & Albany Railroad, was cancelled by the New York New Haven & Hartford Railroad Company as of January 31, 1914, with the consent of the directors of your company, because of orders issued by the Government.

In May, 1913, this company joined in the application to the Interstate Commerce Commission for an increase of about five per cent in freight rates. The decision of the Commission at first gave no relief, but on account of the unusual business conditions which arose subsequent to this decision, the case was reopened, and on December 16th the Commission granted an increase of not more than five per cent with specified commodities excepted. To the extent of its application, the decision of the Commission is helpful, besides inspiring confidence in their general attitude towards the railroads.

Work continued during the year on certain phases of the Grand Central Terminal Improvement which could not well be suspended, such as the excavation of the block at 42d Street and Lexington Avenue and the construction of the loops under the building. The Board of Estimate and Apportionment of the City of New York accepted the street work completed during the previous year under the terms of the general agreement with the City dated June 19, 1903. A lease was made for a store and office building site at 45th Street and Vanderbilt Avenue, the building to cost $1,000,000. A new building has been commenced at 46th Street and Lexington Avenue to cost $980,000, principally for the use of the Post Office Department under lease, in connection with the parcel post business. The New Haven Company has the option until January, 1922, to participate in the cost and benefits of this structure. The building for the Yale Club at 44th Street and Vanderbilt Avenue has been completed. The building for the Railroad Branch of the Young Men's Christian Association at 50th Street and Park Avenue has been completed and occupied since May 1, 1914.

The following changes took place in the Board of Directors during the year:

Resigned: December 31, 1913—William C. Brown,
January 14, 1914—J. Pierpont Morgan,
April 15, 1914—Lewis Cass Ledyard,
September 9, 1914—James Stillman.

Elected: January 1, 1914—Alfred H. Smith,
January 14, 1914—Harold S. Vanderbilt,
March 12, 1914—Ogden Mills,
April 15, 1914—Robert S. Lovett.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1914

ASSETS

Investments			
Investment in road		$253,653,988.41	
Investment in equipment:			
Trust	$42,881,342.53		
Other	79,768,852.88	122,650,195.41	$376,304,183.82
Improvements on leased railway property			86,302,060.59
Miscellaneous physical property			5,906,630.39
Investments in affiliated companies:			
Stocks		$160,369,408.43	
Bonds		10,327,808.91	
Notes		23,935,712.26	
Advances		253,999.90	194,886,929.50
Other investments:			
Stocks		$9,285,552.01	
Bonds		4,675,052.00	
Notes		124,830.00	
Miscellaneous		2,545,677.52	16,631,111.53
Total investments			$680,030,915.83
Current Assets			
Cash		$16,078,562.63	
Demand loans and deposits		153,000.00	
Special deposits		1,509,476.08	
Loans and bills receivable		36,651.62	
Traffic and car-service balances receivable		5,551,662.11	
Net balance due from agents and conductors		2,969,676.49	
Miscellaneous accounts receivable		7,936,336.53	
Material and supplies		9,362,393.80	
Interest and dividends receivable		793,086.05	44,410,845.31
Deferred assets			
Working fund advances		$145,605.02	
Insurance and other funds		183,783.18	329,388.20
Unadjusted debits			
Rents and insurance premiums paid in advance		$52,008.72	
Discount on funded debt		109,476.61	
Other unadjusted debits		3,152,137.42	
Securities issued or assumed—unpledged		613,896.00	
Equipment acquired from lessor companies (per contra)		15,542,423.60	
Securities acquired from lessor companies (per contra)		502,351.00	19,972,293.35
			$744,743,442.69

LIABILITIES

Stock			
Capital stock		$225,579,170.00	
Capital stock held by the company		1,896.00	$225,581,066.00
Long term debt			
Funded debt unmatured:			
Equipment obligations	$32,150,605.19		
Mortgage bonds	164,109,000.00		
Collateral trust bonds	109,914,400.00		
Miscellaneous obligations	85,840,800.00	$392,014,805.19	
Non-negotiable debt to affiliated companies		696,902.36	392,711,707.55
Current liabilities			
Loans and bills payable		$60,509,800.00	
Traffic and car-service balances payable		5,861,527.64	
Audited accounts and wages payable		8,464,240.15	
Interest matured unpaid:			
Matured, payable January 1, 1915	$2,542,925.22		
Interest unclaimed	20,838.35	2,563,763.57	
Dividends matured unclaimed		112,639.13	
Funded debt matured unpaid		5,790.00	
Unmatured interest accrued		3,588,931.92	
Unmatured rents accrued		422,337.08	
Other current liabilities		2,866,419.44	84,395,448.93
Unadjusted credits			
Tax liability		$401,949.09	
Insurance and casualty reserves		49,319.56	
Operating reserves:			
Equipment	$257,205.41		
Personal injuries reserve fund	3,620.00	260,825.41	
Accrued depreciation of equipment		8,069,281.27	
Liability to lessor companies for equipment acquired (per contra)		15,542,423.60	
Liability to lessor companies for securities acquired (per contra)		502,351.00	
Other unadjusted credits		2,011,518.00	26,837,667.93
Corporate surplus			
Additions to property through income and surplus		$5,608,735.49	
Sinking fund reserves		173,074.71	
Total appropriated surplus		$5,781,810.20	
Profit and loss—balance		9,435,742.08	
Total corporate surplus			$15,217,552.28
			$744,743,442.69

On April 7, 1914, the death occurred of Samuel F. Barger, who had been a director of this company for a period of forty years from November 1, 1869, to January 27, 1909.

The following appointments were made during the year:

Malcolm R. Connell, Auditor of Disbursements, succeeding James H. Foulds, Jr., retired;

Ira A. Hubbel, Assistant Freight Traffic Manager, vice Herbert D. Carter, deceased;

William A. Newman, General Freight Agent, succeeding Ira A. Huhbel;

John McAuliffe, Jr., Foreign Freight Agent.

Under date of April 29, 1914, the Board of Directors of this company approved an agreement under the terms of which The New York Central and Hudson River Railroad Company, The Lake Shore and Michigan Southern Railway Company, Chicago Indiana and Southern Railroad Company, The Dunkirk Allegheny Valley and Pittsburgh Railroad Company, The Terminal Railway of Buffalo, Geneva Corning and Southern Railroad Company, Detroit and Chicago Railroad Company, Detroit Monroe and Toledo Railroad Company, Kalamazoo and White Pigeon Railroad Company, The Northern Central Michigan Railroad Company and the Swan Creek Railway Company of Toledo were to be consolidated into a new company to be named The New York Central Railroad Company. This agreement was duly approved by the public service commissions having jurisdiction in the states through which the several companies affected operated, and at a special meeting of the stockholders of The Lake Shore and Michigan Southern Railway Company, held at Cleveland, Ohio, December 22, 1914, the consolidation was duly ratified, and thereupon, on the same date, the agreement was filed in the offices of the Secretary of State of the states of New York, Pennsylvania, Ohio, Indiana and Illinois, and on December 23, 1914, in the office of the Secretary of State of the state of Michigan. Although the consolidation became effective on the filing of the agreement, action was taken by the Board of Directors of the new company providing that the accounts of each portion of the consolidated road formerly owned by a constituent company should be kept separate until the close of the year 1914.

Acknowledgement is hereby rendered to officers and employees for faithful and efficient service.

ALFRED H. SMITH,
President.

LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY COMPANY—ANNUAL REPORT

Under date of April 29, 1914, the Board of Directors of this company approved an agreement under the terms of which The New York Central and Hudson River Railroad Company, The Lake Shore and Michigan Southern Railway Company, Chicago Indiana and Southern Railroad Company, The Dunkirk Allegheny Valley and Pittsburgh Railroad Company, The Terminal Railway of Buffalo, Geneva Corning and Southern Railway Company, The Detroit and Chicago Railroad Company, The Detroit Monroe and Toledo Railroad Company, The Kalamazoo and White Pigeon Railroad Company, The Northern Central Michigan Railroad Company and The Swan Creek Railway Company of Toledo were to be consolidated into a new company to be named The New York Central Railroad Company. This agreement was duly approved by the public service commissions having jurisdiction in the states through which the several companies affected operated, and at a special meeting of the stockholders of The Lake Shore and Michigan Southern Railway Company, held at Cleveland, Ohio, December 22, 1914, the consolidation was duly ratified, and thereupon, on the same date, the agreement was filed in the offices of the Secretary of State of the states of New York, Pennsylvania, Ohio, Indiana and Illinois, and on December 23, 1914, in the office of the Secretary of State of the state of Michigan. Although the consolidation became effective on the filing of the agreement, in accordance with action taken by the Board of Directors of the new company it was provided that the accounts of each portion of the consolidated road formerly owned by a constituent company should be kept separate until the close of the year 1914. This report, therefore, covers the operations and financial transactions of The Lake Shore and Michigan Southern Railway Company to December 23, 1914, and of the road and property owned by it, prior to that date, to and including December 31, 1914.

On July 1, 1914, there became effective revised classifications of revenues, expenses, income, profit and loss, general balance sheet accounts, expenditures for road and equipment, and locomotive, train and car mileage, as promulgated by the Interstate Commerce Commission, and the accounts and records of the company have been kept since that date in conformity with such classifications and in accordance with the orders of the Commission. For purposes of comparison, the revenue, expense and income accounts, and locomotive, train and car mileage figures for the first six months of the year 1914 and for the entire year 1913 have been correspondingly revised on the basis of the new classifications.

The mileage embraced in the operation of the road is as follows:

	Miles.
Main line and branches	849.80
Proprietary lines	269.72
Leased lines	542.52
Trackage rights	190.13
Total road operated	1,852.17

As compared with the mileage operated during the year ended December 31, 1913, there is an increase of .71 of a mile in main line and branches due to changes in tracks through Air Line Junction yard, a decrease of 1.18 miles in leased lines due to re-classification of track from the passenger station at Oil City, Pennsylvania, to a connection with the Pennsylvania Railroad, a net decrease of .33 of a mile in trackage rights due to adjustments and discontinued use of Pennsylvania Railroad track at Oil City, aggregating 1.07 miles, as against additional trackage acquired over rails of Chicago Indiana and Southern Railroad between Gibson, Indiana, and Gibson Transfer, Indiana, a distance of .74 of a mile. These changes resulted in a net decrease in miles of road operated of .80 of a mile. A table showing in detail the miles of road and track operated will be found upon another page.

There was no change in capital stock during the year, the amount authorized and outstanding December 31, 1914, being $50,000,000.00.

The funded debt outstanding on December 31, 1913, was		$169,084,532.79
It has been increased during the year by adding pro-rata liability for additional certificates issued under the New York Central Lines Equipment Trust agreement of 1913		1,154,735.30
		$170,239,268.09
It has been decreased by payments during the year of pro-rata of installments on account of equipment trust certificates as follows:		
January 1, fourth installment 1910 trust	$889,149.54	
January 1, second installment 1912 trust	198,330.75	
January 1, first installment 1913 trust	58,868.40	
November 1, seventh installment 1907 trust	447,226.18	1,593,574.87
Total funded debt outstanding December 31, 1914		$168,645,693.22

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME

	1914	1913	Increase or Decrease
Operating income	1,852.17	1,852.97	
Railway operations	*miles operated*	*miles operated*	.80 *miles*
Revenues	$51,524,285.83	$59,353,109.71	—$7,828,823.88
Expenses	37,699,350.80	43,745,396.36	—6,046,045.56
Net revenue—railway operations	$13,824,935.03	$15,607,713.35	—$1,782,778.32
Percentage of expenses to revenues	(73.17%)	(73.70%)	—(.53%)
Railway tax accruals	$2,413,899.63	$2,126,437.54	$287,462.09

Uncollectible railway revenues	4,972.50	.....	4,972.50
	$2,418,872.13	$2,126,437.54	$292,434.59
Railway operating income	$11,406,062.90	$13,481,275.81	—$2,075,212.91
Miscellaneous operations			
Revenues	$25,282.04	$23,796.78	$1,485.26
Expenses and taxes	10,636.99	11,651.99	—1,015.00
Miscellaneous operating income	$14,645.05	$12,144.79	$2,500.26
Total operating income	$11,420,707.95	$13,493,420.60	—$2,072,712.65
Non-operating income			
Hire of equipment—credit balance	$39,826.13	$667,085.87	—$627,259.74
Joint facility rents	361,871.51	380,247.05	—18,375.54
Income from lease of road	5,000.00	5,000.00	.....
Miscellaneous rents	146,832.19	105,111.30	41,720.89
Miscellaneous non-operating physical property	* 1,884.17	608.74	—2,492.91
Separately operated property—profit	618,166.77	1,213,371.26	—595,204.49
Dividend income	4,589,084.85	6,493,713.80	—1,904,628.95
Income from funded securities	196,690.07	564,450.57	—367,760.50
Income from unfunded securities and accounts	1,629,968.44	1,025,334.20	604,634.24
Miscellaneous income	5,912.74	6,144.92	—232.18
Total non-operating income	$7,591,468.53	$10,461,067.71	—$2,869,599.18
Gross income	$19,012,176.48	$23,954,488.31	—$4,942,311.83
Deductions from gross income			
Joint facility rents	$930,365.63	$901,485.89	$28,879.74
Rent for leased roads	2,706,742.99	2,904,413.31	—197,670.32
Miscellaneous rents	23,159.65	21,916.69	1,242.96
Miscellaneous tax accruals	2,818.01	1,220.25	1,597.76
Separately operated properties—loss	.....	36,513.77	—36,513.77
Interest for funded debt	6,602,897.22	6,632,067.65	—29,170.43
Interest for unfunded debt	1,619,854.09	968,530.64	651,323.45
Maintenance of investment organization	1,465.09	.....	1,465.09
Total deductions from gross income	$11,887,302.68	$11,466,148.20	$421,154.48
Net income	$7,124,873.80	$12,488,340.11	—$5,363,466.31
Dividend appropriations of income			
On guaranteed stock (12% 1914, 18% 1913)	$64,020.00	$96,030.00	—$32,010.00
On common stock (12% 1914, 18% 1913)	5,935,980.00	8,903,970.00	—2,967,990.00
Total dividend appropriations of income	$6,000,000.00	$9,000,000.00	—$3,000,000.00
Income balance transferred to credit of profit and loss	$1,124,873.80	$3,488,340.11	—$2,363,466.31
Amount to credit of profit and loss (free surplus), December 31, 1913			$49,135,944.06
Add:			
Balance to credit of profit and loss for the year 1914		$1,124,873.80	
Profit from sale of $4,450,000.00 bonds of The Cleveland Short Line Railway Company		253,035.00	
Profit from sale of 3,000 shares of Reading Company common stock		172,793.70	1,550,702.50
			$50,686,646.56
Deduct:			
Loss in exchange on one year notes retired during the year		$106,000.00	
Commission and expenses on one year notes issued during the year		75,593.64	
Discount, commission and expenses on New York Central Lines equipment trust certificates of 1913		29,402.98	
Adjustment of sundry accounts including uncollectible items (net)		126,653.22	337,649.84
Balance to credit of profit and loss (free surplus), December 31, 1914			$50,348,996.72

*Debit.

The total railway operating revenues for the year were $51,524,285.83, a decrease of $7,828,823.88 or 13.19 per cent as compared with the previous year. The decline in operating revenues, which commenced in the latter part of 1913, continued during the year of 1914, reflecting the general business depression prevailing throughout the country.

Freight revenue was $31,979,887.51, a decrease of $6,510,296.24, or 16.94 per cent. There was a falling off in practically all classes of revenue freight carried, which amounted to 33,817,871 tons, being 9,276,162 tons or 21.52 per cent less than last year. Tons carried one mile decreased 22.59 per cent, and freight train mileage 23.3 per cent. The general reduction in freight traffic was partially caused by diminution in the export and import business of the country, and by a large decrease in tonnage of bituminous coal handled, brought about by a cessation of coal mining operations in southeastern Ohio since April 1st through a strike of miners as a result of a disagreement between mine operators and employees in connection with the Green screenings law. The hoof and mouth disease, which was prevalent during the latter part of the year in parts of the states of Ohio, Michigan and Indiana tributary to the company's lines, made necessary rigid quarantine regulations, causing a decreased movement in live stock and packing house products.

In May, 1913, this company joined with other carriers in an application to the Interstate Commerce Commission for an increase of approximately five per cent in freight rates. After devoting considerable time to hearings, and requiring the carriers to submit a voluminous amount of data compiled at a large expense to them, the Commission granted to roads in Central Freight Association territory an increase of five per cent to apply on class rates and certain commodities, but not including coal, ore and several other commodities which comprise a large portion of the tonnage handled by the company. The increased rates became effective October 26, 1914, and have not, therefore, materially affected the freight revenue of the company for the year. The Commission, in rendering their decision on the application for increased freight rates, recommended an increase, where permissible, in passenger rates, and the abolition of the various kinds of free service heretofore having been performed by the railroads.

Passenger revenue amounted to $12,735,521.64, a decrease of $690,693.47. There were decreases in the number of passengers carried of 1,027,654, or 9.84 per cent, in passengers carried one mile of 44,941,965, or 6.61 per cent, in passenger train mileage of 6.72 per cent, and in density of passenger traffic of 9.99 per cent.

Revenues from transportation of mails was $2,148,900.44, an increase of $88,611.13, due to the reinstatement, effective January 26, 1914, in mail service of certain magazines which were being handled in freight train service, and additional remuneration allowed from July 1, 1913, account parcel post.

Revenue derived from express traffic was $1,687,490.08, a decrease of $416,125.77, attributable to smaller volume of business handled, caused by the business depression and increasing use made of the parcel post facilities, also to reduction in express rates which became effective February 1, 1914, by order of the Interstate Commerce Commission.

Other transportation revenues amounted to $1,197,499.22, a decrease of $114,228.36, principally due to reduction in receipts from switching, occasioned by the falling off in freight traffic.

Incidental revenues, which include practically all revenues heretofore shown under other than transportation and auxiliary revenues, were $1,774,986.94, a decrease of $186,091.17. The noticeable reductions were in revenues derived from dining and buffet cars, parcel rooms, demurrage and miscellaneous sources, the latter including revenues from operation of coal and ore docks, all of which are the result of the decrease in freight and passenger business.

Operating expenses for the year, by groups, were:

	Amount	Decrease	Per cent
Maintenance of way and structures	$5,561,822.90	$2,061,371.48	27.04
Maintenance of equipment	10,377,316.84	1,633,232.21	13.05
Traffic	960,220.12	113,887.96	10.60
Transportation	18,284,601.98	2,464,309.12	11.88
Miscellaneous operations	589,773.61	74,727.25	11.25
General	1,425,615.35	301,482.46*	26.82
Total	$37,699,350.80	$6,046,045.56	13.82

*Increase

In the maintenance of the roadbed, buildings and other structures, such work was done as was necessary in order to maintain the property to its standard. There were 450,000 less ties renewed and 100 miles less of rail relaid than in the previous year. Expenditures for new ballasting and renewing of bridges and right of way fences were curtailed somewhat. Owing to the conditions at the Cleveland Union Terminal, the Passenger Station it became necessary to tear it down, in place of which an inexpensive but useful and, safe arrangement, with overhead concourse and improved capacity of tracks and platforms, was built. The expense of this work, together with the cost of other improvements which were made at the station simultaneously, resulted in a charge against maintenance expenses of $125,000.00, causing the increase shown against station and office buildings.

Although decreases are shown in practically all maintenance of equipment items, excepting depreciation, due to a diminished demand for use of the company's equipment during the year, expenditures were necessary in equipping 183 locomotives with automatic fire doors and the application of United States safety appliance standards to a large number of freight and passenger cars in order to comply with various state and federal laws. There were also substantial expenditures for other additions and betterments.

The decrease in traffic expenses is attributable principally to a lesser amount expended for advertising. Increases are shown for superintendence and outside agencies, due to the transfer of payrolls of soliciting agency offices located along the line of the road, previously paid by fast freight lines. The increase in these accounts are offset by a corresponding reduction in the expense of fast freight lines.

In transportation expenses practically all items affected by trade conditions show decreases, due to falling off in traffic.

Miscellaneous operations, which consist largely of expenses previously shown under "Outside Operations," decreased $74,727.25, attributable to reduction in dining and buffet car service and in the cost of ice used in the company's commercial ice supply plants.

General expenses increased $301,482.46, due to heavier legal and other expenses on account of the consolidation, additional accounting expense incurred in the preparation of data for the application for the increase in freight rates and to comply with legislative requirements, preliminary work in connection with the proposed Federal valuation of this company's lines and increase in amount paid for pensions. In the operation of the Pension Department during the year 99 employees were retired and placed upon the pension rolls. Of these retirements 49 were authorized because of the attainment of seventy years of age and 50 because of total permanent physical disability. Thirty-four died during 1914, and at the close of the year 429 retired employees were carried upon the pension rolls.

Railway tax accruals amounted to $2,413,899.63, an increase over the previous year of $287,462.09, chiefly due to a higher valuation placed upon the company's property and increase in tax rates.

Non-operating income for the year amounted to $7,591,468.53, a decrease of $2,869,599.18 as compared with the previous year. There was a loss in income from dividends on stock owned by the company of $1,904,628.95, largely due to the fact that no dividends were received on preferred stock of The New York Chicago and St. Louis Railroad Company and on the stock of The Toledo and Ohio Central Railway Company as compared with five per cent on each received in 1913; also to the payment in 1913 by The Pittsburgh and Lake Erie Railroad Company of an extra dividend amounting to five per cent as compared with no extra dividend received in 1914. Income from funded securities decreased $367,760.50 account sale of bonds of The Cleveland Short Line Railway Company. There were also large decreases in income from rental of equipment, and the company's proportion of profit from operation of The Pittsburgh, Mckeesport and Youghiogheny Railroad, caused by the business depression prevailing throughout the year. Income from unfunded securities and accounts increased $604,634.24, due to interest on additional loans made by the company during the year.

Deductions from gross income for the year were $11,887,302.68, an increase over last year of $421,154.48. The interest charges on unfunded debt were $651,323.45 in excess of similar charges for 1913, due to additional short term notes issued during the year.

Out of the net income for the year, amounting to $7,124,873.80, there were paid two dividends of six per cent each on both the guaranteed and common capital stock, aggregating twelve per cent or $6,000,000.00, leaving a balance of $1,124,873.80 which was transferred to the credit of profit and loss.

There was expended during the year, for additions and improvements to the property, $2,446,705.46, excluding equipment expenditures, all of which was charged direct to property investment account. The important items consisted of:

Completion of new car repair plant at Ashtabula to be used for repairing steel equipment.

Continuation of improvements at Air Line Junction, Ohio, consisting of additional yard tracks, new freight engine terminals and car repair shops.

Separation of grades and construction of third and fourth tracks through the City of Elyria, Ohio.

Continuation of work in connection with change of line at Port Clinton, Ohio.

Completion of new locomotive repair shops at Elkhart, Indiana.

Purchase from Armour & Company of ice houses located at Air Line Junction, Ohio.

Acquisition of land at Blasdell for connection with the Terminal Railway of Buffalo.

In addition to the above, expenditures were made for separation of grades at Chicago, Ashtabula, Cleveland, Toledo, Detroit and Sandusky in order to comply with state and municipal requirements.

A statement showing in detail the expenditures for additions and betterments will be found on a following page.

In an action instituted by the United States against this company and the Chesapeake and Ohio Railway Company, The Hocking Valley Railway Company, The Toledo and Ohio Central Railway Company, The Kanawha and Michigan Railway Company and others, the Circuit Court of the United States for the Southern District of Ohio on March 14, 1914, entered a decree in which, among other things, it was adjudged that the ownership of The Lake Shore and Michigan Southern Railway Company and the Chesapeake and Ohio Railway Company (altheugh not in form joint, but separate) in the stock of The Kanawha and Michigan Railway Company and the resulting control of the latter company inhering in such holdings, were acquired in violation of the laws of the United States and in order to avoid further infraction of the federal law in this respect it was ordered that either the stock of The Kanawha and Michigan Railway Company, held by the Chesapeake and Ohio Railway Company, shall be sold and transferred to this company, or such holdings of both companies shall be disposed of by absolute sale. As a result of said decree, this company sold all its holdings in stock of The Kanawha and Michigan Railway Company, consisting of 40,296 shares, to The Toledo and Ohio Central Railway Company, receiving in payment therefor the one year five per cent note of that company dated October 1, 1914, amounting to $2,901,312.00. The company also loaned to The Toledo and Ohio Central Railway Company $2,888,500.00 in cash to enable it to purchase the holdings of the Chesapeake and Ohio Railway Company and others in stock of The Kanawha and Michigan Railway Company, receiving five per cent promissory notes for the amount so loaned, all of which notes are secured by a pledge of the stock of The Kanawha and Michigan Railway Company so acquired.

In accordance with an agreement between this company and the Pere Marquette Railroad Company, the Cincinnati Hamilton and Dayton Railway Company, the Pennsylvania Company, The Michigan Central Railroad Company, The Grand Trunk and Western Railway Company, and The Toledo St. Louis and Western Railway Company and The Hocking Valley Railway Company and The Toledo and Ohio Central Railway Company, this company transferred to The Hocking Valley Railway Company and The Toledo and Ohio Central Railway Company each 1.16 per cent of the company's holdings or 464 shares of the capital stock of the Toledo Terminal Railroad Company, each of the latter companies agreeing to assume its pro-rata share of liability for deficiency in interest charges and working expenses of the Toledo Terminal Railroad Company accruing after January 1, 1914.

There were sold during the year 3,000 shares, par value $150,000.00, of the common capital stock of the Reading Company and $4,450,000.00 of the first mortgage bonds of The Cleveland Short Line Railway Company. There were also sold 18 shares, par value $1,800.00, of the common stock of the Chicago Indiana and Southern Railroad Company, 9 shares, par value $900.00, of the stock of The Detroit and Chicago Railroad Company, 11 shares, par value $1,100.00, of the stock of The Detroit Monroe and Toledo Railroad Company, 14 shares, par value $1,400.00, of the stock of The Kalamazoo and White Pigeon Railroad Company, 18 shares, par value $1,800.00, of the stock of The Northern Central Michigan Railroad Company, and 10 shares, par value $1,000.00, of the stock of The Swan Creek Railway Company.

There were acquired during the year by purchase 158 shares of stock, par value $7,900.00, of The Pittsburgh McKeesport and Youghiogheny Railroad Company.

During the year the company issued its short term notes running for one year or less as follows: On January 22, 1914, $7,000,000.00 of one year 5 per cent notes payable January 22, 1915; on May 15, 1914, one year discount, United States, franc and pound sterling notes, payable May 15, 1915, for a total amount of $19,124,230.23; on June 10, 1914, $6,000,000.00 of one year discount notes, payable June 10, 1915; on September 6, 1914, one year pound sterling notes payable September 6, 1915, for an amount equivalent to $1,425,000.00; on December 1, 1914, $14,774,000.00 of nine months 5 per cent notes payable September 1, 1915, and $3,726,000.00 of one year 5 per cent notes payable December 1, 1915, and on December 15, 1914, one year notes payable December 15, 1915, for $755,000.00, making a total amount of short term notes issued by the company during the year $52,804,230.23; of the proceeds realized $23,767,910.00 was used in retiring the company's one year notes due March 15, 1914, for $12,000,000.00; one year pound sterling notes due May 15, 1914, for $9,726,500.00, and one year pound sterling notes due September 6, 1914, for $2,041,410.00; the balance of the proceeds realized were placed in the treasury of the company.

The laws of the State of Ohio gave to dissenting stockholders of The Lake Shore and Michigan Southern Railway Company the right to have their stock purchased before consolidation. The New York State Realty and Terminal Company, all of the stock of which was owned by The New York Central and Hudson River Railroad Company, acquired 32,200 shares at the price of $500.00 per share, and borrowed from The Lake Shore and Michigan Southern Railway Company $16,100,000.00 which it used in making the purchase, and for which it gave its promissory notes.

Under the contracts for the acquisition of coal lands in Christian, Montgomery, Fayette, Saline, Franklin and Williamson Counties, Illinois, as fully referred to in report for the year 1912, the company has received during the year deeds for 4,594 acres of additional coal lands and has paid therefor $126,647.89, making the total lands acquired to December 31, 1914, 74,573 acres at an aggregate cost of $2,399,659.34.

The stockholders of the company at a special meeting held on June 16, 1914, approved the placing upon the railroad of the company of a mortgage amounting to $100,000,000.00, to secure the twenty-five year four per cent gold bonds which had been issued in accordance with two indentures executed by the company to the Guaranty Trust Company of New York, trustee, dated November 18, 1903, and March 12, 1906, under each of which were issued $50,000,000.00 par value of bonds, or a total amount of $100,000,000.00. The Board designated as trustees under the mortgage the Central Trust Company of New York and Frank L. Littleton of Indianapolis, Indiana. Effective November 15, 1914, the Guaranty Trust Company of New York resigned as trustee for the twenty-five year gold bonds of 1903 and 1906, whereupon the Central Trust Company was appointed by the Board as trustee of said bonds.

The New York State Workmen's Compensation Act which became effective July 1, 1914, while of very limited application to employees of interstate carriers, owing to the Federal Employers' Liability Act, was of such a nature that the State Compensation Commission required the company to deposit $2,500.00 in cash and $25,000.00 par value of New York City 4½ per cent bonds, costing the company $25,503.87.

The United States Express Company which had been conducting a through express business over the company's tracks from points east of Buffalo in connection with the Lackawanna Railroad, destined to Cleveland, Sandusky, Toledo, Detroit and Chicago and points beyond and vice versa, withdrew from the express business as of June 30, 1914. Thereupon a contract was made with the Adams Express Company, effective July 1, 1914, granting to that company practically the same territory and privileges heretofore enjoyed by the United States Express Company.

Out of $24,000,000.00 of certificates authorized under New York Central Lines Equipment Trust agreement dated January 1, 1913, there were issued to December 31, 1913, an aggregate of $15,494,000.00, of which this company's pro-rata allotment was $1,213,072.16. During the year 1914 additional certificates were issued amounting in total to $6,944,000.00. The cost of the equipment assigned to this company in connection with the issue of these latter certificates is approximately $1,291,333.18, and its pro-rata amount of certificates, representing an amount not to exceed 90 per cent of the cost, is $1,154,735.30.

Cost of road and equipment on December 31, 1913, was.. $147,356,093.89

It has been increased during the year as follows:

Expenditures for additions and betterments to the property as shown in detail elsewhere	$2,446,705.46	
Cost of equipment received during the year under the equipment trust of 1913	1,603,587.61	
Additional equity in 468 refrigerator cars cars covered by Merchants Despatch Equipment Trust of 1911	35,077.50	
Cost of equipment in excess of amount required to restore equity in equipment trusts of 1907, 1910 and 1912	19,696.71	4,105,067.28
		$151,461,161.17
Value of equipment retired from service during the year	$1,036,234.06	
Less amount charged account additions and betterments and adjustments	609,047.80	427,186.26
Cost of road and equipment, December 31, 1914		$151,033,974.91

A new transfer house which was constructed by the Indiana Harbor Belt Railroad Company near Gibson, Indiana, was opened for business on January 22, 1914. This transfer house is used for less than carload freight and at present is handling that class of freight received from Chicago industries and western railroads destined to points east and south of Chicago. The transfer house is used jointly by this company and The Michigan Central Railroad Company, Chicago Indiana and Southern Railroad Company and Indiana Harbor Belt Railroad Company. It was necessary for the company, in order to avail itself of the use of this facility, to acquire trackage rights for its freight trains over the rails of the Chicago Indiana and Southern Railroad Company between Indiana Harbor, Indiana, and Gibson Transfer, Indiana.

Mr. Alfred H. Smith, who was on December 10, 1913, elected President and a Director of the Company, assumed the duties of those offices on January 1, 1914.

On March 1, Mr. Frederick Zimmerman was appointed General Freight Agent of the company.

Acknowledgment is hereby rendered to officers and employes for faithful and efficient service.

ALFRED H. SMITH,
President.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1914

ASSETS

Investments			
Investment in road and equipment			
Road		$93,531,879.60	
Equipment			
Owned	$29,244,215.12		
Trust equipment	28,685,066.45		
	$57,929,281.57		
Replacement fund—Ct	427,186.26	57,502,095.31	$151,033,974.91
Improvements on leased railway property			30,184.30
Sinking funds			5,000.00
Miscellaneous physical property			105,264.02
Investments in affiliated companies			
Stocks		$88,010,290.47	
Bonds		3,303,500.24	
Notes and advances			
New York Central and Hudson River R R Co.	$1,500,000.00		
Jamestown Franklin and Clearfield R R Co.	2,151,384.17		
Lake Erie and Western R R Co.	1,679,075.17		
Toledo and Ohio Central Ry Co	8,189,812.00		
Terminal Ry of Buffalo	1,595,000.00		
Indiana Harbor Belt R R Co	1,301,307.97		
Chicago Indiana and Southern R R Co.	4,895,469.05		
Detroit Terminal R R Co	357,360.08		
Cleveland Cincinnati Chicago and St Louis Ry Co	8,854,548.50		
Lake Erie Alliance and Wheeling R R Co.	48,925.16		
Lake Erie and Pittsburg Ry Co	75,000.00		
Cleveland and Short Line Ry Co	1,966,174.65		
Merchants Despatch Transportation Co	250,000.00		
New York State Realty and Terminal Co.	16,100,000.00		
Pittsburgh McKeesport and Youghiogheny R R Co.	5,669,597.47		
Toledo Terminal R R Co	148,922.45	54,782,576.67	146,096,367.38
Other investments			
Stocks		$21,841,835.71	
Advances		45.68	
Miscellaneous		825.00	21,842,706.39
Total investments			$319,113,497.00
Current assets			
Cash			
Treasurer	$5,588,222.63		
Petty cash	500.00		
Local treasurer	541,492.04		
Local treasurer's remittance in transit	40,000.00		
Agents' and conductors' remittances in transit	421,224.53	$6,591,439.20	
Special deposits		102,797.37	
Loans and bills receivable		10,100.00	
Traffic and car service balances receivable		388,521.57	
Net balance receivable from agents and conductors		1,301,743.18	
Miscellaneous accounts receivable		7,600,154.11	
Material and supplies		5,041,358.93	
Interest and dividends receivable		1,161,153.37	
Other current assets		204,960.12	22,402,227.85
Deferred assets			
Working fund advances		$54,468.95	
Other deferred assets		6,508.60	60,977.55
Unadjusted debits			
Other unadjusted debits		$3,079,585.67	
Securities issued or assumed—unpledged			
Lake Shore and Michigan Southern Ry Co stock		3,900.00	3,083,485.67
Total			$344,660,188.07

LIABILITIES

Stock			
Capital stock			
Common		$49,466,500.00	
Guaranteed		533,500.00	$50,000,000.00
Long term debt			
Funded debt unmatured			
Equipment obligations			
Equipment trust certificates of 1907	$3,577,809.47		
Equipment trust certificates of 1910	9,780,644.94		
Equipment trust certificates of 1912	2,578,299.75		
Equipment trust certificates of 1913	2,308,939.06	$18,245,693.22	
Mortgage bonds			
First general mortgage	$50,000,000.00		
Kalamazoo and White Pigeon first mortgage	400,000.00	50,400,000.00	
Miscellaneous obligations			
Gold bonds of 1903	$50,000,000.00		
Gold bonds of 1906	50,000,000.00	100,000,000.00	168,645,693.22
Current liabilities			
Loans and bills payable		$52,805,230.23	
Audited accounts and wages payable			
Audited vouchers	$3,104,285.64		
Audited pay-rolls	1,042,955.14	4,147,240.78	
Miscellaneous accounts payable		551,208.07	
Interest matured unpaid		74,817.50	
Dividends matured unpaid		17,945.17	
Unmatured interest accrued		1,412,750.67	
Unmatured rents accrued		293,953.46	59,303,145.88
Deferred liabilities			
Other deferred liabilities			552,377.91
Unadjusted credits			
Operating reserves		$13,463.51	
Accrued depreciation—equipment		5,606,906.41	
Other unadjusted credits		632,352.05	6,252,721.97
Corporate surplus			
Additions to property through income and surplus		$9,557,252.37	
Profit and loss—balance		50,348,996.72	59,906,249.09
Total			$344,660,188.07

Railway Age Gazette

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies 7,327 were mailed to regular paid subscribers to the weekly edition, 250 were provided for counter and news companies' sales, 1,067 were mailed to advertisers, exchanges and correspondents, and 106 were provided for samples and office use; that the total copies printed this year to date were 129,450, an average of 9,246 copies a week.

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Volume 58 April 2, 1915 Number 14

Contents

*Illustrated.

Politics and the State Commissions

When the Public Utilities Commission of Illinois was organized, Governor Dunne appointed as its chairman a wholesale grocer named James E. Quan. Mr. Quan presided over numerous sessions of the commission, the chief result of which was to show that his knowledge of the business of railways and other public utilities was very circumscribed. He having resigned, Governor Dunne has appointed to succeed him William O'Connell. Mr. O'Connell was commissioner of public works of Chicago when Mr. Dunne was mayor, he was Mr. Dunne's manager during the latter's campaign for governor and he is now treasurer of Cook County, Illinois. All these things indicate that he is an active and successful politician. But why has he been appointed to the Public Utilities Commission? We anticipate that as public utility commissioners run, Mr. O'Connell will be above the average in ability and fairness. But his appointment raises the old, old question as to why members of public utility commissions should not be chosen because of their qualifications for public utility commissions instead of because of their qualifications as politicians.

Passenger Fares in Ohio

An unusually clear and convincing statement of the argument for the repeal of state two-cent fare laws is that regarding the situation in Ohio made by President L. E. Johnson, of the Norfolk & Western, in an address before the City Club of Cleveland, which is published in this issue. Mr. Johnson showed that the question involved is not so much one of increased profits for the companies, as whether by state laws the revenue from passenger service is to continue to be so unfairly reduced that the passenger service will not be self-supporting, the result being that the traveling public will finally suffer in decreased efficiency of service. As the Norfolk & Western is one of the roads that has maintained a division of expenses as between its freight and passenger service, Mr. Johnson was able to show that the operation of its passenger trains in Ohio last year was conducted at an actual loss of $40,000. While such figures are not available for all roads in the state, Mr. Johnson exploded in one sentence the theory on which fares were reduced, that the increased traffic would more than offset the decreased revenue per passenger. In 1905, under the three-cent rate, the railroads of Ohio carried an average of 44 passengers per train mile, giving a train-mile revenue of $1.32. In 1914, there were only 50 passengers per train mile, making the train-mile revenue $1, so that in connection with increased expenses of all kinds the railroads in 1914 received 32 cents less for each train mile for carrying 6 additional passengers. Ohio started the two-cent fare movement by passing a two-cent fare law in 1906. In the face of such a showing it would be very appropriate for the Ohio legislature to take the lead in partially undoing the wrong done.

The New Operating Expenses Classification

The New York Central Lines are the first railroad companies to make annual reports in the new form prescribed by the Interstate Commerce Commission. This new classification went into effect on July 1, 1914; but the New York Central Lines have reclassified their expenses for the first six months of the calendar year and also their 1913 expenses for purposes of comparison. From an examination of these first reports under the new system it would appear that one of the greatest improvements in the new classification as compared with the old is the more logical and scientific division of maintenance of way expenses. Whereas the old classification provided an account for roadway and track, which included the cost of applying material, of track surfacing and cleaning, policing, changing grades, bank protection and other expenses, the new classification divides these expenses as between roadway maintenance and track laying and surfacing. Thus, in 1913 the New York Central & Hudson River spent, according to the old classification, $5,269,000 for roadway and track, while according to the new classification the company spent in the same year $877,000 for roadway maintenance and $4,392,000 for track laying and surfacing. The splitting of the old account in this way is both logical and helpful. There is, however, included under track laying and surfacing the cost of track maintenance, which includes the labor cost involved in keeping track in alinement, surface and gage. From an accounting point of view it would have been more logical to have included this under roadway maintenance rather than to combine it with track laying. Such a division would have kept entirely separate the two independent variables—cost

of keeping materials already in track up to a certain standard and cost of applying new materials. Roughly, but not strictly, it would have corresponded to the distinction between repairs and renewals.

RECENT TENDENCIES IN CONCRETE BALLASTED DECK CONSTRUCTION

THE Judith river and other viaducts built on the new line of the Chicago, Milwaukee & St. Paul between Lewistown, Mont., and Great Falls, described on another page of this issue, are examples of the most advanced practice in adapting concrete ballasted decks to large steel structures. The use of this type of solid floor is not new but it is only within the last two or three years that it has been placed on structures of this size. The development of solid floor bridges has been most marked on the roads in the middle west, including particularly the St. Paul, the Santa Fe, the Rock Island, the Illinois Central and the Burlington.

Some of the earliest designs of solid floor construction were originated for track elevation subways in Chicago about ten years ago. Here it was necessary to construct solid floors to prevent moisture from seeping through the bridge to the street below. The heavy cost of maintenance, the special track construction required and the noise created by the shallow steel floors first used, led to the adoption of concrete slabs carrying the ballast and standard track construction. A similar development was also brought about near this time by the necessity for greater protection of timber bridges from fire, leading the Santa Fe, the Rock Island, and other roads to apply creosoted timber ballasted decks to these structures. The resulting uniformity of track construction and more satisfactory riding qualities soon led to the adoption of the same type of deck on other structures.

The choice between creosoted timber and concrete ballasted decks is purely an economic one. On roads such as the Santa Fe, passing through large timber areas and possessing extensive treating facilities, the timber deck is somewhat cheaper, although the difference is not great. The difference in weight is also not a material factor. Therefore, on roads not accessible to a suitable supply of timber or without treating facilities, a concrete deck is as economical as creosoted timber at the present time and its relative economy will increase materially with the rising cost of timber.

Confined at first to track elevation, subways and other short spans, the use of the solid floor has been extended gradually until the St. Paul, the Santa Fe, and several other roads have made this standard for all deck girder structures and are applying it on many through and deck spans of medium length. The St. Paul has placed such a deck on several 135-ft. deck girder spans and on deck truss spans 160 ft. long. While not important for short spans, the increased dead load resulting from the solid floor becomes of greater consequence as the length of span is increased. However, the advantages of the solid floor are resulting in a general increase in the length of spans to which this type of floor is being applied. The Santa Fe is placing a creosoted timber ballasted deck on spans 306 ft. long in its bridge crossing the Missouri river at Sibley, Mo., and the New York Connecting Railroad is using concrete ballasted deck on the entire elevated section of its four-track line nearly 10 miles long, including the Hell Gate arch with a span of 1,000 ft.

With the concrete ballasted deck built in units as illustrated in the Judith river viaduct referred to above, several difficulties are presented to the designer. In the first place, when casting a large number of slabs in forms it is very difficult to insure exact uniformity of dimensions. Any error in the forms becomes cumulative and noticeable when multiplied in a number of slabs. The joints between the different slabs have not been waterproofed in any way and there has been some fear that with the moisture and fine particles of ballast dropping down between the slabs onto the upper flanges of the girders there would be some deterioration of the girders. However, a recent examination of one of the earliest structures of this type which has been in service for seven years, failed to reveal grounds for any serious fear from this source. Another problem which has been given attention has been the tendency for the individual slabs to creep or move longitudinally along the structure. While this movement has been minor, it has been noticed in several structures. To prevent this a recent design of the St. Paul provides for a spacing angle to be riveted to the upper flange of the girder in the field with one leg extending between the adjacent slabs. These, however, are minor details of design which do not affect the practicability of the solid floor deck as a whole.

Several advantages are derived from this type of construction. Probably the most important is that of economy in maintenance cost. With the open floor replaced by the standard ballasted track construction, it is estimated that the cost of maintenance per foot of track on the bridges is reduced one half. At the same time, a better line and a uniform riding track are secured, while the more or less pronounced jar resulting from passing from one form of track construction to another at the ends of open floor bridges is eliminated. Also, a ballasted deck rides as quietly as the adjacent embankment, while the track may be maintained by the regular track forces without the necessity of calling a bridge gang from time to time. A further advantage which may be considered sentimental, but which is present, nevertheless, is the appearance of added strength which the solid floor gives to the layman.

THE DISINTEGRATION OF THE GOULD SYSTEM

IN 1906 the Gould system lacked only about 100 miles of line—which would connect the Wheeling & Lake Erie with the Western Maryland—of a transcontinental system running from Baltimore, Md., to Oakland, Cal. This 100 miles of line was never built because the disintegration had already begun. The backbone—although it was a weak backbone—of the system consisted of the Missouri Pacific and the Wabash. Today the Wabash is in the hands of receivers, and last week the election of a new board of directors of the Missouri Pacific apparently marked the transfer of control of that company to Kuhn, Loeb & Company and associates.

It is worth while to very briefly outline the steps by which a transcontinental system, of which there has never been one in the United States in the strict sense of the word, was so nearly established. Starting in 1876 with the Missouri Pacific, then called the Pacific Railroad of Missouri, which was controlled by Jay Gould, the St. Louis, Iron Mountain & Southern, the International & Great Northern and the Texas Pacific were brought under Gould control. By 1901 the control of the Denver & Rio Grande had been acquired, and previous to this control of the Wabash had been secured. In 1903 the Western Pacific was incorporated to build a line from Salt Lake City, Utah, the western terminus of the Denver & Rio Grande, to Oakland, Cal., and about this time the Goulds acquired control of the Wheeling & Lake Erie, the western extension being carried out on the credit of the Denver & Rio Grande and the eastern on the credit of the Wabash. The Wheeling & Lake Erie, through the construction of the Wabash-Pittsburgh terminal and the West Side Belt, got an entrance into Pittsburgh. The Goulds acquired the Western Maryland, which ran from Bellington and Elkins, W. Va., to Baltimore, Md. It was only about 100 miles from the southeastern terminus of the Wheeling & Lake Erie to Bellington. The Baltimore & Ohio already had a connection across here, but before the Goulds could build a line, the cost of the entrance into Pittsburgh broke the system's back.

The history of the system since the Wabash-Pittsburgh terminal receivership has been the record of a long fight against economic principles, in which economic principles have been triumphant in every instance. The Rockefellers gradually took over a large part of the Gould holdings of the Western Maryland; the Wabash, after a long up-hill fight, went into bank-

ruptcy; the Missouri Pacific went from bad to worse, and in 1912 was only saved from passing out of the control of the Goulds by a very narrow margin; year by year the Western Pacific became a more unbearable burden to the Denver & Rio Grande until it has been decided to make some default or some compromise in the payment of the Western Pacific's first mortgage bonds, and now George Gould and all but one representative of the Gould estate have retired from the board of directors of the Missouri Pacific.

The causes for the failure of the ambitious plan, backed as it was by the great personal wealth of the Gould estate, may be roughly divided into two classes: The mistakes which were made in carrying out the plan, and the inherent weaknesses of the plan itself. In the first class will be included poor management, shortsighted policies of maintenance and betterment, purchases at excessive cost, etc. In the second class are the inherent and ruinous waste of competition and the undermining of self-supporting local business through the reductions in rates made by state commissions. Every link of this transcontinental system was a line competing for through business with other railroads better situated, better managed or stronger financially. Although, of course, the extension west from Salt Lake City, as well as the acquisition of lines running east from the eastern terminus of the Wabash, might be expected to create new business, the avowed primary object was to secure traffic for the system which was then being secured and adequately handled by other railroads.

In a way the Gould attempt to establish a transcontinental system was an effort on the part of a single system to solve a problem which the roads in central freight association territory and the western roads have taken to the Interstate Commerce Commission. The Missouri Pacific and the Wabash are both economic assets to the territory which they serve of sufficient value to warrant adequate support. On the other hand, competition for the traffic which this territory has to offer was so keen that in self defense the Wabash and the Missouri Pacific had lowered rates to a point where they were not adequately remunerative. An individual system could not, of course, raise its rates without a simultaneous increase in rates by its competitors. To overcome this situation, therefore, the Goulds tried to secure additional traffic over the Missouri Pacific and the Wabash by buying or building "feeders" with termini at the Atlantic seaboard on the one hand, and the Pacific ocean on the other. It was a case of the tail trying to wag the dog. The Pennsylvania in the East lay entrenched in a position so strong that it could afford to support highly competitive lines running out from Pittsburgh west, and the Southern and Union Pacific were so strongly entrenched in California that they could afford to support their lines extending east across the desert. The Goulds, on the other hand, attempted to use as a base of operations the lines in highly competitive territory of the Wabash and of the Missouri Pacific and the lines of small local business of the Missouri Pacific to throw out highly competitive lines into the home territory of the Pennsylvania and of the Southern Pacific.

The case of the Denver & Rio Grande has not been mentioned. This road had a very profitable local business. It was a very expensive line to operate, but it had large sections of country rich in mineral resources where there was no competition. Left to itself it could, and probably would, have been a successful local railroad property. Its credit, however, was used to build the Western Pacific, while at the same time state commission orders reduced its compensation for the handling of local business, both freight and passenger, to a point that probably would have threatened the solvency of the company, even without the drain of the Western Pacific guarantees.

There are lessons which can be learned from this experiment: One is that either the eastern roads controlling central freight association territory roads will have to continue supporting these roads, or else there will have to be further large readjustments in rates in these territories. The day of competitive railroad building is over; the form of competition for traffic has radically changed. It is no longer so much dependent on the efficiency of the traffic solicitors as it is on the quality of service rendered by the transportation department. This was a point which was never fully appreciated apparently by those in control of the Gould system.

THE NEW ENGLAND RAILROAD SITUATION

FROM the standpoint of all the interested parties the railroad situation in New England is at present very serious, and this makes the business situation in that territory serious. No part of the country more imperatively requires good railway service in order that it may prosper than New England. Whether the solution of its railroad problem shall be made in some satisfactory way at an early date, or shall be indefinitely postponed and some of its principal railways shall be thrown into bankruptcy with the resultant demoralization of transportation and the consequent losses in all lines of business, depends on what action shall be taken by the legislatures of the New England states during their present sessions.

The acute problem presented is due to the financial condition of the two principal lines—the Boston & Maine and the New York, New Haven & Hartford. The Boston & Maine is already bankrupt and only a thoroughgoing reorganization can put it on its feet and fit it to render the service needed by the communities it serves. The New Haven, in addition to other difficulties, has outstanding $53,000,000 of floating debt, of which $33,000,000 matures between now and the middle of May and $20,000,000 in 1917. In order to help it to renew the notes falling due before the middle of May and to afterward put its finances on a sounder basis, it needs legislation validating certain stock and permitting it to refund its floating debt.

The situation immediately confronting the Boston & Maine is not merely serious, but desperate. Not many years since it was regarded as a strong railway and its stock commanded high prices. As recently as in 1909 and 1910 its fixed charges and dividends were earned and paid. In 1911, 1912 and 1913 it did not earn its dividends. In the fiscal year 1914 it not only did not earn any dividends, but failed by over $2,000,000 to earn its fixed charges; and its results since then have been discouraging. With its earnings in this condition it had $22,626,000 of short-time notes come due on March 2, 1915. The holders of 98 per cent of these have renewed them for six months pending action on plans for the reorganization of the system. If the legislatures should adjourn without agreeing on some such plan a receivership would result.

Why has a railway which a few years ago seemed to be doing so well been brought so quickly to such a plight? This has been due partly to the road's management under Mr. Mellen, partly to its financial organization, but mainly to increases in expenses and taxes, such as have taken place on all railways. The Mellen regime is ended. The passenger and freight rates are undergoing a readjustment which will at least partially offset the increases in expenses and taxes. But, as President Hustis has frankly stated, it is probable that no changes in its rates can be secured which will be sufficient to save the Boston & Maine unless the railway system itself is radically reorganized.

The Boston & Maine Railroad proper is a relatively small part of the Boston & Maine system. The company actually owns only a little more than 700 miles out of a total operated system of about 2,400 miles. The greater part of the system consists of roads which are leased to the Boston & Maine. The principal of these are the Boston & Lowell, the Concord & Montreal and the Fitchburg, and the total mileage of the leased lines is over 1,500 miles. When these lines were leased to the Boston & Maine the railways of the country were relatively prosperous and apparently promised to become more so; and the then management of the Boston & Maine contracted with the owners of the leased roads to pay them rentals ranging as high as 7 to 10 per cent. While business continued good and the net earnings

of the system were substantial these leased lines were valuable to the Boston & Maine. But when increases in wages, taxes and other expenses and reductions in rates and losses of traffic began to reduce net earnings the position of the Boston & Maine rapidly weakened. It had to pay the high rentals for which it had contracted as well as the interest on its own bonded debt, in consequence of which its total fixed charges were heavy; and at the same time it had to bear the entire loss of net earnings both on its owned lines and on its leased lines. The capitalization of the Boston & Maine system is about $200,000,000, or a little over $94,000 a mile, as compared with $136,000 for the Boston & Albany and $240,000 for the New Haven. Of this total, $160,000,000 is the capitalization of leased and controlled lines, on practically all of which a return has had to be paid whether it has been earned or not, while only about $40,000,000, or 20 per cent, is the capitalization of the Boston & Maine proper. Of the total per mile of $94,210, no less than $46,290, or almost half, represents leases, and $29,390 represents funded and non-funded debt, leaving only $18,530 of capital stock on which the payment of a return could be suspended. It is perfectly evident from this that, while the total capitalization of the system is not heavy for the territory in which it operates, the Boston & Maine's fixed charges are wholly excessive under the conditions which now exist and which will probably continue to exist for some time. Furthermore, it is apparent that the main reason why the Boston & Maine's fixed charges are excessive is that it contracted to pay amounts to its leased lines which may have been reasonable when the leases were made, but which, owing to changed conditions, have become unduly burdensome and will continue to be so. It is clear, therefore, that the owners of the leased lines must voluntarily give up their claims under their leases and enter into some new relation to the Boston & Maine, or that the company must go through bankruptcy, in which case all of the unprofitable leases would be canceled and the system would be broken up.

The owners of the leased lines have much to lose and nothing to gain by having the system disrupted and their roads thrown back on their hands. Some of the leased lines, such as the Boston & Lowell, are themselves made up largely of leased lines, and if the system were broken up they would speedily find themselves in the same situation that the Boston & Maine is in now. The various parts of the system could not be operated separately with profit. Each would have to have its own staff of officers. Each would have to provide independent terminal and other facilities in place of those which they now use jointly. Each would be cut off from markets which it now reaches over the lines of the others. Even if they would have enough credit individually to raise the money for new investment that they would require, which is wholly improbable, each would have its fixed charges and operating expenses increased and its business injured in a hundred ways. The day when such small properties could be operated independently with profit in a territory such as New England long since passed. From the standpoint of the New England public, an attempt to operate them separately would be disastrous; for the traffic of the territory speedily would become demoralized.

The only alternative to the dissolution of the system is a reorganization under which the leases will be canceled and the properties composing the system will be practically or completely merged under the ownership of a single corporation. If the owners of the leased lines are to save the most that they can they will have to do so as owners of the securities of the system rather than as owners of leased lines receiving a guaranteed return. It will be to their best interest for them to co-operate in preventing the system from going into a receivership, which, under present conditions, probably would last for some years and result in heavy losses to all concerned.

The need for a speedy reorganization is generally recognized, but efforts are being made to get for the owners of the leased lines more than can be conceded to them. Obstacles are being thrown in the way of the needed legislation, and provisions in it are being suggested which would render it practically impossible to effect a satisfactory settlement. For example, the Public Service Commission of Massachusetts proposes that the consent of two-thirds of the stockholders of each of the 25 interested corporations be requisite to the adoption of a plan of reorganization. When the Boston & Maine was taken from the control of the New Haven a board of five trustees composed of some of the most prominent and public-spirited citizens of New England was appointed by the Federal government to vote the New Haven's stock in the Boston & Maine until it could be disposed of. These trustees have recommended legislation to the various states which they believe will be fair to all concerned, and it seems clear that the legislation they have recommended should be adopted. The Springfield (Mass.) Republican usually expresses the most independent and intelligent opinion of New England, and, in advocating the adoption of the trustees' plan, it says: "It would surely be impossible to frame a reorganization plan for the Boston & Maine that would be free from objections. It used to be said in the days when the resumption of specie payments was the leading issue in the United States that the way to resume was to resume. So in the case of the Boston & Maine, the way to reorganize is to reorganize as simply, directly and expeditiously as possible in order that the system may be saved from a receivership."

Due consideration should be given to the rights and interests of those who leased their railways to the Boston & Maine company and turned their management over to it. But consideration should also be given to the rights and interests of those who in good faith have invested in the securities of the Boston & Maine itself, as well as to all the business interests of New England. If the rights and welfare of all be given due weight the legislatures will adopt some plan under which, while all directly affected will suffer some losses, the system will be held together and put on a basis where it can be so managed as in the long run to serve and promote the interests of all concerned.

Turning from the Boston & Maine to the New Haven, we find a peculiar situation. The New Haven has been developed and operated under charters from both Massachusetts and Connecticut. Massachusetts long has had a law which has authorized its state commission to regulate the issuance of railway securities and which prescribes the way in which this shall be done. Connecticut, on the other hand, has allowed railways, and the New Haven in particular, to do their financing very much as they have pleased. Prior to 1910 the New Haven, under its Connecticut charter, issued many securities which it could not have issued under its Massachusetts charter and the laws of that state. In 1910 the Massachusetts legislature, in order to clear up this situation, passed a law validating under the statutes of Massachusetts all the securities previously issued. Even after this the Mellen management of the New Haven continued to issue securities which it could not have issued under the laws of Massachusetts. In consequence, the New Haven now has out $52,500,000 of stock which has not been formally validated under the laws of Massachusetts, in addition to the short-time notes already mentioned. There will, therefore, be a cloud upon this stock, and for this and other reasons it will be impossible to so refund the New Haven's floating debt as to reduce its fixed charges, until special legislation is passed by the Massachusetts legislature.

The question as to what should be done about these matters was referred by the legislature to the Public Service Commission of Massachusetts for investigation and report. In February the commission made a report in which it criticised the policy of the state of Connecticut and also condemned the Mellen management for taking advantage of the laws of Connecticut and disregarding the laws of Massachusetts. But the commission recognized the fact that the harm which had been done could not be undone; that the management of the New Haven had been changed; and that the present management had publicly pledged

itself to refrain from the use of the methods which characterized the Mellen regime. In view of all the facts the commission concluded that it was to the interest of the public for legislation such as that being sought by the present management of the New Haven to be passed. It pointed out that such legislation would not increase the capitalization of the road, since the securities in question are already in the hands of the public, and that it would tend to reduce the New Haven's fixed charges and thereby enable it to make improvements which are needed in order that it may render adequate and satisfactory service.

However, much condemnation the former management of the New Haven may deserve, and however disagreeable it may be to the people of Massachusetts to have legislation passed to validate acts committed in disregard of their laws, the conclusion of the Public Service Commission seems the only rational one that could be reached. As the commission's report shows, the people of New England and of the United States must assume a part, and a large part of the responsibility for such mismanagement as has occurred on the New Haven. The old management could not have done what it did if Connecticut had not passed laws permitting it to do so. The New Haven could never have acquired control of practically the entire railroad system of New England if the Department of Justice of the United States had acted as vigorously to have it enjoined from violating the Sherman anti-trust law as it did to break up the combination long after it was formed. There probably never would have been a holding corporation in the United States if certain states for their own selfish advantage had not passed special laws expressly authorizing them to be created. Since the people, through their state and national governments, have permitted and even expressly authorized, a large part of the acts on the part of corporations, the results of which they are now trying to destroy, the people should be willing to suffer their share of the harm which has been done and to co-operate with the corporations in making the consequent period of readjustment as short and the suffering and losses caused by it as small as possible.

THE MICHIGAN CENTRAL AND THE BIG FOUR

THE two principal subsidiaries of the New York Central Railroad are the Michigan Central, operating 1,800 miles of road, the greater part of which lies within the state of Michigan, and the Cleveland, Cincinnati, Chicago & St. Louis, operating 2,381 miles of road, nearly all of which is within the three states of Indiana, Ohio and Illinois. The effect of the business depression was even more strikingly shown in the results of operation of the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis in 1914 than in the results of operation of the New York Central and the Lake Shore (*Railway Age Gazette*, March 26, page 683), the combined properties of which are now operated as the New York Central Railroad. This is because one of the two subsidiaries was being operated previously on a narrow margin of safety above the bond interest and the other at a deficit. The final deficit on the Big Four compares favorably with the deficit in 1913 because of the flood conditions in that year.

The Michigan Central had $414,000 available for dividends at the end of 1914, so that after the payment of 4 per cent, calling for $750,000, the company had a deficit of $334,000. The Big Four had a deficit, after paying its fixed charges, of $1,974,000. Total operating revenues on the Michigan Central amounted to $33,465,000 in 1914, a decrease as compared with 1913 of $3,212,000. The Big Four had operating revenues in 1914 of $35,366,000, a decrease of $2,248,000. Both companies reduced expenses in greater proportion than the reduction in revenue, the Michigan Central operating in 1914 on a 75.25 per cent ratio of expenses to revenue, as against a 76.35 per cent ratio in 1913, and the Big Four on an 81.87 per cent ratio in 1914, as against an 87.23 per cent ratio in 1913.

The loss in revenue on both roads was very largely due to loss in freight traffic. In 1914 the Michigan Central carried 19,196,000 tons of revenue freight, a loss as compared with 1913 of 2,654,000, and the Big Four carried 26,078,000 tons of freight in 1914, a loss of 3,535,000 tons. With the exception only of an increase in the tonnage of fruit and vegetables, forest products other than lumber, and cement, brick and lime on the Michigan Central, the tonnage of nearly all commodities on both roads showed decreases in 1914 as compared with 1913. The heaviest losses on the Michigan Central were in the tonnage of anthracite and bituminous coal, 1,212,000 tons of anthracite being carried in 1914, a loss of 311,000 tons, and 3,447,000 tons of bituminous coal being carried in 1914, a loss of 469,000 tons. The largest losses on the Big Four were in the tonnage of lumber, which loss amounted to 659,000 tons, the total carried in 1914 being 1,748,000 tons; in the tonnage of grain, the loss being 570,000 tons and the total carried in 1914 being 1,327,000 tons, and in the tonnage of bituminous coal, the loss being 368,000 tons and the total carried in 1914 being 11,827,000 tons. A loss in grain tonnage on both the Michigan Central and the Big Four is noticeable because there was, of course, a bumper crop in the fall of 1914. The Michigan Central carried 1,062,000 tons of grain in 1914, a loss of 122,000 tons as compared with the year before. The explanation is probably that there were very large purchases of grain for export by agents of the English and French army and that the greater proportion of this grain was routed via Canada for export at Montreal. The much heavier loss to the Big Four than to the Michigan Central would bear out this assumption.

As already mentioned, both companies succeeded in making very heavy cuts in expenses, the total saving for the Michigan Central being $2,822,000, or approximately 10 per cent, and on the Big Four the total saving being $3,857,000, or 12 per cent. The following table shows the percentage of each class of expenses to total operating revenues for the two roads in 1914 and 1913:

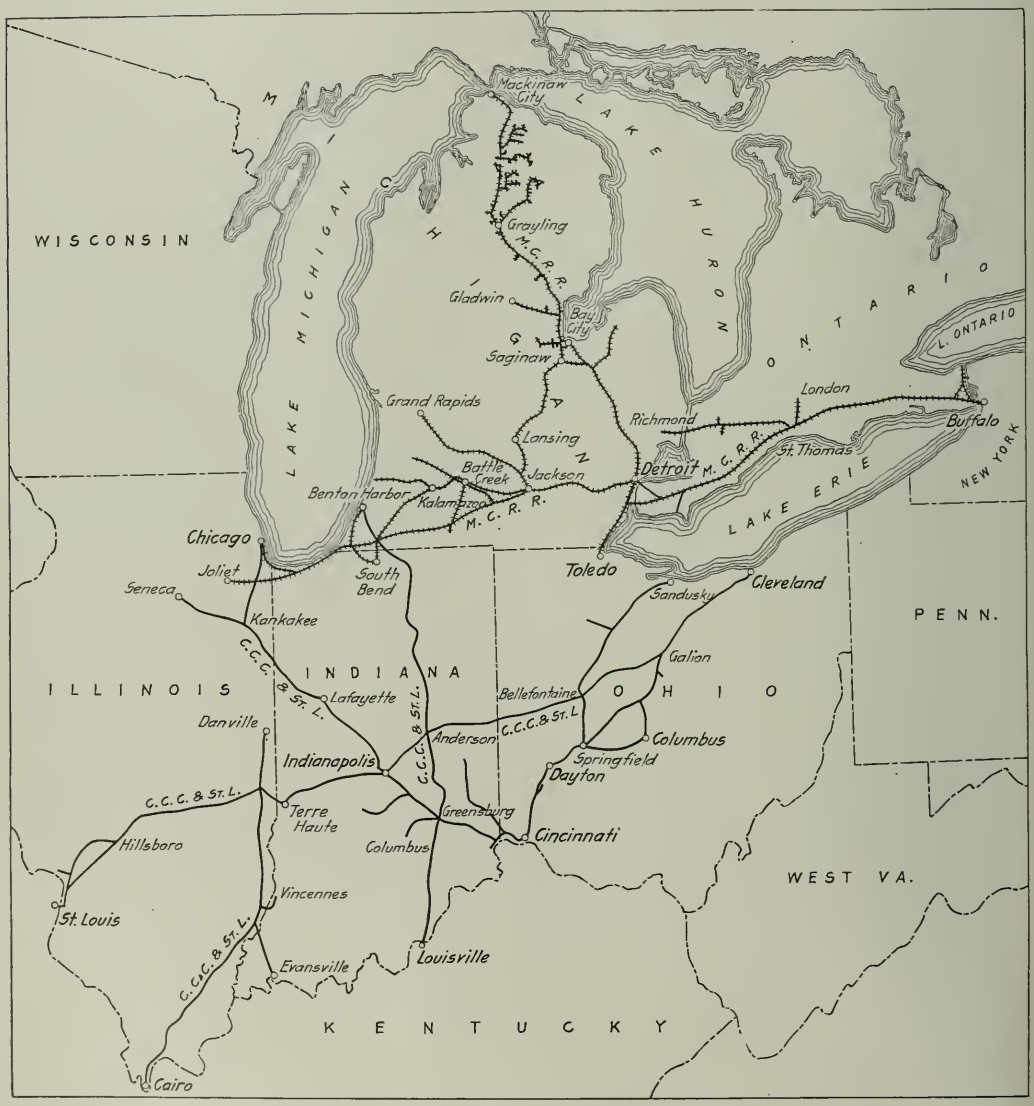
	1914		1913	
	M. C.	Big Four	M. C.	Big Four
Maint. of way and structures	10.84	13.40	13.30	15.27
Maint. of equipment	15.98	21.81	16.60	23.76
Traffic expenses	2.28	2.53	2.17	2.58
Transportation expenses	42.35	41.23	40.94	42.83
Miscellaneous operations	1.74	0.85	1.64	0.89
General expenses	2.06	2.13	1.70	1.90
Total	75.25	81.87*	76.35	87.23

*Of the total in 1914 for the Big Four 0.08 per cent represents "transportation for investment credit."

Transportation expenses on the Michigan Central amounted to $14,170,000, a saving as compared with 1913 of $843,000. On the Big Four transportation expenses amounted to $14,582,000, a saving of $1,528,000. The ton mileage of all freight on the Michigan Central was 3,205,000,000, a decrease of 532,000,000 ton-miles. The total number of passenger-miles handled was 434,800,000 in 1914, a decrease of 14,700,000. It will be noted, therefore, that the reduction in transportation expenses was not proportionate to the smaller amount of freight business handled, but this is probably partly accounted for by the comparatively small decrease in passenger business. On the Big Four the total ton mileage in 1914 was 4,601,000,000, a decrease of 230,000,000 as compared with 1913, and the total passenger mileage was 440,600,000, a decrease of 25,500,000 as compared with 1913. The Big Four, therefore, succeeded in reducing its transportation expenses to a greater extent even than the falling off in freight business. Passenger business did not fall off but about 5 per cent, so there was little, if any, chance for economy in this service.

Both the Michigan Central and the Big Four had a heavier average trainload in 1914 than in 1913, the Michigan Central's being 463 tons in 1914, an increase over the previous year of 6 tons, and the Big Four's being 571 tons, an increase of 62 tons over the year before. These figures for both companies are for total trainload, including company freight. Both the Michigan Central and the Big Four had better engines in

freight service in 1914 than in 1913, a large number of Consolidation locomotives having been converted in the previous year into Mikados; and, of course, also with a falling off in business it was possible to use only the engines in best condition and best adapted to the work required of them. The Michigan Central, however, with its large proportion of diversified commodities, and commodities which must be



The Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis

moved, whether a full carload or a full trainload is obtainable or not, could not show in its average trainload figures for 1914 as big a gain as could the Big Four, with its larger proportion of coal and other drag freight. Average carloading on the two roads illustrates this point. The average carload per loaded car of all freight on the Michigan Central was 17.42 tons in 1914 as against 17.92 tons in 1913. On the Big Four it was 23.3 in 1914 as compared with 21.8 in 1913.

The cut in maintenance expenses on both the Michigan Central and the Big Four appears to be heavy. As will be seen from the table at the end of these comments, the reduction in maintenance of way expenses amounted to about 26 per cent on the Michigan Central and 17 per cent on the Big Four. The saving in maintenance of equipment expenses was proportionately as great on the Big Four, but not so large as on the Michigan Central. In regard to the decrease in maintenance of way expenses on the Michigan Central President Smith says: "The decrease in maintenance of way and structures is accounted for by general retrenchment affecting nearly all of the items in this group." The decrease in maintenance of way expenses on the Big Four represents

in part a reduction in the amount of material used in replacement and renewals, but also in part a saving in wages, larger proportionately than the reduction in amount of work done. Thus the reduction in payrolls amounted to $673,000, which is more than half of the total reduction, notwithstanding the fact that there was an actual increase in the amount spent for ties and rails and for shops and engine houses.

The decrease in expenditures for maintenance of equipment, as shown by the table, is larger than the actual difference in the upkeep of the cars and locomotives as between the two years. In 1913 on both the Michigan Central and the Big Four a number of Consolidation engines were converted into Mikados, as previously mentioned. A part of the charge for this work was made to maintenance of equipment and a part, of course, to additions and betterments. There was nothing to correspond to this charge to maintenance of equipment in 1914. Taking this factor into consideration, the actual expenses per mile run for repairs were as liberal in 1914 as in 1913. This is true when applied to work done, as distinct from cost of work done, even on the Big Four. In the latter part of 1912 and the early part of 1913 the Big Four was so hard pushed to find equipment enough to handle its business that its own shops proved inadequate to make necessary repairs quickly enough. A considerable amount of work was therefore let out to contract shops, which proved more expensive than if the company had done its own work; and, furthermore, the bills for this work done in 1912 strung along into 1913, while in the latter part of 1913 a vigorous policy of cleaning up bills and of making charges to expenses, if necessary, on a basis of accruals, so as to get in the expense in the period in which it belonged, was made, and therefore the 1913's maintenance of equipment accounts were not properly representative of the amount of work done in that year.

The Michigan Central spent $1,434,000 for additions and betterments in 1914 and the Big Four $6,449,000. More than half of the amount charged by the Big Four is accounted for by the charges for equipment acquired under the 1914 equipment trust.

At the end of 1914 the Michigan Central had $2,448,000 cash and $9,364,000 bills payable, and the Big Four $2,979,000 cash and $8,042,000 loans and bills payable. The principal changes in the securities outstanding were the sale by the Detroit River Tunnel Company of $4,000,000 4½ per cent 50-year bonds, guaranteed by the Michigan Central, and the sale by the Big Four of $3,870,000 of its equipment trust certificates. These Big Four equipment trust certificates were in addition to the liability which the company assumed for its share of the New York Central Lines equipment trust, under which a total of $6,944,000 certificates were issued during 1914, of which the Big Four's assignment of equipment and corresponding liability amounted to $619,000 and the Michigan Central's to $715,000.

The following table shows the principal figures for operation for the two companies in 1914 and 1913:

	Michigan Central		Big Four	
	1914	1913	1914	1913
Average mileage operated...	1,800	1,800	2,381	2,365
Freight revenue	$20,717,272	$23,169,518	$23,436,211	$25,133,116
Passenger revenue	8,880,613	9,369,055	8,589,012	8,891,201
Total operating revenue.....	33,464,968	36,676,972	35,365,691	37,613,498
Maint. of way and structures	3,628,376	4,876,534	4,740,009	5,742,960
Maint. of equipment.....	5,349,079	6,088,756	7,713,041	8,935,846
Traffic expenses	762,657	800,660	893,604	971,429
Transportation expenses...	14,170,444	15,013,847	14,582,391	16,110,019
Miscellaneous	583,480	600,253	301,396	334,763
General expenses	687,447	623,049	753,278	716,452
Total operating expenses....	25,181,484	28,003,099	28,954,969	32,811,468
Taxes	1,598,350	1,392,814	1,528,027	1,408,769
Operating income	6,681,796	7,281,058	4,874,086	3,393,261
Gross income	7,608,158	8,527,115	5,811,928	4,214,511
Net income	414,419	1,283,161	*1,973,687	*2,849,661
Dividends	749,520	1,124,280	.....	.....
Surplus	*335,101	158,881	.....	.....

*Deficit.

Letters to the Editor

DON'T DO BUSINESS WITHOUT A RECORD

Memphis, Tenn.

To the Editor of the Railway Age Gazette:

Since the telephone has come to be generally used for train despatching there is a tendency to do a lot of other work on it; work which should be handled by telegraph or on a telephone circuit separately assigned for the handling of outside matter. By the telephone there is tracing of cars, issuance of instructions and transmitting all kinds of information and of which there is no record whatever. It may end up in a misunderstanding. This has frequently occurred, and caused a bad mix-up, and in addition unnecessary expense. A question of veracity frequently makes trouble.

A great deal of this is brought about by station operators taking the view that if a matter is highly important and they cannot raise the operator that is wanted, the despatcher is the man to go to for the desired information. This is done in hundreds of cases.

When it takes all the way from two to six hours to transmit a telegram a distance of 300 to 600 miles and get an answer, there is something wrong. It is not the fault of the telegraph, but of those trying to operate it. Again, some of this is chargeable to clerks who do not want to take time to write a message and who just go into the despatcher's office and have the despatcher get what they want. On the other hand, had they filed a message very likely it would have hung on the hook for two hours before action would be taken on it; this, with the time lost at the other end, makes a bad delay, and we can hardly blame those who are in quest of important information for bothering the despatcher.

The telegraph service should be checked up closer. Getting information over the telephone may, for lack of a record, lay the foundation for a law suit.

While handling important matters on the telephone you are hampering the despatcher with his work. Every move made by him means dollars and cents to the company. To distract his attention from his train work to find out if some car left somewhere yesterday or last week may indirectly cause a serious complication in train movements.

Cannot superintendents of telegraph and managers of telegraph offices check their business more closely and show up the parties at fault? At all events, important communications—and one should be very cautious in deciding that a message is *not* important—should be put in writing at one end of the route or the other.

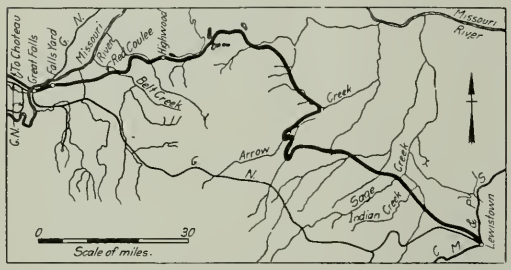
L. J. C.

Armored Trains in Action.—Some interesting details have recently been published concerning the operation of armored trains at the front. These trains did especially useful work during the siege of Antwerp and the subsequent retreat, when they were entirely under the command of British naval officers, who, according to circumstances, worked independently of or in conjunction with the military authorities. The standard armored train is composed of three locomotives, three long cars mounting 4.7 naval guns, a covered ammunition car, and a large covered car, the last known to members of the "crew" as the "chart-room." A locomotive is placed at each end of the train and one in the middle, and locomotives and the vehicles alike are well protected by armor plate. The "chart-room" to which reference is made carries special maps, compasses and instruments, a stock of rifles and ammunition, and comfortable chairs, besides refreshments and newspapers, and the whole is well warmed and lighted by electricity. It is said that the crew of one train was provided with a sleeping car, which was left behind at the nearest siding, to which the crew would return every night.

New Line From Lewistown, Mont., to Great Falls

The Chicago, Milwaukee & St. Paul Has Recently Completed a 138-Mile Extension of Permanent Construction

Immediately upon the completion of the coast extension of the Chicago, Milwaukee & St. Paul, about five years ago, this company began the construction of branch line feeders into the contiguous country, practically all of which had been regarded heretofore as Hill Lines territory. One of the most aggressive invasions of this nature is the construction of a new line from Lewistown, Mont., northwest 137.7 miles, to Great Falls. This line has been completed and opened for local freight and passenger service recently, and a further extension is under construction from Great Falls, northwest 67 miles, through Choteau to Agawam. This new line not only opens up for settlement a



Map Showing New St. Paul Line Between Lewistown and Great Fall

large area of very productive agricultural land in the Judith basin in central Montana, but also gives the St. Paul an entrance into Great Falls, the second city in commercial importance in Montana. The permanent character of the construction adopted also indicates the possibility of this line eventually forming a link in an alternate route to the Pacific coast.

GENERAL DETAILS

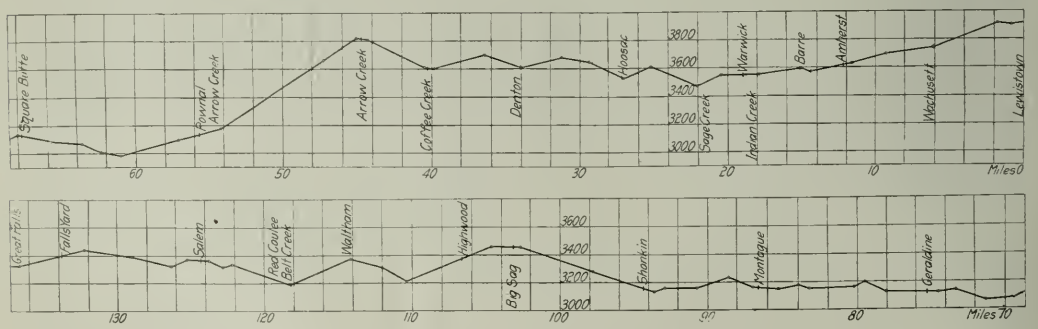
At the time the St. Paul built the coast extension, it purchased the Montana Railroad, extending from Lombard on the Northern Pacific to Lewistown, and completely rebuilt that portion from Lombard to Harlowton, making it a part of the main line. This new line extends northwest from a connection with the old Montana Railroad at Lewistown, generally parallel to, and about 20 miles northeast of the Billings-Great Falls line of the Great Northern.

In order to traverse the center of the Judith basin it was necessary to adopt a line 20 miles longer and with higher grades than the parallel line of the Great Northern between the same points. The country traversed is generally rolling, with occasional high benches and with very precipitous and deeply eroded stream beds. The benches are frequently close to the streams, making the problem of locating a satisfactory crossing more than usually difficult, especially since this line crosses the drainage approximately at right angles. At the crossing of Arrow creek the bench one mile east of the stream lies 800 ft. above the creek, and it was necessary to develop the line and to sacrifice 14 miles in distance to secure a crossing. At this point particularly, but also at Sage and Belt creeks, a very rough formation, closely resembling that found in the Bad Lands of North Dakota, was encountered, requiring very heavy and expensive work, which at Belt creek averaged 100,000 cu. yd. per mile for six miles. In fact, practically all the heavy work of the entire line was encountered in crossing these gashes.

The maximum grade in each direction was established at 1 per cent, except in descending into Arrow creek from the east, where a 1.5 per cent grade was inserted for 10 miles. All grades were compensated .04 per cent per degree for curvature. The maximum curvature was fixed at 8 deg. The construction of this line required the excavation of over 5,500,000 cu. yd. of materials, including 1,400,000 cu. yd. of earth, 2,500,000 cu. yd. of hard pan, 1,025,000 cu. yd. of loose rock and 575,000 cu. yd. of solid rock.

With the exception of a few temporary timber bridges constructed on the 10 miles of 1.5 per cent grade descending into Arrow creek, all structures were built of permanent construction. As this line crossed the drainage at right angles, large steel viaducts were required at the crossings of Judith river, Indian, Sage and Belt creeks, and Red coulee. Numerous long concrete arches were required under high fills at other points. The total amount of steel work required on this line was 10,000 tons, in addition to 76,000 cu. yd. of concrete.

Starting from a connection with the old Montana Railroad at Lewistown the new line of the Milwaukee parallels a branch of the Great Northern, built into Lewistown two years ago from a connection with the Billings-Great Falls line at Moccasin, crossing Big Spring creek, nine miles out of Lewistown, with the Great Northern on a single track gauntleted timber trestle, 1,300 ft. long and 80 ft. high, which is to be replaced by double track embankment. Beyond this point the Great Northern branch swings to the west, while the St. Paul line continues northwest, crossing Judith river and Indian and Sage creeks in the next 12 miles. After crossing the divide between Sage and Dry Wolf



Profile of New Line Between Lewistown and Great Falls

creeks, in Sage creek tunnel, this line traverses rolling country, requiring only moderately heavy embankments, until it reaches the bench near Belton, above Arrow creek, 23 miles beyond the crossing of Sage creek. From this point the line descends toward Arrow creek for 15 miles, 10 miles of which is on a 1.5 per cent grade on a supported line, requiring very heavy work through a badly broken formation. After leaving Arrow creek the line then continues across a fairly light rolling country for 50 miles, until it reaches Belt creek. The next 9 miles, including the crossings of Belt creek and Red coulee, involved some very heavy work. The remaining 17 miles into Great Falls were quite light.

THE GRADING

The grading was handled by steam shovels, elevating graders, fresnos and station men. Much of the material in the heavy portions of this line was moved by the station men who trapped the material into cars. Six steam shovels were also employed to carry out the work at various times. Aside from the crossings of the streams, the largest fills ranged from 55,000 to 150,000 cu. yd.

Six tunnels were constructed with a total length of 5,333 ft. The longest one was 2,063 ft., located three miles west of Sage creek viaduct. A tunnel 250 ft. long was driven near the top of the ascent from Arrow creek on the south side. The other four tunnels were located within a distance of 3 miles, near Belt creek viaduct.

The methods adopted in driving these tunnels varied somewhat. At Sage creek, where a wet shale was encountered, a full arch section top heading was driven, and the bench then removed, all excavation being done by hand. Work was pushed from both portals, and also from two shafts. In most of the other tunnels a center bottom drift was first driven and the remaining material was then trapped into small cars. Tunnels 1 and 5 are on tangent, while tunnels 3 and 4 are on 8 deg. curves. Tunnel 6, 780 ft. long, is on an 8 deg. reverse curve with 150 ft. of intermediate tangent. All tunnels were lined with concrete before the road was turned over for operation, excepting the Arrow creek tunnel, 250 ft. long.

AMPHITHEATER SLIDE

The most puzzling problem, which arose in connection with the grading, developed at a large slide at the east end of tunnel 4, known locally as Amphitheater slide from the shape of the mountain at that point. Here the entire side of the mountain has been moving at irregular intervals ever since the first stages of the work destroyed the equilibrium, until now the original grade line, which is about 190 ft. above the level of the flats, has settled over 100 ft., going down as much as 7 ft. in 48 hours. This material has broken about 150 ft. above grade, and is moving on a stratum inclined about 10 deg. from the vertical. In addition to the vertical settlement, it has moved 75 ft. laterally during this time. The adjacent end of tunnel 4 was also moved about 14 in. out of line, which caused a serious distortion of the easternmost 200 ft. of the tunnel, and made necessary the retimbering of the bore for this distance. At the time this distortion became apparent, the bore was preserved, as far as possible, by timber struts placed between opposite wall timbers and the retimbering was done just ahead of the placing of the concrete lining. A peculiar characteristic of this slide is the fact that the movement is the greatest during dry weather, and appears to be entirely arrested during a rainy season. The underlying cause for the movement has not been definitely determined. An examination of several smaller slides in the vicinity has shown that they rest on a shale which crumbles after exposure to the air for five or six months, and that this disintegration ceases about 10 ft. from the face. One theory advanced is that the crumbling of this shale allows the material above to settle and in this way starts it moving.

To arrest this movement, sliding material was transferred from the upper to the lower side of the railway embankment by steam shovels in an attempt to equalize the weight. This effort proved successful in June of last year, the slide discontinuing movement, but for purposes of safety and to allow the material ample time to gain a dependable equilibrium, a shoo-fly track skirting the hill has been built for train operation, and no attempt will be made to operate trains on the original alinement before next summer. Owing to the geological formation pecu-

Amphitheater Slide Showing Steam Shovel Working at Grade in the Center of the Photograph

liar to this section of the country and chiefly to the widespread presence of shales subject to rapid air-slaking disintegration, a number of similar slides of lesser magnitude have developed, notably on the Arrow creek hill, which have been arrested in the manner outlined above.

HAULING MATERIAL

The most interesting feature in the construction of this line was the bridge work, which was estimated to cost $1,700,000. This included 5 high steel viaducts, 14 arch culverts, and numerous smaller openings. The bridge work was handled by company forces from its inception to completion.

It was necessary that all the culverts and substructures for the viaducts be built in advance of the grading, to enable the line to be completed at the earliest possible date, and, as a result, the material for these structures had to be hauled in wagons from the nearest railroad stations, sometimes as far as 30 miles distant. Over $100,000 was paid for this item of hauling alone.

Material required on the east end of the line was unloaded at a temporary spur 2½ miles east of Glengarry, a station on the Milwaukee road a short distance east of Lewistown, while that required at the west end was hauled in from Swift and Wayne on the Great Northern.

This hauling was let by contract to local freighting contractors. At Glengarry the contractor received 35 cents per ton-mile, and 35 cents per 1,000 ft. B. M. for lumber, hauling all the material required for the first 30 miles of the line out of Lewistown, which included the substructure material for three of the viaducts. On this contract the railway company handled all material at the siding and loaded all wagons. The average haul was 12 miles. At Wayne and Swift, where the average haul was 14 miles, the contractor was paid 50 cents per ton-mile, and per 1,000 ft. B. M. for lumber. Here, however, all loading and unloading of material and payment of demurrage charges were cared for by the contractor.

A material clerk was stationed at the unloading point on the railroad, and he checked all material as it was unloaded from the cars into the wagons. He issued triplicate tickets for each wagon load, showing the contents of the wagon; he retained one of the tickets, one was given to the teamster and one was sent to the office of the engineer in charge of the work to which the material was going. The teamster handed his tickets to the contractor, and once each month the contractor and the various engineers checked their accounts, after which the teaming bill for the month was made up. Under this system not a single controversy arose between the contractors and the engineer in charge, nor was any material lost.

The hauling was done with traction engines and teams. When the roads were good, traction engines would haul two Buffalo-Pitts wagons of 20 tons capacity each, doubling the hills by dropping one trailer. As many as 750 sacks of cement could be hauled in this way at one trip, requiring 14 hours for 24 miles. On this short haul the engines would make the trip during the day, returning to the railroad in the evening, and the wagons would then be loaded at night. However, these engines could not be operated across the adobe flats during wet weather, and about 150 horses were required at Glengarry and a similar number at Swift and Wayne. These horses were generally operated in "four- and six-up" teams, but at times as many as 14 horses had to be used to transport such heavy equipment as hoisting engines. As would be expected in a new country, the hauling of these large quantities of material required the construction of a considerable mileage of new roads, all of which were built and maintained by the contractors with the co-operation of the railroad.

Sage Creek Viaduct

CULVERTS

The larger culverts were constructed of reinforced concrete of parabolic-arch cross section. These were constructed with the use of wooden movable forms made in sections 16 ft. in length, and the work was handled in such a manner that after a start was made, almost all stages of the work were in progress at the same time. One of these culverts was a double 20 ft. by 15.5 ft. arch under a 60 ft. fill. One 10 ft. arch was built under a 65 ft. fill and a 16 ft. arch was placed under an embankment 102 ft. high.

Because of the high freight and teaming charges on cast-iron

pipe, careful attention was given to the selection of the materials for small culvert openings up to 42 in. in diameter. For fills up to 6 ft. in height American Ingot Iron and Acme Nestable corrugated iron culverts were used. For fills higher than 6 ft., cast-iron pipe was used for the most part, although after establishing a concrete pipe plant at Great Falls, concrete pipe was substituted for cast iron in those openings remaining on the line to Lewistown, and for all openings on the Choteau extension. About 1,275 tons of cast iron, and 3,000 lineal ft. of corrugated iron pipe were used on the Lewistown line.

The concrete pipe plant at Great Falls was a field plant, erected for this one piece of construction alone. Four sizes of pipe, 24 in., 30 in., 36 in. and 42 in., were made at this yard. The concrete was mixed, depositing in the forms was done by hand, the

Traveler Placing the First Steel at Judith River Viaduct

concrete being delivered to the forms in steel dump cars. During warm weather the inside forms were removed in four hours, while the outer forms were taken off the following day, all forms and pipes being handled by a traveler moving on a track spanning the working platform. In order to keep up the output in cold weather, live steam was turned into the interior of the inner form, which enabled the inner form to be removed almost as soon as in warm weather. Fourteen men and a foreman made nine pipes regularly every day at the beginning, and the output was later increased to 12 per day by the addition of other forms. This included all work, such as removing the forms, preparing the reinforcement, etc. Wooden forms were used for making the pipe.

VIADUCTS

The largest single structure on the line is the Judith river viaduct, 14 miles northwest of Lewistown, which is 1,953 ft. 10 in. long and 135 ft. high. This one structure required 2,829 tons of steel, and cost $300,000. It consists of 46 ft. 6 in.-towers and 69 ft. 6 in.-intermediate deck spans supported on concrete pedestals, with large concrete abutments at each end. The viaduct was designed for Cooper's E-60 loading, and is provided with a ballasted concrete floor. One interesting detail of the design is that no horizontal bracing is used in the towers. The high abutments are of the type developed at the time of the construction of the coast extension, and described previously in these columns. (See *Railway Age Gazette*, October 27, 1913, page 839.) The east abutment is 65 ft. high above the top of the footing.

About 5,000 cu. yd. of concrete was required in the abutments and pedestals at the crossing. As this concrete was placed in advance of the grading, that for the west abutment was placed by means of a tower, while at the east abutment a trestle was run out from the adjacent bank. The pedestals on the side hill were built by delivering the concrete into the forms by spouts leading from the mixer set farther up the hill. In constructing the pedestals across the flat area in the center, a trestle was built and the mixer moved out over each in turn, going out on one side of the structure and returning on the other. With these arrangements one mixer delivered about 150 cu. yd. of concrete per day. Sand and gravel were delivered to the work in wagons from a nearby pit opened for the purpose.

No steel was erected until after the track laying had reached the bridge site. The erection was accomplished with a large traveler of the type developed by the Milwaukee several years ago, and first used in the construction of a high viaduct at Tekoa, Wash., in 1908. The traveler is shown setting the first steel at Judith river viaduct in one of the accompanying photographs. The material was delivered to this traveler by two work trains, each provided with a derrick car. A force of 100 men, including the derrick crews, erected and riveted about 100 tons of steel daily. The entire 33 spans were erected in 31½ working days of nine hours each.

At Indian creek a viaduct 1,302 ft. 10 in. long and 150 ft. 6 in. high was built. This structure required 1,803 tons of steel and about 3,000 cu. yd. of concrete. Sage creek viaduct is 1,698 ft. 2 in. long and 156 ft. 6 in. high, and contains 2,735 tons of steel and 7,000 cu. yd. of concrete. These structures are four and ten miles west of Judith river viaduct, respectively, and are practically identical in design and construction with that structure. At Sage creek some difficulty was encountered with foundations, and 1,600 piles were driven under the pedestals. The 22 spans at Indian creek were erected in 22 days.

The two remaining viaducts are about 20 miles east of Great Falls. Red coulee viaduct is 675 ft. long and 137 ft. high, requiring 916 tons of steel and 2,400 cu. yd. of concrete. It was possible here to deliver material on top of the bench above the coulee at both ends of the structure, and this made two setups of the concrete plant necessary, one at each abutment. For each setup, two light rail industrial tracks were laid on a trestle, built just high enough to enable concrete to be delivered to the pedestal forms, out to a point midway of the viaduct. By means of a cable on a specially designed drum, a loaded steel dump car was made to pull an empty car up to the mixer. With this layout concrete was taken from the mixer as rapidly as it could be mixed, and both lines of pedestals were concreted simultaneously.

The Passenger Station at Lewistown

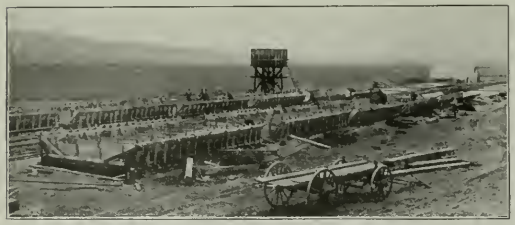
Belt creek viaduct is 651 ft. 10 in. long and 189 ft. 6 in. high, and contains 1,002 tons of steel and 2,000 cu. yd. of concrete. At this point the concrete material was delivered to the site in the bottom of the canyon and the concrete had to be raised by various means. Industrial track on low trestles, upon which 18 cu. ft. steel dump cars were used, enabled the concrete to be placed in the pedestals lying between the bases of the high cliffs. To place the concrete in the pedestals, situated high up on the west cliff and the west abutment, a timber skidway and bucket were devised. The bucket was drawn up or down the

skidway by means of a hoisting engine and was made to dump automatically at any desired point by means of a specially arranged timber yoke. The west abutment was poured by means of a bucket operated with a stiff leg derrick mounted on top of the cliff near the abutment.

The steel in Belt creek and Red coulee viaducts was erected by means of derrick cars. At Red coulee no difficulty was encountered, but at Belt creek tunnels adjacent to the ends of the viaduct necessitated the delivery of the steel by the work train inside of tunnel 6, from which point the erection derrick had to secure it. This slowed up the erection somewhat, but it was accomplished in 15 days.

The concrete deck slabs for these viaducts were built in two yards, established for the purpose. Those for Judith river, Indian creek and Sage creek were made on a level piece of ground just east of Judith river and adjacent to an adequate supply of gravel in a pit which was opened to supply material for viaduct substructures. In the gravel pit, at the extreme east end of the slab yard, was placed a loading trap, and from this trap a light rail track extended the entire length of the yard. Parallel to this track a standard gage track was laid upon which the concrete mixer was operated. The mixer was placed upon a raised timber platform, mounted on trucks, its height being such as to enable the concrete to be delivered directly to the slab forms by spouting. Gravel and cement were delivered to the mixer in steel dump cars, operated by a hoisting engine and cable, and the mixer was moved along its track as the slab forms were filled. The gravel was loaded at the trap with fresnos.

The forms for the slabs were built in sections so that they



Concrete Slab Yard Near Judith River Viaduct

could be easily removerd, as soon as the concrete had set, and placed again for other slabs. The reinforcing was assembled to form complete units for one slab to avoid assembling the steel in the forms. More than 1,200 slabs, 3 ft. 4 in. to 4 ft. 10 in. wide, were built in this yard, with an average of 25 slabs built per day for the entire time the plant was in operation.

The second slab yard was established just west of Red coulee, where the deck slabs were made for Red coulee and Belt creek viaducts. The space was so limited at this point, due to the topography, that it was necessary to build half of the slabs on top of the other half. This, together with the fact that the gravel had to be hauled in wagons a distance of three miles, reduced the average daily production of slabs to 18. For this yard the mixer was stationed at the point where the gravel was delivered by wagons, and the concrete was delivered to the forms in steel dump cars, operated on a light rail track.

Immediately after the steel was erected at the viaducts, the slabs were loaded onto flat cars by means of derrick cars, taken to the structure sites, and put into place by the derrick cars. On the average, 40 slabs were placed per day during the time that the work was in progress.

TERMINALS

At Lewistown, where several lines of the St. Paul enter a 12-stall roundhouse, 96 ft. deep, was built, together with a power house, machine shop, oil house, rotary sand dryer, storehouse, and office building, all of which are of brick construction. A 170-ton mechanical coal hoist of timber construction, C. M. & St. P. standard clinker pit, 225 ft. long, and a 67,000-gal. water tank, were also provided, in addition to the usual small buildings.

At Great Falls a 9-stall engine house, 96 ft. deep, a power house, an oil and tool house and a sand drying house of brick construction were built, and an air-operated coal dock of timber, a water tank identical with that at Lewistown, and a clinker pit 150 ft. long were provided. For the water supply of this engine terminal, a triplex pump, direct-connected to a 10 hp. a. c. motor, was installed on the bank of the Missouri river, from which water is pumped a distance of one mile and raised a height of 268 ft. to the water tank through 6-in. cast-iron and wooden water pipe. All machines in both terminals are operated electrically.

PASSENGER AND FREIGHT STATIONS

Various standard and special designs were used for the passenger and freight stations along the line, all of which are of timber construction. At Lewistown a brick passenger station building, 273 ft. long and 24 ft. to 36 ft. wide, with shingle tile roof, art marble floor and tile wainscoting, and timber beamed ceiling, was built. A portion of the building 81 ft. long and 36 ft. wide is two stories high, on the second floor of which is provided room for division offices. The building also houses a lunch counter for which space 58 ft. by 26 ft. is assigned. All platforms about the building are of concrete and these are lighted by electric lamps, mounted on iron lamp posts, with two 60-watt lamps enclosed in 10-in. frosted globes on each post, and lights placed beneath the building cornice. A novel feature of the building is the C. M. & St. P. trademark in mosaic, placed in the gables and illuminated by reflecting lamps.

The freight house and office building at Lewistown is 302 ft. by 32 ft., of which space 70 ft. by 32 ft. is used for the office. This building is one story high and of brick construction, with concrete floors.

At Great Falls it was very desirable to locate the freight station near the center of the business section, and to accomplish this the area occupied by the city's restricted district was purchased and all the buildings were razed prior to beginning construction. Here a building 469 ft. by 40 ft. was constructed of brick, with concrete floors and basement. One end of this building, 40 ft. by 49 ft. two stories high, contains the local offices of the company. The passenger station at Great Falls, a brick and concrete building 207 ft. by 46 ft., two stories high, has art marble floors, tile wainscoting, Spanish tile roof and coping and plaster beam ceilings. An indirect lighting system is employed. At one corner of the building is a tower 135 ft. high, near the top of which is placed the Milwaukee trademark, made of terra cotta and illuminated with flaming arc lamps. The station platforms are of concrete, lighted in the same manner as at Lewistown, except that there are no cornice lights about the building. Instead of these there are a number of arc lamps on the walls of the building and numerous incandescent lamps about the ornamental iron marquises.

BOARDING CAMPS

As all bridge work was handled by company forces, it was necessary for the railroad to arrange to feed these men. This was done by organizing a commissary department directly, instead of bringing in a boarding contractor. Each camp was placed in charge of a camp clerk with the usual number of cooks and assistants, reporting direct to the engineer's office at Lewistown. Each clerk was allowed to order the food he desired for his camp by telephone from the Lewistown office, one clerk assembling the orders from these various men and then buying in large quantities, and locally as far as possible. At the end of each month an inventory of the supplies on hand at each camp was taken and the actual cost of the meals was computed. A circular letter was then sent to all camps, giving the cost per meal at each camp, with the names of the assistant engineer, the clerk, the foreman and the cooks. It was found that this public

comparison stimulated considerable interest among the men in securing the best food at a low cost. The men in each camp were charged a uniform rate per day, which was deducted by the timekeeper in the usual manner, although this rate varied somewhat in the different camps, depending upon the class of camp; that is, skilled mechanics desired better food than did the laborers and paid a correspondingly higher rate. An average of about 550 men were fed in this manner, at as many as nine different camps. The camps were not run for profit, but were managed so as to be self-sustaining, while endeavoring to give the men the best possible food for the money paid, two direct results being that the company camps held their men on the work and there was a very small amount of sickness. There was no typhoid fever in any of the company camps, although other camps along the line were not immune.

The track was laid by hand from Lewistown to Sage creek crossing. North of this point a Roberts track-laying machine was employed. Seventy-five pound rail was laid on sawed ties fully tie plated and in gravel ballast. Stations were established at intervals of 8 miles, with a house track 1,500 to 2,000 ft. long at each station, and a passing track at each alternate station. Water is secured from streams in most instances, although a gravity supply is secured from one spring at Highwood, and a deep well was driven at Pownal, near the crossing of Arrow creek.

The construction of this line was started in July, 1912. The track laying was completed last spring, and irregular freight service was inaugurated as far as Great Falls about May 15. Local passenger service was started on August 10, and it is expected that through passenger service will be started soon. The grading on the Choteau line has been completed, but no rail has been laid.

The construction of this line was handled under the direction of Charles F. Loweth, chief engineer, and E. O. Reeder, assistant chief engineer. F. J. Herlihy was assistant engineer in charge of all masonry, steel, superstructure, and building work until October 1, 1913, when he resigned to accept service with another company, and was succeeded by F. B. Walker. A. G. Baker was division engineer in charge of grading and water supply work. Assisting him were district engineers C. D. Jackson, W. R. Felton and J. D. McVicar, each of whom was in charge of five resident engineers. C. L. Whiting, superintendent of construction, had charge of track laying and ballasting. Twohy Brothers, of Portland, Oregon, were the contractors for the grading of the Great Falls terminals and for the first 70 miles of the line out of Lewistown. Winston Brothers, of Minneapolis, had the contract for grading the intermediate portion. All other work was done by company forces.

TRAIN INDICATORS AT EUSTON STATION

In the terminal station of the London & North Western at Euston, London, the train indicators, showing the times that outgoing passenger trains will start, are mounted in cases standing on the floor, an arrangement which brings the reading matter into the best possible situation for the convenience of passengers seeking information. There are four of these indicators at Euston, and one of them is shown herewith. Indicators of the same kind are in use at Crewe, Liverpool, Manchester and other important points on that road.

The lettering is black, printed on white paper, the sheets of paper being pasted on a continuous apron or curtain of white canvas. The curtain is carried on rollers and is rolled on to the upper roller and off the lower one as occasion demands, the practice being to show at all times every train that is scheduled to depart within the next hour, or thereabouts. The lettering on the case, above the white space, not clear in the illustration, shows that the bold-face figures in the column in the right hand margin of the curtain indicate the number of the platform at which the train stands. At the top of the case, opposite the index fingers, the passenger is informed which platforms are at the right and which at the left.

It is to be noted that four of the trains among the eleven here shown are run on Saturdays only, while a fifth, that leaving at 1:50, runs every day except Saturday. This condition suggests that a different sheet, with these Saturday trains left out, might well be used on the other days of the week.

New sheets are usually printed twice a year. When it is necessary to make changes at other times, narrow slips are pasted over the lines which are superseded.

For the foregoing information and for the photograph, we are indebted to L. W. Horne, superintendent of the London & North Western, London.

Readers desiring to make comparisons with American practice will find the indicators recently put up at Kansas City and at Memphis, described in the *Railway Age Gazette*, February 12 last, page 272, and those used at the Pennsylvania and the Grand Central stations in New York City in the issue of February 14, 1913, page 296. An indicator arranged on the same general principle as that at Euston, but different in some particulars, is in use at Charing Cross, London. This was described in the *Railway Age Gazette*, December 12, 1913, page 1122. The indicators at the Central station, Glasgow, Scotland, unique in some respects, were described August 9, 1912, page 255.

London & North Western Train Indicators

THE ANTUNG-MUKDEN RAILWAY.—At the conference between the Chinese and Japanese representatives in Peking on March 10, the Chinese agreed to an extension of the Antung-Mukden railway agreement, which expires in 1923, to 99 years.

Hearings on Western Freight Rate Advances

Testimony of Railway Men Concluded, Protestants Begin Presentation of Case in Opposition to Advances

The Western railways practically completed the introduction of their direct testimony as to the reasonableness of proposed advances in freight rates on a number of commodities in Western Trunk Line and Southwestern Tariff Committee territories on Monday of this week, and on Tuesday representatives of the protestants and interveners began the introduction of their evidence in opposition to that of the railroads. Four days were allotted for general evidence in rebuttal of the general and financial testimony presented by the railways at the beginning of their case. This is to be followed by the introduction of evidence bearing on the specific commodity rates involved in accordance with a schedule similar to that which was followed in the presentation of the railways' case.

March 23, 24 and 25 were devoted to the introduction of evidence on behalf of the railways as to their reasons for advancing rates on coal. March 26 and 27 were devoted to the rates on fruits and vegetables, and March 29 to the increased rates on rice and rice products. Some testimony which was not finished on the days allotted for it will be introduced later.

C. C. Wright, general solicitor of the Chicago & North Western, and chairman of the committee in charge of the case for the roads, said that the carriers would need perhaps four days for odds and ends of evidence not yet introduced. Mr. Thorne requested that the carriers be required to finish their direct testimony before the protestants offered their general rebuttal, and when Commissioner Daniels refused to permit the departure from the schedule, he registered a formal protest. He asked for a postponement of 10 days. The commissioner announced a tentative schedule for the evidence to be introduced by the protestants, which provides for the introduction of unfinished evidence by the carriers on April 3 to 8, following the general evidence of the protestants.

COAL RATES

Eugene McAuliffe, general coal agent of the St. Louis & San Francisco, testified on March 23 and described the advances in coal rates asked and the territory affected. He presented a statement representing one year's business based on an actual check of way bills in seasons of both rush and slack traffic on roads which originate 86.5 per cent of the coal originating in the territory.

The average weighted haul, Mr. McAuliffe said, is 303 miles, while the average gross revenue is $1.48 per ton under the present rates. This yields 4.89 mills per net ton-mile or 3.42 mills per gross ton-mile, while if 90 per cent of the empty return haul is included, the revenue is only 2.84 mills per gross ton-mile. The average increase asked is 7.95 cents per ton, which would add .262 mills per net ton-mile, .183 mills per gross ton-mile, and .145 mills per gross ton-mile if 90 per cent of the return haul is included.

The total amount of the proposed increase on roads embraced in this tabulation, he said, is $1,080,286 per year. Including all roads affected the total additional revenue per year would be $1,226,122. This represents an increase of only 5.36 per cent and would entail an addition of 5.37 cents per capita yearly to the expenses of the population in the states affected. Participating in the increase are 121 roads, operating 131,053 miles of line. The increase would add to the revenue of these roads $9.36 per mile yearly.

Mr. McAuliffe testified that the advance applied from mines in Illinois, Indiana, Missouri, Iowa, Kansas, Arkansas and Oklahoma and some from western Kentucky and Alabama to Iowa, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Missouri, Arkansas, Kansas, Louisiana, Texas and Oklahoma. He presented a complete tabulation for a one-year period covering 118 cities, showing the average haul to each, the tons of coal consumed in a year, the average rate per ton, the gross revenue received on the existing basis, the average increase per ton and the amount of increase which would be felt by each city during the course of a year.

The popular mind and the railroad baiter should be disabused of the idea that coal, with its heavy carloads and heavy trainloads, is a necessary foundation to railway traffic, said Mr. McAuliffe. It is often said that the railway should haul coal at any price and make its profit on hauling other products. That is not true. The coal movement is spasmodic. Instead of being adapted to filling out our trains, it monopolizes almost our entire facilities at the worst season of the year, the time of cold weather. Other traffic falls off, but bad winter weather means fuel and lots of it. There is not a road but must not only stand prepared to take care of the maximum normal requirements of the winter season, but also must carry enough potential transportation ability to take care of abnormal conditions in unusually cold weather, or when a coal strike is impending. Railways must keep a tremendous amount of equipment for the sole purpose of taking care of a peak in traffic which lasts only three months a year.

On one road alone the bituminous coal hauled amounted to 30.52 per cent of the total revenue tonnage, yet this paid only 11 per cent of the total freight revenue. There is an immense fluctuation in extremes of coal traffic. If we take the minimum month on 16 roads as 100 per cent, the maximum month is 289.13 per cent. On other commodities the extremes are only the difference between 100 per cent and 152.39 per cent.

Coal is not carrying its share of the burden for many reasons. First, there is an enormous empty haul, the percentage of empty cars to loaded cars being nearly 100 per cent. Secondly, there is the tremendous spread in the volume of business, with commissions, states and courts all demanding that we be equipped for the maximum. Thirdly, weather changes or an impending strike may increase the consumption of coal over night by 25 per cent, at the same time the transportation ability of the roads is cut 50 per cent. The cost of assembling coal alone in the southwestern territory runs as high as 18.1 cents in Arkansas, while the lowest cost, in Kansas, is 8.2 cents per ton. This represents the cost to the railway of maintaining switch engines at the mines, the placing of empty cars, movement of loaded cars to scales and gathering yards, to be picked up by main line trains, and the rental of coal cars while in mine territory. It does not include any interest charges or maintenance on the main line facilities used.

E. H. DeGroot, Jr., superintendent of transportation of the Chicago & Eastern Illinois, testified that the cost of assembling coal on his road in the southern Illinois district is $4.39 per car, or 9.83 cents per ton. Of the total freight traffic of the road bituminous coal represents 54.17 per cent, but the revenue thereon is only 35.45 per cent of the total freight revenue.

Bituminous coal as a predominating article of freight is a liability rather than an asset to railways in the Central Western coal producing states, according to testimony presented by J. M. Daly, former general superintendent of transportation of the Illinois Central on the advance on coal from Illinois and Indiana fields. Daly's testimony related purely to the operating features of coal traffic. Western coal roads, he said, would have saved $12,000,000 a year toward maintaining their credit if their car repairs could be held down to the level on the western non-coal roads. "From $1,600,000 to $8,000,000 invested in coal cars," testified Mr. Daly, "is standing idle every day, representing 2,000 to 10,000 cars a day which are not in use through nine months of the year. Bituminous coal requires cars which, in the West-

ern coal fields, cannot be used for other commodities, as iron ore, lumber, etc. In the East coal moves to the lakes and ore back, but out here the return haul is mostly empty. In the East, because of lake traffic, coal moves in the summer; out here it moves in the winter, when operation is most costly.

"Coal goes to the West, but none comes back. The few cars of scrap iron or gravel could be taken care of 10 times over with the empty cars which had gone west with company coal. If we hauled no commercial coal at all, we would still be hauling empty cars eastward. The empty coal car haul is 95 per cent of the loaded or bituminous coal on these Western coal roads, against an average of only 30 per cent on all freight, including coal.

"Every two years the mines close down or threaten to close down on account of labor disputes. This lasts from two to five months, causing more idle equipment. In January, February and March of these years everyone rushes to stock up on coal, anticipating a strike, so that not only must we furnish cars for the normal winter rush, but extra cars must be maintained because mine operators cannot agree with their miners."

To show that bituminous coal roads should receive a higher rate, Mr. Daly compared 11 roads originating nearly all the bituminous coal from Indiana and Illinois mines with 13 western roads not originating much coal and 10 eastern bituminous coal roads.

"These 11 roads," said he, "report 51 per cent of originated traffic as bituminous coal. Their ratio of operating expenses to revenues is 74.05 per cent. The 13 non-coal roads report only 8 per cent originated tonnage as bituminous coal. Their operating ratio is only 64.24 per cent. The 10 eastern roads report 66 per cent of originated traffic as bituminous coal and their operating ratio is 71.82 per cent.

"Four of the eleven western bituminous roads now are in receivers' hands and three are not paying dividends. The others are fortunate in having a large volume of other business to help them out. It is not a question of traffic density, but of inadequate rates.

"Cost of repairs and depreciation is 1.32 cents per car mile on these western coal roads, 43 per cent of whose cars are coal cars. On the western non-coal roads, the cost is only 0.87 cents, because only 7.3 per cent of their cars are coal cars. On the eastern bituminous roads, 70 per cent of whose cars are coal, the cost is again 1.30 cents. If the western coal roads had the same car repairs as the non-coal roads, the cost would be $12,000,000 per year less.

"Even under proposed rates the proper burden would not be put on coal. There is no doubt that there is a big coal traffic and that it is growing, but there is no money in hauling it at present rates, and the more a road hauls the more it loses."

How rates on bituminous coal in the West have undergone a gradual reduction because of the competition between shipments from western mines and coal from the eastern states via the Great Lakes, was described by F. B. Townsend, traffic manager of the Minneapolis & St. Louis. Mr. Townsend's testimony dealt with the history of coal rate adjustments from the mines in Illinois and Indiana to destinations in Iowa, Minnesota and South Dakota, outlining the competitive conditions which fixed the rates.

"Since 1901," said Mr. Townsend, "there has been a gradual reduction in coal rates to points of destination in these several states and the general level of rates is much below the basis which prevailed in 1901. The advance of 10 cents per ton proposed would not restore the rates to their former basis. For instance, the rate from Peoria to Hanley Falls, Minn., on August 1, 1901, was $3 per ton. On October 6, 1903, this was reduced to $2.25. On August 6, 1906, it was cut further to $2.10. On October 29, 1906, it went down to $1.80, which has prevailed to the present time. The proposed advance would add 10 cents, making it $1.90, only 63 per cent of the rate prevailing in 1901.

"The present adjustment to eastern Iowa and southern Minnesota originated with the adjustment to the Twin Cities and a desire on the part of Illinois lines to reach that market in competition with eastern coal moving from the docks at Duluth and Superior. Duluth and Superior receive annually from 7,000,000 to 9,000,000 tons of soft coal shipped into Minnesota, South Dakota and northern Iowa, a very large tonnage finding a market at the Twin Cities.

"Prior to 1889 the rate on soft coal from northern Illinois to the Twin Cities was $2, and from Duluth $1. These rates were gradually reduced by force of competition between the carriers from northern Illinois and the carriers from Duluth to the Twin Cities, until the rate finally settled, in 1904, to $1.40 from northern Illinois, and 90 cents from Duluth to the Twin Cities. This continued and became the maximum at the intermediate points until December, 1910, when a general advance of 10 cents was made in rates from northern Illinois to intermediate territory in Iowa and Minnesota, but no advance in the Duluth-Twin Cities rate was made, pending decision by the United States Supreme Court of the Minnesota rate case. After the Minnesota rate decision and upon passage of the new rate law in Minnesota, the Minnesota State Commission prescribed a new distance tariff under which the rate from Duluth to the Twin Cities was advanced to 96 cents per ton and following this the northern Illinois rate was advanced to $1.50 per ton.

"It is now proposed to advance the rates from northern Illinois to this territory generally 10 cents per ton with corresponding advances from the various coal fields in southern Illinois and Indiana, rates from which are fixed on a differential over the rates from northern Illinois. In making this adjustment no advance can be made in rates from Duluth to Minnesota points, as these are controlled by the Minnesota commission. Therefore, no advance will be made in rates from Lake Michigan ports to the same territory. The tariffs under suspension also propose a general advance of 10 cents to the western half of Iowa, to western Minnesota and to South Dakota east of the Missouri river."

The Interstate Commerce Commission set rates on coal in 1908 as high as those which southwestern railways now are asking, according to W. W. Miller, general freight agent of the Missouri, Kansas & Texas, who testified as to the advance of 10 cents per ton in the southwestern territory. Since then the rates have been reduced voluntarily by the railways in order to enable Oklahoma to get into Texas in competition with Colorado and New Mexico. This relationship, the witness testified, would not be disturbed, since the proposed advance is horizontal and would maintain the present adjustment of rates. Mr. Miller presented exhibits showing the present rates from fields in Illinois, Kentucky, Alabama, Arkansas, Oklahoma, Colorado and New Mexico to Arkansas, Oklahoma, Louisiana and Texas, showing the present rates to a number of points in each state and the average rate and the rate per net ton mile compared with Class E to the same points.

"Class E is the lowest classification," said he, "and comprises such articles as sand, brick, sewer pipe, etc., while coal is classified one class higher, in D. The coal commodity rate is only about half the class-rate on this lower class, E. From Texas, for instance, the average rate to some 30 points in Oklahoma with an average distance of 311 miles is $2.32 per ton on lump and $1.82 per ton on slack, the proposed rate being 10 cents higher in each instance, an advance of 4.31 per cent on lump and 5.39 per cent on slack. The average class E rate between those same points is $4.63 a ton, just double the present rate on lump coal, although coal belongs to a higher class of freight. The disproportion between the coal commodity rate and its own proper classification, or Class D, would be even greater."

The witnesses on coal rates were cross-examined by J. H. Henderson, commerce counsel for the Iowa commission, and by a number of attorneys for coal interests. C. R. Hillyer, representing Illinois coal producers, said that the change would increase the discrimination between Illinois coal fields and the lake coal by 20 cents a ton, and asked Mr. Townsend if the Minneapolis & St. Louis would increase its revenue by the

change. Mr. Townsend said that it would lose some business to the Twin Cities, which it had retained only by sacrificing revenue on other traffic and that the net result would be to substantially increase its revenues. Mr. Hillyer insisted that the result would be to take tonnage away from the Minneapolis & St. Louis and give it to roads which were less in need of increased revenues. Mr. Townsend said this was true only in part of the territory. The witnesses were also cross-examined by M. O. Lorenz, statistician for the commission. Before the introduction of the testimony on coal Mr. Wright announced that the commission would be requested to allow the withdrawal of all tariffs providing for increases on anthracite.

FRUIT AND VEGETABLE RATES

J. S. Hershey, general freight agent of the Gulf, Colorado & Santa Fe, at Galveston, Tex., testified on Friday, March 26, as to the advances in rates on fruit and vegetables from Texas producing territory to interstate consuming destinations. The advance applies only on carload shipments and is 10 cents per hundred pounds on strawberries, 8 cents per hundred pounds on peaches and cantaloupes, 8 cents per hundred pounds on tomatoes and onions in straight or mixed carloads, and 5 cents per hundred pounds on cabbage, potatoes and watermelons. His testimony reflected generally the present and proposed rates from representative shipping points in Texas to points of consumption and was representative of conditions on all Texas lines.

"Earnings on carload shipments of strawberries from Alvin, Tex., to points in defined territory," said Mr. Hershey, "range from 14.6 cents per car mile to 19.3 cents, while on canned goods the earnings range from 17.5 cents to 26.1 cents, and on agricultural implements from 15.9 cents to 25.9 cents. This is based on the minimum weights of carloads of other commodities moving between the same representative points, and the actual weights would much exceed the minimum and result in a higher average earning. Yet based on these minima, the resulting earnings are thus higher than on perishable fruits and vegetables. The average loading of cars on practically all other commodities is greater than on fruits and vegetables. The loading on heavier articles is generally no less than 30,000 lb., while on fruits and vegetables it ranges from 17,000 lb. on strawberries to 24,000 lb. on heavier vegetables.

"Comparison of the proposed commodity rates on these fruits and vegetables with the classification and rates southbound which have been approved by the Interstate Commerce Commission, show that the proposed advanced rates are far below the approved class rates. On peaches, for instance, the proposed rate ranges from only 47 per cent to 65 per cent of the class rate.

"Based on the movement for 1914, even if every car originating in Texas moved to a point on which advanced rates were in effect, the total gross increase in revenue to all carriers for this traffic would be only $135,000. In fact, however, probably not over 65 per cent or 70 per cent of the total would move to points where rates are advanced, the balance moving to points within Texas or points not involved. The total movement of fruits and vegetables from Texas in the three years 1912 to 1914 was about 40,000 cars. In 1914 the total was only 10,208, showing a falling off in the last year. This movement represents, in all probability, 80 per cent of the total movement from Texas."

L. M. Hogsett, general freight agent of the International & Great Northern, of Houston, Tex., testified regarding the nature of the transportation service rendered in handling these commodities. "Prior to the time of production," he said, "the railways must secure from every available source, information to enable an estimate of the period of production, the volume of traffic, the character and amount of cars needed and whatever other transportation requirements will be necessary. The crops require special equipment, as refrigerator cars and ventilated cars, which must be ordered and stored near producing points before time of shipment. As these cars are used to handle perishable freight throughout the United States, when the shipping season is starting in Texas this equipment has to be secured from the principal market points and transported a great distance to the prospective points of production to await the crop. This causes unusual transportation conditions and heavy expense in furnishing cars.

"Even after cars are assembled, insects, rain or cold, or market conditions, may affect the time of shipment and the size of the crop so that carriers must be prepared to fit the car supply to any situation. Peculiarities of this traffic have caused many lines to construct special side tracks, loading sheds and other facilities costing considerable money and seldom, if ever, used for any other purpose. One Texas road 25 miles long has 24 spur tracks for loading of onions, which are idle 80 per cent of the year.

"Reconsigning and diversion instructions, after the cars are en route, are common and must be handled with extreme care and caution to avoid the various liabilities which fall upon the carriers. On one road which handled 2,795 cars there were sent and received 4,250 telegraph messages as a necessary incident to diversion instructions.

"The refrigerator cars principally used have a dead weight of about 10,000 lb. more than the box car of the same capacity. The ordinary refrigerator car capacity is only about 82 per cent of that of box cars of the same dimensions. Even with the light load, there is still this excess dead weight of 10,000 lb. plus about 5,000 lb. of ice."

RICE RATES

C. W. Owen, assistant general freight agent of Morgan's Louisiana & Texas Railroad & Steamship Company; J. D. Youman of the traffic department of the New Orleans & Northeastern, and D. R. Lincoln, assistant general freight agent of the Missouri Pacific, testified regarding the proposed advance on brewers' rice in carloads from New Orleans, interior Louisiana, Texas and Arkansas to St. Louis, Chicago and Milwaukee. This is the lowest grade of rice and the principal advance proposed is 5 cents per 100 lb. to St. Louis and ½ cent to Chicago and Milwaukee. The witnesses testified that the railways are now asking permission to advance rates which were originally made excessively low in order to develop the communities, and that based on the total yield for 1914-15, the total amount of revenue all the railways would receive from the advance would be $18,500 per year.

OPENING STATEMENT BY CLIFFORD THORNE

Clifford Thorne, chairman of the Iowa Railroad Commission and of a committee of western state commissioners, and attorney for certain organizations of shippers, began the presentation of the case for the protestants on Tuesday with an opening statement. Heretofore, he said, the railroads have been better equipped than the shippers in cases involving rates, but in the present case the commissions of 16 western states have secured the services of an eminent corps of expert accountants and statisticians, and are looking after the interests of the public in connection with the representatives of the shippers.

He objected that, as indicating conditions in the territory, the testimony of only three chief executives had been introduced, the presidents of the Chicago Great Western, the Missouri Pacific and the Missouri, Kansas & Texas. The commission and the public know, he said, whether they represent typical lines or weaklings, and the protestants propose to show that three-fourths of the traffic in this territory is being handled by companies that are earning above all operating expenses and interest, from 6 to 16 per cent on all their capital stock. The present movement for increased freight and passenger rates, he said, involves several times the amount of money involved in "the famous Gould printing press scandal where they made Erie stock over night, which only involved some $23,000,000."

The impression has been given that railroads have not been able to maintain their property during recent years. This is true as to some railroads, he said, but is untrue as to western railroads as a whole, and it would be shown that the western carriers expended in 1914, in maintaining their properties, $2,800

per mile of line, which was greater than in any other year in their history, and that the railroads in western territory as a whole have expended in maintenance during the past five years an average of $50,000,000 a year more than for any preceding five-year period since the first railroad was built in this territory. It would also be shown that the decline in percentage of operating income to property investment results from a change in the system of accounting and not from any operating condition.

The year 1914, he said, was one of world-wide business depression. In the exhibits to be offered on behalf of the protestants it would be shown that in 1913 the net revenues of the western railroads as a whole were the largest, with only one exception, 1910, since the first track was laid west of the Mississippi river; that the average net revenues during the past five years have averaged more than for any five-year period prior to 1913 in their whole history, and that the percentage return of net corporate income on capital stock outstanding in 1913 is more than double what it was 15 years ago, and five times greater than it was 25 years ago. It would also be shown, Mr. Thorne said, that the railroads have been charging many additions and betterments to operating expenses.

"President Felton of the Great Western frankly admitted on direct evidence," he said, "that practically one-half the cost of additions and betterments could be charged to operating expenses, and that very large sums were so charged during the past four years. President Bush of the Missouri Pacific admitted that large portions of the cost of rebuilding his road during recent years had been paid out of operating revenues and charged to expenses. Mr. Wettling, a witness for all of the railroads, made a similar admission, but was unable to state how much of that had been so charged. The magnitude of the sum involved may be grasped when it is noted that Mr. Wettling's exhibit shows that over $700,000,000 have been expended in additions and betterments by these western railroads during the past seven years.

"It is safe to say that the cost of additions and betterments, amounting to several hundred million dollars, has been charged to operating expenses by these western railroads during recent years. So long as this practice is permitted to continue, it is going to be exceedingly difficult to determine just what are the net earnings of our railroads. When prosperity is at its very highest, the railroads can show the lowest net earnings, by simply building a larger amount of improvements and extensions, and charging large portions of this to operating expenses, thereby automatically reducing their net income.

"We are perfectly willing to pay the people these gentlemen represent an adequate return for their investment, such adequate return to include a reasonable surplus for tiding them over lean years, but we are absolutely unwilling to build their properties for them and then pay a return on what we build."

THE RAILROAD CRISIS: A WAY OUT*

By Ray Morris

Of White, Weld & Co., Bankers; Formerly Managing Editor *Railway Age Gazette*

It would perhaps not be too hasty a summary of American railroad policy to say that, from the earliest beginnings until the second Roosevelt administration, the roads were expected to be built, owned and operated by groups of private citizens acting under the minimum of regulative restraint. From about 1904 until the present time, however, experiments in regulation have gone forward so rapidly that we have fairly been swept off our feet by them, and at last have found ourselves committed to a policy of full regulation, state and national. Unfortunately, in the exercise of this regulation, we have failed to attach any responsibility to the full output of authority; we have provided an abundance of regulative statutes, part of which are administered by commissions and part by prosecuting attorneys, but we have nowhere provided a commission, bureau, or department of the government charged with the contingent responsibility of seeing to it that railroad operation should remain profitable. As a matter of fact, during these years of house-cleaning, when our national back yard has been hardly large enough to contain all the linen, once soiled, which we have so newly washed and hung out to dry, we have not especially cared whether railroad operation was being profitable or not.

Consequently, when the war added its especial and heavy burdens to the roads last summer, we awoke suddenly to a realization of the fact that Europe, with some four or five billions of our railroad securities, had a lively interest in our railroad policy, or lack of one, and that if Europe was dissatisfied with it, our own distressed security markets might conceivably have a digestive task forced upon them quite beyond their capacities of assimilation. It is probable that not even the war shock has as yet made the nation realize how seriously the railroads are handicapped, or that regardless of the potential European selling, we simply cannot finance the annual railroad budget of about a billion dollars unless private capital, which has to do the financing, is satisfied with the security and profitableness of its investment. As Thomas F. Woodlock has well expressed it, the investor decides what return on capital is reasonable, not the Supreme Court.

Although I recognize that a certain amount of inefficiency is the price we pay for democracy, and that difficulties of just this sort (as well as the far more galling difficulties arising from state interference) are an unintentioned but essential adjunct to the rule of majorities, yet I believe that we are nationally capable of handling our railroad regulation a great deal better than this. It seems quite clear that the indicated remedy is to bring our scattered regulative efforts together; to do the regulating in an office where there is accompanying responsibility, instead of allowing the two things to be wholly unrelated, as they are today.

Without specific reference to the railroad situation, but as a solution for the evils arising from vesting the control of national business in a local-minded Congress, reinforced by the secret sessions of its own committees, Henry L. Stimson suggested last year, in an able address before the Law Academy of Philadelphia, that the members of the President's Cabinet should be given the right to appear on the floor of the House and discuss matters of general legislation affecting their respective departments. This simple change in procedure, which, as Mr. Stimson points out, is almost universal among other nations, and could be adopted without constitutional amendment, would give each government department a spokesman before the whole people and a national representative, by virtue of his position free from sectional influence, who could harmonize conflict and inconsistencies, and answer questions from the standpoint of the administration's continuous policy, now so often obscured and befuddled by a multitude of counsellors.

In the interest of constructive railroad regulation, suppose this accomplished; a further step would be the creation of a railroad department with a cabinet officer at the head. The secretary of Commerce, recently shorn of some of his duties by the creation of the labor department, might conceivably be able to add this heavy task to his functions, or it might well be better to create a new cabinet officer, to deal either with internal communications alone, or with rail and marine alike. The latter plan would perhaps be in line with a recent suggestion looking towards the establishment of an American minister of marine. Without the direct recourse to Congress, I think this plan could be only partially successful; with it, a great change in our helter-skelter system of administration of our great national interests might be worked almost overnight. The cabinet officer, concerned with the interest neither of the shipper nor of the carrier, but solely with the general good, could readily locate the points of maximum friction, and form his independent judgment as to the merits of conflicting

*From an Article Published in the Yale Review for April, 1915.

claims. As an impartial executive and expert in the service of the administration, he could set before Congress instances of inequitable burdens imposed by the states; or, better yet, he could act as an accredited go-between, to line up and harmonize the respective railroad policies of the states and the national government, without troubling Congress with the matter except as a last resort, and on questions of policy rather than of detail. In view of the extraordinary mixture of local and national legislation under which the railroads are compelled to operate, it is a curious fact that we have devised no intermediary system of communication.

To what extent work of this sort could be performed satisfactorily by a cabinet officer would probably depend a good deal on the personal characteristics of the men who attempted to do it. If the job were handled skilfully, it would develop its own traditions and gradually take its place as an accepted factor in the constantly enlarging machinery of national administration. I should feel sympathy and some concern for the first railroad secretary who tried to wean Texas from the home-industry rate-making habit, but the attempt would at least have the merit of being an advance in national economics over the present method of neglecting state regulative enactments until they become so flagrant that the Supreme Court is called upon for relief.

Recent events have sufficiently justified some of the early criticisms of the interstate commerce act, in holding that the combination of administrative and judicial functions vested in the commerce commission would sooner or later break down from its own weight and complexity. But the matter goes farther than that. The commission, an immensely thorough-going and conscientious body, has not only elaborated a slow, judicial procedure which is nearly the precise opposite of executive efficiency, but it has all the dread of a minor court, of stepping outside the narrow boundaries of its work. What can it do today, when the need is to relieve the railroads from real regulative oppression at a hundred points? It has no access to the state governments; if it had chosen to make a voluntary report to Congress covering suggestions for emergency relief, I believe the report would have been well received, both by Congress and the country, but the commission did not care to take its place as the single national representative of the roads; perhaps, even in the crisis, it felt the old duty to protect the shipper against the carrier.

How differently would this have been handled by a cabinet officer and his department, especially under the plan of direct access to Congress! The need of a spokesman would have been met automatically, and the effect on the public confidence would have been tremendous. Nor is there a single European country today, with the possible exceptions of Greece and Montenegro, where specific machinery has not been provided to meet railroad crises, and where there is not a regularly constituted bureau or office, having executive powers of its own, or accredited access to the government.

In England the Railway and Canal Commission, a body in many ways analogous to the Interstate Commerce Commission, judges of the reasonableness of the rates; but the Board of Trade, which is a branch of the government, formulated the maximum rate schedules of 1891-1892 for enactment by Parliament, and maintains a railway department which deals with privately owned and operated companies like our own, and is in every sense a national administrative body. In Germany, the *Bundesrath*, or Federal Council, made up of delegates appointed by the various states, maintains the *Reichs-Eisenbahnamt*, an executive office, and deals with matters affecting the empire as a whole; while the Prussian minister of public works, for example, is practically supreme in the local administration of Prussian railroad matters, working at the head of an elaborate system of councils and directories, so constituted that the advisory and consultative boards are carefully separated from the executive board. The minister of public works manages the state-owned roads and supervises the private-owned ones. In France, where private companies own much the greater proportion of mileage, the minister of public works is similarly vested with executive authority supported by four permanent boards of committees dealing with various branches of the service, but deriving their authority from the public works office. Italy carefully separates the administrative functions of her minister of public works from the general national control exercised by the department of railways, headed by a permanent council of railway administration, which has nine members whose qualifications are described by statute. Private-owned roads in Italy constitute about fifteen per cent of the total.

In short, we find the commission, or consulting council, an essential part of the regulative plan all over Europe; but the tendency is equally plain to unite the specialized functions of these bodies in an executive office which exercises the authority and accepts the responsibility. The Prussian advisory councils, for example, were instituted with the express purpose of considering traffic and rate changes from the combined standpoint of the management and the public, but these councils do not possess the rate-making power; their suggestions are carried up through the district directories to the general advisory council, whose function it is to supply information and advice to the minister of public works. Sometimes this machinery has been over-elaborated, as in France, where the great commercial advisory board, which deals with minor rate changes, is headed by a permanent committee of 68 members, and works slowly. But provision has everywhere been made to deal with the railroads and their major problems in their entirety; we alone have failed to create a general railroad office with this function, although the need for it is much heightened in this country by our system of state autonomy.

It seems to me that it is our clear duty to supplement the careful and thorough, semi-judicial work of the Interstate Commerce Commission with such an office, and with an executive capable, as the commission is not capable, of appearing before Congress, or before the state governments, or of going from one to the other, with suggestions tending to increase efficiency, promote harmony, and settle abuses without the crude recourse to direct legislative action or the slow and unsatisfactory appeal to the courts: an appeal which takes so long that much irremediable damage is done in the meantime, while the final decision must necessarily turn on general constitutional and statutory rights, without much reference to the administrative necessities of the immediate case at hand.

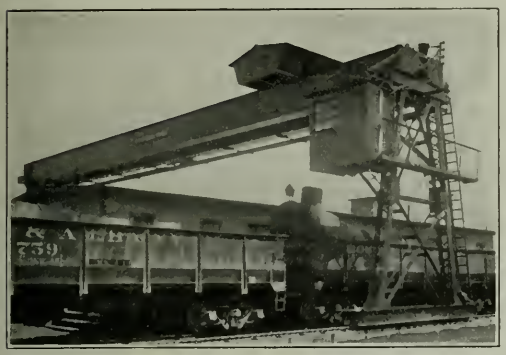
As an ultimate solution, it may well be that we shall come to some form of profit-sharing between the railroads and the national and state governments, either with or without a system of minimum guarantees. New York and Chicago have both worked out a plan of this sort to provide for local traction needs, and it has operated with great success and with conspicuous lack of friction. E. P. Ripley, president of the Atchison, Topeka & Santa Fe, goes even further than the municipalities have gone, and would divide the railroads into groups somewhat after the manner of the regional reserve banks, with a certain number of government directors, and with minimum guarantees of earnings and complete freedom to work out traffic pools, subject to government veto power in the public interest.

Before any constructive plan can be worked out, it will certainly be necessary to create an executive department at Washington to consider the situation in all its bearings. The planning will be a tremendous job, and it is quite obviously idle to look to the Interstate Commerce Commission or to the respective Senate and House committees on interstate commerce to undertake it. But it is fair neither to the capital which has built up the existing railroad system nor to the business interests of the country requiring its extension and development, that our national railroad policy should be permitted to remain in such a muddle, without plan or leadership, and holding out absolutely no inducement to build into new territory, or to rehabilitate and modernize the weak lines.

Plant for Handling Scrap on the Boston & Albany

Includes Reclaiming Shop and Storehouse. Material Is Unloaded, Sorted and Reloaded with a Gantry Crane

On January 1, 1914, the Boston & Albany put into operation at West Springfield, Mass., a new scrap reclaiming plant, and concentrated the handling of scrap for the entire road at this point. Prior to the completion of the plant scrap had been sorted and broken up by hand at several points on the system with little attention to reclamation of serviceable material.



Storehouse and Gantry Crane, Showing Crane Trolley Wires

Considerable material is now economically salvaged and the cost of handling the scrap has been much reduced.

The plant consists of a storehouse 25 ft. by 40 ft., with a connecting shed, 25 ft by 50 ft., housing the reclaiming shop. A high platform, 10 ft. wide on the sides and 30 ft. wide on the end, extends around three sides of the building. Beyond the end of this platform at ground level is an area 45 ft. wide and 200 ft. long, on which the scrap is sorted. This is surfaced with cinders and screenings and is divided into 15 bins, 10 ft. wide, with a large bin 50 ft. wide in the center. Tracks for loading and unloading extend the entire length of the plant, one on each side, and a five-ton gantry crane, running on rails laid on a continuous concrete foundation, spans the entire layout. The tracks are 47 ft. apart, center to center, and the span of the crane wheels is 80 ft.

The tools in the shop consist of a pair of alligator shears, driven by a 7½ h.p. motor; a drop hammer driven by a 7½ h.p. motor; a bolt threader and nut tapper, and one magnetic chip separator. These last mentioned machines are driven from a line shaft by one 7½ h.p. motor.

The gantry crane is of the standard three-motor type of five tons capacity. The maximum travel of the hook from lower to upper limits is 22 ft., and the clearance from the under side of the girders to the base of the rail is 22 ft. The main hoist is driven by a 22 h.p. motor and lifts at a speed of 40 ft. per minute. The trolley is driven by a 3 h.p. motor and travels at the rate of 125 ft. per minute. The bridge is operated on the rails by a 22 h.p. motor and travels 200 ft. per minute. All motors are for two phase, 60 cycle, 440 volt alternating current and were furnished by the General Electric Company. They are enclosed on the sides and top by galvanized corrugated iron with suitable doors for inspection.

The hoisting mechanism is controlled by mechanical load and electric brakes, and a limit switch is provided for opening the main current of the motor to protect the crane from injury should the hook be raised to a dangerous height. A powerful foot brake of the post type is operated by a foot lever located conveniently in the operator's cage, which is placed at one end of the bridge.

The lifting magnet is of 3,500 lb. capacity and has a lifting surface three feet in diameter. It is lifted by the hook of the crane, and when not in use is set on the platform. Direct current for the magnet is supplied by a 7½ kw. 230 volt General Electric motor generator set bolted on the side of the crane bridge girders and controlled from the cage. When loaded to its full capacity the magnet requires about 45 amperes at 230 volts.

The track on one side of the plant is used for unloading scrap as it is received and shipments are made from the other

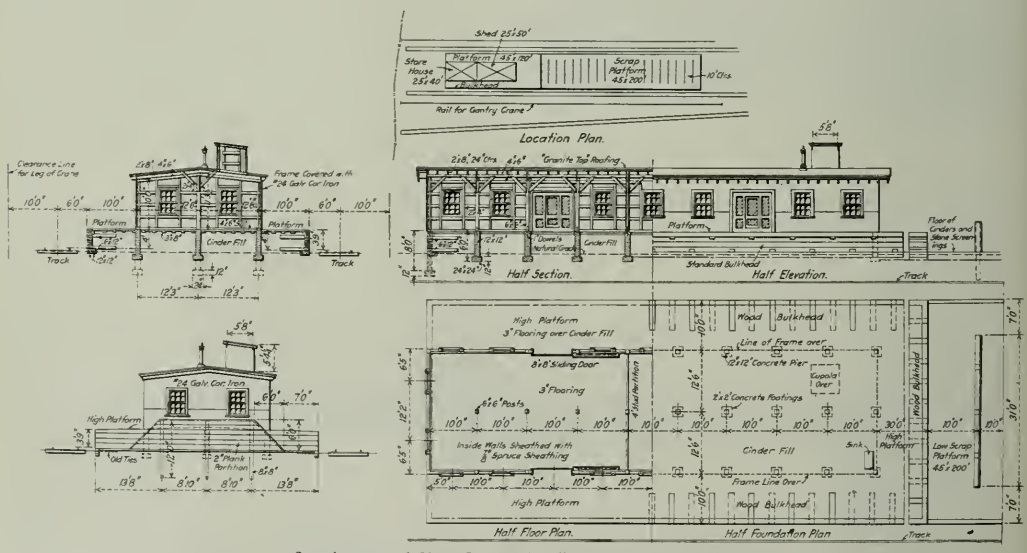
Arrangement of Bins for Sorted Scrap, Boston & Albany Scrap Yard

side. Cars loaded with miscellaneous scrap are placed opposite the large central bin into which they are unloaded by the lifting magnet. The material is then sorted to meet the several specifications as to size, quality of material, etc., each class being placed in a separate bin and held for shipment. In this operation boxes 30 in. by 40 in. square with side bars 8 in. high on three sides are used. Each box is handled by a three-part chain sling, and when filled with sorted material is carried by the crane to the proper bin and dumped.

The power hammer in the reclaiming shop is used for straightening bolts and spikes. A special die has been provided by means of which three spikes may be sharpened at one time with a few blows of the hammer. Bolts and nuts are reclaimed by retapping and rethreading. All brass borings are run through the magnetic separator which removes steel and iron chips. The plant is provided with an oxy-acetylene outfit which is extensively used to cut up into sizes convenient for handling and shipping structural material, old boilers, tender frames and other large pieces.

At present the organization consists of 15 laborers, who are in charge of one foreman. The latter reports direct to the storekeeper and all reclaimed material is turned over to the stores department for disbursement on requisition. During the last eight months of 1914, 10,000 gross tons of scrap was handled by the plant, and material worth $8,715 was reclaimed and returned to store stock. The value of the reclaimed material amounted to about $139 per month in excess of the operating expenses, and during the eight months $139,000 worth of scrap was sold. As compared with the previous method of handling scrap, a saving of 10 cents per ton has been effected by the new plant, and under the former method practically no material was reclaimed. The reclaimed material consists of brake shoes, brake pins, brake levers, connection rods, couplers, follower nuts, washers, fire hooks, bolts, spikes, side irons, tie plates, shovels, round and flat iron, etc.

The installation was made from plans prepared by the engineering department of the railroad.



Storehouse and Shop, Boston & Albany Reclaiming Plant

Australian Strategic Railways.—It is reported that the construction of the strategic railway by the nearest direct route between Adelaide and Brisbane will shortly be begun.

TRAIN ACCIDENTS IN FEBRUARY[1]

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of February, 1915:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of train.	Kil'd.	Inj'd.
†1.	Cin. G. & P.	Amelia, Ohio.	bc.	P. & F.	3	13
2.	Penn.	Irving.	rc.	F. & F.	1	5
9.	N. Y. Central.	Cayuga.	bc.	P. & F.	0	3
9.	Louisville H. & S.	Irvington.	bc.	P. & P.	0	1
28.	A. C. L.	Dillon, S. C.	rc.	P. & F.	0	1

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of train.	Kil'd.	Inj'd.
5.	Balt. & Ohio.	Beardstown.	d switch	P.	0	11
7.	Balt. & Ohio.	Greene Junc.	d. truck	P.	..	..
*10.	Missouri K. & T.	Hailey.	fire	F.	0	0
11.	Vicksburg S. & P.	Dubberly.	ms.	P.	0	2
19.	Balt. & Ohio.	Youngstown.	ms	F.	1	2
22.	Denver & R. G.	Colorado Sp'gs.	unx.	P.	2	11
23.	Southern	Bristow.	d. truck	P. & F.	1	5
25.	Penn.	Morris Junc.	acc. obst.	P.	0	5
26.	Boston & M.	Claremont Junc.	washout	P.	1	3

The trains in collision on the Cincinnati, Georgetown & Portsmouth near Amelia, Ohio, on the 1st, were an eastbound passenger, consisting of a single electric car, and a westbound freight. Three passengers were killed and thirteen injured. Both trains were running at full speed, making a very bad wreck. There was a dense fog at the time.

The trains in collision at Irving, N. Y., on the second, were northbound freights, the second train running into the one preceding at about three miles an hour. The engine, caboose and ten freight cars were badly damaged. One of the brakemen was killed and five other trainmen were injured. The leading train was an extra, stopped for water. The other, No. 303, was

[1]Abbreviations and marks used in Accident List: rc, Rear collision——bc, butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft. Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

running under a permissive block signal and also had been warned by torpedoes.

The trains in collision at Cayuga, N. Y., on the ninth were a westbound passenger No. 3 and an eastbound freight. The freight was standing on a side track and the passenger ran over a misplaced switch and into the head of the freight. Three trainmen were injured. The switch had been left open by a brakeman of the freight in consequence of a misunderstanding with the conductor.

The trains in collision at Irvington, Ky., on the ninth, were eastbound passenger No. 143 and westbound passenger No. 144. Both engines were considerably damaged, but no cars were badly smashed or ran off the track. The fireman of the westbound train was injured.

In the collision at Dillon, S. C., on the night of the 28th, northbound passenger No. 88 ran over a misplaced switch and into some freight cars standing on a side track, damaging the engine and wrecking four freight cars. The engineman of the passenger train was slightly injured.

The train derailed near Beardstown, Ill., on the fifth was southbound passenger No. 122. One passenger car was overturned and fell into water 2 ft. deep. Eleven passengers were injured. The cause of the derailment was the breaking of a pin in a switch stand.

The train derailed near Greene Junction, Pa., on the seventh was eastbound passenger No. 6, and the train ran several hundred feet on the ties before it was stopped. Many passengers were injured, but none seriously. The cause of the derailment was a broken pedestal of one of the trucks of the tender of the locomotive.

The train derailed near Hailey, Okla., on the night of the tenth was a southbound freight, and seven cars of oil were burnt up. The derailment, as well as the fire, was caused by the ignition of oil which dripped from a tank car on a hot brakeshoe, the burning oil causing a sudden and violent explosion.

The train derailed at Dubberly, La., on the night of the eleventh was westbound passenger No. 11. The train ran over a misplaced switch and was derailed entering the side track, three cars being overturned. Two passengers were slightly injured. The cause of the misplacement of the switch is charged to maliciousness. The switch had been moved but slightly from its normal closed position and the switch light gave an indication of clear for the main line.

The train derailed at Youngstown, Ohio, on the nineteenth was an eastbound freight, and the engine and eight cars of cattle were piled up in a bad wreck. A brakeman was killed and the engineman and fireman were injured.

The trains involved in the accident at Bristow, Va., on the twenty-third were a northbound freight of the Chesapeake & Ohio and a southbound passenger of the Southern. The freight was derailed half a mile north of the station by failure of bolts in a freight-car truck, and ten cars were badly damaged. The southbound track was obstructed. The passenger train came along just at that moment and the engine and first two cars were derailed and the fireman was killed. Two passengers and three employees were injured.

The train derailed near Colorado Springs, Col., on the twenty-second was passenger No. 15 and the engine and three cars were ditched. The engineman and fireman were killed and nine passengers and two trainmen were injured. The cause of the derailment was not determined.

The train derailed at Morris Junction, Pa., on the twenty-fifth was a westbound passenger, and five trainmen were injured. The derailment was caused by a large rock which fell down the mountainside.

The train derailed near Claremont, N. H., on the twenty-sixth was an eastbound passenger and four cars were partly overturned. One employee was killed and one passenger and three employees were injured. The cause of the derailment was a washout due to a flood in Sugar river.

THE PASSENGER FARE QUESTION IN OHIO*

By L. E. Johnson,
President, Norfolk & Western

I come to you, not as a stranger, but as a friend and neighbor, to ask your aid and influence, not in order that your railway properties may show increased profits, but that the efficient passenger service furnished to the citizens of Ohio shall be at least self-supporting, and shall pay to the carriers within the borders of your state its fair proportion of the expenses of operating the railroads of your state. The railroad companies, as Justice Hughes pointed out in a decision of March 8, 1915, declaring that a two-cent maximum passenger rate law of West Virginia was unconstitutional, should not be "forced to carry passengers, if not at or below cost, with a merely nominal reward considering the volume of the traffic affected." If by such laws the revenue from the passenger service is thus unfairly reduced, the result inevitably must be that the traveling public will finally suffer in decreased efficiency of service.

The development of your railway properties under private ownership and by private initiative, in co-operation with the various fields of human endeavor, has been responsible for great material development and prosperity in all activities, and I cannot feel that our citizens, when the matter has been frankly placed before them, will sanction, for political or other reasons, legislation prescribing a rate for the carrying of passengers that does not pay to the carriers a reasonable return for the services rendered, and in so doing prevent a continuance of further development, not only in the sections which are now served by railway companies, but also in areas of undeveloped territory.

The progressiveness, initiative, and resourcefulness of the people of our country can be illustrated by the fact that, with a population of 100,000,000, we have under private investment and management about 250,000 miles of railway; while all Europe, with 450,000,000 population (about four and one-half times as many) has 213,000 railway miles, principally state-owned. In Europe there are 5.7 miles of railway line per 100 square miles of area, and in the United States over 8 miles of railway for the same area. With us there is a mile of railway for each 400 inhabitants, and in Europe there is a mile for about 2,100 inhabitants. If the European ratio to population prevailed in this country, we would have less than 48,000 miles, instead of nearly 250,000.

Our mileage has grown because of the prevision of the men who projected it, and invested in the securities of your railway properties. These securities are held, broadly speaking, by the American people. The integrity of every life insurance policy, the proceeds of which we may hope to leave to those dependent upon us, rests in great measure upon the integrity of your railway property. To permit the value of this property to be depreciated will affect intimately the value of your life insurance policies, and nearly every other form of investment. These values will of necessity be seriously affected unless your railway properties are permitted to earn a fair return upon the monies devoted to the service of the public, and I believe that the American people will demand that this fair return be permitted to be earned, when they understand the situation of the railway companies, and feel that the matter is being fairly laid before them.

Prior to March 10, 1906, the passenger fares in the state of Ohio were lawfully based upon a rate of three cents per mile, and by legislative enactment of that date the rate per mile was reduced to two cents, a reduction of 33⅓ per cent. Under this act the receipts from the passenger service are not only insufficient to provide a reasonable return upon the investment, but in reality cause the carriers to operate their passenger service at a loss.

That the service has been well performed, though at a loss,

*From an address before the City Club of Cleveland, Ohio, March 18, 1915.

is evident by the reports of your commission, which show that millions of passengers have been safely carried, and that few have been injured while under the care of the railway companies. Travel upon railway trains, privately operated, is far safer than travel upon public highways, publicly administered. But the continuance of this condition, at least as to the adequacy of train service, cannot go on indefinitely against diminished and inadequate revenues.

That careful and scientific investigation of passenger rates has shown them to be below the value of the service is proven conclusively by the findings of the Interstate Commerce Commission. Can you ask for any higher authority than the finding of this commission charged with the duty of regulating the carriers of this country?

Acting upon this finding of the commission, interstate passenger rates were increased generally to two and one-half cents per mile. If a ticket from Buffalo to Cleveland (interstate) is worth two and one-half cents per mile to both carrier and passenger, a ticket from Cleveland to Columbus (intrastate) on the same train, is worth as much. Yet the law says it must be furnished for two cents per mile, which is less than the cost to the railway for rendering the service.

I know you will concede that confiscation is not reasonable or lawful regulation, and that under the guise of regulating passenger fares we should not be compelled to operate at a loss. Yet that is precisely the condition confronting the Ohio railroads today. The receipts of the Norfolk & Western for passenger fares in Ohio for the year ending June 30, 1914, were $706,048.84. The cost of operating the passenger trains was $683,658.57, leaving an excess of but $22,390.27. Against this small balance is chargeable the taxes, interest and dividends apportioned to the passenger traffic. The taxes paid in Ohio chargeable to the passenger traffic were over $63,000, so, without considering dividends, interest and the maintenance of equipment, roadway and structures, the Norfolk & Western operated its intrastate passenger trains in Ohio last year at a loss of over $40,000.

The total valuation of the Norfolk & Western in Ohio for taxes is over $26,000,000. The Norfolk & Western paid the state of Ohio in 1907 over $136,000 for taxes, and last year it paid more than $316,000, an increase of more than 132 per cent, and not including the United States income tax. The taxes paid per mile of road have increased in seven years from $514 per mile to $1,245 per mile. But this is not all. Grade crossing elimination work in Ohio, ordered by the local authorities, will cost the Norfolk & Western about $700,000 this year. During this same period in other states traversed by the Norfolk & Western our assessment for taxes has increased from $530 per mile to $788. While in Ohio passenger rates have been decreased one-third, our taxes are increased more than two and one-half times.

In addition to this, the increased value of passenger equipment demanded by the public will call for additional expenditures for such equipment, and additional taxes on the value of such equipment. The construction of wooden passenger cars has practically ceased. During the year 1913 and 1914, the Norfolk & Western has spent for steel passenger cars $933,000, and to replace with steel the wooden cars still in use will require an expenditure of more than $4,600,000—this for the Norfolk & Western alone. To replace the wooden passenger cars of the railroads of the United States with steel will cost more than $614,000,000; and yet the railways are expected to arrange for this expenditure, which will not add one dollar to the revenue, and for a business which is now handled at a loss for every passenger carried for two cents per mile.

At the time that the two-cent passenger rate law was enacted in 1906, it was argued by the proponents of the measure that the reduction of the rate from three cents would stimulate traffic, and that the increased traffic would more than offset the decreased rate. Experience has shown that this expectation has failed. In the year 1905, under the three-cent rate which then existed, the railroads of Ohio carried an average of 44 passengers per train mile, equaling $1.32; while in 1914, in spite of the increased population, there were only carried 50 passengers per train mile, equaling $1.00; so that your railways received 32 cents per passenger train mile in 1914 less than they received in 1905, and are only carrying an increase of 6 passengers at the end of nine years.

Every American takes pride in the passenger service of American railways. Here in Ohio, in the very face of adverse legislation, we have each year made betterments for the welfare and comfort of the traveling public. Roadbed, motive power, and equipment are the safest and best that money can buy. Safety and speed combine to make the journey of the traveler short and in comfort, and keep the business man in close communication with his affairs, however distant his trade and commerce may go and come. The roadbed has been made safe and is kept safe for you. The motive power is efficient and swift. The steel cars are safe and comfortable. Employees who operate the trains and keep up the tracks are competent, and are paid the highest wages of any railroad men. The rates charged for both freight and passenger service are the lowest in the world.

In the face of loss we have continued to improve our facilities, increase wages, and make betterments. We expect to pay—and do pay—a fair profit to the manufacturer on every car, every locomotive, every steel rail, every tie, and all other supplies that we buy. No man, no community, and no nation can prosper unless a profit is made. Every man in Ohio, whether he be a manufacturer, merchant, banker, farmer, or workman, expects and has the right to expect a profit upon what his energies and activities may supply to the world. It is not fair to ask any man to give of his talents or property without a reasonable reward. You gentlemen do not do it and you should not ask the railroads to do it. The difference between you and the railroads is this: you will not operate your business at a loss—we have to.

All that the Ohio railroads are asking is fair and equitable treatment as between mutual business interests. The Interstate Commerce Commission, after an exhaustive investigation, has sustained our case for an increase of passenger fares, and named Ohio as one of the offenders in enacting confiscatory legislation as to such fares. All we are now asking the people of Ohio to do is to right the wrong.

Our appeal is made directly to the representatives of the people of the state and if this appeal is backed up by public sentiment enlightened by the information coming from such business associations as are represented at this meeting, then there will be no question that the injustice that now exists will be remedied by the law-making authorities.

FREIGHT TERMINAL CAR CHECKING SYSTEM*

By I. T. Tyson

Assistant Trainmaster, Philadelphia & Reading, Port Richmond, Philadelphia, Pa.

In the operation of large terminal yards I have always found that success depends upon the proper training of the men on whom you must rely at times of congestion; too often, for various reasons, terminals are forced until the "filled up" question is forgotten and they are compelled to become blocked for a period. Under these adverse conditions, every man, from the general yardmaster down to the messenger boy, must be on the job every minute. The engine despatcher must keep in close touch with the mechanical department that he may be thoroughly familiar with just how the road engines are getting through the house so that where repairs are necessary and engines will not be ready by the time the crews' rest is up another engine can be ready. He must also keep in close touch with the yardmasters so that trains may be moved from the congested territory, or where there must

*Submitted in the contest on the Operation of Terminal Yards.

be a clean-up to permit the handling of promised business, or the making up of scheduled or fast freight extras.

From the moment a car arrives at the terminal yard a record should be kept of its movement to enable each yardmaster to keep in touch with every car standing or moving within his respective territory without any waste of time in hunting up the information. We have found it good economy to have sufficient car checkers to allow a yardmaster to be out on the job looking after his power and the proper handling of business. On the arrival of all trains at the terminal the car tickets are turned over at once to the car checker for checking. In this way no cars should get in without tickets or bills, and if a car does arrive without a ticket the question is immediately taken up with the conductor who brought it to learn where it was picked up, etc., and that point is wired for the necessary information, which is usually promptly received. At the time the train is being checked the cars are marked for different territories.

Form 4115—No. 5 8-14-4500

Philadelphia & Reading Ry. Co.

CAR RECORD TICKET

Month.....

Initial	Car Number

RECEIVED

Date.....19

Engine..... Time..... M

Contents .....

Destination.....

FORWARDED

Date.....19

Engine..... Time..... M

Contents .....

Destination.....

Remarks .....

Sample of Car Record Ticket Used on the Philadelphia & Reading, Slightly Reduced

The car tickets are then turned over to the clerk, who takes the record, which is operated by the card system. The inbound record being taken, the card is filed in a rack specially constructed in three sections of 100 pockets each, in rows of 10 to a section, with numerals running on the top and the side from 0 to 9. This permits the use of the last two numerals of a car number for filing. The left hand section is used for the arrival of cars, and the right hand section after the cars have gone out and the outbound record has been filled in on the bottom of the tickets, which are then filed in this rack until the end of the month. At the close of each month all cards which have been filed in the outbound section are removed to a drawer constructed in the same way, where they are held for one year, to be handy for any question that may come up. At the expiration of one year the cards are removed to a record room; the cards from each pocket are tied up separately, and the entire month is filed in a box, which makes it handy to find any record that may be asked for. Any cards that may still be in the left hand rack at the end of the month or because of still being on hand are removed to the middle frame and as the cars go out these cards are removed, filled out and filed where they belong.

The cards used are in 10 different colors, so arranged that each day has its special color, viz.: dark red, left hand corner at top, first of the month; in the middle, the eleventh; in the right corner, the twenty-first; all white, thirty-first; this being the only date where the four tickets are required: With the second, light yellow in the left corner; twelfth, middle; twenty-second, right corner, and so on with all colors. The form number corresponds with the date that the card is to be used, and acts as a check. This enables us to learn at sight the number of old cars in the territory, and just how old they are. These cards can be quickly gone over each day and action taken to start the old cars moving.

In breaking up trains we use the ram system with very good results from the fact that it is not necessary to furnish a crew with the large number of men used to operate a hump. This crew consists of an engineman, fireman, conductor and seven brakemen; one of the latter operates the ram, one is a cutter and five are car riders.

Our receiving yard permits us to pull in and cut out four 60-car and four 45-car trains, which enables us to keep the ram crew going constantly when business is running normal. Should there be a slack time the ram crew is utilized to switch light cars in the outbound yard. Our classification yard is divided into three sections, with 15 tracks to each ladder, the tracks holding from six to 30 cars each.

Our car riders ordinarily ride the cars for a distance of two city blocks, catching them while on the run. The man on the ram regulates the speed according to the distance and the time between the cuts. The engine can be kept going without stops with a good operator on the ram, and car riders who understand their business so as not to take cars in too fast or place them on switches or the head end of tracks, requiring the engine to stop poling and run down to push the cars into clear.

I have always impressed upon our men the importance of the prompt handling and spotting of any car after its arrival. High class freight must receive preference. We aim to have all cars placed promptly, so that the agents may feel perfectly safe in going after the consignee to get teams to release them. I have always found this to be the real secret of keeping down congestion, as there are so many "holidays" and so much "inclement weather" to be accounted for that the only thing to do is to spot the cars and keep pounding for their release, after which they should be promptly moved to the outbound yard, properly switched and started to destination to release per diem charges. The men are taught that today is the time—let nothing lie over until tomorrow, and we will then be prepared for the unforeseen things which will arise the day following and which will require all of our attention without having to take care of something left over from yesterday.

The secret of successful handling is eternal vigilance. The only true way to obtain this is by keeping a constant check not only on the men, but on the results obtained, as well, by actually knowing how each man in charge is performing his duties—whether he works for a clean-up each day, handling his scheduled trains on time and getting his extras out within the prescribed time. With this condition all of his subordinates soon get the habit and everything moves with one strong push. If we find the bad-order car left over, part of a drag backed off without being properly switched and thereby requiring the second handling, tracks not checked up, and the conductor not in position to say what cars are on hand and why they are delayed, we may know that this fellow is going to give all the trouble that is required for an ordinary sized terminal. He wants to be set right as quickly as possible before that spirit extends to the whole territory.

Soldiers and Railway Fares in England.—The regulations regarding fares to be paid by soldiers traveling on English railways have recently been set forth in a letter from the Army Council to the Railway Nationalisation Society: (a) All soldiers are granted one free journey on leave, prior to embarkation, or after serving three months, if they have not previously received this concession. (b) All officers and men, traveling on leave from the continent, get a free warrant to their homes and back. (c) All sick and wounded soldiers, recommended by the medical authorities for sick leave, receive free warrants to their homes and thence to the station at which they are ordered to rejoin. (d) All officers and men under training, traveling on leave at any time, can do so at a single fare for the double journey. Soldiers may also travel free in cases of serious illness or death of a near relative.

J. W. BETTENDORF ON FREIGHT RATES AND BUSINESS ACTIVITY

Clifford Thorne, chairman of the Iowa railroad commission, who is opposing the freight rate increase proposed by western railroads, has received a vigorous protest against his policy from J. W. Bettendorf, president of the Bettendorf Company, of Davenport, Iowa.

Mr. Bettendorf says:

"For the period of ten months following July 1, 1913, our payroll amounted to $1,400.000, paid to an average of 2,000 men at the rate of $35,000 per week. From May 1, 1914, to the present time (ten months) we have been enabled to employ an average of only 400 men, and in this period the payroll has not exceeded $300,000.

"This shrinkage of $1,100,000 during the past ten months represents just this much loss to the merchants of this community, a loss most seriously felt. Merchants approach me continually in the hope that I can assure them that conditions are improving and business will soon return to normal. This I cannot do. . . . What has the shipper gained if, by the saving of a few dollars in freight, he contributes so largely to a condition that actually destroys the buying power of the community? As a large shoe dealer recently put it, 'What gain is there in saving a few cents on freight if I cannot sell my shoes?'

"The very fact that the railroads claim the increase of rates asked for would produce but $10,000,000 additional revenue, while the opposition claims it would produce $100,000,000, would seem to indicate that much if not all the present discussion is based entirely on theory and the skilful manipulation of figures.

"That business is paralyzed, practically at a standstill, with our manufacturing institutions and merchants thoroughly alarmed, is an undeniable fact and not a theory. Will not these deplorable conditions be aggravated by a determination to prove a doubtful theory? Activity of the railroad companies spells prosperity; their inactivity means depression generally.

"Grant this increase asked for. If the returns resulting therefrom are abnormal, it will be immediately reflected in a surplus (since future railway accounting is to be under government supervision) and when this surplus assumes normal proportions then will the shipper be justified in demanding participation therein through the medium of lowered rates.

"I will not attempt to defend the past conduct of some of the railway companies, but it seems to me that with the future issuance of bonds or increases in stock, under the supervision of the government (just as are the public utilities companies of the state of New York under the control of the state) the past can and must be absolutely ignored. We are now confronted with a condition that must be met by the application of common sense.

"Under normal conditions, such as existed in 1913, the tonnage of freight arising directly from the activity of our company amounted in round numbers to about 450,000 tons, or an average of one train a day consisting of fifty carloads of 60,000 pounds each, which at an average of $2.40 per ton, created a revenue to the railroad company alone of about $1,100,000, while in 1914 this tonnage shrunk to about 170,000 tons, creating a revenue of about $400,000 to the railroad companies.

"This inability on the part of the railway companies to purchase equipment not only resulted in the vast falling off of business, but was also the direct cause of the cancellation of orders placed, or the suspension of delivery on large orders, for some of which we had already provided the necessary materials. One such order alone represented nearly $750,900."

CYLINDERS AND VALVE GEARS*

By G. W. Rink

Mechanical Engineer, Central Railroad of New Jersey

While every effort is being made to increase the efficiency of the locomotive boiler, the economical distribution of steam in the cylinders has also received some attention. In general, however, we are not getting the results that are obtained in good stationary engine practice, due to long steam ports and the use of a single slide or piston valve which has to control admission, cut-off, release and compression.

A design of cylinder overcoming these objections to a considerable extent has been introduced in recent years. It is known as the Hobart-Allfree cylinder, is designed with extremely short ports and the exhaust passages are separated from the live steam passages, thereby reducing radiation and the condensation of the steam. The cylinders are designed to operate with either a slide or piston valve, the latter for use on superheater locomotives. This valve controls admission, cut-off and release, the same as any other valve, except that greater expansion is obtained by providing a sufficient amount of exhaust lap. A small compression valve of the piston type was introduced which controls the compression and provides greater fredom for the escape of exhaust steam. While the two valves release at the same instant, the compression valve remains open slightly longer to allow the exhaust steam, which would otherwise be in compression, to escape, until the piston reaches about 90 per cent of its stroke at working cut-off.

The Jersey Central has two locomotives in high-speed passenger service equipped with slide valves and two with piston valves, with this type of cylinder. A comparative test was made with one of the engines fitted with this type of cylinder and a slide valve against another engine of the same class in the same service fitted with the regulation slide valve and cylinder. These tests showed an economy in fuel and water consumption of approximately 12 per cent. This is the result of investigations on six trips to Philadelphia and return with each engine pulling a four car train, weighing approximately 175 tons.

Tests conducted on other roads with Mallet type locomotives equipped with the same type of cylinders with slide valves show a saving over similar engines not so equipped. With practically the same amount of coal used per ton mile, an increase of 13½ per cent in tonnage was hauled, with an increase in speed of 4.3 per cent and a saving in water per ton mile of 11.1 per cent.

Two of our Atlantic type locomotives were equipped with the piston valve type cylinders during the early part of this year. These engines were also equipped with superheaters and Baker valve gear. No actual tests have been made to obtain an accurate comparison, on account of its being impossible to separate the economies obtained. However, the saving in fuel and water is very noticeable, and in fact is considerably more than if superheaters only had been applied. The locomotives are also capable of much higher speed and can easily haul two to three extra cars without effort. Since its introduction, 162 locomotives have been equipped with the slide valve cylinder in connection with various types of valve gears, and 30 locomotives on various roads are now in service with the piston valve type of cylinder, 20 of which are operated with the Baker valve gear and 10 with the Walschaert gear.

British Rail Exports.—The aggregate export shipments of rails from the United Kingdom this year to February 28 were only 266,585 tons, as compared with 641,247 tons in the first two months of 1914 and 510,935 tons in the first two months of 1913. The exports for the month of February of this year declined to 99,840 tons, as compared with 243,495 tons and 279,202 tons.

*Discussion of report on Steam Locomotives of Today, at the annual meeting of the American Society of Mechanical Engineers, New York, December 2, 1914.

ARGUMENTS PRESENTED IN ENGINEMEN'S WAGE ARBITRATION

Oral arguments were presented in the arbitration proceedings at Chicago on the demands of the Western engineers and firemen, during Monday, Tuesday and Wednesday of this week, and briefs have been filed by James M. Sheean, attorney for the Conference Committee of Managers, and by Warren S. Stone and W. S. Carter for the engineers' and firemen's brotherhoods. The board is to render its decision by April 20.

In the brief filed by Mr. Sheean, it is claimed that the employees have failed to establish the propositions on which their demands for increased pay are based. The decision of Seth Low and John H. Finley, in the Eastern trainmen's case, is cited to sustain the position that the present demand for further increases can only be supported by showing that conditions have changed since 1910, and makes the claim that each of the basic propositions contained in Mr. Stone's opening statement is disproved, not only by the railroads' exhibits, but by those which the employees themselves have submitted.

Attention is directed to the fact that since 1910 the railroads involved have expended over $660,000,000 in extensions, additions and improvements to property, and that over $220,000,000 of this amount was expended for the purpose of increasing efficiency and safety and to expedite train movement, that through the elimination of grades and curves and the improvement of roadbed, as well as motive power, the engineers and firemen, with the larger power, which takes the higher rates of pay, have been able to get over the road in a shorter period of time than in 1910; and therefore the higher rates of pay taken by the larger power have been earned in fewer hours upon the road.

Attention is also directed to the fact that the exhibits introduced on behalf of the employees disclose that between 1909 and 1913 the amount of coal consumed on the railroads involved for each thousand dollars paid to locomotive firemen has decreased nearly 5 per cent; even with this decreased coal consumption per thousand dollars of compensation, it is shown by railroad exhibits that with the installation of heavier power there has been constant improvement in the matter of labor-saving devices, such as mechanical stokers, coal-pushers, ash pans operated by compressed air, pneumatic door openers, sloping tanks, etc.

As to the claim advanced that the so-called "productive efficiency" of the engineers and firemen has increased, the brief points out that the net income from operations in 1914 was $15,000,000 less than in 1910; that in 1914 there was declared out of income $22,000,000 less in dividends than in 1910; that there was carried to surplus in 1914 $24,000,000 less than in 1910; and that in the first seven months of the current fiscal year there is a falling off of over $41,000,000 as compared with the gross revenues for a corresponding period in 1914.

The brief emphasizes the fact that no witness on behalf of the employees contradicted the correctness of the interpretation placed by the railroads upon the proposals in arbitration in making application of the proposals to the actual operations on the roads involved during the month of October, 1913, in which the proposals were presented. The employees' expert statistician testified that if there was given to this month's operation only the importance which that month's payroll bore to the payroll for the entire year, an accurate estimate of the increased expense could be made for the year; and by the adoption of this method it is shown that through a year's operation the proposals would mean an increase in the payrolls of the engineers and firemen from $75,000,000 to over $115,000,000, or nearly $41,000,000.

Conceding that the rates and rules should provide full, fair and adequate pay for important duties and responsibilities, Mr. Sheean directed attention to these facts: "When a fireman enters railroad service he is on the bottom rung of a ladder of promotion created by seniority rules under which the oldest man in the service has the right to make selection of his run. From the day he enters service he is guaranteed: (1) A minimum daily wage for every day he is called upon to work, no matter how few the hours he works or the distance he runs. (2) Pay for every mile he runs, no matter how short the time in which the run is made. (3) A minimum hourly rate, irrespective of the distance run. And with these guarantees, under the schedules now in force, some of the men are earning each year as high as $3,725 as passenger engineers, $3,342 as freight engineers, over $2,000 as passenger firemen, over $1,800 as freight firemen. From actual payroll figures here introduced, which give the names of every individual in engine service, with detail of his earnings, it is shown that in regular passenger service engineers earn as high as $341.60 per month, and that the average monthly earnings of all engineers in such service is $183; that firemen in such regular passenger service earn as high as $209.89 per month, and that the average monthly earnings of all firemen in such service is $115; that engineers in regular freight service earn as high as $358 per month, and that the average monthly earnings of all engineers in such service is $170; and that the firemen in regular freight service earn as high as $221 per month, and that the average monthly earnings of all firemen in such service is $110."

In conclusion Mr. Sheean said: "These payroll figures demonstrate that the present schedules provide full, fair and adequate pay, whether measured by comparison with other trades, by comparison with other railroad employees who have like duties and responsibilities, or by comparison with engineers and firemen of the East or the South. These payroll figures have not been contradicted by the employees whose names appear thereon, notwithstanding the fact that during the hearing, while the railroad exhibits were being introduced, Mr. Carter stated to the board of arbitration: 'I have reached the conclusion that our case is lost if we treat the exhibits of the railroads too seriously.'"

A thinly veiled threat that the engineers and firemen would not again be inclined to submit to arbitration if their demands were not granted in this proceeding was made by President W. S. Carter, of the Brotherhood of Locomotive Firemen and Enginemen, in his oral argument.

"If these wage movements are adjusted amicably," he said, "through arbitration and under a federal law, it must take from one to two years to reach a conclusion. These wage movements may be begun when railroad business is at its height, and it may be that when the time comes for the rendering of an award one or two years later railway traffic may be at a low stage. If railroads are to take advantage of that it would make it impossible for the officers and committees of these organizations to curb the men on the engines. We were told at the beginning of this movement that if we did not strike there would be a change in traffic before the arbitrators could render an award, and if what they told us is true I fear they will never again give us consent to prolong the agony for two years before an award is made.

"Hundreds of millions of dollars would be available for the remuneration of engineers and firemen if the finances of western railroads had been wisely and properly managed," he said. "A review of the past history of western railroads discloses the fact that the extraordinary gains in revenue which have arisen from the bounty of the federal and state governments, the population of the country, the development of trade and industry, the adoption of mechanical devices and improved operating methods, added capital investment and the increasing work and efficiency of employees have, to a large degree, been absorbed by fictitious capitalization or dissipated by improper or misguided financial management."

Mr. Carter also asserted that the roads had failed to report to the Interstate Commerce Commission the exact value of their holdings, saying that "the Southern Pacific alone is now estimated to have oil and timber holdings ranging in value from $100,000,000 to $700,000,000, which are reported to the Interstate

Commerce Commission at a book value of slightly more than $40,000,000." Mr. Carter also referred to the finances of the Rock Island and the St. Louis & San Francisco and asserted that all of the railroads in the West are virtually under the control, through interlocking directorates and stock ownership, of the Morgan and Rockefeller groups of financiers.

COOLING HOGS IN TRANSIT

One of the results of placing the settlement of claims in charge of the operating department on the St. Louis & San Francisco, was the introduction of a device for watering or cooling off hogs, which has considerably decreased the claims due to their dying in transit. Formerly when it was desired to cool them water was used direct from the track tank spouts. The cold water striking the hogs on the back and neck caused congestion, and consequent death. The loss in this way has been greatly reduced by putting in a special hog watering device at each of the tanks, similar to the one shown in Fig. 1. The 3 in. wrought iron pipe extends from the bottom of the tank to within about 5 ft. of the ground, and the lever which operates the valve is fitted with a lock, so that it cannot be tampered with. The valve is in the tank, at the top of the 3 in. pipe, so that when it is closed there will be no water left in the pipe to freeze and cause trouble.

In cooling off the hogs a stream of water is first turned on the bedding underneath them. After this is well saturated the nozzle is turned toward the roof of the car and the water is

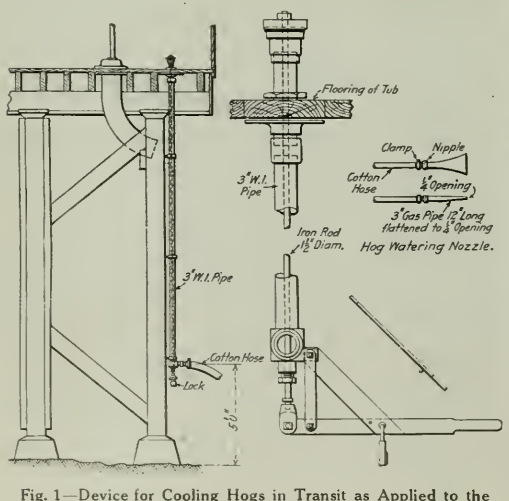


Fig. 1—Device for Cooling Hogs in Transit as Applied to the Older Water Tanks

allowed to spray over the backs of the hogs gradually. The device is simple in construction and saves its cost many times over during the summer season. The bill of material is as follows:

2	3-in. hose nipples	$ .30
1	3-in. floor flange	.30
1	3-in. nipple	.12
15-ft.	3-in. W. I. pipe at 22c	3.30
1	3-in. special valve	2.00
1	3-in. lock nut	.10
1	16-in. iron rod, ½ in. diameter	1.00
1	3-in. special elbow casting	2.00
25-ft.	3-in. cotton hose at 40c	10.00
2	clamps to fasten hose	.20
1	nozzle, 3-in. flattened to ¼-in	.20
1	switch lock	.40
1	valve operating device	2.25
	Labor	10.00
	Contingencies 10 per cent	3.18
	Total	$35.35

With the present standard 50,000 gal. capacity frame water tanks the hog watering device is attached direct to the supply pipe, which is enclosed in a frost proof box as shown in Fig. 2. This costs only $20.85.

1	2-in. globe valve	$ 3.15
1	hump hose rack	2.95
25-ft.	2-in. linen rubber cased hose	10.00
1	nozzle, flattened	.75
	Labor	4.00
	Total	$20.85

Circular 316, issued by the superintendent of freight loss and damage claims, gives detail instructions for the watering of hogs in transit. It specially directs attention to the fact that the first

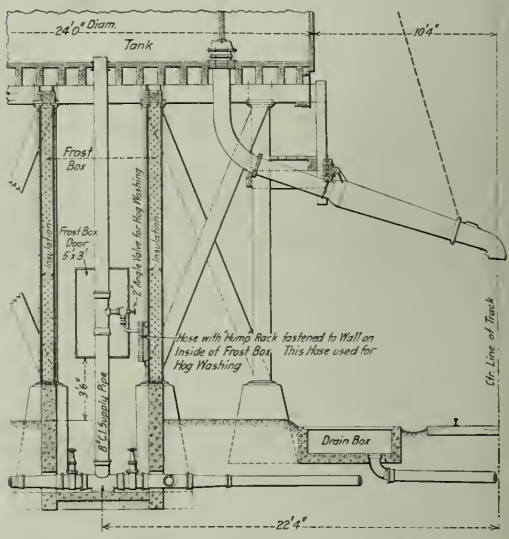


Fig. 2—Hog Washing Device as Applied to New Standard Track Tanks

warm weather of the season is more severe on hogs than the extreme warm weather later; therefore, extra precautions should be taken in the handling of the shipments made in the early part of the season. Hogs as a rule do not suffer while the cars are moving, but a great many die from overheating while cars are not in motion. Conductors are cautioned to watch the condition of hogs closely, and when they see they are getting warm or heating up, should arrange to have them watered at the first opportunity.

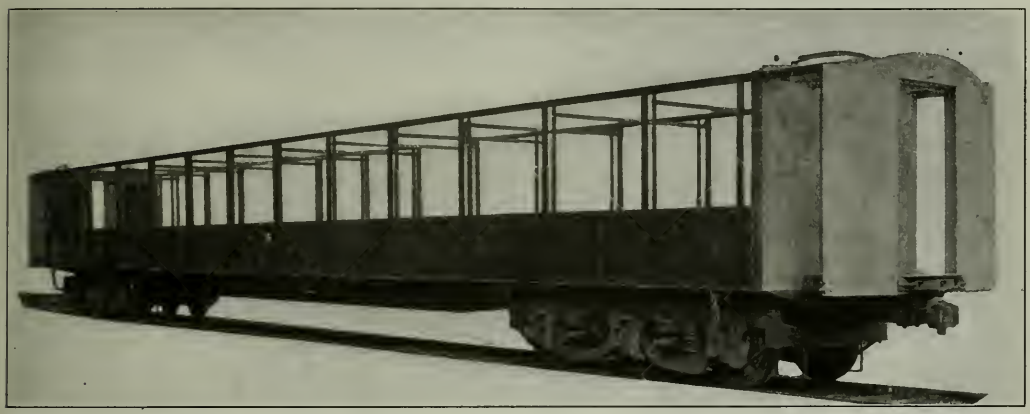
When any of the hogs are found dead on arriving at St. Louis or Kansas City, bad order reports are immediately rendered, so that an immediate investigation may be made to ascertain whether the shipment was properly watered. The hogs are watered immediately upon arrival at division points, or at the last water tank before reaching such points. A great many of them arrive in St. Louis in the morning after 7 a. m., and seldom reach the stockyards until noon, or in the heat of the day. The loss has been considerably reduced by seeing that they are watered before delivery to the terminal.

English Railwaymen and Enlistment.—The British war office has made the following announcement: The railway executive committee is working out a scheme in conjunction with the war office by which increased opportunities to enlist into the army will be afforded to the men employed by the railways. This scheme will be framed in such a way as not to impair the working of the railways, and until it can be put into operation railwaymen will only be recruited under the regulations which existed previously.

Steel Frame Passenger Equipment With Wood Finish

New Grand Trunk Suburban Cars Are Designed for Ease of Repairs in Present Shops, as Well as Strength

The Grand Trunk recently placed in service a number of suburban coaches, which are 83 ft. 3¾ in. long over buffers, 74 ft. long over body end sills and weigh complete, ready for service, with six wheel trucks equipped with rolled steel wheels, 137,000 lb.



Grand Trunk Suburban Car During Construction, Showing the Arrangement of the Steel Members

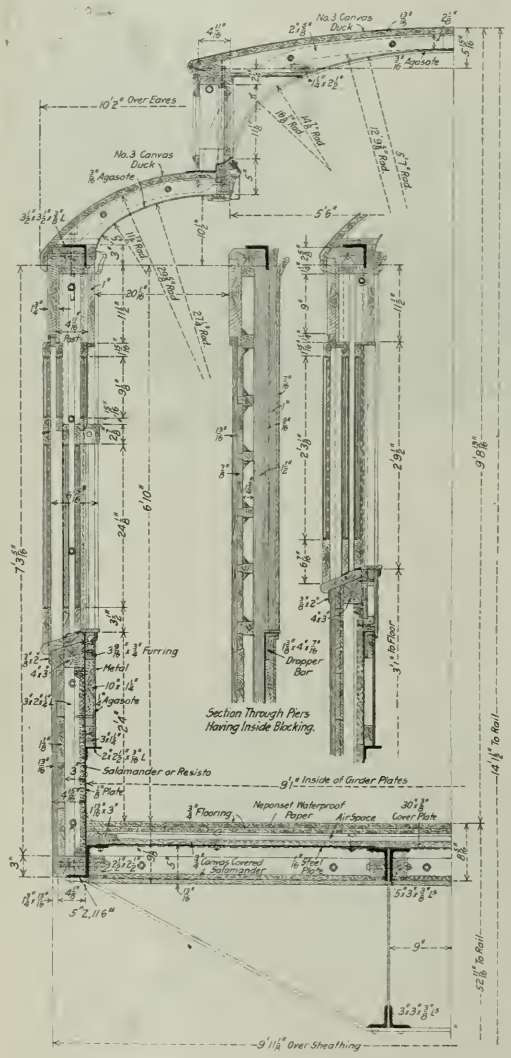
The framing of these cars is of steel construction with all steel vestibule, the interior and exterior finish being of wood. This is the result of much study and consideration, with the object in view of obtaining a construction which offered a maximum of safety and comfort to the traveling public, and a minimum expense to the railway company for maintenance. This problem seems to have been successfully solved by the adoption of a steel underframe and steel side framing, equivalent in strength to a steel car, in addition to which the car body and truck are locked together, so that the braking force is effective in stopping the car body as well as the trucks in case of derailment or collision. By the introduction of this truck and body bolster locking device,* and the adoption of all-steel vestibules, the possibility of telescoping is believed to be practically eliminated. The locking device is designed to have a three-fold function, in case of wreck or derailment: First, to prevent telescoping; second, to lower the center of gravity by adding the weight of two trucks (40,000 lb.) to the car body, and thus prevent the body from turning over in case of derailment; third,

Steel Frame Suburban Car with Wood Finish Recently Placed in Service on the Grand Trunk

*For description of this device see *Railway Age Gazette*, January 10, 1913, page 53.

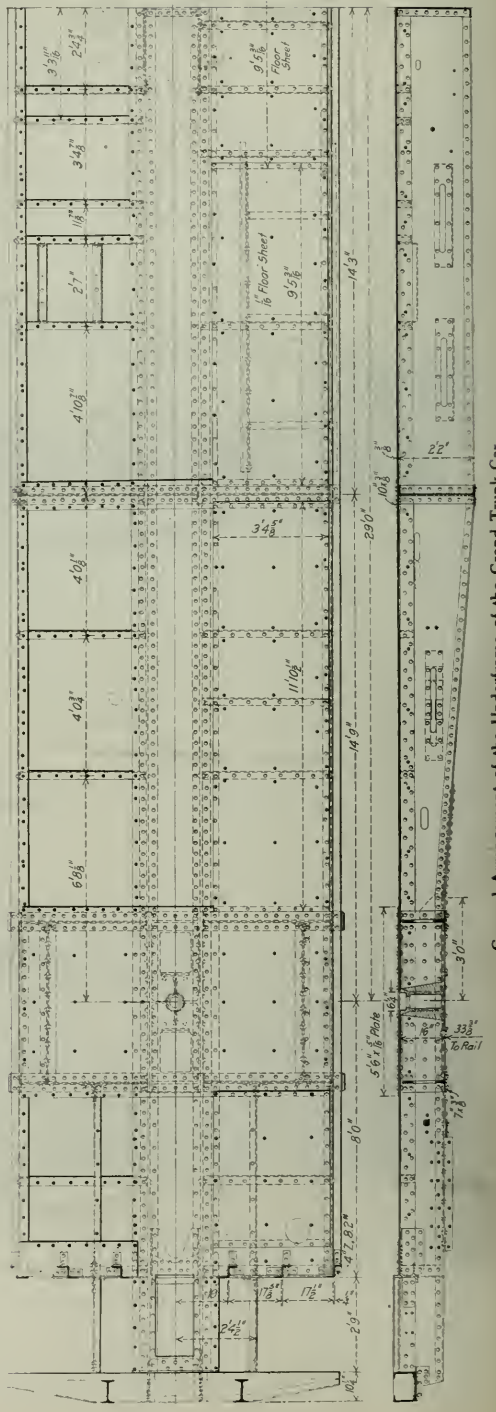
the full effects of the air brake can be obtained under all conditions, even after a derailment has taken place, as each truck is held in position under the car.

By installing steam heat and electric light the car is rendered practically fireproof. The railway officers concluded after careful investigation that the passengers' wearing apparel, the upholstering, etc., in a passenger car is more inflammable than a wood inside finish, and that the paint and varnish in a steel



Cross Sections of the Grand Trunk Car

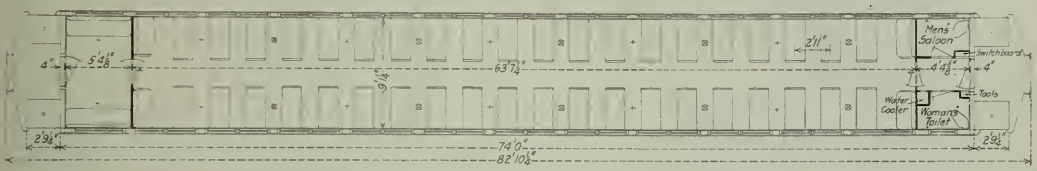
car is inflammable. By the adoption of a composite construction the car is claimed to be warmer in winter and cooler in summer, and in addition, these cars can be repaired in any of the company's shops at the same cost as a wood car, thus saving the expense of buying special machinery and keeping in stock special material for repairs, which would be necessary with steel interior and exterior finish.



General Arrangement of the Underframe of the Grand Trunk Car

UNDERFRAME

The underframe is constructed with the center sills as the principal members. They are of the built up fishbelly type, continuous from buffer beam to buffer beam and consist of a 30 in. by 3/8 in. top cover plate, 5 in. by 3 in. by 3/8 in. top angles, 5/16 in. web plate and 3 in. by 3 in. by 3/8 in. bottom angles. The depth of the center sill at the center of the car is 26 in., and at the bolster 16 in. The body bolster is built up of eight 3/8 in. pressings as side members, one cast steel center member of



Floor Plan of New Grand Trunk Suburban Car Which Seats 96 Passengers

heavy construction designed to take the locking device, a top cover plate 5 ft. 6 in. by 5/16 in. extending the full width of the car and two 7 in. by 3/8 in. reinforcing plates extending from side sill to side sill. There are two crossbearers placed 14 ft. 3 in. on either side of the center of the car and built up of 3/8 in. pressed steel diaphragms placed back to back, with 10 in. by 3/8 in. top cover plate and 7 in. by 3/8 in. bottom cover plate, both extending the full width of the car.

BODY AND END CONSTRUCTION

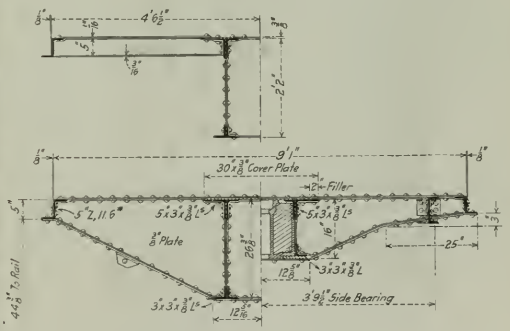
The side girder consists of a 1 3/8 in. by 4 in. by 7/16 in. dropper bar, 1/8 in. by 35 in. web plate, 2 in. by 2½ in. by 3/16 in.

Interior of the Grand Trunk Suburban Car

intermediate angle and 5 in. by 11.6 lb. Z-bar side sill. The side posts are 3 in. by 2 in. by ¼ in. angles, and the side plate is a 3½ in. by 3½ in. by 3/8 in. angle. The steel construction of the body is reinforced with wood posts and horizontal and vertical wood blocking. The interior and exterior finish is of wood. Wrought iron carlines, 2 in. by 5/8 in., are riveted to the side plate, completing the steel superstructure, and here again the wood reinforcing is employed. Canvas duck is used for the final roof covering and the headlining is 3/16 in. Agasote. Agasote is also used below the belt rail. No special insulation was necessary in this construction except below the belt rail, where 3/4 in. Salamander is applied outside the 1/8 in. steel plate. Special care was taken, however, for insulation under the floor, two air spaces, two layers of 3/4 in. Salamander and one layer of Neponset paper between the upper and lower course of the floor being used.

The end posts are 4 in., 8.2 lb. Z-bars with wood reinforcing, and the end plate is a 4 in. by 3 in. by 5/16 in. angle. The vestibule posts are 8 in., 18 lb. I-beams connected at the bottom direct to the platform end sill, which is built up of 7 in. channels, while at the top these I-beams are connected to the body of the car by 6 in. channels running parallel with the center line of the car and by 3 in. by ¼ in. angle diagonal braces from the ends of the I-beams to the corners of the car body; these braces are in turn braced to the vestibule corners by 2½ in. by 2½ in. by ¼ in. angles. The vestibule end plate is a 3½ in. by 3½ in. by 3/8 in. angle and 2 in. by 2½ in. by 5/16 in. angles brace this plate to the end of the car body between the I-beam and the outside of the car. The vestibule is sheathed with 1/8 in. steel plate.

The interior finish is mahogany and rattan seats are used,



Cross Sections of the Underframe

the seating capacity of the car being 96. The Stone Company's axle system of electric lighting is used, the generator being arranged to cut in at about six miles an hour, and the cars are heated by the Chicago Car Heating Company's vapor system of steam heat. They were built by the Canadian Car & Foundry Company, Montreal, Quebec.

Railway Electrification in Switzerland.—There is already a large mileage of railway operated electrically in Switzerland, though a considerable proportion is represented by mountain and special lines other than the general railway system. It is now stated that 1,873 miles of the Swiss state lines are to be converted from steam to electric traction, power being derived from the wealth of water power available.

General News Department

The Atlanta & West Point has put up a telephone line for train despatching, between Atlanta and Montgomery, 175 miles.

Jacob C. Frist, station master at the union station in Meridian, Miss., has received from President Wilson a medal, in recognition of his heroism, a year ago, in rescuing an aged woman and a child from in front of a locomotive. Frist had a leg broken and was otherwise injured.

The United States Civil Service Commission announces examinations, April 27, for the position of assistant supervisor of accounts, in the division of valuation, Interstate Commerce Commission; salary from $3,000 to $4,200 a year. It is desired to get men of large experience in railroad accounting.

It was announced at Ottawa on Wednesday that the Canadian government would at once begin operating the transcontinental railway. The line was built by the government for the Grand Trunk Pacific, which signed a contract to take it over for operation on completion, paying for fifty years as rent, 3 per cent of the cost of construction. The road has declined to sign the lease or to begin operation, claiming that terminals at Quebec have not been finished and that in other respects the road is incomplete.

The Baltimore & Ohio requires train employees, and station and track forces, in times of emergency, to render assistance in putting out fires on adjacent property as well as on the right-of-way; and there have been numerous instances where serious losses have been prevented. Henceforth employees receiving information concerning the existence of a fire are to notify the division superintendent by wire, so that the fire warden or other state, municipal or county officer may be informed. If fire were detected by railroad employees in a farm house, assistance could be summoned by the railroad from the nearest place where such facilities were at hand.

Postmaster General Burleson has replied to Mr. Peters and other critics of his position in regard to railway mail pay, giving the newspapers, for their Monday morning issues, a statement filling a column. He says that the statement issued by Mr. Peters, to the effect that the joint congressional committee had accused the officers of the post office department of ignorance and greed is erroneous; that Mr. Bourne, chairman of that committee, in making that statement was not supported by the other members of the committee. These other members publicly repudiated some of Mr. Bourne's statements. Mr. Burleson says that in the current fiscal year the railroads will have received nearly $4,500,000 for carrying parcels in the mails; and he has recommended to Congress legislation which, when passed, will allow the roads nearly $1,000,000 more for this special purpose. He again says that on long hauls the railroads get more from the post office department than they do from the express companies.

Railroad Laws in Texas

The bill which was discussed by the recent session of the legislature of Texas designed to give railroad employees the option of securing bonds from any desired source, regardless of the regulations of the railroad company, did not become a law. The statement published to the effect that this bill had been adopted by both houses of the legislature was erroneous; it was killed in conference on the last day of the session.

Two New Brunswick Railways to be Transferred

The Canadian Parliament has under consideration three resolutions looking to the expansion of the government railway system. The first authorizes the acquisition of any railway in Quebec, New Brunswick, Nova Scotia or Prince Edward Island, not more than 200 miles long; but no line can be taken that does not connect directly with the government system. The resolution provides for new construction, but no railway of more than 25 miles is to be built until after a sum of money for the purpose is appropriated by Parliament. The next resolution is designed for the ratification of an agreement dated March 18, for the sale to the government of the New Brunswick & Prince Edward Island Railway, 36 miles long, Sackville to Cape Tormentine. The purchase price is $270,000. The third resolution confirms an agreement of August 1, 1914, between the International Railway of New Brunswick and Thomas Malcolm, contractor, and the King, for the sale to the government of the whole of the company's line, from St. Leonards, N. B., near Van Buren, Me., northeast to Campellton, N. B., 112 miles, for $2,700,000. It is provided that the money may be paid any time within five years, and that the line may be leased to the government in the meantime at $90,000 per annum.

Proposed Railway Legislation

The lower house of the Iowa legislature has passed its first railroad bill of the session, a bill to require railroads to provide bunk cars on stock trains for the accommodation of shippers accompanying their stock.

The bill before the Missouri legislature to require the state public service commission to make a physical valuation of the railroad property in the state, before allowing any increase in passenger fares, has been passed by the House.

Anti-Full-Crew Law Campaign

The bills to repeal full crew laws are still under discussion at the capitols of New York, New Jersey and Pennsylvania. At Albany and at Trenton amendments or substitutes have been proposed designed to make sure that the Public Service Commission shall have full authority to regulate the number of men to be employed on trains. The governor of New Jersey is understood to be opposed to the repeal of the present law, and a member of the legislature has proposed that, leaving the present law on the book, an act can be passed authorizing aggrieved railroads to appeal to the Public Utilities Commission.

R. L. O'Donnel, chairman of the committee of New Jersey and Pennsylvania Railroads, continues to publish information concerning the state of public sentiment in those states. He reports that the Reading Chamber of Commerce submitted the full-crew law question to a referendum vote, and the result is 261 votes against the law and 26 for it. The Board of Trade of Williamsport acted after a referendum vote of its members, which resulted 175 to 7. The Civic Association at Media voted 212 to 1. In Scranton, the stronghold of labor unions, the Scranton Board of Trade adopted a resolution in support of the railroad position by a vote of 100 to 12.

Arguments against repeal were heard by a committee of the legislature at Harrisburg, Pa., on Tuesday of this week. Delegations from every railroad center of the state were present and from Philadelphia there came a company of 300, who were met at the railroad station by a band and escorted to the capitol. John C. Bell, former attorney general of the state, was one of the counsel for the brotherhood. Petitions protesting against repeal were presented bearing 68,000 names. Reports of the hearing indicate that no new facts were brought out. It was argued that if the railroads should succeed in having the matter put into the hands of the Public Service Commission they would at once appeal from that commission to the courts, and in a few years they would ask for the repeal of the act creating the commission. Counsel declared that the railroads' money had better go for clothes and food for the extra trainman's family than to go into supplies; as, in either case, it would be put into circulation. William G. Lee, grand master of the Brotherhood of Railroad Trainmen, said that 11 states already had laws providing for an additional man on certain trains, and that the extra man "does more than anything that can be devised to prevent accidents" to trainmen.

Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for January, 1915. No reports are included for roads whose operating revenues for the year ended June 30, 1914, did not reach $1,000,000.

For the Month of January

Item	United States			Eastern District			Southern District			Western District		
	Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated	
	1915	1915	1914	1915	1915	1914	1915	1915	1914	1915	1915	1914
Average number of miles operated	228,689.57	...	...	58,839.58	...	...	42,359.56	...	...	127,490.43	...	...
Revenues:												
Freight	$147,375,039	$644	$697	$63,701,321	$1,083	$1,164	$24,130,378	$570	$662	$59,543,340	$467	$490
Passenger	45,526,999	199	226	19,837,316	337	358	6,792,597	160	199	18,897,086	148	174
Mail	4,759,285	21	18	1,729,584	29	21	626,790	15	15	2,402,911	19	17
Express	5,670,566	25	24	2,652,538	45	38	876,393	20	25	2,141,635	17	17
All other transportation	6,069,737	26	27	3,324,697	56	52	509,624	12	14	2,235,416	17	20
Incidental	4,613,522	20	20	2,406,610	41	35	651,337	15	17	1,555,575	12	14
Joint Facility—Cr.	281,136	1	1	121,200	2	2	57,457	1	1	102,479	1	1
Joint Facility—Dr.	*99,498*	...	...	*59,501*	*1*	...	*15,084*	...	...	*24,913*	...	...
Railway operating revenues	$214,196,786	$936	*$1,021	$93,713,765	$1,592	*$1,700	$33,629,492	$793	$933	$86,853,529	$681	$733
Expenses												
Maint. of way and structures	$23,950,566	$105	$126	$10,706,056	$182	$212	$4,154,531	$98	$117	$9,089,979	$71	$89
Maintenance of equipment	40,401,262	177	190	19,390,315	330	350	6,304,342	149	180	14,706,605	115	119
Traffic	4,811,581	21	23	1,782,957	30	32	909,335	21	24	2,119,289	17	17
Transportation	86,937,730	380	418	40,250,303	684	762	12,514,606	295	344	34,172,821	268	282
Miscellaneous operations	1,842,720	8	8	905,710	15	13	193,755	5	5	743,255	6	7
General	6,239,785	27	29	2,660,838	45	47	990,809	23	25	2,578,138	20	22
Transportat'n for Investm't—Cr.	*404,423*	*2*	*1*	*84,508*	*1*	...	*106,931*	*2*	...	*212,984*	*2*	*1*
Railway operating expenses	$163,769,221	$716	*$795	$75,611,671	$1,285	*$1,425	$24,960,447	$589	$695	$63,197,103	$495	$535
Net revenue from railway operations	$50,427,565	$220	$226	$18,102,094	$307	$275	$8,669,045	$204	$238	$23,656,426	$186	$198
Railway tax accruals	$11,213,928	$49	$50	$4,713,260	$80	$80	$1,588,631	$38	$37	$4,912,037	$39	$39
Uncollectible railway revenues	39,419	...	...	11,874	...	...	7,191	...	...	20,354	...	...
Railway operating income	$39,174,218	$171	$176	*$13,376,960	$227	$195	$7,073,223	$166	$201	$18,724,035	$147	$159

*Includes all unclassified items.

For the Seven Months Ending with January

	1915	1915	1914	1915	1915	1914	1915	1915	1914	1915	1915	1914
Average number of miles operated	228,295.58	...	...	58,757.18	...	...	42,287.68	...	...	127,250.72	...	...
Revenues:												
Freight	$1,185,096,216	$5,191	$5,649	$510,999,792	$8,697	$9,529	$177,823,150	$4,205	$4,759	$496,273,274	$3,900	$4,128
Passenger	389,236,491	1,705	1,906	171,753,050	2,923	3,161	52,843,477	1,250	1,450	164,639,964	1,294	1,470
Mail	33,322,640	146	137	12,123,777	206	195	4,389,324	104	103	16,809,539	132	121
Express	40,854,194	179	199	18,428,694	314	348	6,122,987	145	162	16,302,513	128	142
All other transportation	49,159,709	215	229	27,400,485	466	473	3,898,494	92	107	17,860,730	140	155
Incidental	34,879,639	153	162	18,244,089	310	311	4,183,705	99	111	12,451,845	98	109
Joint Facility—Cr.	2,100,354	9	9	946,614	16	15	407,103	9	9	746,637	6	6
Joint Facility—Dr.	*742,319*	*3*	*3*	*469,036*	*8*	*7*	*91,293*	*2*	*2*	*181,990*	*1*	*1*
Railway operating revenues	$1,733,906,924	$7,595	*$8,307	$759,427,465	$12,924	*$14,098	$249,576,947	$5,902	$6,699	$724,902,512	$5,697	$6,130
Expenses:												
Maint. of way and structures	$216,742,662	$950	$1,097	$91,696,489	$1,561	$1,861	$34,268,742	$810	$895	$90,777,431	$714	$807
Maintenance of equipment	297,411,403	1,302	1,419	139,314,607	2,371	2,628	48,677,033	1,151	1,254	109,419,764	860	907
Traffic	34,476,471	151	166	13,056,531	222	255	6,541,776	155	156	14,878,164	117	128
Transportation	611,621,809	2,679	2,948	284,212,899	4,837	5,375	87,634,987	2,072	2,296	239,773,923	1,884	2,028
Miscellaneous operations	13,715,387	60	67	6,484,952	110	112	1,273,106	30	33	5,957,329	47	58
General	43,114,503	189	194	18,286,124	311	313	6,968,462	165	169	17,859,917	140	146
Transportat'n for Investm't—Cr.	*4,035,375*	*17*	*9*	*432,104*	*7*	...	*796,372*	*18*	*2*	*2,806,899*	*22*	*16*
Railway operating expenses	$1,213,046,860	$5,314	*$5,891	$552,619,498	$9,405	*$10,580	$184,567,733	$4,365	$4,801	$475,859,629	$3,740	$4,058
Net revenue from railway operations	$520,860,064	$2,281	$2,416	$206,807,967	$3,519	$3,518	$65,009,214	$1,537	$1,898	$249,042,883	$1,957	$2,072
Railway tax accruals	$78,083,997	$342	$350	$32,050,456	$545	$559	$10,883,774	$257	$260	$35,149,767	$276	$282
Uncollectible railway revenues	288,602	1	...	108,288	2	...	46,074	1	...	134,240	1	...
Railway operating income	$442,487,465	$1,938	$2,066	$174,649,223	$2,972	$2,959	$54,079,366	$1,279	$1,638	$213,758,876	$1,680	$1,790

*Includes all unclassified items.

Master Car and Locomotive Painters' Association

The advisory committee of the Master Car and Locomotive Painters' Association has selected the following subjects and queries for the next convention, which will be held at Detroit, Mich., September 14 to 16:

Subject No. 1: Flat color v. enamel color—which gives the best results under varnish in durability and permanency of color?

No. 2: Can we suggest any changes in the design or construction of steel passenger train cars to make them better fitted for preservation by protective coatings?

No. 3: Will equipment finished in enamel or varnish color wear and "clean up" in service as easily and economically as the varnish finish?

No. 4: Best methods of taking care of piece-work accounts, including rate fixing, printed forms, and clerical organization, etc., for work in paint shops.

No. 5: What is the most practical and economical method of maintaining the inside of steel passenger cars?

Essay No. 1: The possible results, where price v. quality is enforced in buying paint for the car and locomotive paint shop.

No. 2: The official recognition due the efficient railway master car and locomotive painter.

Query No. 1: Are we having any serious trouble with varnish turning white, and if so, with what grade of varnish?

No. 2: Is there any way by which a greater field can be covered by the association without increasing the time consumed in handling the work?

No. 3: Of what value to the railway companies is ornamentation of the exterior of railway passenger equipment?

Railway Signal Association

The board of direction announces that the regular meeting of the Railway Signal Association will be held at Hotel Astor, Broadway and Forty-fourth street, New York City, on Wednes-

day and Thursday, May 26 and 27; and that the annual convention of the association will be held at Salt Lake City, Utah, beginning September 14.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, Jefferson Hotel, Richmond, Va.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 29 W. 39th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March, 1916, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May, 1915, Galveston, Tex.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreuccetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Association. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-17, 1915, Detroit, Mich.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March, 1916, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICES.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—G. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., La Salle St. Sta., Chicago. Annual meeting, September, 1915.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, 3d Thursday in July, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRUCK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK. John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldgs., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION. W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Canadian Northern announces that its line between Port Arthur and Ruel will be open on May 1 for freight traffic. It is expected to put on regular passenger trains by June 7.

The meeting of the National Industrial Traffic League, announced to be held at Memphis, Tenn., on April 8 and 9, has been postponed to a date to be announced later, probably about the middle of May.

The Chicago, St. Louis & Gulf Transportation Company has announced that service between LaSalle, Ill., and New Orleans, La., will be established on May 1 via the Illinois and Mississippi rivers, with a fleet of steel barges and power boats.

President Bush of the Missouri Pacific is reported to have announced that the railroads in Missouri would appeal to the courts in their efforts to get increased intrastate freight and passenger rates if the increase is not granted by the public service commission.

The Agricultural Department announces that the foot-and-mouth disease has been brought under control in all places throughout the country, except in New York and Pennsylvania. Illinois has been the greatest sufferer from the epidemic, 57,388 animals having been killed in that state; while the number killed in Pennsylvania was 22,958; in New York, 5,727; in Michigan, 7,799; Indiana, 6,643; Wisconsin, 4,704, and Iowa, 3,866.

A bill has been introduced in the Illinois legislature requiring the railroads to publish their time tables in the newspapers. A similar bill was presented at the present session of the Nebraska legislature. The railroads had no trouble in defeating it by having a representative publisher appear in opposition before the railroad commission. He said that the honest and intelligent publishers in the state did not favor the measure and offered to produce, if necessary, many other newspaper men who would testify to the same effect.

Commercial and civic associations in 93 Illinois cities and towns before whom the Illinois railroad officers have presented their arguments in favor of an increase in passenger fares from 2 to 2½ cents a mile, have adopted resolutions endorsing the application of the railroads and have forwarded copies to their representatives in the general assembly. The substance of these resolutions is that on proper showing by the railroads that the proposed higher rate is reasonable, the general assembly will be expected to grant the request. In addition, over 75,000 voters of the state, outside of Chicago, have signed petitions addressed to the general assembly, asking that the increase in fares be granted.

A lively controversy has been aroused in the Michigan legislature by an interview given by C. S. Cunningham, a member of the state railroad commission, published in a full-page advertisement in the Lansing State Journal of March 22, in which he said the railroads would be justified in taking off one-third of their passenger trains if an increase in state passenger fares is denied. Representative Symonds introduced in the legislature a resolution, which was passed, requesting the individual members of the commission to communicate with the house at the earliest opportunity whether such statement by Cunningham meets with the approbation of the commission and represents the views and attitude of the commissioners.

Traffic Club of Chicago

At the annual election of the Traffic Club of Chicago on March 30, the following officers were elected for the ensuing year: President, Fred Zimmerman, vice-president, Chicago, Indianapolis & Louisville; first vice-president, F. L. Bateman, president, Transcontinental Freight Company; second vice-president, W. O. Davis, division freight agent, American Steel & Wire Company; third vice-president, W. J. Leahy, general passenger agent, Chicago, Rock Island & Pacific; secretary, W. H. Wharton, commercial agent, Nashville, Chattanooga & St. Louis; treasurer, Charles B. Hopper, general freight agent, Goodrich Transit Company.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Complaint Dismissed

Public Utilities Commission of Idaho v. Oregon Short Line et al. Opinion by Commissioner Clark:

The commission finds that the carriers' rates on bituminous coal in carloads from Kemmerer and Rock Springs, Wyo., to points in southern Idaho, are not unreasonable. (33 I. C. C., 103.)

New York Central's Reicing Rule Held Reasonable

Providence Fruit & Produce Exchange v. New York Central & Hudson River. Opinion by the commission:

The commission finds reasonable the carrier's rule reading: "Shippers must state at what points cars shall be reiced, if reicing is desired or necessary, and the percentage of salt, if to be used in connection with such icing." (31 I. C. C., 294.)

Rates on Grain and Grain Products to Kansas, Oklahoma and Other States

Opinion by the commission:

The commission finds that the carriers have justified proposed increased rates on grain and grain products from points on the Minneapolis & St. Louis in Iowa and Minnesota to points on the Chicago, Rock Island & Pacific in the southwest. (33 I. C. C., 374.)

Rates on Lumber from Wisconsin, Minnesota and Michigan

Northern Pine Manufacturers' Association et al. v. Chicago & North Western et al. Opinion by Commissioner Daniels:

The commission finds that the rates on lumber from producing points in Wisconsin, Minnesota and Michigan to upper and lower Missouri river crossings are not unreasonable or discriminatory. (33 I. C. C., 360.)

Complaint Dismissed

New England Coal & Coke Company v. Norfolk & Western et al. Opinion by the commission:

The commission finds that the Norfolk & Western is carrying on an entirely lawful practice in making a charge for dumping coal into boats from its piers in the harbors of Norfolk and Newport News, Va., in addition to the regular transportation rate applying to the port on business destined beyond the Virginia capes. (33 I. C. C., 276.)

High Explosives Rates on the Louisville & Nashville

E. I. Du Pont De Nemours Powder Company v. Louisville & Nashville. Opinion by the commission:

High explosives are rated in southern classification first class C. L. and double first class L. C. L. The commission finds that the exception to the classification in the tariffs of the Louisville & Nashville and the Lexington & Eastern providing a double first class rate on high explosives in any quantity is unreasonable in so far as shipments of this commodity in carloads are rated higher than first class. (33 I. C. C., 288.)

Rates on Wire Fence from Adrian, Mich.

Adrian Wire Fence Company et al. v. Lake Shore & Michigan Southern et al. Opinion by Commissioner Clements:

It is alleged that the carload rates on wire from Pittsburgh to Adrian, Mich., and on wire fence from the latter point to Chicago are unreasonable and disadvantageous to Adrian. The commission, following its decision in *Delphos Manufacturing Company v. Pennsylvania Company* (33 I. C. C., 400), is unable to require the carriers to grant Adrian proportional rates from Pittsburgh and to Chicago equal to the through rates from Pittsburgh to Chicago, with a reasonable charge for the privilege of unloading and reloading at Adrian. It is held, however, that the grouping of Adrian with Detroit on traffic from Pitts-

burgh subjects it to disadvantage and that the rate on wire from Pittsburgh to Adrian should not exceed the rate to Toledo by more than one cent a 100 lb. (33 I. C. C., 403.)

Rates on Fish from California to Eastern Points

G. W. Hume Company et al. v. Southern Pacific et al. Opinion by Commissioner Harlan:

The commission finds that carriers' refrigeration charge of $70 per car on salted or pickled fish in carloads from San Francisco and other points in California to New York and other eastern points is not unreasonable. This charge of $70 is in addition to the rate of $1 per 100 lb. for fish moving under refrigeration, the rate being 85 cents on fish when not under refrigeration. (33 I. C. C., 126.)

The Carrying of Coal for Use on Ships Not Export Business

Basin Supply Company v. Texarkana & Fort Smith. Opinion by the commission:

The commission finds that defendant's demurrage regulations relative to the free time allowance on bunker coal at Port Arthur, Tex., are not unreasonable or discriminatory. The carrying of coal for use as fuel and to be consumed by a vessel engaged in coastwise or foreign trade does not constitute a coastwise or export movement of that commodity. (33 I. C. C., 157.)

Rates on Agricultural Implements from California Points

In re rates on agricultural implements from San Francisco, Stockton, and other points to Spokane and other points. Opinion by the commission:

The commission finds that the carriers have justified a proposed cancellation of proportional carload and less-than-carload-rates on agricultural implements from Stockton, Cal., to Portland and East Portland, Ore., when destined to points beyond, resulting in increased rates, and an increase in the carload minimum from 20,000 to 24,000 lb. (33 I. C. C., 119.)

Classification of Address Plates, Culverts and Iron or Steel Tanks

Opinion by the commission:

The proposed rating of first class on address plates, in Supplement No. 4 to Southern Classification No. 40, is found not to be justified and respondents are required to establish a rating not to exceed second class. Proposed changes in the same supplement with reference to the classification on tanks (iron or steel, not otherwise indexed by name), and culverts are found to be justified. (33 I. C. C., 281.)

Rates on Tanning Extracts from Knoxville to Points in Michigan

Tanners' Supply Company, Ltd., v. Louisville & Nashville et al. Opinion by Commissioner Meyer:

The commission finds that the rates on liquid tanning extract in tank cars from Knoxville, Tenn., to Michigan destinations are not unreasonable per se, or discriminatory as compared with the rates from Knoxville to points in Illinois, Wisconsin, New York, Pennsylvania and Ontario. It is also found that the rating of fifth-class for liquid tanning extract in official classification territory is not unjust, in so far as can be determined from the evidence in the instant case. (32 I. C. C., 394.)

Joint Rates Between Rail and Water Lines

Chattanooga Packet Company v. Illinois Central et al. Opinion by Commissioner Meyer:

The Chattanooga Packet Company proposes to re-establish its former boat service on the Ohio and Tennessee rivers between Chattanooga, Tenn., and Joppa, Brookport and Metropolis, Ill. It alleges, however, that the railways discriminate against it in that on traffic routed via the rail carriers connecting Chattanooga with the Ohio river, they apply proportional class and commodity rates to and from the Ohio river crossings, but on that routed via the complainant's boat lines, they apply the local rates to and from the river points at which the interchange is made, which are upon a higher basis than the proportional rates.

The commission finds that defendants by restricting the application of their proportional rates discriminate against the complainant as alleged and against shippers who desire to route their goods over complainant's boat lines. The defendants are therefore required to apply the same rates to traffic between Chattanooga and points north of the Ohio river routed via Brookport, Metropolis and Joppa and complainant's boat lines as they contemporaneously apply on traffic routed via their southern rail connections. The carriers by rail may make a reasonable charge to cover the additional expense, if any, of interchange with boat lines over and above the cost of interchange with rail carriers. The commission in reaching its decision holds that a proportional rate, the use of which is limited to shipments over a particular line is discriminatory. It also holds that the fact that the proportional rates to and from the Ohio river are compelled by competition can have no bearing upon its determination of the issue of unjust discrimination and believes that if carriers are permitted to apply higher rates for the same service on traffic routed over connecting water lines, than on traffic routed all rail, they will be in a position to destroy all water competition and to deprive shippers of the advantage of their location upon navigable waters. (33 I. C. C., 384.)

Rates on Coke from Chicago and Peoria to St. Paul, Duluth and Other Points

Opinion by Commissioner Daniels:

The commission finds that the carriers have justified proposed increased rates on coke in carloads from St. Louis, Mo., Chicago, Waukegan and Peoria, Ill., and Milwaukee and other points in Wisconsin and Menominee, Mich., to points in Minnesota other than Duluth and in Wisconsin, Iowa and South Dakota. Proposed increased rates on the same commodity from the same points of origin to Duluth, Minn., are held unreasonable to the extent that they exceed $2.15 per ton. (32 I. C. C., 543.)

Cement Rates from Salt Lake City

In re cement rates from Salt Lake City, Utah, and other points to Butte, Mont., and other destinations. Opinion by Commissioner Clements:

The commission finds that the carriers have not justified proposed increased rates on cement in carloads from Salt Lake City, Bakers, and Devils Slide, Utah, to Wapello, Idaho, Butte, Mont., and intermediate points on the Oregon Short Line; Anaconda, Mont., on the Butte, Anaconda & Pacific and Helena, and other Montana points on the Great Northern and Northern Pacific. (33 I. C. C., 5.)

Transit of Beans at Saginaw and Jackson, Mich.

Saginaw Milling Company et al. v. Michigan Central et al. Opinion by Commissioner Daniels:

The commission finds that defendants' rules and charges applying on transit of beans at Saginaw and Jackson, Mich., are not unreasonable or otherwise unlawful. It is also held that the withdrawal by defendants of their transit privileges on dried beans at these points upon complainants' refusal to cancel billing to cover the local disposition of transit tonnage, was in accordance with the tariff requirements, and not unreasonable or otherwise unlawful. (33 I. C. C., 25.)

Grain Rates from Milwaukee

Opinion by Commissioner Clark:

The carriers proposed to cancel the so-called reshipping rates on grain and grain products applying from Milwaukee, Wis., via Manitowoc, Wis., and via Chicago to points in central freight association and trunk line territories. If the cancellations were made as proposed, the reshipping rates would still be available directly from Milwaukee and Manitowoc across Lake Michigan via car ferry and joint through rates from Milwaukee via Manitowoc and via Chicago higher than the reshipping rates would also apply.

As it is a fundamental principle in rate making that differences in distance between producing points or markets gradually lose their effect as the distance to destination increases, the commission believes that a distinction may properly be made as between the rates on grain and grain products from Milwaukee via Chicago or Manitowoc to central freight association points west of Buffalo and Pittsburgh, and points taking the same rates, on the one hand, and Buffalo, Pittsburgh and points taking the same rates, and points east thereof, on the other hand. It holds that the carriers have justified the proposed withdrawal

to points in central freight association territory, but that they have not justified withdrawal of the rates to points in trunk line territory, including Buffalo and Pittsburgh and points taking the same rates.

The principal reason advanced in support of the proposed charge was that the revenue of respondents under existing schedules was unsatisfactory. The commission holds it to be essential that Chicago and Milwaukee as grain markets be kept on a substantial parity of rates. They are but 85 miles apart, both are Lake Michigan ports, both are served in common by carriers from the west and from the east, and the commission can not recognize disagreement between the carriers as to how the earnings shall be divided or as to which of them shall perform certain services as justification for disrupting that parity. (33 I. C. C., 417.)

Rates on Black-Iron Sheets

Delphos Manufacturing Company v. Pennsylvania Company. Opinion by Commissioner Clements:

The commission finds that the rates on black-iron sheets from Pittsburgh to Delphos, O., and on galvanized iron sheets from Delphos to Chicago and beyond are not unreasonable or prejudicial.

The basis for complaint was that the combination of rates named above exceeded the through rate from Pittsburgh to Chicago applicable on either of the commodities named by more than a reasonable amount or by more than a reasonable charge for the additional terminal service at Delphos. The commission finds that to fix the rates as suggested would be to take into consideration only the distance without regard to competitive influences which may have fixed the Pittsburgh-Chicago rate at a figure lower than the commission, upon investigation, would prescribe as the maximum of reasonableness. (33 I. C. C., 400.)

Minimum Charges on Bulky Articles

Opinion by Commissioner McChord:

The commission after an investigation into the reasonableness of the application of rule 7 B and C of official classification No. 42; rule 26, section 3, of southern classification No. 40; and rule 17 B of western classification No. 50, restated as rule 20 B in western classification No. 53, relating to minimum charges on articles too long or too bulky to be loaded through the side doors of box cars, holds that carriers should restate these rules embodying these provisions: Unless otherwise provided, a shipment containing articles the dimensions of which do not permit loading through the center side doorway 6 ft. wide by 7 ft. 6 in. high without the use of end door or window in a closed car not more than 36 ft. in length by 8 ft. 6 in. wide and 8 ft. high shall be charged at actual weight and authorized rating subject to a minimum charge of 4,000 lb. at the first-class rate for the entire shipment. (33 I. C. C., 378.)

Rates on Sand Glass from Ottawa, Ill., to Cincinnati

Charles Boldt Company v. Chicago, Rock Island & Pacific et al. Opinion by the commission:

The commission in its previous report in this case found that a rate of $1.80 a net ton on glass sand from Ottawa, Ill., to Cincinnati, Ohio, was unreasonable to the extent that it exceeded $1.60 a net ton. The commission, in view of the fact that the carriers in official classification territory have been allowed a general increase of 5 per cent in some of their rates, now finds that the carriers may establish a rate of $1.80 on this traffic. Rates on glass sand from Ottawa to certain other points in Ohio are, however, found unreasonable and rates are prescribed as follows: To Columbus and Mount Vernon, $2 (now $2.18); to Zanesville and Lancaster, $2.20 (now $2.40), and to Barnesville, $2.40 (now $2.60). (33 I. C. C., 8.)

Rates on Sash and Doors

Anson, Gilkey & Hurd Company et al. v. Southern Pacific et al. Opinion by Commissioner Meyer:

The complainants allege that the rates on sash and doors from their manufacturing plants in Wisconsin, Iowa and Illinois to points in central freight association and trunk line territories are unreasonable and discriminatory when compared with rates from points on the Pacific coast to the same destinations. They also attack as unreasonable the rates on lumber in carloads from California, Oregon and Washington, and from the territory known as the "inland empire" to the points where their plants are located. The commission finds that the rates attacked are not unreasonable, but that there is discrimination with respect to the classification of lumber and lumber products, especially sash and doors, in the various competing territories here involved. The railways are therefore given 90 days in which to work out tariffs which will bring about greater uniformity in this regard. (33 I. C. C., 332.)

Trap Car Hearing

Examiner George N. Brown of the Interstate Commerce Commission began a hearing at Chicago on March 25, on the tariffs filed by the railways proposing a charge of four cents per 100 lb. for trap car service. Similar hearings have been held at Pittsburgh, Cincinnati, St. Louis and Kansas City. The first day's hearing at Chicago was devoted to testimony of shippers regarding the situation at eight different cities outside of Chicago, as to which no representatives appeared for the railroads. E. C. Lindley, general attorney of the Great Northern, and Charles Donnelly, attorney for the Northern Pacific, appeared and arranged for a hearing as to the situation at the Twin Cities on Tuesday of this week, and W. D. McHugh appeared for the Pennsylvania Lines and the western railroads as to the Chicago situation, which was taken up at the hearing on Friday, March 26. At the other hearings the carriers presented very little evidence. Protesting shippers were represented by John S. Burchmore, attorney for the National Industrial Traffic League, and by H. C. Barlow, W. L. Fisher and Rush C. Butler, appearing for the Chicago Association of Commerce and the Central Manufacturing district.

At the hearing on Thursday as to cities outside of Chicago, H. D. Cherry of the Kewanee Boiler Company, Kewanee, Ill., testified as to his plant, which is located on a side track of the Chicago, Burlington & Quincy, and he said that the railroad had no facilities at its freight station for loading boilers and other freight for his company, which must therefore be loaded at the industry tracks. He thought it would cost 40 to 50 cents a ton to cart the freight to the freight house, but that the railroad could not handle it if he did so. His company had enjoyed trap car service ever since the plant was built about 25 years ago, and he thought the addition of 4 cents per 100 lb. to the line haul rate of 15 cents to Chicago would be unreasonable in addition to subjecting him to discrimination in favor of some of his competitors. Witnesses for plants at the other cities gave similar testimony.

On Friday, at the hearing on the Chicago situation, George Hodges, assistant general agent of the American Railway Association, took the stand to testify that the average earnings of a freight car per day are $2.55. He was followed by Willis E. Gray, who has been engaged for some time in making a study of the Chicago terminal situation for the Chicago roads. Mr. Gray described the freight house facilities of the railroads in Chicago, saying that in addition to the main freight station there were seven universal stations and 234 substations, and he gave the history of the establishment of the universal stations. At the present time, he said, there is an average movement of 121 trap cars a day in Chicago, hauling 993 tons of freight to and from industry tracks. There are 3,087 industries in the city having trap car facilities, of which 2,090 are located on carrier lines and the others are on switching lines, while there are over 7,178 industries that have no facilities for using the trap car or the tunnel or lighterage facilities. Fifty-three per cent of the trap car business originates north of Monroe street, in a district which is well provided with freight house facilities. He presented a statistical exhibit showing the revenue from these cars, the switching and other terminal charges absorbed by the railroads, what the charge would be to the shipper at the proposed rate of 4 cents per 100 lb., and the value of such a car to the railroad based on the average earnings of a car per day for the average time consumed in trap car service, in addition to other figures. This exhibit gives figures showing that out of the gross revenue received by the railroads per car the amount paid out for switching and per diem reclaimed ranged between 4.31 per cent and 42 per cent.

PERSONNEL OF COMMISSIONS

The governor of New York has appointed Colonel William Hayward, a lawyer of New York City, a member of the State Public Service Commission, First district, in place of M. R. Maltbie, whose term has expired.

William O'Connell, county treasurer of Cook county, Illinois, has been appointed a member of the Illinois Public Utilities Commission, succeeding James E. Quan, resigned. Mr. Quan had been chairman of the commission since its organization a little over a year ago.

COURT NEWS

In the United States District Court at Detroit, Mich., March 24, the Michigan Central was found guilty of discrimination in failing to collect demurrage from the National Fireproofing Company. The court imposed a fine of $24,000. Eighteen counts in the indictment were quashed.

Judge W. B. Sheppard of San Antonio, Tex., has decided not to grant the application of the receiver of the San Antonio, Uvalde & Gulf Railroad for authority to reduce the wages of its engineers, firemen, conductors and brakemen, but the receiver was authorized to reopen the case and take additional testimony to ascertain what would be a fair and reasonable wage for the employees in comparison with those on other roads similarly situated.

In the United States District Court at Philadelphia, March 31, indictments were returned against the Philadelphia & Reading Railway Company on the charge of violating the law in the transportation of coal by barges for the Philadelphia & Reading Coal & Iron Company and other shippers to New England points without having on file with the Interstate Commerce Commission tariffs showing the freight rates; also for failure to collect demurrage on shipments of coal to Port Richmond.

In the United States District Court at New York City March 27, Judge Charles M. Hough enjoined the Lehigh Valley Railroad from paying commissions to Sheldon & Company, freight forwarders, holding that such payments amounted to rebates, and consequently were illegal. Edward Sheldon, head of the firm in question who had been indicted for the same offence, has gone free, the indictment having been dismissed by Judge Martin. Judge Hough, referring to this action, spoke of the seriousness of branding as a convict a man doing an honest business who fails to comply with a new-fangled statute. Judges are cautious against encouraging juries to find criminal intent in offences against such statutes, where no moral turpitude is evident.

Delivery of Live Stock at Market

When the railroad delivers live stock at market on the day agreed upon, even though delivered at such hour and in such condition as to make it necessary to carry the animals over to the following day's market to get the best results, the Texas Court of Civil Appeals holds that such delivery is a compliance with its contract, and it is not liable for any resulting damage.—Texas Midland v. Fogleman (Tex.), 172 S. W., 558.

Railroad Relief Association—Invalid Contract

The Indiana Supreme Court, following the ruling in Philadelphia, etc., R. Co. v. Schubert (1912), 224 U. S., 603, 32 Sup. Ct., 589, holds that a provision of the contract between a railroad relief association and an employee of the company which deprived the employee of any benefits unless any suit by the employee for negligent injury should be discontinued, being forbidden by the federal employers' liability act, invalidated the entire contract, and left the employee without any claim on the association.—Baltimore & O. v. Miller (Ind.), 107 N. E., 545.

Injury to Shopman at Work (Not an Employee)

A railroad company maintained a track extending from its main tracks half way into the shed of a company which made and repaired cars. The track was used for delivering material and taking away cars made or repaired. Several of the manufacturing company's employees were at work on car bodies in the shed, in such a position that they could not care for their own safety. While the railroad company's servants were making an attempt to couple cars on the delivery track, the rear car was pushed off the end of the track, crushing a workman. In an action for his injuries, the New Jersey Court of Errors and Appeals held that, as the railroad company's servants knew of the nearness of the cars to the end of the track and to the car bodies in the shed, the company was guilty of negligence, rendering it liable. Jacowicz v. D. L. & W. (N. J.) 92 Atl., 946.

Fellow Servants

In an action for the death of an employee engaged in repairing cars in the defendant's repair yards it appeared that the death was the result of negligence of the crew of a switch engine which brought cars to and from the yards. The switching crew did switching all over the yards where the deceased and other laborers were working. They were all in the employment of the railroad, and were engaged in the same general enterprise. The Indiana Appellate Court holds that they were fellow servants, and that under the common law rule that a master is not responsible for injuries caused by fellow servants, the railroad was not liable.—Chicago & Erie v. Mitchell, (Ind.) 107 N. E. 743.

Changing Grade—Compensation

The New York Appellate Division holds that the Court of Appeals having decided, in re Application of Grade Crossing Commissioners, 209 N. Y. 159, 102 U. E., 552, that a railroad company may elevate or depress its tracks without making compensation to abutting owners, such owners were not entitled, in proceedings to eliminate a grade crossing, to compensation for damages alleged to have been sustained by a change of grade of a railroad on its own right of way, although the report of the commissioners allowing such compensation was made and affirmed before the said decision of the Court of Appeals was rendered. In re Grade Crossing Commissioners (N. Y.) 151 N. Y., 146.

Injury to Live Stock—Proof of Cause

The Kentucky Court of Appeals holds that where live stock is accompanied by the owner or his agent, the burden is on him to show how any injury occurred; but where not accompanied, then, on the owner showing injury, the fact of injury is taken as *prima facie* evidence of negligence in transportation; and the burden is on the carrier to show that the injury was due to the inherent propensities or viciousness of the animals. After several cows and calves, not accompanied by owner or agent were loaded, the car was delayed for some time. A commotion broke out among the animals, and on investigation it was found that one of the cows was fighting the others, and ten of them were dead, without indication that they were gored to death. It was held, in an action for their loss, that the question of the cause of loss was for the jury, and judgment for the plaintiff was affirmed.—C. N. O. & T. P. v. Veatch (Ky.), 172 S. W., 89.

State Regulation of Intrastate Carriers—Facilities to Express Companies

The Texas Court of Civil Appeals holds that the absolute power of the federal government to regulate interstate commerce is not interfered with by a Texas law requiring a railroad to grant to an express company the same facilities and accommodations on the same terms and conditions as are afforded another express company. The state has power to fix intrastate rates, applicable through its territory; and both the railroad and the express company are subject to such regulations and rates as may be provided by state law for intrastate commerce. If it be said that the question of interference with interstate commerce by the establishment of statewide rates for intrastate traffic has seldom been raised, this fact itself attests the common conception of state authority, and the decisions recognizing and defining the state power wholly refute the contention that the making of such rates either constitutes a direct burden upon the interstate commerce or is repugnant to the federal statute. Trinity & B. V. v. Empire Express Company (Tex.) 173 S. W., 217.

In another case, where a railroad company was held bound, under the Texas statute, to grant an express company equal facilities with another express company, the same court held

that it devolved upon the plaintiff to show a willingness to obligate itself to perform the same services for the railroad company, as the other express company performed under its contract, since such services were valuable to the railroad company and necessarily entered into the reasonableness of the rate charged the other express company. Missouri, K. & T. v. Empire Express Company (Tex.) 173 S. W., 222.

Cessation of Interstate Commerce—Drifting Cars—Employer's Liability

Empty cars were delivered in the state of New York to the railroad owning them, and were then, according to railroad terminology, "at home." They were moved, without being billed or destined for any particular place, to points in Pennsylvania, where such cars were usually assembled for distribution and use, and, not being needed at these points, were from time to time moved to other distributing points in Pennsylvania. While they were still "drifting," an injury occurred to a brakeman on a train on which they were being moved. It is held by the Circuit Court of Appeals that the interstate movement of these cars ceased when they reached the first distributing point in Pennsylvania, and thereafter their movement did not constitute "interstate commerce," within the federal Employers' Liability Act. Pennsylvania v. Knox, C. C. A., 218 Fed. 748.

Injuries from Animal Escaped from Railroad Wreck—Proximate Cause

A collision between freight trains, caused by the negligence of the railroad's employees, resulted in the wreck of a number of cars loaded with cattle, from which a number of wild, dangerous Texas cattle escaped into the city of Harper, Kan. About four hours after the collision, while the cattle were being gathered together and driven to the stockyards by persons employed by the railroad for that purpose, one of the animals, a cow, charged and injured a woman who was walking on the sidewalk. This cow, after the wreck, and before attacking the woman, had made three separate attacks on one of the men driving her. In an action against the railroad the Kansas Supreme Court held, by a divided court, that the railroad was liable for the injury done to the plaintiff, of which the collision was the proximate cause. Three justices dissented, on the ground that the injury was not the natural or probable consequence of the collision, which, therefore, was not the proximate cause of the injury. Hartman v. Atchison, T. & S. F. (Kan.), 146 Pac. 335.

Transition from Intrastate to Interstate Commerce—Point of Time

A railroad company was owned by a mill company, and its road was used as a logging road from its timber lands in the state of Washington to Puget Sound, where the logs were placed in the water. A portion of the logs were thereafter sold to other mills and the remainder made by the mill company into lumber, which was afterwards sold, some for use locally, and some for shipment to other states or countries. Poles for electric wires were sold to a dealer, to whom they were delivered in the water, and he rafted and removed them, afterwards reselling them to go to other states. In an action for personal injuries brought by a brakeman under the federal Employers' Liability Act, the Circuit Court of Appeals held that the logs, poles, or lumber did not become subjects of interstate commerce until committed to a carrier for transportation to another state, or started on their ultimate passage to that state, and that the railroad company was not engaged in interstate or foreign commerce within the meaning of the act. The court quoted the United States Supreme Court's definition of what is and what is not interstate commerce in Coe v. Errol, 116 U. S. 517, 6 Sup. Ct. 475. Norgard v. Marysville & N. C. C. A., 218 Fed. 737.

Duty Toward Invitees on Railroad Premises

A public weigher had placed upon a railroad platform a shipment of cotton, which by mistake contained two bales not intended to be shipped. He afterwards went to the platform to get the two bales, and, not finding them there, attempted to enter the car into which some of the cotton had been loaded, using the truck iron leading from the platform to the car. The truck iron fell under his weight and he sustained injuries for which he sued the railroad. It was held by the Texas Court of Civil Appeals that the plantiff was an invitee of the railroad company, and not a mere licensee, since his purpose in entering the car was incidental to and connected with the railroad's business, though not of direct pecuniary benefit to the railroad; and the railroad owed him as such invitee the duty to exercise ordinary care to keep its premises reasonably safe. M. K. & T. v. Kinslow (Tex.) 172 S. W. 1124.

Derailment—Presumptions as to Cause—Defective Complaint

Three freight cars, part of a mixed train, left the track while moving at a speed of about 15 miles an hour, resulting in a severe shake-up of a passenger coach, and, as alleged in an action against the railroad, in personal injury to the plaintiff. The plaintiff based his right to recover mainly on the prima facie presumption of the company's negligence which was raised by law, in view of the unexplained derailment of the cars. A derailment, the Alabama Supreme Court said, in such cases may conceivably be due to defective car wheels, a defective roadway, including rails and ties, a foreign obstruction, or an excessive rate of speed. The evidence rebutted any presumption of defective cars, foreign obstruction or excessive speed; and there was nothing in the slightest degree to show wilful or wanton misconduct on the part of the company or its servants, proof of which must be affirmative, and cannot be supplied by the presumption of the law referred to. The evidence did not rebut the presumption that the derailment was due to a defective condition of the rails, ties, or roadbed; but the court held that the specification of negligence in the plaintiff's complaint, which was the negligent operation of the defendant's train, was not broad enough to cover any negligence of the defendant with respect to the condition of the roadbed. Judgment for the defendant was affirmed Knight v. Tombigbee Valley (Ala.) 67 So. 238.

Liabilities as to Trespassers on Tracks

It is a well-established rule that the mere use of a railroad track by the public does not convert the users from trespassers into licensees, unless its use is at a place where the public have a right to go and be, as at a public crossing, or the like; or unless it is in a city, town or populous community, where large numbers of people use the track, thereby putting upon the company the duty of anticipating their presence, and the use of ordinary care to avoid injury to them. In an action for the death of a person struck by a train while crossing a railroad trestle, it appeared that the engineer and fireman did not discover his position of peril, and did not know that the train had struck him until told so later in the day. The public were warned not to use the trestle, but it was frequently made use of by persons in the vicinity. The Kentucky Court of Appeals holds that the deceased was a trespasser, for whose death no recovery could be had.—Card's Admx. v. Cincinnati, N. O. & T. P. (Ky.) 173 Pac. 335.

Applicability of Federal Employers' Liability Act

In an action for personal injuries under the federal employers' liability act it appeared that the plaintiff was at the time of the accident front brakeman of a freight train engaged in interstate commerce. In response to a call to join the train, which was standing upon a "ready track," he asked the fireman if he was ready to start. The latter replied that he was not quite ready, that the tool boy had left him no tin cup, and he asked the plaintiff to hunt the tool boy up and get one. He started to do so. The night was foggy. To avoid an engine he took a few steps backwards and fell into a cinder pit. For the resulting injuries he brought suit, alleging negligence in the omission to supply the tin cup; in the construction and maintenance of the cinder pit; and in its dangerous condition. The defenses were, denial of the alleged negligence, assumption of risk, and that the plaintiff was doing an act not materially or directly connected with interstate commerce.

The Court of Appeals of Maryland held that the act of the plaintiff in looking for the tool boy was such a participation in interstate commerce as to bring him within the act. It was held that the doctrine of assumption of risk did not apply, that the plaintiff was not guilty of contributory negligence, and that the railroad company was liable, on the ground, apparently, of negligence in the construction and maintenance of the pit. Baltimore & O. v. Whitacre, (Md.) 92 Atl. 1060.

Switching Privilege or Use of Terminals?

The Supreme Court of the United States in the decision reported in this column February 26 forbidding the Pennsylvania to refuse to switch cars for the Buffalo, Rochester & Pittsburgh, sustained an order of the Interstate Commerce Commission holding that the B., R. & P. in demanding that its cars should be switched to industries at reasonable rates was not demanding the "use of terminals," in the meaning of Section 3 of the Interstate Commerce Law. The facts, in brief, are given below:

The Interstate Commerce Commission, on the petition of the Buffalo, Rochester & Pittsburgh, ordered the Pennsylvania to accept from the B., R. & P. carloads of freight within the switching limits of Newcastle, Pa., as it did from the Pittsburgh & Lake Erie and other roads. Commissioner Harlan, dissenting, was disposed to agree to an order fixing reasonable joint through rates for the use of the Pennsylvania's terminals, but disagreed with the order on the grounds made. The Pennsylvania went to the federal court for an injunction against the enforcement of the order. The motion was denied, two judges concurring and one judge dissenting, and the Pennsylvania appealed to the United States Supreme Court, which, in an opinion by Mr. Justice Day, says:

Section 3 of the Interstate Commerce Act forbids any undue or unreasonable preference, etc. What is such undue preference, etc., is a question, not of law, but of fact. If the order made by the Commission did not contravene any constitutional limitation and was within the constitutional and statutory authority of that body, and not unsupported by testimony, it could not be set aside by the courts, as it was only the exercise of an authority which the law vests in the Commission. The sole question was whether the Commission exceeded its authority in requiring the Pennsylvania to desist from what the Commission found to be a discriminatory practice.

When the Pennsylvania used its terminal facilities in connection with the receipt and delivery of interstate carload freight it was subject to the provisions of the act, and was obliged to afford all reasonable, proper and equal facilities for the interchange of traffic with connecting lines at non-discriminating rates.

The cars transported over the B., R. & P. are brought to the Pennsylvania at a point where it receives from other roads. The Pennsylvania insisted that the statutory provisions did not apply to it under the circumstances of this case, and that the Commission exceeded its authority for three reasons: (a) That there was no discrimination in a real sense, and certainly none warranting the making of the order; (b) that the order required the company to give up the use of its terminals to another company in violation of the last clause of section 3, and (c) that the order was a taking of property without due process of law, since it subjected the Pennsylvania's property to the use of the B., R. & P. without compensation. With the other three roads the Pennsylvania had certain reciprocal arrangements, covering many junctions. It was contended that this, more than the $3 per car which it charged these companies, was the real inducement for its favorable treatment of them. But the court said that the amount of traffic between these three roads being of a varying and differing quality, to ascertain the value of such service to the Pennsylvania would be a futile undertaking. For instance, it was shown that during 1911 the B. & O. switched for the Pennsylvania 69 cars at New Castle, and in the valleys generally 8,900 cars. The B., R. & P. switched for the Pennsylvania in the same year 406 cars in New Castle and 3,661 cars to points adjacent thereto. The Pennsylvania moved nearly twice as many cars for the B. & O. as the B. & O. did for it. The court therefore sustained the government's contention that such reciprocal switching arrangements ought not to justify giving the B. & O. a preference.

It was also held that there was no requirement in the order of the Commission amounting to a compulsory taking of the use of the terminals of the Pennsylvania by another road, within the inhibition of the last clause of section 3. The order gave the B., R. & P. road no right to run its cars over the terminals of the Pennsylvania or to use or occupy its stations.

Chief Justice White dissented, saying: "I have found it impossible to escape the conclusion that instead of being a question concerning a mere switching privilege, it is really one involving the using of terminal facilities."

Railway Officers

Executive, Financial, Legal and Accounting

George J. Gould, president of the Texas & Pacific, with headquarters at New York, has been elected also chairman of the board of directors.

W. R. Sullivan and H. R. Warfield of New York, and J. M. Wilkinson of Valdosta, Ga., have been appointed receivers of the Georgia & Florida.

J. C. Nelms has been appointed auditor of the Norfolk Southern, with headquarters at Norfolk, Va., succeeding L. A. Farquhar, effective April 10.

Charles F. Black has been appointed attorney of the Central Vermont, with office at St. Albans, Vt., vice C. W. Witters, deceased. Effective April 15, 1915.

E. K. Crowell has been appointed auditor of the Kansas City & Memphis, with headquarters at Rogers, Ark., in place of W. W. Moody, who has resigned to accept service with another company.

Stephen Little, having voluntarily retired from the office of secretary of the Denver & Rio Grande, John P. Howland, assistant secretary, has been elected as his successor, with headquarters at New York.

Alexander Robertson, assistant to the president of the Missouri Pacific, the St. Louis, Iron Mountain & Southern, the Denver & Rio Grande and the Western Pacific, will until further notice, it is announced by President Bush, assume all duties heretofore performed by E. J. Pearson, vice-president in charge of operation of the Missouri Pacific. The position is an elective office and requires a vote of the board of directors of that company to make any selection permanent. Mr. Robertson was born at Albany, N. Y., in 1860, and began railway work in 1885 with the Fitchburg Railroad, with which company he remained until April, 1897, being employed consecutively as brakeman, conductor, general yardmaster, station master and trainmaster. In November of that year he went to the Wabash and until August, 1903, was successively general yardmaster, trainmaster and superintendent of the Middle division. He then became manager of operation of the Western Maryland and West Virginia Central & Pittsburgh, resigning in January, 1904, to accept the position of general manager of the Terminal Railroad Association of St. Louis. Mr. Robertson returned to the Western Maryland and West Virginia Central & Pittsburgh in November, 1905, as general manager; in April, 1907, he was made vice-president of the former road, which absorbed the West Virginia Central & Pittsburgh and was elected president in May, 1911, resigning January 1, 1913. He was appointed assistant to the president of the Missouri Pacific-Iron Mountain system on June 9, 1913, his jurisdiction being extended over the Denver & Rio Grande and the Western Pacific the following month. He now becomes vice-president in charge of operation of the Missouri Pacific-Iron Mountain system, with headquarters at St. Louis, Mo., as above noted.

Alexander Robertson

Edward J. Pearson, whose election as first vice-president of the Texas & Pacific, with headquarters at New Orleans, La., has already been announced in these columns, was born at Rockville, Ind., in October, 1863. He was graduated from the engineering department of Cornell University and began railway work in 1880 as a rodman on the Missouri Pacific. Subsequently he was in the engineering department of the Missouri, Kansas & Texas and the Atlantic & Pacific until 1883, when he went to the Northern Pacific as assistant engineer. From 1885 to April, 1890, he was supervisor of bridges, buildings and water supply of the Minnesota and St. Paul divisions; the succeeding two years he was engineer of the Eastern division and from May, 1892, to May, 1894, he was principal assistant engineer at Chicago in charge of the construction of Chicago terminal lines and of work on the Wisconsin Central Lines being operated by the Northern Pacific. He was then made superintendent of the Yellowstone division; in August, 1895, was transferred to the Rocky Mountain division as superintendent, and from December, 1898, to April, 1902, was superintendent of the Pacific division. On the latter date Mr. Pearson was promoted to assistant general superintendent and in September of the following year was made acting chief engineer, being appointed chief engineer in May, 1904, which position he held until December, 1905, when he left the Northern Pacific to become chief engineer of the Chicago, Milwaukee & Puget Sound. He resigned June 1, 1911, to go to the Missouri Pacific and the St. Louis, Iron Mountain & Southern as first vice-president, and he now has been elected first vice-president of the Texas & Pacific, in which position he will be in charge of operation and will direct the construction of large terminals at New Orleans.

E. J. Pearson

Operating

James Shannon, trainmaster of the Northern Pacific at North Yakima, Wash., has been transferred to Spokane in a similar capacity.

Asa C. Bowen, trainmaster of the Chicago, Milwaukee & St. Paul at Lewistown, Mont., has been transferred to Tacoma, Wash., as trainmaster of the Coast division.

Harry Gee, foreign traffic manager of the American Express Company at New York, has been appointed general manager of the foreign department, with headquarters at New York, succeeding M. F. Berry, deceased.

E. D. Hogan, superintendent of transportation of the New Orleans, Mobile & Chicago, at Laurel, Miss., has been appointed general superintendent, with headquarters at Laurel, and his former position has been abolished.

T. J. Wyche, chief engineer of the Western Pacific, has been appointed assistant general manager, with headquarters at San Francisco, Cal., and C. E. Benton has been appointed superintendent of dining cars, with headquarters at Oakland, Cal.

A. P. Apperson, general superintendent of the Utah lines of the Denver & Rio Grande, at Salt Lake City, Utah, has been appointed also general superintendent of the Salt Lake City Union Depot Company, vice William Otteson, superintendent, deceased.

W. F. Schaff, superintendent of the Detroit division of the New York Central, at Detroit, Mich., has been appointed superintendent of the Toledo division, with office at Cleveland, Ohio, succeeding E. B. Cook, deceased. E. R. Bissell, assistant superintendent at Toledo, is appointed superintendent at Detroit, succeeding Mr. Schaff. E. D. Moon, assistant division superintendent at Ashtabula, Ohio, is appointed assistant superintendent at Toledo, Ohio, succeeding Mr. Bissell, and J. R. Todd, trainmaster at Ashtabula succeeds Mr. Moon as assistant superintendent at Ashtabula.

William Marshall, superintendent of telegraph of the Canadian Pacific at Toronto, Ont., has been appointed assistant manager of telegraph, with headquarters at Winnipeg, Man., and H. J. Lille has been appointed superintendent of telegraph, with headquarters at Toronto, Ont., succeeding Mr. Marshall.

James Warren Roberts whose appointment as general superintendent of passenger transportation of the Pennsylvania Lines West, with headquarters at Pittsburgh, Pa., has already been announced in these columns, was born on February 10, 1872, at Buckhannon, W. Va. He was educated in the public and high schools of Indiana, and later took a business course in the Lafayette Business College, Lafayette, Ind., and a scientific law course in the Indiana College, Covington, Ind. In March, 1894, he began railway work with the Lake Erie & Western, remaining with that company until February, 1900, when he entered the service of the Cleveland, Cincinnati, Chicago & St. Louis, and from July, 1903, to January of the following year was in the service of the Missouri, Kansas & Texas, serving consecutively as telegraph operator, station agent, yard clerk, assistant yardmaster, yardmaster, car distributor, train despatcher, chief clerk in division superintendent's office, chief clerk in assistant general superintendent's office, with supervision over freight and passenger car distribution matters, and as chief clerk in the general superintendent's office. He entered the service of the Vandalia on January 4, 1904, as a clerk in the transportation department. The following January he was appointed assistant chief clerk in the office of the general manager, and in January, 1910, was appointed assistant car accountant. He was promoted to car accountant in September, 1910, and in October of the following year was appointed superintendent of car service of the same road, which position he held at the time of his recent appointment as general superintendent of passenger transportation of the Pennsylvania Lines West, as above noted.

Traffic

H. C. Hallmark has been appointed assistant general freight agent of the Southern Pacific at Tucson, Ariz.

Charles Hamilton, traveling passenger agent of the Wabash, at Pittsburgh, Pa., has been appointed district passenger agent, with office at Philadelphia.

F. T. Brooks, district freight and passenger agent of the Southern Pacific at Buffalo, N. Y., has been appointed district freight and passenger agent, with office at Philadelphia, Pa., vice R. J. Smith, assigned to other duties, and S. C. Chiles succeeds Mr. Brooks.

Gerrit Fort, passenger traffic manager of the Union Pacific and the Oregon Short Line, with office at Omaha, Neb., has been appointed also passenger traffic manager of the Oregon-Washington Railroad & Navigation Company, and effective on April 1, will have jurisdiction over the entire Union Pacific system. His headquarters have been moved to Chicago, although the general offices of the department will remain at Omaha.

It is announced that effective on April 1 the Denver & Rio Grande and the Western Pacific will be operated separately. E. L. Lomax, assistant passenger traffic manager of both roads, has been appointed passenger traffic manager of the Western Pacific, with headquarters at San Francisco, Cal. C. R. Miller, assistant general baggage agent of the Western Pacific, has been appointed general baggage agent, with office at San Francisco.

Engineering and Rolling Stock

A. H. Powell, master mechanic of the Western Pacific at Sacramento, Cal., has been appointed general master mechanic, with headquarters at that place.

OBITUARY

C. H. Trimble, commercial agent of the Atlantic Coast Line at St. Louis, Mo., died recently in that city.

Sidney Freshman, general manager, secretary and treasurer of the Sierra Railway of California, died on March 16, at San Francisco, aged 60 years.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Dallas Terminal is inquiring for 3 switching locomotives.

The Montour Railroad is in the market for 5 Mikado type locomotives.

The Sumpter Valley has ordered 2 Mikado type locomotives from the Baldwin Locomotive Works.

The Missouri Pacific is reported to be considering the purchase of a number of Decapod type locomotives. This item has not been confirmed.

The Toledo, St. Louis & Western.—Walter L. Ross, receiver, has asked permission of the Federal court at Toledo to borrow $600,000, part of which is to be used for the purchase of 5 new locomotives, 50 furniture cars and 2,000 tons of steel rails.

The Lehigh & New England has ordered two superheater eight-wheel switching locomotives from the Baldwin Locomotive Works, for delivery in about 60 days. These locomotives will have 22 by 28 in. cylinders and a weight on drivers of 201,300 lb. They will be provided with Westinghouse air brakes, Symington steel tender journal boxes, Westinghouse friction draft gear with Farlow attachments, Dressel oil-burning headlights, Sharon couplers, Watters air sanders, Standard solid forged rolled steel wheels, Midvale tires, Railway Materials Company brake shoes, Sellers' injectors, Walschaert valve gear and Elliott flange oilers.

CAR BUILDING

The Aliquippa & Southern is asking for prices on 20 freight cars.

The Toledo, St. Louis & Western.—See item under Locomotive Building.

The Chicago & Eastern Illinois is in the market for two 60-ft. steel postal cars.

The Helena, Parkin & Northern, Parkin, Ark., is in the market for a few second hand dump cars.

The Minneapolis & St. Louis has revived an inquiry for freight cars, and is now in the market for 900 box cars and 100 coal cars.

The Chicago Great Western has ordered 2 buffet library and chair cars, 2 observation parlor cars and 2 baggage and smoking cars from the Pullman Company.

The Central of New Jersey has ordered 15 coaches, 10 combination passenger and baggage cars and 5 combination baggage and mail cars from the Harlan & Hollingsworth Corporation.

Russian Government.—The Petrograd correspondent of the Daily Telegraph of London has reported that an order for rolling stock amounting to about $7,000,000 has gone to this country and that a British syndicate lost the order because its bids were higher than those of the American firms.

IRON AND STEEL

The Toledo, St. Louis & Western.—See item under Locomotive Building.

The Wabash has ordered 683 tons of steel for repairs to its bridge at St. Charles, Mo., from the Decatur Bridge Company.

The Chicago & Eastern Illinois has ordered 10,000 tons of 90-lb. open hearth steel rails from the Illinois Steel Company.

The Great Northern has ordered 350 tons of steel in the form of girder spans from the Milwaukee Bridge Company, Milwaukee, Wis.

Supply Trade News

The Stentor Electric Manufacturing Company, Inc., has moved its office from 1790 Broadway, New York, to 126 Fifth avenue.

The Federal Signal Company, Albany, N. Y., has moved its New York office to the Vanderbilt Concourse building, 52 Vanderbilt avenue.

The American Locomotive Company has received a large contract for shrapnel, and has purchased $500,000 worth of machine tools to enable it to fill the order.

The Burd High Compression Ring Company has moved its general and executive offices at Rockford, Ill., from the Masonic Temple to 307-309 South Main street.

The American Car & Foundry Company will participate in the order for shrapnel recently placed with the Canadian Car & Foundry Company by the Russian government.

The Wyckoff Pipe & Creosoting Company, Inc., has moved its offices from 50 Church street, New York, to the Forty-second Street building, at 30 East Forty-second street.

The National Carbon Company, Cleveland, Ohio, is marketing a new signal cell, type 72. It is made in accordance with the R. S. A. specifications for signal cells, and has been in severe operating service for two years at various places.

William T. Simpson, vice-president of the American Rolling Mill Company, Middletown, Ohio, died in Cincinnati on March 30. Mr. Simpson was born in Saratoga county, New York, 59 years ago. He was one of the leading men in the steel industry of the middle west.

The Bird-Archer Company, New York, has opened a St. Louis office at 513 Frisco building, and a Chicago office at 866 Peoples Gas building. The St. Louis office is in charge of J. A. McFarland, vice-president, and the Chicago office is in charge of L. F. Wilson, vice-president.

Frederick Dietz, head of the firm of R. E. Dietz & Co., New York, one of the largest manufacturers of lanterns in the world, died at his home in New York on March 31, in his 68th year. Mr. Dietz was born in that city and was a son of the late R. E. Dietz, founder of the lantern firm, of which he had been a member all his life.

Osborn Van Brunt, for 10 years traffic manager of the Simmons Hardware Company, St. Louis, and formerly chief contracting freight agent of the Chicago, Burlington & Quincy, has been appointed manager of traffic and railway sales of the General Roofing Company, St. Louis, effective April 1. Mr. Van Brunt will supervise the traffic work of the entire company, this work having previously been handled by the traffic manager of each mill. He will also organize a railway sales organization to enable the company to cultivate more extensively the sale of the company's products to the railroads.

TRADE PUBLICATIONS

Electric Drills.—Bulletin E-35 of the Chicago Pneumatic Tool Co., has recently been issued. It is devoted to electric portable drills which are designed for operation on direct or alternating current.

Rail Joint Expander.—The Chicago Railway Signal & Supply Company, Chicago, recently issued a four-page folder which describes and illustrates the uses of the Chicago rail joint expander. It also contains a price list of this device.

Prevention of Belt Slipping.—The Gripwell Pulley Covering Co., 501 Candler Bldg., New York, has just issued a folder devoted to its product "Gripwell" which is a cement and canvas covering for pulley surfaces designed to increase the adhesion of the belt.

Glacier National Park.—The passenger department of the Great Northern recently issued a circular, which contains detailed

information regarding the points of interest in the park and how they may be reached. It also gives complete time schedules and prices covering the various trips.

Pipe Bender.—Bulletin No. 5,001 of the Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, is a folder entitled Bending Pipe with Hydraulic Power. It deals with a recently developed hand-operated pipe bender manufactured by this company and having a pressure capacity of 30 tons.

Coaling Plants.—The Roberts & Schaefer Company of Chicago, Ill., recently issued an eight-page folder containing general data on locomotive coaling plants. Numerous illustrations showing the various types of construction are shown. It also describes briefly a few gravity sand plants.

Hydraulic Presses and Pumps.—The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio, has issued a booklet in which a few of the various hydraulic appliances manufactured by this company are briefly described and illustrated. The development of the business of this company as well as its present organization is briefly set forth and the plant briefly described. The booklet is intended for distribution to visitors of the exhibit of this company at the Panama-Pacific International Exposition and contains a list of catalogs dealing in detail with various classes of hydraulic equipment, which are now ready for distribution.

Pumps.—The National Transit Company, Department of Machinery, Oil City, Pa., has just issued bulletins Nos. 1, 2, 4, 101 and 301, all of which are contained in a neat binder and are devoted to its line of pumping machinery for general service recently added to the line of oil and gas pumping machinery which it has long manufactured. In bulletin No. 1 are illustrated the pumps for different classes of service manufactured by this company, including the duplex, crank and fly-wheel direct steam driven and geared pumps; a line of gas engines and a line of pipe fittings. The other bulletins are each devoted to a particular class of service.

Belt Conveyors.—The Stephens-Adamson Manufacturing Company, Aurora, Ill., recently issued section 3 of its general catalog No. 19. This catalog contains 126 pages, which are chiefly devoted to reproductions of drawings and photographs illustrating the principle, design, uses and installations of the various types of belt conveyors, gates, chutes and feeders. Numerous illustrations show typical views of conveyors installed for construction work, handling cement, sand, rock, etc., also for handling coal and ore. It also includes some descriptive matter and some curves plotted to give width of belts necessary to handle certain maximum tonnages per hour.

Paints.—The St. Louis Surfacer & Paint Company, St. Louis, Mo., has issued a number of circulars and color cards, each one devoted to paints and varnishes for a particular class of work, all of which are neatly bound in a loose leaf folder. Among the circulars are found the following dealing with paints for railway work: No. 1-A, steel and wood freight car paint; No. 2-A, coach and car surfacer; No. 3-A, locomotive surfacer; No. 5-A, canvas roof paint, floor paint and truck enamel; No. 6-A, hand rail and headlining enamel, rattan seat finish and interior car colors; No. 7-A, coach colors and color varnishes; No. 8-A, station and building paint; No. 9-A, bridge and signal target paint, and No. 14-A, car cleaner and metal polish. A color card is included with each circular.

Centrifugal Pumps.—The DeLaval Steam Turbine Company of Trenton, N. J., recently issued catalogue B, an attractive 298-page book, devoted to the design, manufacture, testing, erection and adaptation to the various uses, and characteristics of the DeLaval centrifugal pump. This book is divided into 13 parts, each dealing expressly with one phase of the problem, the first part being devoted to the work for which this pump is adapted, giving illustrations of installations, and curves representing its characteristics. The second and third parts deal with the selection of pumps, the fourth with tests of pumping equipment, giving general test data and formulae, etc., and so each chapter discusses fully one particular topic; reproductions of photographs and curves show results of experiments. A few chapters treat especially on speed-reducing gears and turbine-driven waterworks pumps.

Railway Construction

Alabama Roads.—The Henderson-Waits Lumber Company, Tuscaloosa, Ala., has recently secured control of about 23,500 acres of timber land in Tuscaloosa county, Ala., and it is understood will build a railroad about 15 miles long into these lands.

Atchison, Topeka & Santa Fe.—A contract has been given to the L. J. Smith Contracting Company, Kansas City, to grade seven miles out of Exeter, Cal.

Canadian Roads.—Plans are being made to build a railway from Pennfield, N. B., on the Canadian Pacific southwest to Beaver harbor, L'Etang and Blacks Harbor, about eight miles. The promoters have asked the government of New Brunswick to guarantee bonds at the rate of $20,000 a mile. L. Connors, Blacks Harbor, and H. I. Taylor, are interested.

Chowchilla Pacific.—The grading work on the two-mile extension of this company's line in Madera county, California, has been completed and the track is being laid. Gasoline motive power will be used. Chadwick & Sykes, San Francisco, Cal., are the contractors.

Hillsboro & Northeastern.—This company has applied to the Wisconsin Railroad Commission for authority to extend its line from Hillsboro, Wis., via Yuba and Rockbridge, to Richland Center, a distance of 28 miles. The building of this line will require the construction of 12 bridges with spans about 100 ft. long and several small ones.

Kentucky Roads.—Right of way has been secured in Clay county, it is said, for building a line from Manchester, Ky., south to Barbourville, in Knox county, about 25 miles. W. D. Boyer and E. W. Gerheart, represent a contractor who agrees to build the line. Pennsylvania capitalists are back of the project. C. B. Lyttle and C. B. Donnelly, Manchester, are interested in the project.

New Britain, Kensington & Meriden (Electric).—This company has asked for an extension of time in which to complete a line from Meriden, Conn., north via Kensington to New Britain, about ten miles. E. A. Moore, president, New Britain.

New York Subways.—The New York Public Service Commission, First district, will receive bids up to April 9, for the construction of section No. 4 of Routes Nos. 4 and 36, which is that part of the Broadway-Seventh avenue subway in the borough of Manhattan, between Fifty-first and Fifty-ninth streets. It is expected that bids for the section between Thiry-eighth and Fifty-first streets will be asked for within the next few weeks. The entire line will be under contract when these two sections are let.

Ottawa & St. Lawrence Electric.—This company, which was organized in 1912, to build about 300 miles of electric railway in eastern Ontario out of Ottawa, will resume construction work early this spring, it is said. About 28 miles have been graded and are ready for ties and rails, and the company expects to build about 56 miles this year. H. W. Pearson, Confederation Life building, Toronto, is secretary. (February 5, p. 25L.)

Palm Beach & Everglades.—A sub-contract is reported let to Sanders & Company, Miami, Fla., to build a canal and grade this line from West Palm Beach southwest. The plans call for building from West Palm Beach, west to Lake Hicpochee. The Everglades Construction Company, it is said, has the general contract. Charles H. Baker, president, New York. (March 12, p. 494.)

Petersburg & Appomattox (Electric).—This company with $100,000 capital was recently given a charter in Virginia to build an electric line from Petersburg, Va., southeast to City Point, 10 or 12 miles. A preliminary survey has been made and the engineers have nearly completed a second survey. As soon as the engineering work has progressed far enough and the right of way has been determined upon and secured, the company expects to begin construction work and to push the

work to completion. T. M. Wortham, president; D. W. La Prade, vice-president; W. W. La Prade, secretary and treasurer in charge of engineering, Richmond, Va. Edwin Wortham, an electrical engineer, is also associated with the company and will later take charge of the engineering department. (March 12, p. 494.)

Savannah Piedmont & Western.—Incorporated in South Carolina to build a railroad from a point on the Savannah river at or near North Augusta in Schultz township, Aiken county, north to a point in Saluda county, thence northwest to Greenwood in the county of the same name, about 60 miles. The company has not yet decided whether it will use steam or electricity as the motor power. J. Peyton Clark, New York; S. H. McGhee and K. Baker, Greenwood, S. C., are among the incorporators.

Tennessee Roads.—The Kingsport Lumber Company, Kingsport, Tenn., is building a railroad, it is said, into timber lands adjoining their mills.

Tidewater Securities Corporation.—A contract has been given to J. N. Gillis & Son, Brewton, Ala., to build a railway from the terminus of the Mobile & Ohio tracks near Alabama Port, Ala., to Cedar Point, 3.66 miles. The line is later to be extended to Dauphin Island, a total of about nine miles. J. M. Dewberry, president, and T. W. Nicol, chief engineer, Mobile. (February 12, p. 289.)

Toledo, St. Louis & Western.—W. L. Ross, receiver for the Toledo, St. Louis & Western, has applied to the Federal court at Toledo for permission to borrow $600,000 to cover additions and betterments to property, elimination of trestles, etc., also for purchases of locomotives and cars.

Toronto & York Radial (Electric).—The Railroad Committee of the Ontario legislature has granted this company a two years' extension of time in which to start the construction of certain lines outside the city of Toronto, Ont. This extension of time is subject to the approval of the Hydro-Electric Power Commission of Ontario.

RAILWAY STRUCTURES

Bala, Ont.—Bids are wanted until April 10, by A. L. Hertzberg, division engineer, of the Canadian Pacific, Toronto, Ont., for the construction of four concrete piers and two concrete abutments for a bridge on the Muskoka subdivision to be built over Shaw's creek, at a point about seven and one-half miles south of Bala.

Blackwell, Okla.—The Atchison, Topeka & Santa Fe has awarded the contract for the construction of the combination passenger and freight station at this point to Nelson & Sons, Chicago. The estimated cost is $15,000. (See *Railway Age Gazette,* March 12, page 494.)

Carbondale, Pa.—Bids will be received by James MacMartin, chief engineer of the Delaware & Hudson, at Albany, N. Y., for the proposed steel viaduct to be built over the Lackawanna river and the tracks of the Jefferson branch of the Erie Railroad and a proposed line of the Delaware & Hudson near Carbondale. The viaduct will be about 411 ft. long and will require 398 tons of steel. The cost of the structure will be about $70,000. (March 26, p. 721.)

Fort Worth, Tex.—The St. Louis Southwestern has just begun work on the construction of 1,800 ft. of standard pile trestle in the Trinity river bottom near Fort Worth, Tex. This work is a part of the general improvement of the terminal situation, and will be completed as soon as possible. The trestle is only a temporary structure and later will be filled in. All work is being done by company forces.

Sciotoville, Ohio.—A contract has been given to the McClintic-Marshall Company for the fabrication and erection of 16,000 tons of steel for a bridge over the Ohio river at Sciotoville for the Chesapeake & Ohio Northern. The bridge is to have two 775-ft. spans with 1,900 ft. approaches, and the greatest height will be 140 ft. The contract for the substructure has been let to the Dravo Company, Pittsburgh, Pa. The estimated cost of the structure is $1,500,000.

Railway Financial News

Atchison, Topeka & Santa Fe.—This company, it is reported, has taken over the St. Louis, Rocky Mountain & Pacific, which runs from Des Moines, N. Mex., to Ute Park, N. Mex., 106 miles. Atchison, Topeka & Santa Fe 4 per cent bonds totaling $3,000,000 have been exchanged for the authorized and outstanding bonds of the St. Louis, Rocky Mountain & Pacific.

Boston & Maine.—E. D. Codman, former president of the Fitchburg Railroad, one of the leased lines of the Boston & Maine, and at present a stockholder, has announced that he is strongly opposed to the reorganization as now proposed (*Railway Age Gazette,* p. 721). Up to within a few days Mr. Codman was in favor of some arrangement by which the road could be reorganized, but he has changed his mind because of a large reduction in maintenance charges and cost of transportation. Mr. Codman, upon seeing the figures which showed the reduction, inquired about it of President Hustis, and he replied:

"There has been no curtailment in maintenance of way or equipment expenditures necessary for safe operation and for preservation of the property. Economies in operation have been practiced and all work not necessary for safety and reasonable service has been stopped. There has been a curtailment of passenger train service to an extent which might not be justified except under the critical conditions obtaining at this time."

Mr. Codman looks upon the saving, nearly $1,600,000 in four months, or $400,000 a month, as "magnificent." Coming as it does mostly out of operating instead of equipment or maintenance, "there is abundant promise that the gains are going to be lasting. Now is the time for the leased line stockholders to wake up and understand that their lessee is after all a solvent corporation, capable of replacing a $2,000,000 deficit with $1,000,000 surplus for dividends and that President Hustis is the man they have to thank for it. . . ."

The management of the road has accepted the bill drafted by the public service commissions of Maine, New Hampshire and Massachusetts as the basis for the proposed reorganization. It still remains, however, for the various state legislatures concerned to pass the necessary legislation before further steps in the reorganization plan can be carried out.

Chicago, Rock Island & Pacific.—The Amster committee has given out the names of the four men whom they say they propose to vote for as directors to succeed the directors of the Chicago, Rock Island & Pacific Railway Company, who retire on April 12. These are J. W. Burdick, president of the West Pennsylvania Steel Company; George G. Prentice, a retired manufacturer of New Haven, Conn.; George Warren Smith, of New York, and N. L. Amster. It is, of course, only the Chicago, Rock Island & Pacific Railway Company on the board of directors of which the Amster committee is seeking to place its representatives.

Erie.—The New York Public Service Commission, Second district, has approved the issue by this road of $1,000,000 of its general lien bonds. The issue will be used as a part of the general new scheme of Erie financing by these bonds. Part of the proceeds will go to the treasury to reimburse it for capital expenditures and part will be used as collateral on the $10,000,000 indenture to the Bankers' Trust Company for one year 5 per cent collateral gold notes dated April 1, 1915. The indenture takes care of the securities of the Erie & Jersey and the Genesee River, the handling of which issues by this method was recently approved by the public service commission.

Georgia & Florida.—W. R. Sullivan and H. R. Warfield, of New York, and J. M. Wilkinson, of Valdosta, Ga., have been appointed receivers of the Georgia & Florida on the joint application of the Baltimore Trust Company, which is the trustee for the $6,500,000 5 per cent bonds which are in default in interest since May 13, and the officers of the road. The Georgia & Florida runs from Augusta, Ga., to Madison, Fla., 250 miles.

ANNUAL REPORTS

THE CLEVELAND CINCINNATI CHICAGO & ST. LOUIS RAILWAY COMPANY

To the stockholders of

The Cleveland Cincinnati Chicago & St Louis Railway Company:

The Board of Directors herewith submits its report for the year ended December 31, 1914, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles
Main line and branches owned	1,242.73
Proprietary lines	433.33
Leased lines	203.70
Operated under contract	337.92
Trackage rights	163.56
Total road operated	2,381.24

This is an increase over a similar table in last year's report of 367.46 miles, of which 346.88 miles is accounted for by the inclusion this year of the Peoria & Eastern Division. Included also are trackage rights over the Terminal Railroad Association of St Louis, 12.08 miles, and additional trackage over the Indianapolis Union, 9.53 miles, partially offset by a decrease of 4.73 miles heretofore treated as trackage rights of the Peoria & Eastern Railway and other slight changes in mileage at various points.

A statement showing in detail the mileage of road operated will be found on another page.

There was no change in the capital stock during the year, the amounts authorized and outstanding on December 31, 1914, being as follows:

Preferred stock authorized		$10,000,000.00
Common stock authorized		50,000,000.00
Total preferred and common stock authorized		$60,000,000.00
Preferred stock issued and outstanding	$10,000,000.00	
Common stock issued and outstanding	47,056,300.00	57,056,300.00
Balance common stock authorized but not issued, December 31, 1914		$2,943,700.00

The funded debt unmatured outstanding December 31, 1913, was $91,943,067.88

It has been increased during the year as follows:

C C C & St L Ry general mortgage five per cent bonds, issued for retirement of prior lien bonds	$4,161,000.00	
To place upon the general books of the company its liability in connection with additional certificates issued under the New York Central Lines Equipment Trust Agreement of 1913	619,224.32	
To place upon the general books of the company the certificates issued under the Big Four Railway Equipment Trust Agreement of 1914	3,870,000.00	
Big Four trust equipment notes 1914, issued for equipment	776,314.25	9,426,538.57
		$101,369,606.45

It has been decreased during the year as follows:

C C C & I Ry Co first consolidated mortgage bonds retired	$4,138,000.00	
Pro rata equipment trust certificates due January 1, 1914	432,019.42	
Pro rata equipment trust certificates due November 1, 1914	246,689.81	
C I St L & C Ry Co general first mortgage bonds retired	74,000.00	
C I St L & C Ry Co first mortgage bonds retired	6,000.00	4,896,709.23
		$96,472,897.22

Less:

C C C & St L Ry (St L Div) first collateral trust mortgage bonds held in sinking fund	$676,000.00	
C C C & St L Ry (S & C Div) scrip held in treasury	230.00	676,230.00
Total funded debt outstanding December 31, 1914		$95,796,667.22

Out of $24,000,000.00 of certificates authorized under New York Central Lines Trust Agreement dated January 1, 1913, there were issued to December 31, 1913, an aggregate of $15,494,000.00 of which this company's pro rata allotment was $1,087,551.00. During the year 1914 additional certificates were issued amounting in total to $6,944,000.00. The cost of the equipment assigned to this company in connection with the issue of these latter certificates, viz., 25 steel passenger coaches, 10 steel combination passenger and baggage cars and 12 steel mail cars, is approximately $688,027.02, and its pro rata amount of certificates, representing an amount not to exceed 90 per cent of the cost is $619,224.32.

Under Big Four Railway Equipment Trust agreement of 1914 dated June 1, 1914, there were issued equipment trust certificates aggregating $3,870,000.00 covering the purchase of 5,085 freight train cars. The aggregate cost to the company of this equipment is approximately $4,837,974.75, to be covered with certificates representing an amount not to exceed 80 per cent of the cost, the remaining 20 per cent of the cost to be paid by notes payable respectively eighteen, thirty and forty-two months from January 1, 1915.

During the year the sinking fund of the Cleveland Cincinnati Chicago & St Louis Railway Company's St Louis Division first collateral trust bonds has been increased by the purchase of 31 bonds, par value $31,000.00, making a total of 676 bonds, par value $676,000.00, in the hands of the Central Trust Company, trustee of this fund.

All of the company's roadbed destroyed or damaged during the disastrous floods of March and April, 1913, has been restored to the original grade, and the track is again in good condition. All bridges lost or damaged have been replaced with the exception of the joint bridge at Dayton, Ohio, over the Miami River, which can not be rebuilt until the plans are agreed to by the Flood Prevention Committee of the city of Dayton, Ohio, the County Commissioners and the other roads interested.

In the reconstruction of bridges deeper foundations for bridge piers have been made and greater openings provided in order to avoid if possible a repetition of the damage sustained during this flood.

All station buildings, interlocking plants, etc., which were damaged have been either replaced or repaired.

All tracks on the Peoria and Eastern Division have been restored to their original grade. The bridges have been rebuilt with the exception of those at Troy, Ohio, which have not been permanently rebuilt on account of legislation pending which will affect them.

The direct cost of this catastrophe was $3,223,749.21. The indirect cost from loss of use of property and business interference was large—it cannot be approximated in money.

Incident to the restoration of the property there was charged to the appropriate road and equipment accounts $622,695.60, representing the excess cost of the new facilities over those replaced, and $448,854.33 to operating expenses.

Section 19-A of the Act to Regulate Commerce which became a law on the first day of March, 1913, provides that the Interstate Commerce Commission shall investigate and ascertain the value of all property owned and used by railroad companies: During the year the engineering department has been engaged in the preparation of right of way maps, the compilation of lists of various kinds of property such as bridges, buildings, ownership of tracks, etc., which lists have been furnished to the field force of the Interstate Commerce Commission, Division of Valuation, for their work in inventorying the property owned by this company. During the latter part of the year four field parties of the Division of Valuation were engaged in making cross section measurements of the amount of grading in the present railroad, measuring the track, and taking inventory of track material and small bridges. These parties covered about 510 miles of the road and expect to return in April, 1915, for further work. In addition, a field party of the Division of Valuation has been engaged in making an inventory of interlocking plants on the Cairo and St Louis Divisions. A force of clerks in the general office has been created for the purpose of examining old and current books, records and memoranda necessary for use in the verification of certain of the general accounts appearing on the books of the present and predecessor companies.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME

	1914	1913	Increase or Decrease
Operating income	2,381.24	2,365.39	15.85 *miles*
Railway operations	*miles operated*	*miles operated*	
Revenues	$35,365,690.61	$37,613,498.15	—$2,247,807.54
Expenses	28,954,969.13	32,811,468.02	—3,856,498.89
Net revenue from railway operations	$6,410,721.48	$4,802,030.13	$1,608,691.35
Percentage of expenses to revenues	(81.87%)	(87.23%)	—(5.36%)
Railway tax accruals	$1,528,026.70	$1,408,769.06	$119,257.64
Uncollectible railway revenues	8,608.66	.....	8,608.66
	$1,536,635.36	$1,408,769.06	$127,866.30
Railway operating income	$4,874,086.12	$3,393,261.07	$1,480,825.05
Miscellaneous operations			
Revenues	$16,518.48	$19,900.15	—$3,381.67
Expenses and taxes	11,874.84	14,846.65	—2,971.81
Miscellaneous operating income	$4,643.64	$5,053.50	—$409.86
Total operating income	$4,878,729.76	$3,398,314.57	$1,480,415.19
Non-operating income			
Joint facility rents	$400,607.05	$365,906.70	$34,700.35
Income from lease of road	98,660.59	.....	98,660.59
Miscellaneous rents	149,214.71	147,256.31	1,958.40
Miscellaneous non-operating physical property	77,407.69	72,276.05	5,131.64
Dividend income	61,997.90	57,665.15	4,332.75
Income from funded securities	28,690.00	29,015.00	—325.00
Income from unfunded securities and accounts	85,344.05	115,416.71	—30,072.66
Miscellaneous income	31,276.20	28,660.82	2,615.38
Total non-operating income	$933,198.19	$816,196.74	$117,001.45
Gross income	$5,811,927.95	$4,214,511.31	$1,597,416.64

Deductions from gross income			
Hire of equipment—debit balance	$1,706,711.86	$1,399,335.25	$307,376.61
Joint facility rents	613,538.58	555,028.53	58,510.05
Rent for leased roads	674,561.59	587,116.00	87,445.59
Miscellaneous rents	141,587.28	145,837.85	—4,250.57
Miscellaneous tax accruals	408.64	6,566.20	—6,157.56
Separately operated properties—loss	95,560.19	93,395.08	2,165.11
Interest on funded debt	4,049,176.32	3,975,071.19	74,105.13
Interest on unfunded debt	485,072.14	267,997.11	217,075.03
Miscellaneous income charges	5,729.70	33,825.15	—28,095.45
Income applied to sinking fund	13,269.00	.....	13,269.00
Total deductions from gross income	$7,785,615.30	$7,064,172.36	$721,442.94
Income balance transferred to debit of profit and loss	$1,973,687.35	$2,849,661.05	$875,973.70

Amount to debit of profit and loss December 31, 1913		$1,389,643.20
Add:		
Deficit for year 1914	$1,973,687.35	
Discount, commissions and expenses N Y C Lines equipment trust certificates 1913	15,354.25	
Discount, commissions and expenses Big Four Ry equipment trust certificates 1914	46,281.54	
Discount on C C C & St L Ry Co general mortgage bonds	124,830.00	
Adjustment of sundry accounts	119,124.19	2,279,277.33
Balance to debit of profit and loss December 31, 1914		$3,668,920.53

The gross operating revenues for the year were $35,365,690.61, a decrease of $2,247,807.54 from 1913, largely due to the general depression in business. Of the decrease $2,077,377.15 was in transportation revenue and $170,430.39 in incidentals.

Freight revenue for the year was $23,436,210.75, a decrease of $1,696,905.36 or 6.75 per cent. The revenue per ton mile was 5.31 mills, a decrease of .16 mills. Total revenue tonnage decreased 3,335,223 tons. The average haul per ton increased 14.2 miles. Train loading for the year was 548 tons per train mile, an increase of 64 tons, or 13.2 per cent.

Mention was made in last year's report of the application to the Interstate Commerce Commission for an increase of five per cent in freight rates. The Commission, in a decision rendered July 29, 1914, granted an increase of five per cent in freight rates on certain traffic to and from points witbin the limits of the Central Freight Association territory; these increased rates becoming effective October 26, 1914. In a further opinion submitted December 16, 1914, the Commission granted increases on cement, brick, tile, starch, clay and plaster, which were excepted in their former decision. Also upon traffic to and from territory East of Buffalo and Pittsburgh, excepting coal, coke and iron ore, which commodities during 1914 comprised 48.42 per cent of the total tonnage carried by the company. The increases under the order of December 16th are to become effective January 15, 1915, in the territories and on the commodities prescribed. Similar increases on the same commodities have been allowed on intra-state traffic in the State of Ohio, but no increases have been made effective on intra-state traffic in the States of Indiana and Illinois due to the suspension of the proposed increases by the public service commissions of the states in question. It is hoped, in the interest of the transportation needs in these States, that the commissions will finally grant the increases.

Passenger revenue for the year was $8,589,012.14, a decrease of $302,189.15, or 3.4 per cent. This amount is made up of a decrease in the revenue from local business of $354,693.95, partially offset by an increase in interline revenue of $52,504.80. The average distance carried was 55.7 miles, an increase of 4.4 miles. The average amount received from each passenger was $1.087.

Interstate passenger rates on a lower basis were increased to 2½ cents per mile, effective December 1, 1914. The states of Ohio, Indiana and Illinois either have been or shortly will be petitioned to permit an increase of the statutory rate of 2 cents per mile to 2½ cents per mile on intrastate traffic.

Revenue from transportation of mail was $772,359.42, an increase of $24,984.80, or 3.34 per cent, due to the reinstatement effective January 26, 1914, in mail service of certain magazines which were being handled in freight train service, and additional remuneration allowed from July 1, 1914, account parcel post.

Revenue derived from express traffic was $953,181.41, a decrease of $154,808.01, or 13.97 per cent, attributable to smaller volume of business handled caused by the business depression and increasing use made of the parcel post facilities, also to reduction in express rates ordered by the Interstate Commerce Commission effective February 1, 1914.

Incidental revenues decreased $170,430.39, of which $40,998.47 is in dining car operations, due to the decrease in passenger business, $44,178.91 in demurrage and $83,189.58 in miscellaneous.

The gross operating expenses for the year were $28,954,969.13, a decrease of $3,856,498.89, while the decrease in gross operating revenues, as previously stated, was $2,247,807.54. Divided by groups the fluctuations in expenses making up the total decrease for the year were as follows:

Maintenance of way and structures—decrease	$1,002,950.41
Maintenance of equipment repairs—decrease	1,389,284.33
Equipment depreciation and retirements—increase	166,479.73
Traffic—decrease	78,824.32
Transportation—rail line—decrease	1,527,627.62
Miscellaneous operations—decrease	33,366.31
General—(including Government valuation)—increase	36,826.10
Transportation for investment—Cr.—increase	27,751.73
Total decrease	$3,856,498.89

The decrease in maintenance of way and structures is comorised of decreases in charges for roadway maintenance $289,867.11, bridges, trestles and culverts $81,856.63, ballast $35,449.98, track laying and surfacing $765,234.32, telegraph and telephone lines $34,534.16, and maintaining joint tracks, yards and other facilities $44,494.68, partially offset by increases in ties, rails, crossing signs, shops and engine houses and removing snow, sand and ice. The nay rolls of this department decreased $672,562.31.

The increase in equipment retirements and denreciation is $166,479.73, of which $131,271.66 is in retirements and $35.208.07 in depreciation, the latter due to the additional equipment acquired during the year and the increased value of locomotives. Actual retirements of equipment were substantially less than in the preceding year, the increase being due to an extraordinary charge to this account of $313,678.30, incident to the repair and conversion to Mikado type of 62 consolidation locomotives.

Equipment repairs decreased $1,389,284.33 account decrease in shop machinery $32,192.38, steam locomotives $97,283.86, freight train cars $1,069,263.02 and passenger cars $192,939.60. Actual repairs made to locomotives at company's shops decreased $292,378.86, but this decrease was partially offset by a charge to locomotive repairs of $195,095.00, representing the repair feature of locomotives converted.

Traffic expenses show a decrease of $78,824.32.

The decrease in transportation expenses of $1,527,627.62 is distributed throughout practically all of the primary accounts. Notable decreases are in fuel for train locomotives $497,779.16 and in train supplies $154,261.22.

General expenses increased $36,826.10, due to increases in the accounts, salaries and expenses of clerks and attendants $31,192.84, pensions $7,827.09, valuation expenses $25,791.69, and other expenses $9,486.15. The other accounts in this group showed decreases. The increase in the account salaries and expenses of clerks and attendants is largely the result of increased demands on the accounting department incident to the requirements of laws with respect to accounting and the preparation of statistics for the various rate cases and proceedings, inventory work, etc. Valuation expenses for the year, $27,439.99, are almost wholly an increase over last year as the work was not actively prosecuted until the current year.

Taxes for the year show an increase of $119,257.64, of which $116,894.95 is due to increases in tax rates applicable in the different states, $12,350.00 to additional property returned for assessment, $6,550.00 to increase in the appraisal of property by the different state boards and local assessors and $14,015.96 in the tax on gross earnings in the State of Ohio.

Railway operating income for the year increased $1,480,825.05. Non-operating income was $933,198.19, an apparent increase of $117,001.45, heing largely the result of the change in accounting methods prescribed by the Interstate Commerce Commission. Dividend income, income from funded securities, and income from unfunded securities and accounts, show decreases aggregating $26,064.91. Gross income was $5,811,927.95, an increase of $1,597,416.64.

Deductions from gross income for the year were $7,785,615.30, an increase of $721,442.94. Of this amount $307,376.61 is per diem on freight cars and rent for locomotives, passenger cars and work equipment, $74,105.13 in interest on funded debt including equipment obligations, $217,075.03 in interest on outstanding notes, (aggregating on December 31, 1914, $8,041,-810.00) and $58,510.05 in joint facility rents. The deficit for the year was $1,973,687.35, as compared with a deficit in 1913 of $2,849,661.05, a decrease of $875,973.70.

There was expended and charged to road and equipment during the year $6,448,860.13, a detailed statement of which will be found on another page.

During the year the company advanced $1,029.01 for construction on the Saline Valley Railway Company, all of whose capital stock and funded debt is owned by the Cleveland Cincinnati Chicago & St Louis Railway Company.

There has been charged to income the company's proportion of the deficit resulting from the operation of the Central Indiana Railway Company for tbe year amounting to $76,046.13, an increase of $14,173.27.

The operation of the Kankakee and Seneca Railroad (for which separate accounts are maintained) shows revenues for the year $75,133.01, operating expenses, taxes and additions and betterments $106,040.53, deficit $30,907.52, one-half of which, $15,453.76, was charged to income in 1914.

The Mt Gilead Short Line (for which separate accounts are maintained) shows revenues for the year $7,016.72, operating expenses and taxes $11,-207.52, non-operating income $130.50, deficit $4,060.30, all of which was charged to income in 1914.

The statement of financial operations affecting income for the year includes the operation of the Peoria & Eastern Division from Springfield, Ohio, to Pekin, Illinois, the accounts for 1913 being restated for comparative purposes. Separate accounts for this division are maintained and the operations for the year 1914 show revenues amounting to $3,025,668.63, operating expenses and taxes $2,568,913.21, operating income $456,755.42, non-operating income $209,221.39, gross income $665,976.81, deductions from gross income $826,382.40, deficit $160,405.59.

The financial condition and results from operation for the year for The Cincinnati Northern Railroad Company are shown in a separate report.

The credit balance in equipment replacement account on December 31, 1913, was		$2,002,412.21
There was added during the year 1914 representing value of equipment retired		878,150.58
		$2,880,562.79
There was charged against this account the following:		
Locomotives	$924,141.39	
Passenger cars	62,450.24	
Freight cars	75,507.91	
Work cars	12,193.50	1,074,293.04
Balance December 31, 1914		$1,806,269.75

The City of Indianapolis is engaged under contracts with the railways in constructing sewers, changing the channel of Pogue's Run, etc., as a work preliminary to the separation of grades within the central part of the city. When completed all the companies affected, including this company and the Indianapolis Union Railway Company, in which this company is a stockholder, will be required to proceed with the separation of grades. It is estimated that this company's proportion of the cost of the improvements will be $950.000.00, and that the work will be completed by July 1, 1918.

In the operation of the pension department 63 employees were retired and placed upon the pension rolls. Of these retirements, 35 were authorized because of the attainment of seventy years of age and 28 because of total and permanent physical disability. Twenty-six pensioners died during 1914, and at the close of the year 255 retired employees were carried upon the pension rolls. The total amount paid in pension allowances during the year was $62,706.74.

Apoointments during the year were as follows:

On January 1, Rush R. Harris, Superintendent Freight Transportation.
On January 1, Joseph R. Cavanagh, Superintendent Car Service.
On January 1, Ira S. Downing, General Master Car Builder.
On March 10, Daniel J. Mullen, Superintendent Motive Power.
On May 1, Charles J. Brister, Traffic Manager.
On May 15, Sidney B. Kent, Superintendent Dining Cars.
On June 10, Charles A. Theis, Chief Claim Agent.
On July 1, William T. Stevenson, Assistant General Freight Agent.

On the pages following will be found the general balance sheets and tabulated statements showing results of operation for the year.

Your property is in good physical condition and your officers and employees are loyal and efficient. Much credit is due them for the hard and painstaking work performed through the flood and since, and I express my thanks and appreciation to each.

ALFRED H. SMITH,
President.

MICHIGAN CENTRAL RAILROAD COMPANY'S SIXTY-NINTH ANNUAL REPORT

To the Stockholders of

THE MICHIGAN CENTRAL RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1914, with statements showing the results for the year and the financial condition of the company.

The report covers the operation of mileage, as follows:

	Miles
Main line	270.07
Proprietary lines	326.29
Leased lines	1,110.50
Lines operated under trackage rights	93.18
Total road operated (as shown in detail on another page)	1,800.04

There was an increase of three-tenths (.3) of a mile, compared with the previous year, the result of a re-measurement of leased lines.

Of the total road operated, 73.38 miles are operated in freight service only and 26.44 miles in passenger service only.

There was no change in capital stock during the year, the amount authorized and outstanding being $18,738,000.00.

The funded debt outstanding December 31, 1913, was		$44,587,252.36
It has been increased during the year by pro-rata liability for certificates under the New York Central Lines Equipment Trust Agreement of 1913		639,580.41
		$45,226,832.77
It has been decreased during the year by payment of pro-rata of installments on account of New York Central Lines equipment trust certificates		
November 1, 1914 trust of 1907	$260,425.45	
January 1, 1914 trust of 1910	368,019.72	
January 1, 1914 trust of 1912	151,710.90	
January 1, 1914 trust of 1913	64,279.71	844,435.78
Total funded debt December 31, 1914 (detail on another page)		$44,382,396.99

The changes in the road and equipment account during the year were as follows:

Amount charged against main line to December 31, 1913			$55,469,315.36*
Charged for road and equipment in 1914, as shown in detail on another page			
Against capital account			
For road		$626,527.90	
For equipment	$1,059,292.56		
Less:			
Equipment replacement account	480,289.17	579,003.39	1,205,531.29
Total main line			$56,674,846.65
Amount charged against leased lines to December 31, 1913			$17,799,115.56
Charged for road and equipment in 1914, as shown in detail on another page			
Against capital account			
For road	$374,175.19		
Less reimbursement by Canada Southern Railway Company on account of expenditures in prior years	145,493.51	228,681.68	
Total leased lines			18,027,797.24
Total December 31, 1914			$74,702,643.89

*Exclusive of depreciation reserve, now shown as a liability.

On March 2, 1914, this company issued its one year promissory notes for $6,000,000.00, hearing interest at the rate of 4½% per annum, and retired its one year 4½% notes for $4,000,000.00, which matured on that date.

Additional advances aggregating $9,237.29 were made to The Detroit, Delray & Dearborn Railroad Company during the year for completion of improvements, for which this company will be reimbursed by the proceeds of the sale of additional capital stock of that company.

This company advanced to the Toronto, Hamilton & Buffalo Railway Company, during the year, on its promissory notes, hearing interest at 6% per annum, $100,000.00, as its one-sixth proportion of the estimated cost of construction of The Erie & Ontario Railway, a new railroad incorporated May 27, 1914, and extending from a connection with the Toronto, Hamilton & Buffalo Railway at Smithville, to Port Maitland, Ontario, on Lake Erie, a distance of about eighteen miles. Agreement for amalgamation of this road with the Toronto, Hamilton & Buffalo Railway Company was approved by the Governor in Council December 15, 1914, and will be made effective on filing at Ottawa, January 30, 1915. The road was completed and placed in operation December 22, 1914, between Smithville and Dunnville on the Grand River, a distance of 14.9 miles. It is expected, owing to the great natural facilities afforded at Dunnville and along the Grand River to Port Maitland, that the road will attract many industries to the territory which it serves.

Out of $24,000,000.00 of certificates authorized under the New York Central Lines equipment trust agreement dated January 1, 1913, there were issued to December 31, 1913, an aggregate of $15,494,000.00, of which this company's pro-rata allotment was $2,055,234.09.

During the year 1914 additional certificates were issued amounting in total to $6,944,000.00. The cost of the equipment assigned to this company in connection with the issue of these latter certificates is approximately $715,230.84, and its pro-rata amount of certificates, representing an amount not to exceed 90% of the cost, is $639,580.41.

During the year the Detroit River Tunnel Company issued and sold additional Terminal and Tunnel 4½% Fifty-Year Gold Bonds to an aggregate amount of $4,000,000.00. These bonds bear date May 1, 1911, and the principal and interest is guaranteed by The Michigan Central Railroad Company under an agreement dated May 10, 1911. The proceeds arising from the sale of the bonds were used in the completion of the passenger station and terminal yards at Detroit.

Since January 1, 1914, the effective date of the lease covering the use of the Detroit River Tunnel Company's terminal station and facilities, the items of expenditure covering the maintenance and operation of the properties have been included with the operating results of The Michigan Central Railroad Company.

In accordance with the terms of an agreement with the Canada Southern Railway Company, dated January 2, 1906, and upon the satisfaction during the year of that company's second mortgage, which matured March 1, 1913, this company acquired the entire capital stock, namely 15,476-⅝ shares, and $1,500,000.00 of outstanding first mortgage 4% bonds of the Toledo, Canada Southern & Detroit Railway Company.

Three additional shares of stock of the Michigan Air Line Railroad Company were acquired by purchase during the year, thereby increasing this company's holdings to 6,688-¼ shares, out of a total of 7,855 shares outstanding.

The old passenger station at the foot of Third Street, Detroit, which was partially destroyed by fires in December, 1913, and February, 1914, was repaired and has furnished needed additional facilities for the transaction and handling of this company's freight business.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1914 *1,800.04 miles operated*	1913 *1,799.74 miles operated*	Increase or Decrease *.30 miles*
OPERATING INCOME			
RAILWAY OPERATIONS			
Revenues	$33,464,968.45	$36,676,970.58*	—$3,212,002.13
Expenses	25,181,483.72	28,003,098.71*	—2,821,614.99
NET REVENUE FROM RAILWAY OPERATIONS	$8,283,484.73	$8,673,871.87	$390,387.14
Percentage of expenses to revenues	(75.25%)	(76.35%)	—(1.10%)
RAILWAY TAX ACCRUALS	$1,598,350.12	$1,392,813.51	$205,536.61
UNCOLLECTIBLE RAILWAY REVENUES	3,339.04	.....	3,339.04
TOTAL	$1,601,689.16	$1,392,813.51	$208,875.65
RAILWAY OPERATING INCOME	$6,681,795.57	$7,281,058.36	—$599,262.79
NON-OPERATING INCOME			
Joint facility rent income	$227,227.12	$255,584.14	—$28,357.02
Miscellaneous rent income	1,915.87	1,725.94	189.93
Miscellaneous non-operating physical property	663.13	.....	663.13
Separately operated properties—profit	225.28	.....	225.28
Dividend income	488,159.50	746,941.50	—258,782.00
Income from funded securities	46,880.00	46,880.00	.....
Income from unfunded securities and accounts	160,143.56	192,198.54	—32,054.98
Miscellaneous income	1,148.21	2,726.72	—1,578.51
TOTAL NON-OPERATING INCOME	$926,362.67	$1,246,056.84	—$319,694.17
GROSS INCOME	$7,608,158.24	$8,527,115.20	—$918,956.96
DEDUCTIONS FROM GROSS INCOME			
Hire of equipment—debit balance	$1,364,848.81	$1,367,204.56*	—$2,355.75
Joint facility rents	569,131.09	579,350.32	—10,219.23
Rent for leased roads	3,402,187.00	3,662,313.88	—260,126.88
Miscellaneous rents	14,985.36	8,574.08	6,411.28
Miscellaneous tax accruals	2,675.68	20,652.97	—17,977.29
Separately operated properties—loss	9,318.90	52,246.83	—42,927.93
Interest on funded debt	1,286,005.92	1,258,304.38	27,701.54
Interest on unfunded debt	543,024.33	294,195.68	248,828.65
Miscellaneous income charges	1,561.71	1,112.00	449.71
TOTAL DEDUCTIONS FROM GROSS INCOME	$7,193,738.80	$7,243,954.70	—$50,215.90
NET INCOME	$414,419.44	$1,283,160.50	—$868,741.06
DIVIDENDS, TWO EACH YEAR—4% IN 1914, 6% IN 1913	749,520.00	1,124,280.00	—374,760.00
DEFICIT FOR THE YEAR (SURPLUS IN 1913)	$335,100.56	$158,880.50	—$493,981.06

*Revised for comparison.

AMOUNT TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1913		$13,155,998.88
ADD:		
Received from the New York Central and Hudson River Railroad Company in adjustment of accounts in connection with Buffalo terminals	$65,917.11	
Sundry adjustments and cancellations (net)	18,728.90	84,646.01
		$13,240,644.89
DEDUCT:		
Deficit for the year 1914	$335,100.56	
Discount, commission and expenses on equipment trust certificates of 1913	18,070.27	
Improvement expenditures on Canada Southern Railway prior to 1914 assumed by lessee	476,278.85	
Pullman Company adjustment account	50,000.00	879,449.68
BALANCE TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1914		$12,361,195.21

The statements herein are prepared in accordance with the classifications issued by the Interstate Commerce Commission, effective July 1, 1914, and the results of the previous year have been revised for comparative purposes.

For the year covered by this report the revenue from transportation was $32,442,460.81, a decrease of $3,195,934.01 as compared with the previous year; revenue from incidentals and joint facilities was $1,022,507.64, a decrease of $16,068.12. The total gross revenue from railway operations was $33,464,968.45, a decrease of $3,212,002.13, due to the general business depression throughout the year, and which was aggravated by the European war, and to other causes mentioned in connection with separate classes of revenue.

The freight revenue was $20,717,272.24, a decrease of $2,452,245.58, resulting from a decreased movement of nearly all commodities. This is particularly noticeable in the tonnage of lumber, iron, steel and manufactured products, in which there is a decrease of about 25.4%. The decrease in anthracite coal tonnage is due to the increased movement by water routes, and the decrease in the bituminous tonnage to the labor troubles in the Ohio coal districts.

The prevalence of the hoof and mouth diseases in districts tributary to this company's lines, with the consequent embargoes imposed, caused a decrease in the movement of live stock, packing house products, hay and other commodities. The restrictions imposed affected especially traffic of this nature entering in or passing through the Dominion of Canada. The loss in revenue from this cause was, approximately, $103,000.00.

The principal items showing an increased movement are fruit and vegetables, due to large citrous fruit shipments from the Pacific coast and to the abundant Michigan crop.

In May, 1913, this company joined with other carriers in an application to the Interstate Commerce Commission for an increase of approximately five per cent in freight rates. After devoting considerable time to hearings, and requiring the carriers to submit a voluminous amount of data compiled at a large expense to the carriers, the Commission granted to roads in Central Freight Association territory an increase of five per cent to apply on class rates and certain commodities, but not including coal, ore and several other commodities which comprise a large proportion of the tonnage handled by the company. The increased rates became effective October 26, 1914, and have not therefore, materially affected the freight revenue of the company for the year. The Commission, in rendering their decision on the application for increased freight rates, recommended an increase where permissible, in passenger rates, and the abolition of various kinds of free service heretofore performed by the railroads. A further opinion submitted by the Commission on December 16, 1914, granted increases on certain commodities, and in certain territory excepted in its previous decision, but these increases do not become effective until January 15, 1915.

The passenger revenue was $8,880,613.03, a decrease of $488,442.36. The European war directly caused a decrease of approximately $170,000.00 in immigrant business, also a loss of passenger traffic via Montreal, for which new through train service had been established. Compared with 1912 there is an increase of approximately $63,000.00.

Revenue from the transportation of mail was $469,259.59, an increase of $24,532.64, due to increased compensation allowed from July 1, 1913, account parcel post.

Express revenue was $1,443,143.62, a decrease of $273,160.26 as compared with the previous year, attributable to smaller volume of business handled, caused by the business depression and increasing use made of the parcel post facilities; also to reduction in express rates ordered by the Interstate Commerce Commission, which became effective February 1, 1914.

Revenues from all other sources, including incidental and joint facility operating revenues, were $1,954,679.97, a decrease of $22,686.57; the principal increases being $8,162.37 in station and train privileges, and $20,882.91 in grain elevators; the decreases being $19,860.78 in switching, $45,964.69 from hotels and restaurants and $10,617.84 in demurrage.

The total railway operating expenses were $25,181,483.72, a decrease of $2,821,614.99, as per detail on following pages. By groups the decreases were as follows:

Maintenance of way and structures	$1,248,157.52
Maintenance of equipment	739,676.67
Traffic expenses	38,002.56
Transportation expenses	843,402.84
Miscellaneous operations	16,773.64
	$2,886,013.23
Increase—General expenses	64,398.24
Total	$2,821,614.99

The decrease in maintenance of way and structures is accounted for by a general retrenchment affecting nearly all of the items in this group.

The decrease in maintenance of equipment is almost entirely accounted for by the general reduction in repairs to all classes of rolling stock on account of the falling off in traffic handled.

The noticeable decreases in traffic expenses are in advertising and fast freight lines. The decrease in the latter expense is partially offset by an increase in outside agencies, due to the withdrawal from participation in certain fast freight line expenses and the establishment of independent soliciting agencies.

The decrease in transportation expenses is principally due to the falling off in freight and passenger traffic, with a resulting reduction in freight and passenger train mileage as compared with the previous year. The purchase in the latter part of 1913, of more powerful locomotives made possible an increase over that year in the average freight train load. There was an expense of approximately $25,000.00 incurred in connection with cleaning, disinfecting, repaving, etc., at stock yards on account of the prevalence of the hoof and mouth disease. The large increase incidental to higher rates of wages paid various classes of labor, as well as other causes not prevailing a year ago, have been overcome by extraordinary economies in operation.

The larger portion of the increase in general expenses is due to the employment from the middle of 1913 of additional clerks for a more thorough revision of wayhills, and for paying employees twice a month, the expenditure for the full year being thus compared with that for six months of the previous year, the remainder of the increase is due to unusual requirements for supplies and furniture, coincident with the occupancy of offices in the new terminal station, and to preliminary work in connection with the valuation of the company's property by the federal government.

The railway tax accruals for the year were $1,598,350.12, an increase of $205,536.61 as compared with the previous year, of which $124,563.80 is in connection with the property of the Detroit River Tunnel Company, and due principally to an increased valuation of that property by the State of Michigan and Dominion of Canada. The balance is largely due to increased rates on all property in the various states and Dominon of Canada.

The non-operating income was $926,362.67, a decrease of $319,694.17, as compared with the previous year, due principally to decrease of $258,782.00 in dividend income, also decrease in joint facility rent, and in income from unfunded securities and accounts.

The deductions from gross income amounted to $7,193,738.80, a decrease of $50,215.90; the principal fluctuations being decrease of $261,358.00 in rental of the Detroit River tunnel and terminal as compared with the previous year which included allowance for operation and maintenance charges, and taxes; increase of $27,701.54 in interest on funded debt, due to equipment trust certificates and increase of $248,828.65 in interest on unfunded debt, partially offset by decrease of $42,927.93 in separately operated properties—loss.

The final result for the year, after the declaration of a dividend of 4% upon the capital stock, was a deficit of $335,100.56.

The changes in equipment replacement account during the year were as follows:

Credit balance equipment replacement account December 31, 1913		$671,478.11
There was added during the year:		
Value of equipment retired from service	$768,887.25	
Allowance by C I & S R R Co account shortage in equipment covered by lease of the St J S B & S R R	23,072.07	791,959.32
		$1,463,437.43
Less cost of 144 box cars and 1 official car acquired during the year, and cost of application of superheaters to locomotives and other additions and betterments to equipment		311,670.15
Credit balance, December 31, 1914		$1,151,767.28

In the operation of the pension department, forty-nine employees were retired and placed upon the pension rolls. Of these retirements, twenty-eight were authorized because of the attainment of seventy years of age, and twenty-one because of total and permanent physical disability. Twenty-three pensioners died during 1914, and at the close of the year two hundred thirty retired employees were carried upon the pension rolls. The average monthly pension allowance to these employees was $27.70, and the total amount paid in pension allowances during the year was $58,615.60.

The principal expenditures for improvements during the year, as shown in detail on another page, were as follows:

Additional expenditure at Junction Yards, West Detroit	$184,219.33
Completion of ice house, West Detroit	19,755.49
Completion of elevator, Kensington	138,917.53
Completion of bridge over L S & M S Ry at Air Line Junction	34,212.15
Additional expenditures on Saginaw River draw bridge at Saginaw, in excess of replacement charges	16,249.16
Logging branches on Mackinaw Division	14,665.35
Total	$408,019.01

The death during the year of three venerable officers of the company is recorded.

Major George C. Hopper, retired Paymaster, died in Detroit, June 22, 1914, at the age of eighty-three. Major Hopper worked for this company sixty-eight years. He entered its employment when it was organized in 1846, and his long period of service was unbroken, except during a leave of absence from 1861 to 1864, when he was in the Union Army. He retired from the army with the rank of Major, and credited with distinguished services. He was an able, all-around man, and on account of his usefulness was appointed to many different positions in the service, and always did his work well.

Edwin C. Brown, retired January, 1910, after thirty-nine years' service in the positions of Division Superintendent, Assistant General Superintendent and General Superintendent, died in Detroit, December 4, 1914, at the age of eighty-three. Mr. Brown was a master in his time in the conduct of transportation, and he had practical, personal charge of train operation until his retirement. He rendered efficient service and won the respect and good will of all with whom he came in contact.

Thomas Eedson, retired Auditor of Freight Accounts and Freight Claim Agent, died in Detroit, November 1, 1914, at the age of seventy-three. Mr. Eedson came into the service of this company in 1883 from a position with the Canada Southern Railway Company, and remained in the accounting department until his retirement in 1912. He also held a similar position with the Toronto, Hamilton & Buffalo Company from the date of its organization to the date of his death. He was an industrious man, of studious and inquiring mind, and rendered good service in his own department as well as in the organization and conduct of the Freight Claim Association and the Association of Railway Accounting Officers.

Acknowledgment is hereby rendered to officers and employees for faithful and efficient service.

ALFRED H. SMITH,
President.

Railway Age Gazette

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Sworn to and subscribed before Harry E. French, Notary Public for Kings County, N. Y. (No. 15), whose certificate is filed with the County Clerk of New York (No. 13), and whose commission expires March 30, 1916, on April 1, 1915.

Volume 58 April 9, 1915 Number 15

Contents

*Illustrated.

Damage to freight is not only a dead loss to the railroad, but the annoyance to the patrons, even if full reparation is made for the actual damage, causes a tension in the friendly interest which is so essential if the best results are to be secured. Although practically all of the roads are giving attention to the problem of reducing loss and damage to freight, only a few have succeeded in making any very great reduction in this item. One of the most far reaching and effective efforts which have come to our attention is the campaign on the St. Louis & San Francisco which aims to educate every employee who has anything to do with the handling and transporting of freight to a better understanding of the proper way in which to perform his work and as to his responsibilities. The development of this educational campaign and the most successful methods which have been used in connection with it will be described in a series of three articles, the first one of which appears in this issue.

Reducing Loss and Damage to Freight

The appointment of a politician as chairman of the Illinois Public Utilities Commission was noticed in these columns last week. Governor Whitman (Republican) of New York, has appointed as a public service commissioner in the New York First district a New York city lawyer who aided him in exposing the weaknesses of the present commissioners (Democrats) but who otherwise has no special qualifications; and he has the special disqualification that up to 1912 he lived a thousand miles away—in Nebraska. He has been prominent also in national politics. He is appointed, not in place of one of the unsatisfactory commissioners whom he investigated—they are still in office—but in place of M. R. Maltbie, who although somewhat radical in his views, was the one member of the board who possessed both honesty and conspicuous ability. His term has expired. Mr. Maltbie, with Mr. Decker in the other district, were the last two of the original ten commissioners appointed by Governor Hughes in 1907. Hughes did his best to secure competent commissioners; his successors have done their best to use the offices as political plums. The high salaries—fixed at $15,000, with a view to getting strong men—have not proved as advantageous as they were expected to. They constantly whet the spoilsmen's appetites.

Politicians as Railroad Commissioners

The successes of General von Hindenburg have been attributed largely to his skill in swiftly moving large bodies of troops by railway to the places where from time to time they have been most needed. This has been cited by advocates of government ownership of railways as an example of the great things which can be done under this system. It is therefore somewhat amusing to read an interview with the general himself in the New York Times of March 7, in which he said that while "America might possibly be materially assisting Germany's enemies with arms, ammunition and other war material, certain it is that America, in the last analysis, has helped Germany far more. But for America, my armies would possibly not be standing in Russia today—without the American railroading genius that developed and made possible for me this wonderful weapon, thanks largely to which we have been able with comparatively small numbers to stop and beat back the Russian millions again and again—steam engine versus steam roller." In other words, while the advocates of government ownership say von Hindenburg's achievements have been largely due to government ownership of railways, the general himself says that they have been largely due to his use of methods developed by the privately owned and operated railroads of America. In view of the fact that the Kaiser had to go to the Hamburg-American Steamship Company, a private concern, for a man to manage his

American Railroad Methods and the War

railways during the war and that General von Hindenburg has paid this tribute to American railway methods, the comfort derived by the advocates of government ownership from the progress of the war appears a little ludicrous.

THE CHICAGO, ROCK ISLAND & PACIFIC—1902 TO 1915

A STOCK certificate of a railroad company generally measures about 9 in. by 12 in. If a railroad company were to decide to double the size of its stock certificates it would not lay itself open to the charge of burdening the earning power of the railroad with worthless securities.

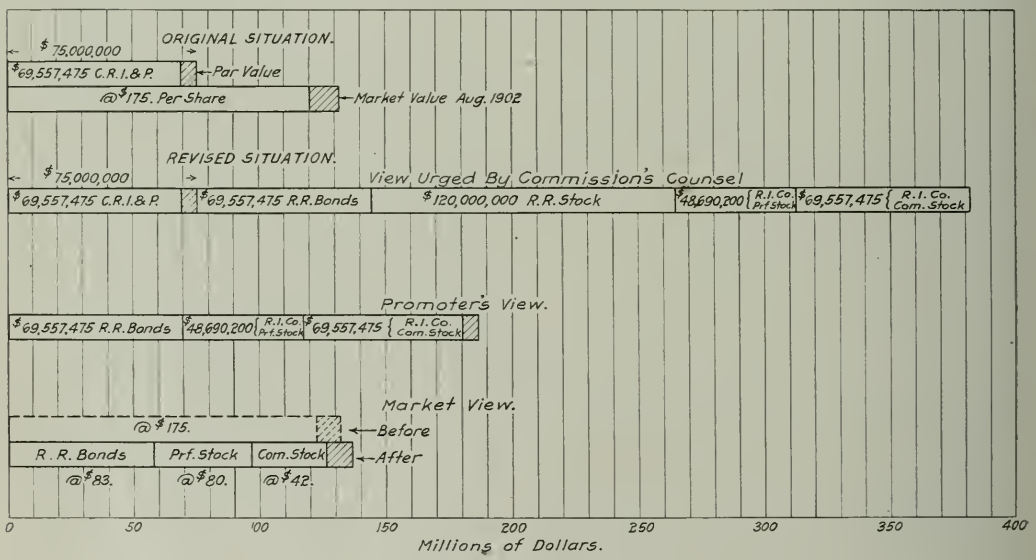
In the investigation which the Interstate Commerce Commission is now making of the Chicago, Rock Island & Pacific Railway Company's affairs, the charge has been made and repeated over and over again that in some way not defined the issue of stock certificates by the two holding companies in exchange for stock certificates of the Illinois corporation the Chicago, Rock Island & Pacific Railway Company—has placed a burden on the railroad which it would not have had to carry if this exchange of certificates had not taken place. The charge is made that because of the multiplication of the securities outstanding against the property, a compelling incentive to earn a larger profit was created which has resulted, on the one hand, in the neglect of proper upkeep and, on the other hand, in excessive rates.

A study of the history of the Chicago, Rock Island & Pacific's earnings, expenses, interest payments and distribution of profits to the owners will show that these two charges are indisputably false.

The total earnings from April 1, 1902, to June 30, 1914, were $713,092,788; the total receipts from the sale of securities were $176,818,196; the total other income was $17,123,516 and total expenses were $505,970,480. The total expenditure on betterment of the property was $40,564,387; the total expenditure for new property was $120,554,575; the total payment of rentals was $16,925,594; the total interest payments were $106,103,614; and the total dividends paid were but $49,654,574. It must be borne in mind that the exchange of Railway company stock for securities of the two holding companies affected in no way whatsoever the amount of money received by the Railway company nor the amount of money disbursed. The exchange of a certificate of Railway company stock, which had written on it the figures $1,000, for a collateral trust bond, which had written on it $1,000, and two certificates of stock, one of which had written on it $1,000 and the other $700, brought not one cent into the Railway company's treasury; neither did it cost the Railway company anything. There were no bankers' commissions, no underwriting syndicate profits; it was precisely the sort of transaction that takes place when a man takes a certificate for 100 shares of stock to the transfer agent of the company and receives four certificates for 25 shares each.

A brief review of the events of the Rock Island affairs from 1900 to 1903 will make clear why this rather elaborate exchange of certificates was made. As D. G. Reid has testified before the Interstate Commerce Commission, he began to buy Chicago, Rock Island & Pacific Railway Company stock in 1900-01. He found that his friend, William B. Leeds, had also been buying the stock, and later they learned that both William H. Moore and James H. Moore had been buying that stock. Previous to this time control of the company had been exercised by an executive committee, which in 1900 consisted of R. R. Cable, Marshall Field, A. R. Flower, W. G. Purdy and H. R. Bishop. Marshall Field and R. R. Cable were the two dominating personalities in this committee. When they learned of the purchases of the stock in the open market by D. G. Reid, William B. Leeds and the two Moore brothers, they invited these men to become members of the board of directors, and by the end of March, 1902, these four men had become the dominating personalities in the company's management. Mr. Leeds was president and a member of the executive committee, and among six other members the executive committee were the two Moore brothers and Mr. Reid. Thus the new interests had a majority of the members of the executive committee.

At the time of the Moore-Reid purchases Chicago, Rock Island & Pacific Railway Company stock was selling in the neighborhood of 175. The new interests had bought in the open market only about a third of the outstanding stock. They were therefore in the position of having made a very heavy investment in a high priced stock without having gained a position in



Shaded area represents undeposited railway stock

The Rock Island Reorganization of 1902

control of the company that was impregnable to attack. A somewhat similar situation has occurred in the history of various railroad companies in the United States and has been met in various ways, one of the most common being the formation of a voting trust. The Moore-Reid control of the Chicago, Rock Island & Pacific Railway Company could not be perpetuated in that way because, although controlling the executive committee and the board of directors, the Moore-Reid group could not offer any inducement to majority stockholders to deposit their stock under a voting trust, nor could they bring pressure to bear to compel them to do so, as has often been the case where submission to these terms was made the price of furnishing new and needed capital. The Moore-Reid group, therefore, cast about for some means of accomplishing its purpose and decided on the holding company device. Its members were optimistic as to the future possibilities of the earning power of the Chicago, Rock Island & Pacific, as was also market opinion.

Two holding companies were formed—the Chicago, Rock Island & Pacific Railroad Company, an Iowa corporation, and the Rock Island Company, a New Jersey corporation. There were now three corporations—the Chicago, Rock Island & Pacific Railway Company of Illinois and the two holding companies, one an Iowa and one a New Jersey corporation. It will simplify matters to refer to these three companies hereafter as the Illinois, Iowa and New Jersey companies, respectively.

The Iowa corporation authorized $120,000,000 capital stock and $75,000,000 4 per cent bonds. The New Jersey corporation authorized $50,000,000 preferred stock and $75,000,000 common stock. All of the $120,000,000 of the Iowa corporation stock was held in the treasury of the New Jersey company. The Iowa company's bonds were to be issued only in exchange for the Illinois company's stock. Stockholders of the Illinois company were offered a $1,000 Iowa corporation 4 per cent bond, seven shares of preferred stock and 10 shares of common stock (par value $100 per share, both preferred and common) of the New Jersey company in exchange for 10 shares of their stock (the Illinois company stock).

Voting power for the majority of the board of directors rested in the preferred stock of the New Jersey company. Stockholders of all but $5,442,525 (reduced to $3,467,000 by 1914) of the old stock accepted these terms, deposited their Illinois corporation stock certificates and received in exchange the new certificates of the holding companies. The Reid-Moore interests could now, by buying a majority of the preferred stock of the New Jersey company, obtain control of an absolute majority of the board of directors of all three companies. By selling part or all of their Iowa company bonds and New Jersey company common stock they could very much reduce their investment and still retain control; but here again it is well to bear in mind that it was not to the Illinois company that the Reid-Moore interests sold their bonds, if they did sell them, but to other investors or speculators.

The accompanying diagram shows what took place upon the formation of the holding companies. In 1902 the par value of the stock outstanding was $75,000,000. The valuation which the market put on this stock was a little over $130,000,000. The promoters' view of the value of the property, subject to its debt, with its earning power, subject to its interest requirements, was $193,247,675. This is the total nominal valuation which the promoters placed upon the stock of the Illinois company. The diagram shows graphically how different this is from the view which has been expressed before the commission, in which the fact that the Illinois company's stock was deposited as collateral for the Iowa company's bonds, and the Iowa company's stock was all held in the treasury of the New Jersey company is overlooked. If the promoters' view of the case had been right, the Illinois company would have needed to earn $7,729,917 net available for dividends to have paid an average of 4 per cent on all of the outstanding securities. In other words, the average net income, making allowance for the proper margin of safety, would have had to have been about $10,000,000. As a matter of fact, the property never earned this amount net. For the 15 months ended June 30, 1903, it earned $9,195,819 net. The best year since was 1907, in which year there was $8,750,517 net earned.

The market's view of the earning power of the property, after the exchange of securities, was only very little different from the view held by the market before the holding companies were formed. The formation of the holding companies and the issuance of their securities did not, therefore, even inflate the market. The market, after the holding companies' securities had been distributed, placed the total value of the "burden" on the railroad itself at $153,750,000, or just about $5,000,000 higher than the market value of the Illinois company's stock in August, 1902 (before the formation of the holding companies). If the market's view of the situation had been correct, the Illinois company would have had to earn net $6,150,000 to pay an average of 4 per cent on the valuation placed on the holding companies' securities by the market.

The actual total amount which the Illinois corporation has paid in dividends to the holding companies, and which is the total amount which the owners of the property received as profit on their investment, is as follows:

15 months ended June 30, 1903	$5,680,540
Year ended June 30, 1904	5,985,060
Year ended June 30, 1905	4,676,622
Year ended June 30, 1906	4,677,553
Year ended June 30, 1907	4,116,728
Year ended June 30, 1908	3,929,785
Year ended June 30, 1909	3,930,019
Year ended June 30, 1910	3,743,272
Year ended June 30, 1911	3,930,948
Year ended June 30, 1912	3,743,760
Year ended June 30, 1913	3,743,525
Year ended June 30, 1914	1,871,763
Total	$50,029,575

This is a total of $50,029,575 in the 12 years and three months, or an average per year of $4,034,026. This amounts to an annual dividend on the *par* value of the $75,000,000 Illinois company stock of 5.45 per cent. It is an average of 2.11 per cent on the promoters' capitalization, and an average of 3.14 per cent on the market valuation of August, 1902.

Instead of being a glaring example of the evils of overcapitalization, the Rock Island's history since 1902 is a striking illustration of the fact that no amount of promoters' hopes can make a railroad property earn more than it can earn, and that no amount of stock certificates affects the total profits available for distribution on these certificates. Time has proved that the market's view of the value of the owner's equity in the Chicago, Rock Island & Pacific Railroad property was wrong and that the promoters' views of its value were wrong, but only to a somewhat greater extent.

The reasons why the hopes of 1912 have not been justified by later events are, of course, a matter of opinion. The property which Mr. Reid and his associates bought in 1902 was not as good a physical property as they thought and as most eastern people at that time thought it was. It is very hard to convince any one who was more or less familiar with Rock Island affairs in 1900-02 of this fact, but fact it has proved to be.

The railroad has suffered not from too great a security issue having been placed on it, but from not having sufficient new capital raised and spent on it. Lack of strong banking connections has been a serious factor in the failure of the management to provide sufficient new capital to meet the progress of the science of railroading.

The movement of traffic as it affects the lines to the southwest has been different from what in 1902 was the general expectation. The grain movement east and the commodity movement west had been sufficient to make the Chicago & North Western, the Burlington and the Chicago, Milwaukee & St. Paul very profitable. It was thought that this grain traffic would move as easily south from Chicago to gulf ports as it had moved from the west to Chicago. If this expectation had been justified, a large volume of business would have been provided

for the Rock Island, the St. Louis & San Francisco and the Missouri, Kansas & Texas which, as a matter of fact, these lines have never received.

The new owners of the Rock Island recognized certain serious difficulties in the way of development of their property as soon as they had bought it. Railroad building was going on at a rather furious pace in the southwest and it was thought necessary to do something to put a stop to this waste. The control of the St. Louis & San Francisco, therefore, was bought, probably in an effort to avoid duplication of new railroad building.

The Rock Island had a very bad line east out of Kansas City. It was so bad in fact that the report of the expert for the bondholders' committee made recently recommended that an entirely new line be built. There are too many lines now between Kansas City and Chicago. The Rock Island owners thought that they saw an opportunity to buy instead of build a line, and therefore bought into Chicago & Alton. Both of these attempts to solve serious problems, one of which has not been solved yet, were failures. The Rock Island had to bear the expense of these mistakes of judgment.

In 1902 the new owners of the Rock Island could not have foreseen the flood of hostile legislation against railroads in the Southwest, which has been so great a factor in the failure of the Rock Island to justify the hopes of its purchasers. This is probably the most important single factor in the situation, but the other factors named have each had an important influence.

THE PRESS AND THE RATE ADVANCE CASE

NEWSPAPER reports of the western rate advance case have been the subject of several controversies during the hearings. Although Commissioner Daniels has properly shut off discussions of this kind, the impression the public gets of such matters is of considerable importance. Each side has intimated that the other has been too generous in giving matter to the press, but only the representatives of the shippers have tried to impute a sinister influence to ordinary publicity methods, such as they themselves have been practicing for years. Mr. Thorne and one of the packers' lawyers have referred to the railroad publicity as "organized propaganda." The Sioux City (Ia.) Tribune in "A Tip to Chicago Newspapers," published on March 19, expresses deep concern because it thinks the Chicago papers are "partial to the railroads." It says:

> The amount involved in this conference is greater than the sum of money involved in any peaceful conference ever held in the United States. Yet to read the Chicago papers one would scarcely know such a conference was actually in session in that city, and certainly no one would ever guess that anyone was present except railroad officials. The opening statement made by the representatives of the western people was never even epitomized. None of the cross-examinations of the railroad officials is even mentioned. Even if the Chicago newspapers are partial to the railroads, they should give the news.

Possibly the Sioux City paper did not know that the first month of the hearing was devoted to the railroad side of the case, just as most of this month has been allotted to the other side, and that at the time its editorial was published the railroads were still at bat.

There has been a change in the character of the newspaper reports of this case, as compared with those made of the 1910 western rate advance case, for example, but there are reasons for the change which our Sioux City contemporary may have failed to note. In the first place, evidence that there is such a large amount of money involved as our contemporary thinks can be found only in the opening statement of Commissioner Thorne. In the second place, whereas, in the 1910 case the shippers were almost unanimously opposed to the advances, in this case comparatively few are taking any part in the proceedings, leaving the opposition almost entirely to Mr. Thorne and the representatives of the big packers.

But perhaps one of the most important reasons why the newspapers are printing the railroad testimony is that the railroads have taken some pains to present it to them by securing the services of an experienced newspaper man who prepares in advance summaries of the testimony and exhibits presented by the railroad witnesses and furnishes them to the newspapers. Without such an arrangement it would be impossible for any newspaper man without hours of study to get an adequate or intelligible report of the evidence. Many newspapers have expressed appreciation of the assistance thus rendered, and the summaries have been used to a considerable extent. There has been no secrecy about it, they have been distributed under the eyes of the commissioner in charge of the hearings and in plain sight of all present. Printed copies have been mailed to out-of-town papers, plainly indicating that they are furnished by the railroads. While naturally they represent but one side, all who receive them know just where they come from and are free to use them, or to throw them on the floor. Moreover, the Associated Press has an experienced man in constant attendance and representatives of individual papers drop in daily. They have used the statements because they are a big help to them and because they can see that they are accurate. If the newspapers are furnished with a concise summary of the direct evidence there is less temptation to make a story out of the fact that some lawyer on cross-examination "charged" something.

In the reports of the 1910 case many of the papers did just what the Sioux City Tribune apparently thinks they ought to do now. They crowded out the direct testimony of the railroads and devoted their space largely to the cross-examination. When there was no cross-examination or when it was not sufficiently sensational "statements" by Thorne or others were usually forthcoming. Mr. Thorne has been playing the publicity game for years, and although he has usually been his own best press agent, when his side had its innings at the hearing last week summaries of his statements and of the testimony of each witness were also given to the press, by a man employed by his side for that purpose. If the newspapers failed to give Mr. Thorne's utterances first page position, possibly the fact that he is using "old stuff" may have had something to do with it. Several times when he first charged the railroads with padding their maintenance accounts and showed they were grossly overcapitalized in comparison with the lowest state valuations he could find, his views made newspaper stories. Their repetition excites less attention, naturally. His exhibit on a reasonable rate of return in the eastern rate case had also lost some of its news value when reintroduced as J. Pease Norton's exhibit in the western case. One of Mr. Thorne's statements during the 1910 hearing that the advance asked by the roads would amount to $500,000,000 a year made a headline at the time, but after the evidence failed to corroborate him his exaggeration of the scope of the present case was less impressive. In his combined capacity of amicus curiae, representative of the public and attorney for shippers, Mr. Thorne has "conservatively estimated the advance which the railroads are trying to put through" at 10 per cent of $700,000,000 freight revenue and 20 per cent of $195,000,000 passenger revenue, or a total of $109,000,000, but because the papers also printed the statement of the railroad men, who are presumably at least as honest as Mr. Thorne and undoubtedly know just as much about it, that the proposed advances in this case only amount to about $10,000,000 a year, the Sioux City paper apparently despairs of the freedom of the press.

If the newspapers generally continued to swallow Mr. Thorne's figures they would undoubtedly publish more than they have on both sides of the case, but they have gradually learned in recent years to accept his calculations with a degree of reserve. At any rate, it will require a great deal of activity on the part of railway men and railway publicity agents to make up for the reams of copy that Mr. Thorne has been putting over for the past five years.

DELAWARE, LACKAWANNA & WESTERN

THE business of the anthracite roads is more likely to be adversely affected by mild weather conditions than by bad business conditions, although, of course, the anthracite roads, in company with the other roads, felt the effects of the business depression in the calendar year ended December 31, 1914. The Delaware, Lackawanna & Western's anthracite coal business was considerably reduced by the mild weather in the first three months of 1914, and the total loss in earnings from the transportation of coal in 1914, amounting to $378,000, was the result of this mild weather. During the rest of the year the coal business, despite the general business conditions, compared favorably with 1913. On the other hand, passenger business was apparently very much affected by the European war and the general inclination to avoid all expenditures not absolutely necessary.

The Delaware, Lackawanna & Western operates a total of 985 miles of road, of which 543 miles has second track and about 25 miles has four tracks. In 1914 the company earned $39,250,000, a decrease as compared with 1913 of $1,334,000, or 3.76 per cent. Earnings from the transportation of coal amounted to $14,041,000, and the decrease of $378,000 previously mentioned amounted to 2.62 per cent. Revenue from freight other than coal amounted to $14,448,000 in 1914, or $641,000 less than in 1913, a decrease of 4.25 per cent. Passenger revenue amounted to $8,158,000, $391,000 less than in 1913, a decrease of 4.57 per cent.

While the Lackawanna can afford to be, and is, one of the most liberal roads in the country in making additions and betterments to its property, it is very economically run. The ratio of expenses to total operating revenues is 64.76 per cent, and of transportation expenses to revenues about 32 per cent. In 1914 transportation expenses amounted to $12,423,000, a decrease of $111,000, or a little less than 1 per cent. This decrease of a little less than 1 per cent in transportation expenses compares with a decrease of 4.57 per cent in ton mileage of coal handled, 6.40 per cent in ton mileage of other freight, and a decrease of 2.89 per cent in passenger mileage handled.

The average trainload of all freight in 1914 was 655 tons, as against 660 tons in 1913. The average ton-mile rate on coal was 8.47 mills as against 8.30 mills the year before, and on freight other than coal, 6.65 mills in 1914 and 6.50 mills in 1913. The full-crew laws, which were in effect during the entire year 1914 in Pennsylvania and for only part of the year 1913, account in part for the comparatively higher transportation costs in 1914. Thus, while fuel for road locomotives cost $2,385,000 in 1914, a decrease of $54,000, road trainmen were paid $1,516,000 in 1914, an increase of $74,000 as compared with 1913.

In 1914 the company spent $1,299,000 for additions and betterments, exclusive of the sums which are being spent on the new Summit-Hallstead cut-off, which is being financed by a separate corporation. The Lackawanna is conspicuously liberal with its maintenance appropriations, and quite rightly so. In 1914 maintenance of equipment cost $6,319,000, an increase of $130,000, or a little over 2 per cent as compared with 1913; and maintenance of way, $5,075,000, a decrease of $75,000, or a little over 1 per cent. The average cost of repairs per locomotive was $2,465 in 1914 and $2,518 in 1913; of passenger-train cars, $528, as compared with $602, and of freight-train cars, $67, as compared with $61.

The total tonnage of all revenue freight carried by the Lackawanna amounted to 22,727,000 tons in 1914, as against 24,723,000 tons in 1913, a decrease of 1,996,000 tons. Of the total tonnage in 1914, 9,803,000 tons were furnished by anthracite coal, and in 1913, of the total for that year, 10,178,000 tons were furnished by anthracite coal. Besides anthracite coal tonnage, the most important commodities from the view point of volume of tonnage are bituminous coal, stone and sand. Bituminous coal in 1914 furnished 1,601,000 tons, a decrease as compared with 1913 of 552,000 tons. Stone and sand furnished 1,776,000 tons in 1914, a decrease of 289,000 tons. From the standpoint of revenue, grain and l. c. l. merchandise are probably the two most important classes of traffic, exclusive of anthracite coal. The total tonnage of grain carried in 1914 was 1,088,000 tons, a decrease from 1913 of only 20,000 tons, and the tonnage of merchandise amounted to 1,488,000 tons in 1914, an increase of 251,000 tons over the previous year.

At the end of 1914 the company had on hand $3,613,000 cash, with total working liabilities of but $5,890,000. The company had in its treasury $12,687,000 marketable securities. The Lackawanna is, of course, unique among important American railroad companies in having practically no funded debt, the total stock outstanding being $42,348,000, with but $320,000 mortgage bonds.

The following table shows the principal figures for operation in 1914 as compared with 1913:

	1914	1913
Average mileage operated	985	985
Revenue from anthracite coal	$14,040,574	$14,418,507
Revenue from other freight	14,448,308	15,089,057
Passenger revenue	8,158,458	8,549,346
Total operating revenue	39,249,790	40,784,148
Maint. of way and structures	5,074,501	5,148,035
Maint. of equipment	6,318,720	6,189,093
Traffic expenses	837,384	887,576
Transportation expenses	12,423,183	12,533,966
General expenses	878,346	815,173
Total operating expenses	25,417,882	25,573,842
Taxes	2,060,832	1,980,000
Operating income	12,121,918	13,742,106
Gross income	18,951,115	18,070,201
Rentals	5,874,935	5,928,930
Interest	6,344	6,486
Betterments	1,299,286	1,879,576
Discounts on bonds	.....	574,050
Dividends	8,444,080	6,028,800
Surplus	3,525,559	3,670,816

NEW BOOKS

Public Utility Economics. Published by the West Side Young Men's Christian Association, New York.

This is a series of ten lectures delivered before the Finance Forum of the West Side Y. M. C. A. of New York. The lectures were given by men prominent in the work about which they spoke and taken together form a quite comprehensive discussion of the various aspects of public utility economics. The subjects covered are the magnitude of electric light, power and transportation business; holding companies; public ownership; lighting companies; telephone companies; future of the public utility corporations; centralization of power supply; public utility securities as investments; regulation, and the legal aspects of regulation. The article on the holding companies is by Francis T. Homer and is a remarkably clear and interesting exposition of the reasons which have led to the general adoption of holding company devices for the control of public utilities and the advantages to the investor through averaging of risks and to the public served through the extension of unified operation, management by specialists and economy in purchases.

The Finance Forum of the West Side Y. M. C. A. was inaugurated in 1905. The forum invites speakers of practical experience of all shades of opinion. The audiences are earnest to an unusual degree and the work that has been done is thoroughly commendable. As a general rule the lectures are not published, but the ten lectures on public utilities form such a valuable addition to the as yet comparatively scanty literature of lighting, electric railway and other public utility companies that an exception was made to this rule. The book can be recommended to anyone interested in the economic questions which at present are of so much importance and which form the subject of a vast amount of federal and state legislation.

United States Safety Appliances. Issued by the Master Car Builders' Association, Joseph W. Taylor, secretary, Chicago. 111 pages, 3⅞ in. by 7 in. Bound in brown press-board. Price 25 cents.

This book contains the orders issued by the Interstate Commerce Commission concerning safety appliances, and includes the rules and illustrations for their application and maintenance.

Letters to the Editor

PASSENGER FARES IN EUROPE AND THE UNITED STATES

Pittsburgh, Pa.

To the Editor of the Railway Age Gazette:

Referring to Daniel Willard's most excellent paper on "The Railroads and the Public," published in the *Railway Age Gazette* of March 26, it is apparent that the author was very conservative in all his statements. For instance, when he speaks about passenger fares, he says, "I am convinced that passenger fares upon the average in the United States are no higher than they are upon the average for similar service in Europe."

This is true if we take one dollar to be equal to 4 marks or 5 francs. If we consider that the European roads pay only half the wages to their conductors, engineers and brakemen, only half the wages to the men along the line that the American roads do; if we further remember that all the shop employees, from the sweeper to the skilled mechanic, get only half the wages paid here; and that living only costs half of what it does in this country (I do not speak about hotel rates charged to tourists in the height of the season), then we must conclude that the money in Europe is actually worth twice what it is in the United States, and that the passenger rates, accommodations being equal, are nearly twice as high in Europe as they are here.

A. Stucki.

WHY USE A HIGH FACTOR OF ADHESION IN STEAM LOCOMOTIVES?

New York.

To the Editor of the Railway Age Gazette:

From the standpoint of utilizing the greatest possible proportion of the total engine and tender loaded weight in developing tractive effort, the ideal locomotive is the one in which all such weight is carried on the driving wheels. Where truck wheels must be used, the same reasoning dictates that the weight on drivers shall be as large a proportion of the locomotive weight as is practicable. It is, therefore, surprising to note in how many instances designers fail to make use of even the weight actually carried on the drivers in deciding on the factor of adhesion. For example, why should it be necessary to use a factor of adhesion of from 4.5 to 5.0 or over, when it has been fully demonstrated by locomotives now in successful operation that a factor of 4.1 or 4.2 is sufficient?

While it is easy to understand that in high-speed passenger locomotives, designed for long, continuous runs, it may be impracticable to keep down the adhesive factor to such a limit, due to the requirements of sustained boiler capacity, still it is believed that in the majority of cases the higher factor is the result of a desire to obtain a relatively low pressure boiler that will maintain the maximum allowable steam pressure under all possible working conditions, as well as to give adhesion that will enable quick starting with maximum train load on bad rail without slipping.

While it is desirable to provide ample steaming capacity, there are locomotives now in service on which this idea has been carried to extremes, particularly in view of superheating and modern methods of stoking, the result being that these locomotives are hauling around a considerable amount of self-contained and non-productive dead weight which is not only useless but expensive, simply in order to meet extraordinary service conditions. In such cases the factor of adhesion runs as high as 4.75 or over, so that considerable of the weight on the drivers is never utilized as regards developing drawbar pull.

Furthermore, there are many enginemen who abuse locomotives and increase maintenance and operating costs unnecessarily, in order to make "a flying start and a slow finish," whereas the same results in schedule time between start and stop could be more economically obtained, and with a lower factor of adhesion, by making the start easier or on sanded rail and the stop quicker with less "rolling" and "drifting" and the more effective use of the train brakes.

Comparing the present day representative Pacific and Mikado type locomotives with the older Eight-wheel and Mogul designs, the added number of driving wheels per locomotive should certainly enable reducing rather than increasing the adhesive factor. The writer firmly believes that no consistent reasons can be advanced for the general use of adhesive factors above 4.1 or 4.2. This practice would enable the elimination of much of the non-productive weight that is now carried not only on driving, but on truck wheels, and which could be more effectively utilized in developing drawbar pull and thereby increasing the average train load performance at less transportation cost per revenue ton-mile.

It would be interesting to hear from the readers of the *Railway Age Gazette* on this subject, particularly those engaged in new locomotive designing. Mechanical Engineer.

UNCLE SAM'S HIGH FINANCE

New York.

To the Editor of the Railway Age Gazette:

As you are running a series of articles on government management in connection with the Panama Railroad, I thought the following extract from the annual report of the Pacific Mail Steamship Company for the year ended June 30, 1912, would interest you. It is printed over the signature of Judge Lovett.

"STEAMERS AND OTHER PROPERTY OWNED"

"In the early fifties the Pacific Mail Steamship Company acquired the sole ownership of the four islands in Panama Bay, i. e., Isla de Naos, Flemenco, Perico and Culebra. In the early sixties a one-half undivided interest in these islands was sold to the Panama Railroad Company

"The Pacific Mail Steamship Company erected on these islands shops, storerooms and warehouses, built stone ways, stone seawalls, and made other improvements thereon. During the time when these islands were in the domain of the United States of Colombia they were exempted from taxation, but when the government of the United States of America assumed control of the Panama canal zone, it assessed the one-half interest in these islands at $72,500 and collected taxes upon that valuation. Subsequently the United States government served notice that it would require these islands for canal purposes and condemned them under the right of eminent domain, awarding to the Pacific Mail Steamship Company but $44,000—$20,000 for the one-half undivided interest, and $24,000 for the improvements. The islands and the extensive improvements thereon were carried on the books of the Pacific Mail Steamship Company at the nominal sum of $118,150. The difference between this sum and the amount received from the United States government was written off to profit and loss."

The government is preaching frugality to the people and leads in extravagance; it is preaching honest finance and leading in high finance. F. J. Lisman.

New Trade Route from England to Russia and Roumania.—A new trade route has been arranged from the United Kingdom to Russia and Roumania without passing through Bulgaria or Turkey. The route is as follows: By rail from Salonica to Prahova via Nish, Parachin and Zaichar, a distance of about 435 miles; from Prahova goods will be carried via Shleps to Turn Severin, a Roumanian port on the Danube (a journey of from 2 to 2½ hours), and thence by rail to their various destinations. "La Société Roumaine de Transports Internationaux et de Camionnage," of Bucharest, has opened a branch at Salonica for the purpose of facilitating traffic by this route.

An Effective Freight Claim Preventive Crusade

Part 1.—The St. Louis and San Francisco Slogan is "$200,000 Reduction in Claim Payments for Fiscal Year"

A most effective and aggressive educational campaign for the prevention of loss and damage to freight, carried on along the lines of a safety first campaign and in some respects similar to the campaign for increasing the train tonnage and car loading on the St. Louis & San Francisco, described in the *Railway Age Gazette* of March 13, 1914, page 501, was inaugurated several months ago on the Frisco. The results have been surprising—in fact, almost unbelievable.

The Frisco officers had been scheming and working for years to reduce freight loss and damage claims and with very considerable success, as those who have watched the progress of these efforts as chronicled in the *Railway Age Gazette* will recognize. In spite of this, however, the freight claim payments for the fiscal year 1913-14 amounted to $16.82 for every $1,000 of gross freight revenue. Critical study seemed to indicate that under favorable conditions this figure might eventually be reduced to less than $10 per $1,000. But how? It seemed as if ingenuity had almost been exhausted in the previous efforts.

It was finally decided to inaugurate an educational campaign and to adopt the slogan "A $100,000 reduction in freight claim payments for the fiscal year." The intensity of the campaign and the good generalship is apparent from the fact that the $100,000 was saved in the first six months and the slogan has been changed to read "A $200,000 reduction in freight claims for the fiscal year." For the first six months of the fiscal year the loss and damage claims were reduced to $9.28 per $1.000 of gross freight revenue. This saving was not made because conditions on the Frisco were particularly bad in this respect. As has been said, an aggressive campaign had been waged for years to reduce the loss and damage to freight and the Frisco was in the first ranks as compared with the other roads, similarly situated, when the educational campaign was started. That the relative importance of the improvement may be properly appreciated, the progress of this work during the previous seven years will be briefly reviewed.

BRIEF REVIEW OF PREVIOUS EFFORTS

The record for the past seven fiscal years is shown in the following table:

Fiscal year	Freight claim payments	Gross freight revenue	Per cent ratio	Number L. & D. claims filed	Claim payments per $1,000 revenue
1907-08.....	$644,354.00	$22,605,000.00	2.85%	80,285	$28.50
1908-09.....	560,759.00	23,759,000.00	2.36%	61,770	23.60
1909-10.....	505,503.00	26,233,000.00	1.88%	58,527	18.80
1910-11.....	511,812.00	26,381,000.00	1.93%	54,962	19.30
1911-12.....	451,632.00	25,744,141.00	1.77%	53,638	17.70
1912-13.....	489,656.00	29,489,000.00	1.66%	58,538	16.60
1913-14.....	482,039.29	28,654,454.10	1.67%	64,572	16.82
1914-15 (8 mos)..	181.055.17	18,788,766.30	0.97%	35,842	9.68

On January 1, 1909, a loss and damage freight bureau* was installed in the office of the superintendent of transportation. This bureau had two functions: To investigate loss, delay and damage to freight with such despatch that all the facts would be available before the claims were presented; and to locate and remove the causes of the failure and prevent a reoccurrence. The claims were, however, paid by the freight claim department as formerly.

On September 15, 1911, the entire handling of claims was transferred to the operating department. The prime objects of this new arrangement were stated in the *Railway Age Gazette* of July 26, 1912, page 163, as follows: "(1) To investigate promptly and thoroughly over, short and damage reports with the object of having investigation completed before claims are filed; (2) to investigate thoroughly each claim filed, so as to locate the cause, properly fix responsibility and apply discipline; (3) by the thorough investigation of claims and OS&Ds from a transportation standpoint, to bring about a reduction in the number of claims filed by correcting bad transportation; (4) to make friends for the Frisco by giving first class service in handling refused and unclaimed freight and l. c. l. tracers; (5) by disposing of claims promptly and equitably, to satisfy patrons and attract business to the road and reduce unfriendly public sentiment, which has been partly caused by past methods of handling claims." The organization for accomplishing these purposes was fully outlined and its methods of operation described in the above mentioned article.

A considerable number of improvements have been made in the handling of claims as the work has developed, resulting not only in a decrease in the number of claims, but in a more prompt method of handling, approximately 68 per cent being adjusted within a period of 30 days from their receipt. Moreover, beginning May 1, 1914, each station agent was furnished with a book of drafts limited to amounts from $10 to $50 and authorized to make immediate payment for physical damage, shortages and concealed losses and damages to freight not exceeding the draft limit.

EDUCATIONAL WORK

The study of the latest development, the educational campaign above referred to, is most interesting and instructive. Beginning in a simple and, to a certain extent, a somewhat cumbersome way as compared with later developments, the movement grew rapidly and soon developed into a whirlwind campaign with possibly less of organization and red tape, but more of enthusiasm and immediate returns.

Remember that for years the safety first movement had been developing into a well organized and most fruitful effort, largely of an educational nature. The receivers of the Frisco, when they took charge of the property, realized full well that little money would be available for additions to equipment or extensions and enlargements of the plant and facilities. At the same time it was also fully recognized that much was needed in the way of improvement to increase the safety and efficiency of operation. One principal direction was open in which to turn and this was quickly taken advantage of. Some scheme must be adopted for enthusing each man in the organization, and at the same time educating him to a higher degree in order that his efficiency might be brought to a maximum. We have already shown how this was accomplished in certain branches of the work. The better carloading and increased trainloading, which was brought about largely by an educational campaign, was described in the *Railway Age Gazette* of March 13, 1914, page 501. In the past three years a million dollars has been saved in the fuel bill, largely by following up individual performances and giving special attention to the training of individuals who were not up to standard. This work was described in the *Railway Age Gazette* of May 8, 1914, page 1018.

EFFICIENCY ASSOCIATIONS

About a year ago G. E. Whitelam, superintendent of freight loss and damage claims, came to the conclusion that about as much as possible had been done in refining the machinery for handling claims—that is, so far as the organization of the freight loss and damage claim department and the detail methods of handling the work were concerned. The causes responsible for the loss and damage to freight were so numerous and so widely distributed that in order effectively to locate and remove them, it would be necessary to have every man in the organization on the lookout and giving his best efforts further to decrease loss and damage to freight. One way in which this

*See article on "Freight Claim Delays Reduced," *Railway Age Gazette*, February 19, 1909, page 353; also an extensive article on "New Methods of Handling Freight Claims on the St. Louis & San Francisco," November 12, 1909, page 925.

might be accomplished seemed to be to form local efficiency associations, for the purpose of having the employees gather together and discuss the different problems or troublesome questions which might come up in connection with their work.

As a starter, the force in the freight loss and damage claim department at the general offices, Springfield, Mo., organized the Freight Claim Department Efficiency Association on March 10, 1914, with the slogan, "Improvement of the Service Our Watchword." In addition to its officers it had several standing committees, including the executive, reports and forms, transportation, office organization and efficiency, and correspondence and files committees. The results soon proved to be such that it was decided to form similar associations at the larger stations.

A round-up was first made to find out whether organizations of this or a similar sort had been formed at any point and to ascertain definitely what had been accomplished. It was found that the agents in a few places occasionally called their men together, but the practice was very limited. These staff meetings had been encouraged by the assistant division superintendents in charge of station work,* and indeed were often called by and presided over by them in their trips over the division.

Here are some of the subjects which were considered in a typical meeting of this sort at Ft. Smith, Ark.:

Weighing of household goods and all l. c. l. freight.
Importance of proper marking of l. c. l.
Importance of nailing up, or repairing slight damages to boxes, etc., to prevent loss by pilfering, or otherwise.
Maintaining clear seal records in and out.
Keeping station bulletin board properly marked up.
Keeping water in waiting rooms.
Importance of courtesy to the public at all times, and especially when talking to patrons over the 'phone.

On April 26, 1914, the Ft. Smith Station Efficiency Association was organized at Ft. Smith, Ark. A constitution was adopted, officers were elected, and a number of standing committees were appointed. The association was scheduled to meet every 60 days, and its object was to secure greater efficiency in station handling, betterment of the service generally by a full discussion of irregularities, and the improvement of the members by intelligent study of the rules and general instructions. The membership included all employees connected with the station proper, the yard and the car department.

Briefly, the duties of the standing committees, as specified in the constitution, are as follows: The executive committee arranges for meetings, acts as an advisory board and passes on all matters. The safety committee reports to the president all irregular practices or conditions which may have a tendency to produce personal injury, and the president in turn forwards these to the division superintendent. The tools and supplies committee was authorized to look after, devise means for preserving and prevent unnecessary waste and destruction of tools and supplies. The loss and damage committee was instructed to make recommendations as to ways and means to reduce loss and damage, due to rough handling or otherwise. The weighing and inspection committee was authorized to suggest the best plan and means for quick inspection and weighing, with a view of getting correct weights and classification on all shipments with minimum cost. The station efficiency committee was instructed to look into and devise plans for greater efficiency of station operation and administration.

It will be recognized that the prevention of loss and damage to freight was only a small part of the work of this association. It was soon found advisable to hold meetings at more frequent intervals than 60 days, as called for by the constitution, for the entire force, including switchmen, car inspectors and platform men seemed to derive great benefit from the meetings.

A number of similar associations were organized during May. One at Sapulpa, Okla., including the platform and warehouse forces, decided to hold its meetings twice a month, and because of conditions a very different set of standing committees than those at Ft. Smith was appointed. For instance, there was an accounting committee and committees to look after miscellaneous affairs, dock transfer, warehouse problems and the stowing of merchandise. We find this association giving much attention to the discussion of bulletins and statistics concerning the loss and damage to freight. The comparative statement of errors for each station was discussed, with the idea of making such improvements at Sapulpa that it might head the list. Specific cases of bad handling resulting in claims were also discussed, with a view of adopting measures to overcome similar errors in the future. As a result, it is reported that errors of this kind have almost been done away with and that there is a much better understanding all around as to the most efficient way of handling the work.

The Birmingham (Ala.) Association, organized on May 3, had as its object the proper solution of problems pertaining to the operation of stations by free interchange of ideas and opinions; the betterment of the service by analyzing irregularities, and the improvement of the members by intelligent study and discussion of rules and special instructions. This association included all employees working on a monthly basis, held monthly meetings and had as its slogan, "Do It Right."

Here again conditions seemed to demand a different set of standing committees. Birmingham has a safety committee; fire prevention committee; building, tools and supplies committee; loss and damage committee; a correct practice committee to reduce misloading of packages and improve the manner of stowing, and a committee on sanitation and working conditions. This association had only been organized a short time when Birmingham was able to show fewer bad orders than usual, and an almost complete elimination of overs and shorts. It was found, however, that errors in billing and handling of waybills were keeping the records down and special measures were at once taken to overcome this deficiency.

The Oklahoma City Efficiency Association, organized on May 8, found it necessary, because of conditions at that point, to have two auxiliary associations, one under the direction of the first vice-president composed of the freight handling force, and the other under the direction of the second vice-president made up of the clerical and office forces. A few months after its organization it reported the following results: "Education of employees, as every man, including the freight truckers, is kept posted as to what is being done in the way of claims, what the losses are, and receives benefits from the suggestions which are made for further improvement. The employees are encouraged and are made to feel that they are of some importance in the organization."

A Frisco Employees' Co-operative Association was organized at Muskogee, Okla., on May 10, with provision for bi-monthly meetings. Two months after the Okmulgee (Okla.) Association was formed on May 17, it was reported that not one error in loading or in handling freight had occurred since its second meeting and that every O. S. and D. handled had been thoroughly investigated for educational purposes. The improvement in individual performance was said to be readily noticeable.

The movement spread rapidly and similar associations were formed at many points. The agent at Hugo reported that the holding of monthly meetings of this sort brought about a decrease in claims, resulted in less errors being made, reduced correspondence and improved the handling of merchandise on the platforms; also, that this improvement was so noticeable that it attracted the attention of the patrons and pleased them. At some points question boxes were maintained to good advantage in connection with the efficiency association meetings.

The agent at Tulsa, Okla., reported these meetings as one of the best schemes he had ever seen, and that not the least important advantage was the fact that instructions could be placed

*This additional supervision was provided December, 1913. See article on "The Agency Plan on the St. Louis & San Francisco," March 20, 1914, page 671.

before the men at such meetings in a far better way than either by letter or a personal talk with each man. This latter is a point well worth considering. Too little attention is often given to the education and training of station employees. It is remarkable how much can be done in an open discussion at a general meeting to educate these men and inspire them to greater and better efforts.

As may be imagined, the superintendent of freight loss and damage claims was not slow in taking advantage of the opportunities afforded by the efficiency associations for getting the loss and damage problem placed squarely before the members. A regular stream of reminders, circulars, bulletins and statistical data started to flow from his office to the officers and committee chairmen. These increased in number and effectiveness as the campaign developed, and will be considered in more or less detail in the second and third articles in this series.

So much for the efficiency associations. They are doing splendid work, the value of which cannot be discounted. On the other hand, there are many places where because of local conditions it has been impossible to organize and develop them. Moreover, good as the work was which was being accomplished in reducing loss and damage to freight, it was felt that even more aggressive and widespread efforts should be adopted. The next step in the campaign will be considered in the second article of this series, which will appear in next week's issue.

PACIFIC TYPE LOCOMOTIVES FOR THE UNION PACIFIC

A few years ago a number of standard locomotives were designed for service on the Union Pacific.* Since that time this road has developed and standardized a heavier Pacific type locomotive to handle the increased weights of passenger trains and the increased volume of mail; 25 of these locomotives have been built by the Lima Locomotive Corporation.

The engines were intended to provide greater sustained power at high speed, and are a distinct advance over the Pacific type locomotives previously referred to, the tractive effort being 38,600 lb., as against 29,900 lb. for the older engines, while the diameter of the cylinders has been increased from 22 in. to 25 in. The stroke, diameter of drivers and boiler pressure was not changed. With the 29 per cent increase in tractive effort the total weight of the engine was increased from 221,100 lb. to 273,500 lb., or 23.7 per cent. The boiler was changed from the straight top to the wagon top type, the outside diameter of the first ring being increased from 70 to 74 in. The length of tubes was increased from 20 ft. to 22 ft. Superheaters were applied in both cases and maintain substantially the same ratio to the total evaporative heating surface. The larger boiler, however, provided an increase in the total evaporative heat nearly 50 per cent and an increase of 47 per c equivalent heating surface. In addition to the increa there is thus provided a substantial increase in the steam pacity in order to take care of the sustained speed requireme

These locomotives are distributed over the main line district, from Omaha, Neb., to Ogden, Utah, and on the west end of this line there are many grades averaging 0.7 per cent. The engines maintain time card speeds of 41 miles per hour with from six to eight heavy storage mail cars, and on one occasion a run was made from North Platte, Neb., to Omaha, a distance of 291 miles, in 290 minutes, including six stops.

In the detail construction of these locomotives interchangeability of parts has been very carefully considered, a large number of the parts being duplicates of those used on the road's Mikado type engines.

The engines are equipped with the brick arch Schmidt superheater and power reverse gear. The Walschaert valve gear, which is the standard of the Union Pacific, is also employed. The main valves have a travel of 6½ in., with 1¼ in. lap, ¼ in. lead and ⅛ in. exhaust clearance. With the increased length of boiler it was necessary to increase the total wheel base of the engine 2 ft. 4 in. over that of the previous Pacific type; the driving wheel base, however, was maintained at 13 ft. 4 in., the same as in the previous engines.

The following table gives the principal dimensions and ratios of the old and new Pacific type locomotives:

	Old	New
General Data		
Service	Pass.	Pass.
Fuel	Oil	Coal
Tractive effort	29,900 lb.	38,600 lb.
Weight in working order	221,100 lb.	273,500 lb.
Weight on drivers	141,500 lb.	164,100 lb.
Weight of engine and tender in working order	382,000 lb.	440,000 lb.
Wheel base, driving	13 ft. 4 in.	13 ft. 4 in.
Wheel base, total	33 ft. 4 in.	35 ft. 8 in.
Wheel base, engine and tender	68 ft. 6¼ in.	70 ft. 3¼ in.
Ratios		
Weight on drivers ÷ tractive effort	4.72	4.25
Total weight ÷ tractive effort	7.36	7.09
Tractive effort × diam. drivers ÷ equivalent heating surface*	652	572
Equivalent heating surface* ÷ grate area	71.3	73.8
Firebox heating surface ÷ tube heating surface, per cent	7.3	6.3
Weight on drivers ÷ equivalent heating surface*	40	31.6
Total weight ÷ equivalent heating surface*	62.6	52.7
Volume both cylinders (cu. ft.)	12.32	15.90
Equivalent heating surface* ÷ vol. cylinders	286	326
Grate area ÷ vol. cylinders	4.01	4.42
Cylinders		
Kind	Simple	Simple
Diameter and stroke	22 in. x 28 in.	25 in. x 28 in.
Wheels		
Driving, diameter over tires	77 in.	77 in.
Driving journals, main, diameter and length	10 in. x 12 in.	11 in. x 12 in.

Latest Development of the Pacific Type Locomotive on the Union Pacific

*For description see American Engineer, January, 1913, page 5.

Wheels—(Continued)

Driving journals, others, diameter and length	9 in. x 12 in.	10 in. x 12 in.
Engine truck wheels, diameter	33½ in.	33 in.
Engine truck, journals	6 in. x 10 in.	6½ in. x 12 in.
Trailing truck wheels, diameter	45 in.	45 in.
Trailing truck, journals	8 in. x 14 in.	8 in. x 14 in.

Boiler

Style	Straight	Wagon top
Working pressure (lb. per sq. in.)	200	200
Outside diameter of first ring	70 in.	74 in.
Firebox, length and width	108 in. x 66 in.	120⅝ in. x 84 in.
Tubes, number and outside diameter	173—2 in.	210—2¼ in.
Flues, number and outside diameter	24—5¾ in.	32—5½ in.
Tubes and flues, length	20 ft.	22 ft.
Heating surface, tubes and flues	2,477 sq. ft.	3,731 sq. ft.
Heating surface, firebox	181 sq. ft.	235 sq. ft.
Heating surface, total	2,658 sq. ft.	3,966 sq. ft.
Superheater heating surface	380 sq. ft.	815 sq. ft.
Equivalent heating surface*	3,528 sq. ft.	5,188 sq. ft.
Grate area	49.5 sq. ft.	70.4 sq. ft.

Tender

Tank	Vanderbilt	Vanderbilt
Weight	160,900 lb.	166,300 lb.
Wheels, diameter	33 in.	33 in.
Water capacity	9,000 gal.	9,000 gal.
Coal capacity	2,940 gal.	14 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

THE PROPOSED TRANSCONTINENTAL RAILROADS OF AUSTRALIA

By W. D. Hornaday

The commonwealth of Australia has now completed about one-third of the transcontinental railway which it is building from Port Augusta in South Australia to Kalgoorlie in Western Australia. This line, when finally completed, will be 1,063 miles in length and will form a connecting link between the present railways of the state of Western Australia and those of South Australia, Victoria, New South Wales and Queensland, although the differences in gage will prevent an interchange of cars. It will thus be part of a greater transcontinental route, 2,500 miles in length, extending from Sydney on the Tasman Sea to Freemantle on the Indian Ocean, traversing the southern part of the continent from east to west and touching the cities of Melbourne, Adelaide, Perth and a number of smaller towns.

The Railways of Australia

Many difficulties have already been encountered in the construction of this great transcontinental system. The enterprise as a whole is complicated to begin with because the several divisions that comprise the completed portions of the line are now owned by the governments of the states in which they are situated while the long connecting link that remains to be constructed is a commonwealth project. The first work on the commonwealth's section was done at Port Augusta, on September 14, 1912. It was originally thought that it would take about four years to build the road, but, at the expiration of two years, only about 200 miles has been completed. The original estimate of the cost of construction was about $20,000,000, but it is now known that that sum will be exceeded by several millions. Politics have interfered with the project ever since its conception. The work, for instance, was inaugurated under the administration of the labor government. The next government, however, rescinded several of the contracts which had been made and thereby delayed the work considerably. The commonwealth's railway for nearly its entire length will pass through a desert region almost wholly uninhabited except for a few points where oases have been created by the development of a water supply. The government in consequence has experienced no little difficulty in arranging for the supply of water and food, medical attention and amusements for the men working in the remote districts. The route, on the whole, offers no important engineering difficulties as the country it traverses is comparatively level.

The gage of the new railway is to be 4 ft. 8½ in. The railways of Victoria and part of those of South Australia are of 5 ft. 3 in. gage; those of Queensland, Western Australia and part of South Australia are of 3 ft. 6 in. gage and those of New South Wales are of 4 ft. 8½ in. gage. It is probable that the decision of the commonwealth to have its railways of standard gage will exert great influence in causing that gage to be made standard throughout the continent. However, the cost of conversion of the existing roads not now standard gage is estimated at about $200,000,000.

The commonwealth government also expects to construct another great trancontinental railway within the next few years from a point on the Port Augusta-Kalgoorlie line in Western Australia to connect with the proposed extension of the Northern Territory railroad, a distance of about 1,000 miles. This latter line, together with the completed link that is now owned by the government of South Australia and the line that runs from Darwin on the north coast to Katherine, will form a north and south line across the continent, about 2,000 miles in length.

The fact that Freemantle on the east and west line is the nearest Australian port to England and that it holds this same relation to the near East, including India and Egypt, makes this new line of vast importance to the whole eastern seaboard of Australia where the population and industries are now chiefly centered. It means a step in the reduction of Australia's geographical disability and, when considered in connection with the new lines of railway that are being constructed in Asia, it affords a prospective reduction of several days in the voyage between the eastern portions of Australia and Europe.

A CORRECTION

In an article entitled "Safety Cut-Out Valve," which appeared on page 708 of the March 26 issue of the *Railway Age Gazette*, the position of the valve shown in Fig. 3 is referred to as being used by the second engineman when he desires to assume control of the brakes while double-heading. The position shown in Fig. 3 is not used in double-heading, but is used in handling cars on the front end of the locomotive, after their train line has been charged by the position shown in Fig. 4. When the second engineman desires to control the train when double-heading he places the valve in the position shown in Fig. 1.

Progress on the Siamese Southern Railway.—It is reported with reference to the progress of the Siamese Southern Railway that considerable difficulty has been experienced, owing to the swampy nature of the ground, in finding a suitable crossing over the Patani (or Goloh) river in order to carry the railway southward to connect with the railway system of the Federated Malay States. After several surveys the difficulty has now been overcome, and the point of junction has been definitely fixed. The route to be followed has been laid out for a distance of about 93 miles south of Ootapao, leaving still some 44 miles, which is is hoped to get completed within a short time.

Hearing on Western Freight Rate Advances

General Evidence on Behalf of Protestants Concluded and Carriers Given Five Days to Complete Testimony

Representatives of the western state commissions and shippers who are opposing the western rate advances occupied four days of last week, from March 30 to April 2, with the introduction of their general evidence in rebuttal of that of the carriers bearing on the general financial condition of the railroads. This was followed on Saturday by uncompleted evidence by the carriers which was to continue until Thursday of this week. Commissioner Daniels announced that the request of Clifford Thorne for an adjournment for 10 days had been declined and that under the schedule for the remainder of the hearing April 9 and 10 are allotted to protestants' evidence on hay and broom corn; April 12 and 13, to cotton piece goods; April 14, 15 and 16, to coal and coke; April 17 to 21, grain and grain products; April 22 and 23, fruits and vegetables; April 24, rice and rice products; April 26 to 30, packing house products and fresh meats; May 1 to 5, livestock; May 6 to 10, uncompleted testimony of protestants. Briefs are to be filed 20 days after the close of the hearing and a date for arguments will be set in June.

Representatives of the railroads have agreed to furnish to the other side copies of minutes and correspondence of the tariff committees bearing on the proposed advances, with names of roads and of individuals concealed by the use of numbers or other devices. The railroads were willing to furnish copies of minutes of the meetings but made some objection to the introduction of the correspondence. Commissioner Daniels said he thought this correspondence ought to be furnished in so far as it threw any light on the reason for making advances on the specific commodities.

At the opening of the protestants' case the committee of state commissioners filed a new appearance showing the committee as representing also the Utah Traffic Club, the American National Livestock Association, the National Council, Farmers' Co-operative Association, National Broom Manufacturers' Association, National Hay Association, and other individual firms and companies.

TESTIMONY OF PROTESTANTS

The first witness for the protestants was Henry C. Wallace of Des Moines, Iowa, editor of a farm paper. He declared that the present attempt to advance rates in the west was largely a conflict between the railroads and the farmers, and that the great body of investments in the United States, including over $40,000,000,000 worth of farm property, only expects a return of 3 to 5 per cent, while the railroads are attempting to establish for themselves a basis that will yield from 7 to 9 per cent, the great burden of which would fall upon the farmers. The farmers of Iowa, he said, are getting a return of not more than 3 per cent on their investment after making an allowance for the farmer's own labor of only $600 a year, while billions of dollars seek investment at from 2½ to 5 per cent and the bonds of well-managed railroads have sold readily at prices which net the investor between 4 and 4½ per cent and the stocks of good roads have sold readily at prices which net the investor less than 6 per cent.

C. C. Wright, attorney for the railways, asked how many automobiles the Iowa farmers owned. The witness admitted that they owned a great many, but he did not know the number. He admitted he had had opportunities to invest money and had invested in farms, and had never invested in railway bonds, stocks or other securities, nor did he know of any one who ever sold farms to invest in railways.

J. Pease Norton, formerly assistant professor at Yale University, and now a bond expert and financial writer, testified regarding the reasonable rate of return on investments. "The true criterion as to a reasonable rate of return," he said, "is the yield the public is willing to accept on its investment. The railroad testimony in the present case appears to be built up on the theory that this rate is 7 per cent, but this is not the case. Applying this test to the bonds of 10 representative roads we find that in 1914 the public was willing to accept an average return of 4.583 per cent, against the railroad claim of 7 per cent."

Mr. Norton presented an exhibit containing tables showing the yields on bonds of various kinds over a period of years. He also presented figures as to the cost of railway supplies, saying that advance figures for 1914 on 82 articles of railway supplies compiled by the Department of Commerce and Labor show that the average price for that year was 123.5 per cent of the average for the period 1890 to 1899, as against 131.5 per cent in 1913.

On cross-examination Mr. Wright asked Mr. Norton how it happened that his exhibit on the reasonable rate of return was identical as to the wording, and largely so as to the figures, with exhibit No. 13, introduced by Mr. Thorne in the Eastern rate case. Mr. Norton said that the exhibit was a joint production of himself and Mr. Thorne, that no change had been made in the principles and arguments set forth, but that the statistics had been brought up to date, and that he had interpolated some additional matter in placing it into the record.

Wayne Ellis, statistician of the Iowa Railway Commission, introduced exhibits to show that the tendency of net returns during the past five years has been higher than ever before in the history of the railroads, that the ability of the carriers to secure capital on favorable returns was never greater and that the cost of supplies is decreasing. One of Mr. Ellis' exhibits, he said, showed that the average percentage of net earnings on the capital stock of railroads serving the bulk of Western Trunk Line territory, was 7.82 per cent in 1914, and 9.4 per cent in 1913. These roads, he said, handle 84.55 per cent of the traffic in the territory. He also presented an exhibit showing 20 roads which he said handled 75 per cent of all the freight traffic handled by roads earning over $1,000,000 a year in the western district, showing earnings on common stock ranging from 6.06 per cent in the case of the Chicago, St. Paul, Minneapolis & Omaha, to 78 per cent for the Duluth & Iron Range. This table included, however, a number of roads not connected with this case.

"During the past five years," said Mr. Ellis, "the net revenues of the western railroads are greater than ever before. The net per mile of line is greater. As compared with 1890, this period shows an increase per mile of line of 74.99 per cent. The greatest previous increase for a consecutive five-year period was only 67.28 per cent. The same is true after the reduction of taxes. Less taxes, the total net revenue for this last period showed an increase of 156.75 per cent compared with 1890 and the next preceding five-year period showed an increase of 151.14 per cent.

"The railroads claim that operating expenses have increased at a greater rate than net revenues, but this is true only during the last five years. And while the increase of operating expenses per mile of line was 91.91 per cent compared to 1890, at the same time the increase in maintenance was 111.44 per cent. The cause of this is, that the railroads have charged to operating expenses large amounts connected with additions and betterments. The western railroads are being built up and improved from operating expenses."

Mr. Ellis' exhibit, in addition to the statistical table, contained many pages of text making deductions from the figures and arguments based thereon, which the witness read in giving his testimony, but when counsel for the railroads sought to cross-examine on them Mr. Thorne objected, saying the witness was only supposed to testify as to the accuracy of the compilations. After some argument Mr. Thorne took the stand himself to tes-

tify as to the text of the exhibits. Mr. Thorne was cross-examined as to his statement that railroads had charged improvements to operating expenses by M. O. Lorenz, a statistician for the Interstate Commerce Commission. "How can a railway make improvements from operating expenses without evading the commission's rules of accounting?" he asked. "Some items could be charged to expenses without violating the rules," said Mr. Thorne. Mr. Lorenz said that to that extent then, the expenditures for betterments would be understated.

One of the exhibits as to which Mr. Thorne testified, was a book of 62 pages on maintenance expenditures. "It has been claimed," it was stated in the text, "that the large increase in other expenses has prevented our railways during recent years from having money to put into better facilities, improvements, etc., and that as a consequence they have been running behind recently. These remarkable increases in maintenance charges suggest the possibility of building betterments and improvements and charging them to operating expenses. If that be possible then a declining net revenue and net income would be shown without any loss to the carrier, and the result—a mere matter of bookkeeping—could be used for certain very obvious purposes.

"We find under existing accounting rules that it is possible to charge many expenditures to operating expenses under the head of maintenance, that can also legitimately be charged to additions and betterments, according to whatever course may chance to suit the policy of the company. Sufficient doubt exists as to the interpretation of some of these rules as to give room for various courses of action. In addition to this, the rate of renewals from year to year is subject to the control and policy of the company officials. Maintenance expenditures can be delayed from year to year, or several years could be packed in one year.

"The agitation for this proposed advance in rates started in 1913. Maintenance charges for western district railroads for that year were larger than for any previous year in their history. This exhibit discloses the remarkable fact that in every instance where there is a decline in net revenues, comparing 1914 with 1912, the increase in maintenance exceeds the decrease in net revenues with only one exception, the Chicago & Alton Railroad."

U. G. Powell, rate expert, and in charge of accounts for the Nebraska Railroad Commission, introduced several bound volumes of statistical exhibits, to show, he said, "that the exhibits introduced by the carriers do not correctly show the true comparisons between the period since 1907, when the accounting rules of the Interstate Commerce Commission became effective, and the eight-year period prior thereto, because in the prior period a very large amount of additions and betterments were paid out of surplus and charged to profit and loss, and in the latter period were charged to property investment.

"The special study made by me of six roads, to wit: Santa Fe, Burlington, Milwaukee, North Western, Rock Island and the Katy, which own 49,006 miles of road, or over 50 per cent of the mileage of the roads involved in this controversy shows that, in the period 1898 to 1906, $86,220,421 was the combined surplus earnings of said roads used in additions and betterments not shown in the property investment account, and that, in the period 1907 to 1914, not only was surplus so applied, charged to property investment account, but that the carriers in addition charged off as a part of operating expense an arbitrary depreciation charge of $67,098,737. While this amount is deducted arbitrarily by the carriers from their income it is not carried on their books as an actual liability against the assets of the companies.

"The depreciation fund so created is not generally speaking used in the replacement of property worn out or displaced. The present rules provide that all property worn out or replaced may be and it is charged to repairs. The carriers geneally speaking use the depreciation fund so created in additions and betterments which are charged to property investment account.

"In substance the study shows that the six roads in question had a net income over and above all expenses sufficient to pay an average return of 7.51 per cent in the first eight-year period, and 8.02 per cent in the last eight-year period on all property investment excluding so much thereof as was paid for out of surplus earnings and an average return of 6.13 per cent for the first eight-year period, and 6.06 per cent for the last eight-year period shown by the carriers' own balance sheet. If the $86,220,421.82 charged by the carriers to their profit and loss account in the first eight-year period were carried in their property investment account as required and done in the second period, the average rate of return on all property investment would be greater in the latter period than the former.

"The net surplus of the six roads in question after paying all operating expenses, taxes, interest and dividends in the first eight-year period was $190,681,161.60, and in the second period $228,412,885.69, or a total for the entire period of $419,094,047.29."

Cross-examination of Mr. Powell by Mr. Wright showed that by deducting improvements and additions paid for out of surplus the value of the Burlington figured out $3,000 per mile less in 1914 than in 1899, $30,000 per mile against $33,000 per mile. The witness' figures also showed the value of the Rock Island at $2,000 less per mile than 15 years ago. Mr. Wright asked if he considered his six roads representative. Mr. Powell said they cover the territory, but admitted that a larger list would have been more representative. He said he had not included some of the roads in the hands of receivers because their condition was the result of improper location.

D. F. Jurgensen, chief engineer of the Minnesota Railroad & Warehouse Commission, testified as to a large number of exhibits based on the state appraisals of railroad properties in Michigan, Minnesota, Wisconsin, Nebraska and South Dakota to show that the capitalization of the roads not only exceeds the present value but the book cost as well. Other exhibits were presented to show that the depreciation reserve set up to take care of obsolescence of equipment and to maintain the railroad properties had not been so used but had been expended for additions and betterments. Mr. Jurgensen said that the capital stock and funded debt outstanding, apportioned on a main line mileage basis to the states in which the appraisals were made, averages $56,198 per mile of main line and the book cost reported by the railroads averages $51,398 per mile, and that the book cost is $139,093,327 less than the capital stock and funded debt outstanding, while the depreciated book cost is $455,333,754 less than the capital stock and funded debt, representing a value of $40,485 per mile. The present cost of the property within the five states, as compiled by him from the state valuations, not including depreciation but including an allowance for general expenditures, he said, is $445,787,430 less than the capital stock and funded debt outstanding. This cost represents $40,815 per mile. The present depreciated cost, including general expenditures, he figured at $691,659,626 less than the capital stock and funded debt apportioned to these states. This depreciation cost represents $32,330 a mile.

On cross-examination Mr. Wright showed that these figures took the value of railway property in states where their lines were the cheapest and applying those figures to the entire line, and that as to the North Western the witness' figures had been taken from states where the road was largely single track, while in states where it was double-tracked and had expensive terminals no valuation had been made.

ADDITIONAL EVIDENCE FOR CARRIERS

Depressed and subnormal rates prevailing on import traffic from the Gulf of Mexico, forced by competition with direct rates from Europe via North Atlantic ports, and the fact that import rates from these North Atlantic ports, the main depressing factor, already have been raised, disturbing the relationship, were given as reasons why gulf lines are asking permission to increase import rates from gulf ports. W. M. Rhett, assistant to freight traffic manager of the Illinois Central, in charge of foreign business, took the stand on Saturday, April 3, to justify the proposed advances. The increases range from ½ cent to 5 cents per 100 lb., and apply on imported commodities, such as sulphate of ammonia, chalk, clay, potash and other fertilizer material, fuller's earth,

glycerine, magnesite, spelter, vegetable tallow, whiting, brewer's rice, pig lead, crockery and earthenware, sisal, flax waste sweepings, linoleum, hemp and manila. The advances apply to interstate points, Mr. Rhett testifying as to points east of the Mississippi river, including St. Louis.

"Even with the advances," said Mr. Rhett, "we would still be far below the normal basis. The first-class domestic rate, New Orleans to Chicago, is $1.10, being a normal first-class rate. The import rate is only 57 cents, forced by an 18-cent differential under the 75-cent rate from New York. If 75 cents is reasonable from North Atlantic ports, surely 57 cents is reasonable for practically the same distance from the gulf. Low rates have been necessary to induce traffic to move via the longer route through gulf ports. Import rates thus are in a depressed and subnormal condition to meet competition from New York. How potent is competition is shown by the fact that the import tonnage from Europe to competitive territory moves 78 per cent through North Atlantic ports and 22 per cent through gulf ports. The total added revenue which would accrue from the proposed advances to the gulf lines would be only about $50,000 yearly."

J. W. Allen, assistant general freight agent of the Missouri, Kansas & Texas, and C. C. P. Rausch, assistant general freight agents of the Missouri Pacific, corroborated Mr. Rhett's testimony largely as to points west of the Mississippi river.

B. J. Rowe, coal traffic manager of the Illinois Central, testified as to the reasonableness of proposed advances in coal rates from Illinois and Indiana mines and Chicago to Iowa, Missouri, Minnesota, Wisconsin and the Dakotas. The advances in general are 5 cents a ton to central and southern Wisconsin; 10 cents a ton to points on the west bank of the Mississippi river and west thereof in Iowa, Missouri, Minnesota and part of the Dakotas. In northern Minnesota and part of northern Dakota there is a general revision of rates.

"In this latter territory," said Mr. Rowe, "the revision entails reductions as well as increases and there are, in fact, more reductions than advances. Taking this western territory as a whole, the advance averages 7.95 cents per ton."

The proposed advanced rates on bituminous coal to Missouri river states would earn, in all cases, less per ton mile than present rates to various representative states west of the Missouri river on hauls of about the same length, according to C. E. Warner, assistant general freight agent of the Missouri Pacific, who testified on Monday. Rates to those cities west of the Missouri have been advanced, the witness testified, and the readjustment is asked east of the river to bring this territory to a more self-sustaining basis. Mr. Warner took the stand to justify the proposed advances of 10 cents per ton from coal mines in Missouri, Kansas, Arkansas and eastern Oklahoma to Missouri river states. He introduced exhibits showing rates from southern Kansas and southwestern Missouri and other mining districts showing distances and the proposed rates, bringing out the fact that the commodity rate on coal, which belongs properly to Class D, is far below the rate prevailing on lower Class E, which covers such articles as sand, brick and sewer pipe.

Eugene McAuliffe, general coal agent of St. Louis & San Francisco, presented additional exhibits showing the cost of assembling and transportating bituminous coal. "Figures covering 16 railways," he said, "show that bituminous coal is 28.57 per cent of the total revenue freight tonnage. The revenue therefrom is 12.92 per cent of the total freight revenue, while the percentage of coal cars to total freight cars is 31.54 per cent, or 27.18 per cent if cars used for company coal are deducted. This means that we handle 28.57 per cent of our freight tonnage, using 27.18 per cent of our revenue freight car equipment, to get 12.92 per cent of our freight revenue."

George H. Kummer, coal freight agent, of the Chicago & Eastern Illinois, testified that in the fiscal year 1914 the Chicago & Eastern Illinois handled 7,476,933 tons of bituminous coal, on which the yield was only $4,168,388. Total other freight handled was only 6,326,842 tons, but the yield therefrom was $7,155,904.

C. W. Galligan, general freight agent of the Chicago & Alton, testified that rate wars in the past were largely responsible for the level of rates on bituminous coal prevailing on western railways. His testimony referred to advances from Illinois and Indiana to Kansas City, Omaha and other Missouri river points.

C. Haile, vice-president of the Missouri, Kansas & Texas, and C. E. Spens, assistant freight traffic manager of the Burlington, testified on Tuesday concerning livestock rates.

CARRIERS SUBMIT NEW PLANS FOR ADJUSTMENT OF TRANSCONTINENTAL FREIGHT RATES

Traffic officers of the western transcontinental lines will appear at a hearing before Examiner Thurtell of the Interstate Commerce Commission at Washington on April 12, to present new plans for the adjustment of trancontinental rates. The report of the commission issued January 29, respecting commodity rates to Pacific coast terminals and intermediate points, in which relief was allowed from the fourth section to enable the carriers to meet water competition on a large number of commodities designated as Schedule C, on which the water competition is especially keen, directed the carriers to submit within 60 days a plan for the adjustment of rates to so-called back-haul points.

The lines leading to California terminals have submitted the following plan for making rates from eastern defined territory to such points. It is proposed to deduct from the terminal commodity rate 7 cents per 100 lb. on carload freight and 10 cents per 100 lb. on l. c. l. freight for basing rates, to which are to be added the full local rates from the nearest terminal points to destination. This basis is to prevail eastward from the terminal points until the point is reached where the direct rate is the same as or less than this combination. In no case shall the rates to any back-haul points be less than to the terminal point.

The plan submitted by the north coast lines provides that rates to points in Group 2, as shown in T. C. F. B. tariff 4-L shall be made by adding to the terminal rates not more than 5 cents per 100 lb. per carload shipment, and 10 cents per 100 lb. for less than carload shipment; that rates to points in Group 3, shall be made by using terminal basing rates, 5 cents on carload and 10 cents on less than carload shipments, less than the rates to Pacific coast terminals. To these basing rates shall be added the lowest rate applying from any Pacific coast terminal point, provided that the rate thus made shall not be less than the rate for similar shipments to Group 2 points, or more than the rate for similar shipments to Group 4 points. The Washington-Idaho line is to be the eastern boundary of Group 4, with the exception of points on the line of the Northern Pacific from Pullman, Wash., to Lewiston, Idaho, which are to be included in Group 4. Rates are to be made to points in Group 4 by the same method as to Group 3, except on a limited list of carload commodity rates embracing staple articles shipped by sea, upon which lower rates are necessary to insure direct movement from the East and permit reasonable competition in the distribution from Group 4 points, as against shipment by sea, and subsequent distribution of the same commodities from Pacific coast ports.

This list of commodities, designated as Schedule C-2, includes canned goods, coffee, iron and steel articles, concentrated lye, paper, soap and starch. In the republication of tariff 4-L an additional group is to be provided to include those points on each road which are situated east of the east boundary of Group 4, as above described, and west of the Idaho-Montana state line. The rates to points in this group, No. 5, are to be made in the same manner as rates to points in Group 4, except that the rates on the commodities named in Schedule C-2 shall be 10 cents per 100 lb. higher than the rates on the same commodities to points in Group 4.

Rates from eastern defined territory to points east of the eastern boundary of Group 5 are to be limited by the maxima prescribed in the report of the commission, but the rates on the Schedule C-2 commodities are to be not more than 10 cents

higher than the rates on the commodities to points in Group 5.

The carriers have also petitioned the commission for a modification of that part of its order which fixes maximum commodity rates on less than carload shipments from Missouri river points to points intermediate to the Pacific coast. They have asked for authority to establish as maxima on less than carload commodities from the Missouri river to Intermountain territory rates made by taking 80 per cent of the present class rates from the Missouri river to Reno, Phoenix and Spokane. They further propose that rates from points east of the Missouri river may be made by adding to the rates above named the differentials prescribed by the commission in its report.

The commission has extended the effective date of its order on Schedule C from May 1 to June 1. A very large number of shippers in the middle western states have written to the commission, asking that their commodities be included in the list on which reductions may be made to the Pacific coast terminals in order to meet water competition, on the ground that they cannot otherwise meet the competition of shippers located near the eastern seaboard, who are in a position to ship via the Panama canal. In giving their reasons to the commission for the petition for a modification of the order on l. c. l. shipments, the carriers point out that they would hesitate to grant Chicago, St. Louis and other interior communities, rates to Pacific coast terminals upon less than carload shipments that they are asking for and which the carriers believe are necessary, because of the effect such rates would have upon their intermediate revenues, and that a curtailment of the list of l. c. l. rates now proposed in Schedule C, and denial to make such further additions as middle west shippers are asking for and which carriers are willing to grant, if protected against excessive reductions at intermediate points, would cause many complaints to both the commission and the carriers. The maxima suggested by the carriers they point out, would put the railroads in a position where they would not be embarrassed in granting applications to interior shippers for l. c. l. commodity rates to terminal points.

The railroads have also discussed a revision of some of their other rates to the coast terminals with a view to adding to the list of commodities in Schedule C on which relief was granted in the order, but difficulties have appeared and it is somewhat doubtful whether the list will be extended. It is proposed to publish the reduced rates on Schedule C commodities as soon as possible after the hearing.

INVESTIGATION OF WAGES PAID BY PULLMAN COMPANY

The United States Commission on Industrial Relations began a hearing in Chicago on Monday for the purpose of investigating the wages and conditions of employment of Pullman conductors and porters. L. H. Hungerford, general manager of the Pullman Company, was the principal witness the first day. He said the company employs about 2,500 conductors and 6,500 porters; that conductors are paid from $70 to $95 a month, with somewhat higher pay for special trains, and porters from a minimum of $27.50 a month on ordinary runs and $35 on tourist sleeping cars to $49.50 on private cars. All car service employees with clear records also receive an extra month's pay at the end of the year. Asked if the company expected its porters to bring their pay up to a living wage by "holding up" the public, Mr. Hungerford said that undoubtedly the porter takes tips into consideration in seeking employment at that rate of pay, but that the Pullman Company did not invent tipping, and simply accepts conditions as it finds them and pays what wages it has to to carry on the business.

As to the wages of conductors, he said that although they often work long hours they have nothing like the responsibility of a train conductor, for example, and have practically no more responsibility than the passenger who travels for pleasure. No previous experience is required and energetic young men have an opportunity for promotion in the service of the company. Ninety per cent of their district superintendents and their assistants and other officers have been conductors. Chairman Walsh asked if it was reasonable for any concern not to pay its employees a living wage and whether tipping ought not to be made unlawful. Mr. Hungerford said that that was too comprehensive a question for him to discuss. Mr. Walsh read into the records a large number of letters of complaints from Pullman employees objecting to long hours and low pay, and Mr. Hungerford was asked to discuss the points raised. He said that if conditions were so bad he did not understand why they had so many applicants for work and why if a man was discharged he tried so hard to be reinstated. Of the total number of porters, 1,721, or about one-fourth, have been in service 10 years or over and 1,704 have been in service between 5 and 10 years, making 3,425 out of the 6,500 that have been in service five years or more.

Mr. Hungerford said that as far as he had been able to ascertain the men in the company's employ were satisfied with their work, although he said the men may not be fully satisfied as to wages; few large bodies of workers are. Mr. Walsh brought out that two petitions had been sent to the company signed by conductors and porters asking for an increase in wages, one in June, 1912, and one in January, 1914. Mr. Hungerford said that these had been instigated by men outside of the service and that the company had not replied to them because there was no way of replying, except to issue a general circular. He said the petitions related entirely to wages and that the company had not received any general complaint about conditions of employment. Meetings were held in each district every three months with the employees and they had any opportunity to bring up suggestions for changes. Premiums were given for suggestions for the improvement of the service, and any or all employees had an opportunity to present any grievance to the officers. He also described the relief and pension systems of the company.

The principal grievances mentioned in the letters from employees were that they had longer runs and received less pay than train conductors, that on some runs they are only allowed 4 hours of sleep out of 24, insufficient layovers, and the fact that the cost of lost linen and supplies is sometimes deducted from their wages. Mr. Hungerford said that he did not believe in long runs and had reduced them wherever possible. He hoped to straighten out the entire situation some day. He said porters were not required to pay for small articles or linen lost, unless the loss was due to a clear case of negligence.

Mr. Hungerford was followed by R. W. Bell, a former Pullman conductor, who said he had been dismissed from the service for attempting to organize a Pullman conductors' and porters' federation.

Importance of Rule F.—A large per cent of loss of life and money could be saved and a corresponding number of good men who lose their positions could be saved, if men would report flagrant violations of the rules. I have often tried to figure out why this was not done more frequently and have about reached the conclusion it is for the want of backbone more than anything else. I know a number of men who report employees who have not carried out the rules, in cases, too, where no trouble was caused, but which sooner or later would result in trouble. Each man I have in mind is a man who carries out the rules himself and is known by all the men as a good man. No one ever criticizes these men; it is realized they have done the right thing and there is not room for criticism. Live up to the rules yourself, be strong and you can help yourself as well as the company by reporting men who are negligent and careless.—*E. H. Daniel in the Railroad Herald.*

Reconstruction of the Jersey City Terminal Yards

C. R. R. of N. J. Is Enlarging and Rearranging Its Facilities and Installing Electro-Pneumatic Interlocking

The extensive rearrangement and enlargement of the Jersey City passenger terminal of the Central Railroad of New Jersey, which was undertaken in 1912 to secure increased capacity and greater facility of operation is now practically completed. This project has involved the reconstruction of the ferry house, station building, ferry and train concourses and train shed, the construction of a new engine terminal at Communipaw, about one mile west of the station, the rearrangement and enlargement of the coach yard with the auxiliary shop buildings, the addition of new main tracks to Communipaw and the installation of a new electro-pneumatic interlocking system covering the entire terminal. The improvements effected in the ferry house, station building, concourses and train shed, were described in the *Railway Age Gazette* of July 18, 1913, and November 6, 1914, and an article in the issue of June 26, 1914, was devoted to the new engine terminal. The changes in yard facilities and interlocking are described in the following pages.

TRAFFIC

As mentioned in the description of the station improvement, this terminal is used by the Philadelphia & Reading, the Baltimore & Ohio and the Lehigh Valley, in addition to the Central of New Jersey. The maximum number of scheduled trains in 24 hours is about 200 each way. The Reading and the Baltimore & Ohio trains are operated by the Jersey Central in the same way as its own service, but the Lehigh Valley with about 12 trains each way daily, operates separately, using the Jersey Central tracks for about 10 miles. As the Jersey Central has a heavy suburban business, the number of trains is much greater than normal during the morning and evening rush hours, and as all passengers use the ferry boat service between the station and New York City, schedules are arranged in many cases so that several trains will arrive or depart at a time that will allow close boat connections, thus further aggravating the tendency to congestion during certain parts of the rush hours. The maximum number of trains regularly handled into and out of the station in one hour is about 38. In addition to these scheduled trains a large number of movements are necessary in making up trains from the coach yard, pulling out empty trains after their inbound runs, and in handling locomotives to and from the engine terminal.

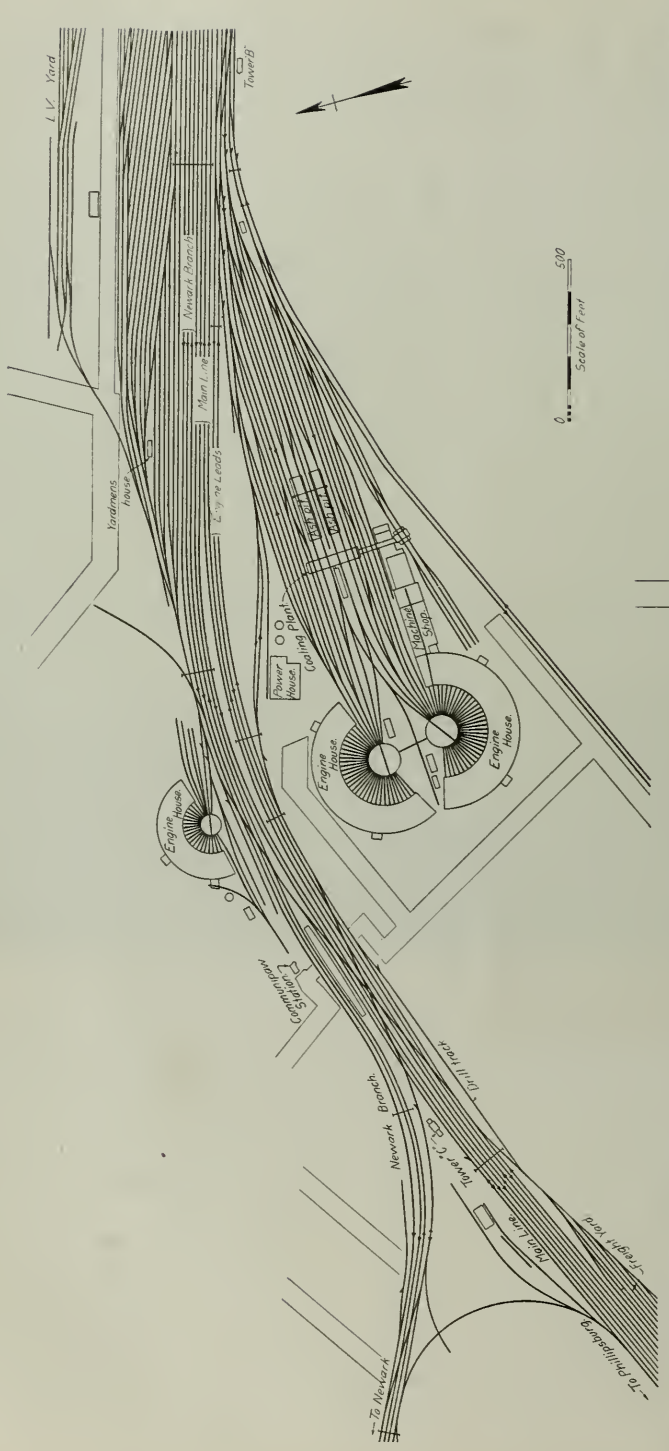
NATURE OF IMPROVEMENTS

The old layout consisted of 14 station tracks, 12 of which were under a shed and 2 main line tracks and 2 Newark branch tracks, the latter paralleling the main line as far as the junction with this branch at Communipaw. The passenger engines were handled in a terminal north of the main line near this junction, which was not ample in capacity or convenient in location or arrangement. The coach yards were located on a narrow strip between the engine terminal and the station north of the main tracks, as all property south of these tracks was occupied by the freight terminal. These limited quarters made necessary a 12-ft. spacing between tracks and the cleaning facilities provided could not be as convenient as the large number of cars handled warranted. In addition, it was necessary to cross the main line with all empty coaches moving between the yards and the southerly station tracks. The operation of switches and signals in the old terminal was controlled from two mechanical interlocking plants.

In planning for the improvement it was desired to provide additional main line and branch tracks to Communipaw, to replace the engine terminal by more commodious facilities, to enlarge and rearrange the coach yards, and to replace the mechanical interlocking by a system that would better safeguard and facilitate the operation of the terminal. The new layout includes 20 station tracks under the new shed and 4 main line and 3 Newark branch tracks to Communipaw. The second outbound Newark branch track was added in order to allow a heavy through train operating over the Newark branch and a Newark suburban train scheduled to leave at the same time to pull out together and both keep moving. The lighter train can reach Communipaw and make the station stop while the other train is reaching that point and passing it a sufficient distance to allow both to proceed at a safe interval on the same track. In addition to the Lehigh Valley and suburban trains a few Jersey Central trains for the main line and points on the shore branches are operated over this branch, connecting with the main line again at Elizabethport.

The new engine terminal was located south of the main

The Throat of the Yard Looking Towards the Station The New Signal Tower on the Right Is Partially Hidden by the Signal Bridge. The Car Repair Shed and Shop Buildings Are Shown on the Left



The Revised Track Layout of the Central Railroad of New Jersey Between the Jersey City Terminal and Communipaw

line and consolidated with the facilities for handling freight engines. This terminal is connected with the main interlocking plant by two engine leads which are operated left-handed. Between 225 and 300 freight and passenger engines are handled at this combined terminal daily.

The reconstructed yard north of the main line has a capacity of about 350 coaches, 100 additional can be stored in a new yard located south of the main tracks, and a third yard about one mile further west is used as an overflow yard. The track spacing in the new north yard is 14 ft. in general with alternate spaces of 17 ft. in the Pullman car-cleaning yard. A new repair shed, store house, oil house, shop, Pullman building and rest house have been built adjacent to the cleaning-yard and new service lines for gas, steam, water and vacuum and plug outlets for charging the storage batteries on the electric-lighted coaches have been installed throughout the yards. The facilities also include a new shed large enough to shelter two private cars. All Lehigh Valley equipment is cared for in a separate yard on adjacent property to the north, reached by a lead through the Central of New Jersey yard.

Looking West Through the Throat of the Yard Showing Double Crossed Ladders

The track layout in the main interlocking plant, known as "A," and located at the head of the train shed consists of a nine-track throat across which extend four ladders, two in each direction. At the west end two of the ladders are extended to the north to include four yard receiving tracks. At the east end where the layout is expanded to embrace the 20 train shed tracks, the four main ladders are supplemented by five additional ladders, two on the north side and three on the south. The layout provides for connections between the seven northerly train shed tracks and the north yard and the ten southerly tracks and the south yard outside of the limits of the main throat. It is possible to make simultaneously six moves between the train shed tracks and the coach yards, and at the same time make four moves between the main line and central train shed tracks.

The terminal interlocking is divided into three plants, A, at the throat of the yard, built new as part of the terminal improvement; B, at the engine terminal, built in connection with the new work at that point, and C, at the junction of the main line and the Newark branch, altered to conform to the new standards.

The work of reconstructing these yards had to be handled in stages in order to avoid interference to traffic. During the reconstruction of the train shed and station tracks, numerous temporary changes in the throat of the yard were necessary and a 29-lever electro-pneumatic interlocking machine was installed in the old tower 1 to control the added functions. When the new engine terminal was put in service in May, 1914, some track and interlocking changes were made at the old tower 2 to get engines in and out of the new layout. At this stage, however, it was necessary in many cases for an engine to run to Communipaw and back, as it was impossible to reach the northerly five station tracks without a reverse movement. The next step was to connect up the new engine leads and complete as much as possible of the permanent work in the throat of the yard. This step required the installation of 23 double slip switches and the functions included represented about 40 per cent of the operated units in the new plant A. The new westerly coach yard was also built during this stage. The control of this portion of the plant was turned over to the new tower on November 9, allowing engines to move directly to and from the engine terminal.

The next move was to connect up the newly completed coach yard with the running tracks, placing the functions under control of the new interlocking plant and putting the old tower 2 entirely out of service. This was completed December 27. At the same time a temporary lead to the Lehigh Valley coach yard was installed. The remaining steps consisted of connecting up the northerly five house tracks with the double crossed ladders, then the southerly six tracks and two additional northerly tracks, and finally the middle seven. These stages were placed in service on January 24, February 28 and March 20, respectively. At the same time the remaining coach yards were completed in sections, the permanent lead to the Lehigh Valley yard was put in, and the new shops and service lines were completed. The changes to the interlocking at tower C were made after the completion of tower A.

YARDS, SHOPS AND SERVICE LINES

The main tracks are laid with 100-lb. A. R. A. section-A rail, tie-plates, creosoted yellow pine ties and switch timbers and stone ballast. The yard tracks are of 90-lb. or 80-lb. relaying rail on creosoted ties in cinder ballast. Duquesne rail joints and Keystone insulated joints are used throughout. No. 9 turnouts are standard with rail-bound manganese frogs and manganese switchpoints for main line switches. All crossing frogs within the interlocking limits are of solid manganese.

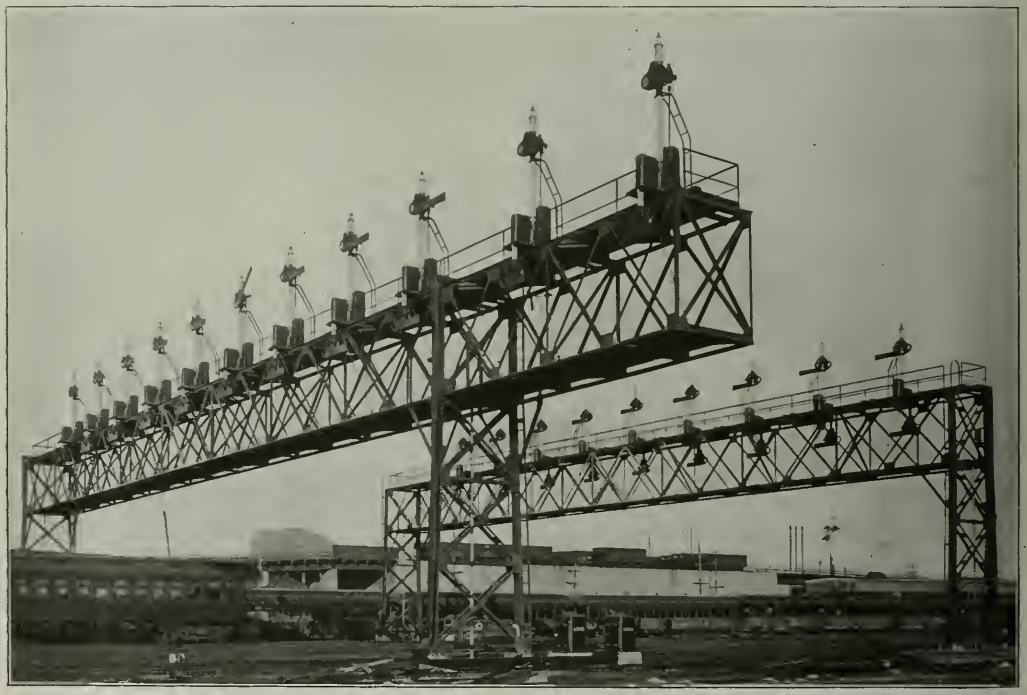
The drainage in the yard is collected by 6-in. lateral drains under the tracks leading to sewers along each side of the yard which empty into a 24-in. outfall sewer. The lateral drains are of cast iron under the tracks and vitrified clay between, laid with open joints. Catch basins are located at frequent intervals to receive most of the surface run-off.

The yard buildings and facilities include a repair shop 180 ft. long with a single track over a full-length pit and a cross drop pit in the center, a space for wheel storage, a two-story shop with offices on the upper floor, an oil house equipped with eight tanks and a pumping system installed by the

Wayne Oil Tank & Pump Company, Fort Wayne, Ind., a storehouse, Pullman building and rest house, with a cantilevered concrete material platform. The car repair shed is an open steel frame structure with wooden roof covered by a prepared roofing. The upper portion of the sides is sheeted with asbestos covered with corrugated iron and on the side facing the street the lower portion is filled in with a concrete wall. The other buildings are of concrete and hollow tile construction on piles 80 to 85 ft. long. A floor construction that is strong and at the same time light and inexpensive was adopted, consisting of lines of hollow tile embedded in the lower portion of the concrete floor at intervals about equal to the width of the tile.

All coach yards are equipped with air, gas, steam, water and vacuum lines. The steam line was designed with more than the usual care with a view to economizing steam in the numerous long runs. No pipes less than 6 in. in diameter of the Railway Signal Association. Since all movements within the limits of the terminal are at moderate speed the high speed blade was omitted in plants A and B. At tower A, the upper of the two arms governs moves over all routes fully equipped with track circuits and the lower arm is used for closing in when the section of track to be entered is occupied. The signals in the plant at tower C are arranged to indicate for high speed main line movements.

In the plant at tower A, 16 signal bridges were required, three of these being of considerable length. One spans 10 tracks, another 11 tracks, and a third 10 with an additional two-track cantilever end. The signals are the Union Switch & Signal Company's three-position upper-quadrant electro-pneumatic type employing tandem cylinders. The lower blades are suspended below the upper chord in all bridge mounted signals. The upper blades are semi-automatic and the lower are non-automatic. The signals are electric-



Two of the Long Signal Bridges in the Jersey City Terminal. The One on the Left Spans Ten Tracks and Has a Two-Track Cantilever End

are used, all being of extra heavy galvanized pipe covered with asbestos and encased in cast iron pipe with lead caulked joints. The steam is supplied both from the Communipaw power plant and the service building at the station, the distributing lines being connected so that they can be supplied from either end. The air is also supplied from both ends, the vacuum from the service building and the Pintsch gas from a plant near the terminal. All electric wires, including the Western Union, telephone and power lines are located underground in lead covered cables in wrought iron conduits encased in concrete.

INTERLOCKING

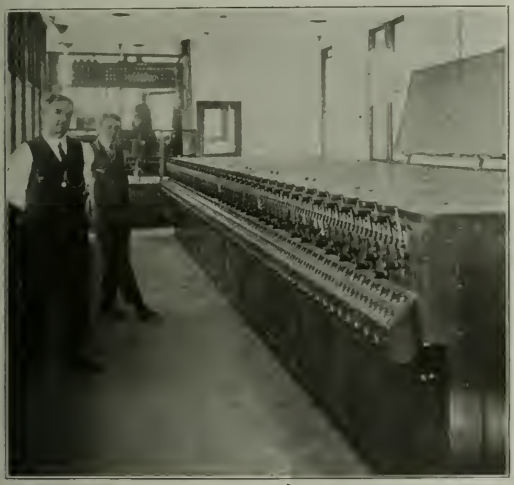
All train movements are controlled by three-position upper-quadrant speed signalling conforming to the recommendations lighted by Dressel lamps and the semaphore blades are the "Saco" enameled steel type.

The new tower A is a steel frame structure with brick walls supported on piles driven about 65 ft. to rock, cut off at low water level and capped by reinforced concrete beams. The floors are of concrete, the upper one being finished with Taylorite surface and wainscoting. The roof is of slate with copper cornice and Lupton steel sash are provided for all windows, making the building fireproof throughout with the exception of the wooden relay rack.

The interlocking machine is the Union Switch & Signal Company's electro-pneumatic type with a number of improved features. It has a 179-lever frame in an enameled steel case. Lever light indicators are provided for all switch and signal levers to show the condition of track, signal and de-

tector circuits. These lights directly under the levers give the lever men the information needed without the use of an illuminated track diagram. A push button is also provided below each signal lever which, with this lever reversed, operates the lower arm as a calling on signal for slow speed movements when the route to be taken is occupied. This push button when depressed remains in that position, eliminating stick relays. The levers are also improved by the application of a latch depressor which insures that time will be allowed in throwing them for the latch to drop. A flashing light indication is momentarily given when a signal has gone to the clear position or started for the danger position. The flashers are located under the signal levers.

Probably the most important change in design of this machine is the system by which all of the combinations needed in this large plant can be made on two vertical combination plates. This is accomplished by connecting through a link arrangement, the lower end of a roller which is not long enough to carry all the necessary contacts with some other roller with spare space. A change has also been made in the design of the electric lock on the lever, making it possible to equip adjoining levers with three locks each. The



Interior of Tower "A" Showing the 179-Lever Electro-Pneumatic Machine and in the Distance Various Indicators Over the Train Director's Desk

third lock is sometimes desirable for a traffic lock, for example.

The plant is equipped with switch detector circuits, advance route locking, approach locking, approach indicator lights and bells, train describing instruments, an indicator showing which, if either of the two receiving tracks alongside the coach yards is occupied, an electro-pneumatic whistle for controlling the movements of trains in emergencies and a complete telephone system between signal bridges, relay locations, work shops, etc., to allow the maintainers to keep in touch with the tower at all times. The train-starting system providing for intercommunications between the ferry master, gatemen, conductors and towermen was mentioned in the previous article.

The power for operating the three interlocking plants is secured normally from the company's power house at Communipaw. Single-phase, 60-cycle, alternating current is received at 550 volts and compressed air at 100 lb. at the compressor. An alternate source of electric power is furnished by a connection with the Public Service Company's 2,200-volt line through a transformer which reduces this voltage to 550, and the compressed air can also be supplied from the service building north of the station. An automatic switch in each tower cuts in the Public Service circuit immediately if the company line is de-energized and when power returns to this line the switch immediately connects the plant to it again. Duplicate installations of four sets of 12 cells each of Edison storage battery charged by a mercury arc rectifier supply direct current for the operation of switch and signal circuits.

The 550-volt current is transformed in the tower to 110 volts and distributed at that voltage for operating track circuits and for tower and signal lighting. Each track circuit is fed by an individual air-cooled transformer of the reactive type mounted in an iron housing, thus eliminating all resistance or reactance coils. The 110-volt current is stepped down to 12 volts for signal lighting by a small air-cooled transformer at each bridge or signal location. This arrangement permits the use of 12-volt, 2½-watt lamps in the signals controlled through Signal Accessories Company automatic cut-in relays. The direct current supply is distributed throughout the plant to terminal boards from which the signal and switch movements are fed.

The compressed air is distributed in a 2½-in. main laid along each side of the yard and connected over each signal bridge with proper valves in the line to allow either main to supply all signals. All switch machines are also connected to both mains by ¾-in. pipe. All cables for the control of functions are Okonite lead-covered, laid in creosoted yellow pine conduits encased in a layer of clay with the top of conduit 18 in. below the bottom of the ties. Concrete bootlegs are used for all track connections, two conductor cables being used in order to eliminate the inductive effect of the alternating current.

All wires are brought into the tower in a gallery under the first floor from which they are carried up to Brach tagged R. S. A. terminals on three terminal boards. The R. S. A. written circuits and wire numbering are used throughout. All conduits in the tower are lined with asbestos. The relay rack of standard wooden construction contains 404 relays in tower A. The U. S. & S. vane type relay is used for all track circuits on account of its quick release.

At tower B all signals are two-position upper quadrant, the machine has 47 levers, the track circuits are alternating current and the system of power supply, lighting and distribution is similar to that described at tower A. At tower C the signals were changed from two-position lower quadrant to three-position upper-quadrant, the 71-lever machine was rebuilt and the track circuits changed from direct current to alternating current. The main tracks between towers A and C are protected by 22 automatic signals with 19 track circuits. The track circuits are polarized and equipped with U. S. & S. model 12, three-position polyphase track relays.

The buildings and the conduit lines in this improvement were built under contract by Westinghouse, Church, Kerr & Company, New York, the new interlocking towers were built by John W. Ferguson & Co., Paterson, N. J., the interlocking system was installed by the Union Switch & Signal Company, Swissvale, Pa., and all track work and changes in the existing plants to keep them in service during the installation of the new plants was handled by company forces. The entire improvement was carried out under the general direction of W. G. Besler, president and general manager, and J. W. Meredith, general superintendent, and the personal supervision of J. O. Osgood, chief engineer and W. H. Higgins, signal engineer.

Dining Car Service on English Railways.—The English railways, which have recently made curtailments in their passenger services, are now considering withdrawing suspension of dining car service.

PROPOSED TERMINAL RAILWAY FOR JERSEY CITY

A report has recently been prepared for the Jersey City Chamber of Commerce by F. Van Z. Lane, a consulting engineer of New York, proposing the construction of an industrial railway which will serve a large part of the water front section of Jersey City, not now well served by railways, and connect with the several trunk lines having terminals in that city. Jersey City not now having the legal power to construct or operate such a railway, the scheme is subject to the approval of the state legislature. The New Jersey Public Service Commission is said to have given its informal approval.

The project involves the construction of a double track main line through five miles of city streets along the water front from the Lackawanna terminals near the Jersey City-Hoboken line south to Caven Point avenue, a short distance below Communipaw, with a possible further extension southward to connect with the West Side Connecting Railroad which it is proposed to build along Newark Bay and the Hackensack river. The road will connect with all the trunk lines, and in the several industrial districts which the line will serve there will be 16 miles of sidings and industry tracks.

It is proposed to operate the railway by electricity, using overhead trolley or storage battery locomotives. The estimated cost is $1,500,000, including trackage, paving, etc. This cost may be borne in various ways. If it is borne by the city, 20-year bonds may be issued at 5½ per cent, whereupon there will be a yearly obligation of $116,250, including interest and sinking fund. The road may be operated by the city or leased to private parties.

The railway may conceivably be built in three sections. It will serve a total area of over 15,000,000 sq. ft. of ground which, because of the transportation facilities given by the railroad, will possess great advantages for high grade warehouses and manufacturing plants. It is claimed that the construction of the line will increase property values by at least $50,000,000 and that the railroads will gain greatly because of the increased freight business.

ANNUAL REPORT OF BUREAU OF EXPLOSIVES

The seventh annual report of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, which has just been issued, shows that no person was killed in accidents in the transportation of explosives by railroads in the United States during the year ending December 31, 1914, and that the property loss was only $14,100; and Colonel B. W. Dunn, the chief inspector, estimates that the quantity of dangerous explosives transported during the year was about 300,000 tons. Five persons were injured, but all of these injuries were in accidents where explosives had been concealed in the baggage of passengers by railroad.

Fires and explosions in railroad transportation chargeable to accidents with all kinds of dangerous and semi-dangerous articles, caused a loss of $283,006; thirteen persons were killed and 114 injured. One item, inflammable liquids, accounts for more than half this loss. The 28 inspectors of the bureau now maintain a very thorough oversight of the transportation of dangerous articles and the record for safety is being constantly improved. The report gives a detailed list of 15 cases where cars containing explosives were roughly treated. There is a mass of information concerning the causes of 452 fires on railroads occurring in matches, charcoal, acid, gasoline and other dangerous articles. Charcoal alone figured in 52 fires, doing damage amounting to $9,871, and a special investigation has been made of the causes of these fires. Details are given, in the same way, of fires reported in the transportation of gasolene, nitric acid and rubber scrap. Over 300 illustrated lectures have been given to railroad employees during the year.

The total number of boxes of high explosives condemned as unsafe for transportation during 1914 was 4,949, about 800 less than in the preceding year; and of kegs of black powder 317, which is 78 more than in the preceding year.

The chemical laboratory of the bureau made examinations during the year of 1,166 samples of explosives, inflammables, etc.

Appendixes, filling 70 large pages, contain a great amount of detailed information relating to the safe transportation of dangerous articles.

The office of the bureau is at 30 Vesey street, New York City, and it now represents 397 railroads operating 263,922 miles of road. N. D. Maher (N. & W.) is president, and W. F. Allen is secretary.

RAILROAD REGULATION*

By Senator John W. Weeks.

If the control of the railroads given to the Interstate Commerce Commission were wise and competent, with definite limitations, the situation would, in my judgment, be extremely unhealthy; but it is even more so under present conditions, for the Commission now feels that it is hampered and restricted by the statutes so that it cannot deal with the railroads as would be done by the officers of a large corporation. The railroads have to face contradictory orders from the courts, the Interstate Commission and State Commissions. During a discussion of the trade commission bill in the Senate a resolution was introduced, inquiring of the attorney-general why he had not proceeded to bring suit to dissolve the New York Central, Lake Shore and West Shore railroads. An examination of railroad consolidations since the passage of the act demonstrated that there have been 1,845, and the inquiry was naturally made if it is wise to dissolve the corporations referred to, why would it not be equally wise to broaden it so that it would apply to all consolidations? As a matter of fact they have been winked at by the department of justice.

I have recently been a member of the Commission to study and determine the rate of pay which railroads should receive for transporting the mails. These studies have convinced me that the railroads are carrying passengers, including mail and express, without profit; that an actual loss is incurred in many cases; and yet the rate for pasesnger service within the states are controlled by state regulation and in many cases the rates are fixed by law. Substantially speaking, the only profit made by railroads under present conditions comes from their freight service. The Interstate Commerce Commission has power to fix, or pass upon interstate rates, and the Commission takes the general ground that in approving rates it cannot base its action on general conditions or the requirements of any particular time, but that there must be a fair return upon the capital actually invested.

Physical valuation of the railroads is now being conducted by Charles A. Prouty at an expense of $50,000,000. Mr. Prouty has stated that it would take at least ten years to complete that valuation and that in the meantime he thought there would be no proper basis on which to fix freight rates. Of course that calculation would mean strangulation of the activities of the country, if not receiverships, for the larger part of our railroad mileage.

The results from this valuation are almost certain to be of no real value in connection with the rate problem and the cost of $35,000,000 to the railroads, in addition to the $15,000,000 to the public, must be paid for by increased rates or taxes, so that in the final analysis it will be another element in the increased cost of living.

*From an address before the Illinois Manufacturers' Association at Chicago on December 8, 1914.

Simple Pacific Type Locomotive for the Santa Fe

For Oil Burning Service; Ample Boiler Capacity for Tractive Effort of 41,000 lb.; Axle Load Limited to 58,000 lb.

The Atchison, Topeka & Santa Fe has recently received from the Baldwin Locomotive Works a simple Pacific type locomotive, which at the present time forms a part of the exhibit of the builders at the Panama-Pacific International Exposition at San Francisco, Cal. It is the first single expansion engine to be built for passenger service on the Santa Fe system in some years.

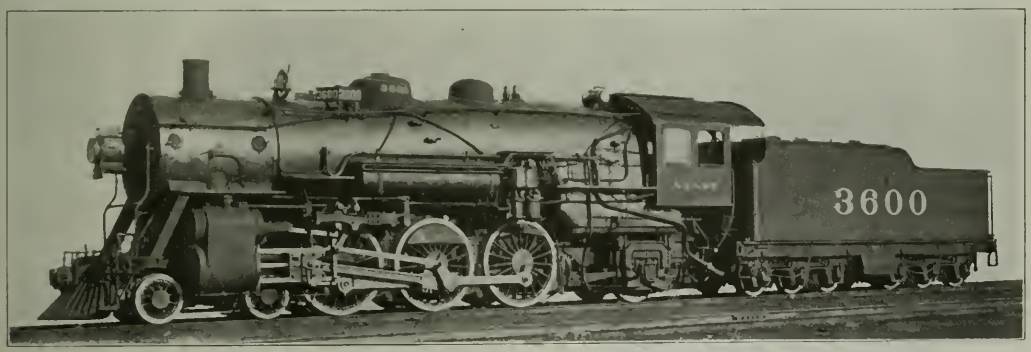
The locomotive is designed to develop the maximum possible capacity within a limiting rail load of 58,000 lb. per pair of driving wheels, and the total weight on the driving wheels of 172,500 lb. closely approaches this limit. The design was prepared conjointly by the railway company and the builder and, as in all recent Santa Fe locomotives, the details have been designed to interchange as far as practicable with those of locomotives already in service. The new locomotive develops a tractive effort of 41,000 lb., with a factor of adhesion of 4.2, and has a total equivalent heating surface of 5,913 sq. ft. The ratio of cylinder tractive effort to equivalent heating surface is 506.17, which indicates a capacity for high sustained performance.

The boiler is composed of three courses, the middle course being tapered, with the slope at the top, and the main and auxiliary domes being placed on the third course. The diameter of the first course is 80 in., which is increased to 90 in. at the third course. A circular opening 16 in. in diameter under the auxiliary dome permits entrance to the boiler without dismantling the standpipe and throttle fittings in the main dome. The boiler is equipped for oil burning but the staybolts are so located that arch tubes may subsequently be applied should it be necessary to fit the locomotive for coal burning service. The inside firebox door sheet is flanged outward, bringing the rivet heads in the water space, and the seam is closed with a copper calking strip. The O'Connor fire door flange is used and the door seam is welded by the autogenous process. Flexible staybolts are used in the breakage zones in the throat, sides and back as well as in the first four rows of crown stays. The boiler is equipped with a Schmidt superheater of 40 elements with a superheating surface of 980 sq. ft., and among the special fittings is included the Chambers throttle.

The cylinder castings are strongly built with liberal steam and exhaust passages and all cylinder saddle bolts are secured with double nuts. The steam distribution is controlled by 16-in. piston valves driven by the Baker valve gear. The valves are set with a lead of one-quarter inch and cut off at 87 per cent when in full gear. The valve motion is reversed by means of the Ragonnet power reverse gear.

The steel frames are each cast in two sections with the splice located back of the rear driving pedestals, the main sections having a width of 5 in. The splice has a slab fit with a large bearing area and is secured by 18 horizontal 1⅛ in. bolts and a pair of vertical keys. A substantial system of transverse frame bracing is applied. The guide bearer brace which is a large steel casting, extends the full depth of the leading driving pedestals, serving as a fulcrum for the driving-brake shaft, and the valve motion bearer, which is located midway between the front and main driving pedestals, has a long bearing on the upper frame rail. A similar brace supporting a waist sheet is placed between the main and rear driving pedestals. A deep brace is also applied at the main pedestal and the frames are braced at the splices between the main and rear sections by a large casting which supports the front end of the firebox and carries the trailer truck radius bar pin.

The driving boxes are cast steel and are fitted with brass hub faces which bear against steel wheel-centers. The shoe and wedge faces of the boxes are also lined with brass, while the shoes and wedges are cast iron. Flange oilers are applied to the main driving wheels. The trailer truck is of the Rushton type with outside journals, a design that has been applied to a large number of locomotives built for the Santa Fe System. The truck frame is composed entirely of steel castings and the swing links are of the three-point suspension type.



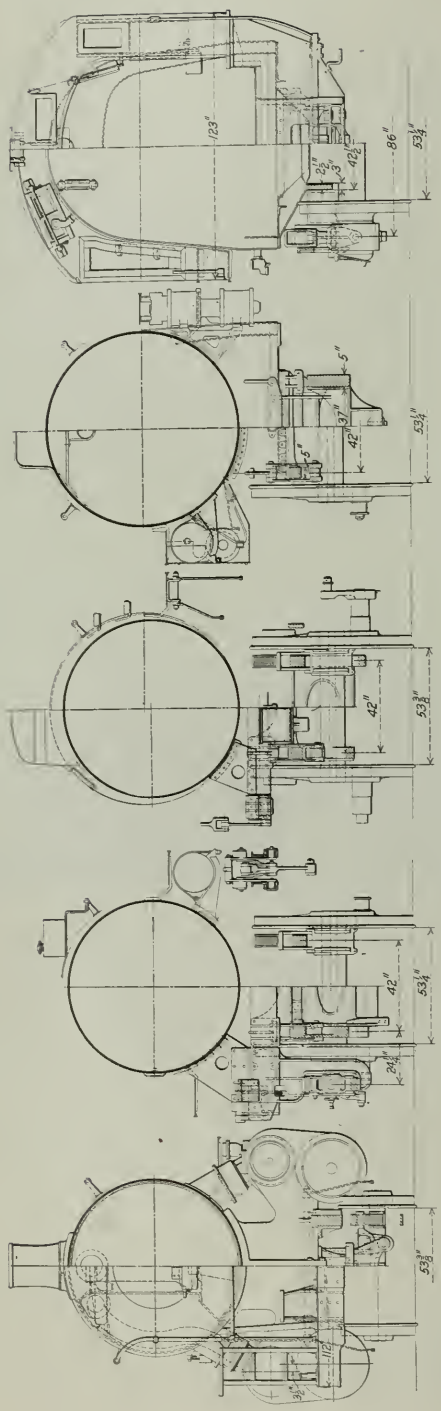
Santa Fe Simple Pacific Type Locomotive

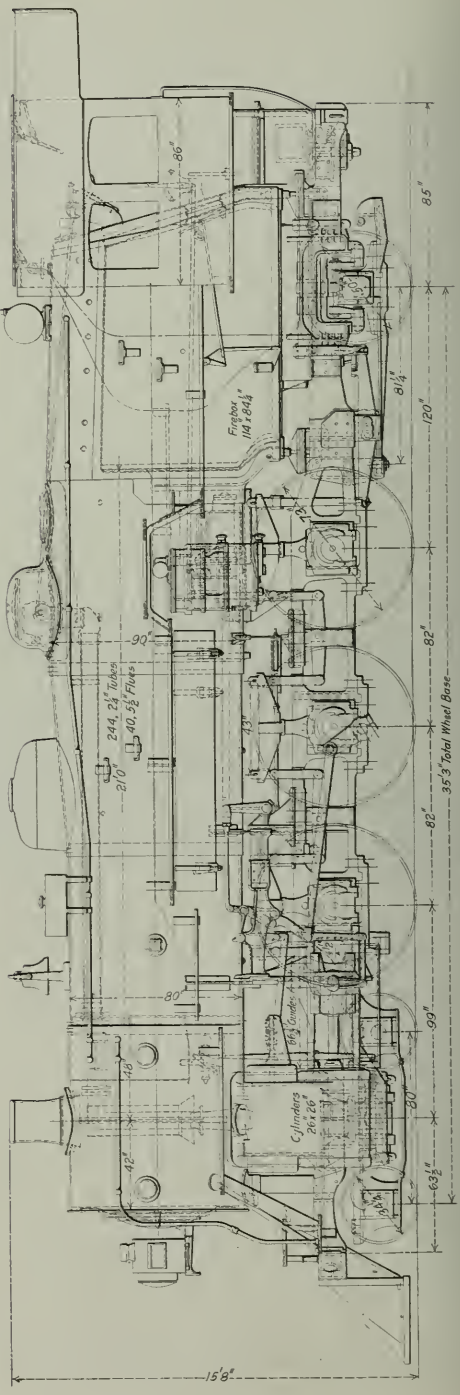
The tender has a water capacity of 10,000 gal., and carries 3,300 gal. of oil. The trucks are of the six-wheel Commonwealth type; this type is now in use under a large number of high capacity tenders in passenger service on the Santa Fe System.

The principal dimensions and data are as follows:

General Data

Gage	4 ft. 8½ in.
Service	Passenger
Fuel	Oil
Tractive effort	41,000 lb.
Weight in working order	288,700 lb.
Weight on drivers	172,550 lb.
Weight on leading truck	59,950 lb.
Weight on trailing truck	56,200 lb.
Weight of engine and tender in working order	506,000 lb.
Wheel base, driving	13 ft. 8 in.
Wheel base, total	35 ft. 3 in.
Wheel base, engine and tender	71 ft. 5¼ in.





General Arrangement of Santa Fe Pacific Type Locomotive

Ratios

Weight on drivers ÷ tractive effort	4.21
Total weight ÷ tractive effort	7.04
Tractive effort × diam. drivers ÷ equivalent heating surface*	506.17
Equivalent heating surface* ÷ grate area	88.65
Firebox heating surface ÷ equivalent heating surface,* per cent	3.92
Weight on drivers ÷ equivalent heating surface*	29.18
Total weight ÷ equivalent heating surface*	48.82
Volume both cylinders	15.98 cu. ft.
Equivalent heating surface* ÷ vol. cylinders	370.02
Grate area ÷ vol. cylinders	4.17

Cylinders

Kind	Simple
Diameter and stroke	26 in. by 26 in.

Volves.

Kind	Piston
Diameter	16 in.
Lead	1¼ in.

Wheels

Driving, diameter over tires	73 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	11 in. by 13 in.
Driving journals, others, diameter and length	11 in. by 13 in.
Engine truck wheels, diameter	34¼ in.
Engine truck, journals	7 in. by 12 in.
Trailing truck wheels, diameter	50 in.
Trailing truck, journals	8 in. by 14 in.

Boiler

Style	Extended wagon top
Working pressure	200 lb. per sq. in.
Outside diameter of first ring	80 in.
Firebox, length and width	114 in. by 84¼ in.
Firebox plates, thickness	Sides, back and crown, ⅜ in.; tube, ½ in.
Firebox, water space	Front and sides, 5 in.; back, 4½ in.
Tubes, number and outside diameter	244—2¼ in.
Flues, number and outside diameter	40—5½ in.
Tubes and flues, length	21 ft.
Heating surface, tubes and flues	4,211 sq. ft.
Heating surface, firebox	232 sq. ft.
Heating surface, total	4,443 sq. ft.
Superheater heating surface	980 sq. ft.
Equivalent heating surface*	5,913 sq. ft.
Grate area	66.7 sq. ft.

Tender

Journals, diameter and length	5½ in. by 10 in.
Water capacity	10,000 gal.
Oil capacity	3,300 gal.

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

RAILROAD STATISTICS TO JUNE 30, 1914

The Interstate Commerce Commission has issued its preliminary statement of the earnings, expense and traffic and financial statistics of railroads *having annual operating revenues of over* $100,000, and of subsidiary non-operating companies operated by them, but not including switching or terminal companies, for the fiscal year which ended nine months ago. The principal items of the statement are tabulated below, but some of the figures for the year preceding are taken from the statement issued last year, which was given in the *Railway Age Gazette* of July 17, 1914, page 102. Where statistics of operating companies include transactions which are reported also by owning companies, there is a duplication at the end of year, the amount of which does not appear. Other items, such as capital stock of one road owned by another, make a fictitious element in the totals.

Statistics of Class 1 and Class 2 Railroads

	Year ending June 30, 1914	Year ending June 30, 1913
Miles of line operated at end of year	247,398	244,418
Miles of trackage rights included in above	11,299	11,163
Average miles operated during year	245,625	242,657
Miles of track at end of year	377,102	369,580
Locomotives	64,760	63,378
Locomotives per 1,000 miles	262	259
Cars, passenger service	53,466	51,700
Cars, freight service	2,325,647	2,273,564
Cars, company's service	124,709	120,244
Cars, total	2,503,822	2,445,508
Cars, per 1,000 miles	10,121	10,005
Passenger miles per passenger locomotive	2,365,000	2,341,269
Ton miles per freight locomotive	7,369,000	7,843,663
Employees, June 30	1,695,483	1,815,239
Employees per 100 miles	685	743
Capital stock, *thousands*	$8,680,760	$8,610,611
Funded debt, *thousands*	$11,566,542	$11,185,514
Dividends, declared	$451,263,197	$368,606,327
Dividends, average per cent	5.20	4.28
Dividends, average per cent on dividend-paying stocks	7.97	6.38
Cost road and equipment, *thousands*	$16,936,698	$16,351,639
Passengers carried, *thousands*	1,053,139	1,033,680
Passengers carried one mile, *thousands*	35,258,498	34,575,873
Passenger mileage, per mile of road	144,278	143,067
Freight carried, *thousands* of tons	1,976,138	2,058,035
Ton miles, *millions*	288,320	301,399
Decrease, *millions*	13,079	37,619
Ton miles, per mile of road	1,176,923	1,245,158
Average freight train load, tons	452	445
Average receipts per passenger mile, cents	1.982	2.008
Average receipts per ton mile, mills	7.33	7.29
Average receipts per passenger train mile	$1.35	$1.36
Average receipts per freight train mile	$3.31	$3.24
Average receipts per revenue train mile, freight and passenger	$2.45	$2.45
Average operating expenses per train mile	$1.77	$1.70
Per cent expenses	72.21	69.44
Passenger revenue, *thousands*	$700,403	$695,988
Freight revenue, *thousands*	$2,114,698	$2,198,931
Total revenue, including miscellaneous, *thousands*	$3,047,020	$3,125,136
Operating expenses, *thousands*	$2,200,313	$2,169,969
Operating expense, detailed, *thousands*—		
Maintenance of way	$419,278	$421,232
Maintenance of equipment	$532,139	$511,561
Traffic	$63,770	$62,850
Transportation	$1,101,597	$1,096,253
General	$83,530	$78,072
Revenue per mile	$12,400	$12,873
Operating expenses per mile	$8,955	$8,939

The increase in dividends declared during the year, $82,656,870, is principally accounted for by increased dividends declared by the Union Pacific and the Central Pacific. The dividends declared during the year by these two companies were more than $86,000,000 greater than those of the preceding year. The total dividends of operating roads, $379,865,024, included $162,760,634 declared out of surplus; and the dividends of non-operating roads, $71,398,173, included $34,170,961 declared out of surplus. No interest was paid on $1,331,581,452, or 11.94 per cent, of the total amount of funded debt outstanding (other than equipment trust obligations).

The expenditures for additions and betterments, as well as the expenditures for new lines and extensions, during the fiscal year 1914 are explained as follows:

Investment to June 30, 1914 (236,706.60 miles of line)	$16,936,697,840
Investment to June 30, 1913 (234,220.06 miles of line)	16,424,359,514
Increase 1914 over 1913	$512,338,326

	Expenditures for additions and betterments	Expenditures for new lines and extensions	
From cash or other working assets	$330,529,491	$61,370,851	
From special appropriations	43,616,529	114,129	
Through issue of securities	138,135,821	60,062,788	
Not assigned	3,779,449	157,910	
Total	$516,061,290	$121,705,678	$637,766,968
Miscellaneous charges not classified			851,008
Total expenditures during year			$638,617,976

Credits.	
Property retired or converted	*$88,104,245*
Adjustments	*8,524,764*
Difference between record value of grantor and purchase price of grantee in cases of roads sold, merged, consolidated, etc.	*29,650,641*
Total	*126,279,650*
Net increase during year	$512,338,326

The 2,325,647 cars in freight service were classified as follows:

Description	Number	Aggregate capacity. *Tons*
Box	1,043,796	36,622,074
Flat	146,133	5,214,949
Stock	82,971	2,597,278
Coal	899,314	40,583,490
Tank	8,530	340,722
Refrigerator	48,886	1,577,973
Other cars in freight service	96,017	4,040,612
Total	2,325,647	90,977,098

CONDENSED INCOME ACCOUNT

Following is a condensed income account of the roads included in this list, below which is a similar statement for the controlled, non-operating companies, both incomplete because of the omission of a few unsatisfactory returns. The accounts of the operating roads include both operating and financial transactions, while the accounts of the non-operating roads are confined for the most part to receipts and payments under leases, contracts and agreements. For a number of items, such as dividends, taxes, etc., both statements must be taken into consideration in order to learn the aggregates

of such items for the railways of the United States therein represented.

The aggregate of dividends declared during the year, $451,263,197, includes those declared out of current income and those declared from surplus both by the operating roads and by the non-operating roads. This amount includes dividends declared on railway capital stock owned by other railway companies.

OPERATING ROADS

	1914	1913
Income Account		
Rail operations—		
Operating revenues	$3,047,019,908	$3,135,135,798
Operating expenses	2,200,313,159	2,169,968,924
Net operating revenue	846,706,749	955,166,874
Outside operations—		
Revenues	64,376,514	67,982,036
Expenses	65,866,609	65,953,702
Net revenue or deficit from outside operations	—1,490,095	+2,028,334
Total net revenue	845,216,654	957,195,208
Taxes accrued	139,591,520	122,005,424
Operating income	705,625,134	835,189,784
Other income	286,893,649	283,063,093
Gross income	992,518,783	1,118,252,877
Rents, interest, etc., deducted	645,312,783	629,706,398
Net corporate income	347,206,000	488,546,479
Disposition of net corporate income—		
Dividends declared from current income	217,104,390	241,750,512
Appropriations for additions and betterments	29,226,675	48,022,688
Appropriations for new lines and extensions	39,622	70,159
Miscellaneous appropriations	12,916,177	14,991,076
Total	259,286,864	304,840,932
Balance to credit of profit and loss	87,919,136	183,705,547
Profit and Loss Account		
Credit balance beginning of year	1,041,672,887	1,078,765,200
Credit balance for current year from income account	87,919,136	183,705,547
Total	1,129,592,023	1,262,470,747
Dividends declared out of surplus	162,760,634	85,706,629
Difference	966,831,389	1,176,764,118
Appropriations for additions and betterments	4,962,901	15,158,827
Appropriations for new lines and extensions	2,081,227	449,652
Miscellaneous appropriations	3,646,706	68,723,482
Other profit and loss items—balance	30,806,359	20,691,684
Total	41,497,193	103,023,645
Balance credit end of year, carried to balance sheet	925,334,196	1,071,740,473

NONOPERATING ROADS

Income Account		
Gross income from lease of road	$110,670,101	$124,332,275
Taxes accrued	940,055	5,326,536
Net income from lease of road	109,730,046	119,005,739
Other income	6,139,973	7,777,635
Gross income	115,870,019	126,783,374
Interest, and similar deductions	64,561,479	68,568,734
Net corporate income	51,308,540	58,214,640
Disposition of net corporate income—		
Dividends declared from current income	37,227,212	38,845,422
Appropriations for additions and betterments	2,271,026	2,200,346
Miscellaneous appropriations	1,178,765	1,274,520
Total	40,677,003	42,320,288
Balance to credit of profit and loss	10,631,537	15,894,352
Profit and Loss Account		
Credit balance beginning of year	31,327,523	57,158,330
Credit balance for current year from income account	10,631,537	15,894,352
Total	41,959,060	73,052,682
Dividends declared out of surplus	34,170,961	2,250,069
Difference	7,788,099	70,802,613
Appropriations for additions and betterments	1,925,334	300,873
Miscellaneous appropriations	434,617	29,945,358
Other profit and loss items—balance *Dr. or Cr.*	+13,165,029	—2,932,044
Total	15,524,980	27,514,187
Balance end of year, carried to balance sheet. *Dr. or Cr.*	—7,736,881	+43,288,426

REFRACTORY LEGISLATIVE MACHINERY

[Springfield Republican]

The closest student of American history could not recall probably a case similar to the present effort of four New England state legislatures to enact at about the same time the same law on a highly important matter of business. If the legislatures of Massachusetts, New Hampshire, Vermont and Maine, in their efforts to rescue the Boston & Maine from a receivership, seem to be in the wildest confusion over the bills and the numerous amendments thereto, one finds no cause for surprise. The difficulties to be encountered in making four independent bodies of lawmakers do team work on a question which affects differently, perhaps, the selfish interests of their constituents were sure to be most formidable. The history of legislative bodies, under somewhat similar circumstances, is that they will work in harmony only when menaced by a common peril sufficiently grave to force unity of action.

There is no question as to the necessities of New England as a whole. The Boston & Maine system should be reorganized and saved from a receivership; indeed, it should be reorganized even if a receivership could be avoided without legislation. The highest conception of the public welfare of this section probably does not control these four lawmaking bodies; selfish and local interests are making themselves powerfully felt. In one of the states it is the common talk that no bill can be passed which is not satisfactory to certain leased lines. . . .

The six New England states have a common name, indicating a historical and geographical identity uncommon among other groups of states in the country. This railroad case is a test of the ability of several states having a common interest to act together on a voluntary basis. Success would exercise a far-reaching influence in mitigating a certain chaos into which, in various matters, our whole state system appears to be drifting.

ROLLING RESISTANCE OF CARS OVER SWITCHES AND FROGS*

By C. L. Eddy

Assistant Professor of Railway Engineering, Case School of Applied Science, Cleveland, Ohio.

In making the design for a gravity yard it is necessary to know or to assume the resistance to rolling of freight cars in order to determine the proper grades to use. This information may be obtained from the results of experience in the operation of yards, or may be taken from tests made to determine the rolling resistance of cars. Considerable data is to be had pertaining to freight-train resistance on straight track, but this information cannot be used in the design of the proper grade for a ladder track in a gravity yard on account of the methods used in making the tests and the difference in track conditions. It is known that train resistance varies not only with the speed, car weight and the number of cars, but also with the condition of the track. In a gravity yard the switches and frogs on a ladder track offer additional resistance to the motion of a car that is not encountered on ordinary track, and might be comparable to the resistance of a badly surfaced track with worn rails.

Modern freight-train resistance tests are made with a dynamometer car and full-length trains in service. This method gives good results for the proper rating of engines, but not for the design of gravity yards, since trains in the yard are divided into cuts of from one to ten or more cars each, which introduces car resistance instead of train resistance. Drop tests with single cars have been made, but usually on straight track free from switches and frogs. In order to obtain data on the rolling resistance of cars over switches and frogs, the tests described below were undertaken by students at Case School of Applied Science as a part of their thesis work.

The tests were made on the south ladder of the south classification group of tracks of the New York Central yard at Collinwood, Ohio. This group consists of 23 tracks running in a general east and west direction, and connected with the hump track by two ladder tracks, which separate about 200 ft. from the top of the hump. No. 8 rigid frogs and split switches are used, all of which are in good order. The tracks are numbered from north to south, so that track 23 is the outside track on the south side. The track from the top of the hump to the classification group is a continuation of the south ladder and has a grade of 4 per cent. The grade of the south ladder is 1.175 per cent, the change being made at the separation of the ladders.

In taking observations, the velocity of a car was measured

*Abstracted from Bulletin 175 of the American Railway Engineering Association, March, 1915.

near the top and bottom of the ladder track. With this information, the distance between points of observation and the rate of grade, the resistance in pounds per ton could be computed.

Only cars going over the hump in the usual routine of yard operation were used in making the tests. In order that the distance between points of observation might be as great as possible, and still have both on the same grade, one point was taken near the foot of the 4 per cent grade and the other at the entrance of track No. 20. Thus cars for tracks Nos. 20, 21, 22 and 23 could be used for observations. The first 76 observations—the first set—were taken during March, April and May, 1913, by one set of students, while the remainder were taken by another set in May, 1914.

In addition to measuring velocity, the following information was obtained for each test: (1) Light weight of car and load, if any; (2) capacity of car; (3) direction and velocity of wind; (4) Temperature of air, and (5) weather conditions.

The light or stenciled weight was taken directly from the car, as was the capacity, while the load was taken from the waybills. During the first set of observations the direction and velocity of the wind were obtained from the local United States weather bureau. The velocity recorded, therefore, was the maximum for that day. While making this first series of tests, a great many observations were taken which have not been recorded on account of too high wind velocity. Those recorded showing wind velocities as high as approximately twenty miles per hour were used for the reason that from notations on the log-sheet it was certain that the wind was not blowing at that velocity at the time the observations were taken. During the second set of observations the wind velocities were taken on the windward side of the ladder track by means of an anemometer, while the wind directions were obtained by means of a weather-vane attached to a staff set in the ground.

Care was taken to see that the brakes were not set on any car under observation from the time it left the top of the hump until it passed the last contact. The car riders were instructed by the assistant yardmaster to allow the cars to run freely between the points of contact when possible. This was not always possible, and it was the duty of one of the observers to watch the car riders. If brakes were set, the record was so marked and the observation was discarded.

The velocity was obtained by recording automatically the time required for a car to pass over a measured distance—usually 60 ft.—and dividing the distance by the time. Contact blocks, placed near one rail of the ladder track, were connected electrically with the recording pencil of a chronograph, so that a record was made when the wheel of a car struck them. One pair was placed near the foot of the 4 per cent grade below the separation of the ladders, and the other near the entrance to track No. 20. The chronograph was also connected electrically with a pendulum, calibrated to accurately beat half seconds, so that each half second was recorded by a V-shaped mark on the record. By scaling between these marks and the records made by the wheels, the time required for a car to run from one contact to another could be obtained to 0.01 of a second. The velocity thus obtained was taken as the velocity of the car midway between the contacts.

To see that there was no material error in taking this average velocity as the velocity at a point, the four contacts were placed 30 ft. apart and observations taken by recording the contact of all four wheels of each car. By measuring the distance between wheels it was possible to compute the average velocity from the time it took the car to travel these distances. Thus the average velocity over a distance as short as 5 ft. was obtained, and at four consecutive points 30 ft. apart. The velocities thus obtained at the second contact were a mean of those obtained at the first and third and checked with the average velocities over the first 60 ft. within 0.5 per cent. By having the fourth contact, a check on the above observations could be had by using the velocities at the second, third and fourth points.

From the results of these observations it was decided that the average velocity as obtained above might safely be used.

All observations were taken on box cars except one with an empty gondola, and two with loaded gondolas.

The results were analyzed with the idea of investigating the effect of variations in the initial velocity upon the total resistance, but no definite conclusions could be drawn because of the limited range of velocities. This range was between 11 and 14 miles per hour for the greater part of the observations, a few falling as low as 9 miles per hour and a few going as high as 16 miles per hour.

There was no definite relation developed between car weight and resistance. This is as might be expected, considering the limited number of observations taken and the variations in the condition of cars observed. However, if established, this law of variation could be given no consideration in the design of a yard, since the inclination must be such as to properly handle both empty and loaded cars. The resistances obtained were not only high in comparison with train-resistance tests, but cover a wide range in their variation.

The average of the resistances derived from the first set of observations, exclusive of the first eleven, was 21.7 lb. per ton. These first observations were not included in the average, because the temperature of 20 deg. F. was outside the range that the observations were designed to cover. The average for the second set of observations was 22.3 lb. per ton. Considering the total number of observations, exclusive of the first 11, the average is 22 lb. per ton. The resistance of from 24 to 27 lb. per ton was obtained more times than any other, showing that it is probable that this resistance might be expected to occur more times than the average of 22 lb. per ton. The tests also show that a resistance of from 27 to 30 lb. per ton might be expected to occur about as many times as the average, indicating that a resistance of at least 30 lb. per ton should be considered in the design.

Over 77 per cent of the total number of cars observed had a resistance less than 27 lb. per ton, and 90.8 per cent had a resistance less than 30 lb. per ton. Therefore, if provision be made in the design for a resistance of 27 lb. per ton, it is probable that 22.3 per cent, or about one-quarter of all the cars passing over the hump, would have a resistance greater than this, and there is considerable certainty that some of them would stop before reaching their destination. Providing for 30 lb. per ton resistance would take care of 90.8 per cent of all cars, leaving only 9.2 per cent with a resistance greater than that provided for. Thirty-three pounds a ton would provide for all but 5 per cent of the total, 36 lb. for all but 1.4 per cent, 39 lb. for all but 0.7 per cent and 42 lb. for all cars.

It is recognized that in gravity switching the speed on the ladders should be as great as consistent with safe operation, in order to get the maximum operating capacity of the yard. However, the speed must not be so great as to cause derailment of the cars on the turnout curve of any classification track. The Committee on Yards and Terminals of the American Railway Engineering Association, Vol. 9, quotes W. C. Cushing, chief engineer of maintenance of way, Pennsylvania Lines, Southwest System, as follows: "The grades on the hump should be sufficient to give the cars a speed of 12 miles per hour on any track, and the speed should be regulated by the brakeman to meet the conditions on any particular track on which his car is going." The committee approved of this statement and continued: ". . . and as a general rule it is no doubt proper to consider about 15 miles per hour as the maximum speed at which cars should reach the turnouts leading to classification tracks."

The momentum grade, then, should be sufficient to deliver the cars to the ladders with a speed of about 12 miles per

hour, and this speed should be attained as quickly as possible to facilitate operation.

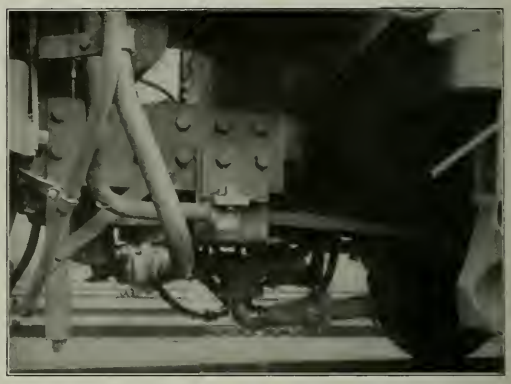
At Collinwood about 56 per cent of the cars observed had a speed greater than 12 miles per hour, about 28 per cent had a speed greater than 13 miles per hour, 5 per cent greater than 14 miles per hour and 1 per cent greater than 15 miles per hour. The conclusion might be drawn from this that the hump is too high, but it must be remembered that the temperature conditions under which these tests were made were all favorable to high velocities. From the first 11 observations, which were taken with the temperature at 20 deg. F., speeds are obtained ranging from 9 to 14 miles per hour, with an average of 11.6 miles per hour. While there are not a sufficient number of these observations to conclusively prove anything, the indications agree with the conclusions reached from observation that less speed can be expected in winter weather than in summer. Attention is called to the fact that all of the cars observed at Collinwood ran down a straight track, a fact which must be taken into account when comparing these results with those observed at yards having a curve at the separation of the ladders.

There should be no lagging or stopping of the cars on the ladder, since either will limit the operating capacity of the yard. On the other hand, there should be no increase in the speed of the cars on the ladder, since they enter with the maximum desirable velocity. Therefore, the grade on the ladder, or "continuing grade," should be such that the cars will be carried along with a uniform velocity. The question then arises as to what car resistance shall be used as the basis of the design in accordance with the above recommendations. It would seem consistent to say that provision should be made for at least 95 per cent of the cars observed in this test, since the observations were made under favorable temperature and atmospheric conditions.

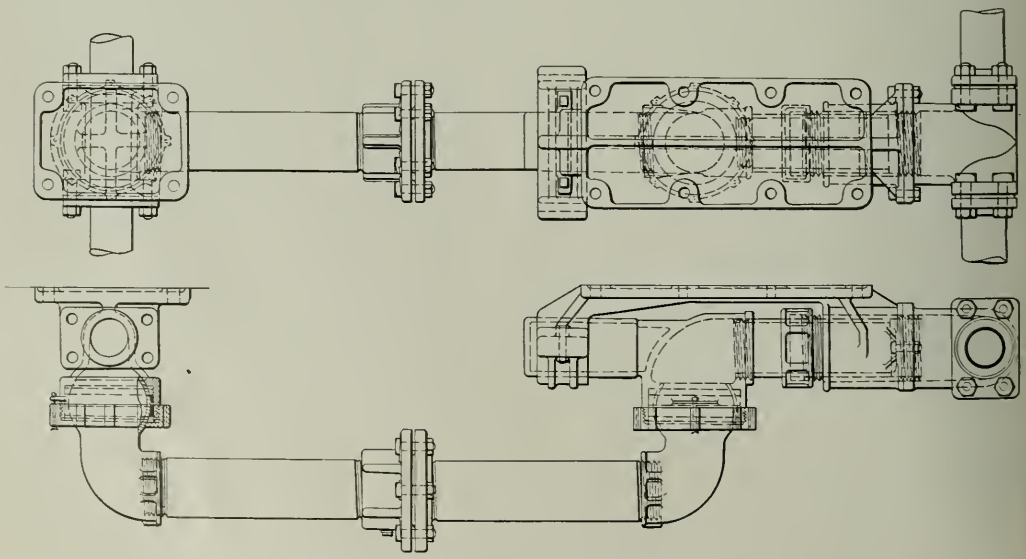
As shown above, when providing for 95 per cent of the cars, provision is made for cars with a resistance of 33 lb. per ton. This would mean that the continuing grade on the ladder tracks should be 1.65 per cent in order that there would be no lagging of these cars. It would also mean that brakes would have to be used to regulate the speed of all cars with a resistance less than 33 lb. per ton, or they would increase in velocity. It is understood, of course, that no yard can be operated under ideal conditions; that provision must be made for adverse winds, low temperatures, etc., so no general rules can be laid down for the design of a yard for year-around operation which are based upon experiments made, or experience obtained, under summer weather conditions only.

SINGLE LOCOMOTIVE WATER JOINT

A single water joint for use between the engine and tender has recently been developed by the Franklin Railway Supply Co., 30 Church street, New York. It eliminates the use of the present rubber hose connections for the injector suction pipes and provides one connection which is large enough to supply water to both injectors. The water joint is located directly under the drawbar on the center line of the locomotive.



Location of the Single Water Joint Under the Drawbar



Single Water Joint for Use Between Engine and Tender

The water connection, which is made up of extra heavy wrought iron pipe, is attached at either end to tee heads, the

branches of which lead to the two tank wells on the tender and to the two injector suction pipes on the engine. It includes two ball joints and one slip joint, a combination which takes any motion occurring between the engine and tender. At its rear end the inside sleeve of the slip joint is threaded into an elbow connection which turns downward and forms the outer casing of the forward ball joint. An extension is cast on the elbow which is supported in a slide bearing bracket secured to the deck of the locomotive. This arrangement serves as a guide for the slip joint, relieving it from lateral strain.

All the attention this joint is said to require is the occasional renewal of the gasket in the ball and slip joints. One of the difficulties it is expected to overcome is freezing, which often occurs in the present hose connections. The probability of freezing in this connection is reduced owing to the fact that either heater will keep it open while both heaters are required with the usual type of double connection.

EXHAUST NOZZLE WITH INTERNAL PROJECTIONS

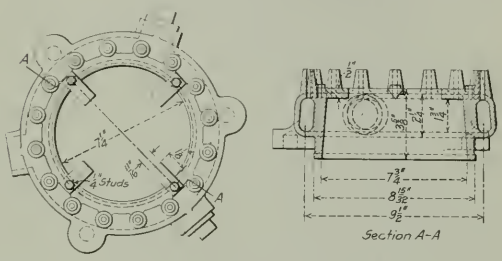
An exhaust nozzle having internal projections from the periphery of a circular opening of the usual type has recently been developed in the Pennsylvania locomotive testing plant at Altoona, Pa., and patented by F. A. Goodfellow, foreman of the testing plant, by the use of which considerable increase in locomotive capacity has been effected. The projections are of triangular section, four in number; each extends out 1⅛ in. from the periphery of the opening, and is 11/16 in. in width at its top face, the area of the opening being reduced 3.44 sq. in. in the nozzle shown in the drawing. The projections are machined to size and fastened in place with studs so that the apex of each piece points in a downward direction, but will be drop forged in the future, thus saving the cost for machining; they will also be fastened permanently in place by electric welding. This will make it impossible to either increase or decrease the size of the opening without breaking off the welded projections and will eliminate the tendency to make unauthorized changes in the size of standard nozzles. In making up a nozzle of this type, it has been the practice to bore the circular nozzle for the particular class of locomotive on which it is to be tried, ¼ of an inch larger than the specified diameter. The projections are then made to give an area equal to the difference between specified and bored out areas. This method reduces the cost of application to a minimum and does not necessitate the making of a new nozzle.

The purpose of the projections is to break up the continuity of the circular section of the exhaust jet and change it to a Maltese cross form, thereby increasing the gas entraining capacity of the jet and creating a greater vacuum in the front end. The nozzle is fastened to the exhaust stand without attention to the angular location of the projections relative to the axis of the front end, as experiments have proved that alterations in this location do not affect the performance.

A number of tests were made in the locomotive testing plant at Altoona of both the standard circular nozzle and the internal projection nozzle on engines of three classes, in each case the only change made on the locomotives being the change in exhaust nozzles. These engines* were an Atlantic, E 6s, a Pacific, K 4s, and a Mikado, L 1s.

The accompanying table gives a comparison of the maximum results which were obtained from the locomotives when using each of the two nozzles. A wide open throttle was used in each instance and the working pressure was 205 lb. per sq. in.

It will be observed that a much better performance in general was obtained from each of the locomotives when using the new type of nozzle, and especially is this true in the case of the Pacific and Mikado type locomotives, both of which have boilers similar in design. The Pacific type locomotive delivered an equivalent evaporation of 87,414 lb. per hour and 3,183.9 indicated hp., with the internal projection nozzle, while with the standard 7 in. circular nozzle it was possible to obtain but 51,842 lb. equivalent evaporation per hour and 2,241.5 indicated horse power. The Mikado type locomotive, having smaller drivers and a longer stroke, developed 79,675 lb. equivalent evaporation per hour compared with 58,539 lb. obtained with the circular nozzle, and 2,835.5 indicated horse power or an increase of 469 i. hp. above what was developed with the use of the 7 in. circular nozzle. Comparing the performance of the Atlantic type locomotive when equipped with each of the two nozzles, there was obtained with the four internal projection nozzle an increase in equivalent evaporation of 24.2 per cent and 14.6 per cent greater indicated horse power.



Internal Projection Exhaust Nozzle

The considerably higher front end draft obtained with the new type of nozzle in each instance is responsible for the remarkable results attained, enabling a much greater rate of combustion and a higher degree of superheat to be obtained.

Type of locomotive	Atlantic		Pacific		Mikado	
Kind of nozzle	Four internal projections	Circular, 6.25 in. diameter	Four internal projections	Circular, 7 in. diameter	Four internal projections	Circular, 7 in. diameter
Area of nozzle, sq. in.	30.86	30.68	38.19	38.45	38.08	38.45
Speed, m. p. h.	46.9	47.0	47.3	37.8	28.3	29.3
Actual cut-off, in per cent.	52.0	46.0	60.3	46.4	60.8	51.1
Average boiler pressure, lb. per sq. in.	204.9	184.8	201.3	203.2	204.7	204.4
Draft in smokebox, in. of water	15.1	8.3	18.8	5.7	14.9	8.6
Draft in ashpan, in. of water	0.40	0.41	0.71	0.51	0.60	0.64
Dry coal fired per hr., lb.	8,271	6,942	11,813	5,146	9,312	6,621
Dry coal per sq. ft. grate	148.3	124.4	170.6	74.3	133.0	94.6
Water evap. per hr., lb.	44,628	35,928	65,400	39,977	59,508	46,170
Equiv. evap. per hr., lb.	58,641	46,771	87,414	51,842	79,675	58,539
Superheat, deg. Fahr.	204.2	175.9	215.2	157.2	183.5	122.2
Indicated horsepower	2,304.8	1,901.1	3,183.9	2,241.5	2,835.5	2,366.7

ARGENTINE RAILWAYMEN AND THE WAR.—The number of men from the Central Argentine Railway who have volunteered for active service with the Allies totals 270, which is equivalent to nearly 30 per cent of the total English staff of the company.

*For descriptions of these locomotives see the following numbers of the *Railway Age Gazette:* E6s, page 356, February 20, 1914; K4s and L1s, page 12, July 3, 1914.

General News Department

The machine and blacksmith shops of the Seaboard Air Line at Portsmouth, Va., were destroyed by fire on the night of April 6.

A bill has been introduced in the Minnesota legislature providing that whenever two or more railroads enter a city, village or town in the state the railroad and warehouse commission may order the construction of a union station.

Of 336 fast freight trains run by the Baltimore & Ohio from New York, Philadelphia and Baltimore to Chicago, Columbus, Cleveland, Cincinnati and St. Louis, March 1 to 12 inclusive, only one suffered by delay, and this was the result of an unavoidable delay near Cincinnati.

The British American Company, Chicago, Ill., announces that it is making plans and specifications for the erection of a $5,000,000 ship building plant, to be located on the Atlantic coast. All business pertaining to the machinery required will be handled directly by this company.

The semi-annual meeting of the Santa Fe Loss and Damage Committee was held in Dallas, Tex., last week. About 100 men, representing all four grand divisions, were in attendance, devoting their time to the consideration of methods of reducing claims for loss of and damage to freight.

Baltimore & Ohio Southwestern train No. 27, a local passenger train running part of the time between Cincinnati, Ohio, and Seymour, Ind., a distance of 87 miles, and the remainder of the time between Cincinnati and North Vernon, a distance of 72 miles, has been on time for 412 consecutive days, up to and including April 1; this is on a busy single-track railroad.

The Canadian Pacific proposes to discontinue the use of its Broad street station at Ottawa for passenger business and to run all trains to and from the Central station of the Grand Trunk. It is understood that arrangements are nearly or quite completed, and that the change will be made about June 1. Counting trains in and out there will be about 34 Canadian Pacific trains daily. Trains of the Canadian Northern already use the Central station.

The International & Great Northern has organized a central safety first committee and division safety committee. The central committee includes A. G. Whittington, general manager; the assistant general manager; the superintendent of transportation, the purchasing agent, the general claim agent, the superintendent of telegraph, the superintendent of motive power, superintendents of various divisions and the general chairmen of the various brotherhoods. The division committee consists of superintendents of the divisions and representatives of the employees.

With their new summer suits the uniformed forces of the Baltimore & Ohio will be decorated with badges of honor upon the basis of length of service. Coat sleeves will bear gold bars and stars, the bars signifying five years' service and the stars twenty-five years. The service record of the Baltimore & Ohio men is approached by few railroads. Many of the passenger conductors, station masters and others will wear the gold star. Pensioned employees have been asked to wear their old uniforms to headquarters that they may be decorated; and those veterans whose service did not require uniforms will receive fitting recognition at the same time.

George Hannauer, general manager of the Indiana Harbor Belt; F. A. Spink, traffic manager of the Chicago & Western Indiana, and John G. Drennan, district attorney of the Illinois Central, appeared before the public utilities committee of the house of the Illinois legislature last week, to oppose a bill to give the city of Chicago power to regulate steam railroads and public utilities within the city limits. The speakers showed that this bill would put Chicago railroads under the jurisdiction of three commissions—the Interstate Commerce Commission on interstate business, the state public utilities commission on most of the intrastate business, and the city commission on business within the city limits of Chicago.

Students of the railway department of the University of Illinois, under the leadership of Prof. E. R. Dewsnup, spent four days last week in Chicago making an inspection of the Chicago terminals, and visiting the offices of various departments of the railroads where officers of the roads explained to the students the work of their various departments. On Monday they visited the local freight station of the Chicago, Milwaukee & St. Paul and were given a talk on freight handling by Agent Nelson W. Pierce. Later they visited the auditing offices of the Rock Island lines, where W. H. Wallace, car accountant, described the system of car service records and accounts. In the afternoon they visited the Fordham classification yards of the Illinois Central, where W. J. Leahy, superintendent of freight terminals, and Trainmaster Bernard described the work of a classification yard. Tuesday was devoted to an inspection of the Belt Railway and the Clearing yard, and on Wednesday the students were given an insight into the work of train despatching, shop work and the storekeeping department at the offices and shops of the Burlington. On Thursday they visited the offices of the superintendent of transportation of the Rock Island lines, the LaSalle street station, the office of chief engineer, where Mr. Morse described the system by which the Rock Island supervises maintenance of way and structures, and later at the office of the Chicago & North Western, R. C. Richards, chairman of the General Safety Committee, gave the students a talk on railway safety.

Proposed Legislation Affecting Railways

The transportation committee of the Minnesota Senate has killed the bill to increase state passenger fares from 2 to 2½ cents a mile.

The bill to increase intrastate passenger fares in Ohio from 2 to 2½ cents a mile has been tabled by the utilities committee of the lower house of the Ohio legislature. It is stated that it is proposed to present a substitute measure giving the state public utilities commission authority to grant an increase if, after investigation, it finds an increase justified.

A bill has been introduced in the Illinois legislature providing for the appointment of a committee, consisting of five senators and five representatives, to investigate the business and condition of the Illinois railroads with reference to revenues, rates, earnings, expenses and equipment, with a view to a determination as to whether their rates are too low. The committee is to be authorized to inquire into all financial relations of the companies and their control.

Enginemen's Arbitration Proceedings Concluded

The board of arbitration, which has been hearing evidence on the wage demands of the western engineers and firemen, began holding executive sessions daily at Chicago on Monday of this week for the purpose of formulating the decision of the board. The oral arguments in the case were concluded on Friday, April 2, when Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers, closed his argument on the brief filed by himself and by W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen. Before the hearing closed both sides agreed that the time for the arbitrators to render an award may be extended to April 30, if necessary, although Chairman Pritchard said he hoped and believed that the board would be able to make its award by April 15.

Referring to the statement made before the eastern arbitration board in 1910, that there was no reason why the western engineers should be paid more money than those of the East on engines of the same class, Mr. Stone said he proposed to make the eastern rates come up to the schedules of the western lines. He did not say when he would present the demands on the eastern

lines for an equalization. Several times during his argument Mr. Stone intimated plainly that if the award in this case failed to satisfy the engineers and firemen they will never again agree to submit wage controversies to arbitration.

The hearings before the board began at Chicago on November 30. The testimony and arguments presented have made a total of more than 2,500,000 words, in addition to thousands of pages of statistical exhibits, and the cost to the railroads and the brotherhoods is estimated to have been more than $500,000.

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for January, 1915, are as follows:

The net operating income of the railways of the United States for January decreased $5 per mile, or 2.8 per cent, as compared with January, 1914; in January, 1914, it was 25.6 per cent less than in January, 1913.

Total operating revenues amounted to $214,196,786, a decrease from 1914 of $17,006,859. Operating expenses were $163,769,221, a decrease of $16,307,796. Net operating revenue amounted to $50,427,565, a decrease of $699,063. Taxes amounted to $11,213,928, a decrease of $87. This left $39,174,218 for net operating income, the amount available for rentals, interest on bonds, appropriations for improvements and new construction, and dividends. Operating revenues per mile of line averaged $936, a decrease of 8.3 per cent; operating expenses per mile averaged $716, a decrease of 10.0 per cent; net operating revenue per mile averaged $220, a decrease of 2.4 per cent, while taxes per mile were $49, a decrease of 1.0 per cent. Net operating income per mile was $171, a decrease of 2.8 per cent. Railways operating 228,690 miles of line are covered by this summary, or about 90 per cent of the steam railway mileage in the United States.

Total operating revenues of the eastern railways per mile of line decreased 6.3 per cent as compared with January, 1914, operating expenses decreased 9.8 per cent, net operating revenue increased 11.8 per cent, taxes increased 0.7 per cent, and operating income increased 16.3 per cent.

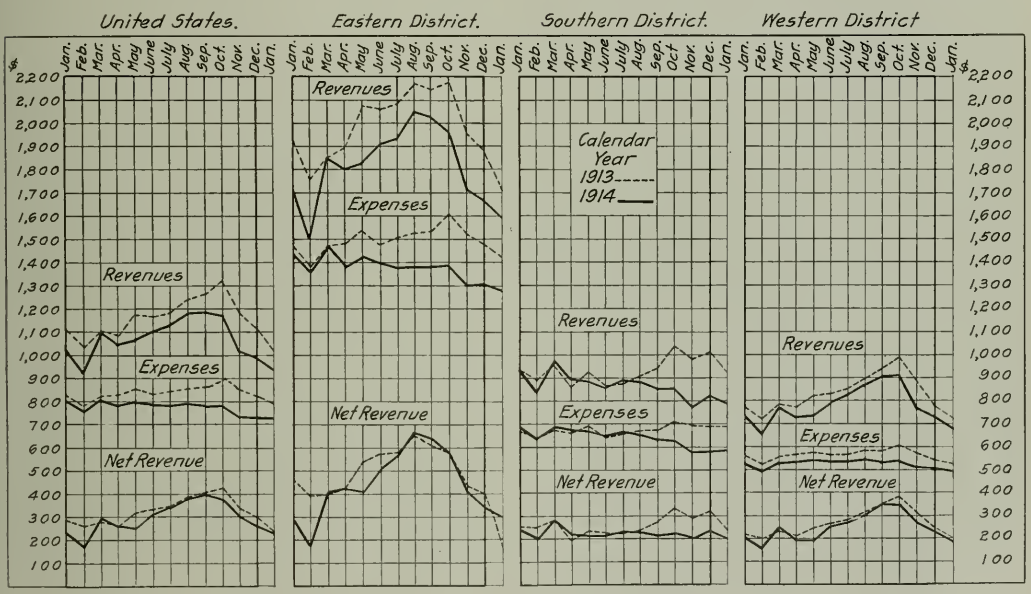
Total operating revenues of the Southern railways per mile of line decreased 15.0 per cent, operating expenses decreased 15.2 per cent, net operating revenue decreased 14.3 per cent, taxes decreased 0.5 per cent, and operating income decreased 17.0 per cent.

Total operating revenues of the western railways per mile of line decreased 7.1 per cent, operating expenses decreased 7.4 per cent, net operating revenue decreased 6.5 per cent, taxes decreased 2.4 per cent, and operating income decreased 7.6 per cent.

The seven months of the current fiscal year show a decrease in total operating revenues per mile of 8.6 per cent as compared with the corresponding period of the preceding year, a decrease in operating expenses per mile of 9.8 per cent, and a decrease in net operating revenue per mile of 5.6 per cent.

This net operating revenue per mile shows an increase of less than one-tenth of 1 per cent in the East, decreased 19.0 per cent in the South, and decreased 5.6 per cent in the West.

January operating income per mile was 2.8 per cent less in 1915 than in 1914, 28.0 per cent less than in 1913, 8.5 per cent more than in 1912, and 13.8 per cent less than in 1911.



Monthly Revenues and Expenses Per Mile of Line 1914 and 1915

Mail Pay Controversy

The intemperate deliverances of Postmaster General Burleson, in connection with the failure of Congress to adopt his recommendations in relation to railway mail pay, have been widely criticized in the press, his denunciations of the railroads, unsupported by any statement of facts, eliciting unfavorable comments from papers of all political parties. Ralph Peters, chairman of the railways' committee on mail pay, has issued a leaflet quoting editorials from a dozen prominent papers.

Mr. Peters has also issued a statement commenting on Mr. Burleson's comparison of mail and express earnings. Mr. Burleson says that from New York to Chicago railway mail pay amounts to $2.58 per 100 lb., while the railroads' proportion of the first class express rate between those cities is $1.20 per 100 lb. But, says Mr. Peters, the fact is that the express rate Mr. Burleson names is not an average, or in any way a representative rate, but is the railroads' share of the express company's share for a single 100-lb. package, on which the very lowest wholesale rate is given to the shipper. "The railroads' receipts from the smaller express packages,

which make up the great bulk of the actual business—and hence their average receipts per 100 lb. of express—are far higher than the figure Mr. Burleson quotes, a fact of which it is scarcely conceivable he could be unaware.

"For instance, for carrying 100 one-pound express packages from New York to Chicago, the express company would receive 23 cents apiece, or a total of $23. Of this amount the railroads' share for its portion of the service would be about half, or $11.50, which is nearly 4½ times the rate for carrying 100 lb. of mail. Such a comparison, if offered as representative of average conditions, would be no more misleading than the one going to the opposite extreme which Mr. Burleson has used. The truth, of course, lies between the two extremes."

Michigan Legislature Fails to Locate Alleged "Slush Fund"

A committee of the Michigan legislature last week held a hearing at Lansing for the purpose of investigating rumors said to have been circulated about the legislature, that the railroads had a large "slush fund" for influencing the attitude of the members of the legislature and also newspapers in the state. The investigation was devoted mainly to a consideration of a number of statements by state officers which appeared in a full-page advertisement in the Lansing State Journal favoring an increase in passenger fares. Investigation of the alleged "slush fund" dwindled to a number of denials from members of the legislature that they had ever heard of such a fund, although some of them admitted discussing a large fund to be used by the railroads for publicity. Newspapers have printed various rumors about a fund of $300,000. W. W. Walker, vice-president and general manager of the Duluth, South Shore & Atlantic, testified on April 1, that since last September three assessments of $5,000 each had been levied against the railroads of the state to be used in newspaper advertising, and that about $500 had been left over from another fund. Later A. W. Towsley, vice-president of the Ann Arbor, submitted a detailed statement of expenditures made for publicity and attorney's fees amounting to $15,283. Some of the state officers who were quoted in the newspaper advertisement either denied the correctness of the statements attributed to them or insisted they did not know they were being interviewed for publication. C. L. Glasgow, chairman of the Michigan Railroad Commission, objected to one of these statements attributed to Commissioner Cunningham, saying it did not represent the views of the commission. Officers and reporters of the Lansing State Journal also were called to explain the way in which the interviews were obtained.

A hearing was held before a committee of the legislature on March 30, on a bill which has been reported by committees of both the House and the Senate, providing for a sliding scale of passenger fares based on the past earnings of the roads. Representatives of several of the railroads appeared and objected to such a bill. Paul King, receiver of the Pere Marquette, said that under such a law his road could not charge the higher rate between points where it came into competition with the Michigan Central, which, under the proposed law, would be allowed to charge no more than two cents a mile. H. Russell, general counsel for the Michigan Central, also objected to the bill. It is reported that a majority of the members of the legislature are in favor of this bill.

June Mechanical Conventions

J. D. Conway, secretary-treasurer of the Railway Supply Manufacturers' Association, advises that already 178 exhibitors have arranged for space on Young's Million-Dollar Pier during the Master Mechanics' and Master Car Builders' conventions in June. Applications for space are coming in daily and in spite of the business depression the indications are that the exhibits this year will be at least as extensive as, and possibly larger than, those of last year. The list of exhibitors shows a number of new companies which have never before exhibited. There seems to be little question but that the New Traymore Hotel will be open to receive guests by June 1. It will have 700 rooms with private baths and, it is said, will compare favorably with the newer and better class hotels of New York. The Convention Hall on the Million-Dollar Pier will be considerably enlarged and the exhibit space designated as Hotel Men's Annex will be enclosed with glass sash. Other improvements and rearrangements are being made in the space, which, it is expected, will add greatly to the effectiveness of the exhibit.

International Engineering Congress

The American societies of civil, mining, mechanical, electrical and marine engineers have arranged for a special train from New York to San Francisco to attend the International Engineering Congress, which will be held there September 20 to 25. The train will leave the Grand Central Terminal New York, at 7:45 p. m. Thursday, September 9, and will stop 4 hours at Niagara Falls, 12 hours at Colorado Springs and 15 hours at the Grand Canyon, arriving at San Francisco at 9:00 p. m. September 15. Since many members of these societies cannot conveniently join this party from New York, extra cars will be added to the Sunset Limited of the Southern Pacific leaving New Orleans at 11:00 a. m. Sunday, September 12, and arriving at San Francisco at 1:00 p. m. Wednesday, September 15.

Electrical Engineers

The American Institute of Electrical Engineers will hold its thirty-second annual convention at Deer Park, Md., June 29 and 30, and July 1 and 2. Morning and afternoon sessions will be held, that of Thursday afternoon being devoted to problems of electrified steam roads. Among the subjects considered at this session will be: Construction and Maintenance Costs of Overhead Contact Systems, by E. J. Amberg and Ferdinand Zogbaum; The Contact System of the Butte, Anaconda & Pacific, by J. B. Cox; Third Rail and Trolley System of the West Jersey & Seashore, by J. V. B. Duer; Top Contact Unprotected Contact Rail for 600-Volt Traction System, by Charles H. Jones, and Under-Running Third Rail Conductors, by Edwin B. Katte.

International Railway Fuel Association

The seventh annual meeting of the International Railway Fuel Association will be held at the Hotel LaSalle, Chicago, May 17 to 20, inclusive. Papers will be presented on the following subjects: Powdered Coal; Fuel Oil for Locomotive Use; Standardizing the Preparation of Coal; South American Railways' Fuel Supply; Analysis of Dependent Sequence as a Guide to Fuel Economies; Relation of Mechanical Stokers to the Fuel Problem; Employment and Training of Firemen; Waste of Fuel in Railway Stationary Plants. In addition to these papers committee reports will be made on Fuel Stations, Storage of Coal, Fuel Accounting, Firing Practice, Fuel Tests and Front End, Ash Pans and Grates.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 23-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Association. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915. Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except, June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Signal Association.—C. C. Rosenberg, Myers Bldgs., Bethlehem, Pa. Stated meeting, May 26-27, 1915, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meeetings with Master Car Builders' and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Road Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

Circulars have been issued by the traffic department of the Rock Island lines, the Wabash and the Missouri, Kansas & Texas to their representatives urging their co-operation in the "buy it now" campaign. The Rock Island lines have also given this movement some space in their March time table, the Chicago & North Western has an editorial on the subject in its passenger department bulletin, and the Atchison, Topeka & Santa Fe has taken it up in its employees' magazine.

The International & Great Northern is making preparations to handle a very heavy movement of freight during the next few months. Extensive agricultural development is in progress in the territory along the division between San Antonio and Laredo, and the company expects an increase in the interchange of traffic between Mexico and the United States through the Laredo gateway. Villa is now in control of a large area of the country that is tributary to that point and is restoring traffic on the National Railways of Mexico as rapidly as possible.

The Moberly (Mo.) Commercial Club has issued a call for a conference of all the commercial clubs in Missouri to be held at Moberly on April 8, for the purpose of discussing the present financial condition of the Missouri railroads, which the circular issued by the club says is one which should commend the serious attention of every thinking citizen of the state. It is pointed out that more than 2,000 miles of railroads in the state are in the hands of receivers, while several other large systems have been on the brink of receivership for some time, and that such a condition would gravely menace the future commercial, industrial and agricultural welfare of the state.

Transcontinental express service was inaugurated on March 30 by the Baltimore & Ohio road and its western connections from New York, Philadelphia and Baltimore to San Francisco and Los Angeles, handling shipments of Wells Fargo & Company through the Chicago and St. Louis gateways on the fastest schedule ever attempted between the leading cities on the two coasts. The first train left Jersey City at 8:45 p. m., and extra cars were attached at Philadelphia and Baltimore. At Cumberland, Md., the train was divided into two sections—one due at Chicago at 9 p. m. and the other due at St. Louis at 1:50 a. m. The section through Chicago connects with the "Fast Mail" of the Atchison, Topeka & Santa Fe, arriving at Los Angeles at 8:55 a. m., and San Francisco at 5:30 p. m., the fifth day from New York. At Chicago connection is made with the Chicago, Milwaukee & St. Paul "Olympian," for Seattle, Portland and Tacoma. The St. Louis section connects with the Missouri Pacific for Kansas City and San Francisco and with the Iron Mountain to Texas and the southwest.

Traffic officers and lawyers of the railways have held several meetings during the past two weeks to discuss the bill passed by Congress at its closing session to prohibit the railways from limiting their liability for loss or damage of freight, in which it is believed Congress unintentionally authorized the railways to make a general advance of 10 per cent in their freight rates. All existing freight rates are embodied in tariffs which include a provision, printed in the classification, to the effect that if the uniform bill of lading, with its numerous conditions, is not used, and the railways accept unlimited liability, they shall receive 10 per cent more than the rates printed in the tariffs. Representatives of the roads in the three classification territories have had meetings and joint conferences in an effort to agree on an understanding of what the law requires and what the attitude of the railways should be toward it. Many of the lawyers are of the opinion that if no action is taken rates will automatically be advanced 10 per cent on the effective date of the law, but there is some difference of opinion among the traffic men as to whether the railways ought to try to take advantages of it. The Interstate Commerce Commission will hold a public hearing on April 10, and has announced that "the representatives of the carriers are expected to present to the commission suggestions or plans to be followed by the carriers in the light of these changes in the law."

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The Duluth Commercial Club has filed a complaint with the Interstate Commerce Commission charging discrimination in favor of St. Paul and Minneapolis in rates to points on the Northern Pacific, Great Northern, Minneapolis, St. Paul & Sault Ste. Marie and Minnesota & International.

The Interstate Commerce Commission has issued a notice saying that since the discontinuance of the printing of its unreported opinions in January, 1913, representatives of carriers, shippers, trade bodies and representatives of the press have been insistent in their demands that they be furnished with copies of the unreported as well as the reported opinions. In response to such requests it has been decided to resume the printing of the unreported opinions, and one copy of each will be placed upon the press tables in the secretary's office. Additional copies desired may be obtained directly from the superintendent of documents of the government printing office, at a nominal price.

Railway Ownership of Boat Line on Lake Tahoe

Opinion by Commissioner Clark:

The commission finds that the Lake Tahoe Railway & Transportation Company does not violate the fifth section of the Panama canal act by operating a boat line around Lake Tahoe. The boat line operated is but an extension of the rail line between Truckee, Cal., and Tahoe City, and the rail line does not, or may not, compete for traffic with the boat line within the meaning of the act. (33 I. C. C., 426.)

Rates on Strawberries from Washington and Oregon to Montana

Lindsoy & Company, Ltd., et al. v. Northern Express Company et al. Opinion by Commissioner Hall:

The commission finds that the rates on strawberries and cherries shipped by express in carload lots from Seattle, Tacoma and eight other points in Washington and Oregon to Helena, Butte, Great Falls and Billings, Mont., are unreasonable and discriminatory and lower rates are prescribed for the future. The rates for initial icing of such shipments or for icing in transit are not found to be unreasonable. (33 I. C. C., 394.)

Rates on Fertilizer from Shreveport

Meridian Fertilizer Factory et al. v. Abilene & Southern et al. Opinion by the commission:

The commission finds that the present single line rates on acid phosphate from Shreveport, La., to Marshall, Jefferson, Texarkana, Palestine, Fort Worth, Houston, Bryan and certain other points in Texas are not unreasonable but that they are prejudicial in those cases where they exceed the rates from New Orleans to the same points. It is also found that the rates for a haul over two or more lines are unreasonable and it is held that the rates for such a haul should not exceed those for a haul of like distances over a single line by more than two cents per 100 lb. There are certain violations of the fourth section in these rates from Shreveport, but consideration of them is left for further investigation. (33 I. C. C., 160.)

Commutation Fares at Washington, D. C.

Opinion by Commissioner Daniels:

The Baltimore & Ohio, which at present sells for commutation traffic out of Washington on its Washington and Metropolitan branches 180-trip tickets good for three calendar months, 60-trip tickets limited to 30 days from date of sale and 10, 24 and 50-trip tickets has proposed to abolish the 180-trip, the 24-trip and the 50-trip tickets, and also to increase the rate on the 60-trip tickets which will be left in existence with the 10-trip tickets.

The carrier was able to show that the traffic was comparatively light and that the service was on the whole unprofitable. The commission finds that the 24 and 50-trip tickets may properly be withdrawn. It also holds that the carrier has justified its proposed withdrawal of the 180-trip tickets, noting in this connection that it is difficult to see what warrants such a spread as exists under the respondent's tariff between the daily charges under the 60-trip ticket and the 180-trip ticket, that the present cost per trip under this three months' ticket is by comparison with the fares of other carriers evidently too low and that the tendency among carriers generally seems to be to do away with the 180-trip commutation ticket or to put it upon the same basis as the 60-trip ticket. It also believes that there is a certain amount of discrimination under the present arrangement in favor of the commuter who has money to invest in three months' transportation as compared with him who can afford to buy his transportation only by the month.

The withdrawal of the 180-trip ticket will relegate the users of that ticket to the 60-trip ticket with a much higher rate per trip. In view of the uncertainty of the result the commission does not believe it wise at this time to permit an increase in the price of the 60-trip ticket.

Commissioner Clements dissents from the above opinion. (33 I. C. C., 428.)

Trap Car Hearing at Chicago

Testimony regarding the methods of handling less than carload freight at Chicago was presented at the hearing last week at Chicago before Examiner Brown of the Interstate Commerce Commission, on the tariffs filed by the railways imposing a charge for trap car service. Testimony on behalf of the Chicago roads was presented by Willis E. Gray, who has been making an investigation of the Chicago terminal situation for the roads. Mr. Gray's testimony bearing on the cost of trap car service was briefly reported in last week's issue. Attorneys for the shippers, including Water L. Fisher for the Chicago Association of Commerce, and John S. Burchmore for the National Industrial Traffic League, discovered a large number of errors in his statistical exhibits. Mr. Gray disputed the contention of the shippers that railroad freight stations are congested, saying that not one of them is worked to full capacity. He said the average team delay was 35 minutes.

It was brought out that among the tariffs filed hardly any two had the same definition of trap car service. Several shippers testified as to conditions at their plants to show that if they are obliged to pay a charge for trap car service they would cart their freight instead and most of them thought that the facilities at the railroad freight stations were not sufficient to handle the business.

Mr. Fisher called to the stand W. H. Lyford, general counsel for the receivers of the Chicago & Eastern Illinois, who was largely instrumental in getting the railroads to co-operate on the construction of the classification yards and L. C. L transfer station at Clearing. He said the present freight stations in Chicago had capacity sufficient to handle the increase of freight for the next 20 years, but that it would be necessary to supplement them by a transfer plant at some outside point, and that a large percentage of freight which now passes through the city should not come within the limits at all. Under present conditions he said the more freight a railroad receives, in many cases, the more expensive it is per ton to handle it. The present system of handling less than carload freight, he said, has become unbearable to the railroads and is fast becoming so to the shippers. He cited some instances in which the terminal charges in Chicago amount to more than the gross receipts for the total haul, and he thought the cost to the railroad of handling freight after it gets to a station is practically double if it comes in trap cars to the cost of handling when it comes by team.

John F. Wallace, chairman of the Railway Terminal Commission of Chicago, said that one of the most impressive facts about the situation is that the more freight a road handles and the more nearly in a wholesale manner the business is conducted the more it costs per ton. He said the remedy involves a changed attitude on the part of railroad officials He suggested two possible remedies. First, loading outbound freight in bulk in full carloads, moving the cars to an outside station and resorting, and, second, the construction of freight houses so that several floors could be utilized, somewhat in the manner contemplated by the Pennsylvania for its proposed new freight terminal. He thought that groups of roads might co-operate in handling freight to outside sorting stations and that a great deal of money could thus be saved. Much of the trouble comes from the law which forbids pooling, without which he said the roads might be able to unite on some co-operative system.

Bion J. Arnold, consulting engineer, and member of the Railway Terminal Commission, urged the necessity of eliminating some of the freight terminals in the congested parts of the city or utilizing them in a more universal way. He said all should be made universal stations, thereby releasing much property which is needed for commercial purposes.

H. C. Barlow, traffic director of the Chicago Association of Commerce, said the proposed trap car tariffs would create discrimination all over the country. He insisted that the trap car service is as much a convenience to the carrier as to the shipper and that the shipper shall not be required to pay for it.

J. Charles Maddison, traffic manager of Montgomery Ward & Company, one of the largest users of trap cars in Chicago, said that the trackage at the plant cost about $120,000. During February 1,457 trap cars were handled, the tracks having a capacity of from 55 to 60 cars. These cars are loaded to the firm in another city, to gateway points, to outside transfer stations and to downtown stations. If the company should send its freight to the downtown stations instead of to transfer points, the railroads would be unable to handle it. He had made an experiment by delivering by team to the downtown station of one of the roads, and they asked him to let up on that kind of delivery. If the four cent rate is applied, Montgomery Ward & Company would quit using the trap cars, but would team the freight. He thought the trap car service was a distinct advantage to the carriers, saving them the expense of loading, especially as a large part of the cars loaded out are those that were brought in under loading. He thought there was no excuse for a charge on cars that go directly to destination, but as to cars that go to downtown service stations he said the service is in effect a substitute for drayage, and there should perhaps be a charge for it.

STATE COMMISSIONS

The public service commission of Missouri, in connection with its investigation of freight and passenger fares, has called upon the roads for lists of all officers and their salaries and the amounts expended for labor in the various departments. This was prompted by a request of one of the interveners in the case, that the commission require the roads to file a list of their officers who are paid more than $2,000 a year, with the duties of each.

The public utilities commission of Colorado, on April 1, put into effect a code of demurrage rules and charges applying to all standard-gage railroads in the state. These rules were adopted by the commission after investigation and a hearing on February 23, at which all the larger carriers in the state were represented by their attorneys, traffic and operating officers, also by Arthur Hale, general agent of the American Railway Association, and W. E. Backensto of the Colorado Demurrage Bureau. On March 15, the commission tentatively adopted and issued a set of rules to which the carriers were to set forth all objections before April 1. Some changes were made in response to these objections. It has been the aim of the commission, it is stated, to have these rules follow as closely as possible the national uniform code of demurrage rules with only such exceptions as are considered necessary to meet the conditions of Colorado intrastate traffic.

COURT NEWS

In the United States District Court at Little Rock, April 3, Judge Trieber handed down a decision making void the Arkansas two-cent passenger fare law, and the commission freight tariff as applied to the St. Louis & San Francisco in Arkansas. He held both to be confiscatory and the state was perpetually enjoined from enforcing a two-cent intrastate rate upon that company. The case had been in court seven years. The road will at once announce passenger tariffs based on a rate of three cents a mile.

In the Federal Court at Trenton, N. J., April 5, the Central of New Jersey was fined, in connection with the violations of law, noticed in these columns March 19, page 643, the sum of $200,000, being at the rate of $8,000 on each of 25 counts in the indictment. The company announced that an appeal would be taken to the higher court. Counsel for the road in his argument declared that no one had been injured by the rebating and that no shipper had complained.

The attorney general of Texas has filed suit against 41 railroads in the district court at Austin, Tex., seeking to enjoin them from issuing free transportation, except to officers, agents and employees. It is charged that the issuance of free transportation is a discrimination against all of the traveling public who are required to pay full fare, and that the railroads in the past 10 years have issued free transportation to the extent of 12 per cent of their total passenger mileage, or to an amount great enough to pay a dividend of 2.41 per cent on their capital stock.

E. P. Vanderwicken, president and general manager of the Art Shade Company, was fined $125 and costs by Judge Carpenter in the United States circuit court at Chicago on April 2, on charges of violating the law by the misdescription of shipments of art glass shades as glass shades. Indictments were returned against the company on November 7, 1914. These shipments were forwarded from Chicago to various points in Western Classification territory and the Western Classification rates art glass shades, L. C. L., as double first class and glass shades as second class. Several notices were sent to the firm directing its attention to the misbilling as being in violation of Section 10 of the act to regulate commerce.

Interstate Traffic Suits in State Courts

The Supreme Court of the United States on Monday of this week, in the case of the Pennsylvania Railroad against the Puritan Coal Mining Company, held that a suit against a carrier for damages could be brought in either the federal or the state court, the amendment to the Interstate Commerce law, in putting suits of this kind under the authority of the Interstate Commerce Commission, having provided that litigants should not lose any right which they already possessed. The Interstate Commerce Commission has jurisdiction to decide as to facts; but in this case there was no question as to the facts which constituted the illegal action of the road, and therefore the Puritan Coal Company was justified in going directly to the court. The amendment to the Interstate Commerce act as to car supply was purposely drawn to secure new rights to shippers, and at the same time to protect them in all former rights under the common law or the statutes.

The case arose out of the failure of the road in the period of the coal strike in 1902 to furnish the proper quota of cars to the Puritan Company, which presented a claim for a loss of profits amounting to $260,777. Suit was brought in the Court of Common Pleas of Clearfield county, Pennsylvania, where the court without a jury found the facts as set forth by the coal company. The distribution sheets put in evidence by the road showed that it was the practice to supply cars to the "Scalp Level region" in preference to the mountain region. The Berwind-White Coal Company being located in the former region, it was charged that the road purposely discriminated in favor of that company.

Justice Lamar, in the decision, holds that Section 3 of the Interstate Commerce act makes it unlawful for the carrier to prefer one shipper over another, and that Section 8 gives the shipper the right of action for damages by presentation of his case to the Interstate Commerce Commission for a determination of the facts, and then by suit in the federal courts to the exclusion of any other remedy in the state courts, the federal courts having exclusive jurisdiction. With these two sections standing alone, the shipper would have had no remedy in the state courts; but under Section 22 of the act it is provided that there shall be no abridgment of remedies already existing at common law or statute, so that all three sections must be read together; and therefore Sections 8, 9 and 22 give the shipper new rights and protect those he has already enjoyed.

While former decisions provide that suits for discrimination must be passed on first by the Interstate Commerce Commission, and that until the commission has passed on the case no court has any jurisdiction, the present decision holds that if the carrier's rule shows on the face of it that it has been unequally applied and suit is brought for damages by violation or by discriminatory enforcement, there is no administrative question involved, and the courts may decide on the facts. The decision holds that the liability is the same whether there is a breach of common law duty to furnish cars or discrimination in the supply of cars.

Railway Officers

Executive, Financial, Legal and Accounting

T. J. Kennedy on March 19 qualified as co-receiver of the Algoma Central & Hudson Bay, with headquarters at Sault Ste. Marie, Ont.

W. E. Douglass, assistant claim agent for the Sunset-Central Lines at El Paso, Texas, has been appointed general claim agent, with headquarters at Houston, Texas, succeeding W. D. Herring, deceased.

J. O. Talbot, auditor of disbursements of the Missouri, Kansas & Texas, of Texas, with headquarters at Dallas, has been appointed auditor of the Maryland & Pennsylvania, with office at Baltimore, Md., effective April 1.

P. B. Bradley, vice-president of the Charlotte Harbor & Northern at Boston, Mass., has been elected president, with headquarters at Boston, succeeding James M. Gifford, who becomes first vice-president and general counsel, with headquarters at New York. L. M. Fouts, second vice-president and general manager at Boca Grande, Fla., has resigned, and Thomas A. Doe has been appointed treasurer, with headquarters at New York, succeeding James B. Kilburn.

John Calvin Nelms, Jr., who has been appointed general auditor of the Norfolk Southern, with headquarters at Norfolk, Va., was born on June 21, 1871, at Suffolk, Va., and began railway work on November 1, 1891, with the Norfolk & Western. He served consecutively as warehouse clerk, yard clerk, billing clerk, cashier, assistant agent and agent on that road until January, 1903, and was then out of railway work for less than one year. He was then appointed freight claim agent of the Suffolk & Carolina, and in January, 1905, was promoted to auditor. He subsequently served as auditor of its successor, the Virginia & Carolina Coast, until August, 1906, when the latter road became a part of the Norfolk Southern, and since that time was in the service of the John L. Roper Lumber Company, Norfolk, Va., as auditor, from which position he resigned on April 1 to become general auditor of the Norfolk Southern. Mr. Nelms is also vice-president and auditor of the Carolina Railroad and the Kinston Carolina Railroad & Lumber Company.

Operating

R. J. Hinkle has been appointed general manager of the Mississippi, Hill City & Western, with office at Hill City, Minn., succeeding W. W. Rabey, resigned.

H. J. Plumhof, trainmaster of the Idaho division of the Oregon Short Line, has been appointed safety commissioner, with headquarters at Salt Lake City, Utah, succeeding L. E. Abbott, promoted.

R. S. Anderson has been appointed terminal trainmaster of the Chesapeake & Ohio, in charge of all yards, with headquarters at Richmond (Va.) terminal, and the office of general yardmaster at Richmond terminal has been abolished.

Jesse G. June, superintendent of terminals of the Erie with office at Jersey City, N. J., has been appointed superintendent of the Allegheny and Bradford divisions with office at Salamanca, N. Y., succeeding Fred M. Hawley, deceased. Eugene R. Allen, assistant superintendent of terminals, at Jersey City, succeeds Mr. June, and D. R. Crowley, special agent, has been appointed terminal trainmaster at Jersey City.

E. B. Pengra, superintendent of the Sumpter Valley, has been appointed general manager, with headquarters at Baker, Ore., and will assume the duties heretofore taken care of by D. C. Eccles, president, to whom Mr. Pengra reports. Mr. Pengra began railway work in 1893 with the Southern Pacific, with which company he remained 20 years, filling the positions of telegraph operator and agent and chief train despatcher. In November, 1913, he went to the Sumpter Valley as superintendent of transportation, and he is now promoted to the position of superintendent, as above noted, effective March 23.

George Owen Brophy, whose appointment as superintendent of the Wyoming division of the Union Pacific, with headquarters at Cheyenne, Wyo., has already been announced in these columns, was born on November 14, 1864, at Eagle, Waukesha county, Wisconsin. He was educated in the common schools, and began railway work in August, 1888, as a brakeman on the Union Pacific at Laramie, Wyo. He left that road in November, 1888, and reentered its service in April of the following year as a brakeman. In April, 1891, he went to the Missouri Pacific at St. Louis, Mo., as a switchman, and in July of that year again entered the employ of the Union Pacific at Omaha, Neb., as a brakeman. He was promoted to conductor in August, 1892, and was appointed trainmaster in March, 1912, which position he held until his recent promotion to superintendent of the Wyoming division, as above noted.

G. O. Brophy

J. H. Clark, who has been appointed assistant general superintendent of the New York division of the Baltimore & Ohio, also general superintendent of the Staten Island lines and superintendent of floating equipment of the same companies, with headquarters at St. George, Staten Island, N. Y., as has already been announced in these columns, was born on June 22, 1864, at Smithtown, Long Island, N. Y. After finishing the public school course he took a special course in engineering at Cooper's Institute, New York. He then served as an apprentice with the New York Iron Works & Engine Builders, and on April 1, 1884, became engineer of ferries of the West Shore Railroad. In October, 1888, he was appointed chief engineer of ferries of the Staten Island Rapid Transit Railway and in April, 1895, was placed in charge of the Baltimore & Ohio's floating equipment in New York harbor. Four years later Mr. Clark was appointed assistant superintendent of floating equipment of the Baltimore & Ohio, and in September, 1902, he was promoted to master mechanic of the Staten Island Rapid Transit Railway. In May, 1913, he was promoted to superintendent of floating equipment of the Baltimore & Ohio system and now becomes also assistant general superintendent of the New York division and general superintendent of the Staten Island lines, as above noted.

J. H. Clark

Traffic

William J. Doran has been appointed general agent of the Union Pacific at Los Angeles, Cal., in place of H. O. Wilson, resigned.

H. W. Rieck, superintendent of transportation of the San Antonio, Uvalde & Gulf at San Antonio, Texas, has been appointed division freight and passenger agent at that place.

W. H. Snell, general agent, passenger department, of the Canadian Pacific at New York, has been appointed general passenger agent, eastern lines, with headquarters at Montreal, Que., succeeding William Stitt, deceased.

William H. Lewis has been appointed general agent, freight and passenger departments, of the Chesapeake & Ohio, also representing interests of the Kanawha Despatch and Blue Ridge Despatch Fast Freight Lines, at San Francisco, Cal.

H. B. Brittan, district passenger agent of the Pacific Coast Steamship Company, at Los Angeles, Cal., has been appointed district passenger agent, with headquarters at San Francisco, succeeding W. R. Meech, resigned, and A. S. Jones, city passenger agent at Los Angeles, succeeds Mr. Brittan.

J. W. Daly, division freight agent of the International & Great Northern at Galveston, Tex., has been appointed also division passenger agent, and J. W. King, division freight agent at San Antonio, has been appointed also division passenger agent at that point. W. E. Pitch, district passenger agent at San Antonio, has been assigned to other duties.

Engineering and Rolling Stock

Samuel T. Wagner, assistant engineer of the Philadelphia & Reading at Philadelphia, Pa., has been appointed chief engineer, with headquarters at Philadelphia, succeeding William Hunter, deceased.

B. J. Schwendt, formerly signal engineer of the Toledo & Ohio Central, and the Zanesville & Western, has been appointed superintendent of telegraph, and now has charge of the telegraph department, while retaining jurisdiction over the signal department. The telegraph department work on these roads was formerly handled by the superintendent of telegraph of the New York Central Lines West, at Cleveland, Ohio.

The offices of supervisor of track, buildings and water supply on the Newport News and Norfolk Terminal district of the Chesapeake & Ohio have been abolished. J. S. Purdie, supervisor of track, Rivanna district, has been relieved of jurisdiction over Virginia Air Line branch. V. T. Douglas, supervisor of track, Peninsula and Piedmont districts and Orange branch, has been relieved of jurisdiction over Piedmont district and Orange branch, and his territory in future will include Newport News and Norfolk Terminal district. The territory of I. Garrison, supervisor of bridges and buildings, Richmond division, has been extended and will include Newport News and Norfolk Terminal district, and C. A. Stanley has been appointed supervisor of track in charge of Piedmont district, Orange and Virginia Air Line branches.

Robert Ferriday, engineer maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., has been appointed engineer maintenance of way of the Chicago division, with headquarters at Indianapolis. A. M. Turner, district engineer, with offices at Middletown, Ohio, and Indianapolis, Ind., has been appointed engineer maintenance of way of the Peoria & Eastern division, with headquarters at Indianapolis, Ind., vice Robert Ferriday. C. W. Cochran, engineer maintenance of way of the Cairo division at Mt. Carmel, Ill., has been appointed engineer maintenance of way of the Cleveland division, with headquarters at Galion, Ohio, vice Joseph Mullen, who has been appointed assistant engineer attached to the office of the chief engineer at Cincinnati, in charge of special investigations. A. F. Maischaider, engineer maintenance of way of the Michigan division at Wabash, Ind., succeeds Mr. Cochran, and J. W. Burt, supervisor of track at Springfield, Ohio, succeeds Mr. Maischaider.

Purchasing

E. J. Roth has been appointed purchasing agent of the Chicago, Indianapolis & Louisville, with headquarters at Chicago, succeeding Fred Davidson, resigned. The position of supply agent is abolished and the purchasing agent will have jurisdiction over purchases and supplies.

Special

T. A. Rittenhouse has been appointed real estate and tax commissioner of the Chicago & Alton, with headquarters at Chicago, succeeding D. J. Corkery, resigned.

OBITUARY

William Stitt, general passenger agent, eastern lines, of the Canadian Pacific, with headquarters at Montreal, Que., died suddenly on April 1 in that city.

Albert G. Tuttle, formerly division general freight agent of the New York & New England at Hartford, Conn., and later in the service of its successor, the New York, New Haven & Hartford, in the general freight office at New Haven until he retired from railway work in 1904, died on April 2 at Hartford, at the age of 81. He was a brother of the late Lucius Tuttle, formerly chairman of the board of directors of the Boston & Maine.

G. W. McMullen of Picton, Ont., who was one of the two leaders in the construction of the Central Ontario, now a part of the Canadian Northern, died suddenly in Chicago, March 23, of heart failure. Mr. McMullen was not only prominent in Canada as a railway builder, but also was an important figure in the Canadian Pacific, in its early days. He it was who brought together Sir Hugh Allan and the American capitalists who proposed to provide the money for the construction of the first Canadian railway to the Pacific ocean. He was also an inventor, and his visit to Chicago last month was made in connection with the annual convention of the American Railway Engineering Association, before which he spoke on his invention for the preservation of timber.

William Hunter, chief engineer of the Philadelphia & Reading, with headquarters at Philadelphia, Pa., died on April 2, in a hospital in that city from the effects of a stroke of paralysis.

W. Hunter

Mr. Hunter was born on May 25, 1854, at Moselem, Berks county, Pa., and graduated from the Polytechnic College of Pennsylvania in 1872. The same year he began railway work as a rodman on the Philadelphia & Reading, remaining in that position until 1876, when he became engaged in private business. In the summer of 1877 he returned to railway work, and until the fall of 1878 was division engineer on the Pittsburgh & Lake Erie. The same year he was appointed assistant engineer of the Philadelphia & Reading, and later served as assistant roadmaster and assistant chief engineer until August, 1900, when he was promoted to chief engineer of the same road.

Turkey and the Smyrna-Aidin Railway.—With a terminus at a port of such international importance as Smyrna, the Ottoman Railway from Smyrna to Aidin was bound to be seriously affected by war conditions. Even before the actual rupture of diplomatic relations between England and Turkey on November 5, there was serious arbitrary interference by the Ottoman government with the conduct of the company's business. From the end of August the traffic was much hindered by the mobilization of troops, the commandeering by the government of all animals available for transport, the prohibition of the export of grain, and the closing of the port of Smyrna. Yet the working of the railway was carried on until November 27, when, without previous notice, the Turkish military authorities took forcible possession and placed the general manager under arrest as a prisoner of war. The Turkish government formally assumed the management of the line on December 6 and immediately dismissed the French and British members of the staff. All postal and telegraphic communication with Smyrna has been cut off since the beginning of the war, but it is understood that a limited circulation of traffic is still maintained.—*Railway Gazette.*

Equipment and Supplies

LOCOMOTIVE BUILDING

The Chestnut Ridge has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

The Mount Hope Mineral has ordered one Consolidation type locomotive from the Baldwin Locomotive Works.

The Standard Oil Company has ordered two four-wheel switching locomotives from the Baldwin Locomotive Works.

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction has ordered 3 gas-electric locomotives from the General Electric Company.

The Chicago, Burlington & Quincy has ordered 5 Mikado type locomotives from the Baldwin Locomotive Works, in addition to the 15 Pacific, 20 Mikado and 15 Santa Fe type locomotives reported in the *Railway Age Gazette* of March 12.

CAR BUILDING

The Illinois Central has ordered 100 gondola cars from the American Car & Foundry Company.

The Richmond, Fredericksburg & Potomac has ordered 6 all-steel coaches from the American Car & Foundry Company.

The International & Great Northern, reported in the *Railway Age Gazette* of March 26 as being in the market for 1,000 freight cars, has issued inquiries for 500 80,000-lb. capacity steel underframe box cars, 200 60,000-lb. capacity steel underframe stock cars and 300 ballast cars. This company also contemplates purchasing 6 passenger cars.

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction was reported in the *Railway Age Gazette* of March 26 as having ordered 45 80,000-lb. capacity box cars, 12 trailer passenger cars and two electric motor cars from the J. G. Brill Company. This item was incorrect in that there were ordered from the J. G. Brill Company 45 box cars, 9 trailer passenger cars, 2 combination mail and express cars and one baggage car and from the General Electric Company, 2 gas-electric motor cars.

IRON AND STEEL

The Philadelphia & Reading is asking bids on 150 tons of bridge work.

The Norfolk & Western is in the market for 4,000 tons of heavy section rails.

Pennsylvania Railroad has ordered 400 tons of bridge material from the Fort Pitt Bridge Works.

The Vicksburg, Shreveport & Pacific has ordered 230 tons of steel for its bridge over the Red river at Shreveport, La.

The Southern has ordered 500 tons of steel from the Pennsylvania Steel Company, for a bridge at Charlottesville, Va.

The Chicago, Milwaukee & St. Paul has ordered 165 tons of steel for roofs and lintels for seven sub-station buildings in Butte, Mont.

The Erie has ordered 5,000 tons of steel rails from the Bethlehem Steel Company and 9,000 tons from the Lackawanna Steel Company.

The Atlantic Coast Line has placed an order with the Phoenix Bridge Company, Phoenixville, Pa., for 250 tons of steel to be used in a drawbridge which it is constructing at Tampa, Fla.

Railway Employees in the United Kingdom.—A report recently issued by the English Board of Trade shows that the railways of the United Kingdom during 1913 employed 615,585 persons weekly, the average salaries and wages amounting to $4,424,085. The 12 principal companies employed 508,434 of this number and paid $3,610,220 of the total weekly amount.

Supply Trade News

George F. Murphy has been placed in charge of the Pittsburgh sales office of the Heine Safety Boiler Company, St. Louis, Mo.

The Standard Paint Company has moved its head office in New York from 100 William street to room 572, Woolworth building.

A. G. Shaver, recently signal engineer of the Rock Island Lines, announces the opening of an office in the Transportation building, Chicago, as consulting electrical and signal engineer.

J. S. Wright, formerly in the Detroit office of Manning, Maxwell & Moore, Inc., has been appointed manager of the Boston office, succeeding Walter M. Wood, who has resigned because of ill health.

L. L. Cohen, formerly with the H. W. Johns-Manville Company, has resigned to accept service with the Safety First Manufacturing Company, with headquarters in the Railway Exchange building, Chicago.

M. A. Sherritt, manager of the Philadelphia branch of Manning, Maxwell & Moore, Inc., New York, has resigned to accept the position of vice-president and general manager of the Sherritt & Stoer Company, Inc., Philadelphia, Pa.

Stockholders of the International Smokeless Powder & Chemical Company, at a special meeting held on April 6, agreed to sell the plant, franchises and patents of the company to the E. I. du Pont de Nemours Company for $5,760,000.

The American Steel Foundries has been given a license by the United States Steel Corporation for the construction of a six-ton Heroult electric furnace at its Indiana Harbor, Ind., plant and will add electric steel castings to the products of that plant.

The Oregon-Washington Railroad & Navigation Company has awarded a contract to the Roberts & Schaefer Company, Chicago, for the designing and building of a large reinforced concrete counterbalanced type locomotive coaling plant with electric automatic operation, with sand handling facilities at the new Summit Boulevard yard, Spokane, Wash.

William Disston, president of Henry Disston & Sons, Philadelphia, Pa., died suddenly of heart disease at his summer home near Philadelphia on April 5. Mr. Disston was born in Philadelphia on June 24, 1859. Besides being president of the saw company he was head of the Henry Disston & Sons File Company, and the Henry Disston & Sons Steel Works.

L. G. Grossman, who for some time has had an office in Washington, D. C., for the general practice of law and the handling of legal business in the District of Columbia, and dealing largely with the securing of patents, has also opened an office at 538 Transportation building, Chicago, and contemplates opening offices in Cincinnati, Ohio and Kansas City, Mo.

The annual luncheon of the former employees of the New York Central signal department will be held at the Hotel Astor on May 26, which is the first day of the New York May meeting of the Railway Signal Association. It is announced that further details may be obtained from F. C. Lavarack, general sales manager of the Signal Accessories Company, 30 Church street, New York.

W. B. Huey, until recently president of the American Blue Print Paper Company, and A. H. Huey, until recently sales manager of that company, announce the formation of a new company, under the name of the Huey Company, with offices and plant at 59 East Adams street, Chicago. The company will engage in the production of blue, black line and other prints, litho productions, hectograph copies and photostat reproductions.

J. P. Rapp, a steel wheel specialist, has resigned from the Forged Steel Wheel Company, Pittsburgh, Pa., and allied companies, and has been appointed vice-president of the Gulick-Henderson Company, inspecting, consulting and chemical engineers, of New York. Mr. Rapp assisted Charles T. Schoen in developing his wheel, and has been directly connected with the

industry from its earliest inception. He will give this item of railway equipment his particular attention.

Judge Landis, of the United States district court at Chicago, rendered a decision on March 25, in favor of the plaintiff, in a suit brought by Felt & Tarrant Manufacturing Company for infringement of its Comptometer patents by the Burroughs calculating machine made by the Burrough Adding Machine Company. The suit has been pending for several years and involved charges of infringement of 58 claims in four patents. The decree was suspended pending an appeal to the court of appeals.

The reorganization plan of the United States Light & Heating Company, Niagara Falls, N. Y., which was announced April 6, provides for the issue of $3,000,000 7 per cent noncumulative preferred stock and $4,000,000 common stock. The preferred is to have the right to elect a majority of the board of directors and will be held in a voting trust for five years. It is also proposed to authorize $1,000,000 first mortgage sinking fund 6 per cent 20-year gold bonds, of which $500,000 are to be issued and sold at present. Preferred stockholders are given the right to subscribe to the new preferred stock and upon payment of $15 per share of their present holdings will receive share for share in new preferred stock. Common stockholders will be given the privilege of subscribing to the preferred and common stock of the new company, and upon the payment of $2.50 per share of their present holdings of common stock will receive $5 in new preferred and $20 in new common stock. Both common and preferred stockholders may also subscribe for the new bonds at the price of $875 and accrued interest, for each $1,000 bond with $1,000 of common stock of the new company attached. The bonds are also offered in denominations of $500 and $100 at the same rate.

Osborn Van Brunt, whose appointment as manager of the traffic and railway sales department of the General Roofing Manufacturing Company was announced in these columns last week, was for 10 years traffic manager of the Simmons Hardware Company, St. Louis. Before entering the service of that company he was for seven years connected with the traffic department of the Burlington system, beginning his railway service in 1898 in the local freight office of the old Hannibal & St. Joseph at Kansas City, where he served for three or four months, after which he was located at Leavenworth, Kan., for a year as soliciting freight agent. He was then engaged as rate clerk in the general freight office at St. Louis for a year or two under D. O. Ives, at that time general freight agent, then until 1905 he served as chief clerk and contracting freight agent in the commercial office of the Burlington lines at St. Louis. In the spring of 1905 he went to the Simmons Hardware Company as assistant to S. F. Pryor, then traffic manager. When Mr. Pryor left to become general purchasing agent for the Gould lines Mr. Van Brunt succeeded him as traffic manager, which position he held until his recent appointment with the General Roofing Manufacturing Company.

O. Van Brunt

Stockholders of the Youngstown Sheet and Tube Company on April 6 approved a resolution of the board of directors to issue $5,000,000 in stock to provide for additions to the company's plant at Youngstown. A by-product coking plant will be installed. The Republic Iron & Steel Company has announced the expenditure of nearly $3,000,000 for changes and additions at its Youngstown mills, and the Youngstown Iron & Steel Company will spend nearly $2,000,000 in additions to its open-hearth plant.

Locomotive Pulverized Fuel Company

The Locomotive Pulverized Fuel Company has recently been organized, with offices at 30 Church street, New York, for the purpose of introducing the use of powdered coal, lignite and peat on steam locomotives. The officers are Joel S. Coffin, chairman; J. E. Muhlfeld, president; H. F. Ball, vice-president, and Samuel G. Allen, secretary and treasurer. This company has obtained the control of various practical appliances and processes which are essential to the effective and economical use of powdered anthracite and bituminous coal, lignite and peat in locomotive and other types of steam boilers used for railroad purposes, the equipment being also readily convertible, with practically no extra cost, for the use of fuel oil.

For some time past the officers of the company have had exhaustive research, investigations and experiments made to determine the practical utility of various improved methods for firing steam locomotives, with the result that they claim to have demonstrated in actual road service that the burning of solid fuels, in a powdered form in suspension, gives the most satisfactory results with respect to boiler evaporative capacity and cylinder power through the elimination of cinders, sparks and smoke and by the reduction of otherwise waste fuel and heat, and of cylinder back pressure. Incidental to these advantages may be added the elimination of the usual smokebox draft and cleaning appliances; rocking and drop grates; ash pans; fire tools; physical labor for firing; liability to set fires from smokestack and ash pans; necessity for building, cleaning and dumping fires; clogging of boiler tubes and flues; and the constant inspection, repair and renewal of the combustion appliances required when fuel is burned on grates. This development in locomotive firing is of interest at this time when the railroads are being pressed to obtain the greatest possible capacity from their locomotives at the minimum cost for operation and maintenance, when there is a constant demand for the use of the smaller sizes and inferior grades of fuel for railroad purposes and when the public is complaining of the smoke, cinder, spark and dust nuisances and of the constantly increasing fire losses.

J. S. Coffin

J. E. Muhlfeld

Joel S. Coffin, the chairman of the company, is also president of the Franklin Railway Supply Company, New York, which he organized in 1902, and vice-president of the American Brake Shoe & Foundry Company, Mahwah, N. J. He entered railway service when he was 17 years old as a shop apprentice and was later fireman, engineman, and road foreman of engines. In 1892 he entered the mechanical department of the Galena Signal Oil Company, becoming in 1896 manager of that department and in 1907 vice-president of the company.

John E. Muhlfeld, the president of the company, has been engaged for some years in railway expert work and has developed

several important devices. He was born at Peru, Ind, on September 18, 1872. From 1889 to 1893 he attended classes in mechanical engineering at Purdue University, spending summer vacations in civil engineering work on the Peru & Detroit and as engine wiper and machinist apprentice in the Fort Wayne shops of the Wabash. After leaving Purdue he continued as apprentice, machinist and pit foreman until the summer of 1894 when the great railway strike of that year gave him an opportunity to become a fireman and engineman on the Wabash. As a result of the experience gained he was made, in November, 1894, engine house foreman at Peru. He later became general foreman and remained with the Wabash until February, 1899, when he left to become master mechanic on the Grand Trunk. In September, 1901, he became superintendent of machinery and rolling stock on the Canadian Government Railways at Moncton, N. B., leaving in October, 1902, to become assistant to the general superintendent of motive power of the Baltimore & Ohio at Baltimore. In February, 1903, he was made superintendent of motive power at Newark, Ohio, and in June, 1903, general superintendent of motive power at Baltimore. He held this position until November, 1908, when he left to engage in railway expert work. In this connection he made inspections and reports of the characteristics of a number of roads, including the Kansas City Southern, of which, from November, 1910, to August, 1912, he was vice president and general manager.

H. F. Ball

H. F. Ball is also president of the Economy Devices Corporation, New York. He entered railway service in 1884 as an apprentice on the Pennsylvania at Altoona. In 1888 he entered the drafting room at Altoona, and in 1890 was appointed chief draftsman of the car department of the Lake Shore. In 1892 he was made general foreman of the car shops at Cleveland, and two years later became general car inspector. In 1899 he was made mechanical engineer and in 1902 superintendent of motive power. In 1906 he left the road to become vice-president of the American Locomotive Automobile Company, but a few months later his jurisdiction was extended over the American Locomotive Company as vice-president in charge of engineering. In December, 1912, he left the American Locomotive Company to open an office as special consulting engineer, becoming early in 1913 president of the Economy Devices Corporation. Mr. Ball was president of the Central Railway Club in 1900 and of the Master Mechanics' Association in 1905-6.

S. G. Allen

S. G. Allen, the secretary and treasurer of the new company, graduated from college in 1891 as a lawyer. After practicing for about nine years he became general manager of the Franklin Air Compressor Company, now part of the Chicago Pneumatic Tool Company. He is now vice-president of the Franklin Railway Supply Company, secretary of the American Arch Company, treasurer of the Locomotive Superheater Company, vice-president of the Economy Devices Corporation, secretary of the American Materials Company and vice-president of the General Equipment Company, all of New York, and secretary of the executive and finance committees of the American Brake Shoe & Foundry Company, Mahwah, N. J.

TRADE PUBLICATIONS

Rail Joint Insulation.—The American Vulcanized Fibre Company, Wilmington, Del., has issued bulletin No. 35—an eight-page folder, showing the method of installation and characteristics of Vul-Cot for insulating joints. It also gives a comparative table of various insulating materials.

Guard Rail.—The Cleveland Railway Supply Company, Cleveland, Ohio, has just issued a booklet describing the Newhall guard rail structure, including the main rails, tie plates and other accessories. The booklet is well illustrated with photographs and drawings, showing the essential features of the design.

Steam Trap.—Catalog No. 8 of the Automatic Steam Trap & Specialty Co., Detroit, Mich., is devoted to the Barton expansion automatic steam trap which is manufactured by this company. In addition to the price list the catalogue contains a number of illustrations of traps in service and a number of testimonials from users of the device.

Graphic Method.—The Statistics Bureau, 5 East 42nd street, New York, has issued a 20-page catalog entitled Materials for the Graphic Presentation of Facts. It deals with drawing room material, cross section paper, maps and other materials for statistical work, and in addition contains a list of books dealing with the general subject of graphic presentation of facts.

Compressed Air.—The Blaisdell Machinery Co., Bradford, Pa., has recently issued a loose-leaf catalog which is devoted to its line of air compressors, vacuum cleaning system and accessories. It is well illustrated and contains considerable information relative to the installation and operation of compressed air equipment in addition to the description of the devices manufactured by the company.

Water.—The Kennicott Co., Chicago Heights, Ill., has recently issued a pamphlet entitled Water, Its Storage, Purification and Measurement for Industrial Purposes, in which is set forth the advantages of soft water as applied to various industries. It contains several illustrations of Kennicott plant, Kennicott water softener plants and other equipment manufactured by this company.

Protecting Structural Steel.—The Cement Gun Company, New York City, has issued a pamphlet describing the use of the cement gun in protecting the steel substructure of the Cortlandt street ferry terminal of the Pennsylvania at New York from corrosion by a thin coating of Gunite applied without reinforcing of any kind. The detailed outline of the method of procedure is accompanied by photographs.

Steel Rail Specifications.—Standard Specifications for Steel Rails is the title of a booklet which has just been issued by Robert W. Hunt & Co., Chicago. In addition to containing the specifications for carbon steel rails adopted by the American Railway Association and those of the American Society for Testing Materials, the Manufacturer's Standard Specifications for open hearth rails and for Bessemer rails and the specifications for open hearth rails of the Colorado Fuel & Iron Company, this book contains a detailed comparison of the dimensions of the various rail sections in common use and the section numbers required at each mill for these standard sections.

Cement Tile Roofing.—The American Cement Tile Manufacturing Company of Pittsburgh, Pa., recently issued two bulletins which are devoted to the description and illustration of its products. One bulletin entitled "Bonanza Data Sheets," contains 2 pages of general data on cement roof tiles and 30 pages devoted to data sheet sketches which are offered as suggestions to structural steel building designers. The other book contains 40 pages, mostly devoted to reproductions of photographs of some of the important structures in which this product is used. It also gives tables of dimensions and weights of interlocking tile and also a discussion on its strength, fire resistance, etc

Railway Construction

Black River Traction.—This company is planning to build 1,000 ft. of double track and about 250 ft. of single track to replace single track now in operation. The company operates an electric line from Watertown, N. Y., west via Glenpark and Brownville to Dexter, 10.38 miles.

Brule, Grand Prairie & Peace River.—Application has been made in Canada for a charter to build a railway from Brule Lake, Alta., north and northwesterly via Grand Prairie, thence to a junction with the Pacific Great Eastern in the Peace River section; also to build a branch from Grand Prairie crossing the Peace river near Dunvegan, to a junction with the projected Pacific, Peace River & Athabasca at the Montagneuse river. The provisional directors include D. R. McDonald, Alexandria, Ont.; C. L. Hervey, Montreal, Que.; T. A. Burgess, R. H. Pringle and L. Cote, Ottawa, Ont.

Buckhannon & Northern.—See Pittsburgh & Lake Erie.

Chartiers Southern.—See Pittsburgh & Lake Erie.

Chesapeake & Ohio.—Bids are now being asked for building a section of 28 miles to connect the C. & O. with the Norfolk & Western near Waverly, Ohio, and a trackage agreement may be made to use the N. & W. tracks from that point north to Columbus. This includes part of the route of the Chesapeake & Ohio Northern, which was organized to build from Columbus, Ohio, to a point in Greenup county, Ky., 92 miles, to connect the Hocking Valley with the Chesapeake & Ohio. Bids were let recently to build a bridge over the Ohio river at Sciotoville, but arrangements have not yet been made for the construction of the entire line.

Chesapeake & Ohio Northern.—See Chesapeake & Ohio.

East Georgia (Electric).—Application has been made for a charter in Georgia by this company, with a capital of $212,500, it is said, to build an interurban electric or steam railway from Glennville, Ga., north to Adabelle, about 30 miles; also to build a short branch from Hagan east to Claxton. The incorporators include H. P. Talmadge, J. K. McIver, G. J. Baldwin, W. B. Stillwell, L. Adler and E. Leffler, all of Savannah.

Huntingdon & Hemmingford.—An extension of time in which to build this projected line has been granted by the Quebec legislature. The proposed route is from Huntingdon, Que., east to Hemmingford, thence to a point on the International boundary. The company was organized about two years ago, and the provisional directors include H. Timmis, R. H. Barron, Montreal; C. W. Taylor and A. R. McMaster, West Mount, Que.

Kansas City, Kaw Valley & Western (Electric).—A contract has been given to S. Dolman Sons, Topeka, Kan., at $100,000, it is said, for grading work between Bonner Springs, Kan., and Lawrence, on about 20 miles It is expected that track laying will be started about August 1. Bids will be asked for soon to build four bridges varying in length from 60 ft. to 100 ft. in length. The line is eventually to be extended west from Lawrence to Topeka, 25 miles. (January 8, p. 78.)

Lake Erie & Eastern.—See Pittsburgh & Lake Erie.

Monongahela Railway.—See Pittsburgh & Lake Erie.

Norfolk & Western.—Contracts are reported let for building the low-grade line between Burkeville, Va., and a point near Pamplin, about 36.5 miles, as follows: To Patterson-Moran & Company, Inc., New York; the Robert Grace Contracting Company, Pittsburgh, Pa.; Rinehart & Dennis Company, Charlottesville, Va., and to J. J. Sheehan, Roanoke, Va. (February 12, p. 289.)

Pacific Great Eastern.—This road has been extended from D'Arcy, B. C., northward to Lillooet, 34.3 miles.

Pittsburgh, Chartiers & Youghiogheny.—See Pittsburgh & Lake Erie.

Pittsburgh & Lake Erie.—The report of this company for the year ended December 31, 1914, shows that the construction of the Buckhannon & Northern as an extension of the Monongahela Railroad from State Line to Fairmont, W. Va., is about finished, and these two lines are in process of consolidation as the Monongahela Railway Company. The Lake Erie & Eastern is about finished on the 8.75 miles of line through Youngstown, Ohio, to reach a number of important industries, except on a proposed connection with the Lake Erie & Pittsburgh west of Youngstown. The grading and masonry work on the extension of the Pittsburgh, Chartiers & Youghiogheny from Van Emman to Eighty-four, Pa., and on the Chartiers Southern from Eighty-four to Marianna are completed, but the track construction has been deferred by reason of the unusual depression in the coal and coke industry and until sufficient revenue is assured.

Seaboard Air Line.—The Lake Wales extension has been opened for business from Bartow, Fla., east to Lake Wales, about 15 miles. (October 10, p. 717.)

Williamsport, Nessle & Martinsburg.—A contract is reported let to Claiborne, Johnston & Company, Baltimore, Md., for work on part of a 15-mile line between the Potomac river and Martinsburg, W. Va. The company was incorporated in West Virginia with $250,000 capital in 1913 to build from Williamsport, Md., southwest to Martinsburg, W. Va., about 15 miles. J. Carmichael, president, Hagerstown, Md.

RAILWAY STRUCTURES

Beaumont, Texas.—The Atchison, Topeka & Sante Fe will enlarge its passenger depot on Crockett street. New train sheds will also be erected and additional tracks laid. The estimated cost of this improvement is $25,000.

Buffalo, N. Y.—The Lehigh Valley is asking for bids until April 15, for the construction of the new terminal in Buffalo. This work will include the construction of new passenger and freight stations. (January 15, p. 116.)

Chicago, Ill.—The Illinois Central has completed plans and expects to start work in the near future on three proposed subways at the crossing of its tracks with Seventy-ninth, Eighty-second and Eighty-third streets. The subways will be built of reinforced concrete. Contracts will probably be let next week.

The Baltimore & Ohio Chicago Terminal started construction on its coach yard and engine terminal at Fourteenth street, between Lincoln and Wood streets, last week. Piles for bridge abutments are being driven and the excavations for retaining walls are being made.

Lexington, Ky.—A contract is reported let by the Louisville & Nashville to T. S. Moudy & Co., Chattanooga, Tenn., for putting up a freight house and other structures at Lexington. The proposed freight house is to be of concrete, brick and steel construction, and will be 700 ft. long. There will also be a transfer platform of steel and concrete construction.

Lindsay, Cal.—The Atchison, Topeka & Santa Fe is asking bids for the construction of a stucco depot at this point. The bids will be received at Los Angeles, Cal. The estimated cost is $8,000.

Marshalltown, Iowa.—The Chicago & North Western will ask bids in the near future for the substructure for a 1,100-ft. viaduct which will carry Third avenue over the Chicago & North Western and the Minneapolis & St. Louis tracks. Steel girders will be used for 930 ft. of the length of the viaduct. The structure will be built jointly by the Chicago & North Western and the Minneapolis & St. Louis.

English Excursion Fares Cancelled.—The English Railway Executive Committee was compelled because of military exigencies to cancel the issue, with a few exceptions, of "cheap bookings" for the holidays. The reasons given were as follows: "(1) The fact that the large works employed in the production of ammunition and ordnance will not be closed as usual during the Easter holidays, and that the collieries are expected to be working nearly full time. As a result the railway companies will have to run a full service of goods and mineral trains. (2) The large number of men who have left the railway service to join the colors, the great majority of whom it has not been possible to replace without having a retarding effect upon recruiting. (3) The necessity for keeping a large number of men, engines and vehicles constantly in readiness for naval and military purposes."

Railway Financial News

Boston & Maine.—The act permitting the reorganization of the Boston & Maine in substantially the form that the Maine, New Hampshire and Massachusetts public utilities commissions approved it, has been passed by the Maine legislature and has been signed by the governor. It now remains for the legislatures of New Hampshire and Massachusetts to pass similar bills.

Chicago, Rock Island & Pacific.—The protective committee, of which E. W. Sheldon, president of the U. S. Trust Company, is chairman, has announced the names of the directors for whom it will vote proxies at the meeting to be held on April 12. These are Colonel T. S. Williams, president of the Brooklyn Rapid Transit; William J. Matheson, a merchant and a director of the Continental Insurance Company; W. Emlin Roosevelt, of the firm of Roosevelt & Son, and Charles Hayden, senior partner of Hayden, Stone & Co.

Detroit United Railways.—Stockholders have authorized the directors to accept the offer of the city government to buy the street railways of Detroit, now owned by the Detroit United Railways. The price offered by the city is $24,900,000.

Long Island Railroad.—The formal complaint in the suit which Dick Brothers, brokers of New York City, have brought against the Long Island, following the refusal of the Pennsylvania Railroad Company to buy certain minority stock represented by Dick Brothers at the price asked for, has been filed in the Supreme Court. There are nine items on which the complaint asks judgment. One of these items asks for the appointment of a receiver and another for an injunction restraining the directors from advancing money for further expenditures of the Long Island for the benefit or purposes of the Pennsylvania Railroad.

Missouri, Kansas & Texas.—Stockholders will be asked to authorize an increase of the interest rate on the consolidated mortgage from 5 to 6 per cent. None of the $125,000,000 bonds authorized under this mortgage in 1910 have been sold, but there is $24,516,000 pledged as security for notes.

New York, New Haven & Hartford.—Accompanying the notice for the stockholders' meeting which is to be held at New Haven on April 24, Howard Elliott, chairman of the board and president, has sent a letter to stockholders in part as follows:

"The company and its subsidiary, the Harlem River & Portchester Railroad Company, have issued and now outstanding in the hands of the public short-term notes amounting to $32,304,000, of which $29,399,000 becomes due May 1 and $2,905,000 between that date and August 1.

"The New England Navigation Company has issued and now outstanding in the hands of the public, short-term notes of $20,000,000 due May 1, 1917.

"The Massachusetts Public Service Commission has recommended to the Massachusetts general court that all capital stock outstanding in the hands of the public, 1,571,179 shares, be validated under the laws of Massachusetts, but has recommended that the 228,991 shares now in the company's treasury should be retired and canceled. In this recommendation the directors concur. The continued existence of this treasury stock is unnecessary; its retirement will have no effect upon the company's balance sheet; and the remaining stock if validated in accordance with the recommendation made to the Massachusetts general court, will start the company with its capital stock and indebtedness issued and the outstanding and premiums paid in and shown in the company's premium account on June 30, 1914, validated by the laws of all the three states in which it is incorporated.

"Directors believe that every security holder of the company is interested in having remedial legislation passed along the lines suggested, and to use influence to bring about the passage of these laws during the present session of the various legislatures. Directors hope and expect to renew the short-term notes as they fall due, but if the legislation fails at this session the company will be confronted with the necessity of renewing the notes again in 1916, and of again making an effort to get the necessary laws so that some permanent plan of financing can be adopted. Officers and employees are straining every nerve to conduct business of the company economically and efficiently, but business is at a low ebb, and the margins are very small. The situation needs careful attention and help. Prompt action is necessary for the welfare of the company, its owners, its employees and its patrons."

Pennsylvania Railroad.—See Long Island Railroad.

St. Louis & San Francisco.—The United States district court has given the receivers authority to pay $1,249,000 interest, due April 1, May 1 and June 1, on securities on which interest has not hitherto been defaulted.

Southern Pacific.—James N. Wallace, president of the Central Trust Company, New York, has retired as a director of the Southern Pacific. The annual meeting was held in Anchorage, Ky. Hugh Neill, secretary of the company, was elected to succeed Mr. Wallace.

The proposition calling for the purchase of the following companies was ratified at the meeting: Coos Bay, Roseburg & Eastern Railroad & Navigation; Corvallis & Eastern; Pacific Railway & Navigation; Portland, Eugene & Eastern; Salem, Falls City & Western, and Willamette Pacific.

Toledo & Ohio Central.—In the fiscal year ended December 31, 1914, this company, operating 446 miles of line in Ohio, had gross revenue from operation of $4,930,626, a decrease of $1,100,804, primarily due to the suspension of coal mining in the Ohio fields in April, May, June and July, and in the West Virginia fields for a considerable part of the same period. The net result of the year's operations was a deficit of $306,616 as compared with a surplus of $441,227 in 1913.

The Toledo & Ohio Central is one of the New York Central Lines. It connects with the New York Central at Toledo, and from Whitmore, just south of Toledo, it has two parallel lines running southeast to a junction at Thurston, the western line passing through Columbus. At Corning, Ohio, it connects with the Kanawha & Michigan. It controls the latter through stock ownership, having purchased during the year 89,478 shares of its stock, and issued for this purpose and for current requirements demand or one-year notes aggregating $8,719,012. Previous to 1914 the Kanawha & Michigan was controlled jointly by the Lake Shore and the Chesapeake & Ohio. The Toledo & Ohio Central also owns the Zanesville & Western, and in 1914 lost on its operation, $254,499.

In the fiscal year ended December 31, 1914, the company earned operating revenue per mile of road of $11,048 as compared with $13,620 in 1913. The freight revenue per mile of road was $9,107 as against $11,443 in the previous year. The total ton mileage of revenue freight was 38,517,440, a decrease of over 8,000,000. The average receipts per ton per mile were 4.25 mills as against 4.10 mills in 1913. The average revenue train load was 669 tons, a decrease of 8 tons. The total number of passengers carried in 1914 was 1,104,290 as compared with 1,157,804 in 1913. The average passenger receipts per passenger mile in 1914 were 1.765 cents, and in the previous year, 1.775 cents.

On December 31, 1914, the company's investments totaled $37,357,158, and its current assets were $2,962,570, of which $676,792 was cash. There was capital stock outstanding of $10,208,000, and funded debt of $12,226,523. The current liabilities were $12,544,587, of which $10,219,012 was loans and bills payable. The loans and bills payable on December 31, 1913, were but $1,500,000, the increase from this total being due to the issue of notes to provide for the purchase of the Kanawha & Michigan stock as above noted.

English Railway Women.—The question of employing women in railway service in England, so as to free men for the colors, is arousing considerable discussion in England just now, particularly in view of the fact that the railways are about to take a census with the object of ascertaining how many of their employees are within the military age limits. A number of companies have already hired women for various employments.

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WE GUARANTEE, that of this issue (the monthly Engineering & Maintenance Edition) 10,700 copies were printed; that of those 10,700 copies 7,295 were mailed to regular paid subscribers to the weekly edition, 1,829 to subscribers who get the Engineering & Maintenance Edition only, 250 were provided for counter and news companies' sales, 1,073 were mailed to advertisers, exchanges and correspondents, and 253 were provided for samples and office use; that the total copies printed this year were 148,850, an average of 9,303 copies a week.

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Contents

*Illustrated.

The market conditions were never so good in years as they are now for the purchase of cars and locomotives. With the general depression in business all over the country the railways have found it necessary to store a large number of engines, and there is an unusually large car surplus. These things, of course, decrease the demand for new equipment and the builders of cars and locomotives are greatly affected by this condition of affairs. They have made savings by partially or wholly closing their shops, but this only reduces their loss, as a large part of the overhead expense must continue. In order to reduce their loss several companies have offered very favorable prices in the hope that the railroads can thereby be induced to buy. At these prices the equipment would be built at a net loss, but it would not be as great as if the equipment were not built at all. If roads that are able to obtain the necessary capital purchase equipment now they will make profitable investments, even though it be necessary to store the new equipment for a while. They will, besides, help the builders and also give employment to a large number of men now unemployed. When business again returns to its normal condition it is probable that the demand for equipment will be so great that it will be impossible to obtain prompt delivery and that prices will be higher than they have been for several years past.

Purchase of Cars and Locomotives

The United States Department of Agriculture has issued, for the benefit of the farmers of the country, a brochure on freight-car demurrage, in which farmers who ship products by rail are advised not to accept special concessions from the railways in the use of cars. Such privileges, says the bulletin, are far from being a real advantage. "The man who is backward in loading a car is contributing to the car shortage throughout the country, and from a general car shortage farmers are likely to suffer more than any other business men." Our paternalistic government meddles with a good many things with which it has no business; and at first sight a pamphlet on a transportation subject from the Agricultural Department looks like an example of the wrong use of public money; but the author, G. C. White, has in this case done his work so well as to merit warm praise. As he says, "the bulletin should be of interest to shippers of all commodities and to transportation men." Perhaps that department of the federal government which deals exclusively with transportation ought to have done this job, though it could hardly have been expected to do it in the trenchant style in which it is here done, by a single individual, studying the subject without responsibility, and having a free hand. At any rate, Mr. White has put into vigorous language some salutary truths which need to be recognized everywhere. Extracts from the pamphlet will be found in another column.

An Illuminating Study of Demurrage

A brief description of the Chicago, Rock Island & Pacific stockholders' meeting in Chicago on April 12 is given elsewhere in this issue. The situation is complicated and interesting. There is a complaint before the courts which denies the right of the representatives of the majority of the stock to vote the proxies which they held at the meeting. One of the four directors elected at this meeting was N. L. Amster, who represents the minority interests. It is, of course, counsel for the minority interests who are pressing the complaint, which if it were upheld by the courts would make the election of all four of the directors, including Mr. Amster, at the April 12 meeting illegal, presumably. Mr. Amster, therefore, is placed in the position of accepting his election to the board as bona fide, in which case the complaint would have to be dropped, or else of refusing to recognize his

The Rock Island Situation

election as a director as legal, remaining on the outside and pressing the complaint. It might be pointed out that the majority interests are homogeneous, in that they are working for some constructive plan of reorganizing the company. They represent, however, very many different viewpoints and, probably in many cases, quite sharply opposed interests. The various classes of security holders other than the stockholders have interests in the future of the property, which in some cases are by no means identical, nor are they necessarily identical with the point of view of the majority stockholders. The bankers representing these various interests have, it is understood, generally supported the majority stockholders' position as represented by the Sheldon committee.

WANTED—DIRECTORS WHO WILL DIRECT

THE struggle over the Rock Island appears to have resulted in the control of the property being left in practically the same hands as before. But it has not been without important results. The minority stockholders won representation on the board. This is as it should be, for every element having a substantial interest in a property should have representation. But in the opinion of the *Railway Age Gazette* the changes made in the directorate were not the most important feature of the meeting at Chicago on Monday. In our opinion the most important feature was the remarks made and the resolutions offered by A. F. Van Hall, chairman of the Dutch Protective Committee of Stockholders. There were more sound principles and sound sense regarding the way a railway board should be constituted, and concerning the duties of directors, concentrated in Mr. Van Hall's brief remarks than we have seen put into an equal number of words in years. If Mr. Van Hall's remarks bear their appropriate fruit the Rock Island in a few years will occupy a different place in the esteem of the public, if not also in the field of transportation, from that which it has occupied for some years.

Mr. Van Hall acted with the committee representing the majority stockholders, but he refused to be blinded to the main cause of the troubles the Rock Island has been having. The main cause has been, as Mr. Van Hall said, that the board of directors has played a negligible part in the road's organization. Nominally the courts of last resort in the organizations of our railways, the boards of directors of many of them, are nothing but rubber stamps to register the wishes and ambitions of a few men who usually own but a small part of the outstanding securities. Commenting on the results of this condition in the Rock Island, Mr. Van Hall made the following statements, which deserve to be read and pondered by every man who desires the welfare of the railways of the United States:

> I am convinced that a great many things which have happened would not have happened if all the directors of the company had always been keenly aware of the trust which they have accepted, and of the responsibility which rested upon them for the proper execution of that trust. I firmly believe that they were not aware of it because they did not feel that they had been elected for such a purpose. Many members of this board, as of many other boards, have accumulated upon themselves so many directorates, have upon their hands the management of so many important affairs, that they cannot have started as directors in this company with the intention of looking after the business of this company as business men should. And this is the strangeness of the thing—every one will agree with me that a grocer who is not attending to his business will certainly see his business go to pieces, and so will a coal merchant or a hotel owner, or a banker. But with a railroad it seems to be otherwise. The boards of directors of this kind of business often seem to think that it is not necessary to attend to the business, and that things will look after themselves. That is all very well when there is a Harriman available to take the load upon his shoulders, but if there is not, things are bound to go wrong. It is true, there are difficulties in the way. Boards of directors are often very numerous and consist of men living widely apart from each other. How can you expect such a board to meet frequently and to handle situations carefully and promptly?

The statements we have quoted apply with as much force to the directorates of many other railway companies as to that of the Rock Island. The board of directors of many of our railway companies are composed of so many men that very few of them feel any special responsibility for the trusteeship they have voluntarily assumed or really exert themselves to perform the duties which they have solemnly undertaken to perform. A small part of the time of a really able man is worth a great deal more than a great deal of the time of a mediocre man; but, unfortunately, many of the able men who have accepted memberships on numerous boards have given almost no time whatever to the duties they have assumed on a large part of these boards. The consequence is that often they do not take an active part in the management of the companies, and that often when they do take an active part their ignorance of the conditions and needs of the concerns is so great that their activity does more harm than good.

The remedy for this condition of affairs was pointed out by Mr. Van Hall.

> What we therefore need in a big corporation such as the Rock Island is a small board of good experienced business men, living not too widely apart from each other, who have got the time and are willing to devote it to the promotion of the business of the company. If there is a Harriman among them, so much the better; he will certainly not fail to assert himself. But even such a man will need the co-operation of other good men. If I remember well, it was the late J. P. Morgan who said that it was his experience that even the best and biggest technical men always needed sound financial advice.

Mr. Van Hall also advocated the payment of a substantial compensation to the directors.

To those familiar with the large directorates of most American railways the suggestion that a board should contain only seven members will seem radical, but a small board composed chiefly of men who live along the property, and who consider it a part of their business to thoroughly acquaint themselves with the public opinion and commercial and industrial conditions in the territory, and the needs of the property, will usually be far superior to the typical board composed of from fifteen to two dozen men who do not live on the property and who know almost nothing about it except what is disclosed in statistical reports concerning it. Of course, the kind of directors that we now have usually think that they are pre-eminently fitted for their duties. The great trouble with them is that they have too much egotism and wealth, and too little knowledge and sense of duty and responsibility. A board of directors should be a working committee and not a list of ornamental and highly useless names, as so many are now.

On Mr. Van Hall's motion the stockholders of the Rock Island adopted resolutions instructing its board of directors to consider the desirability of adopting his suggestions and report thereon at the next annual meeting. It is understood that the management of the road is in sympathy with Mr. Van Hall's views. The results of the board's deliberations on the subject will be awaited with much interest.

LONG ISLAND RAILROAD

IF there is one point more than another on which the majority of railroad operating officers differ radically from the majority of patrons of railroads it is as to the relative importance and profitableness of passenger business as compared with freight business. To the majority of railroad operating officers the economical handling of freight is of much more importance than the development of passenger business. To the great majority of patrons of railways the passenger service which a railroad renders is the measure of the railroad's usefulness. Of course, both of these views have elements of truth in them and each is an exaggeration. Passenger business under the present rates in the United States is nowhere as profitable per train mile as freight business.* On the other hand, the very fact that the quality of the passenger service is so large a factor in the esteem or disesteem with which the public holds a road gives it an importance disproportionate to its net revenue as compared with the net revenue from freight.

Mr. Brandeis pointed out in the 1914 eastern rate advance case that no one of the roads which had shown marked prosperity in the last few years had a very large proportion of passenger business. Nevertheless this question of passenger busi-

*Of course, there may be individual passenger trains which would show a larger net profit than individual freight trains, but the statement here made is intended to apply to averages rather than individual cases.

ness is one which is now being faced squarely and without prejudice by many of the railroad executives who are devoting a part of their time to a study of the broader questions of railroad economics and the relations of the railroads to the public. In this connection the Long Island Railroad Company's annual report for the calendar year ended December 31, 1914, is of particular interest. In 1914—the third-third year of its operation—despite the business depression, the Long Island showed the largest net revenue in its history, and a deficit, after paying fixed charges, half as great as the deficit for 1913. The fact that there was a deficit at all was probably due to business depression, and there are many indications in the annual report that the Long Island, after all the years that the Pennsylvania has put money into it, has at last turned its corner and is in a fair way to become a self-supporting railroad property.

The Long Island's conditions are unique. It operates 398 miles of road, of which four miles are trackage rights through the Pennsylvania Railroad tunnels from Long Island City to the Pennsylvania station in New York. It has practically no through freight or passenger business, the average length of haul of freight being 23 miles and the average passenger journey 14.5 miles. Of the total $13,220,000 operating revenue in 1914, $3,684,000 was from freight and $7,900,000 from passengers. The density of freight (ton-miles per mile of road) was 257,771 in 1914, while the passenger density (passenger-miles per mile of road) was 1,520,000.

The management of the Long Island, as will be seen, had

The Long Island Railroad

conditions to face which are peculiarly difficult. Like other American railroads, it has had to meet demands for continually increasing standards of passenger service. While, of course, it has no heavy fast long-distance trains, with comparatively few passengers per train-mile, which is characteristic of long through runs of trains composed entirely, or nearly entirely, of Pullman cars, it has a very large commutation business, and it has to meet demands for frequency of service which are unusually exacting.

On most roads that have made large gains in operating economies much of the saving has been made through a decrease in the number of trains necessary to handle the same volume of freight traffic. Most roads have shown an increase in the costs of operating each train-mile in both freight and passenger service. The small proportion of freight business on the Long Island leaves it but a small margin for possible gains in economy in this branch of the service and an analogous economy in passenger service; that is, fewer trains to handle the same amount of business is not feasible because of the public demands for frequency of service.

Shortly after the Pennsylvania acquired control of the Long Island in 1900 it was apparent that even with a large growth in business the Long Island would show larger and larger deficits. To offset this some means had to be devised for holding down operating expenses other than a rigid restriction of passenger-train mileage.

In part to facilitate more economical operation, in part to meet the demands of the public for a cleaner and more comfortable service, electrification of the western lines of the system for passenger service was undertaken. The accompanying map shows the lines now operated for passenger service by electricity. A similar policy was adopted toward grade elimination and the construction of permanent passenger stations and over and under grade crossings. Both of these improvements necessitated very large expenditures of new capital, and during the time the work was being done increased instead of decreased the operating expenses of the company. Such a program of investment for the quite distant future and to meet the demands of the public service could only have been made by a rich railroad, willing and able to wait for years for a return on its additional investment.

The result has been that since 1900 more than $50,000,000 of new money has been invested in the road and a debit balance to profit and loss had slowly been increasing, until at the end of 1914 it totaled $6,125,000.

In 1914, however, the results of operation were very encouraging. Total operating revenue amounted to $13,220,000. This is an increase over 1913 of $136,000, despite a loss of $329,000 in revenue from express, and despite the depressed business conditions which affected passenger travel on the Long Island to a marked extent. Operating expenses amounted to $9,116,000, a decrease of $453,000; but of this decrease $352,000 was accounted for by the lower cost of handling express business.* Railway operating income in 1914 amounted to $3,318,000, an increase of $566,000 over the previous year. After the payment of rentals and fixed charges there was a deficit of $494,000, a decrease in deficit as compared with the previous year of $484,000.

The total passenger mileage handled amounted to 605,528,000 in 1914, an increase of 11,928,000, or 2 per cent, over the previous year. This increase of 2 per cent in passenger mileage was handled with an increase of less than half of 1 per cent in passenger-train mileage, the total passenger-train mileage in 1914 being 5,449,000. Moreover, whereas passenger-train mileage showed a slight increase, the expenses for passenger enginemen amounted to $180,000, a decrease of $22,000 from the previous year, and the cost of fuel for passenger locomotives was $331,000, a decrease of $53,000 from the previous year. On the other hand, the wages of motormen amounted to $155.000, an increase

*In 1913 the Long Island entered into a contract with the Adams Express Company to take over its express business; and whereas, therefore, the revenue from express shown in 1914 is the net received from the express company, the revenue in 1913 was for five months the gross, and the cost of handling the business during those five months was a charge to expenses.

of $21,000 over the previous year, and the cost of "purchased power" amounted to $102,000.

A detailed study of both transportation and maintenance costs would show a reduction in a number of items, each of which is small, but the aggregate of which is considerable, due to electrical operation of all passenger trains on the lines shown crosshatched on the map.

The following table shows principal figures in 1914 and 1913:

	1914.	1913.
Average mileage operated	395	395
Freight revenue	$3,684,335	$3,508,173
Passenger revenue	7,899,972	7,814,299
Total operating revenue	13,220,334	13,083,925
Maint. of way and structures	1,457,510	1,611,313
Maint. of equipment	1,440,907	1,547,489
Traffic expenses	141,851	181,072
Transportation expenses	5,687,110	5,882,050
General expenses	345,088	347,169
Total operating expenses	9,115,779	9,569,093
Taxes	784,051	762,864
Operating income	3,318,434	2,751,969
Gross income	3,981,938	3,422,537
Net deficit	494,131	977,985

NEW BOOKS

Department Reports of the State of Ohio. Weekly; published by Nemar Publishing Company, 49 North High street, Columbus, Ohio. Price $10 a year; single copies 25 cents.

This is a new periodical, issued every Thursday, started for the purpose of giving to the public the reports and decisions of the Public Utilities Commission, all of the other commissions, the secretary of state, the attorney general and the supreme court, of the state of Ohio; and with news also of subjects of legislation, when the general assembly is in session. No. 24, dated April 1, contains about 40 pages, and includes decisions by the industrial commission, by the attorney general and by the supreme court of the state. A circular issued by the publishers contains commendatory letters from the Public Utilities Commission and from the attorney general of the state.

Graphic Methods for Presenting Facts. By Willard C. Brinton. Published by the Engineering Magazine Company, New York. 372 pages. Price $4.

In the preface to his book Mr. Brinton says that "the reader who examines only the illustrations and the titles without any reference to the text will undoubtedly get a major portion of vital material in the book. It is believed that an average reader may go through the illustrations and the titles in about one hour." With the first of Mr. Brinton's observations it is impossible to disagree. The book has a wealth of illustrations, which, if carefully studied, will give the student a quite comprehensive, although, of course, necessarily a superficial, knowledge of the principal methods of graphical presentation of facts. Although the sub-titles contain criticisms of the methods used in the illustrations, the text adds a great deal to the value of the work and is very readable. The fact that Mr. Brinton should attempt to expound a language by the use of that language itself is interesting and logical, but to the majority of lay readers of Mr. Brinton's book the English language of the text will form in all cases a source of additional information and in many cases a source of necessary information to make the diagrams and charts comprehensible.

The statement that the average reader can go through the illustrations and titles in about an hour illustrates one of the weak points in the theory of graphic presentation of facts. Not only would it be impossible for the average reader to go through all of the illustrations and titles and understand them in an hour, but it would be quite safe to say that a reader very much above the average who had not had long practice in reading diagrams and charts could not go through even a majority of the charts and diagrams in an hour and understand them.

In the attempt to make a chart or diagram an easy method of conveying facts or figures it is sometimes assumed that there is a mechanical substitute for comprehension. It is quite possible for any one to take one of the numerous charts which Mr. Brinton's book contains and almost at a glance get a certain kind of information conveyed to his understanding; but to assume that this is a substitute for an analysis of the facts is a fallacy into which it is quite evident from Mr. Brinton's text that he does not fall.

Apparently the fundamental theory on which graphic methods of presenting facts is recommended is that the eye can convey to the brain an understanding of relative sizes more accurately and more quickly through a comparison of lengths of line or area of surface than by the shape of a figure. Thus, if the eye sees the Arabic numeral 3 in conjunction with the word tons, and the Arabic numeral 9 in conjunction with the word tons, it does not convey to the brain as quickly or as accurately the relative quantitative importance of the two groups as it would if a line three units long were shown next to a line nine units long. In simpler quantitative measures this is not true. To the average man the fact that a ten dollar bill is no larger in size than a one dollar bill does not obscure the relative buying power of the two pieces of paper. When, however, we come to a complex series of facts, if the eye is to convey the knowledge of the relative quantitative values of these facts to the brain it must either take in all the facts at once or convey each fact separately to the brain to be there set aside and remembered, while the eye brings other facts to place alongside of it, so that all the facts will be held retained at the same time. By presenting a group of facts graphically they can be taken in by the eye as a whole, whereas if they were presented in a column of figures each fact would have to be conveyed separately to the brain and there retained while the other facts were being picked up one by one by the eye. This is what is meant very often when it is said that the *trend* of earnings, expenses, population or any other units can be shown better by a chart than by figures. All this Mr. Brinton brings out very clearly in his comprehensive work on Graphic Methods for Presenting Facts.

What has often been said of the ease with which figures can be made to lie is equally true of charts. Mr. Brinton's book gives numerous examples of misleading charts. These are criticized freely and in a very helpful way. On the other hand, Mr. Brinton at times assigns a function to a chart which the chart is incapable of performing. Thus he shows a chart on which the marks received by English school girls in arithmetic and in English respectively have been plotted, and in commenting on the line which is obtained says that its position proves that girls have much more ability in English than in arithmetic. The marks received by the girls are the proof of their ability and the chart plotting these marks is a graphic presentation of it, nothing more; it is not itself proof.

There are two functions which graphic presentation of facts may perform to better advantage than could either the English language or tabulations of figures. Attention may be drawn more easily and quickly to facts which need analysis, and facts may be conveyed to another person who would not give the time or the attention necessary to comprehend these facts if they had to be presented either in written language or in figures. It is of the utmost importance that the medium which is used to call attention to facts needing analysis shall be so scientifically adapted to its purpose that it will neither draw attention to unessential comparisons or permit comparisons to which attention should be drawn to escape notice. It is also of the utmost importance that if graphic charts are to be used to instruct the public or to help the operating or technical man to lay before his president or his board of directors facts in a form easy of their comprehension, the foundation for the science of chart making must be based on logical and scientific principles. It is the exposition in a comprehensive way of the mediums adapted to various kinds of facts, and the science and logic of the fundamental principles on which the very great value of Mr. Brinton's work rests. In addition to discussing, analyzing and illustrating these fundamental principles, Mr. Brinton's book also describes in detail the mechanical devices used in the graphic presentation of facts, such as map presentations, pins and beads, card records, etc.

An Effective Freight Claim Preventive Crusade

Part II—One Hundred Thousand Dollars Saved During First Six Months of Campaign, Ending December 31

In the first article of this series, which was published in last week's issue, we covered the preliminary steps which were taken in the educational campaign to reduce loss and damage to freight on the St. Louis & San Francisco. The efficiency associations which were formed at several of the larger stations, however, had this as only one of their objects. To supplement their efforts and wage a more direct and aggressive campaign, it was decided to organize freight claim preventive committees along almost exactly the same lines as the safety first movement had been developed. Each division and terminal* has a freight claim preventive committee, of which the superintendent is chairman. These committees are not divided up into sub-committees and supervised by the chairman, but act as one committee. The division and terminal committees are under the general direction of the Central Claim Preventive Committee, which is composed of the general officers of the road.

FREIGHT CLAIM PREVENTIVE COMMITTEES

The scheme was first tried out in June, 1914, on the Northern division. Four meetings were held under the direction of a division freight claim preventive committee—one at Ft. Scott on the ninth, one at Kansas City on the tenth, one at Pittsburgh on the eleventh, and one at Springfield on the twelfth. These meetings were all held in the evening, and over 300 persons attended the four meetings. Those men on the committee who were not on a monthly salary basis were compensated for loss of time from their regular duties and the company paid all traveling expenses. The purpose of the movement was purely educational and committeemen were selected because of their influence with their fellows, the idea being to secure the co-operation of every man who had to do with the handling of freight.

The movement on the Northern division proved so successful that it was decided to extend it to other points on the system as rapidly as possible. On July 7 authority was issued to organize committees at the Kansas City terminal, St. Louis terminal, Memphis terminal, Springfield terminal, and on the Eastern and Ozark divisions. A division freight claim committee is made up about as follows: Superintendent (chairman), assistant superintendents, yardmaster, agent, platform foreman, local engineer, local conductor, local brakeman, car inspector, car foreman, switch engineer, engine foreman, special agent and master mechanic.

The freight claim preventive committee at Memphis is a typical terminal committee and in its membership includes the following: Superintendent of terminal, agent, general foreman motive power department, general foreman car department, platform clerk, receiving clerk, yardmaster, day switchman, night switchman, day engine foreman, car inspector and yard engineer.

WHAT IS DONE AT THE MEETINGS

At the first meeting which a freight claim preventive committee holds at a terminal, it is the practice to place before the employees, in a clear and forceful way, the actual facts concerning the amount of money wasted in paying for loss and damage, and the possibilities which will result from co-operation on the part of each one of the employees in helping to reduce this waste. As far as possible the superintendent of freight loss and damage claims has attended all of these initial meetings and has outlined the situation clearly and thoroughly. In fact he has spent the greater part of his time for several months in traveling over the road, and keeping in close personal contact with all of the freight claim preventive committees. Possibly this intimate personal supervision is the greatest single factor responsible for the remarkable success which has accompanied the work of the committees. In addition to this, Mr. Whitelam has kept a steady stream of pertinent bulletins, statistical data, diagrams, reminders, and other material flowing from his headquarters to all parts of the system.

In the preliminary talk, for instance, attention should be drawn to the large amount of money expended for the payment of loss and damage per thousand dollars of gross freight revenue, and the possibilities of decreasing this amount by eliminating or cutting down certain classes of claims which are due almost entirely to carelessness or thoughtlessness on the part of those engaged in handling freight, thus not only saving money for the road, but making better satisfied patrons. A statement, such as the one following, showing the relation of loss and damage to freight to certain of the more important transportation department expenses, can be quoted from to good advantage. These figures are for the year ending June 30, 1914.

Passenger employees—station service	$324,089.32	or 2.05 per cent
Telegraph and telephone operators	395,082.50	or 2.50 per cent
Yardmasters and clerks	304,562.97	or 1.93 per cent
Yard enginemen	465,659.82	or 2.32 per cent
Fuel, water and supplies	481,569.26	or 3.05 per cent
Enginehouse expense, yard and road	578,269.43	or 3.67 per cent
Water for road engines	212,160.28	or 1.34 per cent
Care of passenger cars	269,341.31	or 1.71 per cent
Passenger supplies and expense	171,934.94	or 1.09 per cent
Care of freight cars	68,506.48	or 0.43 per cent
Freight supplies and expenses	170,575.78	or 1.08 per cent
Loss and damage—freight	513,954.90	or 3.29 per cent

Or possibly extracts may be used to advantage from the following table, showing claim payments made during the previous year for certain classes of freight due to errors of employees, improper refrigeration and ventilation, and improper loading and stowing. these particular items being the largest and most susceptible of reduction with the proper care on the part of the employees.

	Errors of employees	Improper refrigeration and ventilation	Improper loading and stowing
Boots and shoes	$ 264.60	.....	$ 109.48
Clothing, dry goods and notions	1,332.19	.....	951.43
Live stock	2,365.02	.....	140.20
Meat and packing house products	1,014.48	$2,732.65	169.05
Flour and other mill products	472.19	.....	134.54
Sugar	19.50	.....	85.04
Groceries	169.13	9.64	868.99
Wines, liquors and beers	63.22	232.01	157.77
Furniture (new)	5.94	.....	1,540.37
Household goods	107.16	.....	963.45
Glass and glassware	56.95	.....	1,339.77
Products of cement, clay and stone	105.00	.....	788.37
Stoves	33.70	.....	722.36
Iron and steel castings and bars	74.45	.....	194.00
Vehicles	9.79	.....	105.48
Agricultural implements	9.02	.....	186.96
Products of mines	423.57	.....	149.31
Coffee	20.84	.....	209.77

Then again statements showing the amount paid out in claims for various commodities and just what could be bought with this money, as indicated by the following items which are taken from an extensive list, may also drive home the importance of using greater efforts to prevent loss and damage.

A Few Things the Frisco Bought and Paid For, and Did Not Receive During the Fiscal Year Ending June 30, 1914.

Amount	*Commodity*	*Would buy*
$11,976.35	Boots and shoes	3,422 pr. shoes at $3.50.
31,671.69	Clothing, dry goods and notions	31,672 yd. silk at $1, or 452,453 yd. calico at 7c.
46,838.75	Fruit and vegetables	20,817 bu. peaches at $2.25, or 59 cars of 350 bu. per car.
41,415.51	Live stock	207 mules at $200, or 10 cars of 20 mules each.
28,478.62	Meat and packing house products	113,914 lb. breakfast bacon at 25c. per lb.
31,001.93	Grain	44,288 bu. wheat at 70c. per bu., or 44 cars of 1,000 bu. per car.

*The terminals at St. Louis, Kansas City, Memphis and Springfield are under the jurisdiction of terminal superintendents who report to the general superintendents.

Amount.	*Commodity.*	*Would buy.*
22,311.93	Flour and other mill products	9,700 98-lb. sacks flour at $2.30.
16,310.79	Groceries	Supply 652 families of 3 persons 1 month at $25 per family.
9,577.71	Tobacco	95,777 10c. cigars.
16,777.11	Furniture	Furnish 33 homes of 4 rooms at $500 each.
11,207.97	Household goods	Furnish second-hand furniture for 111 families at $100 each.
6,967.77	Vehicles	14 Fords at $500 each.

Another statement from which items may be quoted with good results is reproduced in part below:

$482,039.29 paid in claims for loss and damage to freight, fiscal year 1913-14, would have bought any one of the following items:

21	1040 class locomotives.
412	cabooses.
567	36-ft. box cars.
43,035	freight car axles.
53,616	freight car couplers.
302,395	air hose.
362,875	cast iron brake shoes, engine.
1,163,061	locomotive scoop shovels.
1,198,931	steam gage lamps.
1,463,206	cast iron brake shoes, freight car.
2,387,326	1 gallon oil cans.
3,239,950	½-gallon oil cans.
3,779,949	white lantern globes.
4,123,581	engine torches.
9,071,880	lb. cotton waste.
15,119,797	machine bolts, average size.
22,679,695	lb. 8 penny nails.

A motive power department employee will stop and think when he realizes that the amount paid out in claims for the fiscal year 1913 would buy 21 large freight locomotives. The conductor or brakeman cannot but be surprised when he learns that this money would buy 412 cabooses or 567 36-ft. box cars.

The importance of prompt reply to correspondence is also emphasized in order that the handling of claims may be facilitated. At present 56 per cent of all the claims are settled within a period of 15 days, and 68 per cent within a period of 30 days. The desire is to improve this record in order to secure the good will and the interest of the patrons.

There are 15,000 employees on the Frisco, each of whom has something to do with the handling of freight in some capacity. If each one of these 15,000 employees could save five dollars it would make seventy-five thousand dollars, or three-quarters of the amount which it was aimed to save in the first year. Statements can then be made giving specific instances covering a wide range of activities and showing how by a little care and thought abuses have been removed and losses stopped.

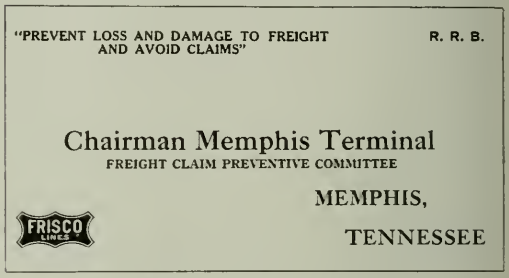
Usually after a brief address of this sort different members of the freight claim preventive committee discuss various phases of the question in which they are especially interested. The meeting is then thrown open and all present are urged to ask questions or make suggestions. This roughly covers the method of procedure at one of the initial meetings.

The succeeding meetings at each point are under the direction of the division freight claim preventive committee and are usually devoted to an analysis of the latest statistics available, the study of any bulletins which may have been received from the office of the superintendent of freight loss and damage claims, and a discussion of abuses which have been discovered at the local points and how they may be overcome.

FREIGHT CLAIM PREVENTIVE POSTAL

One of the more important details and one which has developed the greatest amount of material for discussion at the local meetings is a postal card, both sides of which are shown in the illustrations. The address of the chairman of the local committee is printed on one side. On the other side any employee may, and in fact is urged to, call attention to anything which comes under his notice, the remedying or bettering of which will, in his opinion, prevent loss and damage to freight. It is thoroughly understood that no discipline will be assessed for any mistakes or abuses that are called attention to in this way and that the information will be used for educational purposes only. The wide range of mistakes and abuses which have been located by these cards and the progress which it has been possible to make by their aid is remarkable. The abuses noted are immediately investigated by the superintendent upon receipt of the cards, and the investigations are discussed at the business sessions of the freight claim preventive committee. When the committees ride local freight trains the business session is held between stations. It generally takes a day and a half to go over and discuss the investigation.

Some idea of the extent to which these cards have been used

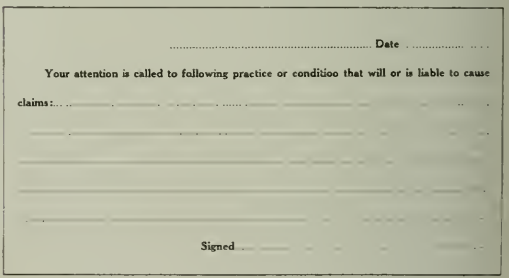


The Address Side of the Special Postal

may be gained from the following figures covering the number received for each of the past four months:

November	1,860
December	1,780
January	1,743
February	2,520
Total	7,903

The number received in February is the largest for any one month to date, and is due to the greater interest which the employees are taking in the campaign. The minutes of the



The "Business" Side of the Special Postal

Eastern Division Freight Claim Preventive Committee meeting, held at Springfield, Mo., January 6, 1915, indicate, for instance, that 67* of these cards were read and discussed. Following are a few extracts showing the sort of information that is often turned in on these cards:

C. L. Mikkelson, Conductor—Train 43 on November 26 had S. F. 31,480 out of Pacific loaded with merchandise from St. Louis. The car was not cleaned before loading with merchandise. Comment: This was handled with St. Louis for improvement in cleaning of cars before loading merchandise in them.

B. C. Barham, Conductor—S. F. 46,975, loaded with cattle, handled on October 3, one cow dead in car. This would not have happened if stock had been properly taken care of en route. Comment: Handled generally and with all concerned.

R. L. Herndon. Operator—Chadwick to Osceola, Mo., waybill No. 40, November 13, covers double marked household goods. Comment: Handled with Chadwick, who advises will have no further cause for complaint.

T. J. Sullivan, Special Agent—S. F. 32,303, loaded with wheat, arrived at Choteau avenue, 6:05 a. m., November 10, in train No. 32. Car leaking wheat along right-of-way. Was loaded at Springfield on October 28. Comment: Handled with the superintendent of terminals, Springfield, as to why such cars were furnished for tight loading.

*This is a rather low figure compared with other months.

F. D. Wrightsman, Conductor—Train No. 31, December 5, S. F. 94,332 and 93,801 loaded with street cars. These street cars were covered with canvas and were placed on head end of train where sparks from engine were liable to set fire to the canvas covering and damage the street cars. Comment: Handled with Newburg where cars were properly placed in the train.

W. W. Fitch, Engineer—New sill needed under freight-house door at Conway to prevent water running in on freight when it rains. Also two windows broken out of transom. Comment: Handled with general foreman bridge and building department, who had repairs made on December 15, 1914.

C. O. McCain, Agent—St. Louis, Broadway to Lebanon, waybill No. 563, December 1, S. F. 33,094. One sack of coffee loaded under freight for station west of Lebanon. Necessary to move all of the freight in the car to get at this shipment. Comment: Handled with Broadway station.

C. O. McCain, Agent—S. F. 29,590, loaded Broadway, St. Louis, December 4. Toe blocking and nails left in both doors. Comment: Handled with Broadway station, St. Louis, who advise person responsible has been told of his errors and promises to be more careful in the future.

W. S. Lea, Agent—Car LS & MS 86,535, loaded with merchandise out of Springfield had large hole in floor. Comment: Handled with Springfield station force, which has been instructed to watch matters of this kind and have them properly attended to before allowing cars to move out.

Springfield Terminal—Car No. 101,420 at Springfield platform, November 18. Part of the waybill for this car showed number of same as 10,142, instead of 101,420. Comment: Handled with the agent at Monett and transfer clerk claims pure oversight on his part and says he will watch these matters more closely in the future.

E. M. South, Conductor—S. F. 31,784, merchandise out of Newburgh on train 45, November 19. One brake beam gone and car not fit for merchandise loading. Comment: Handled with the mechanical department as to why no brake beam was on the car.

E. M. Frew, Agent—S. F. 125,761, merchandise car Broadway, St. Louis, November 12. Number of nails and spikes driven in the floor of the car. Comment: Handled with St. Louis, which in turn handled with the station force, giving men to understand that work of this kind would not be tolerated.

The minutes of the meeting indicate that 11 members of the freight claim preventive committee were present. There were 54 other persons present, including, in addition to the employees from the different departments a number of patrons of the road; among these were grocers, lumber men, harness men, a publisher, auto dealers, tailor, attorneys, bankers, farmers, etc. It is the purpose at all these meetings to invite shippers and patrons in order to interest them in helping to secure better results and to let them understand the care which the railroad employees are exercising to prevent loss and damage to freight.

It is the intention also to have freight claim preventive committees carefully inspect the facilities at the different points which they visit, and also study conditions as they travel. They are instructed to use local trains, where possible, in order to make constructive suggestions as to how this service may be improved. The division freight claim preventive committees have covered the entire Frisco Railroad on local freight trains, have talked to all the agents, checked the stations and held general meetings. This has required two solid days' work of each committee each month.

The following extract, taken from the minutes of a regular monthly meeting of the Western Division Freight Claim Committee, is of interest in this connection:

"Before departure from Beaumont Junction on Monday morning, the committee was divided into three sub-committees,* as follows: Grounds, station records, and merchandise. These committees on arrival at a station inspected the grounds, the cars in the yard, the station records and observed the handling of merchandise. On Tuesday, the 5th, the committee made a trip on a local freight train from Enid to Tulsa, inspecting station grounds, station records and observing the handling of merchandise. This meeting was the most successful the Western division has had. Not only was a great deal of enthusiasm aroused among the members of the committee, but they spread enthusiasm among all with whom they came in contact. Over 100 freight claim preventive post cards were turned in by the different sub-committees on this trip."

A few of the items mentioned on these postal cards and cards from other divisions may be worth consideration, as they differ somewhat from those which have been called attention to in connection with the Eastern Division Freight Claim Preventive Committee meeting, noted above.

S. W. Scudder, Fireman—Clinton Station had two freight trucks in bad condition for handling freight, having several holes in them. Comment: Trucks repaired.

Perry Skinner, Brakeman—Paper and stationery firms are shipping tablets and stationery weighing over 200 lb. in cases which should be reinforced with metal strips. Comment: Handled with Mr. Whitelam, who advises that this class of shipments will be watched particularly as to claims, and will be handled according to the results which develop.

Perry Skinner, Brakeman—Nearly all wholesale houses ship beans in sacks of 200 lb. each and use an inferior grade of sacks which split, scattering the beans. Comment: Referred to Mr. Whitelam, who advises that he will watch this class of shipments closely and handle with the shippers.

C. E. Jones, Brakeman—Run-way to stock pen at Cordell has holes in the floor which are liable to cause the stock to break their legs. Comment: Pens were repaired.

Anonymous—Called attention to agents leaving freight on platform several hours after departure of locals, subjecting it to theft or damage by the weather. Comment: Circular issued to all agents calling their attention to this practice and instructing them to discontinue it.

R. C. Meador—S. F. 123,755, sacked oats loaded against harrow which resulted in hole being worn in sacks. Case of improper loading on part of Oklahoma City. Comment: Matter called to attention of warehouse force at Oklahoma City. Has been handled with foreman personally and an item placed on bulletin board for inspection of all freight men.

J. H. Hammond, Switchman—"If some engineers would take more care in stopping and starting at the Iron Mountain crossing at Tower Grove, I think that it would save freight claims." Comment: Superintendent is handling; it has developed that some engineers use only driver brake and not the air brakes.

R. C. Meador—Merchandise car doors are left open on platform at noon, Afton. No one in charge. Think there should be a man left in charge or doors closed and avoid chance for pilferage. Comment: Matter called to attention of agent at Afton who has put a stop to the practice.

STATISTICS

Another factor which is helping to secure results is the monthly statement of damages at stations. The different stations are divided into groups according to the amount of business which they handle. For instance, Group 1 consists of

The Blackboard at the Hugo Freight Station

Springfield, Monett, Kansas City, St. Louis, Seventh street, St. Louis; Broadway and Memphis. The statements show the total number of shipments handled in each place, the number of damages and the number of shipments loaded to each damage. These statements are discussed at the various meetings at local points, and there is considerable rivalry in the attempt to head

*This is the regular practice for all of the division committees.

the list. At one place, Hugo, which heads Group 2, a large blackboard in the freight station reproduces the data for Group 2 and every man at that place is working hard to keep Hugo at the head of the group. That they are being successful is indicated by the fact that during February not a single error in billing or handling freight was made at Hugo, although 2,382 tickets were billed and 8,074 shipments were handled. This is the first time in the history of the Frisco that a station the size of Hugo has gone through a whole month without being charged with a single mistake. A photograph is shown of the blackboard, as it appeared in October, but the two tables included on it are not very clear and are therefore separately reproduced, as follows:

Statement Showing Total Number of Errors Made at Stations in Group 2, September, 1914. Also Number of Tickets Billed to Number of Billing Errors and Number of Shipments Handled Over Platform (Outbound) to Number of Loading Errors

Stations	Error billing	Error handling	Misbandling waybills	Total	No. tickets billed	No. tickets handled to each error billing	Shipments handled	No. shipments handled to each error
Hugo	2	4	..	6	2,513	1,256	8,206	2,051
Sapulpa	2	10	5	17	1,553	776	14,931	1,493
Tulsa	1	10	1	12	4,645	4,645	8,357	836
Oklahoma City.	10	22	..	32	11,921	1,192	14,333	651
Birmingham	6	12	..	18	5,755	959	7,288	607
Ft. Smith	13	26	..	39	6,051	465	10,359	398

Failures to unload and mishandling waybills not included in above averages.

Damages on Stations (Group 2)—September, 1914

Stations	No. shipments handled	No. damages straight cars	No. shipments loaded to each damage
Hugo	8,206	2	4,103
Ft. Smith	10,359	11	942
Birmingham	7,288	9	810
Oklahoma City	14,333	27	531
Sapulpa	14,931	29	515
Tulsa	8,357	21	398

It should be clearly understood that while the committees cover the different points on the division, the terminals; i. e., St. Louis, Memphis, Springfield and Kansas City, which have terminal superintendents, have freight claim preventive committees of their own and hold regular monthly meetings.

The Central Committee is made up as follows: E. D. Levy, general manager, chairman; J. E. Hutchinson, general superintendent; J. A. Frates, general superintendent; P. T. Dunlop, general superintendent motive power; R. W. Schulze, superintendent car department; W. H. V. Rosing, special engineer; T. B. Coppage, superintendent transportation; J. H. Doggrell, assistant superintendent transportation; J. H. Smith, chief special agent; E. C. Lilley, inspector of transportation and station service; W. E. Ogston, superintendent Frisco Refrigerator Line, and G. E. Whitelam, superintendent of freight loss and damage claims. Mr. Whitelam is secretary.

It was estimated that about $9,000 would be required to cover compensation to committeemen and traveling expenses for the first year's operation of the freight claim preventive committees. The division committees hold meetings monthly, but this interval will be made greater as the work becomes more fully developed. The time of meetings varies with local conditions and the convenience of the committee. Some are held in the evening; others at various times during the day.

There is one important factor which thus far has only been lightly touched upon and which in a large degree is doubtless responsible for the record which has been made. That is the ingenious devices which have been developed for keeping all concerned fully posted as to the progress of the campaign and in holding their interest to a high pitch. Not a week elapses but what something in the way of a bulletin, a reminder, a terse comment, a comprehensive diagram or a cleverly worded poster is sent broadcast over the system. The more important devices of this sort will be considered in Part III of this article, which will appear in next week's issue.

STRONG CLAIMS FOR CHILLED IRON CAR WHEELS

In a paper presented before the Richmond Railway Club, April 12, 1915, F. K. Vial, chief engineer of the Griffin Wheel Company, Chicago, made some very strong statements with reference to the superiority of chilled iron over steel car wheels. The following is taken from the summary of the paper:

"Collecting the various items, we have a saving of over $37,000,000 in the annual expenditures of the railroads of the United States when chilled iron wheels are used instead of steel wheels.

"It has been shown that the railroads cannot purchase immunity from accidents by the expenditure of tens of millions of dollars annually as a premium for steel wheels. It has been shown that there are many fundamental physical properties of chilled iron which are favorable to wheel requirements, that cannot be duplicated by steel. There are many properties of steel that do not harmonize with wheel requirements, that do not exist in chilled iron. It is, therefore, imperative that the fundamental laws of wheel design and the relation of chilled iron to service conditions be thoroughly established.

"A vast amount of work has been done in studying the peculiarities of steel rails in service, and the same line of investigation should be made with reference to wheels. The fundamentals of flange design are well established by the Association of Manufacturers of Chilled Car Wheels, but are not accepted by the M. C. B. standing committee on car wheels, and nothing is given in their place. The relation of the plate of the wheel to heat stresses is also fairly well established by the manufacturers, but is not yet accepted by the M. C. B. wheel committee.

"Notwithstanding the fact that nearly all breakages of wheels in service are caused by heat stresses, no study has ever been made by the wheel committee to classify railway equipment with respect to its braking power, which is the measure of heat generated in the wheel when operating on grades; neither do their specifications refer in any way to heat stresses, which are of greater magnitude than those arising from any other cause. It has been necessary for the wheel manufacturers to establish their own rules for wheels designed for heavy duty, which are based on wide observations at points of maximum service and also on tests made at Purdue University, showing the magnitude of heat stresses developed in wheels of various designs under various brake pressures. These rules have proved to be absolutely reliable and chilled iron wheels are now in use under loads exceeding 200,000 lb. In fact, there is far less trouble in the use of chilled iron wheels under maximum loads on maximum grades when designed according to well established rules than now occurs in the lightest capacity cars using the M. C. B. standards.

"The chilled iron wheel is especially serviceable in passenger service on account of the comparatively light loads carried and the freedom from tread failures such as occur in steel wheels. The difficulty in passenger service has been that only the lightest wheel manufactured, of the chilled iron variety, has ever been used. In fact, in the case of all-steel coaches using chilled iron wheels, the 625 lb. chilled iron wheel is used; when steel wheels are used, however, under the same coaches, they weigh above 1,000 lb. Notwithstanding the large percentage of chilled iron wheels in passenger service, it is only recently that the standardization of design for this service has been presented to the various railroad companies, and it would not be at all surprising if a return were made to the chilled iron wheel for exclusive passenger service.

"There is no question regarding the superiority of chilled iron wheels for the heaviest tender service, whether for passenger or freight; in fact, there is no field of wheel service where chilled iron is not preferable to any other material. It has all the possibilities for making a perfect wheel; all that remains is to establish the proper design and proper method of manufacture."

Hearings in Western Freight Rate Advance Case

Useless Questions Asked by Mr. Thorne. The High Cost of Carrying Live Stock and Useless Attendants

The western railways completed the introduction of their evidence in the western rate advance case being heard in Chicago before Commissioner Daniels, on April 8, after five days had been allotted to them for the presentation of testimony which they were not able to complete in the time scheduled for it last month.

At the close of the railroads' side of the case Clifford Thorne of the Iowa Railroad Commission filed with the commission a list of 36 interrogatories calling for information to be furnished by the railways as to the disposition of railroad revenues during recent years, specific data on certain operating costs and a complete exposition of the financial history of the railroads in the case.

One interrogatory reads: "State what sums have been expended in raising the standard of your property or in making improvements, additions or extensions which have been charged to operating expenses during each of the fiscal years 1901 to 1904, inclusive. Another interrogatory asked for a list of all directors, officers and employees who received salaries of $10,000 or more per annum during the last fiscal year. Another asked for information regarding "payments made for influencing legislatures, assisting political campaigns, special legal services, entertainments of public officials or influencing public opinion through the press during the period 1907 to 1914, inclusive."

Information was also asked as to the charges to road and equipment for the period covered by the carriers' exhibits, property acquired during the same period, life of ties, fuel consumption, purchasing data and sleeping car contracts.

The questions relating to the financial operations include queries concerning sources of money charged to road and equipment, non-railroad property held, security issues, securities retired or converted and intercorporate holdings, the amount of unproductive expenditures for permanent improvements, whether made voluntarily or in compliance with governmental requirements, since 1901, and the amount of unproductive expenditures for other than permanent improvements.

Mr. Thorne also asked that President Bush of the Missouri Pacific and President Felton of the Chicago Great Western, be recalled for further examination.

A vigorous protest against this wholesale demand for information was filed with the commission by C. C. Wright, chairman of the committee representing the railways. Mr. Wright stated that similar questions had been put to the carriers in the eastern rate case, and the information was not used after the roads had been put to tremendous expense in compiling it, and the case had been delayed for months; and that while the questions would be proper in a general investigation of railway management they were out of place in the present case. Moreover, he said, the request comes too late in the case and is unnecessary, as all books and records of the carriers have been open to the shippers from the beginning.

"The record of this case disclosed," he said, "that from time to time the representatives of the state commissions have asked for information of a most general and extensive character, which the carriers have either furnished or are preparing for them. The expense incident to requests already made has been very great and the expense of the present requests would be large. The carriers are ready to undertake anything which may be deemed material to a full and fair presentation of the propriety of the rates suspended in I. & S. Docket 555, but are unwilling to further gratify the curiosity of the complainants in matters which do not bear upon the issue before the commission."

Representatives of the protestants on April 9 and 10, presented their evidence in opposition to the proposed advances in the rates on hay and broom corn, and they will have until May 10, to present their evidence bearing on the rates on specific commodities, and uncompleted testimony bearing on financial conditions.

CONCLUDING TESTIMONY OF CARRIERS

The uncompleted testimony of the railroads was devoted mainly to the proposed advances in rates on livestock and packinghouse products. A large number of operating officers were called to testify as to the unusual expenses attending the handling of this traffic.

C. E. Spens, assistant freight traffic manager of the Chicago, Burlington & Quincy, testified that in 1914 the Burlington furnished free transportation for 79,484 caretakers of livestock, representing free transportation amounting to $419,093, or 7.8 per cent of the revenue from livestock. Mr. Thorne asked how many attendants are carried in the bunk cars. "The number varies with the attractions of the great city of Chicago," replied Mr. Spens. "These caretakers relieve the railroad of a great deal of work, don't they?" asked Mr. Thorne. "They are supposed to," answered the witness.

C. Haile, vice-president of the Missouri, Kansas & Texas, testified that rates on livestock have always been regarded as too low in comparison with other articles comprising the bulk of the tonnage and considering the extraordinary expense and unusual conditions surrounding the traffic.

"This commodity," he said, "is of a perishable nature, with liability for heavy claims for damages; extreme promptness is necessary in reaching markets; free transportation both ways must be accorded caretakers, and the carrier is liable for damages for injuries to the caretakers while en route. Loading of cars and trains carrying livestock is very light, the paying weight being not above 40 per cent of the gross weight hauled, against 50 per cent on other commodities. Special facilities are required for the exclusive use of this traffic, such as pens and chutes, and special side tracks must be built and maintained. The cars must be bedded at the carriers' expense in the Southwest and under the law the stock must be unloaded, rested, watered and fed at least every 36 hours. Cars must be cleaned and disinfected under state and federal regulations, and cars used for livestock are available for loading only a few other commodities. For this reason the empty mileage of stock cars is excessive. On the Missouri, Kansas & Texas the empty haul of stock cars is about 97 per cent of the loaded haul, while the empty mileage on all box freight cars is only about 27 per cent of the loaded mileage. On our railway the average earnings per car on livestock are only $29.81 against an average of $42.07 per car on all other carload freight, excluding livestock. In fact, out of 43 commodities livestock shows lower earnings per car mile than any other, excepting rice, flour and other mill products, on which advances also are asked.

"Owing to the perishable nature of the freight and the necessity of reaching markets at specified hours, unusual expedition is required in the movement as compared with other freight, resulting in reduction of the tonnage of trains hauling livestock as compared with trains made up wholly of non-perishable freight. Excessive claims must be paid in the handling of livestock traffic as compared with other freight. The proportion of total claims paid, excluding livestock, to total freight earnings, was 2.63 per cent. The proportion of livestock claims paid to total livestock earnings was 10.41 per cent, or about four times as great. Damages per car on livestock were $3.10 against average earnings per carload of only $29.81." Mr. Haile submitted figures showing that on six roads, operating 44 per cent of the entire mileage interested, the new revenue which would accrue from livestock would be $645,709. If the same ratio were applied on other mileage the total would be less than $1,500,000 per year.

J. A. Somerville, superintendent of transportation of the Mis-

souri Pacific, described the operating difficulties in the handling of live stock trains. "Livestock business," he said, "is more expensive than the general run of traffic because we are obliged to maintain schedules with a view of reasonable loading time for the shipper, while reaching the market within specified hours and within the time limits set by federal laws. Livestock reduces the tonnage of trains. Observations we have made show that stock trains carry only 51 per cent of the engine's capacity, while through trains not handling livestock carry 91 per cent. The empty movement of stock cars ranges from 67.7 per cent to 97 per cent of the loaded, against 24.1 per cent to 31 per cent on box cars. Excessive empty mileage results from special equipment in which livestock is handled, which cannot be loaded to any material extent in both directions."

The witness then presented schedules prevailing on stock trains, showing that they range from 14½ to 18½ miles an hour, against 10 to 13½ miles per hour on ordinary time freight trains and against 10 miles an hour on ordinary freight. On branch lines and in pick-up service, under which stock is concentrated at junction or division points, he said schedules must be maintained to make proper connections with through trains. Otherwise additional expense for further fast movement in special trains is necessary, instead of regular trains to market points.

G. B. Vilas, general superintendent, Chicago & North Western, showed that free transportation accorded livestock shippers is used extensively by persons neither owners of livestock nor employees of owners, but who travel on someone else's contract.

"In January alone on the North Western," he said, "we furnished on a passenger rate basis $20,475.80 of transportation from shipping point to the market and return. In a year this would amount to $245,000 passenger transportation, on account of the livestock movement.

There is no real necessity for attendants. An actual check for five weeks showed that out of 3,164 such attendants, only 2,033 were actual owners, 231 were employees of owners, while 900 were neither employees nor owners. We paid last year in claims $4,005 on account of attendants being injured and claims amounting to $3,000 more are pending.

"The value of livestock facilities on the North Western is $1,428,000 and the yearly maintenance cost is $74,775. Last month we spent $7,910 disinfecting and cleaning stock yards and the federal authorities have ordered us to do it all over again, because of the cattle infection. Cleaning and disinfecting stock cars costs $2.50 each and often results in a delay of from 24 to 48 hours when the car is needed badly. When the market price of livestock goes up during the week, we receive orders for empty cars, rush them to the loading territory in special trains and then if on Saturday the market drops, the cars are not shipped and we have been put to useless expense running them out at high speed, when they are not used for a week or two.

O. C. Smith, superintendent of transportation, Missouri, Kansas & Texas, and C. B. Strohm, superintendent transportation, Atchison, Topeka & Santa Fe, presented similar testimony.

J. R. Koontz, general freight agent of the Santa Fe, said that livestock pays the least per gross ton mile of any commodity carried. "On a typical run from a southwestern point to Chicago," he said, "the earnings on livestock are only 2.13 mills per gross ton mile, including the empty returns, and 3.22 mills excluding the empty returns. The average carload is only 11.61 tons. To mention only a few other commodities in this same territory, eggs make an average carload of 13.04 tons and earn 6.83 mills per gross ton mile, excluding empty returns; cotton loads 12.16 tons and earns 4.63 mills; beans load 20.46 tons and earn 5.50 mills; poultry loads 9 tons and earns 6.73 mills; agricultural implements load 14.42 tons and earn 6.36 mills; stoves load 16.06 tons and earn 6.81 mills, while structural iron loads 28.62 tons and earns 7.15 mills. Yet loss and damage claims are higher than on any other commodity. Livestock revenue is only 5.7 per cent of total freight revenue, yet the claims paid on livestock are 17.9 per cent of the total claims paid on all commodities, or over three times the proportion of revenue."

N. D. Ballantine, assistant to second vice-president of the Chicago, Rock Island & Pacific, presented figures covering tests made on the Rock Island, which showed that on trains carrying livestock, either exclusively or in part, only 63.9 per cent of the locomotive capacity was utilized, while on trains carrying other freight, 71.1 per cent was utilized. "Had we been able to carry as much tonnage on stock trains as on trains carrying other commodities," said Mr. Ballantine, "we would have saved 2,822 train-miles on the trains investigated, yet this was on divisions where we got the maximum benefit from concentration of livestock traffic, and as we get away from the territory covered, we would get an even small equalization.

"The increased cost of fast freight train service demanded by livestock traffic, as against slow freight service, is shown by the fact that by actual tests where the average speed between terminals was increased 12 per cent, the fuel consumption increased 30 per cent per gross ton mile and the cost of fuel, wages, water, lubricants, repairs, interest and depreciation on locomotive and caboose increased 24 per cent. In a test with another class of locomotive, equipped with superheaters, where the speed was increased 49 per cent, the fuel expense increased 32 per cent and the total expense 11.49 per cent."

S. B. Fisher, chairman of the valuation committee of the Missouri, Kansas & Texas, testified as to the cost of special facilities on his railway, required by the livestock traffic, including lands, tracks, chutes, pens and appurtenances. He showed that the original cost to date of these special facilities reached $688,617. The cost of reproduction new would be $1,017,692, while the cost of reproduction new, less depreciation, would be $784,050.

TESTIMONY OF SHIPPERS ON ADVANCED RATES

Clinton R. Lee, president of the Lee Broom Company and chairman of the board of governors of the National Broom Manufacturers' Association, testified in opposition to the proposed advance in rates on broom corn, saying the manufacture of brooms is conducted on a decreasing margin of profit which will not permit of the absorption of added freight rates, and that the industry has already more than borne its share of the transportation burden by advances in rates in recent years.

C. A. Steel, traffic manager of the National Broom Corn Manufacturers' Association, testified that the existing rates on broom corn are sufficiently remunerative to the carriers. He said that the rates now in effect from 25 representative shipping points in the states principally affected average 54.4 cents per 100 lb. for the average haul and give an average revenue per car of $97.77, or 13.8 cents per car mile.

C. W. Hillman testified as an expert accountant for the protesting state railway commissions, that broom corn instead of failing to pay its proper share of the burden of transportation, shows a very favorable return when contrasted with the rates on other commodities. He presented data covering the movement of 261 cars, moving during October and November, 1914, to show that the average earnings per car were $116.94, and per car mile $16.36, and per ton mile 15.44 mills. He said there were no special costs incident to the broom corn traffic other than its comparatively light loading as compared with other carload freight.

Testimony against the proposed advance in rates on cotton piece goods was presented on Monday, and for a time the room in which the hearing was conducted took on the appearance of a large dry goods store. S. H. Johnson, assistant freight traffic manager of the Rock Island Lines, in his testimony had presented a list of the principal articles included under the head of cotton piece goods, with the high and low prices for each article, making an average of $65 per 100 lb. Leon Smith, president of the Smith-McCord-Townsend Dry Goods Company of Kansas City, before taking the stand had spread out on tables before the commission the contents of two large packing cases of dry goods, saying he had "filled Mr. Johnson's order," and that the value was only $27.65, instead of $65. He said that the prices

as given by Mr. Johnson not only were too high but that they represented an average of the high and low extremes in prices, whereas the great volume of shipments to the Missouri river was made up of articles priced much lower than Mr. Johnson's figures. The effect of the testimony was to show that a freight rate of 40 cents per 100 lb. for the 300 mile haul between the Mississippi and Missouri rivers, represented 1.5 per cent instead of 0.6 per cent, as stated by Mr. Johnson, of the value of a 100 lb. shipment. The proposed advance is 5 cents per 100 lb.

Other testimony was given by J. I. Sweeney, traffic manager of the Smith-McCord-Townsend Dry Goods Company, Thomas Byrne, a dry goods jobber of Omaha, and J. C. Saunders of Bonham, Tex. Mr. Byrne protested that the advance would have a serious effect on his business. T. J. Norton, attorney for the Atchison, Topeka & Santa Fe, asked the witness what percentage the advance in rates would bear to his profit. When objection to this question was raised by counsel for the shippers and the witness refused to give the amount of his profits, Commissioner Daniels said he need not answer the question but that his refusal must be taken into consideration with his testimony that the increase in rates would be a burden.

INDUSTRIAL COMMISSION INVESTIGATES 1911 STRIKE

An investigation of the strike of the labor unions in the mechanical department of the Illinois Central and the Harriman Lines, which was declared in September, 1911, was taken up by the federal commission on industrial relations at a hearing at Chicago beginning on April 7. Charles H. Markham, president of the Illinois Central, was the first witness and occupied the stand almost the entire day. He presented a 70-page typewritten statement outlining the history of the strike and the events that led up to it. This strike, Mr. Markham said, was as ill-advised and inopportune as it was unexpected, and grew out of no real or substantial grievance. Within the year the company had granted large increases of pay to the mechanical department employees and no request for an advance in wages was involved. He said the company refused to recognize the new system federation because contracts were in force with the individual unions, and no 30-day notice was given, as required in the agreement, that it was desired to terminate the existing contract. He also said that the strike grew out of an attempt of the American Federation of Labor to organize the shop crafts on each railroad system and that the railroads opposed the movement in principle. He said the company objected to having men outside of its service who were leaders in the organization of the federation interfere in the affairs of the company, and that it objected to having its labor situation complicated with labor troubles which might exist in shops outside of the railroad service, which would be the result of the system federation plan.

Chairman Walsh asked if it was not a fact that at the time the strike was called 31 railroads were dealing with the federation and that now 52 railroads recognize the federation. "I don't know," replied Mr. Markham. "May I say that if that be true they will be sorry for it?" Asked why, if it was a good thing that railroads should be organized into large corporations, the same proposition did not apply to labor organizations, Mr. Markham said that the consolidations of railroad corporations made it possible to give better and more efficient service to the public, but that labor unions were not organized for that purpose, and that the federation plan placed too much power in the hands of labor leaders. He said the strike had cost the Illinois Central millions of dollars, but that the road had replaced the strikers and that its shop work was now being carried on just as efficiently, if not more so, and at a slightly less cost than before. Mr. Markham said he had no objection to the railroad brotherhoods, but that the mechanical unions had shown they could not be depended upon to live up to contracts; and he considered unions which combined railroad men and men employed outside of railroad service a menace.

A. O. Wharton, president of the railway employees' department of the American Federation of Labor, and a number of other witnesses who had participated in the strike, defended the federation plan of organization of the mechanical department employees. Other union officers and organizers said that the strike on the Harriman lines had been caused by discriminations and arbitrary methods of dealing with the men, including the employment of "spotters" and efforts to break up the unions. Several of the witnesses testified that E. H. Harriman, after settling the Union Pacific strike in 1904, had said that the ideal way to handle such questions would be to deal with an organization representing the entire system, instead of taking up the time of both sides in dealing individually with smaller organizations. They said they felt they had taken his advice in organizing the system federation of the mechanical department unions, and that if Harriman had lived the difficulty would have been avoided. Various witnesses put into the record results of an investigation of the effects of the strike on the men engaged in it; the number who had been obliged to give up their homes and take their children out of school, etc.

Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific, testified on April 10, giving a comprehensive review of the events and causes leading up to the strike. The principal reason of the railways for opposing the demands of the men, he said, was the proposition to establish the system federation plan for the entire Harriman system. This would involve, he said, a recognition of the rights of outsiders to negotiate agreements for the employees. Asked by one of the commissioners what he would suggest for the alleviation of industrial unrest, Mr. Kruttschnitt said that complete publicity for labor controversies is one of the best methods of maintaining industrial peace. "I have observed that no strike succeeds with public opinion against it," he said, "and as I grow older I am more fully convinced than ever that the public should be fully informed on exactly what the issues are. The judgment of the public will be almost always right."

The commission's investigation of wages and conditions of employment of Pullman conductors and porters was interrupted on April 6 by the failure of Chairman Robert T. Lincoln and President John S. Runnells, to appear to testify. Both sent messages asking to be excused on account of ill health.

A number of porters were called as witnesses and testified that they were satisfied with the condition of their employment. R. W. Bell, a former Pullman conductor, said he had been discharged for activity in trying to organize the conductors, and other former employees of the company complained about the conditions and the wages.

On Monday of this week the commission took up the investigation of conditions of employment of the Western Union Telegraph Company.

Ratio of Trainmen Killed.—Statistics prepared by the Interstate Commerce Commission show that in a given year for every 208 trainmen employed in the United States, one was killed and for every 8 employed one was injured. I am afraid a good many of us do not appreciate these figures. Suppose as an illustration the name of every trainman on your division should be taken, these names put on separate slips of paper, these slips put in a hat and you all knew that for each 208 names, one would be drawn from that hat one year from today and the man bearing that name would be taken out and shot. How many of you would remain in the service and take the risk of having your name drawn? This is just what it means, so far as life and death is concerned, except that the man would have a full year to live, whereas in accordance with actual conditions he may be killed today. We are too secure in our belief that it is the other fellow who is careless.—*E. H. Daniel in the Railroad Herald.*

IMPORTANT DECISION IN THE ARKANSAS RATE CASE

On April 3 the United States District Court for the Western division of the Eastern district of Arkansas handed down a decision in the suit of the State Railroad Commission against the St. Louis & San Francisco to enjoin the enforcement of a freight tariff promulgated by the State Railroad Commission and also the 2 cent passenger rate established by the state legislature in 1907. The court declared these rates confiscatory and granted a perpetual injunction to the railroad. The railroad's case was based on a division of expenses made according to the "Oklahoma formula," and the court upheld this formula.

The original bill in this suit was filed in July, 1908. A temporary injunction was granted and a new tariff for freight rates adopted under the supervision of the court, which raised the freight rates above those established by the tariff enjoined and restored the passenger rate of 3 cents a mile. In 1909 an agreement was made between the state and the railroad that the hearing of the case be postponed until the final determination of similar actions instituted by the St. Louis, Iron Mountain & Southern, and the St. Louis Southwestern, and a further stipulation that the company should make a test of the passenger rate at 2½ cents per mile for the purpose of determining what the effect of such a rate would be on the net earnings of the company. The company reduced the intrastate passenger rate to 2½ cents per mile for 18 months in 1909 and 1910, and then restored the 3 cent rate, claiming that the test showed that the rate was not remunerative. On June 16, 1913, a decision was rendered in the Iron Mountain and the Cotton Belt cases, holding that sufficient proof was not presented to justify the court in overruling the action of the state, and the bills were dismissed. On the preceding week the opinion in the Minnesota rate case was filed.

Following these decisions representatives of a number of Western roads devised a formula for the purpose of dividing valuations and expenses between intrastate and interstate and between freight and passenger traffic upon the basis of the use made of the property by each class as suggested by the Supreme court, for special use in the Oklahoma rate case. This formula, which was described in the *Railway Age Gazette* of July 3 and July 24, 1914, was amended to meet the conditions prevailing on the Frisco lines in Arkansas, and was submitted by the road as a basis for its contentions.

As no separate records had previously been kept by this or any other company on this basis, it was necessary to collect special data. This was done for all the lines of the Frisco in the state of Arkansas during November and December, 1913. Printed forms were prepared by the company and distributed among the employees, on which they were required to report every item of expense and the use made thereof for freight or passenger and for intrastate or interstate traffic. To obtain this information clerks were placed on every train running in Arkansas during this period. Special yard clerks were placed at the termini of all through freight runs to record the contents of the trains and when they arrived and left. Conductors in charge of freight trains were required to record the character and quantity of feight, the distance hauled and the amount picked up and set out at each intermediate station. For passenger traffic a division of expense was made on the "car foot mile" basis, the measurement of the space assigned in each car to each class of service being multiplied by the number of miles that car ran in Arkansas.

In a similar way the time devoted by yard engines to the various classes of service and the time of yard and station agents' work was classified. To allocate maintenance of way expenses, experienced men were sent over the road who instructed the section foremen regarding the methods of keeping accounts and who classified every track under the charge of each foreman according to its use as a line or terminal track or common to both. If used exclusively for freight or passenger traffic it was likewise again classified. A similar method was applied to bridges, buildings and other structures. Terminal charges were localized to the state where the terminal was located and each individual yard was treated separately.

The expenses of intrastate passenger traffic were divided between intrastate passenger miles actually determined within that period and the cost per passenger mile for all expenses by this method arrived at. The same method was followed for the interstate traffic and thus the excess cost relation of the work determined. The cost of the intrastate passenger business based on the use of the property was found to be 15.43 per cent more than that of the interstate, and for the freight service the intrastate cost was found to be 319.58 per cent greater than the through.

Comparisons were made with the test period commencing with the year ending June 30, 1913, and working back to the last four months of 1907, which showed that the test period was practically the same as that for the preceding years.

Although the state contested this method of comparison the court decided that "this method of equation will secure results as nearly correct as is possible when no separate accounts of the two classes of traffic have been kept." While the state attacked the formula as incorrect, it presented no better one and all its exhibits were based on the formulae used by the company. The state did not separate the Arkansas business from that of the entire system, assuming that there was no difference in the cost of operation, in spite of the fact that the traffic density in Arkansas was shown to be considerably less than that on the system as a whole, the lines of heavier grades and less favorable operating conditions, and the length of haul of the intrastate traffic much shorter than that of the entire system.

After the hearing began the average value of the property for the years 1910-13, inclusive, was stipulated by agreement as $17,924,441.75, the value fixed by the state taxing board, and the average annual gross earnings in the state were shown to be $4,172,121.71. Had the freight and passenger tariffs of the state commission in question been enforced during this period these returns would have been $456,103.72 less. Deducting this difference the company claimed that there would have been an actual loss on the intrastate business for these four years of $122,651.26, while upon the entire business in the state, intra and interstate, the company earned a net profit of 5.63 per cent.

The state contended that the reduced passenger rate of 2 cents a mile would stimulate traffic to such an extent that the intrastate business would gain. The company charged 3 cents per mile for interstate business, and to ascertain the effect of the reduced intrastate fare a test was made for the month of August, 1913, which showed that while the intrastate business increased it did so because many passengers bought tickets to the state line and then to destination. The court found therefore that the two-cent rate did not stimulate traffic except at the expense of the interstate.

The court found that the average annual net earnings of the Frisco lines in Arkansas from all sources were $1,122,463.21 for the four years 1910-1913, inclusive, yielding a net return of 6.26 per cent on the agreed valuation. Adopting the same basis for the intrastate traffic, the profit on the valuation of the road assigned to intrastate business would be $198,249.25. Deducting the decrease which would have resulted if the enjoined rates had been charged there would have remained a net profit from intrastate traffic of $84,223.32, equivalent to 2.65 per cent on the valuation of $3,166,921 allocated to the intrastate traffic according to its use.

As no claim was made for the state, and no evidence introduced to show that the road is not properly and economically managed, or that it was not built to meet a public demand, the court granted a decree making the temporary injunction, preventing the enforcement of these rates, perpetual but retaining jurisdiction so that the state may apply for further orders to meet new conditions should they change.

One of the reasons why this decision is of special importance is that this Oklahoma formula is being used by the railways as the basis for important rate cases now being contested in Texas, Kansas and Oklahoma.

CHAPEL CARS FOR CHURCH EXTENSION WORK

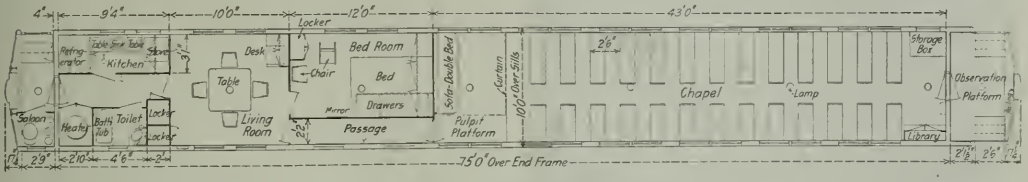
The Barney & Smith Car Company, Dayton, Ohio, recently completed a chapel car for the Catholic Church Extension Society of the United States and one for the American Baptist Publication Society.

The former, which is named the "St. Paul," is 86 ft. long over all, having an observation platform at each end. It weighs approximately 134,000 lb. The framing and exterior construction is entirely of steel and the roof is of copper. The interior finish throughout is in Cuban mahogany, of Barney & Smith design, executed in ecclesiastical Gothic lines. The car is equipped with two lighting systems, gas being used as a primary light, and electric light for an auxiliary. The car can be heated either by direct steam, or by means of an oil stove heating apparatus. There is seating capacity for about one hundred people.

In addition to the chapel and altar, the car is equipped with private quarters for the chaplain, assistant and porter, as shown on the floor plan. Provision has also been made for toilet rooms, sleeping quarters, kitchen and pantry, and there is also a goodly supply of locker space.

The "St. Paul" was built for missionary work, and is intended for use in the Southern states exclusively.

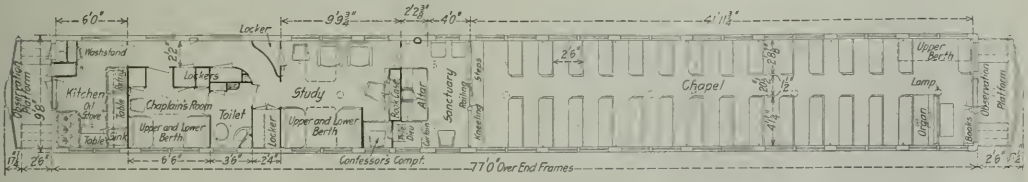
The chapel car for the American Baptist Publication Society is 85 ft. 6 in. long over all, having an observation platform 4 ft. 4½ in. long at one end and a standard closed vestibule platform at the other end.



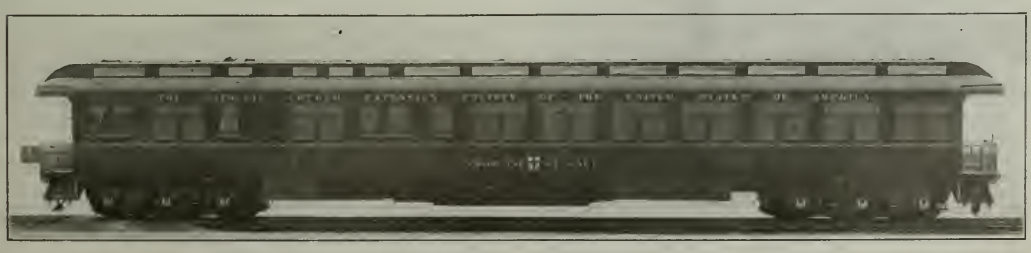
Floor Plan of the Baptist Chapel Car

Chapel Car of the American Baptist Publication Society

The framing and exterior construction is entirely of steel, including the roof framing, the covering of which is of sheet steel. The interior finish throughout is in golden oak, executed in Gothic lines. The finish for the platforms is in flat steel, painted and grained. A raised pulpit platform is provided at the forward end of the chapel. The floor covering in the chapel is linoleum, with carpet aisle strips; for the bedroom, it is linoleum, with small rugs distributed about the room; for the living



Floor Plan of Chapel Car "St. Paul"



Chapel Car for the Catholic Church Extension Society

room, carpet is used; while linoleum is employed for the passageway, kitchen and toilet rooms. The seats in the chapel end of the car are reversible and of the regular day coach type,

An Interior View of the Baptist Chapel Car

finished in oak to harmonize with the interior finish. The total weight of the car is approximately 134,000 lb.

In addition to the chapel, the car is equipped with private quarters for the chaplain, a living room and library, kitchen, toilet rooms with bath, and lockers.

Interior of the Chapel Car "St. Paul," Looking Toward the Altar

The car, after a formal dedication and an exhibition trip from coast to coast, is to be used in the missionary field in sections of the country where no churches have been instituted.

THE CUMMINS AMENDMENT

The law of March 4, 1915 (Public No. 325), commonly called the Cummins Amendment, making changes in section 7 of the Interstate Commerce law (*Railway Age Gazette*, March 12, page 482) was the subject of a hearing before the Interstate Commerce Commission at Washington, on Saturday, April 10. The principal argument tor the railroads was presented by O. E. Butterfield, of the New York Central, representing all the roads in Official Classification territory. The southern lines were represented by Lincoln Green, traffic manager of the Southern Railway, and C. J. Rixey; L. M. Walter appeared for various shipping interests, and H. C. Barlow represented the Chicago Association of Commerce.

R. B. Scott, of the Chicago, Burlington & Quincy, who appeared for roads in the western territory, said the roads did not expect to make a general increase in rates of 10 per cent, but that they desired to be heard further on the question of some increase in those rates which are now predicated on a restricted liability, for in some or all of these the liability of the carriers will be increased. H. G. Wilson, president of the National Industrial Traffic League, opposed any increase in rates, declaring that the present limited liability rates are the rightful rates for the unlimited liability provided under the Cummins bill, and that the effect of the bill is simply to wipe out the limitation of liability; it was not the intent of Congress to increase rates.

C. W. Stockton, speaking in behalf of the express companies, claimed that their tariffs and bills of lading are now so framed that the Cummins law imposes no additional duties; therefore, they had nothing to propose. W. H. Chandler, speaking for the Boston chamber of commerce, said that if the commission should insist on having the value of goods always stated in bills of lading for shipments sent by express many large shippers would be seriously embarrassed, for they ship at the lower rate now provided and depend on outside insurance companies to cover possible losses. They regard the higher rates of the express companies as optional insurance.

Mr. Rixey, for the southern lines, declared that the railroads might properly impose the ten per cent increase in rates, provided for by existing tariffs when a shipper declines to accept any of the conditions in the standard bill of lading; but that the roads in that territory, while not demanding all that they have a right to demand do propose to file tariffs making a five per cent increase; except that for livestock they propose to make a much larger increase.

This statement of the southern lines was the only definite proposal presented on behalf of the railroads except that of Mr. Butterfield. He, speaking for the eastern lines, went into the subject in considerable detail. Following are the main points of his argument:

He began by saying that, judging this matter by their experience in the conduct of affairs under strict governmental regulations, the railroads had attempted in good faith to interpret this law so as to place upon the carriers the full measure of the burden which it is believed was in the minds of its framers of the law, and at the same time to minimize as far as possible the burdens on the shipping public, which a strict construction of the words used by Congress might possibly be said to justify. In forbidding all stipulations as to value of goods this law neutralizes ten decisions of the Supreme Court, beginning with the Croninzer case in the 226th volume and ending with the Pierce case in the 236th.

The first point to be taken up is the uniform bill of lading. The section of the law which has now been amended requires (1) a receipt or bill of lading to be given; (2) imposes liability on the carrier; (3) prohibits exceptions from liability, and (4)

imposes liability regardless of the bill of lading. There is a proviso that if goods are hidden from view the carrier may demand a written statement of value; another that claims must be presented within four months, and a fourth, qualifying the last one, that this four months' limitation does not apply if the loss or damage was due to carelessness, etc.

Mr. Butterfield discussed the subject under seven heads, namely, (1) classification ratings not based on specified value; (2) export and import rates; (3) classification ratings based on specified value (household goods, ore, ostriches, paintings, quartz, silk, watches); (4) livestock; (5) commodity rates based on declared or assumed value; (6) lake and rail rates, uninsured; (7) baggage.

The present tariff rates are conditioned on the use of the standard bill of lading and all its condition. Except as these conditions may affect the value of goods, they are still valid, and the bill of lading may be used. The clause relating to settlement for goods lost or damaged says that the value is to be computed as of the time of shipment and at the place of shipment, with the provision, in parenthesis, that the value is to be "the bona fide invoice price, if any, to the consignee, including the freight charges, if prepaid." This parenthetical clause might be considered a limitation of liability, though the Interstate Commerce Commission in the case of Shaffer, 21 I. C. C. 8, held that it was not a limitation. However, the carriers propose to adopt a form of bill of lading with this left out. Continuing Mr. Butterfield said:

"We believe that if the commission shall be of opinion that the Cummins law condemns the 'place and time of shipment' clause, great confusion and probably unjust discrimination in the settlement of claims will result, and a substantial loss of revenue will be suffered by the carriers; and, while we do not expect an increase of ten per cent in all rates, we submit that some increase in the normal rates should be simultaneously permitted. Upon that point we would desire to be heard further if any such ruling should be contemplated. . . .

"The clause in the bill of lading providing for a notice of claims within four months was held in the Harriman case, 227 U. S., to be reasonable and apparently lawful, and, notwithstanding the Cummins law, may still operate upon claims for loss and damage for which the carrier is liable under the bill of lading although not caused by it, as, for example, loss and damage resulting from fire communicated to the property while in the carrier's possession but without the carrier's fault.

"We propose to amend this clause to read as follows:

"'Except in cases where the loss, damage, or injury complained of is due to delay or damage while being loaded or unloaded, or damaged in transit by carelessness or negligence: . . . . claims must be made in writing to the carrier at the point of delivery or at the point of origin within four months after delivery of the property. . . . or, in case of failure to make delivery, then within four months after a reasonable time, etc.

"It is the opinion of the carriers that this change will result in substantial loss of revenue, and they reserve the right to assert at the proper time a claim for some increase in rates on account of it. We have not the data which would enable us to make any intelligent statement of the extent to which revenue will be affected by that change."

The act does not apply to commerce with non-adjacent foreign countries unless the inland portion of the transportatoin crosses a state line, even if it does then; nor does Rule 1 of the classification apply the ten per cent clause on export rates when the terms of the export bill of lading are not used. The carriers propose to amend the notice clause in the export bill of lading to conform to the suggestions already made with respect to the uniform bill of lading.

As to household goods two rates are already provided. There seems to be nothing in the Cummins law to prevent the promulgation of these two rates, depending on values, provided they are reasonable. If the consignor fails to state the value it will be proper to charge him the higher rate; and while the statement of value, if he makes one, may not be conclusive against him in a suit to recover a greater amount, it will be evidence on the question of fact, and may subject him to criminal prosecution for false declaration.

The carriers propose to strike out the last part of the second paragraph of Section 3 of the conditions of the uniform bill of lading, the paragraph specifically condemned by the Cummins law.

Whether the carriers will continue to maintain rates based on valuation is a matter for further consideration by the traffic officers of the roads. As to all of the other commodities named, ores, ostriches, quartz, etc., the conditions are the same as in respect to household goods.

Livestock.—Livestock is shipped always under a special livestock contract, and this, if not revised, will increase all rates ten per cent. It is thought that there is nothing in the Cummins law to prevent a carrier from promulgating different rates for animals of different values, requiring the owner to specify the value for the purpose of fixing the rate, and declining to accept animals for transportation in case of failure on the part of the shipper to state the value; or, perhaps, imposing the highest rate in case of failure to secure a statement of the value. A misrepresentation of value would be evidence against the plaintiff in a suit to recover a greater sum and might subject him to criminal prosecution if he undertook to recover a greater sum. As to livestock the Cummins law does impose an increased burden. It is hoped that the carriers will be able to submit new tariffs prior to June 3; they are not yet prepared to do so.

Miscellaneous Commodities.—The commodities hereinbefore named are in the classification; now as to goods which are carried under special commodity rates there are 30 or 40 commodities on which two rates are named, one made lower than the other conditioned on various stipulations relating to valuation. For example, copper bars, Chicago to New York, go at 21 cents provided the value does not exceed $100 a ton. Others are, certain articles of furniture, a great variety of crockery and similar wares imported from Europe, liquors, imported printing paper, etc.

On all these rates the carriers are as yet unprepared to say whether or not the ten per cent increase, which they may take under the present tariffs, will be satisfactory.

On westbound lake-and-rail tariffs the railroads bear the cost of insurance; but on certain eastbound lake-and-rail traffic there is a clause exempting the carrier from liability in case of collision or stranding of vessels. This clause seems to be authorized by Section 3 of the act of February 13, 1893, Chap. 105, Vol. 111, U. S. Comp. Stat., 1901, p. 2946, and is not affected by the Cummins law ("*The Hoffmans*," 171 Fed., 455, 464), where it seems to be held that it was not intended by the Carmack Amendment to overthrow the established law with respect to navigation.

Baggage.—Mr. Butterfield, citing the case of Hooker vs. Boston & Maine, 233 U. S., holds that Section 7 applies to baggage; and if so the Cummins law applies to baggage. Most baggage is hidden from view. Baggage tariffs already provide charges for baggage the value of which is more than the ordinary amount, and these tariffs have been approved by the commission. In some states it has been the practice for some time to call upon each passenger offering baggage to declare its value, if he wishes to do so. Under the new law it seems permissible unconditionally to require a statement. As to bicycles, baby carriages and other things not concealed, the carriers will have to make rates sufficient to cover their increased liability.

Argentine Railway to Borrow Twelve Million.—A report from London says that a special treasury consent has been granted to issue £2,500,000 ($12,500,000). Central Argentine Railway 5 per cent five-year notes of which amount £2,000,000 will be offered at 98. The funds secured through this issue will be required for the completion of construction work on the road.

AN IMPARTIAL STUDY OF FREIGHT-CAR DEMURRAGE

Bulletin No. 191 issued by the United States Department of Agriculture and dated March 19, entitled "Demurrage Information for Farmers," is an intelligent and thorough study of the subject, filling 25 pages. Copies can be had from the Government Printing Office at five cents each. It is issued from the "Office of Markets and Rural Organization," Charles J. Brand, chief, and is written by G. C. White, transportation specialist. The principal chapters are those headed Regulation by the States, Interstate Regulation, the Uniform Code, and "Reciprocal Demurrage." In twelve states demurrage is regulated by statute, and in 23 by orders of a commission. The peculiarities of the different state regulations are clearly set forth. An appendix gives a list of demurrage bureaus.

Following are extracts from this bulletin:

The average agreement in rule 9 is of no advantage to the farmer for the reason that he is shipping more than he receives. Its abolition would decrease car detention and thereby benefit the farmer as well as other car users. It is under attack from many quarters on the ground that it enables industries to detain unduly inbound cars of raw material on credits accrued on outbound cars of finished product, which are loaded to fill orders and would be loaded just as promptly in the absence of an average agreement.

The allowance of additional time for inspection and grading of grain and hay is necessary under conditions as they now exist, with different grades and standards effective in different cities and states. Grain is probably reconsigned more than any other one commodity and frequently must bear the burden of car delay in several markets. Instances are on record of its having moved through 15 different markets, in each of which it was subject to official inspection, before it was finally unloaded. This constitutes a serious burden on that commodity. Federal legislation fixing grades and standards for interstate shipments would undoubtedly render much of the present inspection and grading unnecessary. To that extent it would decrease the detention of cars now caused by frequent inspection and grading and thus relieve agriculture of one unnecessary burden.

"Reciprocal demurrage" has done away, to some extent, with the discrimination against the small shipper, in the furnishing of cars, as compared with the man controlling large tonnage. This has been of especial benefit to the farmer. In addition to enabling him to secure cars more promptly when needed, it has had a very powerful influence in awakening the conscience of the railroads to the needs of the farmer and in bringing the railroads to a fuller realization of the fact that their prosperity depends on the prosperity of their patrons. It must be admitted, however, that it is open to the objection of making possible collusion between carriers and shippers whereby carriers may pay rebates, or purchase routing, through the medium of failure to furnish cars on fictitious orders. Similarly the payment of demurrage has been avoided by collusion whereby cars have been set out in transit and held at intermediate points till consignees were ready to receive them.

Conclusions.—If in times of acute car shortage, the shipper who needs cars and is unable to get them could actually see all the other car users at all the other stations in his immediate section who are taking from two to seven days to load and unload cars, when it could and should be done in as many hours, no doubt there would be a speedy reformation among car users and a radical revision of some of the demurrage regulations now in effect. If his vision could be enlarged so as to take in the entire country the effect would be magical. Most, if not all, of the difficulties experienced in connection with car supply and car detention and the demurrage remedies proposed to alleviate the evils of car shortage have arisen from a lack of breadth of vision on the part of shippers, railroad officials, and legislators.

No car user has any moral right to detain a car one moment longer than is necessary to load or to unload it. Unfortunately the proportion of shippers who take this view of the situation, when they themselves are the detainers, is very small. Every shipper holds this view when it is some one else that is detaining the car. Car users who detain cars through carelessness, indifference, or ignorance of the meaning of "car shortage" and "congested terminals" are few. The people responsible for car detention are that vast body of highly intelligent business men who find it more profitable to use cars for storage purposes than to provide other storage facilities. Other reasons for car detention by this class of shippers are comparatively insignificant.

It is not good business to use for storage, space which costs 50 cents per cubic foot to construct, when better storage space can be had for one-third that cost or less, and especially when the higher priced space can earn so much more as a freight car than as mere storage. Storage space does not need costly trucks, steel underframes, automatic couplers, and air brake equipment. Shippers must realize that, from one point of view, they and not the railroads are the owners of the cars of the country. So long as they insist on using them as storage warehouses they must be prepared to pay the cost without complaint. Moral suasion has so far failed to induce them to construct their own storage warehouses when they could get apparently cheaper storage in freight cars. The next step in remedying car shortage should be to limit more closely the free time allowed and to impose demurrage charges sufficiently high to make storage in cars clearly unprofitable.

Refrigerator cars are now paying the nominal demurrage charge of $1 per day and, in some cases, additional charges for track storage. The proposal to impose higher and other charges, in addition to track storage and ordinary demurrage, as a penalty for the detention of refrigerator cars, is a move in the right direction. It will do more than anything else to solve the problem of shortage of refrigerator cars. It will also give an impetus to the erection by municipalities, railroad companies, and private capital of terminal markets with track connections and ample cold storage facilities. . . .

The railroads are between the upper and nether millstone of the man who has the car and the man who wants it. Each abuses the road for the shortcomings of the other. In the last analysis of the case both are the same man, unable or unwilling to see that a car can not be a stationary warehouse and a movable vehicle at the same time. The railroads would gladly forego all revenue from demurrage in return for prompt release of cars.

Some of the state demurrage codes contain provisions apparently designed as special concessions in favor of the farmer. No doubt other industries would not very readily give up any special concessions in their favor on the strength of the farmer voluntarily giving up his. It would seem, however, the proper thing for farmers to insist on the elimination from all demurrage regulations of all special concessions in their favor. Then they could with greater force demand the abolition of concessions in favor of others. This would mean a minimum of car detention, more cars for all shippers, and greater prosperity for the farmers.

The Kenitra-Mequinez Railway of Morocco.—The military railway between Kenitra and Mequinez has been completed to within 3½ miles of Fez, and will probably be opened for traffic in May. The use of the railway has been restricted hitherto by the insufficiency of the rolling stock and the difficulty of obtaining engines, etc., from France. The freight rates work out very favorably in comparison with transport by camel between Fez and Laraiche. While the journey will only take three days by this route, the journey by camel from Laraiche to Fez takes 12 days in summer and 50 days or more in winter. There seems little doubt that, if the deficiency in rolling stock can be made good, the Kenitra route will have a great advantage over that by Laraiche and the traffic of the latter port will be very seriously affected by the opening of this railway.

Tests of a Mountain Type Locomotive on the Rock Island

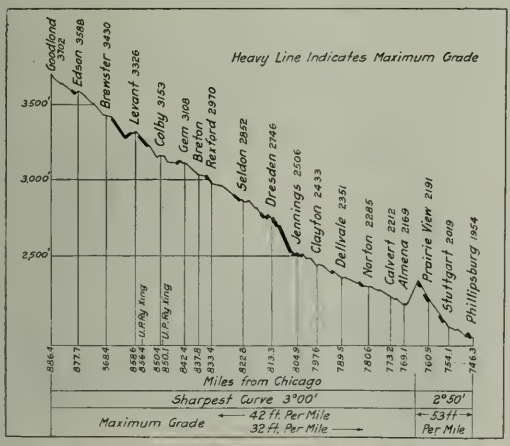
Conducted with 16-Car Trains on District with One Per Cent Grades; Maximum Horsepower Developed 2700

By W. J. Tollerton

General Mechanical Superintendent, Rock Island Lines, Chicago, Ill.

The Chicago, Rock Island & Pacific recently conducted some tests with one of their Mountain type locomotives, No. 999, which is one of two delivered to that road by the American Locomotive Company in the Fall of 1913. These locomotives were intended for hauling the St. Louis section and the Chicago section of the Colorado trains in one train west of Phillipsburg, Kan.

From Phillipsburg westward to Goodland, on the Colorado division, over which the tests were made, there is a steady uphill pull for 139.9 miles with maximum and ruling grades of 1.0 per cent, as shown on the accompanying profile. The trains on which this type of locomotive is used have a normal consist of 10 or 11 all-steel cars, the weight varying from 675 to 750 tons, and the locomotive is capable of hauling as high as 1,175 tons in 19 cars. In the distance of 139.9 miles there are 16 stations, 4 of which are regular stops and the remaining 12 are flag stops. On an average, 11 or 12 stops are made on this run, and it is not infrequent that 15 stops are made, resulting in hard pulls out of stations, many of which are located at the



Profile of the Colorado Division Between Phillipsburg and Goodland

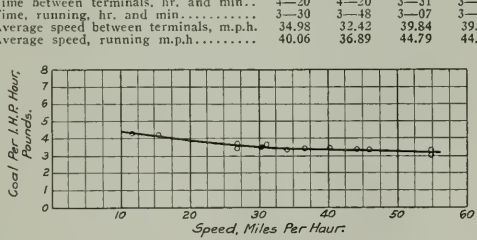
foot of grades. This is shown by reference to the profile. It will be seen, therefore, that a locomotive which can successfully and economically haul this train must have both a high starting tractive effort and a relatively high sustained tractive effort at high speeds.

The Mountain type locomotives were described in the *Railway Age Gazette* for January 9, 1914, on page 86. They weigh 224,100 lb. on drivers, and have a total weight of 333,100 lb., cylinders 28 in. by 28 in., 69-in. drivers, and a maximum tractive effort of 50,000 lb. In 14 of these tests the number of cars ranged from 10 to 16, with an average weight of 674 and 1,045 tons, respectively. In addition to these trips later tests were made with 19-car trains with a weight of 1,175 tons, exclusive of lading. The tests were made in regular service, the trains leaving Phillipsburg at 8:30 p. m. and arriving at Goodland at 12:45 a. m., giving a schedule running time of 4 hr. 15 min., and a schedule speed of 33 miles per hour. For the 10-car and 16-car tests the locomotive was equipped for taking indicator cards, determining temperatures in the steam chests and front end, steam pressures in the superheated and saturated steam chambers of the superheater header, and the draft, as well as for obtaining the steam consumption by the various auxiliaries. The tender tank and boiler were calibrated and the water was measured at all stops from the start of the test. The coal was delivered to the firemen in quantities of 100 lb., being loaded on the tender in bags for this purpose. The same engineer and firemen were used throughout the tests in order that the conditions would be as nearly as possible the same. A shield was built over the pilot for the protection of the observers, as shown in the illustration. This enclosure was lighted with electric lamps, the current being provided by the electric headlight generator.

The accompanying table gives the average results of three tests each, with an average of 10 cars and an average of 16 cars in both directions.

Test Results for the Mountain Type Locomotive

Items	Westbound 10 Cars	Westbound 16 Cars	Eastbound 10 Cars	Eastbound 16 Cars
Mileage	139.9	139.9	139.9	139.9
Tonnage	674	1,045	709	1,028
Ton-miles	94,292	146,196	99,190	143,817
Time between terminals, hr. and min..	4—20	4—20	3—31	3—33
Time, running, hr. and min.	3—30	3—48	3—07	3—10
Average speed between terminals, m.p.h.	34.98	32.42	39.84	39.48
Average speed, running m.p.h.	40.06	36.89	44.79	44.13



Curve of Coal Consumption

Coal used between terminals, lb.	18,133	27,033	10,943	13,433
Coal per gross 1,000 ton-miles, lb.	193.72	184.84	110.52	93.33
Coal per car mile, lb.	12.57	11.83	7.59	6.00
Coal per i. hp. hr., lb.	2.58	3.17	.....	.....
Coal per sq. ft. grate area per hr. (between terminals), lb.	72.26	99.57	49.77	60.45
Coal used at terminals, lb.	2,902	3,500	3,010	3,517
Water delivered to boiler between terminals, lb.	119,170	155,446	75,609	93,076
Water per i. hp. hr., lb.	16.98	18.29	.....	.....
Steam used in cylinders (net), lb.	106,807	140,606	58,090	70,231
Steam used per hr. in cylinders (open throttle), lb.	33,707	40,514	20,382	26,582
Steam used per hr. in cylinders (running time), lb.	30,591	37,074	18,960	22,891
Water evaporated per sq. ft. evaporating surface per hr., lh. (throttle open)	9.13	10.86	.....	.....
Water evaporated per sq. ft. total heating surface per hr., lb. (throttle open)	7.43	8.85	.....	.....
Steam used per pound of coal, lb.	6.57	5.76	.....	.....
B. t. u. absorbed per pound of dry coal.	8,539	7,525	.....	.....
Efficiency of boiler (dry coal)	67.74	59.70	.....	.....
Steam pressure—				
Boiler, lb. per sq. in.	182.5	181.1	.....	.....
Saturated steam chamber in header, lb. per sq. in.	172.9*	178.8	.....	.....
Superheated steam chamber in header, lb. per sq. in.	157.7	160.4	.....	.....
Steam chest, lb. per sq. in.	154.1	158.6	.....	.....
Initial in cylinder, lb. per sq. in.	145.6	152.9	.....	.....
Temperature at steam chest, deg. F.	580.8	598.3	.....	.....
Superheat, deg. F.	212.9	228.2	.....	.....
Smokebox temperature, deg. F.	511.7	538.9	.....	.....

*This pressure is low due to throttling.

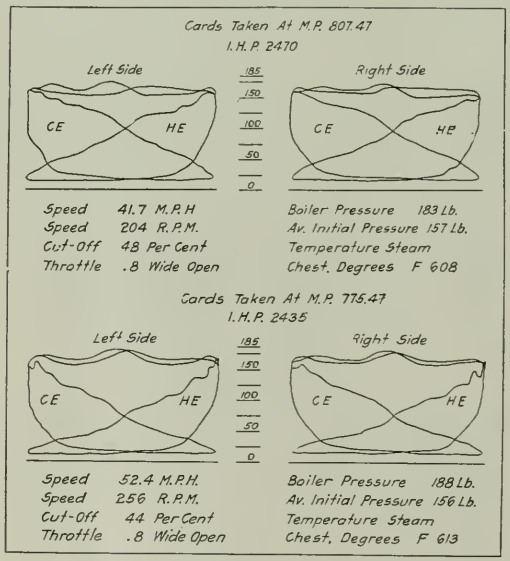
The power of the locomotive was not taken on the eastbound trips as the grade is mostly descending. This will account for the difference in the coal and water rates between the eastbound and westbound trips.

An inspection of these tabulated results shows that the loco-

motive operated more efficiently on the ton-mile basis with 16-car trains. In the tests with the 19-car trains, which were simply coal and water tests, this efficiency showed still greater increase, the average coal consumption per 1,000 gross ton-miles being approximately 138 lb. It will be noted that the coal consumption per indicated horsepower hour with the 16-car train was 3.17 lb. at the time maximum horsepower was developed. This is somewhat better than the theoretical rating applied to this locomotive, which is 3.25 lb. The water rate per indicated horsepower hour is also better than the theoretical rating, the tests showing it to be 18.29 in contrast to a theoretical rating of 21.6 lb. It was found that the maximum horsepower developed for short periods exceeded the theoretical rating, the former being 2,700 and the latter 2,613.

Another feature of the test which shows that the locomotive was not being worked to its full capacity with a 10-car train is the drop in pressure of approximately 10 lb. between the boiler and the saturated steam chamber in the superheater header This drop is explained by the fact that it was necessary to throttle the locomotive to keep from exceeding the speed limit with this load. The results also show how the superheat increased as the locomotive became more heavily loaded.

The fuel used in these tests was good quality Colorado coal



Examples of Indicator Cards Taken on the Tests

of mine run consistency. The approximate analysis, as taken from several different cars, was as follows:

Moisture	1.69 per cent
Volatile matter	36.69 per cent
Fixed carbon	47.58 per cent
Ash	13.45 per cent
Sulphur	.59 per cent
Total	100.00 per cent

The heat value obtained by the calorimeter was 12,604 B. t. u. for dry coal, and 12,593 B. t. u. for wet coal.

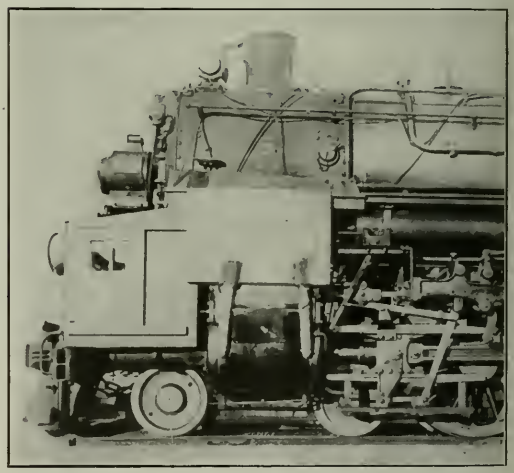
Exceptionally good performance with 19-car trains was shown on various occasions. On the ruling grade immediately out of Prairie View, going west, the locomotive, from a standing start at the foot of the one per cent grade, reached a speed of 23 miles per hour at a point 3.5 miles west. The locomotive was working at 50 per cent cut-off and carried full boiler pressure. With a 19-car train on the three-mile, 0.8 per cent ruling grade between Jennings and Dresden, the speed at the foot of the grade was 33 miles per hour and at the top 23 miles per hour, the locomotive working at 50 per cent cut-off and carrying full boiler pressure. These figures are not the result of one or two performances, but are quite representative of the performance of this locomotive.

With the 19-car train, no stop was made at the coal chute at Selden (a half-way station between Phillipsburg and Goodland), the locomotive arriving at Goodland with about three tons of coal on the tender. Under these unusual conditions, viz., maximum trains, running by coal chutes, etc., sacked coal was carried on the rear of the tank and an extra man was kept on the locomotive in case an emergency arose which would require using all the loose coal in the tank and some which was sacked.

The success attained by the engine crew in handling these large trains may be attributed partly to the efficiency of the crew, and partly to the design of the modern locomotive, including as it does such labor-saving devices as the superheater, brick arch, screw or power reverse gear, pneumatic fire door opener, and a tank with sloping coal sheets, so that 70 per cent of the coal is kept within reach of the fireman.

The following is a list of the general data for the locomotive used in the test:

Number	999
Type	4-8-2
Service	Passenger
Fuel	Bit. coal



Arrangement of the Indicator Reducing Motion and the Shield to Protect the Observers

Tractive effort	50,000 lb.
Weight, total	333,100 lb.
Weight on drivers	224,100 lb.
Weight on leading truck	57,500 llb.
Weight on trailing truck	51,500 lb.
Weight of engine and tender	490,500 lb.
Wheel base, driving	18 ft. 0 in.
Wheel base, total	38 ft. 11 in.
Wheel base, engine and tender	70 ft. 2¼ in.

Ratios

Weight on drivers ÷ tractive effort	4.48
Total weight ÷ tractive effort	6.66
Tractive effort × diam. drivers ÷ equivalent heating surface*	623.53
Equivalent heating surface* ÷ grate area	88.24
Firebox heating surface ÷ evaporative heating surface, per cent	7.58
Weight on drivers ÷ equivalent heating surface*	40.48
Total weight ÷ equivalent heating surface*	60.18
Volume both cylinders, cu. ft.	19.94
Equivalent heating surface* ÷ volume of cylinders	277.50
Grate area ÷ volume of cylinders	3.14

Cylinders

Kind	Simple
Diameter and stroke	28 in. by 28 in.

Valves

Kind	Piston
Gear	Baker

Wheels

Driving, diameter over tires	69 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	11 in. by 22 in.
Driving journals, others, diameter and length	11 in. by 13 in.
Engine truck wheels, diameter	34 in.
Engine truck journals	7 in. by 12 in.
Trailing truck wheels, diameter	42 in.
Trailing truck journals	9 in. by 14 in.
Tender wheels, diameter	33 in.
Tender journals	6 in. by 11 in.

Boiler

Style	Conical
Working pressure	185 lb. per sq. in.
Outside diameter of first ring	78 in.
Firebox, length and width	107 7/16 in. by 84 in.
Tubes, number and diameter	207—2¼ in.
Flues, number and diameter	36—5½ in.
Tubes and flues, length	22 ft. 0 in.
Heating surface, firebox	287 sq. ft.
Heating surface, tubes and flues	3,805 sq. ft.
Heating surface, arch tubes	25 sq. ft.
Heating surface, total	4,117 sq. ft.
Superheating surface	944 sq. ft.
Equivalent heating surface*	5,533 sq. ft.
Grate area	62.7 sq. ft.

Tender

Water capacity	8,500 gal.
Coal capacity	14 tons

*Equivalent heating surface = evaporative heating surface + 1.5 times the superheating surface.

REMOTE SWITCHES MOVED BY BATTERY CURRENT

On the Northern Pacific, at Bozeman Pass Tunnel, 12 miles west of Livingston, Mont., there are two switches at the entrances of two side tracks, which are worked by electric motors controlled by the telegraph operator at the mouth of the tunnel, nearly a mile away. The motors are the low-voltage switch machines of the General Railway Signal Company, and were put in last November. With these the stopping of freight trains on the steep ascending grades for the purpose of having the switch set for the side track by hand is no longer necessary. The movement of a switch takes 23 seconds. C. A. Christofferson, signal engineer of the road, gives the following particulars of this installation.

Each of the side tracks is 4,500 ft. long, one east of the tunnel and one west, and each is used, when necessary by freight trains ascending toward the tunnel, which is at the summit. As pushing engines are used on both sides of the tunnel the number of movements is comparatively large, and economy of time is an important desideratum. The line through the tunnel is single track and the staff system is used. At the entrance of each side track a two-arm signal was installed, and there is a short track circuit section at the switch to serve the purpose of a detector. The control circuits for the signals are selected by the switch so as never to give a wrong indication. There is also a special relay, normally de-energized, to provide against danger from crosses between wires. Repeaters in the telegraph office, one for each signal arm, keep the operator constantly posted as to the position of the signals.

Trains are announced by a bell which is rung when the engine passes a point two miles away; and on this announcement, having received suitable instructions from the train despatcher, the operator sets the switch for the siding.

The switch machine is provided with an emergency crank which can be used by trainmen in case of failure of the electric circuit. Suitable provision is made for guarding against the application of power by the crank and by the electric current at the same time.

The battery, which works the signal arms as well as the switch machine, consists of seven cells of 20-ampere-hour lead storage battery, charged by 24 cells of 400-ampere-hour caustic soda battery. The time required for a complete operation of the switch machine, the signal, and the repeater in the telegraph office, is 31 seconds. The maximum current required is 4½ amperes, which is required to lock the switch.

The whole system has worked thus far without failure, and, of course, it makes a decided saving in the movement of heavy freight trains on ascending grades when they are required to take the siding. The company intends to try a device for setting switches, in situations like this, without the intervention of the operator; that is to say, by means of a contact rail, fixed on the ties some distance back of the switch, with a sliding contact on the locomotive which, when adjusted by the engineman, will close an electric circuit which will operate the switch and the signal.

CHICAGO, ROCK ISLAND & PACIFIC STOCKHOLDERS' MEETING

At the annual meeting of the stockholders held in Chicago on April 12, Charles Hayden of Boston, William J. Matheson of New York, W. E. Roosevelt of New York and N. L. Amster of Boston were elected directors, succeeding E. S. Moore, J. J. Mitchell, D. G. Reid and Roberts Walker. The election came at the close of a stormy meeting which lasted from noon until nearly 10 o'clock at night, in which Amster and his lawyers attempted to oppose the actions of the majority, represented by the Sheldon proxy committee, at every move.

Counsel for the Amster committee had previously made a written agreement with counsel representing the majority stockholders, by which it was provided that if the meeting were held in accordance with certain mutually agreed on conditions, the by-laws would be abided by and that no opposition would be put in the way of the election of directors by the representatives of the minority stockholders. As soon as the meeting had been called to order, however, a motion was made to appoint tellers other that those appointed by the board of directors. Mr. Amster claimed that he did not know of the agreement previously made by his representative. The by-laws provide that the board of directors and not the stockholders shall appoint the tellers and that the board of directors shall amend the by-laws, but there is no provision by which the stockholders can amend the by-laws. Mr. Amster and other representatives of the minority stockholders proposed the amendment of the by-laws and the motion was ruled out of order by the chairman. A motion was then made to adjourn until May 24 and at that time elect 13 directors, but this motion was ruled as out of order because of carrying the rider in regard to the 13 directors.

Finally a straight motion to adjourn was made. This motion was put to a vote, each share of stock having one vote, and a recess was taken during the counting of the vote. It was during this recess that Mr. Van Hall made the statement which is commented on in the editorial columns of this issue. The count of the vote on the question of adjournment showed—437,197 votes against adjournment and 151,579 for adjournment.

Representatives of the minority stockholders thereupon entered a protest against this vote on the ground that there had been no time for the Amster committee to circularize stockholders for proxies; on the ground of the complaint filed in the courts on April 9 (the substance of this complaint is given below); that the Sheldon committee had offered to put 10-cent revenue stamps on voting certificates, which was an illegal inducement to secure proxies; and finally that the Sheldon proxy certificates had not been stamped.

The election of directors then took place and by the concentration of their votes on one director the minority interests elected Mr. Amster, and the three other directors previously mentioned were elected by the majority.

A resolution was then adopted providing for the appointment of a committee of five stockholders to draw up a new set of by-laws for the company. A vote was then taken on the motion of a stockholder, who said that he represented neither minority nor majority interests, ratifying the proceedings of the meeting. The minority representatives voted against ratifying the proceedings, the majority and the independent stockholders voting in the affirmative. The vote, therefore, was carried in about the proportion as that of the vote against adjournment.

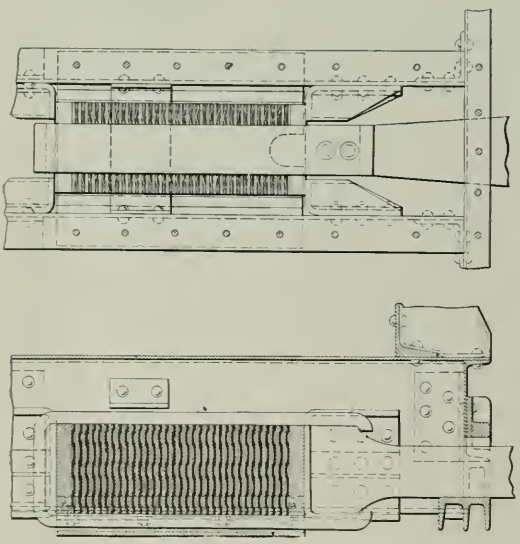
On April 9 counsel representing the minority interests filed a bill of complaint in the United States district court at Chicago

asking an injunction restraining the holding of the stockholders' meeting and the voting of the Sheldon committee proxies. The injunction was denied, although the bill of complaint is still before the court to be acted on. Summarized briefly the bill of complaint alleges (1) that the directors and officers unlawfully refused permission to stockholders to see the stockholders' list and at the same time gave the Sheldon committee, which represents the majority interests, the addresses of stockholders for the express purpose of permitting the Sheldon committee to circularize stockholders for proxies; (2) that the Sheldon committ secured proxies without revealing to the stockholders that they were used for the benefit of the present management; (3) that the division of the Chicago, Rock Island & Pacific board into three classes, with four directors each in two of the classes and five directors in the third class, is unlawful under Illinois statutes, which provide that directors should be divided into classes with three in each class; (4) that the present division of directors into classes deprives the minority stockholders of their rights under the Illinois constitution to the exercise of cumulative voting.

FRICTION SPRING DRAFT GEAR

The drawing below shows the plan and half-sectional elevation of the Slick friction spring draft rigging which was recently developed by the Carnegie Steel Company, Philadelphia, Pa.

The springs in this rigging are formed of comparatively thin, square or rectangular corrugated steel plates, the axes of the corrugations being parallel to each other. A number of these plates are used, the corrugations of each being placed at right angles to those of the two adjoining plates. The arched portions of the plates are thus in contact with each other, and each



Slick Friction Draft Gear

plate forms an abutment against which the adjoining plate operates. The device may be made either with single corrugated spring plates or where greater stiffness is desired the elements may be made up of two or more laminations each. The construction of the rigging is otherwise similar to that commonly used with other types of spring elements.

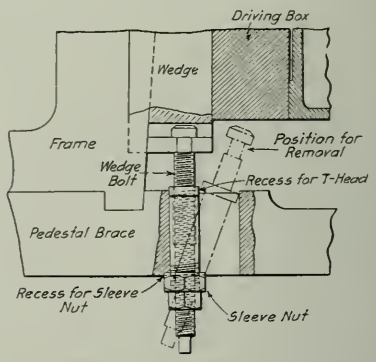
When under load the plates withstand stresses first by the spring action of the corrugated portions, which tend to flatten out under pressure, and in addition by the frictional resistance to the movement of the plates one upon another due to the flattening out of the corrugations. This action tends to dissipate a portion of the energy delivered to the draft rigging.

It is also claimed that the arch action of the corrugations tends to distribute the stress through the curved portion of each corrugation in such a way as to counteract to a certain extent the stress in the tension side of the plates. The depth of the corrugations is such that when each plate is flattened under load the stresses will be about equal to the proper working stress of the material.

LOCOMOTIVE WEDGE BOLT

A wedge bolt which may be applied and removed without taking down the pedestal binder is shown in the engraving. This device, which is manufactured by the Wine Railway Appliance Company, Toledo, Ohio, is made standard for all wedges on the locomotive, and in case of emergency may be renewed by the engineer while the engine is in service.

The pedetsal brace is provided with a slot, as shown in the drawing, through which is inserted a tee headed sleeve. The wedge bolt is screwed into this sleeve, which in its normal position becomes a rigid part of the brace, and the bolt is operated in the same manner as if the sleeve were not used. The top of



Wedge Bolt Removable with Binder in Place

the pedestal brace is provided with a recess for the reception of the tee head and the bottom of the brace is provided with a recess for the sleeve nut, which is threaded on the sleeve and holds it rigid within the pedestal brace.

It will be noted that the nut which locks the wedge bolt bears against the sleeve nut and acts as a lock nut for the sleeve as well.

To remove one of these bolts, all that is necessary is to back off the lock and sleeve nuts until the tee head on the sleeve can be lifted out of the recess in the top of the pedestal brace. The sleeve is then revolved through 90 deg. into the position shown by dotted lines, the head of the wedge bolt being slid out of the slot in the wedge at the same time. In order to do this the wedge must be drawn down into the position shown so that the slot in the wedge is clear beneath the driving box.

This device is in use on about 100 engines and is said to be giving excellent service.

Projected Railway from Fiume, Hungary, to Novi, Croatia.—A concession has been granted for the construction of a 25-mile railroad from Fiume to Novi, Croatia, passing through the towns of Susak, Buccari, Portore, Cirquenizzo and Selce. The Fiume branch of the Hungarian bank secured the concession, which was asked for before the war began. Work will probably not begin until normal times return again.

Maintenance of Way Section

No single practice is more conducive to economical maintenance of way work than starting operations early in the spring and taking full advantage of the seasons.

Start Your Work Early

With the present indications that continued retrenchment will be the order this year, it is all the more necessary that maximum results be secured from every dollar expended. Many roads have already entered actively upon their work and are now well advanced in their surfacing, tie renewals, etc. Those who are still holding back for the close of the fiscal year or other reasons should consider what this delay means in ultimate expenditure. Now is the time to start.

Approximately three per cent of all expenditures for maintenance of way and structures are for ties. With the exception of the roadway and track and the labor account, this is the largest single item in this group, being over three times that for rail. The importance of careful supervision in the renewal of ties to secure their full life, while at the same time maintaining the track in proper condition, is therefore evident. At this season of the year the track forces are very largely engaged in the renewal of ties. For this reason we devote a large amount of space in this issue to this and allied subjects.

The Season of Tie Renewals

At the closing session of the convention of the American Railway Engineering Association last month a resolution was adopted requesting the Board of Direction to consider a plan by which the conclusions of certain other associations working along the same lines should receive the endorsement of this association without discussion in detail before its conventions. While this resolution is so general in its character that it might apply to any technical association, it undoubtedly refers more particularly to those in the maintenance of way field and is the first step towards the co-ordination of the work of these societies. The other important associations in this field include the Railway Signal Association, the American Railway Bridge & Building Association, the Roadmasters' & Maintenance of Way Association, the Maintenance of Way Master Painters' Association, and the American Wood Preservers' Association, the latter association having among its members commercial as well as railway men. Each of these societies specializes in work covered in a general way by the American Railway Engineering Association. Up to the present time the only one of them whose work has been co-ordinated with that of the Engineering Association is the Railway Signal Association. As a result there has been more or less duplication of work and even direct conflict in recommendations. It is evident that such a condition results in a loss in efficiency and a possible confusion in standard practices. It is the experience of each one of these associations that many more subjects are presented to it for consideration each year than it is possible to study properly. There is, therefore, sufficient work for all to perform without this unnecessary duplification. It would not seem especially difficult to co-ordinate the work of these various associations to remove these conditions. The American Railway Engineering Association and the Railway Signal Association are now working in close co-operation and the reports presented to the two associations harmonize. A similar arrangement is gradually being perfected between the American Railway Engineering Association and the American Wood Preservers' Association. A somewhat different arrangement would be necessary with reference to the other associations because of the greater variety of the subjects within the scope of their investigations. It would seem practicable for an advisory committee composed of two or three officers of each association to consider the suggested lines of work for the different associations and to so harmonize them as to remove the present objections. This committee need not have any direct authority over the different associations, but could act in an advisory capacity only. In this way each of the associations would maintain its complete identity and independence while at the same time it would be informed regarding the contemplated work of other associations. There is a definite need for complete harmony in the recommendations of different associations on the same subject as well as for so planning the investigations that the greatest amount of information may be brought out. We believe the time is now ripe for the inauguration of some such plan as outlined.

Co-Ordination of Association Work

Fourteen papers were received in the contest on Bridge Construction Methods, which closed March 10. These papers were referred to W. H. Finley, chief engineer, Chicago & North Western, and C. F. Loweth, chief engineer, Chicago, Milwaukee & St. Paul, who awarded the first prize to I. L. Simmons, bridge engineer, Chicago, Rock Island & Pacific, Chicago, and the second prize to James H. Stack, secretary, The Thomson Bridge Company, San Francisco, Cal. Other papers were presented by: E. K. Barrett, supervisor of bridges and buildings and water service, Florida East Coast, St. Augustine, Fla.; C. M. McVay, engineer maintenance of way, Kanawha & Michigan, Charleston, W. Va.; E. M. Grime, supervisor, Northern Pacific, Dilworth, Minn.; J. B. Sheldon, supervisor bridges and buildings, New York, New Haven & Hartford, Providence, R. I.; J. J. Wishart, supervisor bridges and buildings, New York, New Haven & Hartford, Hartford, Conn.; L. C. Lawton, division engineer, Atchison, Topeka & Santa Fe, Newton, Kan.; J. E. Bebb, office engineer, Duluth, South Shore & Atlantic, Duluth, Minn.; S. C. Tanner, master carpenter, Baltimore & Ohio, Baltimore, Md.; C. V. Chamberlin, assistant supervisor of bridges, New York Central, Utica, N. Y.; W. L. Ratliff, supervisor bridges and buildings, Illinois Central, McComb, Miss., and E. W. Fair, supervisor bridges and buildings, Buffalo, Rochester & Pittsburgh, Du Bois, Pa. The prize-winning and others of these papers will be presented in the May maintenance of way section.

Contest on Bridge Construction Methods

SCREW SPIKES

IN spite of the fact that screw spikes are in service today on about 1,500 miles of main track, their use is still in its infancy. The first installation of any magnitude was one of a half mile on the Santa Fe near Topeka, Kan., in 1908. Since that time the mileage has risen to the figure given above and is increasing over 200 miles annually. The Santa Fe has over 150 miles of screw spike track and is now placing them in eight ties per rail on the western lines when laying new 90-lb. rail to secure a more rigid track construction. The Lackawanna is the largest user of screw spikes, having employed them exclusively in main tracks for both renewal and construction work for the past four years, until it now has over 12,000,000 in service. This line is one of relatively heavy grades and curvature with an average density of traffic of about 4,000,000 ton miles and 600,000 passenger miles per mile of line for the system, which figures are trebled if the main line only is con-

sidered, so that the service is unusually severe. For this reason the article by Mr. Ray describing the results secured from the use of screw spikes on the Lackawanna, which appears in another column, is of special interest.

Wherever introduced, the screw spike has encountered the opposition of the track men, who have pointed out numerous objections. The one most emphasized has been the difficulty of removing the spikes when necessary to replace rails following derailments or during relaying operations. The Lackawanna has a dense freight traffic on heavy grades, and therefore has its share of derailments. Therefore the conclusion of Mr. Ray that screw spikes have not been a disadvantage, but rather a decided advantage at such times, indicates that this fear has been exaggerated. It has been the experience of this road that by providing a stronger track the screw spikes have materially decreased its destruction as well as the delay to traffic while it was being repaired. Another threatened disadvantage that has not been encountered in the experience of the Lackawanna is difficulty in keeping the screw spikes tight. To offset these real or fancied disadvantages, screw spike track construction gives a stronger track, requires less maintenance after installation and greatly retards the destruction of the ties.

To secure the greatest advantages from the use of screw spikes in the conservation of ties corresponding standards must be adopted throughout the track construction. It is obvious that it is not economical to use screw spikes with untreated soft wood ties or without adequate tie plates. While not so obvious at first glance, it is also important that the ties be properly adzed and bored before treatment to retard destruction uniformly. It is interesting to note in this connection that the use of screw spikes has enabled the Lackawanna to secure sufficient resistance against track spreading by using a flat bottom tie plate and thus decreasing the abrasion of the tie.

Undoubtedly important modifications will be made in the use of screw spikes as their use is extended. At the same time the results obtained on the Lackawanna, the Santa Fe, the New Haven and other roads would indicate that they have proved their practicability. In general the relative economy depends upon the amount of money spent for maintenance. Where traffic is heavy and the expenditures for maintenance are correspondingly high, the savings resulting from the adoption of a more permanent form of track construction are of course greater than on lines of lighter traffic where a relatively long life is secured from the track materials. On the other hand, the Santa Fe is using screw spikes on its western lines where the rainfall is small and the resistance of timber to decay is relatively great, and where the ties customarily fail from mechanical wear. The subject is one of primary interest to all track men interested in ultimate economy in maintenance of way expenditures and in the strength of the track structure.

ORGANIZATION IN THE MAINTENANCE OF WAY DEPARTMENT

AT no time in our history has the subject of the organization of maintenance of way forces received more attention than at present. Much progress has been made in industrial establishments along certain lines following the reorganization of forces, as a result of which efficiency experts have urged their claims most vigorously on railway managements during the past few years. This has led to a greater interest in this subject on the part of railway men. As an example, one of the subjects assigned to the committee on Rules and Organization of the American Railway Engineering Association last year was a study of the science of organization, while other committees of this same association have been studying the economics of maintenance of way labor, leading largely to the same end, for three years.

The organization and methods of work of maintenance of way forces have changed to a surprisingly small degree during the past half century, expanding as the duties have increased but maintaining the same general character. This would tend to prove that the existing organization is the most efficient and places the burden of proof on the critics. However, up to the present time the railway managements have been forced to direct their energies primarily toward the development of facilities and methods of operation to handle the rapidly increasing business and many secondary practices have become standard without receiving a great deal of attention. With the more recent demands for economical operation has come the necessity for more efficient methods in all departments.

Numerous channels for investigation and experiment along this line have presented themselves. The bonus system which has been applied successfully in many commercial establishments and some railway shops has been attractive to some and has been tried on at least two roads to a limited degree. Other roads are reorganizing their forces on a permanent basis, giving their men employment throughout the year and rearranging their schedules of work with excellent results. Still other roads are investigating the possibilities of combining the various semi-independent groups of maintenance of way employees into one roadway organization and concentrating all ordinary maintenance of way work on a certain territory under this one force. Still other roads are devoting a great deal of attention to the installation of mechanical devices for many of the routine as well as the special problems usually performed by hand. While none of these plans has been developed sufficiently to enable one to say that it is entirely successful, they all have certain qualities which appear valuable when revised to adapt them fully to practical conditions.

It is the history of all important improvements that a certain amount of pioneering work must be done in opposition to general opinion. Many railway men believe that these various methods offered to increase the efficiency of maintenance of way forces are theoretical and that while present practices are not entirely satisfactory they are accomplishing as much as can reasonably be expected. The same opposition was shown a few years ago to the idea of the economy of heavy tonnage trains, to the creation of a favorable public sentiment towards the railways, and to the use of large locomotives, all of which goes to prove that the science of railroading is continually developing and that those who stand still are soon left behind. There is no reason to believe that the maintenance of way department differs from other railway departments, and while it is too early to determine just what results will be secured from these various experiments, they are entitled to sympathetic support in the hope that they may lead to ultimate success and economy.

NEW BOOKS

Masonry. By Malverd A. Howe, professor of civil engineering, Rose Polytechnic Institute. Size 6 in. by 9 in., 260 pages, illustrated, bound in cloth. Published by John Wiley & Sons, Inc., New York City. Price $2.

This book is entitled "A Short Text-Book on Masonry Construction, Including Descriptions of the Materials Used, Their Preparation and Arrangement in Structures." It is divided into three parts—Materials, Masonry and Specifications. The first part takes up natural building stones, their classification, tests, properties and methods of quarrying; also artificial building materials, including brick, terra cotta and plaster blocks, cement, sand, gravel and mortar. Part II takes up stone masonry, including ashlar, square-stone, stopewall, riprap and stone paving, brick and hollow tile masonry and concrete masonry, including the proportioning, mixing and depositing of concrete, surface finishing, waterproofing, etc. Part III contains the definitions and specifications for stone masonry, plain concrete, building brick, lime, sand and cement, adopted by the American Railway Engineering Association and a list of references to periodicals and books in which a more extensive discussion of the subject can be obtained.

Letters to the Editor

A GENERAL STORES DEPARTMENT

San Antonio, Tex.

To the Editor of the Railway Age Gazette:

In reading the article "Handling of Maintenance Material by the Maintenance Department," in the issue of February 19, it strikes me that Mr. Bowser has overlooked the very important feature that in the application of any principle the benefit to be derived by the property as a whole from the results thereof must be the governing factor, and has viewed his subject from the standpoint of mere convenience to those immediately supervising track, few of whom are yet of the belief that it is economy to have a superabundance of everything to avoid the absence of anything. It is my thought that 90 per cent of the maintenance of way officers of today would not favor the separate maintenance department store as outlined, and I doubt if 10 per cent of the general maintenance officers, who are responsible for final results, would approve such a plan.

Certainly there was need for the "general stores" system where it originated or the plan would not have been inaugurated, and it must have proven a decided betterment over previous practices on many roads, or it would not have been continued and broadened, nor would it have received so much favorable comment and apparently succeeded so well in many cases, as Mr. Bowser states. If this idea is correct, then why not allow the transportation, mechanical, signal and electrical branches of the service each to carry its own stores? Would he suggest five separate store organizations, each with its storekeeper for one or two divisions trying to order, receive, handle, distribute and account for its necessities separately and endeavoring to gather up and dispose of its scrap, usable second hand, and repairable material, similarly, as he has arranged for the maintenance department?

The "general store" system is not theoretical. Net results and consequent general adoption have proven it decidedly practical. Let one present the "each department order, handle, dispose of and account for its own material" plan to any management that has watched the results of a tried "general store" plan, and he can readily learn which is the theoretical and which the practical as viewed from the managerial platform. Did our experiences under the plan of "each user look out for himself and men," show that there was any effort to prevent getting heavy surpluses, any action toward getting rid of them when they did accumulate, or even that the material actually needed was not missing just as often, or possibly oftener, than under even an *ordinarily* supervised general store plan?

Can we find a general storekeeper, or say division storekeeper (the latter is the man closest to the division maintenance organization), "who probably possesses little or no intimate knowledge of the needs of the maintenance department?" If so, is he a real storekeeper? Generally he possesses an equal, and in some cases even a more correct knowledge than the user, of the quantity the latter will require in any given period. Why, "with the comparatively small territory supplied from his storeroom," should the division storekeeper serving all departments as a whole through the general stores system, not be able to keep in close touch with the needs for all work on his district?

After considerable study of this subject it is my thought that an up-to-date general stores system, with "live-wire" storekeepers, such as Mr. Bowser would have on the maintenance job, on proper divisions or districts, and departmental hedges all grubbed up and burned, or with these "store department Indians" camping on the "operating reservation," as Major Hine would have it, is one of the best railroad assets of the day from the stockholders' point of view.

H. C. Stevens,
Transportation Dept., San Antonio & Aransas Pass.

HOW THE N. R. A. EXHIBIT APPEARED TO A BRANCH LINE SECTION FOREMAN

Canadian Division, Section No. 10

To the Editor of the Railway Age Gazette:

Since seein' you at the show, thought p'raps you'd like to know, that I'd got back to No. 10, glad to be on job again. With my trip am very pleas'd. Good of the boss to send me. He paid expenses to and fro. Sure I'll be teachin' what I know and so perhaps efishency will bring a good return by me. Already I have had some talk with Vinelli, who is next my walk. He's a dago, inquisitive gape, but keeps his track in fair good shape, altho' old fashion, out-o-date. He's never made a trip, you see, after more efishency. Says he to me, "You comma back. I s'pose you see lotta 'bout track." "Oh, yes," I burst. Then he, quite sly, say "P'raps you learna tampa da tie." At which I, bulging with the know, say "It's a ceench, an easy go, the way they done it at the show." "How did they do it?" asks Vinell. "By wind." I then explain, and tell the hose and all. Vinell insist, that may be good but no use here, cause car is not equip for air. By gee, I'll surely have to see the man they call the M. C. B. And then he take a laugh at me. Next 'bout tie plates he want to know, which kind they like, at which I so, "While many plates good in their way, for modern track cut little hay." "Why no? What then?" he doth exclaim. "Steel and concrete ties the game." "On long muskeg," Vinell replies, "much too heavy. Cedar ties, a top of sawdust, much the best, lightly on the top to rest." "Are so," say I and know him right. (Permanent track fades out o' sight.) "What else you see at greata show?" "A weeder," I inform. "No hoe is now required. A sprinkler is the modern way." "How much she cost?" return Vinell. And I admit I cannot tell. But track do look so fine. I'll ask the boss for some for mine. "Had you enough of oil, or short were you last month?" is his retort. I have to 'low that for my car I had to borrow from afar. "To get your weeder is no show," says Vinelli, and he know. "Some crossings stunts I s'pose were shown." A flange guard seen, I then make known, and various bells and warnin' signs, and swingin' stops which engines winds, by weight they said. At which Vinelli smile and said, "Now what in h——l is any use for such round here? Have you a crossing on your beat?" "Have you one either?" I repeat. I tell him it's good to know these things ahead a little so when at last they really come we won't appear like country bum. I see some track jacks work so ease. Their wound up when you buy and these just keep on jacking up and down, and when you want the track to lift, under the rail you make a rift, put in the jack and up she goes. Electric current is the force. "Just tap the power line, of course," adds that Vinell.

"Fence posts we see, in tin and stone, no forest fire will ever burn." "What's that to you?" he say. "Goldurn, we ain't got fence on our secs." I know that well but still me vex. "You should a seen ottomatick signals block, and flashing lights for interlock, and frogs and crossings Maganeese." Here friend Vinelli interject, "Have you got switch light on your sec?"

From all of this you'll see I think, Vinell's a knocker, and by jink, quite like the speaker who consined nothing good to the human mind. Whereas with Foster I agree one must the future try to see and smile and smile for seven miles, Mulholland said. I spose he meant full length of section—his intent.

Now good night. Wife and I start on the task to keep time the way committee ask. This letter will I'm sure reveal the good of a trip like mine. I feel so much improved and ready now to keep my sec. in year two thou., by then at least I feel that we will want those things I saw, by gee. And, Meester, thank you for your say, I again attend A. R. E. A. Exhib. of track is just a play to shimming, shimming, all the day. Here's hoping you will get these lines.

Yours very truly,

M. J. Hines.

P. S.—Spoke to boss again today bout motor car for my sec. Will not tell you what he say. M. J. H.

Renewing Heavy Swing Span by Floating Into Place

Old North Western Bridge in Milwaukee Removed and New Span Weighing 800 Tons Placed in One Day

The placing in service of the new Chicago & North Western swing bridge over the Milwaukee river, in Milwaukee, Wis., on March 14, involved the simultaneous handling of two heavy spans on scows. The large amount of floating equipment necessary for such an undertaking and the care with which all details had to be worked out to safeguard the structures during the movement are noteworthy features.

This bridge is located about ¾ mile south of the Milwaukee passenger station on the main line to Chicago and about ¼ mile from the mouth of the river. It is a double-track structure, carrying all main line passenger trains and numerous freight and switching movements to and from the Milwaukee freight houses, the engine terminal just north of the river and the adjacent industries. Through freight trains use the belt line around the city.

The old bridge built in 1890 and operated by a gasolene engine was too light to carry the increasing wheel loads of modern equipment and the substructure also was in need of repair. Since another swing bridge could be built without the necessity for securing a new permit from the government, and the city and government officials were inclined to favor that type, it was decided to replace the old span by a new one of the same length, 240 ft., providing two clear channels of 90 ft. each.

It was essential on account of yard connections and the proximity of structures on the water front that the old alinement be retained on the new bridge, but in order to rebuild the center pier and the abutment it was necessary to remove the old bridge. It was, therefore, floated downstream about 60 ft. to a temporary location and traffic carried over it during the repair of the permanent substructure and the erection of the new bridge. The narrow right of way and the presence of elevators and docks close to the line limited the amount of this move so closely that the new bridge could not be erected in the open position on its permanent center pier. Falsework was therefore driven in line with the center protection pier upstream from the site to support the new bridge during erection.

The operation of placing this structure in position on the new substructure, without undue delay to traffic, required the movement of both bridges in one day. First the new span was blocked up on scows and floated out into the north channel, taken upstream to clear the falsework, then turned and brought down over the falsework to the permanent location. This movement could not be completed with the old span still in its temporary location on account of the difficulty that would then have been connected with the removal of the old bridge. So the new span was anchored about 100 ft. from the permanent location, while the old span was blocked up on scows and moved downstream a sufficient distance to clear the operations at the permanent location, after which the new bridge was brought down and centered on the permanent pier.

New Bridge in Final Location Before Scows Were Removed; Old Bridge Shown at Left Has Been Moved Downstream from Its Temporary Location

The moving of the old bridge to its temporary location on October 25, 1914, and of the new bridge to its permanent position, as mentioned above, were both carried out on Sunday, when river traffic could be stopped and the tracks cut between 10:15 a. m. and 4:00 p. m., during which time passenger trains were detoured around the belt line. In connection with the new work, a 56-lever General Railway Signal Company's all-electric interlocking plant was installed in a new tower, just north of the bridge, to govern movements across the river.

The first step in the renewal of the old bridge was the driving of piles for the temporary center piers, abutments and approaches on the downstream side of the bridge in its original location. At the same time, timber wedging and bracing was provided along the I-bar diagonal members in the two spans each side

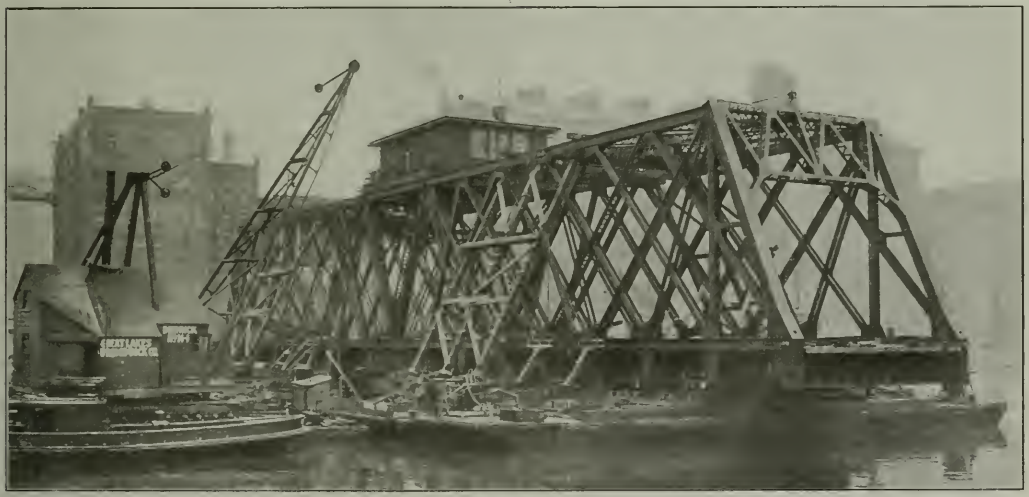
of the center in each truss, to allow them to take the compressive stresses, which would result in carrying the bridge on scows located in the two channels. The movement of this bridge was successfully made on a steel scow 100 ft. by 35 ft. by 8 ft., and a wooden scow 112 ft. by 33 ft. by 9 ft. The bridge weighed about 500 tons, making it necessary to place the blocking against the stringers in order to secure the 2 ft. greater height for distribution of the load on the scows and to reinforce the bottom chords of the trusses in the wooden scow.

The old substructure consisted of stone masonry on timber piles. In the reconstruction, new concrete bridge seats and backwalls were placed on the abutments and a new octagonal concrete top on the center pier, after removing the old masonry down to a level as near the water as possible. The new pier top has a diameter of 34 ft. and is reinforced by ¾-in. radial bars 6 ft. long and five ¾-in. bars 14 ft. long, placed parallel to four of the faces.

The new bridge is 237 ft. 6 in. long, center to center of bearings, 31 ft. wide between centers of trusses, and 32 ft. high between centers of chords. The trusses are of the quadruple intersection type, with a panel length of 14 ft. 9 in. The structure was designed for a live loading of Cooper's E-55, with the following impact allowances: With the bridge closed, $I = \frac{3}{4} L + \frac{L}{L+D}$ for the trusses and floor beams, and $I = L + \frac{L}{L+D}$ for the stringers; for the bridge swinging $I = 0.25$ D. The bridge is of the combination center and rim bearing type, the load being equally divided between the 2 ft. 6 in. phosphor bronze and steel center castings and the 64 rim bearing wheels. The estimated weight of the bridge, with the operating machinery, was about 800 tons.

The bridge will be operated normally by electricity. Two independent sets of machinery for turning have been installed, each driven by a 75-hp. motor, which can operate the bridge in the necessary time. In addition to this, an emergency plant is provided at the operating house, consisting of a 32-hp. Fairbanks-Morse gasolene engine, operating at 200 r. p. m., which can be connected to the operating shaft in case of failure of the electric power. This power is purchased from the local public service company and is brought to the operating house through a submarine cable and a drag cable on the center pier. A 15-hp. motor at each end of the bridge operates the end latch, end lift and rail lift at that end, both of these motors being operated through one controller in the machinery house on top of the bridge. Three sets of lights above the controllers indicate to the operator when the movements of the rail lift, the end latch and the end lift, respectively, have been completed. The machinery is interlocked from the signal tower and the separate circuits in the operating house are also interlocked.

The erection car was placed on the new falsework from the end of the old span in the open position by blocking up that span and extending the rails on blocking, and all steel was delivered to the site on scows without interruption to river traffic. Two girder spans were provided in the falsework to allow the placing of the barges on which the bridge was to be moved into position. The operating rack, tread rim bearing wheels and spider and the lower two center bearing castings were located on the new pier. To assist in centering the bridge on the bearings a 10-in. steel band made in three pieces bolted together was placed around the center on the pier. Two short sections of the operating rack at diametrically opposed points on the circle were omitted before the new bridge was put in place in order to allow the pinions on the bridge to be lowered into position without damage to either the rack or the pinion. The bridge was later turned by tugs to mesh the rack and pinion, after which the short sections were put in place to complete the circle. In order to provide for any difference in the deflection at the ends of the bridge from that computed in advance, the end bearings were set one inch below the calculated elevation and two ½-in. and several thinner shims were provided to adjust this height properly.

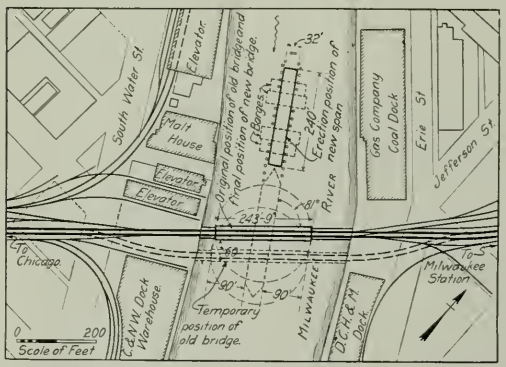


Floating the Milwaukee River Bridge on Four Scows Showing Diagonal Bracing for Distributing Loads on Two Main Scows

All preparations for the placing of the new bridge had been completed before February 21, and an unsuccessful attempt was made to carry out the work that day. The weather conditions and the surge in the river caused by winds from the lake prevented the movement of the span on the two succeeding Sundays, but on the next Sunday, March 14, the conditions were favorable and the movements were made with complete success. To make sure that enough time would be available on Sunday for the movements of both bridges, the water-filled scows were placed under the new bridge and the blocking wedged up by the Saturday night preceding the day of the movement. These scows were watched during the night by crews and tugs to protect the outfit from damage by passing boats and also to be ready to remove the wedges immediately

if any considerable change of river level occurred due to a shifting of the wind.

Four scows were used under this span instead of two, as originally planned, enough of the falsework being removed to provide clearance for the additional scows outside of the other two. The new bridge with all of the blocking on the scows made a total load of nearly 1,000 tons. The plan provided for carrying this load on a steel scow 35 ft. by 100 ft. by 8 ft., and a wooden scow 33 ft. by 110 ft. by 9 ft. These two scows had ample capacity to support this load but in order to distribute it more evenly over their length, and also to support the bridge more rigidly against tipping, diagonal bracing from the top and bottom chords to the scow decks was placed as shown in one of the illustrations. This bracing was designed to carry 60 per cent of the load of the bridge, the remaining 40 per cent being transmitted to the blocking from the floor beams directly over the scows. Two feet of combing was provided on the steel scow and one foot on the wooden scow as a precaution against filling with water on account of listing or washing. The two additional scows were used to give greater stability to the span during the movement and also to assist in supporting the load during the lowering of the bridge on its new center pier. When nearly submerged a steel scow



Location Plan of Milwaukee River Swing Bridge on the Chicago & North Western Showing Permanent and Temporary Locations and the Erection Position of the New Span

is not thoroughly reliable and for this reason it was considered advisable to have the additional scows in position to help support the load at this critical point. These two scows were 90 ft. by 24 ft. and 98 ft. by 24 ft., respectively. They were blocked up under the floor beams but carried no diagonal bracing.

As Saturday night passed without a change in weather conditions the pumping out of the scows to raise the bridge was started by 6:30 a. m., river traffic having been stopped at 6 a. m. Eight pumps were used in unwatering the scows, with leads of steam hose from tugs, etc. The new bridge had been erected 1.5 ft. above its permanent elevation and was lifted about 17 in. off the falsework by the scows. This lift was completed by 7:30, and during the following hour the bridge was shifted sideways into the north channel, taken upstream far enough to turn it across the channel and brought down over the falsework, the caps and blocking of which had been removed in the meantime to allow ample clearance for the operating pinions. These movements of the structure on the scows were accomplished by hand operated lines, the tugs and other floating equipment standing by in case of need. On the downstream movement the current was more than sufficient to move the scows, making it necessary to hold back continually on the lines. The floating outfit was tied up within 100 ft. of the permanent location of the bridge and men left to watch the scows while the movement of the old bridge was effected.

By 10.00 a. m. the old bridge had been wedged against the blocking on four water-filled scows, two in each draw. These scows were from 75 to 80 ft. long and 24 to 28 ft. wide, lashed together in pairs with continuous blocking over the two. The last train passed over the old bridge at 10:15, and immediately afterward the eight pumps were started pumping out the water. By 11:15 the old bridge, with the rack, tread, etc., had been lifted about 16 in. off its pier and removed downstream out of the way, where it was tied up during the remaining operations on the new span.

The final movement of the new span was begun about 11:25, the scows being kept parallel to the protection pier until the northeast corner of the span was about one foot from the west end of the north pier. It was then held stationary while the south end was swung downstream to bring the bridge parallel to its final position. Keeping this relative position, it was then floated over the center pier and held as nearly as possible in the true alinement. The centering ring on the center casting was adjusted so that its diameter was about 3 in. greater than the diameter of the casting on the bridge, and as soon as this casting had entered the ring three men were stationed at the joints to tighten up the bolts, thus accurately centering the bridge. This adjustment was made with the span about 6 in. above its final position. When the adjustment was correct the span was lowered to a bearing and the wedges on the scows were at once knocked out, releasing the scows soon after. Before 4 o'clock the track connections at the ends of the bridge had been completed, the end bearings adjusted and the power cable connected so that the first train was passed over the new bridge without delay. After this train had passed the bridge, the span was swung to mesh the pinions and the operating rack, the power was tested and the bridge operated at 5:20, allowing river traffic to be resumed according to schedule at 6:00 p. m.

During the centering of the new span the old bridge was floated downstream and was held on the scows for several days until a favorable opportunity offered for landing it endwise onto a dock. This landing was accomplished by sliding it on the floor beams on lines of rails placed on blocking at the proper height. The scows were removed one at a time and additional supports provided as necessary to carry the proportion of the weight of the bridge still over the water.

The design of the new bridge and the method of renewal were worked out under the direction of W. H. Finley, chief engineer, and W. C. Armstrong, formerly bridge engineer. H. M. Spahr was the resident engineer in charge of railway company's work in field. The substructure was built under contract by the Cleary-White Construction Company, Chicago, the superstructure was fabricated by the American Bridge Company and erected by the Bernhisel Construction Company, Chicago. The power equipment was installed by George P. Nichols & Brother, Chicago, and the Great Lakes Dredge & Dock Company handled the movements of the spans.

War Traffic on the Metropolitan Railway of England.—Since August the Metropolitan Railway, which connects with the Midland and Great Northern systems in the north of London and with the South-Eastern & Chatham, and London, Brighton & South Coast systems in the south, has been the means by reason of its lines under the "Circle," near Farringdon street, of conveying over these lines no fewer than 2,738 troop trains. During the despatch of the expeditionary force as many as 58 troop trains a day passed over the Metropolitan lines without any sensible interference with the ordinary passenger traffic. In addition to this burden during the first fortnight of February, 2,935 freight trains, equal to 210 a day, have passed over the Metropolitan lines, in addition to special trains with troops and government stores and the ordinary local passenger service throughout the day. This has been carried out without interference with normal traffic, except on one or two days of exceptional pressure, and without mishap of any kind.

Results of Five Years Extensive Use of Screw Spikes*

Lackawanna Has Over 12,250,000 Screw Spikes in Track, Giving Satisfactory Service Under Heavy Traffic

By G. J. Ray
Chief Engineer, Delaware, Lackawanna & Western

The general use of screw spikes in new construction and in maintenance on the Lackawanna was started early in 1910, and during the past five seasons 5,120,000 flat-bottom tie plates and approximately 12,272,000 screw spikes have been placed in new and old tracks. As would be expected, some mistakes were made at first, and no doubt later developments will change present practice somewhat. As a whole, however, the screw spike installation has proven very satisfactory, and no conditions have developed to cause any doubt of the ultimate success of the undertaking. Many minor difficulties which we had anticipated have not developed. It was fully expected that no small amount of trouble would be experienced from derailments, changing out broken rails, difficulty in gaging track on sharp curves, etc. It is a pleasure to state that, to the writer's knowledge, we have never had a derailment where the screw spikes have not been very much less damaged than the cut spikes in the same locality, and very seldom has a derailment broken off any screw spikes or damaged them to such an extent that they did not continue to hold the rail firmly in place. We have had many cases of derailments where it was not necessary to remove a screw spike, whereas nearly every cut spike on the damaged side of the rail was destroyed. Again, we have had some derailments where it is reasonably certain that bad accidents were prevented by screw spikes in some of the ties holding the rails in position, whereas the cut spikes in the other ties were destroyed. With the first tie plates used, without supports for the spike heads on the inside of the rail, we did have some spikes badly bent by derailed wheels, thus causing no little delay in their removal.

We have as yet had but few cases with screw spike construction where the tracks have been found to be wide gage, due to spreading the rails, and these have been on sharp curves, where shortleaf yellow pine ties were used in renewals and where only a few screw spike fastenings were placed per rail length. It should, of course, be understood that there are some exceptional places on the railway where any metal parts, irrespective of whether they are cut spikes, screw spikes, bolts, etc., even when thoroughly protected and reinforced by channel plates or other devices, will be cut off or will fail to hold track, but such exceptional cases should not be taken as evidence of the success or failure of any holding device. On the other hand, we have many cases where the rails could no longer be held to safe gage with cut spike fastenings, when the installation of screw spikes and flat-bottom tie plates have not only made safe track, but materially lengthened the life of the ties, bridge and switch timbers. A good many cases of this kind occurred in the Hoboken Terminal. Steam-seasoned creosoted switch and track ties were laid out of face in 1906; the rail fastenings consisted of cut spikes and Wolhaupter flange plates. After six years' service it was necessary in numerous instances to replace the plates and cut spikes with flat-bottom tie plates and screw spikes to get any further service out of the timber. At the present time, due to shattering of the timber, the screw spikes are failing to hold the rail, as might have been expected. As to relaying rail, or removing broken rails, it is to be expected that more time will be consumed in doing the work. In other respects the conditions are no different from those experienced with cut spikes.

It is not the intention to convey the impression that positive conclusions can be reached from the experience thus far gained. It does seem advisable, however, to relate more or less in detail the facts which have thus far developed, and from these facts draw such conclusions as the evidence will warrant.

The through passenger trains are handled by Pacific type locomotives, weighing 227 tons. Fast freights are handled by Pacific type locomotives, weighing 228 tons. The standard heavy freight engine is of the Mikado type, weighing 238 tons. The axle load per driver on passenger and fast-freight engines is from 62,000 to 63,000 lb., and 59,500 lb. on the Mikado engines.

REASONS FOR ADOPTING SCREW SPIKES

The Lackawanna first commenced to creosote crossties on an extensive scale in 1910. During 1910 and since that time all main and sidetrack renewals have been made with creosoted ties, with the exception of the chestnut ties which were available. These chestnut ties were used in side-tracks and on branch lines, where the service is light.

From 1905 to 1909 many bridge-tie renewals were made with longleaf yellow pine, treated with 12 lb. of creosote oil per cu. ft. These ties were steamed at a 25-lb. pressure for an average of eight hours before treatment. Wolhaupter flange tie plates (6 in. by 8½ in. by ⅜ in.) were placed on the bridge ties, with the idea of protecting them. The dimensions of the ties varied with the bridge structure and were from 8 in. by 8 in. to 10 in. by 10 in. and 8 in. by 16 in.

On the main-line bridges none of the treated bridge ties has lasted to exceed 8 years. Many of them were renewed in 6 and 7 years. In no case was the timber decayed, but the failure was due to the shattering of the wood fibers under the rail seat and tie plates. As stated above, these were all longleaf yellow pine ties, with a very small percentage of sap. We have attributed this failure to the fiber being injured by the steaming process before treatment, and to the destructive action of the flanges on the tie plates. Five hundred and thirty-five of these ties (8 in. by 12 in.) were placed on the deck-plate girder bridge No. 241.56, eastbound track, Buffalo division, in 1906, and had to be renewed in 1914. Untreated ties of the same size, and purchased under the same specifications, were placed in the westbound track of the same bridge in 1905 and are still in service and in fairly good condition. The old flange tie plates were removed from the deck of both tracks in 1910 and replaced with flat-bottom plates and screw spikes.

For several years past we have placed very few chestnut ties in main-line tracks. It was found that they did not last to exceed 5 or 6 years, on account of the rail and tie plates cutting through them very rapidly. These ties give excellent service and last many years in yard tracks or on branch lines where the traffic is light.

As far as possible, hardwood ties are used on curved track. Longleaf yellow pine ties are generally used throughout on straight track. They are used not because they are preferable to hardwoods, but on account of the difficulty of getting a sufficient supply of hardwoods. A considerable number of loblolly and wide-ringed shortleaf pine ties were treated and placed in various services. However, unless otherwise stated, sap longleaf pine ties are referred to where pine ties are mentioned here. A good many gum, beech and maple ties were treated and placed in 1910, many in sharp curves.

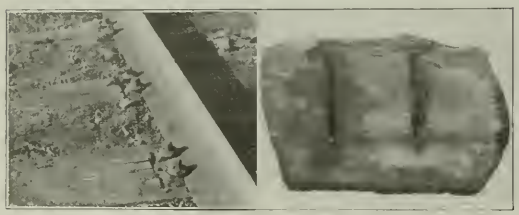
It was found, after some years' experience, that much dam-

*Abstracted from Bulletin 175 of the American Railway Engineering Association for March, 1915.

age was done to the ties by the use of flange tie plates. It was, therefore, concluded that their use should not be further considered, either in connection with treated or untreated timber. A good flange plate, or something equivalent thereto in actual holding power, is absolutely necessary to hold gage on many of the sharp curves. After a careful investigation of all available data on screw spikes, it was concluded to adopt them as a means of holding track to gage, and thus permit the use of a flat-bottom tie plate which would not destroy the fibers of the tie. Hence, since the spring of 1910, screw spikes and flat-bottom plates have been used generally in all ties placed in main tracks and in heavy-running yard tracks and leads, but not in light-yard tracks. In such tracks cut spikes and tie plates are used. In no case have screw spikes been used without tie plates.

It is necessary to have a tie plate of sufficient size to provide a safe bearing area for the weakest kind of wood used. As the main-track ties are 7 in. by 9 in. by 8 ft. 6 in., it was not considered advisable to make the tie plates wider than 7 in. Often the very best pole ties have a face at the rail seat of 7 in. or less, and, therefore, any excess in width of tie plate over 7 in. would be a waste of material. It is, therefore, quite evident that the tie plate must be of good length in order to provide a safe bearing area for all classes of wood.

The first tie plates which were rolled for our screw-spike construction were 7 in. by 10¼ in. by ½ in., with raised lugs to support the heads of two screw spikes and with an intermediate shoulder on the outside of the rail. The plates were smooth on the bottom, and did not have a shoulder or raised lug for the screw-spike head on the inside of the rail. The following season the plates were lengthened to 10⅝ in. and made ⅝ in. thick, with lugs for the inside screw spikes. Two holes were also punched for lag screws, one at each end. We had some doubt at first whether it would be possible to keep the flat-bottom plates from rattling and causing unnecessary noise in service. Furthermore, it would seem reasonable that the least possible wear between the tie plate and the tie would be the ideal condition. This can best be obtained by securely fastening the tie plate to the tie. If the raised lug for supporting the head of the screw spike is sufficiently high and of the proper shape to hold the head of the spike firmly, the tie plate will be held firmly to the tie, and most of the



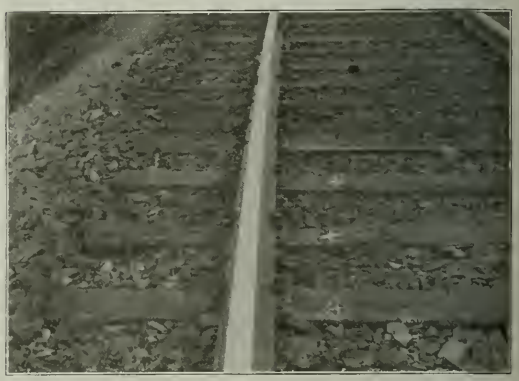
Two Pine Ties Marked = Placed in 1912, Gum Tie Marked + Placed in 1910 on 4 deg. Curve, With 5 in. Elevation on 1.4 Per Cent Descending Grade. Traffic Per Annum, 12,000,000 Tons. Track Held to Perfect Gage. Photograph at Right Shows Cross Section of One of These Pine Ties and Perfect Condition of Wood Under the Tie Plate

wear will take place between the rail and the tie plate, rather than between the tie plate and the tie. We had considerable difficulty at first in getting the lugs rolled sufficiently high to allow for play between the head of the spike and the rail base, and for this reason it was considered that the additional lag screws might be necessary in order to more securely hold the tie plate. These lag screws have not been used, excepting in certain cases for experimental purposes. It has been found that, with very few exceptions, tie plates do not rattle and plates with a good support for the screw-spike head can now be rolled.

It is quite evident that so long a plate must have considerable thickness to avoid the possibility of buckling. The first plates rolled were ½ in. thick; they were at once increased to ⅝ in. and about a year ago we again increased them to ¾ in. in thickness.

The holes for the screw spikes on the shoulder side of the tie plate are punched slightly back of the line of the shoulder, in order to prevent the neck of the screw spike from being cut by the rail base. This method was also found to be of great advantage in case of derailment, where the ties are slued. Otherwise, the base of the rail will cut into the screw spike, making it very difficult to remove from the tie.

At first some difficulty was experienced in getting the holes



The High Rail on a 7 deg. Curve With 8 in. Elevation Carrying 20,000,000 Tons Per Annum. No Indication of Lateral Movement of Tie Plates or Spikes or of Plates Cutting Into the Ties Which Were Placed in 1910

punched at the proper point on account of the great depth of metal through the lug of a thick tie plate. The hole must be punched from the top down, so as to keep the smallest diameter of the hole at the top of the lug, or directly under the screw spike head, and to prevent damage to the lug.

During the first two years that screw spikes were used, joint plates were made of malleable iron, angle bars were slotted for cut spikes, and one screw spike was used on the outside of the outer angle bar. Since that time all plates have been rolled, and screw spikes are used in anglebar slots, with one extra spike on outside of the anglebar.

SCREW SPIKES

The first change from the standard cut spike fastening was made in February, 1909, when a new double-track tunnel through Bergen Hill, Jersey City, was put in operation. This tunnel has a concrete roadbed, with short, creosoted, yellow pine ties. Flat tie plates (6 in. by 9 in. by ½ in.) were used, and the rail was fastened with a lag screw and clip. The plates, clips and screws were made at the company's frog and switch shop. New rail has now been laid on the tracks in question. The old fastenings have been replaced with heavy plates and screw spikes.

A heavy traffic is handled through this tunnel, including a large amount of refrigerator business. Although considerable difficulty from corrosion had been experienced in the old tunnel, the lag screws in question were firm in the wood, and no difficulty was encountered in removing them with socket wrenches. These lag screws held the rails to gage—there was no sign whatever of lateral movement.

We have been very careful not to vary the thread of the spikes used, on account of the possibility of destroying the threads formed in the wood, in case a new screw spike was inserted in an old hole. The size of the heads of the screw spikes have been somewhat increased from those first used, on account of the great deterioration from rust caused by

brine dripping at certain points on the line. This difficulty has not been experienced generally. The worst places were those in the immediate vicinity of icing stations. This is a difficulty which could and should be entirely eliminated by using containers under refrigerator cars, thus avoiding this unnecessary damage not only to track fastenings, but to bridge structures, interlocking, etc.

The first year that screw spikes were used, an "Ajax" hand

Chestnut Ties Placed in Tangent Track Carrying 12,000,000 Tons Per Annum in 1912. Ties Adzed and Bored Before Insertion, and Are Still in Excellent Condition

machine was used for boring all ties in the field. A template was used to spot the holes. Creosote oil was poured into all the holes as soon as bored. In 1911 a Greenlee Brothers boring and adzing machine was installed at the creosoting plant. This machine operated more or less successfully, but was not of sufficient capacity nor heavy enough in construction to successfully handle heavy hardwood ties. Accordingly, two new and larger machines, of the same make, were installed early in 1913. These machines have operated successfully, and have adzed and bored 5,000 ties per day without difficulty. During 1914 we adzed and bored 523,935 ties.

The cost per tie for adzing and boring, including the interest on the investment, depreciation, operation, running repairs, electrical current for operating the machines and trams while the latter are taking ties to and from the machines, does not exceed 1½ cents per tie. Holes are also bored for cut spikes used in yard and industrial tracks of light service.

Some service tests are being made with different kinds of linings. The Thiollier helical lining, a steel spiral screw of the same pitch as the threads of the screw spike with the inside diameter the same as the core of the spike, provides good holding power, but to date we have found considerable difficulty in applying the device. We are also using a malleable lining with inner threads to correspond to the pitch of the screw spike and outer threads to form a new contact with the fibers of the wood. The lower end of this lining is cut in three parts and spreads as the screw spike is forced into place. This device is not hard to apply. The old hole has to be enlarged and the lining inserted. All of the devices so far tested have been placed in new timber, as we have as yet had no occasion to make such applications in old ties where the screws have become loose.

A test has also just been started with plates bolted to soft pine ties. A strap holds the two bolts together on the bottom, while heavy nut locks of a special design hold the plate firmly to the tie. The rail is held in place by a hook shoulder on the inside and a screw spike on the outside. With longleaf yellow pine, birch, gum, oak and other hardwood ties, it is not thought that any such appliance will be necessary to get the full value of the ties, excepting, possibly, in some cases on sharp curves with excessive traffic. On straight track the rail can be regaged at any time that this is necessry by using the two spare holes in the plates and boring new holes in the ties. After nearly five years of service there is no indication that this will have to be done for some years to come, if at all.

COST

The following data are a summation of the labor costs in connection with the construction of the Lackawanna Railroad of New Jersey. These figures cover the entire line, amounting to a mileage of approximately sixty miles of main track:

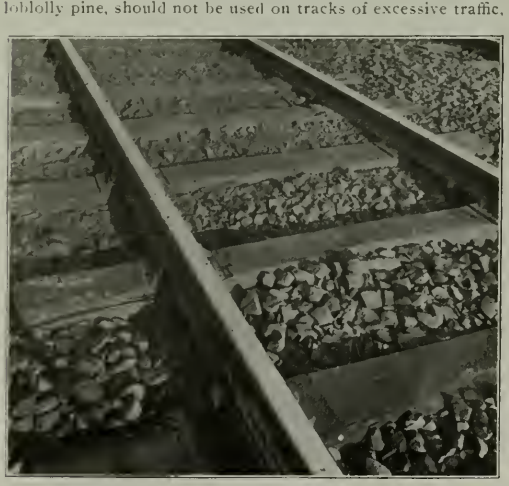
	Per mile
Cost of boring by hand in the field, 2,880 ties at $.035	$ 100.80
Cost of applying 11,520 screw spikes at $.019	218.88
Cost of laying track, less boring and placing screw spikes at $.085 per foot	448.80
Cost of surfacing 5,280 feet track at $.17 per foot	897.60
Average cost of labor per mile of main track	$1,666.08

The above figures include the entire labor cost for putting the track in finished condition, but do not include any labor cost for the distribution of materials. It will also be noted that the cost of boring ties in the field on the above work amounted to 3½ cents per tie, whereas the boring and adzing of ties, which is now done before treatment, has not cost to exceed 1½ cents per tie.

CONCLUSIONS AND PRECAUTIONS TO BE TAKEN IN APPLYING *Ties*

(1) Treated beech, birch, gum, hard maple, elm and probably other similar woods may be safely used with oak on sharp curves where the traffic is especially heavy.

(2) From an economic standpoint, softwood ties, such as loblolly pine, should not be used on tracks of excessive traffic,



Effects of a Derailment Where Screw Spikes Were Partially Used. Weber Joint Badly Damaged. All Cut Spikes Had to Be Replaced, But Original Screw Spikes Show No Damage

nor is it advisable to use them on sharp curves with moderately heavy traffic. An expensive fastening device, such as an extra large and heavy tie plate or chair, securely fastened to the tie by fastenings independent of the spikes securing the rail, with sufficient room for rail movement on the tie plate, thus reducing the movement between the plate and tie to a minimum, would probably make it practicable to use softwood ties on straight track and light curves with moderately heavy traffic. It is not believed, however, that loblolly pine, or similar ties, can be economically used with good results on heavy curves, regardless of the style of fastenings.

(3) As a rule, with woods which it will pay to treat, the

poorer the quality of the timber the more elaborate and expensive must be the fastening if the mechanical life of the tie is made to approach the life of the treated timber.

(4) The hardest track to maintain, from a tie standpoint, is that on sharp curves, elevated for high-speed trains, where the speed of freight trains is restricted on account of grade conditions. Where traffic is especially heavy, such curves should be provided with the best of hardwood ties.

Tie Plates

(1) Tie plates should be used on all ties where screw spikes are used.

(2) The tie plates should project well beyond the base of the rail on the outside and less on the inside to counteract the tendency of rail to roll out.

(3) As a rule, the required thickness of the tie plates will depend upon their projection beyond the base of the rail, and the traffic.

(4) Four holes should be provided for screw spikes, so that two extra holes will be available if needed.

(5) All holes should be punched from the top down and be as neat a fit for screw spikes as consistent, to make all screw spikes act together in resisting lateral pressure. The outside screw spikes should be so protected by the shoulder on the plate as to prevent the rail base from cutting into the screw spike neck; otherwise, in case of derailment and slued ties, it will be found impossible to remove the spikes without first straightening the ties.

(6) A raised lug, or shoulder, both inside and outside of the rail base, should be provided to give support to the screw-spike heads. This shoulder assists in holding gage and materially reduces the breakage of spikes and damage to track in case of derailment.

Spikes

(1) The size of screw spikes and the design of the thread should be carefully considered before a screw spike is adopted. Thereafter no changes should be made; otherwise the new screw spikes cannot be used in old holes without damaging the wood fiber.

(2) Where salt brine drippings are excessive, screw-spike heads must be made sufficiently large; otherwise there may be difficulty in the future in removing the screw spikes from the track, due to corrosion. During the nearly five years' service no screw spikes have been found that were rusted within the tie, and there was no rust to speak of below the head, although some spike heads were rusted so badly that they could not be removed with the standard tool.

(3) The screw-spike head should have tapering sides to prevent turning in the wrench socket after the size of the head has been diminished by rust.

(4) Any mechanical device for setting down screw spikes must automatically release when the screw spike is seated; otherwise the screw spike is apt to be damaged in case of hardwood or the wood fibers destroyed in case of softwood.

(5) Very little trouble is experienced by screw-spike heads breaking off, either on account of track movement or derailed equipment. The heads are, at times, damaged to considerable extent by derailments, but as a rule the spikes are not broken, nor is their holding power affected. Where screw spikes are broken off, a device for extracting the broken portion from the old hole without injury to the wood threads would be a valuable appliance.

(6) When screw spikes are fully seated, no further strain should be put on them, as this will tend to destroy the threads in the wood or injure the spikes.

Holes for Screw Spikes

(1) All ties should be bored at the treating plant before treatment. This can be done while the ties are being adzed, and not only insures that the holes are bored deep enough, but assures good treatment of all wood adjacent to the holes.

(2) Where the ties are bored before treatment, the track must be at proper gage before the ties can be placed.

(3) The holes for screw spikes should be of proper dimensions for the wood used, with due regard to the size of spike.

(4) A limited number of holes can be bored with one bit, after which its size will diminish so as to make it too small.

(5) Holes should be bored somewhat deeper than the length of the screw spike. There is no serious objection to boring the holes clear through the ties.

Gage

(1) With oak, birch, hard maple, gum or longleaf yellow pine ties, gage can be maintained with flat-bottom plates, using two screw spikes on tangents and two or three on curves.

(2) Heavy curves elevated for high speed, where heavy freight trains move at a slow rate of speed, are the hardest track to keep to gage.

(3) Double spiking should be done on the inside of the rail.

(4) Not only is the lateral and vertical resistance of a screw spike greater than that of a cut spike when both are first applied, but the lateral and vertical resistance of a loose screw spike is considerably greater than the lateral and vertical resistance of a loose cut spike.

(5) When the threads in the tie are entirely destroyed, a screw lining (any one of several different varieties) may be used with good results.

General

(1) All ties should be bored and adzed before treatment. This insures good gage, a perfect bearing for the tie plates and good impregnation under the rail and around the holes.

(2) In placing screw spikes, they should be driven by hammer only far enough to make the threads take hold. If rigid instructions are not enforced, laborers will overdrive spikes and so destroy the wood fibers near the top of the holes.

(3) Screw spikes with flat-bottom plates on hardwood ties will hold track to gage on sharp curves under heavy traffic. The holding power of screw spikes in hardwood ties is not materially reduced after more than four years' service.

(4) No screw spikes have ever been found so loose that they could be easily pulled out of the holes, and but few have been discovered which could be as easily extracted as a newly-driven cut spike. In no case, except with loblolly pine ties, have the threads in the wood been found weakened.

(5) Screw spikes in maintenance work can be used most economically where all rail is of a standard pattern, so that regaging of track is not necessary in relaying rail.

(6) Slight irregularities in frozen track are likely to throw an excessive strain on screw spikes where there are but a few mixed with cut spikes.

(7) The best results with the screw spikes can be expected in new construction, and where the number of screw spikes in tie renewals predominate over cut spikes.

(8) In relaying rail, cut spikes should never be driven in old screw-spike holes, if the holes are to be used again for screw spikes.

(9) No effort should be made to draw up a low tie with screw spikes when the roadbed and ballast are frozen solid.

(10) Screw spikes do not have to be set down continually, as do cut spikes, but should be gone over and set down properly after the plates are seated in the tie.

(11) Flat-bottom plates with raised shoulders or lugs for the screw-spike heads make but little noise and do not rattle at all where ties are adzed before treatment.

(12) It cannot be expected that the full life of all creosoted softwood ties, such as loblolly pine, will be realized without providing expensive fastenings from the start, and then it will probably be necessary to add some further device at a later date. Probably the most practical and least expensive device will prove to be one or the other of the lining devices to be placed in worn out spike holes.

(13) The use of screw spikes for the past five years has not made it necessary to increase the number of section men.

(14) Whether or not it will pay to use screw spikes will depend upon the cost of ties, their probable life and the amount of traffic.

The Effect of the War on Timber Preservation

Twenty-Five Per Cent Reduction in Creosote Supply Forces Use of Other Materials and Closing of Plants

One of the direct effects of the European war on the American railways has been the partial demoralization of the timber-treating industry following the cutting off of a large part of the supply of preservatives. The railways are the largest consumers of treated timber. Over 80 per cent of the total of 153,000,000 cu. ft. of timber treated in 1913 consisted of cross-ties, while over one-half of the remainder comprised piling, bridge timbers and other materials consumed directly by the railways. They are also large plant operators, owning directly 27 out of a total of approximately 95 plants in active operation, while they are the main customers of the others, contracting for the entire output of many of the privately owned plants. Any interference with the operation of these wood preserving plants is therefore of direct concern to the railways. Because of the wide variety of statements regarding present conditions in this field and the confusion resulting therefrom, we have communicated with the large operators and present the following information as a resume of the present situation.

THE MATERIALS USED

Ever since the inauguration of wood preservation on a commercial scale about 1885 the greatest attention has been devoted to the treatment of ties and the largest output of treated material has been in this form. Starting with about 120,000 ties in 1885, the output of treated ties has risen from year to year until it reached 2,800,000 ties in 1900, or 3.2 per cent of the total requirements of the railways. Since that date the industry has developed even faster, until in 1914, 41,075,655 ties were treated, which was nearly 30 per cent of the entire number used. Thus, both the absolute number of ties and the percentage of the total treated is increasing rapidly as the service results become more generally known and the cost of untreated timber increases. The growing scarcity of hard wood and the possibility of securing a relatively long life by treating the so-called inferior woods have also helped this increase.

The two preservatives most commonly used are zinc chloride and creosote oil, forming 97 per cent of the total quantity of all preservatives consumed. Zinc chloride was applied almost entirely at first, and it has been estimated that of the 15,000,000 ties treated previous to 1900, zinc chloride was injected into all but 500,000. Even as late as 1905 approximately 90 per cent of the ties were treated with this material. Since that date creosote has been more widely adopted, although the consumption of zinc chloride has continued to increase, until in 1913, 26,466,800 lb. of dry zinc chloride was used.

The creosote treatment has been in marked favor, especially during the past five years, and its used has increased rapidly. Nearly all of the new plants have been designed and built for this treatment. Starting with less than 3 per cent of the total output of treated ties previous to 1900, and with only 10 per cent in 1905, this increased to approximately 70 per cent of all the ties treated in 1913. This has naturally resulted in a very great increase in the demand for this oil. In 1903 about 8,000,000 gal. were used, which was increased to 56,000,000 gal. in 1908, 83,000,000 gal. in 1912 and 108,000,000 gal. in 1913, practically doubling in the last five years.

Creosote is a by-product of the distillation of coal tar. As such its production is only practicable commercially when there is a demand for pitch and the other primary products. A sufficient quantity of crude tar is produced in the United States to provide all the creosote needed for timber preservation. However, the normal price of creosote oil does not warrant the distillation of the coal tar for this product alone. As a result a quantity of tar is refined just sufficient to provide the pitch and other primary products for which there is home and export demand. This condition now retards the distillation of creosote and will continue to do so until the industries of this country are sufficiently developed to create a demand for the pitches and other coal-tar products.

Previous to 1905, when relatively small amounts of creosote were used in wood preservation, over one-half of the oil required was manufactured in the United States; but with the rapid increase in the demand the proportion of domestic creosote fell to 29 per cent in 1910 and 1911. Since that time the production of domestic creosote has been increased about 10,000,000 gal. per year, resulting from the increased activity of older firms and the entrance of new firms into this field. As a result the percentage of imported oil fell to 62 per cent in 1913. However, large as the recent increase in domestic production has been, it has not kept pace with the increased demand and the importation of foreign creosote has increased from year to year. The importation of foreign oils will therefore continue to be essential to the industry of wood preservation for many years to come.

The imported oil comes almost exclusively from England, Belgium and Germany. Germany furnishes about 15 per cent of our total requirements and Belgium a considerably less amount. Nearly half of all the oil used in this country comes from England. The total amount imported has risen from 38,000,000 gal. in 1908 to 51,000,000 gal. in 1911, and 66,000,000 gal. in 1913. This large surplus of oil available for export results primarily from the extensive demand and development of manufactories of coal-tar products in Europe, enabling creosote oil to be produced economically as a by-product.

THE RESULTS OF THE WAR

When the European war broke out last August the United States was consuming about 110,000,000 gal. of creosote annually, of which nearly 70,000,000 gal. was being imported. The plants along the south Atlantic coast depended almost entirely upon imported oil. Those along the north Atlantic coast were securing about half of their requirements from domestic sources, while those in the interior were using domestic oil very largely. The plants along the Pacific coast were also dependent almost entirely upon imported oil.

At the beginning of hostilities, embargoes were placed on the exportation of creosote from the belligerent countries. The English embargo was soon raised, but it is still impossible to secure any oil from Germany or Belgium, and this condition will undoubtedly exist until the close of the war, owing to England's control of the sea. While there is now no restriction on the shipment of oil from England, it is very difficult to secure boats to bring it to this country, as the British Admiralty has commandeered for its own uses many tank steamers formerly engaged in this service, even after they were loaded, and is still doing so. One recent report showed a list of over 85 tank steamers which had been withdrawn from commercial service in this way. Importers of creosote oil and railroads which purchase their oil abroad directly are both suffering from this condition. One railroad had two cargoes confiscated at sea last fall. Other roads have had boats taken repeatedly after being placed for loading and, in some cases, after being loaded. Thus, while large quantities of foreign oils are available and are accumulating in storage, they are largely unavailable for the plants in this country because of transportation conditions.

Consequently, the amount of oil imported for the six months from August, 1914, to January, 1915, inclusive, decreased to 17,000,000 gal. as compared with 27,000,000 gal. for the same period a year ago, a loss of 37 per cent, and it is still decreasing as the demands of the English government for tank steamers

become more urgent. Thus in January only 200,000 gal. of creosote oil was received in this country. As approximately 62 per cent of the creosote consumed in the United States is imported, this is equivalent to a total shortage of at least 25 per cent.

The effects of this situation on the individual plants in this country have varied widely. The most favorably situated are those which have contracted regularly in advance with domestic producers for their entire requirements. Thus, their source of supply is not disturbed and they have suffered no direct ill effects. In fact, from a competitive standpoint their condition has been improved. Other plants normally contract for a portion of their requirements with the domestic producers and import the balance. At times such as these the home manufacturers naturally favor their regular customers in the sale of oils previously uncontracted. Such plants are therefore affected by this shortage only to a limited degree.

The decrease in the supply is felt most seriously by those plants which secure a large part or all of their supply from abroad. Measures adopted by these operators depend largely upon the purposes for which their timber is treated. For those plants which treat piling, paving blocks, etc., which require a creosote treatment, there is no alternative but to close down when the supply of oil is exhausted, and a number of plants have already been forced to this extremity.

Various expedients have been adopted to conserve the supply of creosote. A number of plants have changed from the full cell to the Reuping or other empty cell processes to reduce the consumption of oil. At least two roads have reduced the unit quantities of oil injected into the timber without changing the process. There has also been a distinct tendency towards the adoption of other oils previously considered inferior, such as water-gas tar creosote. One large plant is planning to substitute up to 20 per cent of this for coal tar creosote. The addition of refined coal tar to creosote, which has met with increasing adoption during recent years, has received a decided impetus under present conditions.

Since, as stated above, over 80 per cent of all the timber treated consists of ties, and since over 25 per cent of all ties treated are impregnated with zinc chloride under normal conditions, the most obvious and readily applied method of relief in the treatment of crossties is the substitution of zinc chloride for creosote treatment. As a result a considerable number of large plants have been rearranged and are now preserving ties in this manner. However, this is not without its difficulty, as the cost of zinc chloride has risen materially, due to the increased demand and to the difficulty in securing spelter because of the war. The shortage of this material, however, has not been serious up to the present time.

Probably the most important single factor contributing to the relief of the shortage has been the depression existing in railway and commercial circles, making retrenchments in expenditures for improvements necessary, and holding up much new work. This has materially reduced the demand for treated timber, and thereby for creosote. Largely for this reason one road was enabled to close down its plant entirely for 2½ months. Another reduced the hours of operation from 20 to 10 per day, and several others have made similar reductions.

In view of the shortage of foreign creosote and the serious situation with which many of the plants have been confronted, there has naturally arisen a strong demand from the consumers for an increased output of creosote on the part of the domestic manufacturers. This demand has served to increase the price of the domestic oil at least 35 per cent, which has served as an incentive toward increasing the production. While the manufacturers are believed to be making strong efforts to produce the largest possible amount of creosote oil, the depression in general business conditions has caused a decreased demand for pitch and other primary products in this country and has very materially reduced the export sale. For this reason it is not commercially practicable to entirely or even largely offset the shortage resulting from the decrease in European importation by increased home production in so short a time.

Furthermore, the present conditions are but temporary, and at the close of the war the large quantities of creosote now accumulating in England and Germany will be released for shipment to this country. This will probably result in a material reduction in the price of oil even below that existing previous to the war. In spite of the evident advantages to the timber-treating industry of a greatly increased domestic production now, one can only expect to see a normal development in our domestic production which will keep pace with the home and export demands for pitch and other primary products. With the various relief measures which have been adopted, the situation should become little worse than now existing, even though the war continues for some time:

The following brief abstracts from information received directly from the larger railway treating plants in this country, show the wide variety of conditions existing.

"We have not substituted any other process of treatment. When our oil supply ran so low that there was likelihood of our running out, our plants were cut from 20 hours to 10 hours per day. We have arranged for the purchase of a few hundred thousand gallons of domestic creosote that will meet the A. R. E. A. grade 1 specifications. We have also contracted for some water-gas tar which we expect to use at the rate of 20 per cent. The latter plan was decided upon before the shortage of creosote became apparent."

"When the war broke out we had just received approximately one-fourth of our annual requirement of creosote oil. However, we immediately set about making changes that would conserve this supply and did not use a gallon more creosote than we had to in order to save the timber on hand ready for treatment. We immediately rebuilt our plants to use zinc chloride, and are now operating by that method, using the creosote we have only for bridge timber and piling."

"No definite measures have been adopted to relieve the shortage, although the retrenchment in renewal and new work has decreased the output of the plant. We are also experimenting with other processes, more with a view to decreasing the cost of treatment than of conserving the supply of creosote as our present stock is sufficient for at least 12 months."

"We have a sufficient supply of creosote on hand to operate our plant during 1915. We have reduced the quantity of creosote used from 3 lb. to 2 lb. per cu. ft., using the same quantity of zinc chloride, namely ½-lb. per cu. ft., and employing the Card process. We are considering the use of a certain percentage of water-gas tar creosote mixed with coal-tar creosote and zinc chloride. We have not in any way decreased our output. On the other hand, we have been and are working our plant to the maximum capacity."

"We have not changed our process, and while we have not decreased our crosstie output, we have postponed the treatment of some construction material, such as piling and dock timber. This postponement, however, is also partly due to the reduced earnings of our company for the past six months."

"During 1914 we received one shipment of 500,000 gal. of creosote by tank steamer from England. We experienced considerable trouble in securing this shipment and had two cargoes confiscated at sea by the English government."

"We have adopted no method to reduce the shortage except to reduce the quantity of oil left in the tie from 6 lb. to 5 lb. per cu. ft. This reduction was not due entirely to difficulty in securing creosote, for we believe that with our climate and soft pine ties, 5 lb. of creosote will preserve the tie against decay until it fails otherwise."

"We formerly used the full cell process on our material, but since August 1 we have used the Reuping process for all ties. We have also treated some ties with zinc chloride. We still treat most of the bridge timber by the full cell process. Unless boats can be chartered we will be short of oil this year."

"We have not been compelled to resort to any measures to

relieve the shortage, having sufficient oil on hand to treat our immediate requirements. However, should the price of the creosote we use rise too high we can resort to a heavy zinc chloride treatment for certain dimension timbers for inland use."

"The European war has not interfered with our creosote supply in any way, as all of the oil used in our plant is domestic."

"We do not know where our supply of oil is coming from this year or whether we will secure any at all. As soon as the war started we began to conserve our supply of creosote oil for only the most important work, and are now using considerable untreated timber."

"We have substituted for the Card process, chloride of zinc for the treatment of ties and will continue to use this until creosote can be purchased at a reasonable price."

"It has not been necessary for us to adopt any unusual measures to secure a supply of creosote oil, as our demands are covered by contract with plants in this country. We are curtailing our bridge work this year, so that we will not use more than two-thirds as much oil as we used last year."

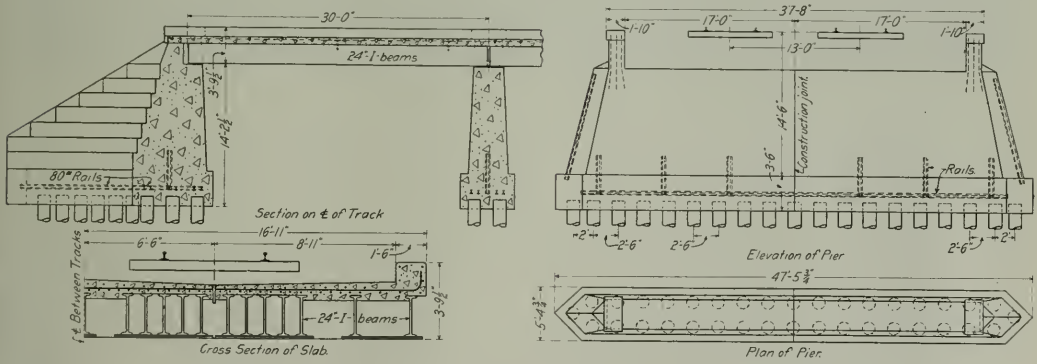
NEW B. R. & P. STRUCTURE ACROSS ALLEGHENY RIVER AT RIVERSIDE, N. Y.

During the past year the Buffalo, Rochester & Pittsburgh has replaced its old bridge across the Allegheny river at Riverside, N. Y., with a new structure designed according to the latest standards of this road. The old structure consisted of a gauntleted single track steel through pin-connected truss of the camel back type 212 ft. long supported on stone masonry with a double-track, frame-trestle approach 532 ft. 8 in. long. The truss was designed for Cooper's E-40 loading and weighed 212 tons. In addition to being gauntleted the old structure was too light for the modern equipment. It was replaced with a 212 ft. double-track, steel-riveted, through-Warren-truss span and a concrete and steel approach viaduct 504 ft. 4 in. long. The new truss span was designed for Cooper's E-60 loading and weighs 643 tons.

The pier and the abutment under the old single track span were of stone masonry supported on piles and designed for double track. Only short extensions were therefore necessary to comply with present standards. These were built of concrete, with which material the old masonry was also encased.

The viaduct consists of 17 spans each 30 ft. long supported on concrete piers resting on timber piles. The piles project 12 in. into a concrete cap 5 ft. 4¾ in. wide, 3 ft. 6 in. high and 47 ft. 5¾ in. long between extreme end points. These caps are reinforced longitudinally with four 80-lb. rails placed two over each pile. These caps are also bonded to the pier above by seven 4-ft. sections of rails set vertically at intervals of 6 ft. 6 in.

The deck of the viaduct consists of 25 24-in. 100-lb. I-beams arranged in clusters and supporting concrete slabs, as shown in the accompanying cross section. These slabs, which are 30 ft. long and 33 ft. 10 in. wide, were constructed in place in half sections for each track separately. An interesting feature of their design is the width of roadway provided. The tracks are spaced 13 ft. between centers, leaving a distance of 10 ft. 5 in. from the center of the adjacent track to the outer edge of the parapet. The tops of the slabs are sloped each way towards the center of each track where drainage outlets are provided at intervals of approximately 8 ft. The bottoms of the slabs ex-



Elevation and Sections of Buffalo, Rochester & Pittsburgh Steel and Concrete Trestle

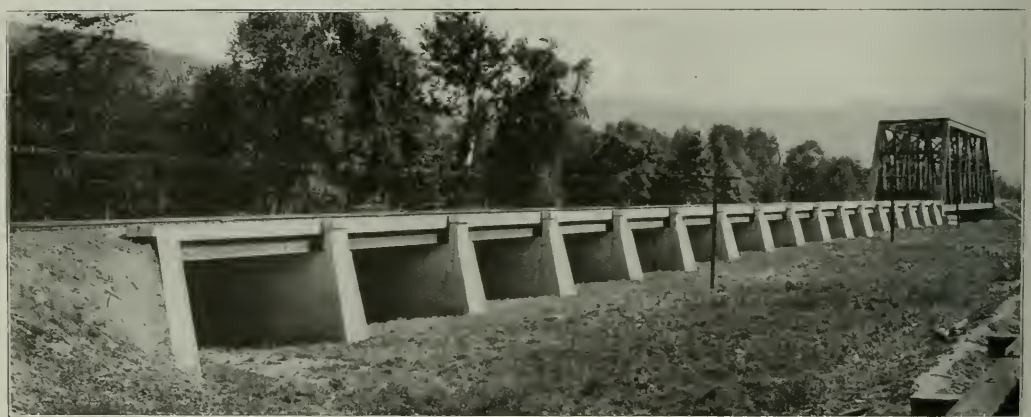
tend down to enclose the outer side of the upper flange of the outside I-beams of each cluster, locking the I-beams and the slabs into one unit.

In renewing the river span, traffic was carried on timber falsework. In the reconstruction of the approach viaduct, the east

Views of Completed Steel Span and Concrete Deck Approach Viaduct

second track was removed and the gauntlet extended across the viaduct. The new piers were so spaced that they did not disturb any of the old timber bents except for a short distance at the south end next to the river span, where it was necessary to place temporary timber bents. One-half of the structure was then built complete, after which the gauntleted tracks were shifted onto the new structure and the other half completed.

The plans for this work were prepared under the direction of E. F. Robinson, chief engineer, Buffalo, Rochester & Pittsburgh, and W. F. Pond, office engineer. The steel was fabricated by the American Bridge Company, and the truss span was erected by it. All other work was carried on by company forces under the direction of G. H. Stewart, master mason, and Charles Scott, supervisor of bridges and buildings.



New Buffalo, Rochester & Pittsburgh Bridge Across the Allegheny River

PRODUCTION OF RAILS IN THE UNITED STATES IN 1914

The Bureau of Statistics of the American Iron & Steel Institute has just issued a bulletin giving the production of rails last year based on statistics furnished by the various manufacturers. The most striking thing about these statistics is the decrease of over 1,557,000 tons, or 44. per cent in the production of rails as compared with the preceding year. This is the greatest reduction in the 18 years these statistics have been compiled, with the exception of 1908, when the output decreased 1,612,000 tons.

PRODUCTION OF RAILS BY PROCESSES, IN GROSS TONS, 1897-1914

Years	Open-hearth	Bessemer	Rerolled*	Electric	Iron	Total
1897.....	500	1,644,530†	Included with Bessemer and open-hearth steel rails from 1897 to 1910 inclusive.	.....	2,872	1,647,892
1898.....	1,220	1,976,702		.....	3,319	1,981,241
1899.....	523	2,270,585		.....	1,592	2,272,700
1900.....	1,333	2,383,654		.....	695	2,385,682
1901.....	2,093	2,870,816		.....	1,730	2,874,639
1902.....	6,029	2,935,392		.....	6,512	2,947,933
1903.....	45,054	2,946,756		.....	667	2,992,477
1904.....	145,883	2,137,957		.....	871	2,284,711
1905.....	183,264	3,192,347		.....	318	3,375,929
1906.....	186,413	3,791,439		.....	15	3,977,887
1907.....	252,704	3,380,025		.....	925	3,633,654
1908.....	571,791	1,349,153		.....	71	1,921,015
1909.....	1,256,674	1,767,171		†	.....	3,023,845
1910.....	1,751,359	1,884,442		†	230	3,636,031
1911.....	1,676,923	1,053,420	91,751	462	234	2,822,790
1912.....	2,105,144	1,099,926	119,390	3,455	.....	3,327,915
1913.....	2,527,710	817,591	155,043	2,436	.....	3,502,780
1914.....	1,525,851	323,897	95,169	178	.....	1,945,095

*Rerolled from old steel rails and renewed rails which the manufacturers could not classify as Bessemer or open-hearth.

†Small tonnages rolled in 1909 and 1910 but included with Bessemer and open-hearth rails for these years.

PRODUCTION OF RAILS, SHOWING DECREASE BY PROCESSES, 1913-1914

Kinds.	1914	Per cent	1913	Per cent	Decrease	Per cent
Open-hearth	1,525,851	78.45	2,527,710	72.16	1,001,859	39.64
Bessemer	323,897	16.65	817,591	23.34	493,694	60.38
All other	95,347	4.90	157,479	4.50	62,132	39.45
Total	1,945,095	100.00	3,502,780	100.00	1,557,685	44.47

The increase in the proportion of open hearth rails has continued rising from 72.16 in 1913 to 78.45 last year, while the production of Bessemer rails decreased from 23.3 per cent in 1913 to 16.7 per cent in 1914.

PRODUCTION OF RAILS BY WEIGHT PER YARD, 1897-1914

Years.	Under 45 lb.	45 and less than 85	85 lb. and over	Total. Gross tons
1897.....	88,896	1,223,435	335,561	1,647,892
1898.....	123,881	1,404,150	453,210	1,981,241
1899.....	133,836	1,559,340	579,524	2,272,700
1900.....	157,531	1,626,093	602,058	2,385,682
1901.....	155,406	2,225,411	493,822	2,874,639
1902.....	261,887	2,040,884	645,162	2,947,933
1903.....	221,262	1,603,088	1,168,127	2,992,477
1904.....	291,883	1,320,677	672,151	2,284,711
1905.....	228,252	1,601,624	1,546,053	3,375,929
1906.....	284,612	1,749,650	1,943,625	3,977,887
1907.....	295,838	1,569,985	1,767,831	3,633,654
1908.....	183,869	687,632	1,049,514	1,921,015
1909.....	255,726	1,024,856	1,743,263	3,023,845
1910.....	260,709	1,275,339	2,099,983	3,636,031
1911.....	218,758	1,067,696	1,536,336	2,822,790
1912.....	248,672	1,118,392	1,960,651	3,327,915
1913.....	*270,405	†967,313	2,265,062	3,502,780
1914.....	*238,423	†309,865	1,396,807	1,945,095

*Includes rails under 50 lb. †Includes 50 lb. and less than 85 lb.

The production of Bessemer rails last year was only 22 per cent of the tonnage of open hearth rails.

PRODUCTION OF ALLOY-TREATED STEEL RAILS, 1909-1914

Years	Total production. Gross tons	Production by alloys: Titanium	Production by alloys: Other alloys	Production by processes: Open-hearth and electric	Production by processes: Bessemer	Production by weight: Under 45 lb.	Production by weight: 45 and under 85 lb.	Production by weight: 85 lb. and over
1909...	49,395	35,945	13,450	13,696	35,699	..	9,132	40,263
1910...	257,324	256,759	565	27,389	229,935	..	70,170	187,154
1911...	153,989	152,990	999	38,539	115,450	..	27,097	126,892
1912...	149,267	141,773	7,494	40,393	108,874	21	5,426	143,820
1913...	59,519	47,655	11,864	33,567	25,952	*91	†9,414	50,014
1914...	27,937	23,321	4,616	27,447	490	*14	†1,168	26,755

*Includes rails under 50 lb. †Includes 50 lb. and less than 85 lb.

DANISH STATE RAILWAYS.—The report for the last financial year shows receipts amounting to $15,500,000 and an expenditure of about $13,000,000, in both cases the highest figures on record, the actual surplus being $2,425,000. The freight traffic shows an increase of 3.4 per cent and the passenger traffic of 1.2 per cent, compared with the previous year. The passenger traffic shows receipts of $6,700,000, of which about $1,050,000 arise from the through traffic. As regards the different classes in the passenger traffic, first class yields 0.1 per cent, second 8.6 per cent and third 91.3 per cent. At the end of the financial year in question the state railways in Denmark had a capital outlay of $79,000,000, of which capital the earnings represent about 3 per cent. As regards accidents during the year in question, there were killed, of passengers, railway servants and others, 31; 35 were severely injured, and 45 less severely.

Importance of Economical Methods of Renewing Ties

Three Timely Discussions Emphasizing the Possibilities for Conservation in this Important Expenditure

At this season of the year when the work of renewing ties is being actively pushed on most roads those in charge of this work can well afford to give it their personal attention because of the large amounts normally expended on this account and the resulting opportunities for waste or economy both in material and labor. The three discussions given below, prepared by men who have given this subject careful consideration, call attention to different phases of this problem, all of which are important.

AN ECONOMICAL METHOD OF RENEWING TIES

By "Roadmaster"

For a number of years I have followed the practice of jacking up the track 1½ to 2 in. when renewing ties and pulling out the old ties instead of digging them out and disturbing the original bed, as is commonly done. With this method I have materially reduced the unit cost of renewals, and this work has required less of the time of the section forces than the old method.

Many track men think that gravel or earth ballast will run under the ties when the track is jacked up. This is true only when the ballast is sandy or new, in which latter case the ties are also generally new and require few replacements. When the ballast has been in the track a year or longer it forms walls along the sides of the ties which are not easily disturbed. Although the track does not necessarily return at once to its original bed of its own weight unless the ballast is well packed or foul, this is an advantage, as the side-binding holds the track suspended until new ties are inserted. For this reason it is important that the new ties be put in before a train passes to avoid digging out the old bed afterward to get them in. The increasing use of tie plates resulting in reduced rail cutting is of assistance with this method, making it unnecessary to raise the track as great a distance as formerly as well as reducing the digging out of the old bed. In adopting this method I have found considerable difficulty in training the foremen to do this work properly, and it has been necessary to spend considerable time with them to insure that they understand and handle it correctly.

This method is equally applicable to dirt track and was originally developed here where less care is required than in ballasted track. I recall one section where two men with the foreman put in 1,250 hardwood ties in clay track in one month and left the old ties piled. This gang put in as many as 80 ties in a single day.

RENEWING TIES IN STONE AND EARTH BALLASTED TRACK

By P. J. McAndrews

Roadmaster, Chicago & North Western, Belle Plaine, Ia.

For the proper maintenance of track it is essential that good ties be provided and important that the work of renewing be done at the proper time. These considerations, taken in connection with the present high cost of the ties themselves and of the labor required to handle them, make the tie renewing program of a railway a matter of great importance. The exercise of good judgment and the use of systematic methods are necessary at each of the various steps from the date of making estimates until the completion of the season's work. Enough ties must be furnished to maintain the track properly and safely, but care must be taken to avoid the other extreme, which leads to a probable waste of material and labor. Supervising officers, to whom are entrusted the duty of making or approving requisitions for ties, have opportunity to and should observe conditions on their territory from time to time, thus being in a position to submit approximately correct estimates.

Before submitting estimates, section foremen and, if possible, supervisors should walk over their territories, carefully inspecting ties, marking such as appear decayed to the stage that would make renewal necessary the following season. A slight adze mark on a certain portion of each tie selected for renewal, having the adze marks uniformly at one end of all ties, serves well and need not be of such extent as to damage any ties which a later or more rigid inspection might decide to be serviceable for another season. An old and rather bad practice of examining ties for renewal consisted in the foreman sinking a pick deep into them and mutilating them so that quick decay would result. Ties must be carefully distributed along the track, with a view of saving expense that might be incurred later in handling long distances with a push car.

Where local conditions justify, I prefer to renew ties in stone ballast while giving the track a light general surfacing, making a lift of from one to two inches. The organization of a gang for this work depends on the number of men employed, the extent of the renewals and the density of traffic. The ties are distributed with a push car, unless they have been unloaded directly from a train along the track. I then employ a gang of from 10 to 16 men working under ordinary conditions where the renewals are not excessive. A part of this gang lifts the track, using two jacks, and tamping the good ties immediately. At the same time the remainder of the gang replaces the poor ties with new ones, also tamping them at once.

When the track is raised an inch or two, less labor is required to excavate ballast alongside and under the ties, while the general riding condition of the track is benefited through the new ties having substantially the same bearing as the sound ties that have been left in service.

To make tie renewals where track in stone ballast is not being raised, I prefer to distribute the ties and have the force organized so that one man with a claw bar pulls the spikes from the marked ties, except when a number of poor ties are bunched, when sufficient spikes are left to keep the track safe; one or more men with shovels and chopping axes remove the ballast from both sides of the ties just inside of the rails, and then chop off the tie to be removed so it can be taken out without making any side excavation. After the removal of the old tie, sufficient ballast may be shoveled aside to permit the new ties being pulled to place, but care must be taken to avoid digging too deep, which always results in having loose ties for some time after. The new tie should be carefully tamped and a portion of the ballast replaced, leaving the ends of the tie and a space near the rails only partially filled so that the tie may again be tamped a few days later if found loose, which is quite often the case. I believe the plan of chopping out the old tie is more economical than the tedious and expensive method of excavating the ballast alongside of it and digging a trench to knock it into for removal from under the rails.

The use of tie tongs should be insisted upon in all handling of new ties. New ties should be spiked to proper gage. Before tamping them they must be adzed so that the rails or tie plates have proper bearing. In replacing ballast, forks should be used and no dirty material placed around the new ties. Old ties must be gathered up daily and disposed of as directed.

In renewing ties in earth-ballasted track the following plan is recommended: The gang should be paired off and each pair provided with a claw bar, pick, raising bar or chisel pointed bar (unless the claw bar has a chisel end), shovels and two hard wood blocks tapering from a point to a thickness of about 3 in.

and from 2 to 3 in. wide. To remove the old tie have the dirt dug away from on top of and about half way down the sides by one man, while the other pulls the spikes from the tie to be removed and starts them up on a sound tie on each side. Raise the rails and insert one of the blocks under each rail a sufficient distance to permit the decayed tie being removed without fouling the rails. The height necessary to raise the rails will depend on the kind of dirt and the extent to which the rails may have cut into softwood or unplated ties. After removing the old tie the bed should be prepared for the new one, removing only enough dirt from the old bed to permit the new tie being placed and left "stiff," holding the rail a little high until a few trains pass and settle it.

The height at which the track may be held on the new tie must be governed by the kind of soil in the roadbed and its condition at the time. The force of men usually employed on earth ballasted lines being few, foremen have an opportunity to watch the work closely, and with their knowledge of local conditions they can usually lay new ties so that they will bed themselves to a good bearing under the rails.

Where the old bed is not disturbed and the new tie placed thereon, without any loose material being used under it, care must be taken not to leave the rails too high, as the new tie will settle but little if placed on the old "crust." With this method of raising rails in making tie renewals the track is quite often pulled out of line and after spiking the track it should be lined where necessary.

PROPER SUPERVISION OF TIE RENEWALS

By A. W. Tabert

Roadmaster, Chicago & North Western, Allis, Wis.

Now that the section forces are largely engaged in renewing ties, it is worthy to note that there is no more fruitful field of economy in maintenance expenditure than in the renewal of ties, as this is the largest single item in the cost in track maintenance other than labor. It is apparently more neglected than any other item largely because it requires constant and immediate supervision to prevent the renewals of good ties.

It is natural that if the choice of ties for renewal is left to the foreman he will use all he can get, unless it is made to his interest to save them. Thus, ties are frequently taken out of the track which would have given several more years' service. After removing them it is too late to tell by inspection whether or not they should have been left in track, as they are generally split and otherwise injured in removing them. A certain section foreman who was replacing a string of perfectly good ties with new ones, replied to the question why he was taking out good ties: "I had plenty of new ones on hand and I wanted to get rid of them as soon as possible." This is the attitude of many section foremen. The difficulty of obtaining a sufficient number of ties in certain seasons makes the men put in all they can when ties are plentiful.

Under no circumstances should badly decayed or broken ties be left in the track for this is not true economy. When it becomes necessary to renew a large percentage of ties in any one season it is usually because they have been neglected. As "a stitch in time saves nine," so a tie in time may save others. For instance, we take out switch ties on a busy lead which are spike-killed, rail-cut, etc. These ties can be used by turning them over and putting them in on some track where there is not so much switching. Also the ties that are taken out of side-tracks, such as "big old cedars," can be turned over and used at the tail ends of spurs or "lazy" tracks that are not used very often, and then merely for storing cars. There are various side-tracks, especially stub end sidings, storage tracks, car-repair tracks, freight-house tracks or industry tracks that are infrequently used for the movement of locomotives but quite generally for standing cars. In such cases a great many second-hand ties which must necessarily come out of a main line may be used to advantage. A roadmaster should without fail watch this feature closely enough to be sure that he is getting the maximum efficiency in the use of track ties.

If we get interested in this we can save our company money on ties. When we realize that it takes approximately 150,000,000 ties per year we can appreciate the immense expenditure involved. Any reduction that can consistently be made in the tie renewal item for either side or main track ought to have our personal attention.

The usual manner of putting in ties is to employ three or more men. When the tie is put into the track in its proper position one man measures it before it is spiked, with a mark made previously on the handle of his spike maul or pick to see if the end is the proper distance from the rail. It usually is not. The other men then stand idle waiting for the first man to place it in the proper location. When the spiking gang comes along the men will again measure the tie from the end to be sure it is the correct distance from the rail as frequently the ties are moved before they are spiked. Assuming that he and his two assistants find the tie distance correct, they have lost from one to two minutes.

To overcome all this delay let the foreman make a mark with chalk, measuring from the end of the tie to the line where the outside base of the rail will come. In this way the tie can be placed in the proper position by the first men, and the spikers will see that it is in the proper place as the chalk mark will still be there. Another method which I have used in spacing ties when track is being surfaced is to have one man put a chalk mark on the base of the rail commencing at the first bolt in the joint and measuring off 21 in. along the entire rail to give the center of the tie. Then one or two men can go along with the lining bars and locate the ties at the chalk marks.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since March 12, 1915:

Canadian Pacific Terminal Improvements at Vancouver.—The construction of a new passenger station and a pier for coast steamers recently completed by the Canadian Pacific at Vancouver, was described and illustrated in the issue of March 19, page 614.

Notable Structures on the Spokane-Ayer Cut-Off.—The interesting features of the Spokane river bridge, the Snake river viaduct and the Hangman creek viaduct on the O.-W. R. & N. line entering Spokane, were described and illustrated in the issue of March 19, page 623.

The Railways and the Steel Companies.—An editorial commenting on the purchase of rails by the Illinois Central and other roads from the Algoma Steel Company at a lower price and to higher specifications than could be secured from mills in this country, was published in the issue of March 26, page 682.

Rock Island Track Elevation Work at Chicago.—The progress made during the first year's work in elevating certain sections of the Rock Island's line in the city of Chicago involving unusually high retaining walls, a complicated three-level structure at the crossing with the Western Indiana, a novel suburban station and other interesting features, was described in the issue of March 26, page 690.

New Line from Lewistown, Mont., to Great Falls.—The Chicago, Milwaukee & St. Paul has completed a 138-mile line providing an entrance into Great Falls and opening up a large agricultural district. The construction details of this work were described in an illustrated article in the issue of April 2, page 734, and in an editorial in the same issue, page 728, the recent tendencies in the use of concrete ballasted deck construction for long bridges was discussed, as illustrated by the practice on the long viaducts built on the Milwaukee's new line.

Reconstruction of the Jersey City Terminal Yards.—The important yard changes and the installation of an electro-pneumatic interlocking system in the Jersey City terminal of the Central Railroad of New Jersey which were completed on March 20, were described in the issue of April 9, page 787.

Rolling Resistance of Cars Over Switches and Frogs.—A discussion of the results of tests made to determine the actual resistance of modern cars in passing over switches and frogs in a bump yard as abstracted from a paper by C. L. Eddy, assistant professor of railway engineering, Case School of Applied Science, Cleveland, Ohio, in a bulletin of the A. R. E. A., was published in the issue of April 9, page 796.

Concrete Work on the Arizona Division of the Santa Fe

This Material Is Being Used in the Construction of Bank Protection, Bunk Houses, Bridges, Sign Posts, Etc.

The Arizona division of the Santa Fe, extending from Seligman, Ariz., to Mojave, Cal., and including four branch lines, presents some maintenance problems which have been handled in a manner which it is thought will be of general interest to those who have to do with concrete. This division ranges in altitude from less than 500 ft. to over 5,600 ft. elevation, with like variations in climate. All of it is desert country subject to violent rain storms, commonly referred to

A Blanket Protection Wall Some Distance from the Track

as cloudbursts, in the summer time. The roadbed is constructed for the most part of sand and gravel, which disintegrates readily under the action of water.

The extensive use of concrete on the division had its beginnings in trying to meet these conditions, but owing to certain favorable as well as unfavorable conditions and also to the personnel of the division forces one thing has led to another until the pile driver is nearly obsolete, and concrete brakeshoe boxes, crossing, yard-limit and other signs are being tried out, while a section laborer's concrete bunk house has been made standard.

BANK PROTECTION WALLS

To handle storm water a system of "A" surface ditches was constructed years ago reaching out from a bridge to an apex

Wing Walls Extending Out from a Bridge Opening

and coming back to the next bridge. There are miles of these ditches costing many thousands of dollars. The statement is probably not far from true that on one branch line there is as much yardage in the ditches as in the road bed they protect. Some of them where the soil contains clay are good yet, but others have been known to give way in one violent storm and many have been rebuilt from one to several times.

About two years ago it became necessary either to rebuild the ditches protecting about 14 miles of roadbed especially subject to washouts, or to adopt some other form of protection, and it was decided to try out on a large scale what had already been done on a small scale in the immediate vicinity of the bridges, viz., line the roadbed with a concrete blanket on the slope of the embankment. Eventually about 25 miles of line was so protected at a cost less than would have been required to restore the ditches, and it looks as though washout troubles have been practically eliminated on this territory and that repairs should be nil, barring accidents. The method of construction as well as the finished wall is well shown in the accompanying photographs.

Where the wash is likely to scour, the blanket is carried down to the bottom on a 1½ to 1 slope. This involves a great deal of grading. Where the wash does not scour, the slope wall is carried a foot or so below the bed of the wash

New Type of Concrete Pier and Slab Construction

and turned straight down in the form of a toe wall, as narrow as can be dug. On this division a toe wall can usually be dug from 14 to 18 in. wide. On a great deal of this territory the material which comes out of the trench is put back in the form of concrete. Therefore, it is cheaper to fill the trench with concrete than to build forms. However, a sheet of metal is dropped into the trench where it is too wide, and

Concrete Slab Opening With a Concrete Hand Rail

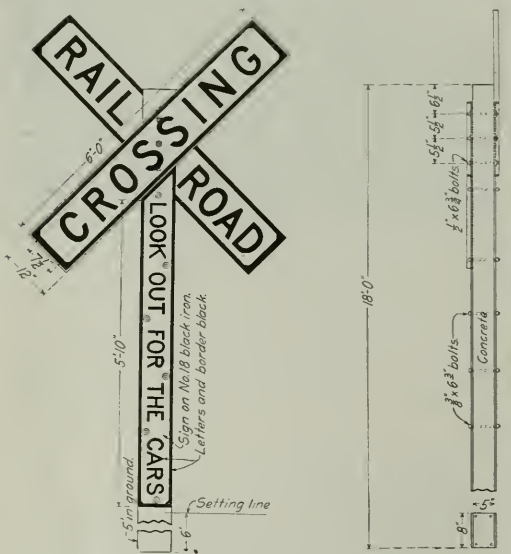
blocked against the side, answering the purpose of a form and keeping the wall the desired width.

Above the toe wall, the bank is sloped off on a 1½ to 1 angle with shovels. A 2-in. by 6-in. piece secured to stakes driven in the ground is laid along the top of the slope, defining the upper limit of the wall. Wire mesh is laid on the

slope and tied to mesh embedded in the toe wall. Parting strips, about 4 ft. apart, are then run down the slope from the 2 by 6 timber at the top to define the slope and skid against. No other forms are used.

The concrete is applied with shovels and skidded off against the parting strips. The greatest care should be taken to see that the mesh is pulled up and kept uniformly in the middle of the concrete. At the head banks of bridges and where water strikes it hard the blanket is made 6 in. thick. Where it is to encounter a rather gentle side wash the thickness is reduced to 4 in. or less.

Figures are not now available showing the cost of all of this work, but one stretch of 8.67 miles cost, per sq. ft., for labor $0.077 and for material $0.038, a total of $0.115. Another stretch of 1.75 miles cost for labor $0.062 and for material $0.031, a total of $0.093 per sq. ft. These had toe walls and no gravel or crushed rock was hauled in. The weather only was unfavorable, being very hot. Another stretch of about 0.75 mile, which was out in the country and not built against the roadbed, cost for labor $0.09 and for material $0.034, a total of $0.124 per sq. ft., the weather and the distance from the track being unfavorable and gravel being obtained on the spot. A wall 400 ft. long, sloped to the bottom, built about 1,500 ft. from the track, cost for labor $0.156 and for material $0.045, or a total of $0.201 per sq. ft. It is expected that many



Concrete Crossing Post With Steel Arms

more miles on this division will be protected in like manner in the future.

BRIDGES

In 1913 a 112-ft. reinforced concrete slab deck bridge was built under the main line and a siding at Klondike, Cal., from plans furnished by the bridge engineer. The bridge has seven 16-ft. spans. The plans, which were new designs, were general plans and did not contemplate a sidewalk and hand rail. In this particular instance it developed that a sidewalk and hand rail were necessary and these were added by making slight change in these plans. The ends of the piers were bracketed near the top, and this bracket was increased sufficiently to support the ends of the sidewalk slabs. The guard rail was abolished, the sidewalk serving that purpose, and the inner edge of the sidewalk slab was supported for its entire length on the outer edge of the deck slabs. In the case of this particular bridge an angle iron was used for a hand rail, the uprights being embedded in the ends of the piers and intermediate uprights being bolted by eye-bolts to the reinforcing of the sidewalk slabs. The iron was afterward painted the color of concrete and sanded. Crushed rock was used in the deck and sidewalk slabs and in the upper 3 ft. of the piers. The balance of the piers was made from gravel taken out of the excavation.

The slabs were cast at the site of the work and were put in place with a wrecker, U-bolts being provided for this purpose in the reinforcing. The photographs show construction of the bridge and the way the slabs were handled. The bridge cost $30.87 per running foot.

Another type of bridge that has been used in late construction more than any other on this division has a standard

The Concrete Crossing Post With Metal Cross Arms

creosoted ballast deck on concrete piers. This type of bridge is peculiarly suitable for this territory and is the result of the special conditions prevailing. The violent rains and the soluble nature of the soil render frame bents impracticable. Hard material, including gypsum, hard pan, cemented gravel, or heavy boulders, make it impossible to secure sufficient penetration of piles without digging holes or trenches to set them in, with the result that it is nearly, and in some cases wholly, as cheap to build concrete piers of the material at hand as it is to set piles. Material for the deck and the piers is always in stock, available on short notice, no special plans or supervision are necessary and there is no waiting for steel to be delivered. The creosoted timbers on the concrete last so many years that such a structure is practically a permanent water way. The piers are made strong enough so that when the deck does eventually wear out, steel, or even slab decks, may be substituted, if desired.

SIGNS

Experiments are also being made with concrete and metal signs. These signs are purely experimental as yet, but the results so far indicate that wooden signs cannot compete with concrete and metal, if the latter can be made in quantities by machinery. So far they have been made by hand.

One of the most practical results obtained with this type of sign, and one which might escape notice, is that anyone, say, the section foreman, can detach the metal bearing legend in a moment, attach a fresh one and ship the old one to the shop to be repainted. The large saving in this feature alone, over the prevailing method of sending a painter over the road on a speeder, needs only to be mentioned to be appreciated. This and the tendency hunters have for shooting holes in signs are the considerations that led to abandoning the idea of making them wholly of concrete. In climates where metal corrodes too readily wood may be substituted for the metal parts which bear the legend.

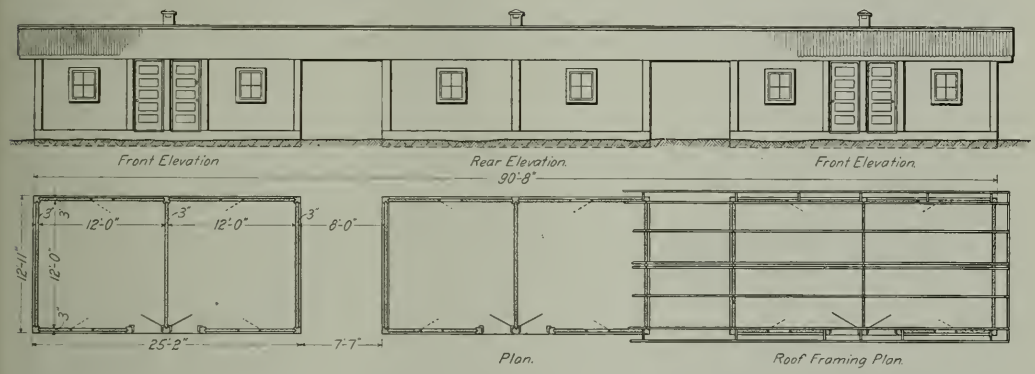
The following is a table showing the cost of these signs made by hand as compared with the store department price of wooden signs:

Kind of sign	Number made	Cost at Needles	Store department prices: Topeka	Cleburne	San Bernardino
Highway crossing	12	$3.72	$4.81	$4.75	.....
Station sign	18	1.90	1.62	1.72	$1.17
Yard Limit sign, tentative Y shape	4	2.73	2.32	.....	.....
Whistling sign	18	1.90	1.63	1.60	.94
Section limit board	14 posts / 28 signs	.75	.....	.80	.68
Station name board	3	4.45	.....	.....	.....
Rail rests	12	.50	.....	.....	.....

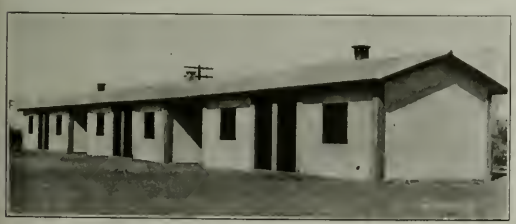
Signs made in Topeka, Cleburne and San Bernardino carrying overhead shop charges, while those at Needles do not.

BRAKEHOSE CELLARS

The campaign for "Safety First" led to the design of concrete cellars for brakehose and air valves in the train yards and many of them have been installed in the terminals at Needles and Barstow from plans shown herewith. The cover of the cellar is of metal, flush with the surface of the ground, and eliminates what has heretofore been a considerable hazard. These boxes were made at Needles at a cost of $1.98 each, and were then shipped to points where needed.



Plan and Elevation of Standard Concrete Bunk House



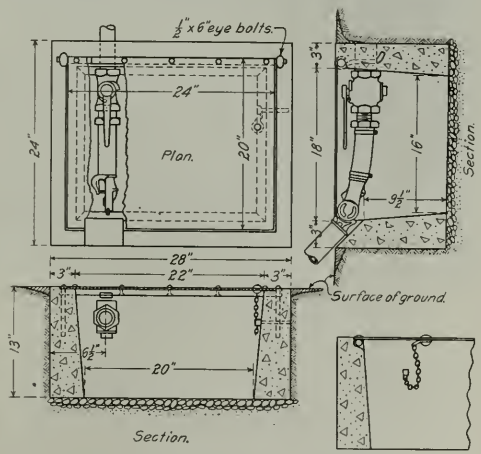
Standard Concrete Bunk House

REINFORCED CONCRETE BUNK HOUSE

Perhaps the most striking and satisfactory result so far, of the use of concrete, is the house for section laborers. The section laborers on this division are Mexicans and their bunk houses have heretofore been built of ties with oiled dirt roofs. For this class of labor it became highly desirable, if not necessary, to provide some form of habitation which could not be burned down and which would provide more sanitary living quarters.

The conditions mentioned at the beginning pointed to concrete construction as being the solution and, with generous backing on the part of the management, experiments have been carried on until such satisfactory results have been achieved, both as to meeting the needs and as to cost, that this type of house has been adopted as standard on the Coast Lines.

The first two houses were built by the unit system, the side, end and roof slabs being poured one on top of the other with building paper between. This required very little form work and made cheap construction, but had some undesirable features. It was difficult to ship the thin slabs, and to load, unload and set them up without breaking them. For the first house, at Needles, the slabs were poured at the site of the house. The second was poured at Needles, shipped 130 miles and set up. These cost $645.06 and $654.38, respectively.



Concrete Brake Hose Cellar

The next two were built on the unit system except that it had been decided that concrete was not the proper material for the roof and corrugated asbestos was substituted. These houses cost $612.39 each. The present method is to cast the pilasters in units and, after setting them up similar to the way that studding is set up for a frame house, the walls are poured. The roof is made of galvanized corrugated iron and is ceiled with Schumacher's wall board, a practically fireproof composition.

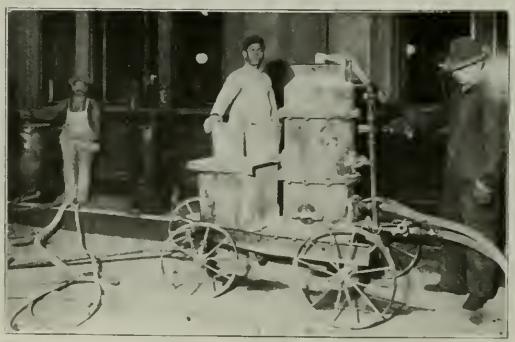
Thirteen houses have been constructed on the division and more are under construction. Four typical houses, the construction of what is thought to be the ultimate design, cost an average of $664.54, all the costs quoted being without freight or rental charges.

Two pump houses have been constructed along the same lines as the bunk houses, but the cost figures are not available.

These various uses of concrete have been developed under the general direction of W. H. Oliver, assistant engineer, and J. W. Wood, general foreman of bridges, of the Atchison, Topeka & Santa Fe, Needles, Cal.

PREVENTING CORROSION OF STEEL UNDER SEVERE CONDITIONS

The steel substructure of the Cortlandt street ferry terminal of the Pennsylvania in New York City was recently coated with a thin layer of cement and sand applied with a cement gun, to protect it from rust. This work is unusual in that the steel work is subjected to exceptionally severe conditions and no reinforcement was used in the Gunite. The first floor of this ferry terminal consists of a steel frame work with wooden floor beams and floor. The steel was given a coat of linseed oil paint before shipping, and after erection was cleaned with wire brushes and given two additional coats of a standard paint. It is about 4 ft. above high water, which at this point is very salty, and in addition, the steel is exposed to large quantities of steam which escape from the drip and drain pipes through the bulkhead wall at low tide. The surface of the steel is therefore wet at all times.



Cement Gun and Two Kelley Sand Blast Machines at Work in Cortlandt Street Ferry Terminal, New York

The paint which was first applied soon came off; the steel was again cleaned and asphaltum applied, but after about six months this could be dusted off with a broom. After this nothing was done for three years, when it was found that some action was necessary, as a coating of scale and rust had formed which could be pulled off in layers 3/32 in. thick. In consultation with the Cement Gun Company, Inc., New York, the proposal was made that the steel be covered with a wire mesh reinforcing, and Gunite be applied over this to a thickness of 1½ in. This proposal proved to be too expensive, however, as the placing of the reinforcement on the 220 steel girders and numerous tie beams was made very difficult by the layout of the wooden floor beams, and the thickness of Gunite would have been greater than that needed for the protection of the steel.

The question of coating steel without reinforcement was then taken up, and an exhaustive preliminary test made to see whether such an application of Gunite would be practical and satisfactory. It was found that the design of the steel work provided amply for the additional load, so that the ability of the Gunite to withstand the conditions existing was the only point to be determined. A piece of 4-in. by 4-in. angle 2 ft. long was sand-blasted to the gray metal and left with a smooth surface. As the steel work under the building was very badly pitted by corrosion it was evident that, after cleaning, the surface would be rougher than the test sample and would, therefore, afford a better bonding surface.

About one hour after the sample was cleaned, it was coated with a 1:3 mixture of cement and sand applied with a cement gun to a thickness of from ¼ in. to ½ in. The sample was then stored in moist salt air for three days, then submerged in salt water from the river for three days, then carried into a cold storage house nearby in the pan containing the salt water and the sample. Here the sample was taken out, placed in a clean, dry, wooden box on a sheet of white paper and stored at an even temperature of 5 deg. below zero for 48 hours. At the end of that time no cement had flaked off, and as it was coated with ice it was taken into a warm room and allowed to thaw out over night. In the morning no flaking had occurred and the sample was then placed on top of the boiler in a power house, where the temperature was 110 deg. F. It was left for three days, after which a microscopic examination showed it to be intact. No hair cracks were visible and no cement had flaked off. After it had cooled it was given a 2-ft. drop on a wooden floor and then on a concrete floor. Another microscopic examination failed to reveal cracks or checks, so to find out whether the water had penetrated the coating the sample was given a 10-ft. drop on a concrete floor, which broke the coating from the outside of the angle but not from the inside. There were no signs of corrosion, the neat cement bond and the glazed cement finish being evident.

As a result of the satisfactory nature of this test two sand-blast machines and a cement gun were put to work on the terminal. All the steel was first sand-blasted to the gray metal and then coated with Gunite to a thickness of ¼ in. to ½ in. The work was started early in October, 1914, and completed in January, 1915. An examination of the work after four months showed no signs of cracking and gave every indication of a strong bond.

The Pennsylvania has recently purchased a cement gun equipment to repair concrete-protected overhead steel bridges on which the concrete has been cut away by the action of locomotive blasts. This purchase was made after a two years' test of steel protected with Gunite under severe conditions, the test beams being located in the West Philadelphia station, directly over the point where many locomotives stop. There is quite a grade at this point, and on starting, the locomotives subject the beams to the full force of the blast No erosion or disintegration of the Gunite coating has occurred since this test was inaugurated.

SUPREME COURT AND THE POST OFFICE DEPARTMENT.—It is a pity, perhaps, that the principle of rate fixing by public service commissions recently enunciated by the United States Supreme Court, cannot be applied with equal rigor to the government's own enterprises. A state cannot compel a railroad to transport either passengers or particular commodities, says the court, at rates which do not yield reasonable compensation. If the post office department were managed on that principle, second-class mail matter and rural delivery service would have to pay postal rates sufficient to wipe out the heavy deficits which they now are responsible for each year.—*Springfield Republican.*

American Railway Engineering Association Committees

A Complete List of Names of Members Appointed and Subjects Specified for Investigation and Report

The Board of Direction of the American Railway Engineering Association has selected the personnel of the new committees and the subjects for investigation and report during the coming year as follows:

Committee I—Roadway

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of unit pressures allowable on roadbed of different materials, co-operating with Special Committee on Stresses in Railroad Track.
3. Report on the prevention and cure of water pockets in roadbed.

W. M. Dawley (chairman), Erie; J. A. Spielmann (vice-chairman), B. & O.; J. R. W. Ambrose, G. T.; A. F. Blaess, I. C.; S. P. Brown, C. N.; B. M. Cheney, C. B. & Q.; Ward Crosby, C. C. & O.; W. C. Curd, M. P.; Paul Didier, B. & O.; S. B. Fisher, M. K. & T.; Frank Merritt, G. C. & S. F.; L. G. Morphy, B. & A.; F. M. Patterson, I. C. C.; W. D. Pence, I. C. C.; W. H. Petersen, C. R. I. & P.; A. C. Prime; H. J. Slifer; J. E. Willoughby, A. C. L.; W. P. Wiltsee, N. & W.

Committee II—Ballast

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on the economical and efficient depth of ballast, co-operating with Special Committee on Stresses in Railroad Track.
3. Methods and cost of applying ballast—
   (a) Ballasting by contract.
   (b) Mechanical tamping and shoulder formings.
4. Efficiency of various stone and gravel ballasts.

H. E. Hale (chairman), President's Conference Committee on Valuation; I. M. Meade (vice-chairman), A. T. & S. F.; L. W. Baldwin, I. C.; D. P. Beach, P. L. W.; W. J. Bergen, N. Y. C. & S. L.; Carl Bucholtz, Erie; T. C. Burpee; O. H. Crittenden, I. & G. N.; J. M. Egan, I. C.; T. W. Fatherson, C. G. W.; H. L. Gordon, B. & O.; G. H. Harris, M. C.; C. C. Hill, M. C.; S. A. Jordan, B. & O.; William McNah, G. T.; S. B. Rice, R. F. & P.; E. V. Smith, B. & O.; D. L. Sommerville, N. Y. C.; F. J. Stimson, G. R. & I.; D. W. Thrower, I. C.; R. C. White, M. P.

Committee III—Ties

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on the effect of tie plates and track spikes on life of crossties.
3. Specifications for cross and switch-ties.
4. Metal, composite and concrete ties.

L. A. Downs (chairman), I. C.; F. R. Layng (vice-chairman), B. & L. E.; C. C. Albright, Purdue University; M. S. Blaiklock, G. T.; W. J. Burton, M. P.; W. A. Clark, D. & I. R.; S. B. Clement, T. & N. O.; E. D. Jackson, B. & O.; E. P. Laird, A. C. L.; E. R. Lewis, D. S. S. & A.; J. B. Myers, B. & O.; A. J. Neafie, D. L. & W.; J. V. Neubert, N. Y. C.; R. J. Parker, A. T. & S. F.; J. G. Shillinger, Rutland; I. O. Walker, N. C. & S. L.; H. S. Wilgus, P. S. & N.; Louis Yager, N. P.

Committee IV—Rail

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on rail failures, statistics and conclusions.
3. Report on effect on rail of defective equipment and improper maintenance.
4. Continue special investigation of rails.
5. Track bolts and nutlocks.

J. A. Atwood (chairman), P. & L. E.; R. Montfort (vice-chairman), L. & N.; W. C. Cushing, P. L.; E. B. Ashby, L. V.; A. S. Baldwin, I. C.; Chas. S. Churchill, N. & W.; J. B. Berry; G. M. Davidson, C. & N. W.; Dr. P. H. Dudley, N. Y. C.; C. F. W. Felt, A. T. & S. F.; L. C. Fritch, C. N.; A. W. Gibbs, P. R. R.; C. W. Huntington, M. & S. L.; John D. Isaacs, S. P.; Howard G. Kelley, G. T.; C. F. Loweth, C. M. & S. P.; H. B. MacFarland, A. T. & S. F.; C. A. Morse, C. R. I. & P.; J. R. Onderdonk, P. & O.; J. P. Snow; F. S. Stevens, P. & R.; A. W. Thompson, B. & O.; R. Trimble, P. L.; Geo. W. Vaughan, N. Y. C.; M. H. Wickhorst.

Committee V—Track

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of Economics of Track Labor.
3. Study the relation between worn flanges and worn switch points, with a view to correcting the causes and decreasing the number of derailments due to the combination of worn switch points and worn flanges on wheels.
4. Present specifications and designs for cut- and screw-spikes.
5. Report on guard rails and flangeways and effect of increase of 1/8-inch thickness of wheel flanges.

J. B. Jenkins (chairman), B. & O.; G. J. Ray (vice-chairman), D. L. & W.; Geo. H. Bremner, I. C. C.; J. F. Burns, L. & N.; H. M. Church, B. & O.; Garrett Davis, C. R. I. & P.; J. M. R. Fairbairn, C. P.; T. H. Hickey, M. C.; E. T. Howson, *Railway Age Gazette*; L. J. F. Hughes, C. R. I. & P.; E. L. Ingram, University of Pennsylvania; T. T. Irving, G. T.; J. R. Leighty, M. P.; H. A. Lloyd, Erie; A. C. Mackenzie, C. P.; P. C. Newhegin, B. & A.; F. B. Oren, I. C.; R. M. Pearce, P. & L. E.; H. T. Porter, B. & L. E.; E. Raymond, A. T. & S. F.; W. G. Raymond, State University of Iowa; L. S. Rose, C. C. C. & S. L.; H. R. Safford, G. T.; C. H. Stein, C. R. R. of N. J.; A. H. Stone, K. C. T.

Committee VI—Buildings

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on coaling stations.
3. Report on freight house scales.
4. Report on ashpits.

M. A. Long (chairman), B. & O.; G. H. Gilbert (vice-chairman), Q. & C.; G. W. Andrews, B. & O.; J. P. Canty, B. & M.; D. R. Collin, N. Y. C.; W. H. Cookman, P. R. R.; C. G. Delo, C. G. W.; W. T. Dorrance; C. H. Fake, M. R. & B. T.; A. T. Hawk, C. R. I. & P.; P. B. Roberts, G. T.; W. S. Thompson, P. R. R.

Committee VII—Wooden Bridges and Trestles

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of design of docks and wharves.
3. Report on comparative merits of ballast deck and reinforced concrete trestles.
4. Continue the study of the use of lag screws in trestle construction.

E. A. Frink (chairman), S. A. L.; W. H. Hoyt (vice-chairman), D. M. & N.; H. Austill, Jr., M. & O.; J. E. Barrett, L. & H. R.; H. C. Brown, Jr., I. C.; E. A. Hadley, M. P.; F. G. Hoskins, B. & O.; H. S. Jacoby, Cornell University; A. O. Ridgway, D. & R. G.; I. L. Simmons, C. R. I. & P.; D. W. Smith, H. V.; W. F. Steffens, N. Y. C.

Committee VIII—Masonry

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on cost and method of constructing concrete piles.
3. Report of cost, appearance and wearing qualities of surface finish of concrete.
5. Report on design of foundations for piers, abutments, retaining walls and arches in various soils and depth of water (not including pneumatic foundations).

F. E. Schall (chairman), L. V.; F. L. Thompson (vice-chairman), I. C.; R. Armour, G. T.; John C. Blye; H. A. Cassil, B. & O. S. W.; T. L. Condron; J. K. Corner, L. E. & W.; L. J. Hotchkiss; Richard L. Humphrey; W. S. Lacher, C. M. & S. P.; C. P. Richardson, C. R. I. & P.; R. A. Rutledge, A. T. & S. F.; G. H. Scribner, Jr.; F. P. Sisson, G. T.; Joh Tuthill; J. J. Yates, C. R. R. of N. J.

Committee IX—Signs, Fences and Crossings

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on principles governing the use of railway signs.
3. Continue the study of concrete fence posts.

W. F. Strouse (chairman), B. & O.; G. E. Boyd (vice-chairman), D. L. & W.; R. B. Abbott, P. & R.; H. E. Billman, M. P.; E. T. Brown, B. & O.; A. C. Copland, C. & O.; Arthur Crumpton, G. T.; J. T. Frame; L. E. Haislip, B. & O.; Marc Johnson, I. C.; L. C. Lawton, A. T. & S. F.; G. L. Moore, L. V.; Thomas Quigley, I. C.; C. H. Splitstone, Erie.

Committee X—Signals and Interlocking

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of economics of labor in signal maintenance.
3. Report on signal installations on single-track roads.
4. Present, for approval, specifications adopted by the Railway Signal Association, which, in the judgment of the Committee, warrant consideration.
5. Requisites for switch indicators, conveying information on condition of the block to conductors and enginemen.

C. C. Anthony (chairman), P. R. R.; J. A. Peabody (vice-chairman), C. & N. W.; Azel Ames; H. S. Balliet, N. Y. C.; C. A. Christofferson, N. P.; C. E. Denney; C. A. Dunham, G. N.; W. J. Eck, Southern; W. H. Elliott, N. Y. C.; G. E. Ellis, K. C. T.; M. H. Hovey; A. S. Ingalls, N. Y. C.; A. M. Keppel, Washington Terminal Company; H. K. Lowry, C. R. I. & P.; J. C. Mock, M. C.; F. P. Patenall, B. & O.; D. W. Richards, N. & W.; A. H. Rudd, P. R. R.; W. B. Scott, Sunset Central Lines; A. G. Shaver; Thos. S. Stevens, A. T. & S. F.; W. M. Vandersluis, I. C.

Committee XI—Records and Accounts

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Report on the use of small forms on cardboard or other suitable material for use of fieldmen in making daily reports, to the end that supervision may be facilitated and efficiency encouraged.

3. Continue the study of feasible and useful subdivisions of Interstate Commerce Commission classification accounts 202 and 220, with a view to securing uniformity of labor costs, separating the items in accordance with such forms as are promulgated by the I. C. C. during the year.

4. Investigation of methods for reproducing maps and profiles on drawing linen for permanent record.

W. A. Christian (chairman), I. C. C.; M. C. Byers (vice-chairman), W. M.; F. J. Bachelder; W. S. Danes, Wabash; Lester Bernstein, B. & O.; G. D. Hill, I. C.; Huntington Smith, N. Y. C. & S. L.; Henry Lehn, N. Y. C.; J. H. Milburn, B. & O.; J. W. Orrock, C. P.; J. C. Patterson, Erie; H. C. Phillips, A. T. & S. F.; J. H. Reinholdt, M. & St. L.; R. C. Sattley, C. R. I. & P.; Guy Scott, P. L.; H. M. Stout, N. P.; Frank Taylor, C. P.; J. M. Weir, C. R. I. & P.; W. D. Wiggins, P. L. W.; J. H. Prior, Public Utilities Commission of Illinois.

Committee XII—Rules and Organization

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Report on clearance for maintenance of way structures under assignment from the Committee on Maintenance of the American Railway Association, conferring with other committees.

3. Continue the formulation of rules for the guidance of field parties.

4. Continue the study of science of organization.

G. D. Brooke (chairman), B. & O.; F. D. Anthony (vice-chairman), D. & H.; R. P. Black, K. & M.; L. L. Beal, A. B. & A.; Ralph Budd, G. N.; J. B. Carothers, B. & O.; S. E. Coombs, N. Y. C.; C. Dougherty, Q. & C.; B. Herman, Southern; A. J. Himes, N. Y. C. & St. L.; Jos. Mullen, C. C. C. & St. L.; E. T. Reisler, L. V.

Committee XIII—Water Service

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Report on cost of pumping water by various methods.

3. Report on protection for water stations against freezing.

A. F. Dorley (chairman), M. P.; J. L. Campbell (vice-chairman), E. P. & S. W.; J. T. Andrews, B. & O.; C. A. Ashbaugh, G. C. & S. F.; F. T. Beckett, C. R. I. & P.; M. C. Blanchard, A. T. & S. F.; C. C. Cook, R. & O.; R. H. Gaines, K. C. S.; W. C. Harvey, C. G. W.; E. G. Lane, B. & O. S. W.; W. A. Parker, St. J. & G. I.; R. W. Willis, C. B. & Q.

Committee XIV—Yards and Terminals

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Report on handling of freight in double-deck freight houses and cost of operation.

3. Continue study of typical situation plans of passenger stations and approaches, and methods of operating same.

4. Continue the study of classification yards.

E. B. Temple (chairman), P. R. R.; B. H. Mann (vice-chairman), M. P.; W. G. Arn, I. C.; H. Baldwin, C. C. C. & St. L.; G. H. Burgess, D. & H.; A. E. Clift, I. C.; L. G. Curtis, B. & O. C. T.; H. T. Douglas, Jr., C. & A.; A. C. Everham, K. C. T.; R. Ferriday, C. C. C. & St. L.; G. H. Herrold; D. B. Johoston, P. L.; H. A. Lane, B. & O.; L. J. McIntyre, N. P.; A. Montzheimer, E. J. & E.; H. J. Pfeifer, T. R. R. A.; W. L. Seddon, S. A. L.; C. H. Spencer, I. C. C.; E. E. R. Tratman, Engineering News; E. P. Weatherly; W. L. Webb, C. M. & St. P.; C. C. Wentworth, N. & W.; J. G. Wishart, C. R. I. & P.

Committee XV—Iron and Steel Structures

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Continue the study of methods of protection of iron and steel structures against corrosion.

3. Continue the study of the relative economy of various types of movable bridges.

4. Continue the study on secondary stresses and impact.

5. Continue the study of column tests.

A. J. Himes (chairman), N. Y. C. & St. L.; O. E. Selby (vice-chairman), C. C. C. & St. L.; J. A. Bobland, G. N.; W. S. Bouton, B. & O.; A. W. Buel; A. W. Carpenter, N. Y. C.; Charles Chandler, I. C.; C. L. Crandall, Cornell University; J. E. Crawford, N. & W.; A. Chas. Irwin, C. M. & St. P.; J. M. Johnson, I. C.; B. R. Leffler, L. S. & M. S.; W. H. Moore, N. Y. N. H. & H.; P. B. Motley, C. P.; Albert Reichmann, American Bridge Company; J. W. Reid, C. & A.; A. F. Robinson, A. T. & S. F.; H. B. Seaman; C. E. Smith, M. P.; H. B. Stuart, G. T.; G. E. Tebbetts, K. C. T.; F. E. Turneaure, University of Wisconsin; L. F. Van Hagan, University of Wisconsin.

Committee XVI—Economics of Railway Location

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Establish a rational basis for determining the relative efficiency of various locations.

3. Report on effect of curvature on cost of maintenance of way and equipment.

4. Report on train resistance at speeds exceeding 35 miles per hour.

5. Report on fuel consumption per horsepower hour.

John G. Sullivan (chairman), C. P.; C. P. Howard (vice-chairman); F. H. Alfred, P. M.; R. N. Begien, B. & O. S. W.; Willard Beahan, L. S. & M. S.; D. F. Crawford, P. L. W.; Maurice Coburn, Vandalia; A. C. Dennis; R. D. Gardner, S. N. E.; A. S. Going, G. T.; F. W. Green, Louisiana & Arkansas; P. M. LaBach, C. R. I. & P.; Fred Lavis; J. de N. Macomb, Jr., A. T. & S. F.; C. W. P. Ramsey, C. P.; S. S. Roberts; E. C. Schmidt, University of Illinois; A. K. Shurtleff, Engineering Committee of the President's Conference; H. J. Simmons, E. P. & S. W.; H. R. Talcott, B. & O.; L. L. Tallyn, D. L. & W.; Walter Loring Webb; H. C. Williams, L. & N.; M. A. Zook, I. C. C.

Committee XVII—Wood Preservation

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Continue the study of the effect of water in creosote.

3. Continue the study of the relation of amount of preservative and depth of penetration to the resistance of materials against decay, and also the penetration of preservatives.

4. Continue the compilation of service test records.

5. Report on drying process of wood preservation.

Earl Stimson (chairman), B. & O.; E. H. Bowser (vice-chairman), I. C.; F. J. Angier, B. & O.; W. A. Fisher, A. C. L.; C. F. Ford, C. R. I. & P.; Dr. W. K. Hatt, Purdue University; V. K. Hendricks, St. L. & S. F.; George E. Rex, A. T. & S. F.; E. A. Sterling; Lowry Smith, N. P.; C. M. Taylor, C. R. R. of N. J. and P. & R.; C. H. Teesdale, Forest Products Laboratory; T. G. Townsend, S. O.; Dr. Hermann von Schrenk.

Committee XVIII—Electricity

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Continue the study of the subject of clearances of third rail and overhead structures, conferring with other committees.

3. Continue the study of electrolysis and insulation and its effect upon reinforced concrete structures.

4. Report on water power for electrical railway operation.

5. Continue the study of maintenance organization with relation to track structures.

George W. Kittredge (chairman), N. Y. C.; J. B. Austin, Jr. (vice-chairman), L. I.; D. J. Brumley, I. C.; R. D. Coombs; A. O. Cunningham, Wabash; Walt Dennis, C. R. I. & P.; R. H. Ford, C. R. I. & P.; George Gibbs, P. R. R.; G. A. Harwood, N. Y. C.; E. B. Katte, N. Y. C.; C. E. Lindsay, N. Y. C.; W. L. Morse, Jacksonville Terminal Company; W. S. Murray; J. A. Peabody, C. & N. W.; Frank Rhea, I. C. C.; J. R. Savage, L. I.; Martin Schreiber, Public Service Railway; H. U. Wallace, Northern Colorado Power Company.

Committee XIX—Conservation of Natural Resources

1. Continue the study of tree planting and general reforestation.

2. Present specifications for southern yellow pine, conferring with other committees and associations.

3. Continue the study of resources of iron ore, coal, fuel-oil and timber.

4. Report on water power for railway electrical operation.

C. H. Fisk (chairman); William McNab, G. T.; R. H. Aishton, C. & N. W.; Moses Burpee, Bangor & Aroostook; F. F. Busteed, C. P.; A. L. Davis, I. C.; W. A. Hammel; A. L. Moorshead, Erie; Francis Lee Stuart, B. & O.; S. N. Williams, Cornell College; R. C. Young, L. S. & I.

Uniform General Contract Forms

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Report on siding agreements.

3. Report on agreement forms for interlocking and railway crossings, conferring with Committee on Signals and Interlocking.

E. H. Lee (chairman), C. & W. I.; C. A. Wilson (vice-chairman); C. Frank Allen, Massachusetts Institute of Technology; W. G. Atwood, I. C. C.; John P. Congdon; Thos. Earle, Pennsylvania Steel Co.; J. C. Irwin, B. & A.; R. G. Kenly, M. & St. L.; C. A. Paquette, C. C. C. & St. L.; J. H. Roach, L. S. & M. S.

Grading of Lumber

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.

2. Report on grading rules for white and Norway pines.

3. Specifications for southern yellow pine. (A. S. T. M.)

4. Specifications for timber to be treated in co-operation with the Committee on Wood Preservation.

Dr. Hermann von Schrenk (chairman); B. A. Wood (vice-chairman), M. & O.; W. McC. Bond, B. & O.; D. Fairchild, N. P.; W. H. Norris, Maine Central; J. J. Taylor, K. C. S.

Stresses in Track

A. N. Talbot (chairman), University of Illinois; W. M. Dawley (vice-chairman), Erie; A. S. Baldwin, I. C.; J. B. Berry; G. H. Bremner, I. C. C.; John Brunner, Illinois Steel Co.; W. J. Burton, M. P.; Chas. S. Churchill, N. & W.; W. C. Cushing, P. L.; Dr. P. H. Dudley, N. Y. C.;

H. E. Hale, President's Conference Committee; Robt. W. Hunt; J. B. Jenkins, B. & O.; George W. Kittredge, N. Y. C.; P. M. LaBach, C. R. I. & P.; C. G. E. Larsson, American Bridge Co.; William McNab, G. T.; G. J. Ray, D. L. & W.; Albert Reichmann, American Bridge Co.; Earl Stimson, B. & O.; F. E. Turneaure, University of Wisconsin; J. E. Willoughby, A. C. L.

THE DISTRIBUTION AND CARE OF CROSSTIES*

By E. F. Robinson

Chief Engineer, Buffalo, Rochester & Pittsburgh

The question of the distribution and care of crossties is one of the most important that we have to deal with in track maintenance and one that has been given a great deal of thought and attention by our present engineering organization. We have a timber-preserving plant at Bradford, which was placed in service during the summer of 1910, and since that time practically all cross and switch ties placed in our tracks have been treated with creosote, with the exception of ties renewed in unimportant side tracks.

In outlining our present practice, we considered it necessary to begin at the beginning, that is, with the purchase of the untreated ties. We are very particular in the selection of our ties, both as regards the manufacture and the character of timber, and nothing but first-class material is accepted. With a view of securing uniform treatment and a uniform roadbed, we accept nothing for treatment but sawed ties of uniform dimensions, excepting in some cases where we have been unable to secure sufficient local ties for our supply. We have found it necessary to purchase yellow pine hewn ties from the South, but this applies to a limited extent only. So far we have been able to secure practically all ties locally from points near our line, mostly beech, maple, hickory, red oak and chestnut. After the selection of the ties, we give careful attention to the piling and seasoning before treatment, separating the different classes of timber into groups, as our experience in treating may dictate. I am a firm believer in thoroughness in the treatment of ties, and am strongly of the opinion that in treating some classes of timber to refusal and others with from 10 to 12 lb. of creosote oil per cu ft., we are working in the right direction, especially in view of the precautions taken in the handling and protection of ties after treatment, details that unfortunately are entirely disregarded on a great many roads.

After the ties are treated they are either piled in the storage yard at our timber-preserving plant, or shipped out along the line, depending upon conditions. Usually in the fall and early spring months, before we wish to distribute ties along the track for renewals, we ship them out from the plant as treated and pile them in standard piles at stations and adjacent to sidetracks where they can be reloaded easily for distribution by the section men. During the summer months the piles are covered with a layer of earth to prevent rapid drying out, but during the winter months they are left uncovered.

We require our men to be very careful in the handling of treated ties; they are not allowed to throw them over the sides of cars on top of each other in piles, neither are they permitted to throw them down embankments promiscuously when distributing for renewals. We require the use of tongs in pulling ties into the track, and absolutely prohibit the use of shovels, picks or any other tools for this purpose. We also prohibit the use of spike mauls or like tools for bucking the ties around in the track.

As sawed ties do not require adzing for tie plates, and as what few hewn ties we treat are adzed at the plant before treatment, it is not necessary for the track men to use an adze on them; but we realize, of course, that in a few years, as the tie plates will settle more or less into the ties, it will be necessary to adze them to some extent when laying new rail or when rolling rail in on curves. Every treated tie that goes into our tracks, both on tangents and curves, is plated with a Goldie shoulder tie plate, size ½ in. x 7 in. x 9 in., and these plates are applied to the ties, using the Ware tie-plate gage and surfacer and beetles, before the ties are placed in the track. Where it is necessary to pull spikes, all holes in treated ties are plugged with creosoted tie plugs, and before driving the plugs in place, hot creosote is poured into the spike holes, the men driving the plugs being provided with goggles to avoid injury to the eyes. Where it becomes necessary to adze treated ties, the cut surfaces immediately receive a brush treatment of hot creosote oil.

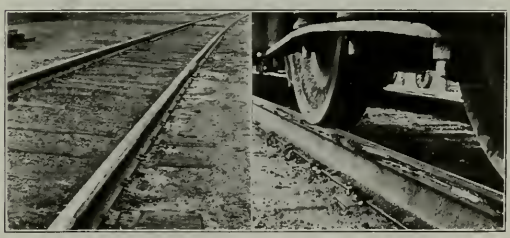
A galvanized nail is applied to the ties at the timber-preserving plant, indicating the class of timber, and when the ties are placed in the track dating nails are applied, showing the year. Section foremen are required to submit a daily report, showing the number of ties of each class placed in the track between each mile post, and a condensed record is kept in this office. In the case of the removal of treated ties from the track from any cause whatever, the foremen are required to report, giving sufficient data as regards location, etc., to enable us to trace out the life of the ties removed.

With the exception of providing our men with goggles to protect the eyes, we have not thought it necessary to adopt any method of protection against poisoning, except to call the attention of our foremen to the necessity of using extreme care in the handling of treated ties, especially in the case of men having skin abrasions or any form of skin disease. When we first commenced using treated ties, we had a large number of cases of poisoning, but this trouble seems to be disappearing as our men become more familiar with the handling of the treated timber.

*Abstracted from Appendix A to the report of the Committee on Ties of the American Railway Engineering Association.

EFFECT OF CANTING THE LOW RAIL ON CURVES

In our issue of August 21, 1914, page 351, we discussed the practice of canting rails and the advantages and disadvantages resulting therefrom. In that article we referred particularly to the detrimental effect of canting the inner or low rail on curves, as this brings the line of contact between the rail and the wheels on the outer edge of the head, causing excessive pressure and flowing of the metal. This condition is strikingly shown by the two accompanying photographs recently taken within a few minutes of each other at the same location. The one on the left shows the condition of a Bessemer rail canted inward slightly on the low side of a 3 deg. 30 min. curve after being in the track eight months. The elevation at this point was 3¼ in. and the gage 4 ft. 9⅛ in. This curve was within station limits near a water tank where many trains stop and the speed was therefore slow. The photograph on the right shows the contact of a car wheel on the outer edge of the rail with light showing between the inner edge of the rail and the wheel tread.



Condition of Low Rail on Curve (on Left) and Condition Causing It (on Right)

A SUCCESSFUL EXAMPLE OF TREE PLANTING*

The catalpa plantation of the Illinois Central at Harahan, La., is located seven miles north of New Orleans, on the main line of the Illinois Central, and consists of 200 acres set apart from land already acquired by the railroad company. The soil is the well known alluvial deposit of the Mississippi river bottom land, of great depth, and having good drainage and sub-irrigation. The planting was made in the spring of 1902, at which time 173,000 one-year seedlings of the Catalpa Speciosa were planted. The trees were planted 4 ft. apart, with the expectation that the close planting would promote a straight growth until such time as the trees had become sufficiently large for fence posts, thinning them out as they became of such size, leaving the trees that were to grow into size for crossties approximately 12 ft. apart.

The handling of the plantation was at first entrusted to outside parties, who, on account of lack of familiarity with the soil and labor conditions, incurred a greater expense, in

View in Illinois Central Catalpa Plantation at Harahan, La.

the first few years, than is now felt to have been necessary, in the cultivation and upkeep of the plantation, although, due to the exceedingly fertile soil, an unusual expense would necessarily be incurred in the first few years in the protection of the seedlings from the rank growth of grass, weeds and underbrush, which had a tendency not only to smother the seedlings, but presented a fire risk in the fall of the year, from which latter cause considerable injury was incurred on several occasions.

When the trees were first planted, it was with the theory that when the catalpa tree is cut back at an age of from three to five years, the sprouts which will spring from the stump will be straight, more hardy and generally better than if the original tree be allowed to mature. Carrying out this theory at Harahan, a considerable number of young trees were cut back, but the few sprouts that grew were inferior to the original plant and showed no superior qualities as to straight growth. While this theory may be applicable to a catalpa tree growing in an isolated position, experience at Harahan plantation proved that when catalpa trees are planted closely together the shadows cast by their tops, together with atmospheric conditions and probably sub-surface influence, produce a different effect, and the stump produces sprouts with short life and very slow growth.

In 1906 the practice of cutting back the young trees was abandoned and the growth having advanced considerably, cattle were allowed to graze throughout the plantation, with the result that the growth of grass and weeds was kept down, danger from fire was eliminated, the trees became sturdy and straightened up well in their growth, and heavy expenditures for upkeep were no longer necessitated. This practice is continued at the present time. While this might not be successful under other conditions, it has given the best results in the particular condition of climate and soil and character of trees at this particular plantation.

At the 1914 convention of the American Railway Engineering Association the Illinois Central exhibited a standard 6 in. by 8 in. by 8 ft. crosstie, and two 6-ft. fence posts cut from a single catalpa tree grown on the plantation in 12 years from the seed, but the tree from which these were cut was one of the largest in the plantation, being probably twice the size of the average tree. It was given as an illustration of the possibilities under the most favorable conditions.

The financial status of the plantation as of June 30, 1914, was as follows:

Cost of 200 acres of land in 1898	$ 1,466.67	
173,000 seedlings	1,346.66	
Preparing land and planting	2,537.96	
Cultivation	3,030.13	
Total first year ending June 30, 1903		$ 8,381.42
Cultivation, 1904		4,805.25
Cultivation, 1905		1,643.76
Cultivation, 1906		2,334.65
Fencing and fire protection, 1907		525.40
Cultivation and thinning, 1907 to 1914		606.92
Taxes and interest charges to 1914		8,055.70
Total cost to June 30, 1914		$26,353.10
Credit—rent from pasture and fence posts cut		1,102.92
Net investment		$25,250.18
Present value:		
150,000 posts, first class, at 20 cents	$30,000.00	
150,000 posts, second class, at 10 cents	15,000.00	
	$45,000.00	
Less cost of making at 5 cents each	15,000.00	
Net value		$30,000.00

The value of posts obtained by thinning has now reached a point where, added to rent received from owners of stock pastured, an annual revenue is obtained which pays for the small annual expense of supervision and for taxes, and meets the annual interest charges due to the heavy expenditures of the first four years of the life of the plantation. The total investment in 1922 is estimated at approximately $25,600. If conditions continue as at present there should be obtained from the plantation at that date not less than:

260,000 posts at 25 cents	$ 65,000.00
130,000 ties at 75 cents	97,500.00
Total	$162,500.00
Deduct cost of making	45,500.00
Net value	$117,000.00

The land has appreciated so that its value in 1914 was not less than $50 per acre, or for the 200 acres, $10,000. In 1922 the land will probably be worth not less than $150 per acre, or a total of $30,000, but it is land bought and held for future terminal expansion, and is being used with a view of getting the greatest return from it pending the date at which such expansion becomes necessary.

The results, however, seem to justify further development along these lines, and the subject is being looked into with a view of carrying the experiment further.

*Abstracted from a statement by A. S. Baldwin, chief engineer, Illinois Central, in the report of the committee on The Conservation of Natural Resources of the American Railway Engineering Association.

General News Department

In Canada all passengers by railroad now have to pay a tax on both railroad and sleeping car tickets.

The Southern Railway and the Seaboard Air Line have agreed to use their own tracks in common between Raleigh, N. C., and Cary, 12 miles. Each road has a single track, and the new tracks will be operated as a double track railway. There are no stations between Raleigh and Cary, except flag stops and a passing track.

The Globe Express Company is going out of business about June 1; and will be succeeded on the Denver & Rio Grande by the Wells-Fargo and on the Western Pacific by the American Express Company. The American, which operates over the Union Pacific, will then have a continuous line from the Atlantic to the Pacific.

The Virginia Railway & Power Company, operating electric cars in Norfolk, Va., announces that it will reward each conductor and motorman who has gone through the last six months without an accident, with a new suit of clothes. The names of the employees of the company who are to receive this favor are printed in a local newspaper.

A conference on the proposed purchase by the state of California of the Western Pacific Railroad, now in receivership, was held last week in the office of Governor Johnson of California. After the meeting the governor said, "All there is to say is that we have been considering the matter and when our study is completed a statement will be made."

The carferry "Ontario No. 2," of the Grand Trunk Railway, was successfully launched at the yards of the Polson Iron and Shipbuilding Company last week. The vessel was designed by William Newman, is of steel and will cost $500,000. It is to run between Coburg, Ont., and Charlotte, N. Y. It is 318 ft. long, 54 ft. beam and 20.5 ft. molded depth. She has capacity for 30 loaded 70-ton cars. Her speed will be 17 miles an hour. The vessel is built as an ice breaker and is expected to make her way through ice 4 ft. thick.

Postmaster General Burleson has issued another notice, dated last Sunday, replying to some criticisms of the railways' mail committee. He says that on important through routes between New York and Chicago the government pays the carriers $903,359 for tonnage which if carried by express would net the railways only $452,352 a year. He says that Mr. Peters' comparison between express rates and mail rates, using as an illustration express shipments of one pound each, is not fair; and in particular that the small packages make up but a very small proportion of the merchandise carried by express.

To its slogan, "Safety First," the Pennsylvania Railroad has added "courtesy first," and is to have some lectures at Philadelphia on two days this week for the benefit of employees on the Philadelphia terminal division and for passenger trainmen of other divisions who run to and from Philadelphia. Among the employees who have been notified to attend the courtesy meetings are assistant station masters, clerks in ticket offices, ticket examiners, ushers, elevator attendants, checkmen, station patrolmen, telephone operators, cab starters, package, parcel and ladies' room attendants, station porters, and clerks and others in freight agents' offices. Similar lectures will be given at other terminals.

A special committee of the Michigan legislature appointed to investigate rumors that the railroads were spending money improperly to influence the passage of the 2½ cents a mile passenger fare bill, after several hearings has rendered a report, in which it says: "There has been no improper conduct on the part of the representatives of the railroads, and there exists no grounds upon which to base the slightest suspicion that any agent or representative of the railways has made corrupt use of money. There never existed any so-called slush fund or publicity fund of $300,000, or $100,000, for the purpose of putting the fare bill through the legislature, but there has existed a fund, designated as publicity fund, of about $15,000, which was expended honestly and legitimately."

Among the worst of the innumerable acts of wanton vandalism committed by the different warring factions in Mexico, the destruction wrought on the property of the National Railways in Monterey by the Carrancistas on the eve of their recent evacuation of the city probably caps the climax. When the near approach of the Villa forces made it apparent to the Carranza followers that they would have to abandon the town, it was decided to celebrate their coming departure with an orgy of anarchy. Locomotives were sent out to gather up all the box cars on the adjacent divisions of the railway and bring them to Monterey for the purpose of making a bonfire of them. These cars—more than 600 in number—were hauled into town and lined up on the extensive division terminal tracks. On the last night the Carrancista officers gave an elaborate ball in the handsome passenger station of the National Railways, which ended with a mock ceremony in which the torch was applied to the costly passenger station and to the 600 box cars. Within a few hours all of this valuable property was in ruins.

Street Car Disaster in Detroit

A press despatch from Detroit, Mich., reports 15 persons killed and 20 injured on the afternoon of April 14, in a collision between a Detroit City street car and a string of freight cars pushed by a switching engine on the Detroit, Toledo & Ironton. The street car was heavily loaded with passengers homeward bound from their day's work. As the car approached the railroad crossing it stopped and the conductor ran ahead to see if the track was clear. He signaled the motorman to wait, but apparently the latter, who is said to have been inexperienced, misunderstood his meaning. He applied the power and the car ran rapidly down an incline and on to the railroad tracks.

Alaska Railway Authorized

Secretary Lane of the Interior Department announced on Saturday that the President had adopted the Susitna route for the proposed railway to be built by the Government to the interior of Alaska, and that he had decided to buy the Alaska Northern, extending from Seward inland 71 miles, which will be a part of the Government line. This line will be extended from its northern terminus northward through the Susitna valley across Broad Pass and down the Tanana river to Fairbanks, a total distance of 471 miles from Seward. A branch will also be run from Matanuska Junction eastward into the Matanuska coal fields, 38 miles. The Alaska Northern was purchased for $1,150,000, while the estimated cost of the entire system is $26,800,000. Seward is at the head of Resurrection Bay, about 300 miles west of the boundary between Alaska and the Dominion of Canada. Secretary Lane announced that construction work would be begun at once and that probably 40 miles could be completed this year.

Railroad Legislation in Maine

Laws pertaining to the railroads in the state of Maine passed by the session of the state legislature, recently adjourned, provide for but few changes over previous legislation.

Several amendments were made to the Public Utilities law of 1913, viz., permitting railroads to carry, free, police officers, firemen in uniform, municipal fire apparatus, editors and regularly employed reporters of newspapers; giving the Public Utilities Commission full power to investigate all accidents resulting in death or personal injury, on the premises of all public utilities; and where the utility is a common carrier and an accident occurs, it is required that it shall transport all witnesses over its lines free of charge; free transportation for the members of the commission, their employees and agents is provided; the commission is required to provide for a chief inspector of utili-

ties, who shall be "a practical railroad man" and perform such duties as the commission may require, at a salary left to the discretion of the commissioners; and amendments giving the commission all authority formerly held by the state railroad commission.

Laws were passed authorizing railroads to give passes as usual to their employees, even if the employee holds a public office; requiring railroads to issue 500-mile books at the same rate as thousand-mile books; and providing for disposing of all inflammable material along the railroad rights-of-way. Under the last law, anyone cutting any forest growth on property adjacent to the right-of-way of a railroad must clear away and dispose of all slash and debris within 50 ft. of the right-of-way. The laws passed are subject to the referendum, and do not become operative until 90 days after the adjournment of the legislature.

Legislation Affecting Railways

The lower house of the Michigan legislature has passed the bill establishing a sliding scale of passenger fares for railroads in the state, ranging from 2 to 3 cents a mile, according to the earnings of the railroads. The vote was 24 to 6. The bill provides that roads earning less than $1,200 a mile may charge three cents.

Next Wednesday, April 21, will be "Railroad Day" at Springfield, Ill., arrangements having been made to give the railroads a hearing before the House and the Senate committees on public utilities on the bills pending before the legislature to increase passenger fares generally throughout the state to the basis of 2½ cents a mile. The roads are planning to send a large delegation of railroad officers, headed by President C. H. Markham of the Illinois Central. The presidents of all the principal roads have signified their intention of being present.

The executive committee of the Chicago Association of Commerce has adopted a resolution opposing the extra crew and train limit bills pending in the Illinois legislature. The association's committee on legislation had recommended the adoption of the resolution at a previous meeting. "We believe these bills raise questions of public concern," said Charles L. Dering, president of the association. "It is evident that any unnecessary burden placed on the carriers must ultimately be borne by the shippers, thereby increasing the cost of transportation which eventually reflects upon the consumer."

Railroad Men's Improvement Society

At the semi-monthly meeting of the Railroad Men's Improvement Society, held at 90 West street, New York, on April 8, a paper was presented by C. E. Hildum, auditor of freight accounts of the Erie, entitled: The Audit Office Settlement Idea The Railroad Men's Improvement Society is a railroad club having a membership of over 300 of the younger men from the general offices of several of the railroads centering in New York City. Meetings are held on the second and fourth Thursdays of each month, usually in the rooms of the Trunk Line Association at 143 Liberty street, New York, and at these meetings papers are presented on subjects of interest to railroad men.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railroad Men's Improvement Society.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Signal Association.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama & Vicksburg	143	$66,656	$25,478	$103,231	$17,345	$28,104	$3,451	$46,960	$2,179	$5,600	$103,640	—$409	$8,600	—$9,009	—$18,959
Alabama Great Southern	309	263,365	65,773	358,374	44,112	83,098	13,204	134,834	2,197	7,913	269,584	88,791	15,154	73,620	12,881
Ann Arbor	294	120,327	33,154	163,955	13,080	22,291	4,919	79,300	214	7,270	127,074	36,881	10,580	26,282	20,073
Arizona Eastern	367	116,626	22,638	151,824	26,824	19,116	2,144	46,397	1,408	10,554	106,430	45,394	12,460	32,934	—38,725
Atchison, Topeka & Santa Fe	8,514	4,796,157	1,900,202	7,301,008	834,995	1,276,835	176,703	2,206,372	.....	149,378	4,637,122	2,663,886	409,503	2,248,412	506,962
Atlanta & West Point	93	48,186	31,251	95,225	8,547	22,874	5,092	31,185	1,591	4,238	73,527	21,698	5,785	15,908	—719
Atlanta, Birmingham & Atlantic	639	149,600	30,162	197,624	35,123	45,462	11,864	93,642	—163	10,894	196,823	801	13,100	12,335	—38,995
Atlantic & St. Lawrence	167	105,471	14,580	130,583	14,530	26,452	4,649	75,292	.....	3,681	124,603	5,980	10,800	—4,820	—33,555
Atlantic City	170	53,926	44,350	105,548	25,920	22,541	1,541	25,036	123	1,008	126,259	—20,710	13,500	—34,210	26,427
Atlantic Coast Line	4,700	1,726,539	753,984	2,681,611	346,746	377,424	56,324	902,099	14,182	66,062	1,760,819	920,792	138,000	782,614	—186,051
Baltimore & Ohio—System	4,516	5,081,511	853,186	6,469,049	635,471	1,090,009	150,182	2,530,536	46,180	165,513	4,617,731	1,851,318	285,328	1,563,332	1,001,886
Baltimore & Ohio Chicago Terminal	79	.....	427	116,289	6,961	15,029	821	50,780	1,050	3,804	76,525	39,764	19,021	20,713	37,091
Bangor & Aroostook	631	291,419	35,947	343,524	37,235	45,900	2,428	101,193	2,244	9,380	198,344	145,180	12,525	132,655	115,047
Belt Ry. Co. of Chicago	24	.....	.....	240,607	13,620	26,783	828	89,866	.....	5,859	136,957	103,650	11,587	92,063	14,603
Bessemer & Lake Erie	205	172,986	20,800	202,980	38,395	135,709	8,675	106,305	.....	11,711	290,850	—87,870	17,003	104,889	69,835
Bingham & Garfield	27	99,602	2,800	102,807	4,725	13,613	883	17,695	22	1,660	38,648	64,159	2,367	61,792	—517
Birmingham Southern	44	33,649	496	59,576	8,459	10,865	551	23,734	.....	3,378	46,987	12,589	2,063	10,526	4,937
Boston & Maine	2,302	1,954,480	925,795	3,210,802	390,753	475,544	28,593	1,560,181	14,599	94,314	2,563,983	646,819	155,000	491,819	517,542
Buffalo & Susquehanna R. R. Corporation	253	106,980	5,664	115,391	17,509	38,932	1,863	37,893	.....	5,452	101,650	13,741	2,600	11,141	—6,272
Buffalo & Susquehanna Railway	91	8,819	4,267	14,865	3,268	6,014	818	10,997	6	2,298	23,401	—8,535	1,600	—10,135	—12,090
Buffalo, Rochester & Pittsburgh	586	562,166	72,485	657,570	67,276	137,323	11,641	253,128	985	17,179	487,533	170,037	20,000	150,037	16,797
Canadian Pacific Lines in Maine	233	119,319	16,263	141,715	7,596	25,767	5,042	57,912	.....	3,426	99,743	41,972	12,000	29,972	36,025
Carolina, Clinchfield & Ohio	248	150,452	10,578	164,770	24,976	20,366	5,986	33,147	.....	9,801	93,455	71,315	14,250	57,065	—12,097
Carolina, Clinchfield & Ohio of S. C.	18	9,026	947	10,345	1,420	70	1,573	2,000	.....	763	5,825	4,520	750	3,770	—1,253
Central of Georgia	1,924	662,896	206,761	964,228	118,714	181,239	32,171	345,760	2,036	34,141	713,681	250,547	50,285	199,779	—30,105
Central of New Jersey	678	1,348,371	352,361	1,840,234	151,558	418,042	33,065	765,820	10,739	47,806	1,426,995	413,239	106,417	306,823	—61,163
Central New England	304	242,447	31,153	288,723	30,132	29,809	1,316	99,268	.....	3,958	164,456	124,266	14,998	109,268	69,846
Central Vermont	411	199,697	55,249	272,568	29,273	57,448	9,131	144,435	1,974	5,784	248,046	24,522	15,760	8,762	62,632
Charleston & Western Carolina	341	104,436	20,187	131,513	26,321	20,280	3,044	49,534	5	3,997	103,177	28,336	5,000	23,336	—1,472
Chesapeake & Ohio Lines	2,372	2,350,199	347,146	2,867,273	294,886	578,980	53,144	1,049,819	15,384	68,371	2,060,584	806,689	115,009	685,872	320,490
Chicago & Alton	1,033	674,835	247,569	1,015,923	150,662	257,892	35,038	427,497	8,475	30,343	909,907	106,016	45,012	60,665	180,093
Chicago & Eastern Illinois	1,282	801,650	203,257	1,092,446	135,981	237,026	27,196	448,316	9,089	35,811	893,269	199,177	53,600	145,312	19,873
Chicago & Erie	270	451,045	34,301	519,267	50,654	77,236	16,745	228,882	2,181	11,958	385,082	134,184	20,500	113,684	199,517
Chicago & North Western	8,108	3,944,023	1,307,196	5,812,349	520,424	999,358	117,567	2,439,796	41,615	156,832	4,271,670	1,540,679	375,000	1,165,350	173,844
Chicago, Burlington & Quincy	9,375	4,615,318	1,287,164	6,504,847	515,351	1,278,194	130,560	2,418,726	48,027	177,960	4,568,818	1,936,029	325,660	1,610,369	3,845
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	49,591	10,400	71,377	6,584	12,061	1,571	39,179	.....	1,262	60,658	10,719	2,870	7,849	2,738
Chicago Great Western	1,429	707,117	202,524	1,003,157	92,826	162,824	45,970	450,837	7,751	34,126	794,189	208,968	48,668	160,091	3,476
Chicago, Indianapolis & Louisville	618	296,532	114,111	454,555	32,041	52,059	17,820	174,460	101	14,765	291,244	163,311	26,318	136,980	116,406
Chicago Junction	24	.....	.....	151,096	21,445	19,779	1,082	94,005	.....	6,542	142,853	8,243	1,492	6,751	—5,373
Chicago, Milwaukee & St. Paul	10,067	4,644,701	1,079,556	6,472,696	608,211	1,177,215	137,032	3,174,210	49,270	159,580	5,179,181	1,293,515	386,022	907,320	—67,875
Chicago, Peoria & St. Louis	255	90,103	18,039	114,630	20,793	24,237	6,072	54,778	.....	5,105	110,986	3,645	5,700	—2,055	16,617
Chicago, Rock Island & Gulf	477	156,468	45,060	220,885	20,568	34,955	9,639	92,930	1,722	8,611	168,425	52,460	8,094	44,272	12,688
Chicago, Rock Island & Pacific	7,852	3,521,238	1,245,852	5,155,839	493,375	830,148	151,365	2,220,742	35,866	146,103	3,876,623	1,279,216	270,015	1,008,946	559,951
Chicago, St. Paul, Minn. & Omaha	1,753	962,562	306,601	1,359,192	113,329	195,030	26,922	631,151	12,889	34,426	1,013,538	345,655	77,425	267,291	—15,759
Chicago, Terre Haute & Southeastern	371	152,143	13,499	169,608	16,302	35,577	4,128	55,269	987	9,446	121,710	47,898	12,500	35,398	6,405
Cincinnati, Hamilton & Dayton	1,015	482,182	99,305	651,364	99,454	183,314	17,582	324,034	3,075	22,631	649,231	2,133	34,659	—32,689	85,536
Cincinnati, New Orleans & Texas Pacific	337	546,940	133,140	725,007	62,639	166,028	25,713	245,520	4,673	18,746	521,427	203,581	31,000	172,526	—63,852
Cincinnati Northern	246	92,645	13,096	109,906	17,720	26,309	2,616	40,268	.....	3,969	90,882	19,024	5,500	13,516	46,682
Cleveland, Cincinnati, Chic. & St. Louis	2,381	1,794,854	574,615	2,597,324	286,757	612,520	71,927	1,147,543	19,528	61,674	2,192,722	404,603	128,000	275,967	531,412
Colorado Midland	338	85,884	7,875	103,832	15,464	26,193	6,619	44,055	708	5,308	98,347	5,485	10,000	—4,515	—27,398
Colorado & Southern	1,089	414,607	83,812	541,386	50,096	141,032	9,874	188,114	3,421	19,225	411,761	129,625	36,803	92,815	3,291
Cumberland Valley	164	143,514	42,984	201,022	20,186	32,569	5,208	73,753	969	8,138	140,824	60,198	5,794	54,404	—7,811
Delaware & Hudson Co.	881	1,208,072	144,581	1,435,522	114,228	302,536	39,111	638,510	11,032	63,053	1,159,307	276,215	58,500	217,715	36,974
Delaware, Lackawanna & Western	960	2,024,357	548,551	2,890,450	205,819	532,212	95,297	1,092,294	23,838	80,576	2,014,218	876,232	186,600	689,608	105,822
Denver & Rio Grande	2,575	1,029,220	215,199	1,340,525	104,713	297,833	37,732	449,091	18,645	52,421	960,435	380,090	84,000	295,832	—27,953
Denver & Salt Lake	255	77,371	11,765	95,140	13,765	24,439	1,848	34,352	.....	4,912	79,316	15,824	7,000	8,824	15,781
Detroit & Mackinac	400	58,001	16,810	80,576	9,321	14,960	1,335	34,566	.....	3,246	63,428	17,148	7,504	9,644	—3,735
Detroit & Toledo Shore Line	79	127,954	.....	128,479	9,805	10,888	3,286	39,497	.....	2,878	66,354	62,125	5,750	56,375	2,746
Detroit, Grand Haven & Milwaukee	191	119,000	34,500	178,620	18,522	29,766	6,169	115,165	587	4,006	174,215	4,405	3,360	952	20,714
Detroit, Toledo & Ironton	441	92,845	9,576	109,749	9,095	24,060	3,235	67,266	.....	5,340	108,997	753	5,500	—4,747	213,393

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Duluth & Iron Range	273	$92,312	$15,091	$112,858	$28,003	$43,105	$944	$66,269	$1,007	$10,326	$149,654	—$36,796	$5,631	—$42,427	$14,827
Duluth, Missabe & Northern	369	53,794	21,351	80,377	26,565	51,578	1,669	55,406	3,410	11,380	150,008	—69,632	1,010	—70,642	76,255
Duluth, South Shore & Atlantic	628	159,604	44,697	221,245	27,390	34,132	8,136	103,429	3,168	10,647	186,903	34,342	16,000	18,331	—751
Duluth, Winnipeg & Pacific	185	113,495	15,276	134,531	7,432	17,642	1,834	49,692	1,157	6,462	84,219	50,312	6,731	43,581	41,736
El Paso & Southwestern Co	1,027	407,697	105,419	557,752	80,668	84,155	16,781	162,176	5,436	23,775	372,786	184,966	34,889	150,064	—103,324
Elgin, Joliet & Eastern	776	558,393	5	594,926	64,150	117,917	5,853	204,220	.....	17,852	409,992	184,934	40,890	144,044	22,631
Erie	1,988	2,906,814	572,179	3,865,427	317,052	959,919	94,214	1,509,527	26,560	94,963	2,994,283	871,144	168,654	696,526	394,075
Florence & Cripple Creek	87	78,794	12,925	93,560	16,361	11,152	1,795	26,093	.....	3,021	58,422	35,138	6,607	28,531	—6,903
Florida East Coast	745	237,677	277,700	598,498	56,287	56,740	13,050	178,789	3,582	14,061	321,475	277,023	20,468	250,531	—26,348
Fort Worth & Denver City	454	340,338	91,374	453,229	49,096	78,200	6,691	197,127	2,366	15,737	349,218	104,012	12,621	91,391	28,474
Galveston, Harrisburg & San Antonio	1,350	532,325	221,855	835,605	116,399	141,826	28,591	381,085	8,483	36,002	710,759	124,846	39,624	85,161	—47,030
Georgia	307	143,795	47,235	206,708	18,981	55,483	11,918	93,030	408	7,067	186,887	19,821	3,629	16,100	—48,231
Georgia, Southern & Florida	395	93,276	46,629	158,057	23,629	30,074	6,459	75,836	768	10,461	147,227	10,830	10,122	603	—17,418
Grand Rapids & Indiana	575	257,160	96,371	376,328	48,461	78,032	10,883	183,238	138	13,411	334,162	42,166	21,594	20,552	47,622
Grand Trunk Western	347	385,000	101,000	521,951	49,392	126,886	17,648	261,165	4,278	13,275	472,644	49,307	35,920	13,264	5,724
Great Northern	8,077	2,719,337	717,168	3,914,717	360,591	529,954	87,330	1,342,724	53,509	95,940	2,468,262	1,446,455	345,690	1,100,321	739,454
Gulf & Ship Island	308	89,178	20,311	116,303	13,913	31,518	2,508	32,662	245	7,009	87,856	28,446	7,349	21,071	452
Gulf, Colorado & Santa Fe	1,937	1,069,153	183,136	1,310,638	195,218	184,270	30,690	525,002	.....	31,906	961,714	348,924	49,162	299,187	195,491
Hocking Valley	351	285,922	54,811	362,570	29,509	67,241	7,991	143,737	.....	16,163	264,641	97,929	34,050	63,879	69,564
Houston, East & West Texas	191	84,248	19,233	109,797	15,196	17,752	1,855	42,550	223	2,891	80,466	29,331	4,170	25,094	4,312
Houston & Texas Central	858	411,724	96,255	547,019	73,551	81,513	14,968	215,173	3,189	17,499	405,714	141,305	26,952	114,294	99,852
Illinois Central	4,767	3,386,545	939,934	4,729,205	592,385	1,006,982	99,396	1,823,444	29,065	130,416	3,659,654	1,069,551	269,400	798,565	58,230
Indiana Harbor Belt	110	.....	.....	250,367	23,744	27,143	2,630	126,739	.....	7,321	187,577	62,790	6,950	55,832	28,985
International & Great Northern	1,159	548,735	114,461	728,628	126,718	136,051	21,416	337,872	2,991	28,760	653,808	74,819	40,000	34,801	44,954
Kanawha & Michigan	177	171,431	22,727	200,256	25,499	59,381	2,799	64,973	.....	5,803	158,454	41,802	11,200	30,602	—2,708
Kansas City Southern	837	582,096	96,541	736,477	70,999	75,397	25,134	269,517	.....	35,853	468,396	268,081	48,169	219,714	4,423
Lake Erie & Western	900	373,362	48,829	443,617	61,216	78,009	14,013	190,101	.....	11,458	354,796	88,821	20,000	68,807	71,357
Lehigh & Hudson River	97	108,895	8,341	118,383	13,424	18,106	1,816	46,883	.....	3,698	83,928	34,455	4,150	30,305	6,985
Lehigh & New England	294	125,577	993	135,426	19,531	27,450	1,968	43,511	.....	5,226	97,686	37,741	5,104	32,637	—2,299
Lehigh Valley	1,443	2,495,052	235,120	2,910,302	309,663	618,469	68,002	1,215,825	9,184	70,504	2,289,909	620,393	142,500	477,518	317,739
Long Island	398	226,643	427,857	755,355	116,218	125,153	7,636	408,806	6,923	29,341	694,079	61,277	78,383	—17,144	—32,845
Louisiana & Arkansas	279	109,053	14,480	127,369	19,295	22,504	2,860	37,032	.....	3,750	85,442	41,927	7,500	34,346	—5,395
Louisiana Ry. & Navigation	351	131,273	19,472	160,474	27,922	16,186	5,714	64,424	.....	4,905	119,150	41,324	9,500	31,824	18,506
Louisiana Western	208	108,045	50,498	170,929	14,926	36,080	7,191	60,612	2,765	6,155	127,729	43,200	9,895	33,199	—6,754
Louisville & Nashville	5,034	2,758,387	797,022	3,839,947	765,888	797,694	106,648	1,354,255	17,458	104,687	3,111,888	728,059	127,987	599,698	—145,601
Louisville, Henderson & St. Louis	200	72,463	26,295	107,415	21,596	5,298	5,286	38,941	.....	3,827	74,949	32,466	3,800	28,659	11,192
Maine Central	1,219	624,453	179,158	855,575	108,122	128,341	8,427	339,349	1,534	24,498	609,395	246,181	53,076	193,091	74,208
Michigan Central	1,800	1,624,303	553,926	2,431,295	332,047	475,147	55,504	1,108,509	43,242	57,183	2,071,631	359,664	120,000	239,105	148,588
Midland Valley	380	72,977	28,116	107,541	17,975	16,122	2,122	38,721	.....	3,441	80,381	27,160	4,750	22,366	24,244
Minneapolis & St. Louis	1,646	605,595	127,965	772,298	92,393	112,012	19,383	347,940	.....	20,018	591,746	180,552	32,966	147,587	15,524
Minn., St. Paul & Sault Ste. Marie	4,127	1,554,485	314,064	2,019,070	182,433	315,274	43,152	772,874	11,877	48,123	1,372,306	646,764	79,009	567,754	218,033
Missouri & North Arkansas	365	56,548	20,960	83,933	27,375	22,994	2,824	50,753	.....	5,576	109,523	—25,590	6,000	—31,602	—11,468
Missouri, Kansas & Texas System	3,865	2,072,793	554,479	2,818,684	364,504	275,828	54,016	1,061,922	22,883	75,560	1,851,160	967,525	111,901	854,874	487,777
Missouri, Oklahoma & Gulf	334	82,815	14,320	100,722	24,299	20,476	4,244	49,924	111	7,161	106,215	—5,492	5,128	—10,672	14,816
Missouri, Oklahoma & Gulf Ry. of Texas	19	11,005	142	11,404	1,365	3,988	191	5,046	.....	660	11,250	154	140	14	—1,310
Missouri Pacific	3,920	1,486,242	324,039	2,005,317	245,534	418,631	49,917	887,164	10,464	53,330	1,665,039	340,278	98,590	239,864	125,334
Mobile & Ohio	1,122	683,786	85,699	809,118	73,147	128,830	38,388	313,457	2,589	28,011	584,423	224,695	33,153	191,348	103,310
Monongahela	75	81,209	1,808	84,562	12,752	7,594	867	21,136	.....	2,066	44,415	40,147	1,810	38,337	—18,930
Morgan's La. & Tex. R. R. & S. S. Co.	405	228,215	81,325	339,184	45,856	66,287	12,013	138,963	2,382	11,444	276,780	62,403	20,013	42,239	—3,479
Nashville, Chattanooga & St. Louis	1,231	598,109	178,093	849,618	118,867	171,695	45,991	354,758	9,098	28,576	718,797	130,821	26,000	104,687	13,744
Nevada Northern	165	68,091	4,901	75,796	11,784	9,550	453	19,687	45	3,502	45,021	30,775	5,002	25,772	—26,634
New Orleans & North Eastern	204	200,840	42,114	274,362	25,714	57,907	9,306	101,109	6,060	11,569	211,666	62,697	14,500	48,197	—20,898
New Orleans Great Northern	283	88,102	17,859	118,731	17,385	23,261	2,347	35,613	178	5,928	84,712	34,019	3,125	30,894	—20,453
New Orleans, Mobile & Chicago	403	108,544	17,956	134,077	26,029	19,444	3,717	49,601	—9	7,331	106,113	27,964	6,395	21,563	—17,634
New Orleans, Texas & Mexico	286	87,055	17,210	110,171	27,605	17,665	4,085	46,838	.....	10,319	106,513	3,659	1,502	2,040	8,686
New York Central Railroad	5,984	7,353,498	2,939,721	11,997,020	1,310,667	2,816,526	247,941	4,686,915	199,047	342,675	9,603,771	2,393,249	781,736	1,610,194	.....
New York, Chicago & St. Louis	568	752,363	67,925	849,740	75,805	166,133	41,390	467,518	4,008	20,635	775,490	74,250	40,000	34,249	5,834
New York, New Haven & Hartford	2,003	2,220,832	1,849,088	4,590,967	437,583	647,056	25,932	1,811,153	44,510	139,891	3,105,267	1,485,700	195,000	1,289,683	788,590
New York, Ontario & Western	568	396,908	65,725	545,854	49,523	113,359	8,497	269,596	.....	14,528	455,502	90,352	20,000	70,352	34,958

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
New York, Philadelphia & Norfolk	112	$201,173	$28,105	$249,190	$23,747	$63,121	$5,365	$119,496	$4,076	$10,828	$226,633	$22,557	$9,500	$13,053	$15,457
New York, Susquehanna & Western	140	183,825	37,719	246,798	19,724	29,476	3,717	111,621	.....	4,642	168,208	78,590	13,208	65,235	45,104
Norfolk & Western	2,044	2,487,707	304,219	2,934,664	319,251	656,740	60,156	939,273	8,784	65,893	2,026,091	908,573	168,000	740,339	91,112
Norfolk Southern	900	213,883	61,847	298,580	40,947	47,871	5,969	119,913	95	20,062	234,857	63,723	9,978	53,734	—17,356
Northern Pacific	6,497	2,959,646	774,765	4,125,078	298,537	443,525	90,417	1,457,008	62,284	85,535	2,393,884	1,731,194	368,183	1,362,712	565,899
Northwestern Pacific	401	65,979	87,579	177,855	42,697	36,216	4,494	102,384	.....	6,699	190,956	—13,101	16,068	—29,184	—22,221
Oregon Short Line	2,162	912,364	361,978	1,303,818	154,615	237,801	32,697	362,769	21,135	52,299	860,046	443,772	78,264	365,011	—21,702
Oregon-Washington R. R. & Nav. Co.	2,028	710,949	257,712	1,082,435	99,266	148,306	38,156	404,289	9,722	54,339	752,382	330,052	100,018	229,876	1,785
Panhandle & Santa Fe	670	260,211	51,266	326,260	57,858	57,560	4,708	98,392	.....	7,684	226,202	100,157	9,357	90,801	66,421
Pennsylvania *Company*	1,757	2,418,340	652,551	3,424,768	498,385	796,622	76,479	1,411,408	29,789	109,686	3,922,369	502,398	257,507	244,094	217,388
Pennsylvania *Railroad*	4,512	8,929,816	2,508,958	12,687,674	1,870,832	2,990,918	320,786	5,248,625	199,193	415,734	11,046,088	1,641,586	634,476	1,005,346	209,022
Pere Marquette	2,312	981,260	240,233	1,326,871	109,491	188,193	31,366	597,667	3,446	37,226	967,250	359,621	—40,901	400,367	425,011
Philadelphia, Baltimore & Washington	717	652,412	575,155	1,380,913	220,369	307,578	44,325	663,685	32	44,567	1,280,558	100,356	53,735	46,610	50,569
Pittsburgh & Lake Erie	225	787,668	104,031	935,644	98,684	237,225	11,667	286,558	2,953	26,685	663,770	271,874	49,500	222,374	—104,408
Philadelphia & Reading	1,120	2,596,100	435,875	3,219,132	259,342	615,677	67,468	1,260,715	34,968	70,623	2,308,041	911,091	100,121	810,422	31,669
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	1,885,502	541,834	2,734,491	313,614	622,514	63,206	1,149,592	22,562	82,864	2,254,353	480,138	154,579	325,369	162,343
Port Reading	21	87,655	.....	110,488	—11,349	6,248	38	45,851	.....	341	41,129	69,359	12,000	57,359	25,007
Richmond, Fredericksburg & Potomac	88	103,275	92,972	230,343	16,400	28,849	3,471	82,641	6,488	7,479	145,328	85,015	6,476	78,537	—3,367
Rutland	468	131,282	67,306	225,039	26,824	42,755	7,892	100,010	992	5,042	183,516	41,523	16,780	24,743	29,157
St. Joseph & Grand Island	258	68,420	20,299	95,140	11,514	14,094	4,416	39,609	.....	4,548	74,180	20,960	7,620	13,302	3,365
St. Louis & San Francisco	4,746	2,249,260	662,964	3,136,177	365,643	461,835	72,003	1,078,384	.....	114,047	2,091,901	1,044,275	108,949	933,607	391,730
St. Louis, Brownsville & Mexico	548	111,651	55,189	181,825	29,403	14,406	6,054	63,009	.....	10,676	123,282	58,543	6,500	51,774	15,517
St. Louis, Iron Mountain & Southern	3,364	1,772,425	358,418	2,321,844	323,434	423,401	62,256	749,224	7,077	68,060	1,633,452	688,392	111,032	574,662	—175,393
St. Louis Merchants' Bridge Terminal	9	.....	123	145,864	14,190	8,993	772	76,151	.....	5,014	105,120	40,744	6,540	34,204	15,954
St. Louis, San Francisco & Texas	235	50,924	19,252	75,688	20,828	14,582	2,055	44,804	.....	4,142	86,410	—10,722	1,305	—12,028	—6,204
St. Louis Southwestern	943	431,477	75,107	533,034	60,526	95,076	24,301	164,369	2,741	25,828	370,904	162,130	35,239	126,872	—36,674
St. Louis Southwestern of Texas	810	228,901	52,893	304,205	65,460	71,176	11,402	160,395	435	17,133	319,596	—15,391	15,020	—30,505	20,179
San Antonio & Aransas Pass	724	205,657	60,766	285,866	71,902	52,745	6,109	137,922	.....	11,961	280,608	5,258	14,077	—9,015	18,073
San Pedro, Los Angeles & Salt Lake	1,132	439,227	162,568	658,226	56,413	120,333	32,738	242,967	16,726	17,785	486,962	171,264	46,032	125,232	—56,980
Seaboard	3,101	1,158,268	403,429	1,763,623	201,240	259,793	63,217	658,409	15,843	55,089	1,253,592	510,031	86,006	423,029	—182,079
Southern	7,036	3,131,291	1,082,793	4,617,407	698,842	891,086	170,253	1,755,755	31,400	152,688	3,664,431	952,976	231,322	719,165	179,125
Southern in Mississippi	281	44,369	18,126	67,704	24,237	8,279	2,276	35,200	.....	3,969	73,687	—5,983	8,375	—14,364	—21,822
Southern Pacific	6,517	3,960,642	1,952,459	6,966,342	724,449	1,146,825	170,428	2,319,900	124,563	212,753	4,659,471	2,306,871	375,080	1,926,354	371,849
Spokane International	163	39,178	8,283	50,297	7,131	4,124	2,328	18,673	.....	3,577	35,833	14,465	3,174	11,202	—5,640
Spokane, Portland & Seattle	556	165,908	81,414	274,726	46,748	32,801	6,574	78,171	2,842	13,088	180,106	94,619	53,400	41,194	—11,220
Tennessee Central	294	75,852	24,895	107,964	29,343	14,973	5,385	46,383	.....	6,909	102,992	4,972	4,480	473	—24,257
Terminal R. R. Ass'n of St. Louis	35	.....	166	217,438	14,991	13,174	895	75,943	.....	4,864	109,867	107,571	28,199	79,372	23,483
Texas & New Orleans	469	188,648	73,775	290,963	49,455	75,241	7,707	130,817	2,977	9,613	275,737	15,226	15,805	—645	—9,273
Texas & Pacific	1,887	1,037,126	279,789	1,441,867	131,111	212,298	34,262	647,046	12,397	38,628	1,074,542	367,325	68,700	297,705	109,656
Toledo & Ohio Central	446	266,410	39,611	323,066	51,889	88,137	7,800	145,253	1,605	8,684	303,368	19,698	21,001	—1,311	6,568
Toledo, Peoria & Western	248	53,947	31,905	90,655	14,506	26,556	1,989	42,258	3,451	.....	88,761	1,893	6,100	—4,207	3,358
Toledo, St. Louis & Western	451	358,916	21,140	406,180	37,213	52,963	17,429	158,468	.....	7,496	273,568	132,612	17,864	114,748	62,584
Trinity & Brazos Valley	315	61,612	9,180	75,502	21,337	9,316	2,492	37,954	.....	7,810	78,910	—3,408	4,585	—8,018	8,115
Ulster & Delaware	129	23,222	11,544	48,072	8,961	17,440	1,024	31,080	61	2,654	61,219	—13,147	3,300	—16,412	—6,685
Union Pacific	3,617	2,134,463	619,277	3,185,136	296,635	567,698	110,963	977,625	58,951	118,305	2,127,787	1,057,349	254,035	602,779	—149,563
Union R. R. of Baltimore	9	113,462	16,606	131,793	14,135	.....	.....	4,764	.....	2,496	21,395	110,398	5,930	104,467	50,545
Union R. R. of Pennsylvania	31	.....	.....	166,293	28,051	85,465	100	105,644	.....	2,455	221,716	—55,423	5,301	—60,724	11,908
Vandalia	**910**	**541,958**	**170,328**	**806,061**	74,862	187,968	22,651	350,084	10,001	22,221	667,787	138,274	34,152	104,121	15,572
Vicksburg, Shreveport & Pacific	171	49,795	24,852	87,461	19,238	26,505	4,336	39,149	1,975	4,965	96,168	—8,707	7,100	—15,807	—31,442
Virginia & Southwestern	240	113,672	9,682	126,758	30,729	35,103	2,329	40,292	.....	3,334	111,787	14,971	7,083	7,888	—10,495
Virginian	504	366,732	25,235	421,310	56,403	71,797	5,520	102,990	10,070	11,685	258,304	163,006	20,000	143,006	53,640
Wabash	2,519	1,597,144	381,775	2,183,334	226,081	423,935	105,542	1,007,489	10,770	55,398	1,829,005	357,329	78,875	278,211	221,836
Washington Southern	36	29,236	45,752	102,045	10,219	14,975	1,443	40,598	2,881	2,966	73,083	28,962	3,236	25,726	—548
West Jersey & Seashore	356	127,503	197,095	362,303	78,300	74,368	18,692	208,154	2,473	13,764	395,751	—33,449	28,806	—62,256	—33,125
Western Maryland	661	508,921	55,494	594,213	87,411	114,158	27,279	234,347	2,937	17,496	473,144	121,069	25,500	95,569	421,732
Western Pacific	943	249,631	63,696	334,626	63,104	42,081	21,485	126,830	9,039	20,170	282,709	51,916	28,885	22,832	59,061
Western Ry. of Alabama	133	54,411	30,458	97,827	18,005	24,958	6,249	31,532	1,500	4,986	87,230	10,597	5,270	5,208	—17,557
Wheeling & Lake Erie	459	266,951	35,142	337,229	32,167	88,341	10,529	158,163	1,052	14,004	304,257	32,972	30,121	2,851	—109,337
Yazoo & Mississippi Valley	1,382	784,549	146,472	979,378	133,762	119,296	16,579	346,300	2,212	26,449	643,831	335,547	51,000	284,368	17,968

REVENUES AND EXPENSES OF RAILWAYS

Eight Months of Fiscal Year Ending June 30, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structurea.	Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.				
Alabama & Vicksburg	143	$632,883	$280,869	$1,010,051	$156,764	$254,102	$29,384	$387,863	$22,750	$45,237	$896,100	$113,951	$60,386	$53,565	—$157,159
Alabama Great Southern	309	2,165,991	720,635	3,159,373	369,449	781,722	110,802	1,109,271	24,556	72,741	2,452,766	706,607	123,326	583,105	—212,353
Ann Arbor	296	1,086,966	371,965	1,558,913	165,165	213,470	39,234	636,993	3,160	59,512	1,117,533	441,379	101,140	339,846	3,496
Arizona Eastern	367	1,018,300	206,354	1,327,268	224,308	183,396	16,941	374,614	8,329	81,782	889,334	437,935	103,910	333,703	—297,978
Atchison, Topeka & Santa Fe	8,481	43,275,744	15,812,342	64,434,296	8,909,366	11,143,781	1,359,061	18,283,003	.....	1,234,318	40,881,977	23,552,318	3,142,630	20,395,890	2,120,682
Atlanta & West Point	93	390,636	294,619	793,464	120,123	187,849	43,468	252,201	12,975	36,870	653,423	140,041	52,978	86,843	—82,401
Atlanta, Birmingham & Atlantic	644	1,268,105	363,497	1,785,831	279,992	354,874	99,841	783,584	.....	82,822	1,601,113	184,718	95,193	89,123	—274,753
Atlantic & St. Lawrence	167	778,118	221,084	1,096,105	152,794	172,000	33,254	474,767	.....	27,246	860,061	236,045	86,400	149,645	81,673
Atlantic City	170	515,279	1,039,765	1,639,455	287,951	192,619	19,200	826,735	772	11,341	1,337,849	301,606	108,000	193,474	9,351
Atlantic Coast Line	4,684	13,369,386	5,342,335	20,332,310	3,122,886	3,655,541	461,848	7,475,310	70,409	594,115	15,338,233	4,994,077	1,104,000	3,886,824	—2,014,672
Baltimore & Ohio—System	4,516	45,737,239	9,757,926	60,093,755	6,128,667	11,038,205	1,263,160	23,842,170	368,169	1,403,829	43,682,833	16,410,922	2,173,122	14,227,555	—266,306
Baltimore & Ohio Chicago Terminal	79	.....	4,719	1,055,205	100,185	149,691	6,987	450,574	16,932	36,553	755,793	299,412	152,169	147,133	61,393
Bangor & Aroostook	631	1,818,416	436,088	2,388,807	374,325	383,941	20,627	737,022	9,049	76,309	1,600,800	788,007	78,322	709,644	53,906
Belt Ry. Co. of Chicago	24	.....	.....	2,195,928	118,218	197,941	7,017	785,390	.....	48,830	1,157,396	1,038,531	87,445	951,087	304,892
Bessemer & Lake Erie	204	5,285,094	272,775	5,660,085	467,812	1,243,605	82,136	1,311,385	10,106	93,294	3,175,124	2,484,961	148,016	2,336,887	611,003
Bingham & Garfield	27	736,016	28,486	768,963	70,871	102,827	7,399	142,664	643	14,906	339,310	429,653	16,170	413,483	—276,961
Birmingham Southern	44	318,284	7,447	574,090	119,982	99,397	3,961	220,529	.....	28,292	472,161	101,929	20,788	81,141	—139,611
Boston & Maine	2,302	17,682,016	10,654,947	31,185,821	4,667,013	4,746,372	290,475	13,637,746	135,538	779,276	24,256,420	6,929,402	1,296,001	5,633,401	779,638
Buffalo & Susquehanna R. R. Corporation	253	918,622	54,984	998,181	184,966	303,298	10,612	300,835	.....	42,951	842,662	155,519	20,800	134,719	—103,938
Buffalo & Susquehanna Railway	91	107,196	54,245	180,809	36,840	64,173	4,591	95,439	250	19,282	220,574	—39,765	12,800	—52,566	38,339
Buffalo, Rochester & Pittsburgh	586	5,387,013	770,721	6,387,779	838,030	1,486,174	97,611	2,122,283	10,345	146,534	4,700,977	1,686,802	160,000	1,526,599	—548,038
Canadian Pacific Lines in Maine	233	603,847	159,071	820,134	161,412	134,952	46,252	371,749	.....	29,065	743,430	76,705	96,000	—19,295	116,459
Carolina, Clinchfield & Ohio	248	1,278,447	121,192	1,433,954	143,240	183,078	51,861	283,260	.....	73,097	735,379	708,575	114,000	594,360	—305,330
Carolina, Clinchfield & Ohio of S. C.	18	74,249	11,706	88,287	8,489	690	13,557	16,796	.....	5,039	44,571	43,716	6,000	37,708	—23,705
Central of Georgia	1,924	5,355,183	2,105,489	8,300,639	1,127,761	1,569,645	272,039	2,929,310	11,019	271,726	6,158,088	2,142,552	372,945	1,766,416	—568,052
Central of New Jersey	678	13,757,215	4,047,471	18,868,444	1,621,849	3,471,061	246,814	6,639,393	103,735	392,233	12,472,635	6,395,759	958,569	5,437,151	—343,962
Central New England	304	2,077,674	318,323	3,515,051	531,466	276,075	9,492	860,373	.....	30,058	1,707,139	807,913	95,000	712,878	—118,025
Central Vermont	411	1,726,458	612,740	2,532,188	337,282	437,959	65,407	1,190,204	20,813	54,407	2,106,071	426,118	126,080	299,330	271,949
Charleston & Western Carolina	341	884,796	222,445	1,166,605	237,290	223,369	30,010	435,688	5	35,568	961,854	204,751	40,000	164,744	—125,098
Chesapeake & Ohio Lines	2,368	20,063,747	3,882,315	25,508,626	2,912,480	5,420,101	438,097	8,542,799	158,965	578,619	18,051,062	7,457,564	889,550	6,560,703	86,445
Chicago & Alton	1,033	6,221,370	2,650,758	9,671,582	1,107,223	2,202,317	293,254	3,547,573	78,647	238,864	7,467,878	2,203,703	360,373	1,841,347	637,561
Chicago & Eastern Illinois	1,282	7,213,273	1,914,229	9,896,305	1,177,339	2,067,291	188,506	3,728,687	64,330	292,403	7,514,756	2,381,549	421,600	1,959,188	597,556
Chicago & Erie	270	3,156,548	394,420	3,926,833	603,628	216,498	153,640	1,855,375	18,294	101,738	2,899,642	1,027,191	120,993	906,156	1,325,820
Chicago & North Western	8,108	35,887,779	14,131,434	55,628,842	7,338,164	8,852,968	883,973	20,305,236	404,180	1,172,447	38,835,061	16,793,780	3,000,000	13,790,428	—724,324
Chicago, Burlington & Quincy	9,326	43,853,421	14,009,046	63,361,665	6,102,426	10,639,700	1,082,154	20,136,390	511,406	1,394,836	39,866,911	23,494,754	2,626,138	20,868,616	—82,118
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	424,084	121,566	634,296	82,412	98,093	13,319	344,612	.....	11,505	549,942	84,355	22,960	61,377	—27,589
Chicago Great Western	1,428	6,616,512	2,112,401	9,531,403	1,235,222	1,627,674	375,208	3,518,045	54,947	282,046	7,084,542	2,446,861	389,348	2,054,321	—41,686
Chicago, Indianapolis & Louisville	618	2,799,277	1,143,404	4,317,612	466,387	784,864	162,735	1,617,423	1,352	138,909	3,169,633	1,147,979	212,025	935,601	—74,958
Chicago Junction	24	.....	.....	1,303,936	168,563	147,051	8,139	730,196	.....	38,453	1,092,423	211,512	15,929	195,436	—97,004
Chicago, Milwaukee & St. Paul	10,028	43,251,705	12,267,910	61,958,881	7,194,034	9,016,311	1,193,088	24,798,661	493,496	1,202,120	42,577,923	19,380,958	3,217,154	16,145,589	—1,814,962
Chicago, Peoria & St. Louis	255	741,810	167,405	965,510	160,476	177,413	41,563	410,252	.....	36,706	826,410	139,100	39,900	99,200	184,794
Chicago, Rock Island & Gulf	477	1,526,557	411,863	2,092,002	241,427	299,830	77,299	801,594	13,980	62,891	1,497,000	595,002	61,213	533,375	51,144
Chicago, Rock Island & Pacific	7,852	31,814,283	12,105,341	47,224,999	6,426,903	7,659,336	1,173,091	18,824,508	320,391	1,109,466	35,481,726	11,743,274	2,141,091	9,599,270	376,896
Chicago, St. Paul, Minn. & Omaha	1,753	8,026,821	3,454,447	12,377,292	1,388,196	1,650,149	229,480	4,685,933	117,465	288,499	8,343,609	4,033,683	701,671	3,328,791	—40,619
Chicago, Terre Haute & Southeastern	372	1,356,435	132,919	1,531,468	208,216	353,409	29,263	471,213	7,558	79,483	1,149,142	382,326	95,000	287,326	119,015
Cincinnati, Hamilton & Dayton	1,015	4,770,458	1,033,314	6,494,293	946,677	1,345,567	159,711	2,940,448	23,790	157,789	5,572,040	922,254	291,921	628,416	183,966
Cincinnati, New Orleans & Texas Pacific	337	4,685,180	1,215,750	6,264,259	624,444	1,652,215	202,898	1,994,227	48,345	161,303	4,684,540	1,579,719	248,000	1,331,281	—634,652
Cincinnati Northern	246	858,326	150,203	1,052,048	154,221	207,660	21,573	349,258	.....	28,331	761,043	291,005	42,463	248,253	313,242
Cleveland, Cincinnati, Chic. & St. Louis	2,368	16,301,825	5,741,665	24,181,738	2,588,592	4,817,268	626,998	9,397,381	189,080	494,295	18,072,702	6,109,036	1,037,027	5,062,403	3,260,592
Colorado Midland	338	982,521	162,070	1,271,883	196,619	273,743	60,177	502,278	9,409	45,001	1,087,226	184,656	69,709	114,947	134,448
Colorado & Southern	1,089	3,972,299	983,532	5,341,627	626,311	1,180,063	85,597	1,669,411	32,595	156,564	3,750,540	1,591,087	281,845	1,308,894	189,813
Cumberland Valley	164	1,372,016	448,658	1,933,754	328,065	273,127	36,257	677,872	6,899	65,414	1,387,635	546,119	45,659	500,460	—95,149
Delaware & Hudson Co.	881	12,152,213	1,959,507	14,941,806	1,096,880	2,535,267	214,507	5,538,509	97,871	502,567	9,973,038	4,968,768	450,619	4,517,661	.....
Delaware, Lackawanna & Western	960	20,080,330	5,681,347	28,585,788	3,066,578	4,656,760	580,664	9,221,649	243,464	603,699	18,182,556	10,403,232	1,324,032	9,077,866	50,193
Denver & Rio Grande	2,568	11,100,145	2,983,001	15,020,581	1,877,914	2,782,829	305,823	4,420,824	212,275	423,113	10,013,475	5,007,106	703,500	4,302,639	—39,843
Denver & Salt Lake	255	877,272	230,385	1,170,317	138,313	208,168	18,888	392,073	.....	42,887	797,318	372,999	45,000	327,999	136,233
Detroit & Mackinac	400	445,275	213,440	715,569	91,678	124,193	17,224	271,516	1,021	22,336	527,968	187,601	52,332	135,269	—27,544
Detroit & Toledo Shore Line	79	1,006,164	.....	1,008,950	101,379	80,978	15,566	290,492	.....	22,492	510,906	498,044	47,700	450,344	—66,852
Detroit, Grand Haven & Milwaukee	191	1,079,089	429,749	1,750,944	259,639	269,699	54,610	902,200	7,336	38,162	1,531,646	219,298	26,880	191,402	—53,976
Detroit, Toledo & Ironton	441	1,083,751	121,352	1,279,140	169,957	215,521	31,326	768,836	.....	46,266	1,231,907	47,233	47,500	—268	468,149

REVENUES AND EXPENSES OF RAILWAYS

EIGHT MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
Duluth & Iron Range	287	$2,666,307	$148,600	$2,930,468	$540,737	$496,972	$8,413	$719,291	$20,422	$71,198	$1,857,032	$1,073,436	$149,029	$924,406	—$1,312,538
Duluth, Missabe & Northern	366	3,043,651	217,895	3,343,659	412,109	555,119	16,183	715,901	21,294	109,269	1,829,875	1,513,784	174,480	1,339,303	—1,361,626
Duluth, South Shore & Atlantic	628	1,149,861	606,266	1,939,072	351,398	282,809	65,147	777,036	30,577	83,958	1,590,924	348,148	127,970	220,099	—108,800
Duluth, Winnipeg & Pacific	185	726,283	145,144	898,010	141,381	157,581	18,286	336,550	8,823	48,607	711,229	186,781	44,789	141,992	—83,598
El Paso & Southwestern Co.	1,028	3,738,256	875,686	4,996,042	624,894	711,511	145,941	1,361,532	45,389	185,432	3,062,271	1,933,770	261,186	1,659,358	—95,195
Elgin, Joliet & Eastern	777	5,080,091	44	5,403,049	561,200	1,049,232	45,979	1,672,307	.....	147,011	3,475,389	1,927,659	279,130	1,648,497	—473,956
Erie	1,988	26,669,556	6,147,185	36,249,860	3,995,330	8,729,154	746,867	13,341,344	253,681	793,554	27,772,026	8,477,834	919,096	7,535,540	—530,467
Florence & Cripple Creek	87	656,730	126,614	798,486	92,081	78,205	16,362	234,147	.....	31,734	452,529	345,957	45,283	300,674	—9,721
Florida East Coast	707	1,566,043	1,206,363	3,220,626	482,832	443,588	73,656	1,084,421	24,511	134,875	2,219,615	1,001,010	154,468	845,710	249,161
Fort Worth & Denver City	454	2,578,537	1,056,469	3,831,327	368,004	560,736	60,203	1,550,678	26,106	114,745	2,680,471	1,150,856	94,425	1,056,431	257,218
Galveston, Harrisburg & San Antonio	1,345	5,103,755	2,022,328	7,687,398	1,032,545	1,329,621	232,289	3,344,397	70,499	283,713	6,286,597	1,400,800	305,748	1,093,940	—151,563
Georgia	307	1,285,025	509,548	1,942,143	232,448	401,611	95,528	844,850	2,493	60,697	1,627,628	314,515	32,340	281,609	—209,577
Georgia, Southern & Florida	395	871,186	465,361	1,525,967	204,551	316,038	58,240	620,230	2,212	82,730	1,284,001	241,966	75,664	164,648	—83,060
Grand Rapids & Indiana	575	2,035,762	1,282,248	3,612,831	390,934	581,936	88,385	1,539,074	13,167	112,577	2,726,072	886,759	188,530	695,741	123,796
Grand Trunk Western	347	3,233,512	1,207,278	4,769,693	771,955	938,640	156,452	2,078,734	59,028	119,362	4,124,172	645,521	287,360	357,403	—157,828
Great Northern	8,077	34,092,282	9,226,473	47,940,922	4,504,983	4,858,018	776,875	12,649,913	565,391	832,548	24,139,900	23,801,022	3,015,913	20,783,070	837,555
Gulf & Ship Island	308	800,329	208,734	1,075,171	135,234	240,759	19,666	295,174	1,980	56,307	749,121	326,050	61,555	264,332	—152,658
Gulf, Colorado & Santa Fe	1,937	8,968,372	2,091,540	11,599,712	1,521,922	1,656,495	221,991	3,997,957	.....	273,344	7,660,052	3,939,661	383,806	3,552,736	1,705,086
Hocking Valley	352	3,419,283	586,643	4,303,129	508,551	833,385	75,835	1,403,052	.....	114,906	2,935,728	1,367,401	300,900	1,066,501	241,063
Houston, East & West Texas	191	632,835	211,245	893,181	165,019	145,224	15,365	374,654	223	25,139	725,372	167,808	32,932	134,680	—88,702
Houston & Texas Central	856	3,305,731	1,037,992	4,641,179	773,846	647,724	122,617	1,831,859	14,596	141,143	3,528,850	1,112,330	199,172	912,291	151,180
Illinois Central	4,769	30,505,133	8,864,809	42,632,354	5,683,441	9,246,868	832,572	15,423,551	241,041	1,017,498	32,220,621	10,411,733	2,176,400	8,221,085	—31,877
Indiana Harbor Belt	110	.....	.....	2,192,870	288,805	210,721	21,848	970,986	.....	60,652	1,553,012	639,858	60,307	578,913	187,669
International & Great Northern	1,159	4,665,234	1,272,516	6,403,722	1,039,178	1,072,321	185,317	2,801,962	23,118	238,219	5,360,115	1,043,607	260,000	783,097	—666,844
Kanawha & Michigan	177	1,695,445	237,101	1,987,105	273,431	498,133	20,953	594,513	28	52,876	1,439,935	547,170	92,001	455,136	—83,559
Kansas City Southern	827	5,200,460	990,487	6,813,404	736,376	799,518	230,368	2,311,946	.....	334,369	4,383,933	2,429,471	381,637	2,045,467	—306,135
Lake Erie & Western	900	3,076,619	525,814	3,797,898	525,914	649,818	113,329	1,542,704	.....	97,414	2,929,179	868,720	186,541	681,188	223,983
Lehigh & Hudson River	97	1,072,095	78,115	1,164,563	161,600	158,209	11,277	431,372	.....	34,293	796,752	367,811	33,200	334,611	98,592
Lehigh & New England	294	1,571,306	10,191	1,660,166	217,644	243,554	14,317	422,401	.....	47,139	945,054	715,112	44,227	670,885	166,744
Lehigh Valley	1,444	23,576,255	2,807,538	28,031,045	3,065,690	5,584,408	613,533	10,290,997	97,370	577,919	20,226,503	7,804,542	1,127,500	6,668,457	110,345
Long Island	398	2,427,809	5,259,606	8,850,594	938,700	953,201	92,176	3,754,054	58,025	223,316	6,019,372	2,831,221	553,213	2,275,895	557,519
Louisiana & Arkansas	279	925,565	150,867	1,108,724	199,473	185,367	21,808	305,585	.....	33,319	745,111	363,613	52,400	310,969	—49,222
Louisiana Ry. & Navigation	351	1,065,881	173,465	1,322,167	247,985	140,598	45,206	546,171	.....	41,726	1,021,687	300,480	64,000	236,480	—2,234
Louisiana Western	208	934,728	457,902	1,487,531	149,319	275,006	54,509	464,771	23,200	51,234	1,017,938	469,593	83,198	386,212	31,558
Louisville & Nashville	5,029	24,854,059	7,501,595	34,810,656	5,677,715	7,155,472	893,615	11,999,550	129,402	827,466	26,613,044	8,197,613	1,425,153	6,768,794	—2,150,258
Louisville, Henderson & St. Louis	200	619,733	266,479	947,597	193,387	127,135	42,768	325,331	.....	25,773	714,394	233,203	30,400	202,748	—11,407
Maine Central	1,214	4,701,867	2,354,370	7,602,416	1,082,886	1,160,529	87,888	2,895,596	47,535	211,741	5,495,300	2,107,117	412,683	1,694,277	104,761
Michigan Central	1,800	13,535,891	6,039,134	22,200,311	2,482,941	3,565,099	508,829	9,212,465	399,988	450,746	16,620,069	5,580,242	1,045,350	4,350,938	1,070,543
Midland Valley	380	645,033	283,774	988,316	189,803	169,562	16,514	324,750	.....	44,738	745,366	242,950	50,826	191,787	37,590
Minneapolis & St. Louis	1,646	5,223,564	1,324,896	6,934,353	785,088	984,713	143,832	2,663,882	376	165,185	4,743,077	2,191,276	308,733	1,882,543	187,385
Minn., St. Paul & Sault Ste. Marie	4,111	13,816,607	4,115,270	19,390,440	2,151,596	2,777,108	380,469	6,277,245	116,639	391,625	12,040,946	7,349,495	793,111	6,556,384	133,507
Missouri & North Arkansas	365	509,206	249,358	816,882	233,028	176,023	27,574	411,846	.....	45,572	894,043	—77,162	48,000	—125,501	—158,612
Missouri, Kansas & Texas System	3,865	15,551,610	5,699,900	22,848,689	2,992,715	3,066,324	444,469	8,258,999	208,686	689,793	15,566,274	7,282,415	877,900	6,400,102	1,194,781
Missouri, Oklahoma & Gulf	334	643,506	155,257	836,278	182,103	139,355	33,166	383,887	856	45,912	785,279	50,999	50,431	46	3,093
Missouri, Oklahoma & Gulf Ry. of Texas	19	86,932	2,454	90,936	12,809	17,099	1,763	35,794	.....	4,397	71,861	19,075	1,460	17,615	7,795
Missouri Pacific	3,920	14,669,567	3,240,188	19,511,859	2,451,120	3,681,057	473,368	7,583,092	61,676	475,838	14,726,150	4,785,708	788,720	3,986,670	1,581,247
Mobile & Ohio	1,122	5,988,929	867,341	7,289,587	745,253	1,270,113	322,119	2,829,187	21,153	231,524	5,419,350	1,870,236	250,579	1,618,742	—92,954
Monongahela	71	659,126	16,592	689,417	125,652	60,279	5,095	184,694	.....	16,212	391,932	297,486	13,028	284,458	—273,746
Morgan's La. & Tex. R. R. & S. S. Co.	405	2,114,249	716,726	3,086,907	374,987	567,615	91,353	1,201,267	20,136	94,887	2,349,618	737,290	158,882	574,929	—89,523
Nashville, Chattanooga & St. Louis	1,231	4,983,949	1,745,999	7,361,415	970,583	1,498,708	357,083	3,007,311	74,013	235,983	6,143,491	1,217,924	216,491	1,000,589	—528,073
Nevada Northern	165	586,137	62,464	675,693	125,971	105,072	3,762	176,232	496	30,442	441,976	233,717	40,248	193,418	—326,024
New Orleans & North Eastern	204	1,738,308	366,452	2,322,699	243,050	484,314	77,407	832,871	46,611	94,267	1,778,520	544,179	117,490	426,689	—81,941
New Orleans Great Northern	283	765,211	196,059	1,058,742	137,625	163,136	20,798	324,301	1,444	51,536	698,840	359,902	23,275	336,611	—155,179
New Orleans, Mobile & Chicago	403	928,222	200,866	1,194,458	232,494	164,616	30,427	420,033	—32	54,279	901,808	292,650	50,281	242,269	—259,659
New Orleans, Texas & Mexico	286	815,602	158,152	1,025,677	222,053	128,342	30,777	416,097	.....	74,803	872,071	153,606	13,085	140,405	—27,973
†New York Central Railroad	5,984	15,118,188	6,368,158	25,100,869	2,676,243	5,679,295	480,051	9,753,810	416,372	698,633	19,704,404	5,396,465	1,577,506	3,816,951	.....
New York, Chicago & St. Louis	568	6,275,517	922,705	7,528,043	907,303	1,005,751	336,998	3,518,849	40,344	158,878	5,968,123	1,559,920	321,267	1,237,981	—2,267
New York, New Haven & Hartford	2,003	19,674,159	18,076,202	42,408,061	5,147,398	6,377,155	282,873	16,296,299	385,347	1,064,383	29,541,987	12,866,075	1,779,000	11,083,939	1,192,583

†Figures shown here are for two months ending February 28, 1915.

REVENUES AND EXPENSES OF RAILWAYS

EIGHT MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comn. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
New York, Ontario & Western	568	$4,112,758	$1,154,145	$6,119,878	$779,848	$1,123,098	$65,386	$2,399,896	.....	$123,421	$4,491,649	$1,628,229	$158,824	$1,469,373	$84,056
New York, Philadelphia & Norfolk	112	1,897,380	337,984	2,446,981	239,291	494,035	35,191	1,083,116	$37,140	79,642	1,968,414	478,567	77,800	400,561	21,016
New York, Susquehanna & Western	140	1,464,265	351,107	2,024,711	198,291	239,269	17,473	919,498	.....	43,521	1,416,951	607,760	31,270	564,877	144,930
Norfolk & Western	2,041	23,098,184	3,180,602	27,414,833	3,667,934	5,473,543	471,095	8,334,935	74,850	552,201	18,207,838	9,206,995	1,206,000	8,000,647	—149,644
Norfolk Southern	900	1,634,525	719,016	2,551,318	348,314	411,408	58,339	971,598	704	159,222	1,949,585	601,732	87,489	512,867	—215,653
Northern Pacific	6,451	30,458,601	9,398,083	43,731,488	5,553,903	5,551,579	733,510	13,196,628	642,971	736,739	25,577,979	18,153,508	3,177,509	14,974,188	—962,607
Northwestern Pacific	401	948,553	1,205,711	2,428,128	436,953	321,770	37,512	936,149	.....	67,227	1,766,664	661,464	128,129	533,235	—86,419
Oregon Short Line	2,161	9,747,609	2,975,871	13,905,837	1,876,604	1,919,994	244,704	3,460,454	211,806	438,451	8,082,064	5,823,774	820,860	5,001,333	—934,950
Oregon-Washington R. R. & Nav. Co.	1,991	6,767,764	2,929,304	10,624,091	1,184,771	1,273,115	308,604	3,545,789	98,908	454,368	6,803,317	3,820,774	757,926	3,061,591	206,774
Panhandle & Santa Fe	670	2,077,556	452,376	2,655,575	475,963	510,154	31,161	836,566	.....	68,772	1,922,616	732,959	71,509	660,434	411,578
Pennsylvania *Company*	1,757	25,112,560	6,572,821	35,360,539	5,239,927	6,692,095	615,106	13,285,157	288,194	896,050	27,016,530	8,344,009	2,101,831	6,240,395	—2,020,239
Philadelphia & Reading	1,120	24,560,576	4,409,859	30,483,902	2,857,330	5,625,424	367,066	11,064,309	135,581	557,125	20,598,400	9,885,501	800,664	9,080,646	—1,404,612
Pennsylvania *Railroad*	4,512	84,631,121	25,899,896	121,817,757	16,359,977	24,630,835	1,668,404	46,321,113	1,814,595	3,263,972	94,058,896	27,758,861	5,163,553	22,581,730	—828,577
Pere Marquette	2,312	8,301,230	2,765,210	12,085,670	1,066,921	2,314,131	258,981	4,764,096	37,681	344,429	8,783,112	3,302,558	330,050	2,970,800	2,149,425
Philadelphia, Baltimore & Washington	717	6,438,523	5,531,894	13,356,830	2,062,210	2,539,038	221,655	5,773,371	126	354,909	10,951,308	2,405,522	457,460	1,947,165	209,709
Pittsburgh & Lake Erie	225	7,916,336	1,105,225	9,430,170	1,254,694	2,156,556	114,138	2,631,999	26,856	222,644	6,406,887	3,023,283	409,596	2,613,562	—1,610,319
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	17,238,017	5,407,979	25,621,689	3,305,712	5,040,265	524,792	9,691,680	191,521	632,338	19,386,308	6,235,381	1,303,202	4,930,256	115,648
Port Reading	21	822,335	.....	1,002,181	93,394	66,330	310	349,265	.....	2,995	512,292	489,889	96,000	393,889	—5,587
Richmond, Fredericksburg & Potomac	88	909,305	640,126	1,797,763	160,674	240,648	28,271	689,157	35,244	57,510	1,211,503	586,260	56,450	529,654	—35,006
Rutland	468	1,259,705	772,193	2,313,706	286,129	399,066	65,190	918,918	9,559	45,981	1,724,844	588,863	136,999	451,864	57,192
St. Joseph & Grand Island	273	766,308	205,200	1,048,283	175,240	155,896	37,643	382,076	.....	42,054	792,908	255,374	64,783	190,499	80,073
St. Louis & San Francisco	4,746	18,927,718	6,987,841	27,727,389	3,770,612	4,365,520	526,220	9,350,084	.....	720,734	18,733,171	8,994,219	821,172	8,160,518	380,617
St. Louis, Brownsville & Mexico	548	870,478	492,049	1,497,252	276,815	165,302	42,701	567,637	.....	86,537	1,130,239	367,013	50,423	316,321	27,190
St. Louis, Iron Mountain & Southern	3,364	15,363,350	3,602,604	20,540,708	2,941,695	3,673,510	465,874	6,540,349	66,432	502,471	14,190,331	6,349,878	900,256	5,438,812	—2,004,428
St. Louis Merchants' Bridge Terminal	9	.....	1,419	1,231,670	155,854	57,484	6,215	625,450	.....	51,790	896,793	334,877	57,029	277,840	116,802
St. Louis, San Francisco & Texas	235	569,812	213,333	835,798	197,247	138,640	18,388	282,934	.....	36,739	773,948	61,850	10,222	51,598	—169,277
St. Louis Southwestern	943	3,676,343	822,075	4,774,091	589,069	836,202	205,756	1,362,313	26,235	210,079	3,226,360	1,547,731	256,194	1,290,967	—729,971
St. Louis Southwestern of Texas	810	1,759,852	647,856	2,610,254	616,617	650,781	97,355	1,231,101	6,446	142,807	2,707,433	—97,179	117,129	—215,078	—225,119
San Antonio & Aransas Pass	724	1,816,800	741,729	2,731,868	536,994	505,073	52,752	1,286,587	.....	93,133	2,474,321	257,547	100,156	156,690	—482,245
San Pedro, Los Angeles & Salt Lake	1,132	3,837,749	1,614,133	6,018,525	615,863	936,763	261,083	2,016,689	113,187	146,363	4,109,947	1,908,578	334,558	1,573,514	—252,505
Seaboard	3,100	9,267,451	3,061,744	13,845,985	1,638,959	2,100,553	510,553	5,187,709	71,376	439,832	9,946,725	3,899,261	718,151	3,176,054	—1,246,508
Southern	7,036	26,918,822	11,386,489	42,035,985	5,831,768	7,588,481	1,465,673	15,552,382	267,637	1,354,052	31,933,117	70,102,868	1,721,603	8,369,670	—3,697,404
Southern in Mississippi	281	430,805	226,291	720,987	179,400	69,978	19,396	324,044	.....	29,618	622,437	98,550	67,657	30,808	—119,773
Southern Pacific	6,513	39,269,646	18,069,359	63,818,216	6,386,312	9,230,858	1,294,213	20,605,817	1,071,029	1,835,109	40,249,201	23,569,015	3,258,001	20,289,200	—2,210,599
Spokane International	163	385,514	114,841	526,715	88,868	38,304	18,079	173,484	30	28,836	347,602	179,114	35,431	143,556	—126,163
Spokane, Portland & Seattle	556	1,831,565	980,005	3,095,449	376,378	281,171	60,412	714,284	27,135	107,236	1,566,425	1,529,024	427,200	1,100,194	—31,770
Tennessee Central	294	659,176	262,811	985,568	234,547	133,634	43,988	397,102	.....	54,026	863,157	122,412	35,807	86,486	—167,595
Terminal R. R. Ass'n of St. Louis	35	.....	1,456	1,819,434	146,254	98,382	7,336	637,748	.....	42,645	932,365	887,069	229,669	657,400	228,092
Texas & New Orleans	469	1,653,192	714,892	2,629,538	439,634	647,845	62,948	1,102,848	78,501	84,569	2,415,484	214,055	127,324	85,209	—138,243
Texas & Pacific	1,887	8,663,400	2,890,538	12,531,394	1,243,785	1,910,451	296,069	5,238,145	116,492	310,854	9,106,859	3,424,536	558,736	2,862,301	—155,309
Toledo & Ohio Central	446	2,920,156	419,552	3,552,190	510,083	677,716	64,252	1,337,164	14,030	79,338	2,682,583	869,606	179,355	688,486	139,688
Toledo, Peoria & Western	248	466,967	305,713	822,624	127,250	214,930	19,527	357,720	28,656	.....	748,083	74 541	48,800	25,736	28,109
Toledo, St. Louis & Western	451	2,635,421	225,460	3,075,765	368,549	468,377	133,254	1,203,802	.....	67,558	2,241,539	834,226	191,116	643,110	—241,163
Trinity & Brazos Valley	334	570,840	139,205	764,137	161,659	81,228	24,907	358,880	.....	65,161	691,835	72,302	34,720	37,350	680
Ulster & Delaware	129	334,836	246,875	696,977	109,333	129,603	11,782	328,742	470	29,784	609,713	87,264	26,400	60,174	—66,406
Union Pacific	3,616	25,530,633	6,624,659	35,962,960	4,105,429	4,975,972	749,128	9,030,258	564,314	979,399	20,390,580	15,572,380	1,586,159	13,982,575	—168,652
Union R. R. of Baltimore	9	894,645	172,469	1,081,509	105,050	.....	.....	37,109	.....	19,831	161,989	919,520	45,712	873,807	2,030
Union R. R. of Pennsylvania	31	.....	.....	2,238,070	339,151	764,170	809	1,003,109	.....	26,039	2,133,278	104,793	24,773	80,020	—278,202
Vandalia	910	5,027,069	1,619,245	7,479,468	1,009,722	1,493,495	188,221	2,942,920	78,260	173,724	5,886,343	1,593,124	257,577	1,335,397	—310,293
Vicksburg, Shreveport & Pacific	171	514,252	312,341	930,478	163,731	217,630	29,338	369,087	18,639	40,411	838,836	91,643	57,207	34,435	—215,789
Virginia & Southwestern	240	1,100,793	110,988	1,248,168	202,128	290,352	19,520	366,407	.....	30,548	908,955	339,213	52,499	286,714	—55,343
Virginian	503	3,345,200	266,755	3,856,995	490,456	682,429	43,151	898,423	79,439	88,958	2,262,327	1,594,669	172,500	1,421,930	—392,419
Wabash	2,519	13,650,166	4,270,337	19,690,750	2,200,922	3,563,164	692,598	8,069,657	115,581	483,437	15,107,617	4,583,134	650,393	3,930,850	181,327
Washington Southern	36	272,522	313,642	799,343	94,248	122,873	10,950	331,807	15,020	24,119	599,018	200,325	26,225	174,080	—16,589
West Jersey & Seashore	356	1,210,350	2,858,656	4,476,965	731,185	675,813	104,599	1,905,906	22,223	107,383	3,547,108	929,857	228,902	700,686	84,952
Western Maryland	661	4,523,823	663,222	5,451,258	792,392	924,837	176,260	2,034,145	15,766	152,965	4,090,583	1,360,675	200,000	1,160,675	856,969
Western Pacific	943	2,767,106	744,763	3,734,053	797,053	488,083	197,702	1,264,611	86,620	167,337	3,001,407	732,647	231,597	499,766	—42,112
Western Ry. of Alabama	133	457,935	296,860	836,570	153,382	203,682	47,233	257,765	12,162	36,361	710,285	126,285	43,730	82,017	—151,843
Wheeling & Lake Erie	459	2,800,865	387,826	3,518,203	387,778	678,584	72,485	1,381,511	10,258	118,909	2,649,525	868,678	251,255	617,423	—857,608
Yazoo & Mississippi Valley	1,377	6,012,522	1,575,265	8,024,038	1,187,042	1,119,814	135,773	2,980,283	13,591	191,943	5,620,714	2,403,324	405,000	1,996,904	—640,364

Traffic News

The Erie, in co-operation with Cornell and Alfred Universities is running a farmers' demonstration train in western New York.

The date for the appearance of Illinois railroad officers before the senate and house committees on public utilities in behalf of the 2½-cent passenger fare bill has been postponed until Wednesday, April 21.

The Central of Georgia has posted in its stations notices to farmers calling on them for information concerning any surplus oats or wheat which they may be likely to have at the end of the season, the agricultural department of the road being prepared to assist, where desired, in finding nearby markets for surplus grain.

A new passenger train from St. Louis to the Pacific coast, to be called the "Scenic Limited," was put into service on April 12, over the Missouri Pacific, the Denver & Rio Grande and the Western Pacific. The train will leave St. Louis at 2 p. m. daily, arriving at Kansas City at 9:30 p. m., Pueblo, Colo., at 2:15 p. m. the following day, Salt Lake City at 1:30 p. m. the third day, and San Francisco at 5:45 p. m. the fourth.

The New York State Public Service Commission, Second district, has received notice from the principal railroads that beginning May 1 party tickets for ten or more persons traveling together will cost about 2¼ cents a mile, or 2½ mills more than at present; that the minimum charge for a special train will be increased from $50 to $75 and the minimum charge for a special car will be increased from 25 fares to 40 fares.

The Baltimore & Ohio, with a view to encouraging the exportation of coal by showing the opportunities for extending this trade as a result of the European war, is circulating a pamphlet issued by the National City Bank of New York. The pamphlet shows the tremendous proportions of the coal industry as well as the destruction of commerce and financial loss which the countries at war have suffered through the interruption of their coal trade. Coal operators in the United States have an advantage as a result of the Panama Canal route. It seems certain that coal produced in the United States can be sold profitably at Cristobal coaling station at the Atlantic end of the canal at one dollar a ton less than the price charged at Port Said station of the Suez Canal. Over 500,000,000 tons of coal was produced in this country in 1913, which was about 40 per cent of the world's output. It is estimated that all of the coal produced in the United States to the present time is about one-half of 1 per cent of the total supply of the country, which is calculated to be more than three trillion, five hundred billion tons.

Missouri Business Men Ask Help for Railroads

A large delegation of members of commercial clubs and business men's organizations held a meeting at Moberly, Mo., on April 8, in response to an invitation sent out by the Moberly Commercial Club for a conference to devise some means to assist the railroads in bettering their financial condition. Nearly 150 representative business men attended the meeting. Thirty-five went from St. Louis in a special car and 20 from Trenton in a special car. Festus J. Wade, president of the Mercantile Trust Company of St. Louis, was one of the principal speakers, and short talks were made by others, all favoring a resolution requesting the Missouri Public Service Commission to grant the request of the railroads for an increase in state freight and passenger rates. A committee was appointed to prepare resolutions to be presented to the commission.

Car Surpluses and Shortages

The American Railway Association's Committee on Relations Between Railroads, Arthur Hale, chairman, has issued statistical statement No. 3 giving a summary of freight car surpluses and shortages for April 1, 1915, with comparisons.

The total surplus on April 1, 1915, was 313,421; on March 1, 1915, 322,290, and on April 1, 1914, 141,525.

The surplus for March 1, 1915, shown above, includes figures reported since the issue of statistical statement No. 2 (published in the *Railway Age Gazette* of March 12, page 486).

The total shortage on April 1, 1915, was 348; on March 1, 1915, 543, and on April 1, 1914, 2,013.

The figures by classes of cars follow:

Classes	Surplus	Shortage
Box	93,400	208
Flat	19,472	50
Coal and gondola	145,069	33
Other	55,480	57
Total	313,421	348

Passes in Texas

J. H. Hill, president of the General Managers' Association of Texas, in a statement relative to the suit against 41 Texas railroads filed by the attorney general of Texas, seeking to declare unconstitutional the exceptions or exemptions of the Texas anti-pass law, says that all passes issued by the roads since the enactment of the law on July 1, 1907, have been in accordance with opinions issued by the attorney general's department interpreting the exemption section, and that since the passage of the act there has never been a prosecution for the illegal issuance of a pass. The calculations of the attorney general as to the amount of revenue the roads have lost by issuing passes, he says, are entirely fanciful and based on the violent assumption that all persons who have traveled without paying fares would have traveled to the same extent and paid fare if they had not had passes. He says the common assumption that doing away with passes has increased the revenues of the roads is not proved by the figures.

For the year ended June 30, 1908, the year following the enactment of the law, with 500 more miles of railroad, the passenger revenue of the Texas lines increased only $23,671, while according to the attorney general's statement the free travel had decreased 26.5 per cent. For the six fiscal years ended June 30, 1913, Mr. Hill says, the total mileage traveled on passes in Texas was 752,571,281, of which 71 per cent represented travel by employees and members of their families over the roads on which they were employed, and 26 per cent by officers, agents and employees of other railroads, making 97 per cent of the total traveled by railroad employees and their families. A large part of this travel was by employees in the discharge of their duties, and the rest was represented by travel for pleasure, a large proportion of which would not have taken place without the passes. About 2 per cent of the total represented travel by public officials of the state of Texas, and about one-half per cent by officials of the United States, the remaining one-half per cent representing passes issued for charitable purposes, or for other purposes allowed by the law. Since 1907, he says, the general managers of the Texas railroads have supposed that this transportation was issued under the declared policy of the state of Texas, and if they have made a mistake it has been contributed to by the action of the attorney general's department.

Traffic Through Sault Ste. Marie Canals

Lieut. Col. Mason M. Patrick, of the U. S. Army, has issued the annual statistical report of lake commerce passing through the canals at Sault Ste. Marie, Michigan and Ontario, during the season of 1914. The total freight traffic of 55,369,934 short tons for the season of 1914, when compared with the season of 1913, shows a decrease of 31 per cent, or 24,348,410 tons, and the net registered tonnage of 41,986,339 shows a decrease of 28 per cent, or 16,003,376 tons. All the items of freight show a decrease when compared with the season of 1913, except salt and copper. The total number of passengers was 59,801, a decrease of 17,393. The passages through both canals numbered 18,717, showing a loss of 5,078, or 21 per cent. The total lockages numbered 13,502, a loss of 3,365, or 20 per cent.

The season of navigation continued for a period of 7 months and 28 days, during which time the average monthly freight traffic was 6,979,403 short tons, and 5,292,396 tons net register. The mean depth of water through the canals and locks limited the safe draft to about 19 feet until after the opening of the new third lock and canal.

The traffic through the American canal was 50 per cent of the total freight, 59 per cent of the total net registered tonnage

and 50 per cent of the total number of passengers carried, the amounts being 27,771,467 tons of freight, 24,690,381 tons register and 29,792 passengers. Compared with the season of 1913, there was a decrease of 9,250,734 tons of freight, or 25 per cent; 7,372,238 tons register, or 23 per cent; and 10,704 passengers, or 26 per cent. The American canal opened April 20 and closed December 17, 1914, making the length of its season 242 days.

The traffic through the Canadian canal was 50 per cent of the total freight, 41 per cent of the total registered tonnage and 50 per cent of the passengers carried, the amounts being 27,598,467 tons of freight, 17,295,958 tons register and 30,009 passengers. Compared with the season of 1913, there was a decrease of 15,097,676 tons of freight, or 35 per cent; 8,631,138 tons register, or 33 per cent; and 6,689 passengers, or 18 per cent. The Canadian canal was opened April 20 and closed December 14, 1914, making the length of its season 239 days.

The general summary for American and Canadian canals is as follows:

Total freight carried, tons	55,369,934
Total tons net register	41,986,339
Total mile-tons	46,112,251,781
Total valuation placed on freight carried	$634,800,268
Total amount paid for freight carried	$27,597,099
Total number of registered vessels using canals	813
Total number of passages by unregistered craft carrying freight	375
Total valuation placed on registered vessels	$134,631,700
Total number of passengers transported	59,801
Average distance freight was carried, miles	832.8
Average cost per ton for freight transportation	$0.50
Average cost per mile per ton, mills	.60
Average value per ton of freight carried	$11.46
Time American canal was operated, days	242
Time Canadian canal was operated, days	239
Freight carried by—	
Registered vessels, tons	55,285,213
Unregistered vessels, tons	84,721
American vessels, per cent	91
Canadian vessels, per cent	9
Passengers carried by—	
American vessels, per cent	48
Canadian vessels, per cent	52

American Association of Passenger Traffic Officers

The sixtieth annual convention of the American Association of Passenger Traffic Officers was held at San Francisco, Cal., beginning on Thursday of this week. The program includes reports from the executive committee and the various standing committees and special committees, including the committees on adjustments of disputes relative to division of passenger fares; printing of folders and other advertising matter, and economical distribution thereof; telegraph code applicable for use in passenger traffic departments; operation of and charges for dining cars; additional charge for checking baggage; revision of joint tariffs; improved method of making sleeping car reservations; additional fare for sleeping or parlor car passengers, and additional charge for passenger occupying section in sleeper; and reports from co-operating associations. Topics for discussion under the head of new and miscellaneous business included: expense of special train service for organized party business; operation of unnecessary sleeping cars on through trains; advance in passenger fares, those made and under contemplation with an exchange of views as to conditions and progress being made; economics in operation of city ticket offices and in passenger service; improved method of handling reports of territorial committees on subjects which have been referred to them by the American Association of Passenger Traffic Officers; and relations of passenger traffic officers with the Interstate Commerce Commission and with state, railroad and utility commissions. The annual address was presented by O. P. McCarty, passenger traffic manager of the Baltimore & Ohio.

A large party of members of the association and their families left Chicago on Sunday evening, April 11, in a special train, which was practically a duplicate of the Overland Limited, the route being over the Chicago & North Western, the Union Pacific and the Southern Pacific. The itinerary provided for spending several hours at Salt Lake City enroute, and after a stop of about four days at San Francisco, where in addition to attending the convention the party will visit the Panama-Pacific Exposition, the party will proceed by special train to Los Angeles, stopping at Del Monte, Paso Robles and San Bernardino. After spending four days in Los Angeles and vicinity, including a trip to the Panama-California Exposition at San Diego, the return trip will be made from Los Angeles over the Atchison, Topeka & Santa Fe, a stop of one day being made at the Grand Canyon, and the party will arrive at Chicago on April 29.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Coal to St. Paul and Minneapolis

Daly Coal Company et al. v. Chicago & Alton et al. Opinion by Commissioner Clements:

The commission finds that the rates, increased ten cents a ton on May 30, 1914, on bituminous coal from mines in Illinois and Indiana to St. Paul and Minneapolis, Minn., are not unreasonable. (33 I. C. C., 467.)

Minimum Weight on Calves

Irvin Kibbe v. Abilene & Southern et al. Opinion by Commissioner McChord:

The commission finds that the minimum carload weight of 22,000 lb. on calves from Greta and other Texas shipping points to points in Colorado, Kansas, Illinois and other states is discriminatory against such points of origin. A minimum of 17,000 lb. is prescribed for the future. (33 I. C. C., 415.)

Rates on Corrugated Galvanized Sheet Iron to Pacific Coast Points

California Corrugated Culvert Company v. Alabama Great Southern et al. Opinion by the commission:

It is found that a rate of 95 cents per 100 lb. on corrugated galvanized sheet iron in carloads from Middletown, Ohio, to Pacific coast points is reasonable, but that it is discriminatory in that it exceeds the rate of 85 cents between the same points on plain galvanized sheet iron. No reparation is awarded. (33 I. C. C., 445.)

Rates on Grain Between Points in Oklahoma and Kansas

Opinion by Commissioner Harlan:

The commission finds that the carriers have not justified a proposed cancellation of joint rates on grain and grain products moving from points on the line of the Chicago, Rock Island & Pacific in Nebraska and Kansas to points in Oklahoma on the St. Louis & San Francisco. Had the joint rates been cancelled rates equal to the sum of the intermediate rates would have applied which would have been from one-half cent to 13½ cents per 100 lb. higher than the rates at present in effect. (33 I. C. C., 452.)

Joint Fares with the Grand Rapids, Grand Haven & Muskegon

Howard P. Damon et al. v. Crosby Transportation Company et al. Opinion by Commissioner McChord:

The commission finds that the Crosby Transportation Company in selling through tickets via its boats and the line of the Detroit, Grand Haven & Milwaukee, between Milwaukee, Wis., and Grand Rapids, Mich., and refusing to sell through tickets between the same points via the line of the Grand Rapids, Grand Haven & Muskegon, discriminates against the latter. The Detroit, Grand Haven & Milwaukee is a subsidiary company of the Grand Trunk, and the Grand Rapids, Grand Haven & Muskegon is an electric line which parallels it. (33 I. C. C., 448.)

Railroad Ownership of The Dalles, Portland & Astoria Navigation Company

In re Spokane, Portland & Seattle's ownership of the Dalles, Portland & Astoria Navigation Company. Opinion by Commissioner Clark:

The Spokane, Portland & Seattle operates a line from Portland, Ore., to Spokane, Wash. From Portland to Pasco, Wash., it follows the north bank of the Columbia river, and for substantially the same distance is paralleled by the main line of the Oregon-Washington, which follows the south bank. The railway is the sole owner of the stock of The Dalles, Portland & Astoria Navigation Company, which owns and operates two

steamboats on the Willamette and Columbia rivers between Portland and Dalles, Ore., a distance of approximately 95 miles. The route from Portland is down the Willamette river, 12 miles to its mouth, and thence up the Columbia river, paralleling the rail line of the petitioner.

The commission finds that the navigation company does and may compete with the rail line within the meaning of section 5 of the Panama Canal Act.

It was shown that attempts had been made at different times to operate independent boats between Portland and The Dalles, but that with the exception of a single boat, now in operation, all had failed. It was admitted that so long as the boats of the navigation company were operated, it would be impossible for another boat line to exist on this route. What is known as the lower Columbia river is navigable only from Portland to Celilo, Ore., a point 11 miles above The Dalles. The Celilo canal, which is being constructed by the United States government, will, however, permit boats to pass from the lower to the upper river, and will allow navigation even up to Pasco. An attempt had already been made by an independent company to operate boats above Celilo in connection with boats below, but this attempt also had failed. The commission believes that it is clear from the record that through water transportation cannot be established or maintained between the upper and lower rivers so long as the Spokane, Portland & Seattle owns or controls the navigation company. It was shown that new capital could not be secured to establish and operate a boat line in competition with a railroad-owned boat line, and that a through line could not profitably operate unless it could secure a certain amount of the traffic in the lower river, particularly the passenger traffic.

The commission holds that the continued ownership by the petitioner of The Dalles, Portland & Astoria Navigation Company would not be in the interest of the public and of advantage to the convenience and commerce of the people, and that it would exclude, prevent or reduce competition on the water route here considered. The railway will not be allowed to continue its ownership of the navigation company after June 1, 1915. (33 I. C. C., 462.)

Carriers Should Waive Demurrage at Galveston

E. E. Clark, of the Interstate Commerce Commission, has rendered an opinion on the controversy between the railroads and shippers regarding the assessment of demurrage at Galveston on grain for export, which grew out of the accumulation of demurrage charges on account of the difficulty of obtaining boats last summer. A conference of the parties was held before the commission at Washington on March 25. The carriers reaching Galveston last summer established tariffs providing for the collection of demurrage at Galveston on grain for export. On the breaking out of the war the exporters were disappointed in getting ships to take the grain from Galveston, and the embarrassment was further accentuated by the burning of a large elevator at Galveston in November. A considerable congestion of export grain ensued, accompanied by the accrual of a very large amount of demurrage. The Galveston commercial interests had insisted that it is unjustly discriminatory against the port of Galveston for the carriers to assess demurrage on export grain at that port, so long as similar assessment was not provided for at the port of New Orleans. Mr. Clark said that under the circumstances the tariff should be cancelled, the earlier the better, and the commission will permit such cancellation on one day's notice. He also expresses the opinion that under the circumstances it would be just and proper to relieve the shippers and exporters from the obligation to pay the demurrage accrued and accruing on this export grain, but that this should be done in a lawful and proper manner, that the carriers should present to the commission formal request for authority to waive the collection of these demurrage charges upon the ground that in normal times the carrier would not deem it proper to assess such demurrage at Galveston while none is assessed at New Orleans, and because of the difficulties created by the war. "I do not deem it at all necessary," he said, "that the carriers should admit that the principle of demurrage on export grain is wrong or a mistaken one. The request should be considered in the light of unusual and unprecedented circumstances."

STATE COMMISSIONS

The Texas Railroad Commission on May 3 will resume its hearings on the application of the railroads in the state for 15 per cent advance in freight rates.

The Arkansas Railroad Commission last week refused to accept and file the tariffs received from the St. Louis & San Francisco, putting into effect three-cent passenger rates on that road in Arkansas, following the decision of Judge Trieber of the United States district court holding the two-cent fare law confiscatory. The commission announced that it would appeal from the decision to the United States Supreme Court, and that pending the appeal the three-cents-a-mile tariff would not be accepted.

A hearing on the application of the Kansas railroads for increases in their freight and passenger fares was begun before the Kansas Public Utilities Commission last week. The first witness was James Peabody, statistician for the Atchison, Topeka & Santa Fe. He presented statistical exhibits making a division of expenses between freight and passenger service and line and terminal expenses to show that the railroads are losing money on passenger service. He also showed that the handling of traffic on local trains was more expensive than on through trains. W. J. Black, passenger traffic manager for the Atchison, Topeka & Santa Fe, also testified.

The New York Public Service Commission, second district, holds that a paper package need not be received as baggage, no matter how well it may be disguised with a cardboard suitbox inside the paper, and straps and cords and handles outside. The complainant in the case was a woman, Sara W. Lyons, and the New York Central was the road which refused to check her package. In its order the commission tells of the necessarily rough handling that baggage must be subjected to. Not knowing the contents of paper packages, the railroad contended that its baggagemen would have to handle such material much more slowly and carefully than that in leather or other stronger containers. The commission recognizes the right of the railroad to require that baggage be enclosed in substantial containers. Adequate protection is not afforded by the paper-wrapped cardboard box.

PERSONNEL OF COMMISSIONS

Joseph L. Bristow, formerly United States senator from Kansas, has been appointed chairman of the Kansas Public Utilities Commission, succeeding C. F. Foley. Mr. Bristow was born in Wolfe county, Kentucky, on July 22, 1861. He was clerk of the district court of Douglas county, Kansas, from 1886 to 1890, and for the next five years was owner and editor of the Salina (Kansas) Daily Republican, from 1895 to 1905 of the Ottawa (Kansas) Herald, and since 1903 he has been owner and editor of the Salina Daily Republican Journal. He was private secretary to Governor Morrill of Kansas from 1895 to 1897, fourth assistant postmaster general from 1897 to 1905, and secretary of the Republican state committee from 1894 to 1898. In 1900 he had charge of the investigation of Cuban postal frauds and the reorganization of the Cuban postal service, and in 1903 he conducted the postal investigation under the Roosevelt administration. In 1905 he was special commissioner of the Panama Railroad, and in 1909 he was elected United States senator from Kansas, serving one term, which expired this year.

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J. L. Bristow

COURT NEWS

In the United States district court at Cairo, Ill., on April 6, the Mobile & Ohio was fined $900 for violation of the federal quarantine restricting the transportation of cattle.

The Supreme Court of the United States, in a decision handed down this week, has annulled as arbitrary and unconstitutional the statute of Wisconsin, adopted in 1911, providing that if four or more passenger trains are run each way daily (except Sundays) by a railroad, at least two of them shall be stopped at every postoffice village having 200 inhabitants.

The Supreme Court of Illinois has granted a motion of the Illinois Public Utilities Commission for permission to file a petition for mandamus to compel the Chicago & North Western to comply with an order of the old railroad and warehouse commission. The question involved is whether the orders of the old commission can be made effective by the public utilities commission which succeeded it.

The United States District Court at Huntsville, Ala., has dismissed 34 suits against the Louisville & Nashville for damages based on the charge of neglect in the transportation of cotton at the time of the notorious Knight-Yancey bill-of-lading frauds several years ago. These suits were brought by cotton brokers in England, Germany, France and Italy. A suit against the road brought by the National Park Bank of New York City is still pending in the court of Morgan county, Ala.

Reconsignment Charge—Shipper Must Prove Damage

The Circuit Court of Appeals for the Second Circuit holds that though a carrier was guilty of discrimination in making a reconsignment charge of $2 at a point where the plaintiff reconsigned hay, while it permitted reconsignment free at another point, this did not necessarily entitle the plaintiff to recover $2 per car as damages, in the absence of proof that he in fact suffered the loss. It was not enough to show that various items of $2 had been paid; for aught that appeared the money may have come out of the ultimate buyers. Without affirmative proof to show damages, the hay company was not entitled to a verdict. (Lehigh Valley v. American Hay Co., C. C. A., 219 Fed., 539.)

Twenty-Eight Hour Law—Separate Offenses

Ten separate actions brought by the government against the Oregon Short Line, for violations of the 28-hour law, turned upon the two following questions: (1) If a carrier confines animals in a car for more than the time named in the statute (28 or 36 hours, as the case may be), and thereupon puts them into pens of inadequate size and insufficiently equipped for feeding and watering, is it guilty of two offenses? and (2), if the carrier consolidates into the same train consignments loaded at different times, and thereafter, before the expiration of the period of 28 hours, unloads the entire train into pens of insufficient capacity and without proper facilities for feeding and watering, does it commit more than one offense?

The Federal District Court of Idaho, S. D., considered that both questions might be referred to one controlling consideration, whether the mere unloading of stock into inadequate pens, of itself, constitutes an offense. The act of Congress does not prescribe at what points stock pens shall be maintained, or how they shall be equipped. The carrier may fully comply with its terms without any pens at all. The offense consists in confining the stock beyond the period of 28 hours without feeding, etc. The confinement does not constitute an offense until it passes the prescribed limit. The holding of stock in unfit pens is equivalent to holding them in cars which are deficient in similar particulars. The court held that in unloading stock into improperly equipped pens, after they have been confined in transit without food and water for more than 28 hours, the carrier only continues and aggravates the offense; it does not commit a new one. In effect, the confinement in the cars is deemed to continue until the stock are unloaded into suitable pens and there fed, watered and rested. But where consignments, unloaded simultaneously, were received by the carrier at different hours, the unlawful confinement of each consignment constituted a separate offense. (United States v. O. S. L., 218 Fed., 868.)

Railway Officers

Operating

P. F. McManus, superintendent of the Joliet division of the Elgin, Joliet & Eastern, has been appointed general superintendent, with headquarters at Joliet, Ill., and his former office has been abolished.

D. S. Brigham has been appointed trainmaster of the Boston & Albany, with office at Beacon Park, Mass., vice Sheridan Bisbee, promoted to fuel supervisor in charge of all matters pertaining to the use of fuel, with headquarters at Boston.

Traffic

F. L. Word, having been assigned to other duties, the office of live stock freight agent at Atlanta, Ga., has been abolished on the Southern Railway, the Virginia & Southwestern, the Georgia Southern & Florida, the Hawkinsville & Florida Southern and the Macon & Birmingham.

T. B. Montgomery, general agent of the Chicago, Milwaukee & St. Paul, at Pittsburgh, Pa., has been appointed assistant general freight agent, with headquarters at Minneapolis, Minn., succeeding F. E. Otis, deceased, and E. H. Spence succeeds Mr. Montgomery as general agent at Pittsburgh.

W. H. Tayloe has been appointed passenger traffic manager of the Southern Railway, the Virginia & Southwestern and the Northern Alabama, with office at Washington, D. C., vice S. H. Hardwick, who has resigned the office of passenger traffic manager, on account of ill health, and has been appointed general agent, passenger department, with office at Montgomery, Ala.

Gerrit Fort, whose appointment as passenger traffic manager of the Union Pacific System, including the Oregon Short Line and the Oregon-Washington Railroad & Navigation Company, with headquarters at Chicago, has already been announced in these columns, was born November 12, 1865, at Cedar Rapids, Iowa. He began railway work in the fall of 1884 as clerk to the superintendent of the Burlington, Cedar Rapids & Northern at Cedar Rapids. From January, 1887, to September, 1889, he was clerk to the auditor of the Wabash at Chicago under the receivership; was then for two years assistant rate clerk in the general passenger department of the New York Central & Hudson River at New York, and from September, 1891, to January, 1897, was chief clerk of that department. He left the New York Central to become secretary of the Central Passenger Association at Chicago, resigning in September, 1900, to go to the Union Pacific as assistant general passenger agent. Mr. Fort returned to the New York Central Lines in June, 1907, as assistant to the vice-president, and in February, 1910, he was made general passenger agent of the lines east of Buffalo. In July of that year he again entered the service of the Union Pacific as passenger traffic manager, with office at Omaha, Neb. His jurisdiction was extended over the Oregon Short Line in December, 1910, and on April 1 he was appointed also passenger traffic manager of the Oregon-Washington Railroad & Navigation Company, and his headquarters removed to Chicago, as above noted.

Gerrit Fort

F. R. Perry, general agent of the passenger department of

the Canadian Pacific at Boston, Mass., has been transferred in the same capacity to New York, succeeding W. H. Snell, promoted, and E. F. L. Sturdee, assistant district passenger agent at Toronto, Ont., succeeds Mr. Perry.

J. L. Burnham, division freight agent of the Northern Pacific at St. Paul, Minn., has been appointed assistant general freight agent; L. R. Capron has been appointed assistant general freight agent, and W. A. Cleland has been appointed division freight agent; all with headquarters at St. Paul. J. C. McCutchen has been appointed general agent of the freight department at Milwaukee, Wis., vice C. T. Noonan, deceased.

Engineering and Rolling Stock

J. M. Kerwin has been appointed general foreman, locomotive department, of the Rock Island Lines, at Cedar Rapids, Iowa, in place of M. B. McPartland, transferred.

V. E. Hunter has been appointed general foreman of the Texas Midland, with headquarters at Terrell, Texas, succeeding A. C. Miller, whose title was master mechanic.

George A. Butler has been appointed acting assistant engineer of the Belleville division of the Grand Trunk, with headquarters at Belleville, Ont., vice C. S. Ogilvie, who has enlisted for active service abroad.

Purchasing

Major Charles E. Dole, assistant purchasing officer of the Panama Isthmian Canal Commission, has been appointed purchasing officer of the Alaskan Engineering Commission, with headquarters in the Alaskan building, Seattle, Wash. This is the board that will build the government railroad in Alaska.

Edward J. Roth, whose appointment as purchasing agent of the Chicago, Indianapolis & Louisville, with headquarters at Chicago, has already been announced in these columns, was born on March 4, 1882, at Rochester, Minn. He began railway work with the Chicago, Burlington & Quincy, in 1902, and was employed in the store department of that road until April, 1914, at that time holding the office of assistant general storekeeper. He then went to the Chicago, Indianapolis & Louisville, as supply agent, which position he held until his recent promotion to purchasing agent, as noted above.

OBITUARY

Henry L. Millis, manager of the Western Livestock Express, Chicago, died at his home in Chicago on April 2.

James McGee, master mechanic of the Lorain, Ashland & Southern, with headquarters at Ashland, Ohio, died at his home in Lorain on April 6, aged 56 years.

M. C. Roach, superintendent of the New York division of the Lehigh Valley, with headquarters at Jersey City, N. J., died on April 12, at his home in Passaic, N. J., at the age of 46.

David James Mackey, formerly from 1881 to December, 1892, president of the Evansville & Terre Haute, died on April 9 at Evansville, Ind., aged 82 years. Mr. Mackey was president also of the Louisville, Evansville & St. Louis from April, 1889, to 1894.

Henry W. Poor, president of Poor's Railroad Manual Company, died at his home in New York City, April 13, at the age of 71. He was a director of the Missouri, Kansas & Texas; and, as a banker, had other important railroad interests; but he is best known to readers of the *Railway Age Gazette* by his connection with Poor's Manual of Railroads, a name which has been a household word in railroad offices for nearly half a century. He was born in Bangor, Me., his father being Henry V. Poor, who was editor of the American Railroad Journal (now the Mechanical Edition of the *Railway Age Gazette*), from which he retired in 1863. Henry W. Poor was graduated from Harvard College in 1865, and in 1868 became a partner with his father in the banking firm of H. V. & H. W. Poor; and in that year the first number of the Manual was issued. This annual publication, still an essential part of the equipment of the railroad officer's library, was, until the establishment of the statistical office of the Interstate Commerce Commission, in 1887, of still more importance than now; for it was the only source of detailed information concerning the financial affairs and history of the railroads of the United States.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for one second hand 45-ton six-wheel switching locomotive and one second hand 70-ton Consolidation type locomotive.

CAR BUILDING

The Virginian Railway is in the market for 500 underframes.

The Wilkesbarre & Hazleton is in the market for 10 coaches.

The New York Municipal is asking for bids on 100 more steel subway cars.

The Pennsylvania Lines West are inquiring for 150 underframes for cabooses.

The Western Maryland is contemplating the purchase of a number of passenger cars.

The Chicago & North Western is reported to be in the market for 2,500 freight cars and 50 passenger cars.

The Ponca Refining Company, has ordered 100 tank cars from the American Car & Foundry Company.

The New York, Westchester & Boston has ordered 15 multiple unit passenger coaches from the Pressed Steel Car Company.

IRON AND STEEL

The Southern has ordered 3,700 tons of steel rails from the Tennessee Coal, Iron & Railroad Company.

The Government Railways of the Union of South Africa have ordered 30,000 tons of steel rails from the Dominion Iron & Steel Company.

The Pittsburgh, Cincinnati, Chicago & St. Louis has ordered 767 tons of steel for a bridge over its tracks at West Lake street, Chicago, from the Chicago Bridge & Iron Company.

Coal Car Shortage in New South Wales.—Colliery managers in the neighborhood of Sydney are complaining of damage to trade caused by a shortage of railway cars. Only a short while ago some of the pits were idle, although orders were plentiful. One colliery was operated but 14 hours in two weeks.

Irish Railways' War Bonus.—Trouble has arisen over the claim that Irish railwaymen of the wages staff should receive the same war bonus as has already been granted by arrangement with the government on English and Scottish railways. That arrangement includes adult wage-earning employees in the grades embraced in the conciliation scheme, a bonus of 3s. (75 cents) a week being granted where the wages are under 30s. ($7.50) a week, and of 2s. (50 cents) a week where the wages are 30s. and over. The position of the railways in Ireland is peculiar as they are neither parties to the conciliation scheme, nor under government control. In answer to appeals from their employees for some concession to meet the increased cost of living, individual companies voluntarily gave assistance some weeks back. The Great Northern, Midland (Northern Counties Committee), and Belfast & County Down have sanctioned allowances varying from 2s. to 1s. a week to all permanent adult members of their staffs, while the Great Southern & Western allowances are 1s. 6d. and 1s., and the Dublin & South-Eastern is allowing 1s. a week in many cases. The difficulty in which the Irish companies are placed is that they have no government subsidy, and their circumstances vary so much that they cannot be treated as a unit for the purpose of fixing a uniform bonus.

Supply Trade News

Merrill G. Baker has been appointed assistant general manager of sales of the American Vanadium Company.

A. Munch, who has been factory manager of the Maywood, Ill., plant of the Hewitt Company, Chicago, has been appointed to the new position of service engineer for the same company.

The Chicago Pneumatic Tool Company, Chicago, has moved its New York office from 50 Church street to 52 Vanderbilt avenue, and its Boston office from 191 High street to 185 Pleasant street.

Edwin S. Jarrett, formerly vice-president of the Foundation Company, New York, and Ralph H. Chambers, formerly chief engineer and general manager of the same company, have formed the Jarrett-Chambers Company, Inc., contractors, with offices at 30 East Forty-second street, New York.

Announcement was made in this column last week that the annual meeting of the former employees of the New York Central Signal department would be held at the Hotel Astor in New York on May 26. It is now announced that this date has been changed to May 27.

Charles R. McCormick & Co., manufacturers and cargo shippers of creosoted lumber, ties and piling, with main office at San Francisco, Cal., and mills, creosoting plant and ship yards at St. Helens, Oregon, have opened an office at 17 Battery place, New York, with C. E. Bland as New York manager.

The Reliance Equipment Company, Inc., Mobile, Ala., has been incorporated in that city, and has opened offices at 112 N. Water street. The company will solicit railway business in Alabama, Mississippi, Florida and Louisiana, and will specialize in rails, track tools, equipment, waste and general supplies for railway machine shops. The president of the company is James H. Zelnicker, and the vice-president and secretary, William J. Zimmern.

Judge George H. Bingham in the United States Court for the district of Massachusetts at Boston, handed down a decision on March 13, 1915, sustaining the validity of patent No. 741,385, owned by the Terry Steam Turbine Company, Hartford, Conn., which has been involved in the suit entered about two and one-half years ago by it against the B. F. Sturtevant Company, Hyde Park, Mass. The suit alleged that the B. F. Sturtevant Company was building a steam turbine which infringed this Terry patent.

The Canadian Car & Foundry Company is reported to be working on an order for shrapnel and other ammunition for Russia said to amount to $80,000,000, of which $20,000,000 has already been advanced. A part of this business has been let to American companies. The Westinghouse Electric & Manufacturing Company and the American Rolling Mill Company, Middletown, Ohio, are also reported working on orders for shrapnel. The Westinghouse Air Brake Company is reported to have received an order for 1,000,000 shrapnel, valued at $20,000,000 from France.

The receivers of the United States Light & Heating Company, Niagara Falls, N. Y., announced to Judge Hazel of the United States District Court of the Western District of New York in Buffalo on March 30 that a complete reorganization of the company was now assured through the efforts of the stockholders protective committee which represents a controlling share of the preferred and common stock. The proposed reorganization plan was given in this column last week. The receivers have made application advising Judge Hazel to wind up the receivership and transfer the business and the property to the reorganized company. It is understood that necessary notification to the stockholders and others will take some time and that the receivership will probably not be discontinued before some time in June. The plant at Niagara Falls has been doing a larger volume of business during the last two months than for a year past and orders booked for future deliveries are considered very satisfactory. The receivers of the company are James A. Roberts, of New York; James O. Moore, of Buffalo, N. Y., and J. Allan Smith, of Niagara Falls, N. Y.

J. W. Cowper and F. D. Huntington announce the incorporation of the John W. Cowper Company, Inc., engineers and contractors, with office in the Fidelity building, Buffalo, N. Y. It is the purpose of the company to execute complete contracts in building construction. Mr. Cowper was for a number of years engineer of maintenance of way on the Cleveland, Cincinnati, Chicago & St. Louis. From 1900 to 1904 he was with James Stewart & Co. as superintendent of construction on the British Westinghouse plant at Manchester, England, and other structures in Great Britain, including the Savoy hotel in London and the Midland hotel in Manchester. He was then with the same firm for several years in this country, and for the last six years has been vice-president of Worden-Allen & Company, Milwaukee, Wis., and the Lackawanna Bridge Company, from which positions he resigned on April 1. Mr. Huntington, the other member of the company, graduated from Cornell with the class of 1900. He was originally with Westinghouse-Church-Kerr & Company. He also was connected with James Stewart & Co., in England and this country, and later was general superintendent and manager of the Warring, White Company, London. For a time he was in charge of building construction on the Brazil Railway at Rio de Janeiro, this latter engagement lasting until the beginning of the war last fall.

Edward N. Hagar, of Chicago, formerly president of the Universal Portland Cement Company, who resigned from that corporation about two months ago for the purpose of organizing a new cement combination, has recently said with reference to the proposed company that, "The company will be capitalized not in excess of $25,000,000, with a possible minimum of $20,000,000. The stock will be all of one class. There will be no bonded indebtedness. Should the company require additional working capital or money for plant extensions in the future, that will be provided out of earnings. The object of the company is to establish a chain of plants over the country. These plants will be obtained by purchase where practicable, or by building where necessary. For years the cement industry has been hampered as a result of freight rates. Manufacturers have been unable to handle business, successfully in territory beyond a radius of 150 or 200 miles from their plants. The present plan involves what may be termed a 'coast-to-coast' cement company, with plants located at advantageous points throughout the country. The entire country will be divided into territories which may be described within circles, each circle touching the adjacent circles, with a plant as near to the center of the circle as possible. In this way the company will be enabled to overcome the hampering cost of freights for long distances and will be enabled by reason of the magnitude of the output, to compete successfully with any other producer of cement."

TRADE PUBLICATIONS

Electric Railway, Light and Power Materials.—The Drew Electric & Manufacturing Company, Indianapolis, Ind., has recently issued catalog No. 3, a 208-page book devoted to illustrations and descriptions of electrical fixtures and construction materials. The book also gives the prices of the various apparatus.

Boiler Makers' Tools.—A 40-page catalog has recently been issued by the J. Faessler Manufacturing Co., Moberly, Mo., which is devoted to the general line of boiler makers' tools manufactured by this company together with special flue cutting and countersinking tools. The catalog is well illustrated and contains price lists as well as information concerning the operation of the various tools.

Forging Hammers.—Catalog No. 66 of the Chambersburg Engineering Co., which has just been issued, is devoted to a representative line of the different types of steam hammers manufactured by this company. This is a 64-page, 8½-in. by 11-in. catalog in which the features of Chambersburg hammers are described in some detail. It contains a complete index of machinery built by this company, including equipment not shown in this catalog as well as the line of hammers which the catalog covers. It is exceptionally well illustrated.

Railway Construction

Canadian Pacific.—On the Kettle Valley Lines, which is building extensions in British Columbia, the section from Midway, B. C., via Penticton and Princeton, to a junction with the Nicola sub-division of the Canadian Pacific at Merritt, 272 miles, and with the main line at Spences Bridge, 312 miles, is expected to be open for passenger traffic in June; the section from Mons Junction southwest to Hope will not be completed until 1916. The opening of the Kettle Valley Lines will give the Canadian Pacific another alternative route to and from the Pacific coast, by way of the Crowsnest Pass, Kootenay Landing, Nelson, Midway, Penticton, Princeton and Spences Bridge, and the distance between Winnipeg, Man., and Vancouver, B. C., via this new route will be 1,811 miles, as compared with 1,484 miles via the main line through Calgary and Banff, and 1,657 miles via Dunmore Junction, Crowsnest, Kootenay Landing, West Robson and Revelstoke.

Chester & Lancaster (Electric).—Residents of Joanna, Pa., are said to be back of a project to build a high speed electric railway from Blue Ball, Pa., east via Churchtown and Elverson to Phoenixville, about 35 miles. Jacob Hartz, Blue Ball, is said to be interested.

Erie & Southwestern (Electric).—Organized in Pennsylvania, it is said, by residents of Erie, Pa., to build an electric line from Erie, southwest via Weis Library, Sterretania, Platea, Cranesville, Albion, Springboro, Conneautville and Exposition Park to Conneaut Lake, about 40 miles. Surveys for the line have been made. H. C. Allen, Erie, may be addressed.

Furman & Yemassee.—Incorporated in South Carolina with $10,000 capital and headquarters at Furman, S. C. The plans call for building from Furman, on the Southern Railway, east via Grays to Yemassee on the Atlantic Coast Line and the Charleston & Western Carolina, about 22 miles. J. H. Adams, W. P. Ellis and H. Weindal are said to be interested.

Kettle Valley Lines.—See Canadian Pacific.

Long Island.—The report of this company for the year ended December 31, 1914, shows that work was continued on the tunnel section at East New York of the Bay Ridge improvement, and it is expected that all the work will be completed during 1915, except the yard, float bridges, etc., at Bay Ridge, which are to be finished before the New York Connecting Railroad is completed, and connection made with that railroad at Fresh Pond junction. The New York Connecting will be completed by the end of 1916. Very little construction work was carried out on the Jamaica improvement during the year, and there yet remains work to finish this improvement, consisting of completing tunnels under tracks, passenger storage tracks and freight tracks; also, street paving, sewers, etc. The North Side division improvement, including the elimination of grade crossings, laying of second track and the electrification of lines, has been completed. It is planned to complete work on the Woodside-Winfield cut-off in 1915. This will eliminate a number of grade crossings, besides improving the alinement by cutting out 150 degrees of curvature. Some progress was made in the elimination of grade crossings at Bushwick Junction and a settlement as to the grade line through Hollis and Queens was agreed upon with the authorities. This work and the elimination of crossings through Richmond Hill will be started the latter part of 1915, if financial conditions permit. A new passenger platform and shelter was built at Hunters Point avenue, on the tracks leading to Long Island City, and new stations were built and put in operation during the year at Murray Hill, at Holtsville and at Dunton.

Louisiana Roads (Electric).—A company is being organized in Louisiana, it is said, to build an interurban line from Rayville, La., to a point 22 miles south. T. J. Coenen, president, Progressive League, Rayville, is said to be interested.

New York Subways.—The New York Public Service Commission, First district, opened bids on April 9 for the construction of Section No. 4 of Routes Nos. 4 and 36, which includes the part of the Broadway subway in the borough of Manhattan in Seventh avenue between Fifty-first and Fifty-ninth streets. The lowest bidder was the Litchfield Construction Company, Brooklyn, N. Y., who offered to do the work for $1,937,509.

Oneida & Western.—This company, which started work about two years ago on a line from Oneida, Tenn., northwest, has eight miles of track laid and open for freight service. The route as projected for the first 15 miles is along Pine creek to its affluence with the Big South fork of the Cumberland river nine miles, thence along that river for 2.5 miles, and then up White Oak creek. The work is heavy, involving the handling of between 15,000 and 20,000 cu. yd. to the mile, and about 80 per cent is solid rock work. The maximum grade will be 2 per cent and the maximum curvature 20 deg. There will be six steel bridges on the line aggregating 595.5 ft.

Virginian Railway.—Surveys have been made to build a 6-mile line from Stone Coal Junction, W. Va., to mines on Stone Coal creek, but the company is not yet ready to carry out the construction work.

Bids were asked for recently by the Virginian Railway for the construction of the Devils Fork branch from mile post 7.5 on the Winding Gulf branch, and extending about 1.16 miles up Devils Fork in West Virginia. The company expects to let contracts for this work about April 16.

RAILWAY STRUCTURES

Chicago, Ill.—The Pittsburgh, Cincinnati, Chicago & St. Louis has awarded a contract for the steel for a bridge over its tracks at West Lake street, to the Chicago Bridge & Iron Company.

Columbia Cross Roads, Pa.—The Pennsylvania Railroad is now having repairs made to three small bridges on the Elmira division, and is also installing new superstructures. One of the bridges is near Columbia Cross Roads and the other two bridges are in Lycoming county.

Philadelphia, Pa.—The following bridges have been authorized by ordinance, to be built in Philadelphia, and bids for the work will be asked for in the near future. At Fifth street over four tracks of the North Pennsylvania Railroad, to be 70 ft. wide and cost about $70,000; at Diamond street over six tracks on the Connecting Railway, to be 60 ft. wide and cost $75,000; at Cambria and "A" streets over 13 tracks of the Richmond branch of the Philadelphia & Reading, to be 52 ft. wide and cost $62,000, all are to be skew bridges with steel floors, and concrete substructures and encasements. At Fifty-eighth street a 60 ft. reinforced concrete arch, 30 ft. wide to cost $18,000 is to be built over the Baltimore Central, and at Whitby avenue a bridge 80 ft. wide with steel floor and concrete substructure and encasement to cost $42,000 will be built over four tracks of the Baltimore Central. There will also be constructed at Third street, under two tracks of the Philadelphia & Newtown Connecting Railroad a steel superstructure to be 50 ft. wide, with concrete abutments to cost $32,000, and at Fisher avenue under two tracks of the North Pennsylvania Railroad, a steel superstructure with concrete abutments to cost $32,000.

Pittsburg, Pa.—The Baltimore & Ohio has decided to eliminate the Liberty avenue grade crossing in Pittsburgh at a cost of $750,000. Bids for carrying out the work will probably be asked for in the near future.

Spartanburg, S. C.—Contracts have been given by the Southern Railway to M. M. Elkan, Macon, Ga., and R. B. Tufts, Norfolk, Va., to construct a passenger subway under the tracks at the Spartanburg station. The subway will be 30 ft. wide, and will extend 110 ft. from the outside of the station building. It is expected that the work will be completed in six months.

Stonington, Conn.—The New York, New Haven & Hartford and the town of Stonington will jointly build a pony truss span over the tracks of the N. Y. N. H. & H., with deck I beam approach span at a point 1.5 miles west of Stonington on the Providence division. The bridge is to be of steel construction on concrete supports with wooden floors, and will require about 50 tons of steel. The cost of the bridge is $6,500, and of the approach $5,500. Contracts for the work have not yet been let.

Railway Financial News

Atlanta, Birmingham & Atlantic.—A committee, consisting of George C. Clark, S. L. Schoonmaker, Percy R. Pyne and R. G. Fessenden, has been formed, and asks the deposit of the $5,761,000 joint Atlantic & Birmingham Construction Company and Atlanta, Birmingham & Atlantic Railroad collateral 5 per cent notes due May 1. The railroad has been sold under foreclosure, but is still being operated by a receiver.

Chicago, Rock Island & Pacific.—See editorial comment and account of the stockholders' meeting in other columns of this issue.

Memphis Railway Bridge & Terminal.—This company, which is controlled by the St. Louis, Iron Mountain & Southern, the St. Louis Southwestern and the Chicago, Rock Island & Pacific, and is to build a bridge across the Mississippi river at Memphis, has been given permission by the Missouri Public Service Commission to issue $7,500,000 5 per cent bonds.

Missouri, Kansas & Texas.—Holders of the $19,000,000 2-year 5 per cent secured notes of the Missouri, Kansas & Texas, which mature on May 1, 1915, are asked to extend these notes for one year at 6 per cent interest. Holders of a majority of the notes have already agreed to this extension. Noteholders are asked to deposit their notes before April 26 with the Central Trust Company, New York. It is also announced that a committee of the board of directors, consisting of Horace E. Andrews, George W. Davison, Lewis B. Franklin, A. J. Miller and Frank Trumbull, have been appointed by the board to work out a plan for a readjustment of the financial position of the company. In the notice to noteholders Mr. Trumbull, chairman of the board, says:

"The present emergency is not due to lack of earning power, as the property is showing increases both in gross and net earnings and a surplus over all fixed charges, but is due to the maturing at an unfavorable time of this large amount of capital obligations. Any plan necessarily involves action by the stockholders of the company, in order to provide for the payment of the notes and the consequent protection of their interest in the property. It has been impossible to work out a definite plan in time for submission to the stockholders at their recent annual meeting, as a large proportion of the stock is held abroad and foreign holders could not be consulted in time.

"The committee is proceeding diligently and hopes to make an announcement at an early date. The plans under consideration contemplate an issue, to be offered to stockholders, of securities carrying a contingent charge or of preferred stock, which latter has only become practicable through the enactment by the Kansas legislature of an act shortly to become effective authorizing such issues upon consent of the holders of three-fourths of the stock."

Missouri Pacific.—Directors have asked the holders of the $24,845,000 3-year 6 per cent secured notes which were due June 1, 1914, and extended to June 1, 1915, to further extend these notes with the same collateral and at the same rate of interest to June 1, 1916. An announcement was made by George Gould that he had not agreed to extend his notes or those of the Gould estate, but had the matter under consideration.

New York, New Haven & Hartford.—A syndicate, composed of J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, and Kidder, Peabody & Company and Lee, Higginson & Company, both of Boston, has bought $27,000,000 one-year 5 per cent collateral notes of the New York, New Haven & Hartford, secured by the following collateral:

98,132 shares Old Colony 7 per cent stock at 150	$14,719,800
9,551 shares Providence & Worcester 10 per cent stock at 200	1,910,200
5,246 shares Boston & Providence 10 per cent stock at 230	1,206,580
4,867 shares Providence, Warren & Bristol 6 per cent stock at 120	584,040
971 shares Norwich & Worcester 8 per cent preferred, at 150	145,650
291,622 shares Ontario & Western at 26	7,582,172
$1,500,000 Central New England 1st 4s at 75	1,125,000
$13,000,000 Harlem River & Portchester debenture 5s at 100	13,000,000
Total	$40,273,442

The receipts from the sale of this note issue will be used to pay off $30,000,000 notes, falling due on May 1. These notes are $20,000,000 New York, New Haven & Hartford collateral notes, and $10,000,000 Harlem River & Port Chester 5 per cent notes. Thus, as *The Wall Street Journal* points out, $3,000,000 of the maturing notes will be paid for out of current funds, and this is the first reduction in the New Haven floating debt since 1911. The new notes are being offered to the public at 99¼ to yield 5¾ per cent.

Oakland, Antioch & Eastern.—Jesse W. Lilienthal, president of the United Railroads of San Francisco; H. A. Lardner, of the J. G. White Engineering Corporation; C. Osgood Hooker, F. H. Beaver and A. Haas have been elected directors, and Henry T. Scott, president of the Pacific States Telephone Company, and H. A. Mitchell have retired from the board.

Toledo, St. Louis & Western.—The protective committee for the preferred and common stock, J. S. Bache, chairman, announces that more than 70 per cent of the outstanding stock has been deposited with the committee and that the time for making deposits has been extended to May 1 and that after that time deposits will be received only on the payment of 50 cents a share.

Vandalia.—This company, operating 910 miles of line, inclusive of the line of the Terre Haute & Peoria which it leases, in the fiscal year ended December 31, 1914, had net income, after the payment of expenses, rentals, taxes and interest of $282,559 as against $369,259 in 1913. The increased net was primarily due to the business depression resulting in a decreased carriage of bituminous coal which normally constitutes over 50 per cent of the total freight tonnage.

The Vandalia is controlled by the Pennsylvania Company. It operates lines from Indianapolis, Ind., to East St. Louis, Ill.; from Rockville, Ind., to South Bend; from Logansport, Ind., to Butler; from Indianapolis to Vincennes, giving it a total main line of 609 miles, and in addition it has branches aggregating 30 miles. The Terre Haute & Peoria operates lines from Farrington, Ind., to Decatur Junction and from Maroa, Ill., to Farmdale, a total of 145 miles. The Vandalia also operates 16 miles jointly with the Chicago & Eastern Illinois from Otter Creek Junction, Ind., to Rockville, and it has trackage rights, totaling 109 miles, over a number of roads which give it access to Terre Haute, Peoria and Toledo.

In 1914 the Vandalia earned freight revenue per mile of road of $8,093 and passenger train revenue per mile of road of $3,625, these being decreases respectively of $771 and $220. The ton mile rate in 1914 was 6.17 mills as against 6.59 mills in 1913, the total ton mileage carried being 1,193,096,783, an increase of 15,436,065 tons. The company estimates that the average cost per ton mile was 5.20 mills, a decrease of .23 mills and that the net revenue per ton per mile was 0.97 mills as against 1.16 mills in 1913. The average trainload of revenue freight in 1914 was 397 tons, and in 1913, 381 tons. The average passenger receipts per passenger mile in 1914 amounted to 2.137 cents, and in 1913 to 2.134 cents.

The Vandalia controls the Terre Haute & Peoria by lease and the figures given above include the combined operations of both companies. The Vandalia lost $271,150 by the operation of its leased line, an increase of $18,573 over 1913. The Vandalia has been paying 4 per cent dividends, but no dividend was declared in 1914. On December 31, 1914, there was cash on hand of $1,205,454 or $272,164 more than on December 31, 1913. The total current liabilities at the close of the year were $1,404,784.

Wabash.—George J. Gould, Edward T. Jeffery and Winslow S. Pierce, as directors of the Wabash, on October 15, 1913, are held liable by the appellate division of the Supreme Court of New York for $5,133,307, with interest, for illegal bond transactions which took place in 1906. Suit was brought by James Pollitz on behalf of himself and other stockholders.

Western Maryland.—An agreement has been reached between the Western Maryland and the Baltimore & Ohio by which the Western Maryland is to get trackage rights to a connection with a line which it proposes to build from a point in Somerset county to a point in Westmoreland, which line taps properties of the Consolidation Coal Company. The Consolidation Coal Company is understood to be controlled by John D. Rockefeller, who also controls the Western Maryland.

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Contents

*Illustrated.

The Railway's Interest in Correct Weight

The correct determination and recording of weights is a matter of direct concern to the shipper as well as to the railway, and this subject was a topic of active discussion among various shipper's organizations previous to the recent Interstate Commerce Commission hearings on this subject. Mr. Maegley's plea for less secrecy with reference to weights, calling every weight by its right name, and for the participation of the carriers in the determination of the weights of the receiver and the shipper is therefore of general interest to the patrons of the railways as well as to the railways themselves. Unless there is co-operation between the shipper and the receiver of grain and the railways, it is very difficult to locate and correct discrepancies. It would seem that they can best be discovered and corrected by the carrier, since it is a neutral intermediary between the shipper and the receiver. In the reduction or elimination of any class of claims for losses it is first necessary to make a diagnosis of their causes. Only by some joint co-operation, such as that suggested can the proper analysis be made. It is to the ultimate interest of all concerned that legitimate claims be reduced to the minimum, for money paid for the payment of such claims is an economic loss from which no one benefits. Joint committees representing the grain dealers and the railways are now studying this subject and it is to be hoped that their deliberations may result in the evolution of some practicable plan whereby legitimate claims may be reduced to the minimum and others made impossible.

Foreign Government Short Term Financing

Both France and Germany and some of the neutral countries have successfully bid for American short-term money. In recent years the American railroads have been heavy bidders for short-term money at continually advancing prices. It has been recognized, however, both by the railroad managements and the bankers that railroad financing by means of short-term notes was a temporary and an uneconomical expedient. Within the next few years, therefore, American railroads will, both for purposes of meeting maturing short-term notes and for new capital, have to sell a very large amount of long-term bonds and will have to sell them almost exclusively in the American market. Any short-term financing which railroads are compelled to do at present is in competition with the short-term financing of the European governments. Will the long-term bonds of American railroads have to be sold in this country in competition with long-term bonds with which the European governments will meet the maturing notes which they are now selling over here? The proceeds of the sale of foreign government notes are not, of course, leaving the United States, but are being used by the belligerents to pay for war supplies, and by the neutral countries to pay for foodstuffs. There is no gold being exported from the United States to Europe, but foodstuffs and manufactured materials are being exported. This, of course, is a transfer of wealth for which the United States reecives credit. When the short-term European notes fall due the European governments will have the choice either of attempting to sell long-term bonds in the United States to American investors or of selling their bonds to their own investors. In the latter case there will necessarily have to be a transfer either of gold or of some form of wealth from Europe to America to liquidate the debts which Europe is now contracting. Europeans hold a very large amount of American railroad securities. The European investor could ship back to America American railroad securities, thus liquidating the European debt to America, and take in exchange European government bonds. American investors would then be called on to take not only the American railroad securities which were issued to refund short-term notes and to raise new capital, but also the old securities which had been sold in Europe.

Government Versus Railway Securities

Of course, the extent to which the foreign investor sells his holdings of American railroad securities in order to buy European government bonds will depend in part on inducements in the way of interest, security, etc., which the European government bonds will hold out to investors, but also in part to the security of American railroad bonds and their attractiveness as an investment. It might well be that an English or French holder of first mortgage bonds of a strong American railroad company would prefer to retain these bonds even in the face of an offering of European government bonds with a comparatively high rate of interest, but this could only conceivably be so if American railroad credit as a whole were to be much higher in

a year or two from now than it has been in the last few years. On the other hand, the price at which American railroad refunding operations and the raising of new American railroad capital can be accomplished will depend directly on whether or not the two to four hundred million dollars of American railroad securities now held in Europe are dumped on the American market. In other words, it apparently behooves the American railroad managements to be fore-handed in preparations for meeting competition for new capital. To successfully improve railroad credit railroad managers must under our present form of government have the active co-operation of the Interstate Commerce Commission, and although the co-operation of state commissions is hardly to be hoped for, yet there must be a minimum of opposition on the part of these railroad regulators. Railroad managements and the bankers handling their securities will have to make a strong bid for the confidence of investors; but the investors' attitude will be very materially affected by that of the Interstate Commerce Commission and of national and state legislatures. There is, therefore, a vital need for mutual confidence as between railroad managers and railroad regulators and the public.

A SECRETARY OF TRANSPORTATION

FROM different sources there has come recently the suggestion that the industry of transportation should be given representation in the President's cabinet. Ray Morris, in an article in the Yale Review, and Chairman Elliott of the New Haven, in an address at Norwich, Conn., have pointed out the desirability of such action.

Labor has recently been given representation in the cabinet by the creation of the office of secretary of labor. The three greatest industries in the country are agriculture, manufactures and transportation. Agriculture is given representation through the secretary of agriculture, and manufactures and commerce are given representation through the secretary of commerce. The secretary of the treasury, to a large extent, represents the banking interests. Not only is railway transportation one of the three great industries of the country, but in its magnitude it is a peculiarly American industry. The largest railway mileage in any country in the world, except in the United States, is in Russia, which has 50,000 miles; and the mileage of the United States is five times that of Russia. The mileage of the railways of the United States largely exceeds that of all the railways owned by governments in the world. In no other country has railway transportation been developed to such a magnitude either absolutely or relatively, and in no other does the prosperity of the public depend to so great an extent on the prosperity and progress of railway transportation. Yet, while we have secretaries of labor, of commerce, of agriculture and of the treasury, and while many other countries have ministers of railways, the railway industry of this country is conspicuously unrepresented in the President's cabinet.

What is the explanation of this condition of affairs? The functions of the secretaries of labor, of agriculture, of commerce and of the treasury, are wholly in some cases and largely in others, to promote the welfare of the classes or the industry which they represent. Congress thought that by having special government departments to promote the welfare of the laboring class and of the agricultural, manufacturing, commercial and financial interests, the welfare of the public in general would be furthered. But, by some peculiar process of reasoning, it concluded that in the case of the railway industry, what was needed was not a governmental policy of encouragement, but a governmental policy of regulation and repression. It thought it would be advantageous to the public for the other large industries to make large profits, but that it would be advantageous to the public for the profits of the railways to be narrowly restricted. The state legislatures have thought the same way; in fact, the public has thought the same way. Consequently, for years the federal government has been following the policy of fostering other industries and regulating, and repressing the railway industry. It has tried to fix a minimum for the prosperity of other industries and a maximum for the prosperity of the carriers. The effects on the public welfare have not been good. The policy of railway repression has not only injured the railway industry, but has reacted unfavorably on all other classes of industries and tended to counteract the effects of the government's attempts to foster them.

The railways ought to continue to be regulated. The Interstate Commerce Commission should be maintained and should continue to arbitrate between the shippers and the railways regarding rates, and perhaps it should arbitrate between the railways and their employees regarding wages. But, as has been done in the cases of other industries, there should be created an administrative department of the government whose function it should be to study the railway industry and its needs sympathetically and to try to foster its development. Perhaps to this administrative department should be transferred a large part of the administrative duties now performed by the Interstate Commerce Commission. But the primary, fundamental duty of the proposed department should be to foster the industry and not to restrict burden and oppress it.

The public is awakening to the fact that it does not pay any class or classes for the railways to be treated as if they alone among all the great industries are a proper object for attack and repression. Perhaps therefore the time is now ripe for the creation of an administrative department of the government devoted to the interests of transportation.

THE ROCK ISLAND'S FINANCING AGAIN

THE Chicago, Rock Island & Pacific was placed in the hands of receivers on Tuesday. The immediate cause of the receivership was the unwillingness of the directors or bankers to personally extend further aid to the company to help it meet its May 1 interest charges without some assurance that they would not have to continue to carry the company indefinitely. They had already personally helped the road out of its April 1 difficulties.

It has been apprehended for a long time that the condition of the Chicago, Rock Island & Pacific Railway Company would become so serious as to result in its being placed in the hands of receivers. The Railway Company, it should be understood, is the underlying operating company and not either of the two holding companies. The net earnings of the company and the dividends paid by it have been declining while its taxes, interest and other outgo have been increasing. In 1914 it had a deficit of over $1,400,000 and its case seemed hopeless. After the recent annual meeting the outlook seemed more hopeful but the receivership so long feared has at last come both suddenly and unexpectedly. The company found it was unable to get the bankers to let it have certain money which it expected to raise and this rendered it unable to meet certain debts which would soon become due.

The *Railway Age Gazette* recently has published several editorials on the Rock Island situation. A correspondent whose friendship it long has valued, and whose good opinion it desires to deserve and retain, has written chiding us for the editorial entitled "The Chicago, Rock Island & Pacific—1902 to 1915," published in our issue of April 9. He finds the editorial not at all convincing as an argument that the financial operations of the Rock Island "are defensible even in their intentions, which, from my reading of the article, I judge you to defend." He says that the property was capitalized entirely beyond its earning capacity, and that it seems to him that "any argument that tries to defend this procedure on a technicality weakens the whole case of all honest and wise railroad managers." He adds, "Your defense, or what appears to be your defense, of these operations certainly very much weakens the influence that your arguments will have with one of your readers, and it seems to me that it must weaken the influence that your arguments will have with other readers."

Since our correspondent interprets the editorial he criticizes

as a defense of the financing of the Rock Island, we are not surprised that it tends to weaken the influence that our arguments have with him. If other readers place the same interpretation on it, it will doubtless tend to weaken our influence with them also. But such an interpretation is erroneous. The editorial was not, and was not intended to be, a defense of the financing of the Rock Island. No paper has more severely condemned the financial structure built up on that road by Messrs. Reid and Moore than has the *Railway Age Gazette*. That structure was built up to give a few men control of a large property by means of a small investment, and it ought not to be possible for the control of so large and important a property to be thus secured and held. One of the effects has been to injure the Rock Island's credit, and the injury to its credit has interfered with its needed development. The worst effect of the Rock Island financial structure was that it made it essential to the maintenance of the solvency of the holding companies that the operating railroad company should continue to earn and pay four per cent dividends. In other words it turned a contingent liability into a fixed liability, thereby rendering it impracticable for the operating company even temporarily to suspend or reduce its dividends. In consequence earnings which otherwise might have been devoted to improvements which would have increased the earning capacity of the property were paid out in dividends and the property's development did not keep pace with the development of competing railways in the same territory. There can be no serious question that if the Rock Island property had not been loaded down with one holding company after another, and had not suffered losses through the Frisco and Alton transactions, it would be a better property today, both in the service it renders to the public and in the profits it earns. The issuance of railway securities should be so regulated as to make impossible such financial transactions.

But the *Railway Age Gazette* can entertain the views above expressed, and at the same time refuse to be blinded to other facts and circumstances affecting the situation of this property besides those mentioned. The purpose of the editorial in our issue of April 9 was to point out certain of these other facts and circumstances. The main point sought to be established was that the entire financial structure was based on the hope that the road's profits would increase, or at least not decline; that, as a matter of fact, the profits had actually declined; and that this, and not the holding companies, was the *main* cause of the troubles that have overtaken the property. Are not these facts? Between 1907 and 1914 the dividends paid by the underlying company declined from $4,116,728 to $1,871,763, or $3,344,965. What was the cause of this decline? The following figures explain, and more than explain, it. Between 1907 and 1914 gross earnings increased from $60,238,420 to $68,208,113. Meantime operating expenses and taxes increased from $42,720,180 to $54,315,578. Taxes alone jumped from $1,676,000 to $3,316,000, or about 100 per cent. The result was a reduction in net operating income of $3,635,705, which substantially exceeds the reduction in the dividends paid.

The more the figures are studied the more clearly it appears that if the two holding companies had never come into existence at all it would have been impossible for the management to have offset the increases in operating expenses and taxes by any increases in the efficiency and economy of operation that were within its power.

The facts show, then, that the Rock Island has been subjected to two sets of adverse influences. One of these has grown out of its peculiar financing. The other has grown out of increases in its operating expenses and taxes which have caused it to suffer more severely than many other properties because it has been so situated that it has not enjoyed as large an increase as some of them in its gross earnings. Is it defending the financing of the property to call attention to the fact that the plight to which it has been brought is chiefly due, not to its unwholesome financing, but to increases in its operating expenses and taxes?

It is not the policy of this paper to defend the mistakes made or the wrongs done by railway managements. It is our policy to try to present all the facts regarding the railway situation in their true proportions. This is made the more necessary because many persons who discuss these matters seize upon and use only those facts which may support their prejudices or serve their own special purposes. The reckless and, as it has turned out, foolish financing of the Rock Island has been harped upon so much that most people have become convinced that this has been the only thing that has got the property into trouble. This persistent exaggeration of certain features of the case has made it necessary to call attention forcibly to other and equally important features, and this is all the *Railway Age Gazette* has meant to do in the editorials on the Rock Island which it has recently published.

The final bankruptcy of the property is the natural result of the operation of the two sets of influences that have been acting upon it. If the holding company superstructure had never been erected it might have had to reduce or suspend its dividend, but it would probably be a solvent property today. If on the other hand there had not been such an enormous increase in wages, taxes and other expenses it would have been able to have earned and paid sufficient dividends to support the holding company superstructure. With the two sets of influences acting on it, it was unable to continue to stand up. The outcome may properly be denounced as a natural result of the sort of financing of which the Rock Island has been the victim, but it may also with equal propriety and justice be denounced as a natural outcome of the sort of regulation to which the Rock Island and other railways have been subjected.

DELAWARE & HUDSON

THE Delaware & Hudson is generally classed with the financially strong roads of the country, and quite properly so. Even in the calendar year 1914 the company earned net income available for dividends of $4,608,000, or 10.84 per cent, on the outstanding $42,503,000 stock. The company can earn a margin of safety over its 9 per cent dividend rate in a year such as 1914, when it was adversely affected by loss of both freight and passenger business, on the one hand, and by increased operating expenses from causes beyond the control of the management, on the other, because the profit is concentrated on a comparatively small volume of stock; the company has had to pay in the past a low rate of interest for borrowed money and has pursued a liberal policy toward betterment and upkeep. The net earnings on the value of the property used in public service are not high. It was brought out in the anthracite case before the Interstate Commerce Commission that the net operating income of all of the anthracite roads, that is, the total amount available for interest charges, rentals, dividends, etc., after the payment of operating expenses and taxes, amounted to 5.06 per cent on the book cost (the actual cost was probably greater and the rate of return therefore less) of the property devoted to public use. It is so obvious that it is to the public interest for American railroads to get their new capital at the cheapest possible price, and that the reason why such a road as the Delaware & Hudson has in the past been able to do so has been that its earning power has left a fair margin of safety even in times of depression, that it hardly needs reiteration here.

Many of the adverse circumstances which affected the Delaware & Hudson's operating results in 1914 were foreseen and commented on in the annual report for 1913. Briefly summarized, these adverse circumstances were: a loss in bituminous coal tonnage of 355,000 tons, the total carried in 1914 being 2,052,000 tons; in ore tonnage a loss of 313,000 tons, the total tonnage carried in 1914 being 465,000 tons; a loss in miscellaneous tonnage of 919,000 tons, the total carried in 1914 being 715,000, all due to the business depression, the loss in bituminous coal tonnage being of course directly traceable to the shutting down of business in the New England mills and industries; a loss in passenger revenue amounting to $331,000, the total earnings from passenger busi-

ness being $2,947,000 in 1914; and increased expenses of $77,000 due to the operation of the full-crew law for an entire year as against four months in the previous year; increases in wages amounting to about $136,000, due to results of arbitration, and increases in general expenses due to valuation expenses and compliance with requests for information, etc., from the commission.

A favorable factor during the year was the increase in the tonnage of coal mined by the coal mining department, amounting to 230,000 tons, the total mined in 1914 being 7,401,000 tons. There was a loss of a little over 4½ working days in the coal mines due to strikes, as compared with about 54½ days lost in 1913. There would have been no loss of time in either year if the miners had lived up to their agreement to leave disputes to arbitration before striking. There was, as would be expected, a larger tonnage of anthracite coal shipped over the road, the total in 1914 being 9,211,000 tons, an increase of 299,000 tons as compared with 1913. Despite the larger amount of coal mined, however, the revenues from the coal mining department amounted to $15,517,000 as against $16,045,000, and net revenue amounted to $964,000 as against $1,297,000. Presumably the payment of a tax of 2½ per cent on the value of anthracite when prepared for market imposed by Pennsylvania and which went into effect on June 28, 1913, accounts for part of the loss in revenue in the face of the increased tonnage of coal mined. The company is now testing the validity of the Pennsylvania tax in the courts.

Transportation expenses in 1914 amounted to $8,603,000, comparing with $8,585,000 in 1913. The enforced increases in expenses previously mentioned in part explains why it was impossible to reduce transportation expenses proportionately to the reduction in freight and passenger business handled.

The large falling off in tonnage of ores probably also had its effect on the increased transportation expenses per ton-mile and this is reflected in the trainload figures. The revenue trainload was 518 tons in 1914, a decrease of 24.5 tons from the average in 1913, and the total trainload, including company freight, was 557 tons, a decrease of 27.7 tons as compared with 1913. Since the number of loaded cars per train was almost the same in 1914 as in 1913—20.58—and the tons of revenue freight per loaded car pretty nearly as great—25.17 as against 26.14 in 1913—the loss in ore tonnage was a considerable factor in the increased proportion of empty car mileage—this tonnage moving in the direction of the empty car movement.

In 1914 $1,670,000 was spent on maintenance of way, a decrease as compared with the 1913 expenditure of $117,000; and $3,650,000 was spent on maintenance of equipment, a decrease as compared with 1913 of $104,000. In the early part of 1914 there was some very bad weather in the part of the country traversed by the Delaware & Hudson, and the removal of snow and ice in 1914 cost $101,000 as against $18,000 in the previous year. At least a part of the smaller expenditure on maintenance of way apparently represents work more economically done, since the amount spent for rails in 1914 was $73,000 as against $41,000 the year before, and for ties, $273,000 as against $287,000, while applying track material cost but $139,000 in 1914 as against $224,000 the year before; although, on the other hand, there was $8,000 spent for ballast as against $17,000 the year before, and $85,000 spent for "other track material" as against $107,000 the year before. The smaller amount spent for betterments entailed smaller charges in expenses for "replacement in kind."

More was spent for repairs of locomotives and somewhat more for repairs of freight cars in 1914 than in 1913; but the decrease in total maintenance of equipment expenditures is accounted for by the fact that but $31,000 was charged for freight-train car renewals in 1914 as against $316,000 in 1913.

During 1914 the Delaware & Hudson spent $1,821,000 for additions and betterments. Of this, $15,635 was for the installation of block signals between Plattsburg, N. Y., and Rouses Point, and $29,950 on the program of installation of distant signals at the end of the double tracks and for passing track leading from single track line and the extension of overlaps to a minimum distance of 2,000 ft., where distant signals were not in use.

The company sold during the year $4,500,000 first and refunding mortgage 4 per cent bonds at 95. At the end of the year the company had $1,968,000 cash, as compared with $1,647,000 at the beginning of the year, and had on special deposit $1,055,000, of which all but $10,000 represents the unexpended balance from the proceeds of the bond sale mentioned above. Loans payable amounted to $3,019,000 at the end of the year as compared with $4,500,000 at the beginning of the year. The Delaware & Hudson had advanced for construction and acquisition of new lines $5,085,000 as compared with $4,275,000 at the beginning of the year. The greater part of the advances made during the year were for the Wilkes-Barre Connecting Railroad.

The following table shows principal figures in 1914 and 1913:

	1914	1913
Average mileage operated	904	904
Merchandise freight revenue	$8,153,086	$8,794,429
Coal freight revenue	10,844,093	11,436,960
Passenger revenue	2,946,665	3,277,929
Total operating revenue	22,595,029	24,153,495
Maint. of way and structures	1,670,364	1,787,614
Maintenance of equipment	3,649,673	3,753,963
Traffic expenses	314,327	305,966
Transportation expenses	8,602,636	8,584,722
General expenses	811,453	778,042
Total operating expenses	15,048,452	15,210,307
Taxes	671,119	623,107
Operating income	6,875,457	8,320,081
Gross income	7,979,068	9,683,485
Net income	3,169,527	4,926,977
Income from coal mining department	1,357,955	1,188,426
Net corporate income	4,607,863	6,174,736
Dividends	3,825,270	3,825,270
Surplus	782,493	2,349,466

NEW BOOKS

Statistics of Railways of the United States, 1903 to 1913. Bulletin No. 75, issued by the Bureau of Railway Economics, Washington, D. C. 81 pages, 6 in. by 9 in. Bound in paper.

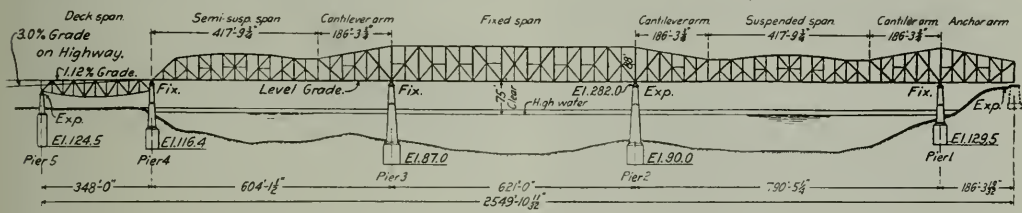
Last year the Bureau of Railway Economics issued in Bulletin No. 66 a compilation of the statistics of the railways of the United States for the years 1900 to 1912, with the purpose of presenting in a form adapted for convenient reference the principal aspects of railway operation, as shown by official statistics. With Bulletin No. 75 the bureau has begun what is intended to be an annual series of similar statistics for the latest 10-year period for which the official figures are available. The railway tabulations are based upon official data published by the Interstate Commerce Commission for each fiscal year ended June 30, 1903, to 1913, and tabulations concerning population and area are based upon the reports of the census bureau. The bulletin contains 76 tables, classified under the following heads: Population and Area, Railway Mileage, Capital Securities and Dividends, Revenues, Expenses and Taxes, Employees and Compensation, Equipment, Freight Traffic Statistics, Passenger Traffic Statistics and Accidents, the various tables under each head giving the principal details for each year. Where such a division is suitable the figures are reduced to a mileage basis. The arrangement of the tabulations renders this bulletin of especial advantage from the standpoint of convenient reference, because it brings together in comparative form the figures for 11 years, thus doing away with the necessity for consulting the different volumes of the Interstate Commerce Commission statistics, and especially because all of the statistics are compiled for the three territorial districts now used by the commission. Prior to 1911 the Interstate Commerce Commission presented the statistics of railways by 10 territorial groups. Beginning with 1911, it has presented the statistics in three districts, eastern, western and southern, representing the three important traffic areas. The statistics given in this bulletin respectively for the three districts for the years prior to 1911 are combinations of the statistics originally published by groups. This makes it possible to obtain an accurate comparison of the statistics for the various years without the necessity of recasting the group figures. The bulletin is published in such a handy form that it should be indispensable to all who have frequent occasion to study the railway statistics and should be on the desk of every railway man, economist and foreign newspaper man who has current need for such compilations.

Substructure of the New "Harahan" Bridge at Memphis

Construction Methods Used to Build Piers for Mississippi River Bridge to Carry Three Roads and a Highway

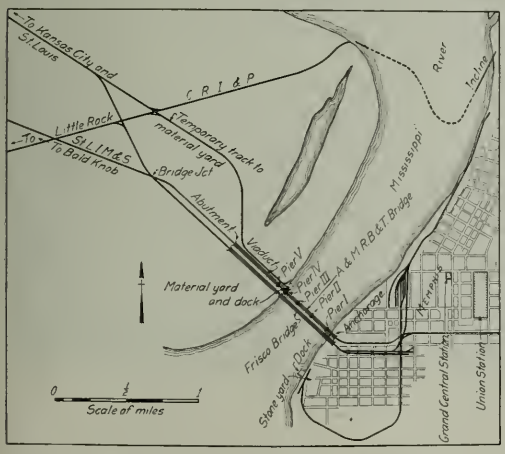
By M. B. Case
Resident Engineer, Arkansas & Memphis Railway Bridge & Terminal Co., Memphis, Tenn.

All traffic on the four roads extending west from Memphis, Tenn., must now pass over a single-track bridge completed in 1892 for the Kansas City & Memphis Railway & Bridge Company, which has since become a part of the Frisco system. In order to provide more adequate facilities, a new bridge is now being built by the Rock Island, the Iron Mountain and the Cotton Belt systems through a joint organization named the Arkansas & Memphis Railway Bridge & Terminal Company. Work was commenced in June, 1913, as mentioned in a preliminary description of the plans for this bridge in the *Railway Age Gazette* of October 31, 1913, and the substructure was entirely completed in January, 1915, slightly more than 18 months after the preliminary work was started at the site.



Elevation of New Mississippi River Bridge at Memphis

Active preparation for the erection of the superstructure of the main bridge is now under way. False work is being placed under one anchor arm, and derricks for unloading and storing the heavy truss members are being erected. The erection of the main bridge and the viaduct approach will be under way during the coming season.

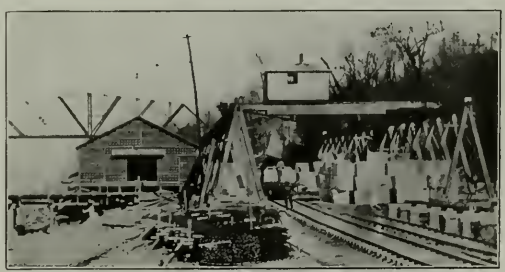


Sketch Map of Bridge Location Showing Material Yard, Stone Yard, Temporary Track, Etc.

THE NEW BRIDGE

The bridge will carry two railroad tracks spaced 14 ft. center to center located between trusses spaced 34 ft. 6 in., and two roadways 14 ft. wide on brackets outside of the trusses. The main bridge is 2,550 ft. long from the anchorage pier on the Tennessee bluff to Pier 5 located 345 ft. back from the low bank on the Arkansas side. Beyond this point a tower and girder viaduct continues over the bottom land for a distance of 2,363 ft. to the west abutment. The tracks are here carried onto an earth embankment 55 ft. high at the abutment, which extends westward on a tangent about ¾ miles to Bridge Junction, where the elevation is about 25 ft. above the general level of the bottom land.

The tracks ascend from the yards in Memphis on a 1.1 per cent grade to Pier 1, and run level to Pier 4, where they descend on a 1.126 per cent grade over the viaduct and the embankment, the necessary vertical curves being provided. The roadways start at Pier 4 to descend to the Arkansas bottoms on a 3 per cent grade along the viaduct until reaching an elevation above high water, about 23 ft. above the ground, when they run level for a short distance to the west abutment and then turn to the down stream side of the Frisco embankment on a single roadway structure to be provided by the county.



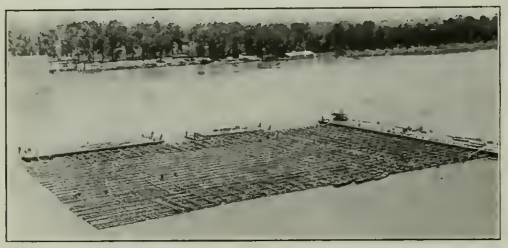
Stone Yard, Traveling Crane, Cement House and Dock on the Tennessee Shore

The center line of the new bridge is 200 ft. up stream, and parallel to the existing structure. Pier 1 on the Tennessee shore, and Piers 2 and 3 in the river are directly above the corresponding piers of the old bridge, while Pier 4 on the Arkansas shore is 17 ft. toward the river from the center line of the old pier in order to permit the duplication between Piers 3 and 4 of the cantilever arm and suspended span used between Piers 1 and 2.

The piers are supported on pneumatic caisson foundations

resting on a very hard blue clay over-laid by several softer strata of clay having slightly variable characteristics. Above this is a bed of sand covered with the shifting alluvial silt of the Mississippi river. The caissons for Piers 2 and 3 are 42 ft. by 90 ft. by 51 ft.; for Pier 1, 40 ft. by 80 ft. by 59 ft.; for Pier 4, 31 ft. by 77 ft. by 62 ft., and for Pier 5, 25 ft. by 46 ft. by 81 ft. The height from the bottom of the foundation to the coping of Pier 2 is 192 ft., and of Pier 3, 195 ft.

The shafts of Piers 1, 2 and 3, resting on the caisson foundations, are 42 ft. long between the shoulders with pointed noses extending up to the starling coping a short distance above high water elevation. The up-stream nose or cut-water is fine-pointed from the mud line to the starling coping, and above this level the piers have semi-circular ends, both of which have a quarry face. The piers are built of 1:2½:5 concrete, faced with a light gray granite with the exception

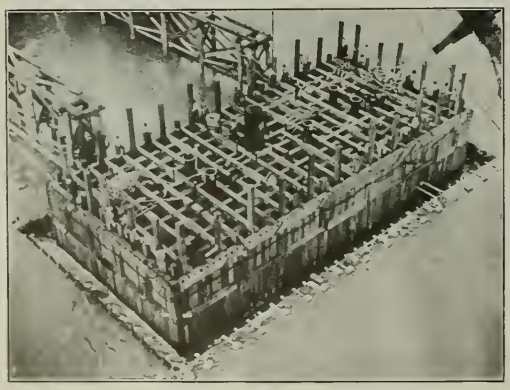


Laying a Willow Mat Over the Site of Pier II to Reduce the Tendency to Scour

of the three courses under the coping which have granite backing as well as facing. The stone was laid in Flemish bond with few exceptions, and the courses were 3 ft. thick up to the starling, with 30 stones in a course. Above this level the courses are reduced in thickness to a minimum of 2 ft. under the belting course.

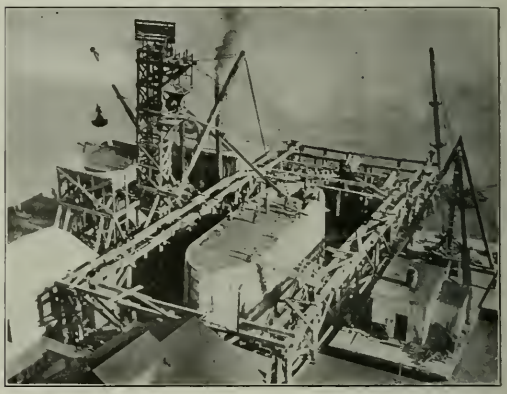
CONSTRUCTION PLANT

The most convenient ground available for the large storage and timber framing yard necessary was on the Arkansas



Launching the Timber Caisson at Pier III

bottom land along the viaduct. This location furnished ample space at small expense, and permitted the quick and cheap delivery of material to barges for transportation to the piers. Although this ground was likely to be overflowed between February and June, a material yard on the high Memphis bluff would have caused considerable expense and delay in delivering material and supplies on the river, and did not furnish suitable ground for building the large number of barges required. The first preliminary construction consisted in building about two miles of track from the old Rock Island Hopefield line to the west bank of the river, as shown in the



The Concrete Mixing and Placing Outfit Working on Pier II

sketch map. This line connected with two tracks extending onto a dock equipped with a derrick for transferring material to boats.

The first three months were occupied almost entirely with the building of 15 barges, a part of which carried the various rigs needed in the construction and the rest were for use as cargo boats. In addition to these barges constructed on

Placing the Upper Courses of Granite Facing on Pier II

the work six more were purchased second-hand, and several others and a small steam boat were chartered from time to time as required to keep the work going without delay. A screw propeller tug and two launches completed the marine equipment. The rigs built on these barges consisted of an air compressor plant, a concrete mixing and delivering plant, a pile driver, three derrick barges and two mat weaving outfits.

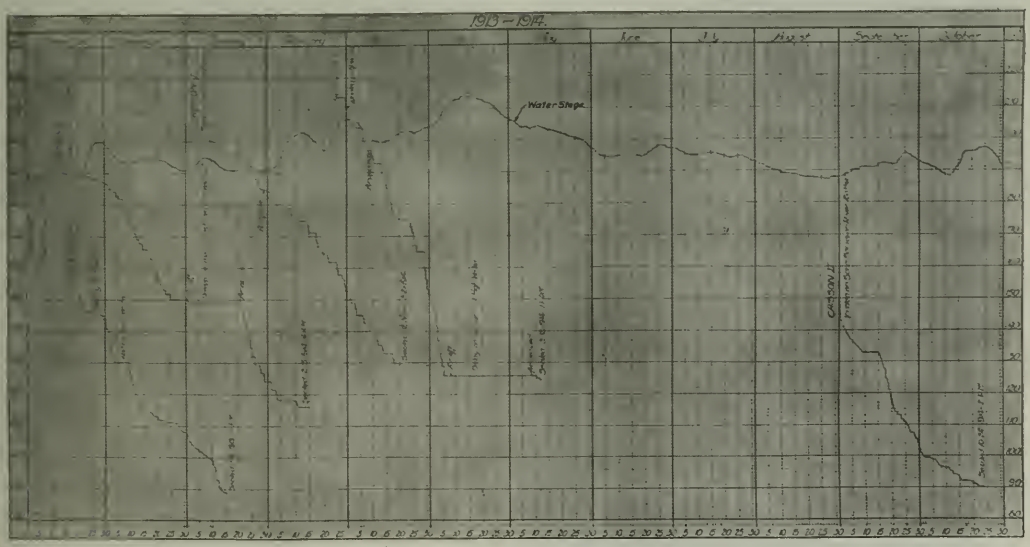
The granite for the piers was cut at the quarry and shipped from Stone Mountain, near Atlanta, Ga. This naturally called for storage on the east side of the river. A storage yard was obtained a short distance below the bridge on the

Tennessee side below the bluff but above high water. This yard was equipped with a traveling crane which unloaded the granite as received and later delivered it onto push cars which could be run out onto a dock with a derrick to lower it onto the barges by which it was delivered to the piers. A cement house of 3,000 bbl. capacity, for storage of a reserve supply, was also located on this ground next to the river. The greater part of the cement was delivered by

Piers II, III, IV and V Completed, Showing Also the Old Frisco Bridge

boat from St. Louis and unloaded into two covered barges of 1,500 bbl. capacity each. Cement intended for the storage house was shipped by rail, and used only when the deliveries by boat were delayed or suspended by the river conditions. This was but a small part of the 59,000 barrels used, and hopper which discharged into a 1-cu. yd. mixer. Cement was elevated to the measuring hopper in a small car pulled up an inclined track by a line leading to a spool on the tower hoisting engine. The cement car ran back on a track extending under the roof of the cement barge which was moored below the mixing plant, thus reducing the handling of the cement and the loss and damage of sacks during wet weather. This barge carried a 60-hp. locomotive type boiler furnishing steam to the mixer engine and tower hoist. Ample steam was available for heating water and sand during chilly weather to hasten the setting action of the concrete, although low temperatures are not common at Memphis.

The compressor barge for the pneumatic caisson foundations carried four locomotive type boilers with a combined capacity of 300 hp., with the necessary pumps and feed water heaters. Three low pressure compressors with a capacity of 2,500 cu. ft. of free air per minute furnished air for the caissons, and one smaller machine furnished high pressure air for the boring tools and hammers used on the timber construction. A 25-kw. direct-connected generator furnished current for lights and for an elevator operated in the main shaft of the two deeper piers. The so-called hospital lock, for the use of the pressure men in relieving occasional cases of bends or after effects of the air pressure by recompression, was located on this barge. The compressors discharged directly into a small air receiver during cool weather, but during the warmer months the air passed through a series of cooling pipes before entering the caisson.



Progress Chart Showing Rates of Sinking Caissons at the Five Piers

could be delivered directly into the barge houses by chuting down an incline.

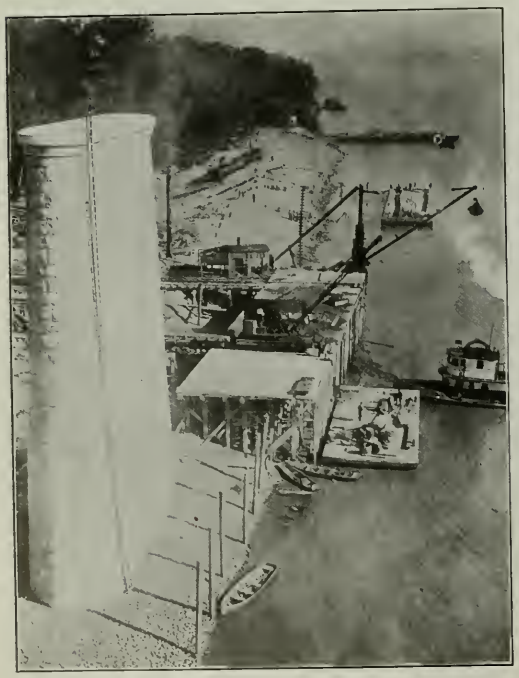
The concrete mixing plant was carried on a barge 36 ft. x 100 ft. equipped with the familiar tower and chute for the delivery of concrete. Mississippi river washed sand and screened gravel were furnished by a local firm. This material was handled on the bridge company's barges of 275 cu. yd. capacity, and was raised into the hoppers over the mixer by a clamshell bucket and derrick located on the corner of the mixing plant barge opposite the mixer. These hoppers had a capacity of 50 cu. yd. of sand, and 70 cu. yd. of gravel. The material ran by gravity into a measuring These were submerged in the river and supported alongside the barge. This plant was used for Piers 3, 1 and 2 in the order named. Another compressor plant built on the Arkansas shore west of Pier 5 was used for Piers 4 and 5.

SINKING CAISSON FOR PIER 3

Preliminary construction of barges and plant had advanced so that construction of the caisson for Pier 3 was started in September, 1913. This caisson was built up 14 ft. in a 54 ft. by 100 ft. by 11 ft. pontoon before launching. The weight of the caisson was distributed over the bottom of the pontoon by transverse loading beams consisting of two 12 in. by 12 in.

timbers well keyed and bolted together to act as a single beam 24 in. deep. These beams rested on longitudinal 12 in. by 12 in. timbers of the pontoon, and received the weight of the caisson at the cutting edge and center bulk-head. The pontoon was built with a longitudinal joint to provide a means of separating the two halves and withdrawing them from under the caisson after the pontoon had been flooded and the caisson floated. The bolts in this joint were removed just before flooding the pontoon. After the pontoon was submerged, the halves were pulled from under the caisson, the sliding surface being the top of the longitudinal timbers on the pontoon and the bottom of the transverse loading beams. The latter were afterwards pulled out by lines attached for that purpose before flooding the pontoon. The buoyancy of the timber in the pontoon was reduced very materially by loading it with pig iron immediately before flooding. The launching of this caisson was accomplished without trouble.

A well braced pile dock had been driven around three sides of the pier site previous to the launching of the caisson, which proved very satisfactory for holding it in position until well landed on the river bed and afforded a convenient and economical staging for the caulkers and the work of planking the sides of the crib during the sinking. It also furnished a location for a derrick on the upstream end of the pier, thus



The Arkansas Shore Showing the Completed Pier IV, the Dock from Which Construction Material Was Handled to Barges and Shore Protection Extending Up Stream

getting a maximum amount of plant into position to work on the pier at one time.

A 6-ft. shaft, with a lock at the bottom a short distance above the roof of the caisson, was equipped with an electric elevator for handling the gangs in and out of the caisson, and in addition to this a 3-ft. shaft with a ladder and Morison lock was provided. Five 2-ft. material shafts were used for locking out the clay excavation and for passing in concrete when sealing the caisson. These material shafts were equipped with short vertical locks taking a bucket of 9 cu. ft. capacity handled by a derrick, the hoisting rope running through a packing gland in the top doors of the lock. These locks were very economical of air required for lockage.

While the sinking was in sand which was handled through 4-in. blow pipes, the rate of sinking nearly always depended upon the progress of building up on top, but when the clay excavation was reached sinking usually depended on the rate

Placing Concrete in Steel Pedestal Forms for Western Approach Viaduct

at which the locks could remove the spoil from the working chamber. After the harder clay was reached, the progress depended upon the rate of excavating the clay ready to be locked out. The accompanying diagram shows the rate at which the sinking proceeded on the various piers, as well as the immersion at various stages of the work. The highest air pressure required was 48 lb. on Pier 2, which continued for several days while the immersion was 107 ft. Pier 3 required 45 lb. just previous to sealing the working chamber.

In building up the piers, no difficulty was experienced in setting and backing one course each day. The water and sand were heated during chilly weather to hasten the setting action, so that the concrete was well hardened for the masons to work over on the following day.

OTHER PIERS AND THE APPROACH VIADUCT

The design of Pier 2 and the general construction methods followed differ but little from those described for Pier 3. Because of the much deeper water at Pier 2 (50 ft. as compared with 30 ft) it was necessary to use a removable cofferdam 15 ft. high as an extension to the crib. This was done to permit the landing of the caisson on the river bed, and to increase the buoyancy of the pier until sufficient friction and bearing was developed to carry the weight of the granite masonry. Because of the swifter current and consequent tendency to scour, the bed of the river was prepared to receive the caisson by sinking a willow brush mat 200 ft. by

300 ft. in size placed centrally over the site of the pier. The design and construction of this mat differed in no way from those placed by the Mississippi River Commission on other parts of the river. After the dock was driven through the mat 29,000 burlap sacks filed with sand were deposited at the pier site to reduce the depth of the water about 8 ft., and to give an even bearing on which to land the caisson.

Willow mats extending 150 ft. on both sides of the bridge axis were afterwards sunk and covered with rip rap for the entire distance between Piers 2 and 3 to protect the false work from scour during the erection of the 621 ft. fixed span, which also forms the anchorage for the 790 ft. cantilever span towards Pier 1, and for the cantilever arm and semi-suspended span towards Pier 4. After the completion of this channel mat work the same plant was used to place a mat along the Arkansas bank extending 1,000 ft. above the bridge.

The 76 pedestal foundations and the west abutment were built during the summer of 1914. The pedestals each contain 53 cu. yd. of concrete and rest on a 13 ft. by 13 ft. footing block supported by 16 30-ft. reinforced concrete piles of octagonal section, 16 in. between faces at the top, and tapering to 12 in. at the point. The reinforcement consists of 8 7/16-in. square twisted bars, spiral wound with No. 4 iron wire about 2½ pitch. The piles were cast on the Arkansas dock using 1:2:4 concrete from the river mixing plant, and were removed to the storage yard by a locomotive crane after 48 hours, where they were cured 30 days or more before driving. The concrete in the pedestals was made from crushed rock delivered on cars, and was mixed by a plant rigged on a flat car with tower and spout delivery. This car ran down the center line of the viaduct, and the four pedestals of a tower could be poured from one position of the plant. One of the accompanying illustrations shows the plant working on the last of the pedestals, and the steel forms used for the pedestal shafts.

Ralph Modjeski is the consulting engineer in charge of the design and construction of the bridge, and W. E. Angier is assistant chief engineer. The Union Bridge & Construction Company, Kansas City, Mo., were the contractors for the entire substructure, including the channel mats and bank protection work. They were represented in Memphis during the first season's work by H. K. Seltzer, vice-president and chief engineer, and later by J. F. Wilhelm, engineer of construction.

FRICTION SPRING DRAFT GEAR

On page 832 of the *Railway Age Gazette* for April 16, 1915, there was published an article with the heading given above, descriptive of the Slick friction draft gear. The first paragraph of this article read as follows: "The drawing below shows the plan and half-sectional elevation of the Slick friction spring draft rigging which was recently developed by the Carnegie Steel Company, Philadelphia, Pa." Through an unfortunate error the name of the manufacturing company was given incorrectly; the Slick friction draft rigging was developed by the Cambria Steel Company, Philadelphia, Pa.

A New Railway for India.—The government of India has granted a concession to the Khoolna Bagirhat Light Railway to build a 20-mile, 2½-ft. gage line from the east bank of the Rupsa river, opposite Khoolna, the terminus of the central section of the Eastern Bengal Railway to Bagirhat, the headquarters of the most important subdivision of the Khoolna district and a place of considerable importance. The present communication between the two places is unsatisfactory, steamer service having been discontinued because of the silting of the River Bhairab, which runs parallel to the proposed railway. The country through which the line will pass is populous. The line will be operated by the Eastern Bengal Railway.

NEW ENGLAND AND THE NEW HAVEN ROAD*

By Howard Elliott
Chairman of the Board of Directors and President of New York, New Haven & Hartford

In discussing the railroad and public utility question the opinion is sometimes expressed that the public cannot be expected to pay a return upon any more capital than was originally invested in a prudent manner. But is this the whole story, and who is to decide today what was prudent 10, 20, 50, even 100 years ago, as in the case of the Norwich & Worcester road? Must we not, as long as we stick to the theory of private ownership of public utilities, allow those private owners to make their investments with the hope of a profit inasmuch as they have to assume the burdens that come with increased values and take all the risks of loss?

Prudence, if carried to an extreme, may stop all progress. What would be the conditions in America, in the United States today, if Christopher Columbus, Amerigo Vespucci, Vasco Nunez de Balboa, John and Sebastian Cabot and daring spirits like them had been prudent? Emigrants to the west who followed were not always prudent, but they helped to make an empire. Where would our great American manufacturing and transportation enterprises be if men of enterprise, ingenuity and resource throughout the whole period of wonderful development of the last 50 years had not had the courage to enter unknown and untried fields of human endeavor and really been imprudent on many occasions?

It is so easy to look back, criticize and point out the mistakes of others, and so hard to look ahead, do constructive work, and take the chance of failure in the hope of producing results that are to benefit a whole community and a whole country.

Under private ownership we have built up in this country a very remarkable system of railroads, public utilities and large industries. They furnish more of comfort and convenience to the people of the United States than are obtained anywhere else on the globe. In doing this great work, the private owners have made mistakes, of course, and a few men have made great fortunes—comparatively few, if you take the trouble to count up, when the vast number of men engaged in the constructive work of the last 50 years is considered. Only 357,598 persons in our population of 95,000,000 had an income of $4,000 or more, according to the report of the commissioner of internal revenue for 1913, and the greater proportion of these were in the $4,000 class. Because of these mistakes; because of a few great fortunes; because the growth of these great businesses has been very rapid and some of the men guiding them have not always grown as rapidly and considered carefully enough the rights of the public, there has been developed a system of regulation by state and national commissions. This is right and proper because human nature is such that people with power, unless checked, sometimes exercise that power unwisely. The regulators, however, given great power by the people, are human, too, and the business of regulating the public service corporations and the business enterprises is new, and men are trying to find out the best way to do it.

In the evolution of the regulatory system, mistakes are being made, and the absence of a check upon the vast powers of the various commissions has led to some arbitrary exercise of those powers and some harm has been done by this regulatory system. I am glad to say that some of the state and national commissioners, particularly in New England, realize the seriousness of the situation and the great responsibility that accompanies the unusual powers that have been delegated to them and that they are acting accordingly and are now trying to protect the public service corporations and business of the country.

VALUATION

A very important problem before the country today is that

*From an address to the members of the Eastern Connecticut Development Committee and of the Civic Associations of Norwich, New London, Willimantic, Putnam and Danielson, at Norwich, Conn., on April 8, 1915.

which involves the fair valuation of railroads and public service corporations.

This matter is very vital to the New Haven road and to the welfare of New England because of the present disturbed and depressed condition of the transportation business. The Interstate Commerce Commission under the direction of Mr. Prouty and with the hearty co-operation of the company has just begun the valuation of the New Haven.

In 1910 a valuation of the New Haven property was made under the direction and by authority of Massachusetts. The engineer in charge reported to the state authorities that there was a value at that time in the properties of $101,000,000 above the par value of securities outstanding. In arriving at his result the engineer did not include anything for intangible assets such as those taken into account by the supreme court of Washington.

WORLD CHANGES AND TERMINALS

The country has grown since 1910, and certain world changes are coming, which will increase rather than decrease the value of the New Haven property.

One result of the European war will be to make the United States the leading commercial and financial power of the world. Furthermore, it will increase the commercial importance of industrial centers in New England and New York. The value of the New Haven road today, with its important terminals in all these cities, is certainly no less than it was in 1910. Terminals in great cities are hard to obtain and it is slow work developing them. The great South Terminal station at Boston and the approaches over and through which 35,000,000 people go to and from their homes each year, and the great freight yards and docks in Boston, because of their location and use by the public, have a value far above the original cost which in some cases was incurred many years ago. The same may be said of important terminal properties in Providence, Hartford, New London, New Haven and many other places. Terminals are hands and feet to the railroad; without them the road is as helpless as is the man.

The much discussed New York, Westchester & Boston road has been most costly, but looking ahead a few years this entrance to the city of New York through this road will be of great value in facilitating business between New England points and that city by taking some of the local short-haul business off the main line which at times is overtaxed.

When the valuation of the company's property is made, I firmly believe that on any fair basis there will be more than enough value found in these great terminals, above what they now stand on the books of the company, to offset the losses that will probably be sustained in selling the properties under the decree of the federal court. It is especially important to the general financial health of New England that all reasonable elements of value shall be taken into account in arriving at the value of the New Haven road because its securities are such an important part of the financial fabric of New England.

Recently the commissions, state and national, have permitted the New Haven to make several increases in passenger rates. People naturally do not like to pay more, but it seems better for New England to place more of the burden of supporting her railroads on the passenger travel and in that way make it less necessary to advance the freight rates on raw materials, manufactured articles and food products.

An examination of the passenger train earnings of the company for two periods of two weeks each shows how many passenger trains are being run that contribute nothing directly to the financial upkeep of the road.

	July 18-31, 1914		January 18-31, 1915	
Trains earning per mile:				
50 cents a mile or less...	619	25.2 per cent	670	31.9 per cent
50 cents to $1.....	660	26.9 per cent	618	29.5 per cent
$1 to $2	621	25.2 per cent	494	23.5 per cent
Over $2	557	22.7 per cent	316	15.1 per cent
	2,457	100 per cent	2,098	100 per cent

In the two weeks in January there were 257 trains running daily, except Sunday, that earned 25 cents a mile or less.

In the eight months ending February 28, 1915, the average cost of running all classes of trains, freight and passenger, was, without taxes, $2.04 and for so-called "transportation expenses" (nothing allowed for maintenance of way and equipment and administration) the average cost was $1.13. Thus, you see that out of the 2,000 to 2,500 trains run every day, more than half fail to make the average cost of running without taking any account of maintenance or overhead charges; and this, too, in spite of the fact that during the past year the company has discontinued many of the poorer paying trains. This non-remunerative service is a direct contribution to the general development of New England business as a whole.

GENERAL OBSERVATIONS

This New England railroad situation, with conflicting laws in different states, calls attention very forcibly to the desirability of a federal incorporation act for those railroads the majority of whose business is interstate. Exclusive federal jurisdiction over corporate affairs and of finance would not interfere with the rights of the states in matters of local regulation. A simplification of the relations between the railroad and one central governmental agency as to corporate and financial questions would save a great deal of time and energy now used by officers in appearing before many different state organizations, and give them that much more to devote to details of management and to constructive work for efficiency, economy and improved service to the public.

The present condition of the American railroads is due in part to an effort on the part of the country to fix rates and service by regulation, and at the same time have them fixed by competition, thus creating an almost impossible condition, somewhat destructive of results and values. It is a question how far it is to the public interest to apply the so-called anti-trust law to the transportation business. Well organized, prudently managed and wisely regulated combinations of railroads may, in the long run, produce greater efficiency and service to the public than excessive competition, with the resulting duplication of facilities and increased expenses.

A SECRETARY OF TRANSPORTATION

To day the government recognizes some of the great commercial activities of its population by departments and cabinet officers, such as the secretary of the treasury, secretary of agriculture, secretary of commerce, and secretary of labor. The transportation business of the United States is next to agriculture in importance, in volume, and in its relation to the welfare of the whole country, and it should have a defender in the councils of the cabinet.

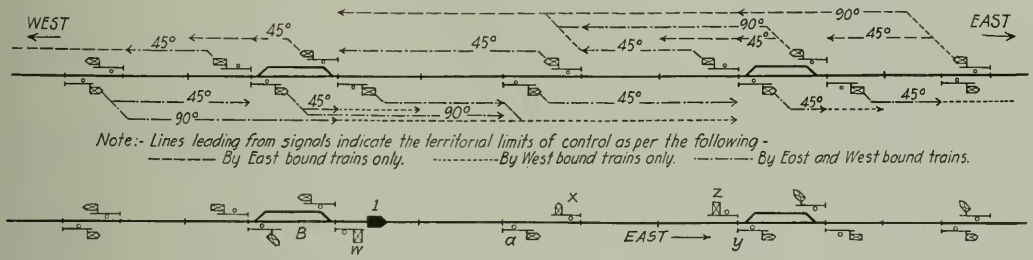
I believe it would be well to have a department of transportation, with a secretary of transportation at the head of it, who would be a member of the cabinet. Such a man would of necessity have to champion somewhat the rights and privileges of the transportation business just as the secretaries of the treasury, commerce, and labor speak for their particular subjects. Such an officer would have a wholesome balancing effect between the demands of the public and of the regulatory organizations on one side, and any errors of policy and management on the part of the owners of the property on the other side. These are great questions which require the careful thought of just such organizations as your development committee. They may not seem to affect you very much, but until they are settled and settled right they do affect everyone in the United States.

With a settlement of this great transportation question on a "live and let live" basis, there will be more time for the great machinery of the railroad organizations to do constructive work in helping to build up the territories served by their roads not only to the advantage of the manufacturer, but what is even more important, to the farmer, a subject to which your committee is paying very proper and effective attention.

THE ENGLISH NATIONAL UNION OF RAILWAYMEN.—Advanced figures published by the National Union of Railwaymen show that at the end of last year it had 273,362 members.

AUTOMATIC BLOCK SIGNALS ON THE WESTERN MARYLAND

In connection with a general program of extension and improvement, the Western Maryland recently completed the equipment with automatic block signals of the 61-mile single-track section of its road between Big Pool, Md., and Cumberland. This is an important single track line between a number of lines on the east which converge at Hagerstown, Charlton and Cherry Run, and two heavy-traffic lines on the west which join near Cumberland. A portion of the line signaled passes through a very rough district, necessitating many deep cuts and tunnels, as well as nine crossings of the Potomac river. The railway followed the banks of this river, crossing and recrossing to obtain the most advantageous locations. The signals through the tunnels were put in service first, before construction was started on the other parts of the line, usually four signals at each tunnel.



Arrangement of Automatic Block Signals on the Western Maryland; Single Track

The 61 miles of track between Cumberland and Big Pool includes 38 miles of tangent and 23 miles of curve, with 3,182 deg. of curvature. The maximum curve is 6 deg., and the maximum grade is 0.3 per cent. Considering the ruggedness of the country, these standards are quite low, and the gradient is so low that it was not necessary to consider it in the location of the signals. Serious difficulties were encountered, however, because of curves, rock cuts, tunnels and bridges. There are five tunnels with a total length of 10,144 ft. There are 23 bridges, 9 crossing the Potomac river with a total length of 6,464 ft., 4 over the Chesapeake & Ohio canal with a total length of 387 ft., and 2 separate crossings of the Baltimore & Ohio with a total length of 370 ft. All other bridges total 875 ft., giving a grand total of 8,005 ft. of bridges

A short time ago the company put in effect on this section of the road the telegraph block system; but recently most of the telegraph was superseded by telephone, at which time it was possible to effect a reduction in the number of employees concerned in despatching trains, some offices being discontinued. There was no further reduction in this force when the automatic signals were installed.

The signal system used is the Union Switch & Signal Company's "A. P. B." system, providing against opposing movements to the siding in advance and rear protection the same as on double track. The rules of this road, however, allow no movements past either an absolute or a permissive automatic signal on single track without sending a flag ahead. When a train encounters a signal at stop it must be flagged through to the next signal or to the next telephone where communication may be had with the despatcher. Control from the train order signals at the stations is carried back through one automatic, or if it is very close, through a second automatic signal, so that the engineman is given ample notice to stop for orders. The general arrangement by which signals are successively changed as a train passes over the road is shown in the accompanying drawing.

Because of the curvature, cuts and tunnels it was found difficult to get good locations for intermediate signals and provide a good view for the engineman, and therefore, except in two cases, there is but one intermediate signal in each direction. The intermediate signals are staggered, and the maximum protection was obtained by arranging the circuits so that the intermediate signal for the movement in the opposite direction stays at stop until the rear of the train proceeds far enough to secure the indication of the starting signal for the opposite direction at the next siding. This is explained in the lower part of the drawing. Thus if a following train has left the siding in the rear (B), the leading train will not secure a proceed signal to back up. Should two trains, one eastbound and the other westbound, pass starting signals at the same time and proceed toward the center of the block between sidings, they would be stopped by the intermediate signals before meeting.

For example, in the drawing, train No. 1 when it passes x would, under certain arrangements, allow that signal to go to

Intermediate Signal at Entrance to Tunnel

A Five-hundred-foot Wire Span

the clear position; but in this scheme of signaling it remains in the stop position until the rear of the train has passed signal *y*. If, then, a following train had passed *B*, it would hold signal *z* at stop and warn the leading train not to back up.

In this arrangement it is necessary to hold signal *x* at stop, as noted, because signal *w* assumes the diagonal position when the rear of train No. 1 passes signal *a;* and if signal *x* assumed a proceed position when the rear of the train passed, it would be possible for the train to back up, under a clear signal at *x*, at the same time that a following train proceeded past caution signal *w*. In other words, as the block from signal *w* to signal *x* has no preliminary, one of these two signals must be held in the stop position against opposing movements.

On account of the possibility of slides in the rock cuts where the rock is constantly spalling off, emergency knife switches were provided, located in boxes attached to the sides of the signal cases. These boxes are locked with standard switch locks. If the track is found obstructed the knife switch may be opened, which will set the signals in both directions at stop.

The night color indications are white for clear, green for caution and red for stop. Signals are double-case ground-mechanism, three-position, upper-quadrant, low-voltage style S, operated by direct current. Switch indicators are used only at ends of passing tracks which are long enough to accommodate a train of some size and where there is no double signal location. Switch indicators are of the semaphore type, unilluminated at night.

BSCO battery is used for both line and track circuits, 16 cells being provided for the signals, and 3 cells in multiple, with re-

High Post to Make Signal Visible Beyond Hill

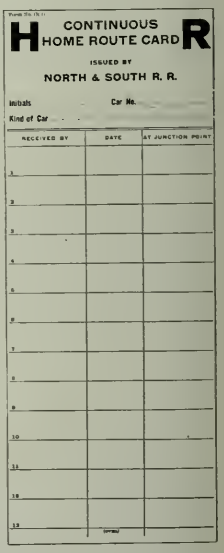
sistance in the positive lead, for track circuits. At double signal locations, both banks of battery are placed in one Massey style C well, while at single locations they are placed in a style K well.

Before putting the installation into operation, the signal department prepared a chart showing a typical arrangement of signals and the operation while a train was passing through a section. A track layout was also prepared giving the location of all side tracks, signal numbers and approximate distances between signals. These were used in instructing the trainmen and were made as simple as possible.

Each signal maintainer has a helper. He has a gasolene motor car, and in addition to looking after the signals he takes care of all lamps, batteries, highway crossing bells and outlying telephones. Signal maintainers are required by the operating department to pass an examination on train rules and train orders, and the movements of the motor cars are made on orders from the despatcher. The work was installed under contract by the Union Switch & Signal Company. E. E. Bradley, signal engineer of the Western Maryland, had supervision over the design and construction and is in charge of maintenance.

CONTINUOUS HOME ROUTE CARD RECOMMENDED

The committee on relations between railroads, of the American Railway Association, has accepted the recommendation of the Association of Transportation and Car Accounting Officers to submit for general use a continuous home route card, for use with freight cars when away from the home road; and Secretary W. F. Allen, acting in behalf of the committee, has issued a circular giving the rule proposed for the guidance of station agents and yardmasters, in the use of the cards, and showing also a fac-simile of the proposed card. This card is 3¾ in. wide and 9½ in. long; a reduced reproduction of the face of the card is shown herewith. There are spaces for thirteen notations of transferences of the car from one road to another; the back of the card has 17 more spaces, making 30 in all. When the car has been transferred from one road to another 30 times (if it has not then reached home) the rules provide for the use of a second card, to be attached to the first, and containing spaces numbered from 31 to 62 inclusive.


CONTINUOUS HOME ROUTE CARD

ISSUED BY

NORTH & SOUTH R. R.

Initials Car No.

Kind of Car

	RECEIVED BY	DATE	AT JUNCTION POINT
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

The committee has not yet presented its formal recommendation to the association, but in view of the desirability of a gradual introduction of the plan, it is recommended that all members begin using the new card on May 1, 1915.

The first and perhaps the most important feature of the regulations is a requirement that the road owning the car shall prepare the card, and deliver it with any car delivered to a connection. In case this card is lost the road losing it should at once make a new card to go with the car for the rest of its journey.

Until action by the association the use of this substitute card will be optional. The committee intends, however, to recommend a rule for the use of such cards. As a substitute card shows an incomplete record of the car since it left its home, it may not afford full information for the car's return; but in that case the receiving road can return the car to the delivering road or to the road making the substitute card.

The committee calls attention to the desirability of having uniform stamps for making notations on the cards; and Secretary Allen (75 Church street, New York City) will take orders for rubber stamps, ink pads, etc.

A number of important railroad systems have used continuous home route cards for some time, within their own territories, and have found the plan very satisfactory. Knowing the route by which a car has come, an agent can often save miles of car-haul, and perhaps days of per diem charges, by sending a car back to the delivering road by a shorter route. The proposed rule will require that the short route be used whenever it can be done without creating empty mileage in excess of the original loaded haul.

The Real Value of a Freight Locomotive*

As Determined By the Transportation Department; Each Movement Must Be Carefully Studied and Analyzed

By N. D. Ballantine
Assistant to Second Vice President, Rock Island Lines

In studying the value of a locomotive, time is an essential factor, and any study which does not take into consideration all the factors affecting the machine, that is the entire time from its purchase to the scrap pile, fails to fully accomplish the task. It may be profitable to scrap and replace, or modernize; the new locomotive may not be profitable if it be a radical departure from established custom or not properly designed for the purpose for which it is to be used.

This is said with a full realization that there are many small roads or light divisions of trunk lines where the freight service is practically fixed by arbitrary local or through freight runs, concerning which the superintendent can readily keep all such information in his head or a vest pocket memorandum book, and no amount of records or statistics made therefrom will bring about a reduction in expense incident to train service, engine mileage or miles per day per engine. Where such a condition exists the amount of labor to keep the data is insignificant, but it is of value to have all data on a large system kept uniformly that the aggregate may be obtained, as during a serious congestion or an unusual condition, it may be of value to the distributing officer, who cannot work intelligently by a rule of thumb.

With respect to the cost of producing such data my opinion, based on experience, indicates that where all other data of a similar nature is discarded and all work on the one system on a number of light divisions, no increased labor expense can properly be charged on divisions having 75 to 100 freight locomotives assigned. A $60 to $75 a month clerk can summarize the data in from six to eight hours work per day. The work of summarizing and working out averages for 21 divisions in the general office can be done in from 30 minutes to one hour's time per day.

Considering a modern freight locomotive worth from $25,000 to $30,000 with a potential gross freight revenue, when actually moving freight, of from $75 to $100 an hour, does it not seem to warrant a complete analysis of its use while in the hands of the various departments? Consider also the ever present tendency to shift blame from one department to another. If a potent factor in producing friction between departments is due to an absence of definite information as to all the facts, is it not worth while to produce the data so that each department has first hand opportunity for introspection so far as concerns the locomotive detention while in its possession, and realizes that the same data is correlated into the whole, from which the general officer can intelligently "judge the quick or the dead."

There is a growing tendency towards the introduction of abnormally large power units. Any radical departure from well established practices or customs in railroad service naturally carries with it changes which in their ramifications beneficially or adversely affect many departments. As an illustration, consider as a maximum, a given sized locomotive, with main and passing tracks, bridges, yards, clearances, turn-tables, coal chutes, water cranes, roundhouses, shops and roundhouse machinery to properly handle them. If one or more locomotives are purchased of from 30 per cent to 60 per cent greater tractive power, with dimensions necessitating a change in any or all of the above mentioned factors, then the additional expense incident to such changes should be considered whether charged to additions and betterments or operation.

The principal object in the purchase of new locomotives is doubtless to take care of the "peak load," to decrease the cost of operation and facilitate the movement of traffic. After they are purchased the operating man need not bother himself about the interest, taxes, insurance and depreciation. They are "with us always," but his problem is to so utilize the power as to reduce the cost to a minimum during periods of light traffic, and during the "peak of the load" to move the traffic as cheaply as possible, but move it. Congestion of traffic is as dangerous to a railroad, as is pneumonia to an individual, and it is to avoid this condition and clearly point out the economics for each division during times of heavy demand that it is so essential to have reliable and current data produced during the entire period. Assuming that the peak of the load extends over a period of three to four months, it is evident the excess number of locomotives, or their equivalent, to take care of this load, have no earning power during eight or nine months of the year, but are a liability and expense; during the three or four months of heavy demand, their earning power is quite a variable factor. In fact during this period only is the opportunity present to obtain the maximum return from the investment, hence the importance of a time study with a view of having as few engines as possible tied up to protect a heavy movement.

While records or statistics therefrom do not necessarily of themselves bring about economies, it is submitted that with a problem containing so many unknown factors, many of which are very important and substantially affect the net results, if they can be set out and their proper relations ascertained, at least some operating men should be able to interpret them and knowingly effect economies in transportation. They are not a cure-all but an index or pointer to those who can read and interpret.

As an illustration of some of the methods by which such data can be used, let us take some data which for the sake of argument we will say are typical for a given division of 480 miles with 60 per cent of its mileage branch lines, all of it single track, with a train density of 14 per day, seven freight and seven passenger, and with 52 freight engines assigned and an average of 41 engines available.

Mechanical department, total		14 hr. 03 min.
Roundhouse		7 hr. 46 min.
Classified repairs		2 hr. 50 min.
Running repairs		3 hr. 27 min.
Terminal detention		3 hr. 27 min.
Regular schedule		2 hr. 06 min.
Stock, fruit, etc.		07 min.
Superior trains		06 min.
Insufficient tonnage		34 min.
Rest for crews		05 min.
Miscellaneous		11 min.
Between call time and departing		18 min.
Waiting for engine	03 min.	
Making up trains	10 min.	
Meeting trains	02 min.	
Miscellaneous	03 min.	
Between terminals		6 hr. 30 min.
Actual running time		3 hr. 38 min.
Meeting trains		55 min.
Station work		1 hr. 28 min.
16-hour law		02 min.
Accidents, washouts, etc.		01 min.
Block signals		02 min.
Engine failures		03 min.
Car failures		03 min.
Miscellaneous		18 min.
Weather conditions		.....

The average tractive power of the engines was 37,700 lb., the gross tons per train mile averaged 858 tons, the average miles per engine per day on assigned basis 63.8 and on available basis, viz., excluding those in shops 79.3. The average speed between terminals was 9.8 miles an hour and when actually running 17.5 miles an hour. The delays between terminals per 100 freight

*Abstract of a paper presented at the Western Railway Club meeting, April 20, 1915.

train miles was 4 hr. 29 min., of which 1 hr. 27 min. was meeting trains, 2 hr. 18 min. station work and 44 min. miscellaneous items. Overtime was $90 per day, $20 of which was terminal overtime, and $70 road overtime. The gross freight earnings of each engine was 76 cents a minute while running and $176 per day.

From the division of time shown above, it will be noted that the mechanical department had the power 58.5 per cent of the total time, and that the balance of the time, that is 9 hr. 57 min., it was in the hands of the transportation department, 65 per cent of it is between terminals and 36.6 per cent actually running. This, of course, considers all trains, locals, mixed and through, the schedules of which are fixed; when traffic is heavy it is easier to increase the miles per day by reducing the terminal delays. It is fair to assume under normal conditions that if the transportation department can utilize one-third of the time the power is in its hands, in moving traffic under stress of heavy traffic, this proportion can be increased. We know from experience that it so works out in practice and that it can utilize the power for at least 50 per cent of the time it is in its possession. The question then comes, "What can be done to increase the actual running time or revenue producing period?" What increased return can be expected?

Assuming the average earnings per gross ton mile to be 2.94 mills, and the average engine to haul 858 gross tons per train at 18 miles an hour when actually running, the earnings would be $44 gross. One half an hour increased use per day would mean an increase of $22 per day for each hour's decrease in delay on the part of either the mechanical or transportation department. Put in another way, let us assume the average detention to all engines was reduced one hour. This would give the transportation department 52 engine hours, from which we should expect it to utilize 26 hours actually running and moving freight. As the average running time per locomotive per day was 3 hr. 38 min., this would be equivalent to an increase of about seven engines, increasing engine mileage 455 miles hauling 858 gross tons per train mile, and earning an equivalent of 2.94 mills per gross ton mile, or $1,148 per day. At the same time this additional train mileage would produce 12,285 more car miles per day based on handling 27 cars per train. Assuming that the average miles per car per day was 24.6 miles prior to the time this improvement occurred, this is equivalent to increasing the car supply approximately 500 cars, and the miles per day 12.5 per cent—a cash equivalent from a per diem standpoint of $225 figured at the current per diem rate of 45 cents per day, which item might properly be credited against any increased cost necessary to bring about the reduction in freight car delay and increase its utilization.

There is an important relation between transportation expense and the cost of freight equipment, namely that for every dollar spent for freight transportation, from 30 to 40 cents in addition is spent for the freight car in which it is moved; the items included in this comparison are shown below:

Transportation Expense (For each $1.00)	Cost of Freight Cars 30 to 40 cents
Under I. C. C. Classification	Which, in the case of foreign or private line cars is not a charge to operating expenses, but to the hire of equipment account; in case of owned equipment operating expenses are only affected to the extent of the net cost of repairs, renewals and depreciation, including insurance. A very considerable sum represented by the funded debt or mortgage and the taxes are not charged to operating expenses.
Supervising transportation	
Station service	
Yard service	
Road engine service	
Train service	
Other transportation expenses	
Accounts 371 to 420 inclusive	

The basis generally adopted for the comparison of the maintenance of freight cars is the freight car mile. Under M. C. B. rules the owner of a car is charged with practically all expense of its maintenance except that which may result from accident or unfair usage, and this expense for the railroads varies roughly from three-quarters of a cent to one and one-quarter cents, or, say, a general average of one cent per car mile. If road A is a heavy borrower of freight cars, its maintenance of equipment expense will be materially reduced as the owner of the car will be paying directly, or indirectly, for repairs to cars, the expense for which is charged to his maintenance of equipment account, while the money received from A as a rental is credited to the loaning roads' hire of equipment account. Road A at the same time charges the amount to hire of equipment, which however, is not an operating expense. The net result then of loaning equipment is to increase the hire of equipment account at the expense of maintenance of equipment, the former being an "income account" and the latter an "operating expense." If the car mile is a controlling factor in the cost of repairs, it will readily be seen that if the borrower so handles the car as to make an average of 45 miles per car per day with it, the owner will have to spend all the car per diem received from the borrower to keep up the repairs while he is using it, receiving nothing for interest or taxes. While this may be a slightly different angle from which the subject is viewed by many operating men, the reason for it is undoubtedly due to the fact that our accounting methods do not properly reflect in operating expenses the influence which the ownership of freight cars has on the net return from the investment therein. Its proper relation to the operating man and his operating expenses would seem to be worthy of considerable emphasis, when the amount involved represents the equivalent of 30 to 40 per cent of the total amount spent for conducting transportation expenses.

Reverting now to the net return from a decrease in delay to freight power, keeping in mind the typical division, let us set down the tangible debits and credits as far as we can.

		Dr.	Cr.
455	Engine miles, repairs at 15.2 cents per mile	.....	$69.16
390,390	Gross ton miles at 2.94 mills revenue	$1,148.00	.....
12,285	Freight car miles, repairs at .7 cent	.....	90.19
500	Freight car days at 45 cents per day	225.00	.....
	Yard service at 21.9 cents per mile	.....	99.64
	Road engine service at 40 cents per mile	.....	182.00
	Train service at 16.2 cents per mile	.....	73.71
	Other transportation expenses at 16.4 cents per mile	.....	74.62
		$1,373.00	$589.32

Considering the above items alone and without going into the detail accounts, the locomotive would appear to produce a return of 233 per cent of the expenses incurred. Included in the above items, however, are a number of factors which will not increase the cost as much as indicated, for the reason that many of them do not vary in a direct relation with the train miles. For example, under yard service accounts, at least 30 per cent of the items going to make it up, such as yard masters and clerks, switch and signal tenders, yard supplies, operation of fuel station, water, lubrication and operation of joint yards would not vary directly as the train miles. If the yards were not working to their capacity, there might be an increase only in fuel, water and oil, and that only perceptible. Under road engine service the engine house handling, operation of fuel stations, water and other supplies, items approximating 12 per cent of the amount, would not be directly affected. Under train service expense the items other than train supplies, cleaning, heating, icing, watering, coopering and grain dooring freight cars, as well as detouring freight trains, represent 16 per cent of such expense and do not necessarily vary directly as the train miles. Under other transportation expenses, such items as block signals, interlockers, crossing flagmen, drawbridge operation, telegraph and telephone operation, stationery and printing, and operation of joint tracks, amounting to approximately 20 per cent of the items, would not be affected appreciably.

30 per cent of yard service expense	$33.20
12 per cent of road engine service expense	21.70
16 per cent of train service expense	11.75
20 per cent of other transportation expense	14.90
	$81.55

Deducting 81.55 from the $589.32 leaves $507.77, or considered from this standpoint the return would be 240 per cent instead of 233 per cent on the first premise.

In the above calculation no consideration is given the question of track maintenance, as it is rather an intangible, although

an important factor. However, additional expenses on this account should of course be deducted from the $507. It should be clearly understood that this method of figuring costs, is not a proper one for the purposes of rate making, as it eliminates a large number of items of fixed or current expenses which would not vary regardless of the manner in which the traffic is handled, but which items should be included in any method of computing entire costs of service. The above outline in a general way indicates what economies or increase in utilization might be expected from improving given conditions.

Let us now consider the comparison of results from a change in method of handling through freight power, viz., from slow to higher speed, with consequent decrease in gross tons per train. For the purpose of this comparison we will assume the data is obtained from an analysis of the locomotive utilization, together with the gross tonnage and unit cost figures carefully produced and not based upon general averages of such units. It might be opportune at this time to point out the great difficulty in attempting to forecast results of a change in working conditions. For example a trainmaster once said to me, "The meeting points on a single track railroad vary as the square of the number of trains run; that is, if you double the number of trains you quadruple the number of meeting points." A little thought indicates the statement by itself is incomplete and misleading, as two very important factors are omitted, namely, the time of day at which the trains are to be run, and the average speed at which they are to run between terminals. It can readily be shown from a theoretical point, as well as in practice, that it is possible to double the number of trains run and decrease the number of meeting points or delays incident thereto. Hence just what effect a change in the number of trains will have on the question of delays due to meeting trains is an indeterminate factor. But if the data is known for a particular division with given facilities and a given train density, the actual effect may be readily found, and at the same time, any other unusual factors which may be injected into a given day or interval of time, can be shown and its bearing on the whole noted. It is a fact, however, if tonnage is unbalanced, and a reduction of 15 per cent in the average tons per train be made, the train density will increase 30 per cent. The important thing to watch when a reduction is made, say for the purpose of cleaning up a congestion, is whether the increased speed between terminals with less tonnage, combined with the mechanical and terminal delays enables the production of an increase in gross ton miles per day with given power? Secondly, what is the variation in tonnage and cost?

For the purpose of simplifying as much as possible we will disregard expenses incident to maintenance of way, traffic, general and fixed charges, such as supervision, station service, etc., confining ourselves to those items which are appreciable and readily allocated, such as engine repairs, car repairs, wages of engine and trainmen, fuel, water and lubrication. It also includes interest on locomotive at 6 per cent and depreciation at 5 per cent, and interest on the caboose at 6 per cent and depreciation at 4 per cent.

	In Direction Traffic. Consolidation Locomotives.		
	Slow Frt.	Fast Frt.	Per cent variation
Percentage distribution of time:			
Mechanical department	34.84	37.19	.....
Terminal	33.37.	31.44	.....
After call time	0.98	1.18	.....
On road running	23.22	23.73	.....
On road running	(5.6 hr.)	(5.7 hr.)	.....
Road delays	5.59	6.46	.....
	100 per ct.	100 per ct.	.....
Miles per locomotive day	83.5	80.5	Dec. 3.5
Miles per hr. when running	19.2	20.9	Inc. 9.
Miles per hr. between terminals	14.5	16.3	Inc. 12.
Per cent efficiency engine loading	91.7	68.6	Dec. 21.
Cost per 1,000 gross ton mile, in cents:			
Fuel	12.8	16.6	Inc. 29.5
Wages train and engine crew	13.6	16.8	Inc. 22.
Total, as above outlined	40.3	50.1	Inc. 24.
Cost per train mile in cents	61.5	57.	Dec. 7.3
Gross ton miles produced per day	153,968	130,000	Dec. 15.2

Cost car repairs at $23.10 per 1,000 G.T.M.	$35.40	$30.00	Dec. 15.2
Cost trans. service and repairs as above	62.00	65.00	Inc. 4.8
	$97.40	$95.00	Dec. 2.5
Add equivalent value per diem on 33 cars at 28 cents per day deducting 17 cents for repairs based on 25 miles per day at 7 mills per mile		9.24	
		$104.24	Inc. 9.3

From the above exhibit, it would seem that regardless of the fact that the reduction of tonnage enabled the fast freight trains to get over the road at an increase in speed of 9 per cent when running and 12 per cent between terminals, combined with a reduction in terminal delay, the mechanical department was unable to turn the power promptly enough and the net result of such handling was a decrease of 15 per cent in the gross ton miles, equivalent to $70.46 decrease in gross freight revenue, an increase in engine repairs and transportation service cost of 24 per cent, a decrease in cost of car repairs, but an increase in loss of use of cars, making a net loss from all the items considered of 9.3 per cent. Regardless of the above, it should be noted that the cost of engine repairs and transportation expense was 7.3 less per train mile.

Comparisons along the basis above outlined made between engines of different types, say Consolidation, Mikado or Mallet, would undoubtedly reveal interesting information, providing it was kept currently and not spasmodically when all concerned were keyed up to concert pitch. Tests made under such conditions are not typical, nor do they generally extend over a sufficient length of time to really be comparable. I have seen cases where engines with 44 per cent greater capacity when in slow freight service with relatively the same loading efficiency as the smaller engines would yield under stress of traffic but 9 per cent more gross ton miles per day. When put in fast freight service they would yield 21 per cent more than the smaller engine, indicating that the larger engine was able to produce more ton miles when assigned to fast freight service. But what about the effect on the track, bridges and equipment and cost of operating at high speeds versus slow speed. Surely the field is a large one and the opportunities inviting.

In view of the fact that the mechanical department necessarily must hold the power for some time, and that when all other factors remain the same, the running time diminishes rapidly as the distance between terminals decreases, it would seem that special attention toward keeping the engines on the road by changing crews without roundhousing would be worthy of investigation, as many divisions are 150 miles long. If engines can, and they do, make successful trips of that length, can it not be stretched another 50 and make "turn around" engine runs with pooled crews, getting 200 miles out of an engine between roundhousing instead of 100 miles on divisions of that length. Suppose we assume a division of 100 miles where the engines now are being roundhoused at the end of every trip and the average detention is 8 hours. If we could eliminate the mechanical delay of one roundhousing and turn the engine promptly upon arriving, allowing the transportation department two hours for call time, and 25 per cent longer for the roundhouse work when the engine gets back to its home terminal, this would increase the utilization per day 12 per cent and not involve any modification in tonnage or expense. This is on the assuming, of course, that the power is turned out in proper shape, as there would be no economy in slighting the work in the roundhouse or shop and have it reflected in an increase in cost of transportation which would more than offset it. There is surely no more economical investment than power well kept up. It is by far the largest element in fuel economy.

While I may seem to have specialized on the mechanical department detention, there are other directions where economies can be obtained and the results just as clearly shown, such as despatching, coal and water stations, passing tracks, telegraph or telephone offices, sufficient crews, schedules of trains and many others. Station work can be checked to determine when it is more economical to put on a switch engine than it is to have the

road crews do the work and so on ad infinitum. I trust this rough outline may raise questions and bring out some new thoughts which will suggest other ways through which we can obtain a better understanding of the transportation problem and the real value of a locomotive.

ACCURACY OF GRAIN WEIGHTS*

By F. C. Maegly

Assistant General Freigbt Agent, Atchison, Topeka & Santa Fe, Chicago, Ill.

Weighing, grading and remitting are the three principal problems of the grain shipping business. There should be a closer understanding between the shipper, carrier and receiver of grain concerning these three problems. The carrier is really a partner of both the shipper and the receiver of grain. Carelessness, error, or cheating on the part of anyone of these affects all.

Many shippers and receivers provide themselves with suitable grain weighing scales, and safe elevator equipment between scales and cars at the points of loading and unloading. Where such shippers and receivers weigh the entire contents of each car with care and accuracy, and are careful to properly apply the cooperage, the grain shortage evil is conspicuous by its absence.

The carriers usually weigh grain en route upon their first most convenient track scale. The net weight so determined, by the use of gross, marked tare, and a proper allowance for the grain doors used, is sufficiently accurate for the purpose of assessing the carriers' freight charges, but is not sufficiently correct for buying and selling grain.

The buyer and the seller of grain almost invariably agree upon the terms of sale, both as to grades and weights—that is to say, either the shipper's or the receiver's, or some other agreed or established weights and grades, govern the transaction. Even in the case of cross-town movement of bulk grain, where the opportunity of loss from the car is practically eliminated, the buyer and seller agree either that the loading or the unloading weights shall govern.

If the shipper and the receiver would be more inclined to make a confidant of the carrier, checks to prove the efficiency of both the loading and the settlement-term weights could then be made more positive. For example, if the carrier's agent were given a carefully ascertained shipper's loading weight, and the information that the shipment has been sold on the basis of receiver's unloading weight, efficiency tests could be developed which would soon develop the prevailing accuracy of such weights, and particularly of the controlling weight. Such tests would be made with extraordinary care.

Various grain shipping organizations are now recommending that shippers provide themselves with scales of recognized standard, and with elevator loading and unloading equipment that is safe against possible loss or confusion of weights between scales and cars; so that a shipper's certificate of loading weight may be furnished with the shipping instructions for each car shipped; such certificate to show the scale, the dates and drafts weighed, the total weight, the signature of the weigher, and a positive declaration identifying such actual weights with the car and shipment.

Each shipper should maintain permanent and complete record of all of his weights of first entry, and should enter upon such record for each car the outturn reported to him by his customers. The shortage or the overrun, as the case may be, should be extended for each car. The receiver of grain should also maintain a complete and permanent record of all of the unloading weights for each car, and to carry out the program of co-operation, the receiver also should furnish the carrier's delivering agent promptly with a written certificate, or declaration of his unloading weights, said certificate to set forth the scale, the dates and drafts weighed, the total weight, the signature of the weigher, and a positive statement identifying such actual weights with the particular car and shipment. Under such a plan, the carrier would be in the strongest possible position to co-operate to the full limit with shipper and receiver, in the effort to bring about the elimination of error and the establishment of the proper standard of accuracy.

The grain carrying roads are giving serious thought to this problem, and I am sure that it will be solved with the co-operation of the grain-shipping and receiving organizations. For over two years experiments have been tried by means of an extra slip carried with way-bills for bulk grain, the same showing: (1) The name of the shipper, station, elevator, scale, car number and initials, car inspected by, and the shipper's certified loading weight. (2) The in transit record of railroad track scaling; the leakage and loss of grain from car, if any, and (3) the consignee, destination, scale and declared unloading weights.

It is contemplated hereafter to have the delivering agent extend the difference between the shipper's and receiver's declared weights, and to require the prompt investigation of excessive discrepancies; but to intelligently investigate excessive discrepancies, the carriers must have a prompt report of the shipper's loading and unloading weights. To this end, the shippers and receivers must provide suitable scales and elevator loading and unloading equipment that is safe against loss or mixup of weights, between cars and scales, at both ends of the transit.

The carrier's record referred to is yet in the experimental stage. It is returned by the destination agent to the proper officer on whose district the shipment was loaded, so that after the lapse of a short time the carrier has before it the history of the accuracy, or inaccuracy, of the weights declared by each shipper of grain. To make that record more effective, and to provide a proper stimulus for greater effort to each individual shipper and receiver, would it not be desirable to have a medium to which the data made up from such cumulative record could be submitted, if necessary, for an expression of approval, or for recommendations as to means necessary to improve results that are not creditable? The comparisons referred to are rendered more valuable by various efficient and impartial grain weighing departments at several of the important grain centers, like Chicago, Kansas City and St. Louis. At the markets named, the existing Board of Trade organizations have established efficient grain weighing departments. An impartial competent tally weighman is present and actually witnesses and records every weight certified by such weighing departments. At busy elevators, in addition to the tallyman stationed at the hopper scale, another tallyman is located down stairs to check the condition of each car, and to supervise its complete unloading and the sweeping of the entire contents into the elevator unloading pit, and delivery to the hopper scale, before the signal to weigh is transmitted from the downstairs floor to the weighman who is located in the top of the elevator. These tallymen are fortified by suitable Board of Trade regulations.

Let us join in a campaign to call every weight by its right name. If it is the shipper's weight, let us call it "shipper's weight." If it is a board of trade weight, let us make sure that it is in fact a weight witnessed and recorded by an efficient, impartial board of trade tallyman. If it is a state weight, let us make sure that an impartial, efficient employee of the state, not interested directly or indirectly in the shipment, actually performed the weighing, or tallied and recorded the weight. If it is a shipper's or receiver's weight, covered by an agreement between shipper and carrier's weighing bureau, let us call that weight the "shipper's agreement weight," or the "receiver's agreement weight," as the case may be. But do not let us fool ourselves, or each other, by calling weights by any other than their real names.

A bill was recently introduced in one of the state legisla-

*Abstract of a paper read before the Kansas Farmers' Cooperative Grain Dealers' Association, Wichita, Kan., March 3, 1915.

tures, requiring the carriers to install a railroad track scale at every station producing 100 or more cars of grain per year. The advocates of this legislation had figures to show that 400 additional track scales would have to be installed by the railroads operating in the state referred to. The total cost of said scales would be approximately $1,500,000, on which the annual interest at 5 per cent would be $75,000. The annual cost of up-keep would exceed $75,000 additional and the annual taxes would be considerable. The cost of the time lost by trains and switching crews in pulling cars to and from the scales and spotting them at industries would add another very great item, to which we must add the delay to all the other freight while passing trains are occupied with such weighing service; also, the expense and interruption to the industries themselves by pulling the cars away from their plants, in order to get to and from the scales with other cars to be weighed, whether for the industries so disturbed or their neighbors.

And then a very large percentage of the shippers located at these 400 additional track scale stations would continue to invoice their grain on the basis of their own and not the track scale weights; and they would continue to sell their grain, as at present, on the (usually destination) weights and grades per agreement between buyer and seller. One state having such a law on the statute books has proved the accuracy of the statement just made, in that the grain shippers who are located at stations equipped with railroad track scales do not use the railroad weights for invoicing purposes.

THE CITIZEN'S RESPONSIBILITY*

By Frederic B. Lincoln
General Superintendent, Erie Railroad

Civic responsibility, as the question resolves itself today, looks a good deal like individual responsibility. The railroads have been making a strenuous attempt lately to enlist the interest of the people in the economic questions connected with the relations of the public to the carriers, but with not very encouraging results. There is not as yet much evidence of comprehension on the part of the people most affected. The general public seems to have but little realization of the extent to which the transportation problem affects the individual citizen. Transportation is the second greatest industry in the country and engages the energies of a fourth of our population. Even the simple question, that of reasonable passenger and freight rates, but a part of the broader problem, has but little attention given to it by the average busy professional or commercial man.

The interdependence of business and transportation and all the important commercial interests, is, however, self-evident when one examines the facts and the observing citizen must agree that co-operation between different interests is of the utmost importance. Co-operation thus far has been greatly lacking. The remedy is simple; the only demand upon the business man is that he give these matters a moderate amount of attention. A very little real study will put his thoughts in the right channel.

The question needs to be studied on broad lines; commerce is subject to regulation by 48 states and the federal government. At present there is very little harmony. It is the duty of the citizen, through the law makers, to cure this defect.

Are you and your neighbors in Newark and Texas and Paterson and Oregon and Passaic and Chicago—for you are all neighborhood friends in this matter—are you going to let this thing drift as it has in the past, or are you going to further perfect this representative organization of yours and through it strengthen the hand of your State Chamber of Commerce and make that a moving spirit in that increasingly powerful body, The Chamber of Commerce of the United States of America, to the end that through active and intelligent organization some reasonable restraint may be put upon class legislation that is almost wholly responsible for the halt in our country's development and the business depression we are facing today? Above all, are you, as average citizens, going to apply to these transportation questions the small measure of time and thought necessary to insure an intelligent direction to those charged by you with legislating the business and social welfare?

*From an address before the Nutley Board of Trade, Nutley, N. J., April 8.

FRISCO SEAWALL AT CAPE GIRARDEAU, MO.

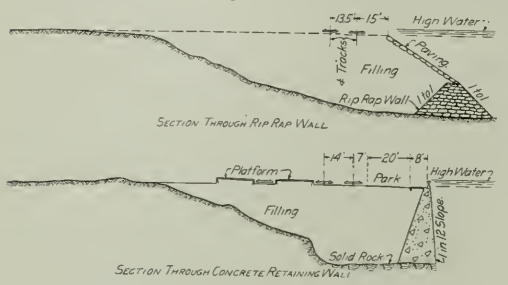
The St. Louis & San Francisco is now reclaiming a considerable area from the Mississippi river at Cape Girardeau, Mo., permitting the straightening of the main line and providing more space for yard and team tracks. At the present time the river makes a considerable indentation at this point and the tracks follow closely around the foot of the bluff. The improvements consist of the construction of a concrete wall out in the river 600 ft. long at the north end and 600 ft. long at the south end with a heavy rip-rap wall 620 ft. long between. The area between this wall and the present tracks will be filled, after which the tracks will be laid on the new location and a new depot erected. A considerable area will also be given over to the city for park purposes across the track from the station and also immediately south of the station.

The concrete wall, which varies in height up to 37 ft., is of a plain gravity section 3 ft. wide on top, requiring a total of 11,000 cu. yd. of concrete. It was built in a maximum depth of water of 13 ft. The concrete was mixed adjacent to one of the tracks on shore, elevated by a tower and spouted into bottom-dumping buckets on a barge on the water. These buckets were then picked up by a derrick on the barge, lowered into forms and opened. The wall at the north end opposite the station is surmounted by an ornamental concrete balustrated protecting a sidewalk.

The rip-rap wall which is located in the water for the entire

View of Concrete Wall and of the Construction Outfit

distance is 6 ft. wide on top and has a maximum height of 20 ft., with a slope of 1:1 on each face. While the concrete wall is located parallel to the track with its top 3 ft. below the top of rail, the rip-rap wall is located on the slope line some distance out in the stream with its top a maximum of 24 ft. below the



Typical Sections of Wall and Embankment

top of rail. On the completion of the wall and of the filling behind it, the slope above the wall will be paved with rip-rap on a 1½:1 slope.

This improvement, which is estimated to cost about $240,000, is being handled under the direction of F. G. Jonah, chief engineer of the St. Louis & San Francisco.

THE CHICAGO, ROCK ISLAND & PACIFIC RECEIVERSHIP

On the application of the American Steel Foundries Company President H. U. Mudge and Jacob M. Dickinson were on April 19 appointed receivers of the Chicago Rock Island & Pacific Railway Company. This is the owning and operating company.

T. M. Schumacher, chairman of the Chicago, Rock Island & Pacific Railway, has issued the following statement:

"The appointment of receivers for the Chicago, Rock Island & Pacific Railway Company by the U. S. Federal Court in Chicago upon the application of creditors was assented to by the president of the railroad because of the absolute inability of the president or the company to give assurances to creditors that their obligations would be met when due.

"Just previous to April 1 in order to meet requirements of $1,600,000 on that date, strenuous efforts were made to secure from various banking institutions in New York a temporary loan. This loan was finally secured at the last moment by the personal endorsement of five of the directors. It is apparent that the company cannot continue raising funds by such a method.

"It is necessary to obtain approximately $2,000,000 on May 1, and with a much less active and attractive collateral from a banker's standpoint upon which to borrow. Furthermore, on July 1 an additional $2,000,000 will be necessary. The short time loan of $2,500,000, due April 30, would only be renewed by the present holders upon absolute assurance from the board that its finances for the balance of the calendar year 1915 have been arranged.

"As such assurance could not be given, it would have been necessary also to meet this $2,500,000 on April 30, making a requirement of $4,500,000 on that date.

"It is very essential for the proper development and economical operation of this property that many grades should be reduced, that a large amount of new steel rails should be immediately laid for the safety of both passenger and freight traffic, and that 5,000 freight cars should be ordered. While car equipment notes could be issued for 80 per cent of the cost of the freight cars, $1,000,000 would be required for the other 20 per cent.

"A receivership at the present time is merely to obtain the protection of the court that the company's physical condition and equipment may be improved, its temporary loans continued and an opportunity be given for working out a comprehensive and permanent plan for financing to preserve for the shareholders the valuable equity believed to be in the property.

"Stockholders should not be confused nor led into the belief that this appointment of a receiver means any immediate foreclosure of the property or the immediate assessing of the stock. It simply means that the way is being prepared for the working out, as above outlined, of some comprehensive plan which will permit this property to grow and expand on good, sound lines to the ultimate benefit of the shareholders."

Answering the American Steel Foundries' petition, the Chicago, Rock Island & Pacific Railway admits each and every allegation of the bill of complaint, and adds:

"Believing it to be its duty to its officers, directors and stockholders to protect its property and business and to treat the same as a trust fund for the security of its creditors and stockholders, the company hereby consents to the appointment of receivers of all its property and consents further that such receivers take possession and operate all such property under order of this court."

The petition of the American Steel Foundries Company sets forth that the creditors are so scattered that it fears isolated attachment suits to the injury of the propery as a whole, so that it might become disrupted and disorganized, whereby security holders and the public would be injured. The complainant frequently demanded payment of $15,818 due to it for materials furnished the railway, but the company pleaded financial inability to pay. Continued operation as an entity under this court's protection is essential to its ability to pay hereafter. Interference of a court of equity for the protection of its rights and the rights of all parties in interest is immediately required, and there is a necessity for immediate appointment of receivers.

N. L. Amster, who was elected a director representing the minority interests, is quoted as saying:

"I would call this Rock Island receivership a huge joke if it were not for the fact that it has brought untold hardship and loss to thousands of innocent and helpless investors.

"The company has never in its history been less in need of a receivership than at this time. The physical condition of the property is now universally admitted to be in better shape than ever before. The earnings of the company, according to the last statements filed with the Interstate Commerce Commission, are far in excess of last year, and larger than ever before. This too in face of the business depression through which we have passed the last year. Now, with business expansion and general prosperity, on the threshold of which this country is just entering, everybody admits that the railroad earnings will be greatly increased. How, in the face of all this, the management could consent to a receivership is beyond my comprehension, and such action is entirely opposed to my feeling in the matter.

"I have practically arranged for a two year $6,000,000 loan, secured by $11,400,000 of the company's refunding and other good negotiable bonds. This would have paid off this $2,500,000 Central Trust loan, the $1,494,000 Choctaw serial notes coming due May 1, and the $1,600,000 Bankers Trust Company loan coming due in September, and would have put the company beyond any possibility of straining any of its securities, but this receivership has put a wet blanket temporarily over this negotiation."

The Chicago, Rock Island & Pacific has a $2,500,000 note, due April 30, and has maturing May 1, $1,494,000 gold bonds of 1912. The June requirements are very small, but in July they exceed $3,000,000, with $4,500,000 more maturing before the end of 1915. The following table summarizes interest and principal maturities up to and including July, 1916:

1915		1916	
May	*$4,997,700	January	$2,739,000
June	104,500	February	8,377,300
July	3,195,000	March	247,500
August	884,900	April	2,662,900
September	247,500	May	2,165,100
October	2,608,800	June	104,500
November	962,400	July	3,176,100
December	83,500		
		Total	$32,496,700

*Includes the $2,500,000 note due April 30.

The above total of $32,000,000 includes $11,600,000 of equipment trust and short term indebtedness.

An Effective Freight Claim Preventive Crusade

Part III—Some of the Schemes Which Have Helped to Reduce Payments $17,000 a Month Since Last June

In the two previous articles of this series we discussed the early development of the campaign on the St. Louis & San Francisco for the reduction of loss and damage to freight and the organization of the so-called freight claim preventive committees which have stirred the employees over the entire system to exert their individual efforts toward cutting out the useless waste, due in many cases to carelessness or thoughtlessness in the handling of freight.

In this, the third and last article of the series, certain methods will be described which have done much to maintain an intense interest in the campaign, and which are more or less novel. It is comparatively easy to launch a movement of this sort, but the hard fight comes after the first novelty has worn off and the scheme becomes more or less commonplace. This issue has been met squarely and straight from the shoulder. The superintendent of freight loss and damage claims lives on the road, and being on the fighting line, as it were, is able to watch the progress of the campaign critically and to keep a perfect stream of ammunition headed from his headquarters to the men who are responsible for results.

SIGNS

A slogan was first adopted: "A One Hundred Thousand Dollar Reduction in Claim Payments for the Fiscal Year." Then followed the placing of signs at such points on the railroad prop-

A Typical Freight Claim Preventive Sign at the Memphis Yards on the Banks of the Mississippi

erty as to attract the greatest possible number of those whom it was desired to interest in the campaign. These signs were of various sorts, a typical one reading: "Prevent Loss and Damage to Freight and Avoid Claims." Sign posts were in some cases erected to carry them; in other cases they were placed on the side or the roof of a building; they have even been worked into the designs of the flower beds at the stations. In some instances electric signs have been erected similar to those which are sometimes used in connection with the safety first movement. Signs were also stenciled on the doors of cabooses, and pertinent suggestions were introduced in one form or another on bulletin boards.

RUBBER STAMPS

A number of special rubber stamps were made and distributed over the system to be used on all correspondence interchanged between those who had anything whatever to do with the movement and handling of freight. The first one of these read:

> An ounce of prevention is worth a pound of cure. Watch what you are doing in order to prevent claims.

The wording on several of the more novel of these stamps is reproduced below:

T R Y
T o make a better showing in freight claim payments,
R educe errors—
Y ou can if you try.

There is no more opportune time than the present to better freight handling. Will you help?

It is easier to prevent errors in freight handling than to correct them, and it is less expensive too.

59% of our freight claims are for amounts $5.00 and less. You are interested and can help reduce claim payments by watching the small leaks.

> Loss and damage freight claim payments is 3.2% of total transportation expense. Help reduce this large item.

Don't talk war; talk claim prevention.

> Careful marking and packing of freight will prevent its becoming lost or damaged.

Freight is half way there when properly marked and packed.

REMINDERS

Closely allied to the messages on these stamps were an extensive series of brief reminders. These were printed on small sheets of paper and as in the case of the rubber stamps were sent out from time to time during the progress of the campaign. In some instances the value of the reminder lay in the terse way in which the message was conveyed; in others it might lay in the peculiar arrangement or wording. Reminder No. 4 was of this sort and read as follows:

A great many claims are
V ery easily overcome
O n all railroads
I f the employees
D ecide to co-operate.

C ut down
L oss and damage
A nd prevent claims
I n all classes of freight.
M any claims are caused by
S mall irregularities which can be corrected.

Reading down the first line of each of these two arrangements we have the words "Avoid Claims," the letters being bold face in order to throw these two words into relief.

Reminder 330 was of a similar type but designed to emphasize the advisability of promptly filling out and sending in the postal cards which were referred to in the second article of this series. It read as follows:

P revent claims by filling out the cards
O f every case or bad situation you know should be corrected.
S end the cards to your Preventive Committee.
T ake time to do this on every case you run across.
A stitch in time will save nine.
L et us all work together—claim prevention.

C atching errors should be our aim, and a $100,000 reduction in claim payments will be easy.
A sk your Freight Claim Preventive Committee for a supply of cards if you have none.
R ough handling of freight cost us last year $70,593.82.
D efective cars cost us last year $72,544.12.
S ee if you cannot help us to cut this down by reporting all bad cases on the cards.

Other typical reminders were:

No. 282—Are you aware that loss of package freight cost the company $60,000 last year? Help to reduce this; see that each and every package is plainly and properly marked.

No. 340—Errors may sometimes not cause claims, but they cost us money in the way of stationery which otherwise would be saved. Watch this leak.

No. 342—Claim prevention is something to which we can all contribute our efforts with good results. Considering the fact that 59 per cent of all claims received are for amounts of $5 and less, you will readily see that close co-operation is necessary. Help reduce claim payments $100,000 this fiscal year.

A large number of these reminders were suggested by committee men or interested employees. The following acrostic was developed on the River and Cape division and was used by the freight claim preventive committee to good advantage:

P revent loss and damage to avoid claims.
R ough handling of cars causes claims.
E veryone is urged to do their part.
V ery few cards are being turned in by yardmen; let us hear from you.
E arnest co-operation is desired from all employees.
N o discipline will be applied for matters reported to the committee.
T his company paid out $435,503.91 in claim payments in the fiscal year of 1913-1914.

C laims are costing this company over $2 for each minute of each working hour, 26 days per month.
L et each one of us remember the slogan: "Reduce Claim Payments $100,000."
A void claims and have better satisfied patrons.
I n reporting small matters, much good can be gained.
M oney saved in claim payments means reduction in transportation expenses.
S witchmen, will you do your part?

BULLETINS

In addition to these reminders, circulars and bulletins were sent out at more or less regular intervals. Claim bulletins addressed to agents, train and yard employees called attention to certain specific abuses which had come to the attention of the claim department and which could have been avoided with a little effort or by a more intelligent handling. Typical paragraphs from two or three of these bulletins follow:

We recently paid four claims for damage to bottles moving in as many cars and earning in revenue less than $300. These claims were filed for breakage which could be the result of nothing except rough handling in transit inasmuch as the bottles were carefully packed and properly loaded and braced under the supervision of employees of this company. The four claims aggregated approximately $550 and left us heavy losers on the traffic handled. In this case carelessness somewhere proved very expensive.

We were required to pay $131.76 for damage to 300 sacks of cotton seed meal loaded in a defective car. Car Inspector at point of origin passed the equipment as fit for this loading and his employer, the company, had a right to expect that the roof would protect the consignment to its destination. However, on arrival at destination, almost the entire load was found to be watersoaked from a leaky roof which Car Inspector at that point declared to have been of long standing, and it was necessary for us to pay the amount mentioned. Surely, the car could not have been in first class condition when originally loaded although it was passed as such.

A car of cotton seed oil recently delivered us in switching service was bit hard enough in the terminal to shift the tank on car frame, breaking steam pipe and requiring transfer. Loss of oil and cost of transfer amounted to nearly $100 which was caused entirely by carelessness in switching.

A claim was recently filed on a car of plate glass which moved about 450 miles without noted exceptions. In the next 200 miles it was set out five times for rebracing and replacing a shifted load. Glass worth more than $1,700 was broken and claim for its value paid. It is very apparent that the car had unusually rough handling on several occasions after it was first set out for rebracing, or the employees repairing the braces performed their duties in a very inefficient manner. Needless to say the loss could have been avoided had every one given this car of glass the same careful handling and attention that would have been given it had it been the property of those who were handling it.

Another series of circulars sent out by the superintendent of freight loss and damage claims is addressed specially to agents and concerns the proper methods of classifying and handling certain commodities, such as eggs, poultry, food products and a variety of commodities which require special attention both as to packing and handling.

EDUCATIONAL BULLETINS

Possibly the most interesting and inspiring of the different series of circulars are those known as "educational bulletins." These are largely suggestive and ordinarily are short and to the point. The following extract from Bulletin 4, for instance, cites certain specific instances where serious damage was avoided, thus preventing claims for loss or damage.

This office has issued periodically claim bulletins showing specific cases where the Frisco has paid out money in freight claims due to transportation errors, and I am thinking that it would be well to issue a circular covering cases where on account of activity of employees, claims have been prevented.

Not long ago my attention was called to a case where a conductor was ordered to pick up a car of race horses for a short haul; after putting the car in the train it was found that it was off center. Conductor immediately decided that it would not be safe to move; shipper offered serious objections to any delay, claiming horses were scheduled for a certain race meet, and further objected to transfer to the only available car, which was a stock car, claiming horses would catch cold. At the conductor's very timely suggestion, blankets were produced by shipper, stock car lined with same, horses transferred and handled forward with but one hour's delay, obviating a claim on a carload of high priced animals.

An employee at one of the smaller stations noticed a car of wheat in a

Prevent Loss and Damage to Freight and Avoid Claims

MY AIM IS

IMPROVEMENT OF THE SERVICE

BY

LOADING—No defective cars that would result in damage.
STOWING—Packages properly, giving consideration to weight, shape, size, nature of contents and station order
TRUCKING—With trucks not loaded too high or too wide so that they are liable to bump against warehouse door or car door and topple over, making certain the freight is so loaded that it will rest secure until it reaches car or warehouse, as the case may be.
CHECKING—Freight carefully to see it is properly marked and packed in accordance with classification requirements, and that shipping ticket or bill of lading is legible and complete.
BILLING—Legibly all articles shown on ticket or bill of lading.
HANDLING—Cars carefully, avoiding carelessness in starting and stopping trains and in switching
DELIVERING—Freight only to authorized persons, using care to safeguard the Company's interests
PREVENTING—Loss and damage to freight, thereby avoiding claims.
REMEMBERING—That better transportation means better pleased patrons and more business for the Frisco.

"YOUR CO-OPERATION IS REQUIRED IN ORDER TO REDUCE CLAIM PAYMENTS $100,000.00"

A Heavy Card of About This Size and Bearing the Above Inscription Was Distributed to Advantage in the Early Stages of the Campaign

passing train leaking grain; he flagged the train and had the conductor set car out; repairs were made and further loss avoided.

At one of our larger stations, a shipment of household goods was received, with certain pieces in bad order; claim clerk called upon a repair man to ascertain the cost of repairs, and was informed as to what the cost would be including certain material. He was further told that the material necessary would be furnished free of cost, providing our forces at the platform made the repairs. The proposition was readily accepted by the claim clerk, and the broken pieces repaired, with all cost eliminated.

A mixed car of stock with partition broken, was noticed moving through a terminal; car was set out, partition repaired promptly, and a heavy claim no doubt avoided as the bad condition was noted before any of the animals had become injured.

I have just received a bad order report from one of the larger stations covering damage to floor and bran account wet. Check of contents shows 28 sacks of flour more or less damaged. Delivering agent carefully inspected the shipment, and advised consignee that he would take up the damaged flour and pay him invoice price for it, at the same time making arrangements to sell all of the flour at invoice price, thus avoiding any loss.

Owing to the alertness of one of the receiving clerks at a large platform, claim was avoided account of shortage to a shipment of coats. When shipment was received, receiving clerk noted case had appearance of having been opened, and refused to sign for shipment until invoiced. The result was we have an actual check of contents of the shipment when received, and are in position to decline claim when presented.

It is the kind of interest shown in the above mentioned cases that is going to assist in bringing about the $100,000 decrease in claim payments this fiscal year. I hope each will give claim prevention careful consideration and endeavor to contribute his share towards the reduction mentioned.

Circular No. 7, addressed to all employees who have to do with the handling of freight, was more extensive and outlined 37 physical causes which lead to loss and damage. Extracts from this circular follow:

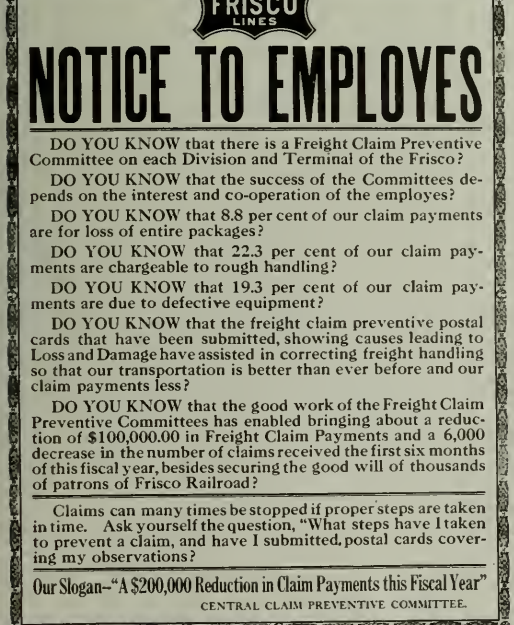
I wish to call your attention to the 37 items noted below, which are the principal causes that lead to loss and damage claims. They are not listed in the order of their relative importance. You can study these items with profit to yourself and to the company:

1. Rough handling in starting and stopping trains, in switching at stations, on the road, and particularly in yards.
2. Damage caused through improper stowage.
3. Livestock and perishable freight delayed in transit.
4. Failure to re-ice perishable shipments properly before starting and while in transit.
5. Loading freight liable to be damaged by water in cars with leaky roofs, or cars that are not otherwise water tight.
6. Freight stolen in yards, in transit and in depots.
7. Failure to keep proper seal record of cars received from connecting lines and otherwise.
8. Failure to properly check freight to and from drays and to and from cars.
9. Rough handling of freight by employees in loading and unloading from cars.
10. Failure to properly inspect cars before permitting them to be loaded with grain, to know that they are in fit condition.
11. Failure to record on waybills and make report of all freight damaged, over and short.
12. Signing bills of lading without positive knowledge that freight has been received.
13. Failure to see that all package freight is properly marked in accordance with marks shown on B/L and wayhills.
14. Freight damaged in handling.
15. Freight freezing account box car service and failure to note proper exceptions when received.
16. Concealed damages, concealed shortages.
17. Damages account negligence of employees.
18. Damaged when received from connecting lines and no exceptions noted.
19. Damaged when received from shippers and no exceptions noted.
20. Careless checking of freight to and from connecting lines.
21. Frail packages, improper packing, etc.
22. Damage caused through wrecks, derailments, etc.
23. Failure to load into car for which checked and billed, going forward later, but not accompanied by billing.
24. Erroneous and improper loading.
25. Failure to take proper exceptions against freight received not in good shipping condition.
26. Failure to safeguard the company's interest in delivering freight in a damaged condition to consignees.
27. Failure to inspect shipments of live stock and to take exceptions against when received in a damaged condition from connections.
28. Failure to trim down, brace and block off freight before closing car doors.
29. Failure to remove freight on platforms to a safe place when exposed to the rain.
30. Delivering order shipments without surrender of the original B/L.
31. Failure of yard clerks to examine cars before reporting them as empty and to make a list of any packages found in cars.
32. Carelessness in the matter of making and sending out arrival notices.
33. Failure to inspect stock cars before loading to see that they are in proper condition in every way to receive live stock.
34. Failure before loading to properly inspect and clean cars.
35. Claims caused through misrouting and account of incomplete wayhills.
36. Failure to compare wayhills with bill of lading or shipping ticket.
37. Inaccurate and illegible bills of lading or shipping tickets.

These causes are what we call preventable causes. In other words, if our employees will co-operate along the lines of claim prevention we can reduce claim payments fully 50 per cent, which will mean over $200,000 reduction.

The following paragraph, taken from Circular 8, addressed to all trainmen, enginemen, yardmen, carmen, and others concerned is typical not only of the other information contained in this circular, but as to a large part of the information which is sent out in this way to the various employees engaged in the handling of freight:

Seventy per cent of the claims received are for amounts less than $10. And 60 per cent are for amounts less than $5. Therefore it is the small claims that go to make up the large sum we pay out yearly, and which has averaged close to $500,000 during the past five years. The average



An 18-in. x 24-in. Poster Used in the Educational Campaign

ST. LOUIS AND SAN FRANCISCO RAILROAD

Prevent Loss and Damage to Freight and Avoid Claims

MY AIM IS

IMPROVEMENT OF THE SERVICE

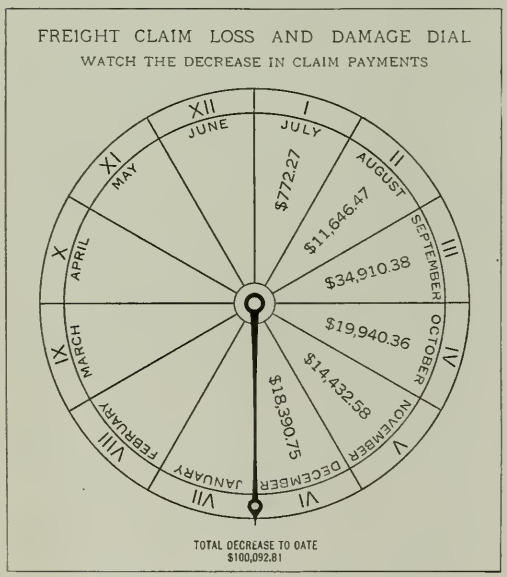
"Your Co-operation is Required in order to Reduce Claim Payments $200,000"

Inscription Which Appears on Frisco Blotters for Use of Employees and Patrons

amount of every claim received is $10. Therefore if we bring about a decrease in claim payments of $100,000 we will receive 10,000 less claims. This would mean approximately 20 per cent less work for the employees on this railroad who have to handle correspondence in connection with claims. It would mean less OS&Ds. It would be hard to estimate the amount of labor and stationery saved, but the benefit would be large.

We have already mentioned the co-operation which has been sought from the patrons of the road by inviting them to some of the freight claim preventive meetings. In Circular 9, addressed to the patrons and coming from the office of the superintendent freight loss and damage claims, the freight claim prevention campaign was briefly described and suggestions and co-operation were asked for.

One of the illustrations shows the inscription on a blotter. These blotters have been distributed to all of the employees, and 10,000 have been printed for distribution to patrons. When an agent or traffic department representative gives these blot-



The Dial Bulletin Which Was Issued January 15

ters to patrons he has an opportunity to explain to them the efforts which are being made to get their freight to destination without loss or damage.

Another illustration shows what has been designated as the freight claim loss and damage dial. It shows the decrease in claim payments by months as compared with the previous year and indicates that for the first six months of the present fiscal year a decrease of over $100,000 had been made. It is planned to issue these dials each month until the close of the fiscal year, thus keeping the men posted in a simple way as to the progress which is being made.

The loss and damage pyramid bulletin is also of interest and was issued early in December, 1914, to cover the performance of the previous five months. A large rubber stamp has also been gotten out within the past few weeks and is reproduced in one of the illustrations. It shows that up to February 27, 1915, $146,920.35 had been saved in freight claims as compared with the previous year and that a further reduction of only $53.079.65 is needed to reach the $200,000 mark. Revised stamps will be sent out from time to time as new data is available.

Hand bills have been furnished to the agents which are to be signed by them personally and enclosed with correspondence to patrons. These are apparently securing good results in developing a more friendly feeling on the part of the patrons toward the road. The wording is as follows:

To Our Patrons:

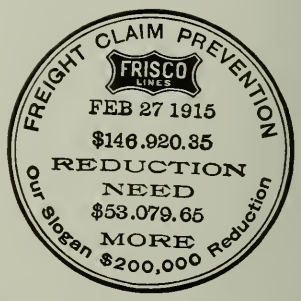
Care and promptness are the chief requisites in handling freight, and by giving first class service in this respect, the Frisco hopes to retain the good will of its patrons.

Our employees having to do with the handling of freight fully realize the annoyance to all concerned incident to loss and damage and have endeavored to remove the causes leading to same; as a result, there is a very large decrease in the number of freight loss and damage claims filed.

We feel that our patrons will appreciate our efforts towards giving them better service and will co-operate with us in any way possible in removing any causes for loss or damage that come under their control. Particularly can conditions be improved in this respect by seeing that freight that is tendered for shipment is properly packed and carefully marked.

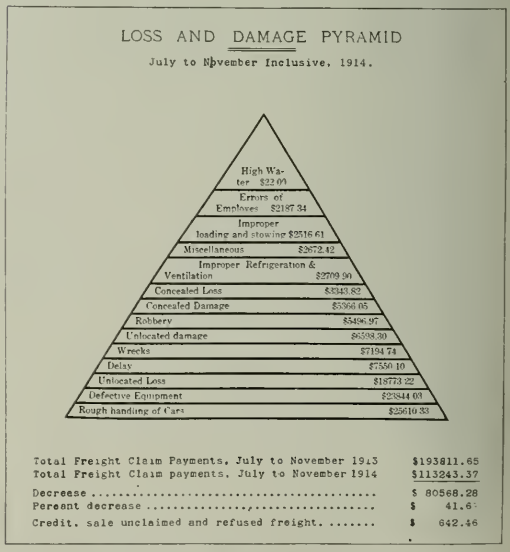
Your suggestions will be gratefully received.

Agent.



A Special Rubber Stamp Used on Railway Correspondence

All members of the freight claim preventive committees have been furnished with business cards similar to the one repro-



Freight Claim Loss and Damage Pyramid Bulletin

duced herewith, which they are expected to use in the solicitation of business. All of the members of these committees are urged to use their influence in securing business for the road and to interest other employees in this work.

Naturally the enthusiastic work of the freight claim preventive committees and the employees has attracted the attention of the press and much desirable publicity has been obtained from the

notices of the progress of the work and the accounts of the meetings which have been held at more or less regular intervals at each of the more important points on the system.

SPECIAL CLAIM PREVENTION DAYS

Handbills were distributed to all employees late in February announcing that the ninth and tenth days of March and April had been set aside as special claim prevention days, the idea being to absolutely prevent on these days errors of any kind which result in loss or damage to freight. In addition to the handbills, rubber stamps were distributed to be used on company correspondence and bearing the message: "Don't forget that March 9th and 10th are special claim prevention days." On March 9 the superintendents sent wires to all freight train crews emphasizing the importance of preventing loss and damage to freight.

On the handbill announcing the special claim prevention days appeared the following reminders:

The RECEIVING CLERK may help by seeing that he receives all the freight he signs for. He is the man to reject consignments improperly prepared for shipment.

The TRUCKER may help by careful trucking, and by being sure that the freight is loaded in the proper car.

The STEVEDORE or LOADER may help by careful stowing and bracing and by supervising the work of the loader.

The CAR INSPECTOR and WAREHOUSE FOREMAN may help by choosing suitable cars for loading, and by seeing that cars selected are free from nails and other projections, and from oil or other refuse which may injure the lading.

The SWITCHMAN may help by avoiding unnecessary movements of the car, by careful signaling, and by making smooth couplings.

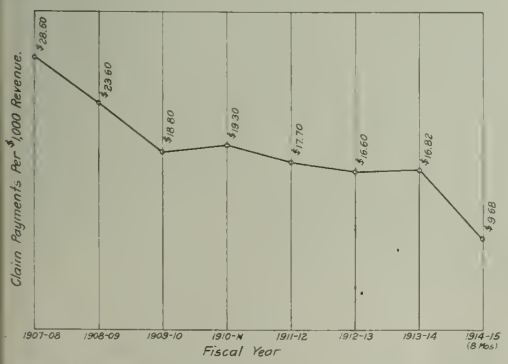
The ENGINEER may help by prompt and careful observance of signals, and by avoiding sudden and hard applications of air.

The CONDUCTOR and BRAKEMAN may help by unloading and loading freight as though it were their own property, being cautious to see that it is put off at its correct destination, and by reporting instances of improper loading.

Thus far the records show that very few claims have been filed for loss or damage which occurred on these days. The plan created much enthusiasm and undoubtedly inspired the employees to greater efforts and resulted in much good. Voluntary reports have been received from a number of stations and employees calling attention to the fact that they did not make any errors in these special days.

SPECIAL MEETINGS

A new scheme is just being tried out, that is the holding of joint meetings of the freight claim committees wherever it is possible. For instance, a joint meeting of the Eastern and the Northern divisions and Springfield Terminal committees was held at Springfield, Mo., on March 24. A goodly number of patrons were present, as well as a large number of employees. Talks were made by general officers, division officers, and employees. This month there will be a joint meeting at Memphis of the Southeastern, the Ozark and the River and Cape divisions and the Memphis Terminal committees. There will also be a joint meeting a little later at Monett, Mo., of the Eastern, the Central, the Kansas, and the Southwestern division committees.



Graphical Presentation of the Freight Claim Payments Per $1000 Freight Revenue for the First Eight Months of the Present Fiscal Year and for the Seven Previous Years

RESULTS

The results of the freight claim preventive campaign for the first eight months were discussed in the first article in this series and are shown graphically in the accompanying diagram as compared to the records for the previous seven years. The saving in the prevention of friction between the patrons and the railroad representatives and in the reduction in transportation expenses due to the better service which has resulted cannot be estimated, but must have been large. This is reflected by the following data:

Claims Received for First Eight Months of Fiscal Year	1913-14	1914-15
July	3,785	4,627
August	6,441	4,426
September	5,076	4,750
October	5,216	5,262
November	5,336	4,195
December	6,662	4,202
January	5,822	4,289
February	5,126	4,076
Total	43,464	35,827

This shows that the number of freight claims for the first eight months of the fiscal year 1914-15 decreased 7,637, or 17 per cent, as compared to the same period for the previous year.

The statement following shows the decrease in the number of

FRISCO LINES

NOTICE!

The Slogan of the Freight Claim Preventive Committees has been realized—the $100,000 reduction in Freight Claim Payment has been made.

Our Slogan now is "A $200,000 reduction in Claim Payments this fiscal year." Every dollar of this can be made if each employe will help.

REMEMBER!

Money saved is money made. Stop a leak. Stop a shipment going wrong and last but not least—STOP A CLAIM.

CENTRAL CLAIM PREVENTIVE COMMITTEE

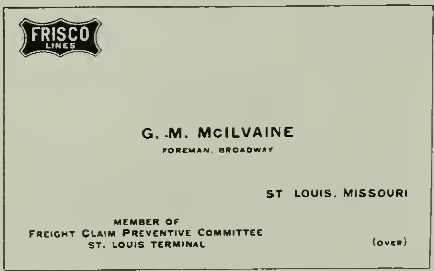
(These were printed in several colors)

One of a Number of Campaign Hand Bills

OS&Ds, refused and unclaimed freight reports, and L. C. L. tracers received during the first eight months of the present fiscal year as compared with last year:

	1914-15	1913-14	Decrease	Per cent
Overs	15,955	26,625	10,670	40.1
Shorts	14,858	22,493	7,635	33.9
Damages	35,225	39,054	3,829	9.8
D/Rs	13,826	16,557	2,731	16.5
LCL Tracers	3,590	6,787	3,197	47.1
Total	83,454	111,516	28,062	25.1

In other words about 30,000 fewer investigations were started in the freight loss and damage claim department. This means roughly that from 60,000 to 70,000 fewer letters were sent out

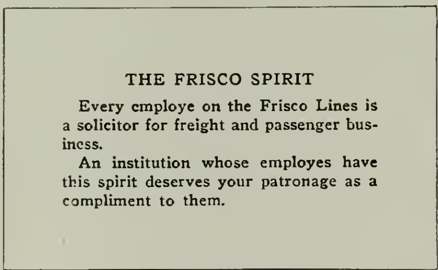

FRISCO LINES

G. M. McILVAINE
FOREMAN, BROADWAY

ST LOUIS, MISSOURI

MEMBER OF
FREIGHT CLAIM PREVENTIVE COMMITTEE
ST. LOUIS TERMINAL

(OVER)


THE FRISCO SPIRIT

Every employe on the Frisco Lines is a solicitor for freight and passenger business.

An institution whose employes have this spirit deserves your patronage as a compliment to them.

Face and Back of Business Cards Used by Members of Freight Claim Preventive Committees

by that department and that the agents and trainmen have had much less correspondence to attend to. Is it any wonder that they are boosters for the new order of things?

CONCLUSION

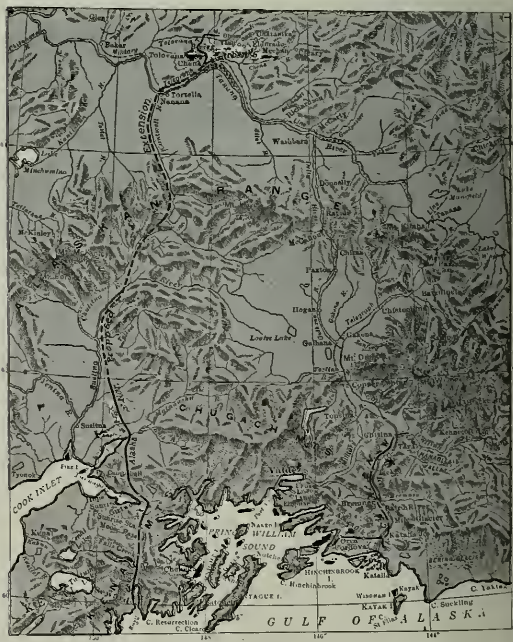
In the first article of this series certain statistics were given which indicated that for several years the freight loss and damage claims had steadily decreased on the Frisco per thousand dollars of gross freight revenue until a certain point was reached in 1912-13, beyond which it seemed almost impossible to go. Impressed by the results gained in the educational campaigns which had been waged in the safety first movement and later in the effort to better the train and car loading and improve the freight movement, it was decided to inaugurate a similar effort to reduce the waste due to the loss and damage to freight. It was estimated that it might be possible by a strong effort to save $100,000 in the fiscal year 1914-15. The importance of giving more attention to the education and training of employees is indicated in no uncertain terms by the fact that the goal which was set at a high point (many believed it to be beyond reach) was reached in six months and the indications are that double the saving, which was originally aimed at, will be made. Does it pay to educate employees fully as to their duties and to inspire them by various means to do better and more efficient work? The experience of the Frisco, not only in this campaign, but in the others which we have described during the past year, surely proves that it does.

THE ALASKAN GOVERNMENT RAILWAY

As announced in our issue of last week, the government has selected the route for its proposed railway from the coast into the interior of Alaska and has authorized the inauguration of work at once. The route adopted extends from Seward on Resurrection Bay across Kenai Peninsula and the head of Cook Inlet, ascending the valley of the Susitna river, crossing the Alaska mountains through Broad Pass and then descending the Tanana river to Fairbanks, a total distance from Seward of 471 miles. The Alaska Northern extending from Seward inland 71 miles to Turnagain Arm has been purchased by the government for $1,150,000, or $16,000 per mile. A branch will also be built from Matanuska Junction to the Matanuska coal fields, a distance of 38 miles. A terminal will be built at Ship Creek on Cook Inlet, which will serve as the outlet for the Matanuska coal, and as a base for the construction of the road.

It is expected that about 40 miles of line will be constructed this year. Because of climatic conditions and the difficulty of getting equipment in to the line most of the grading will be done by station men on small contracts. The experience gained by this method this year will aid in determining the method to be followed in building the remainder of the road later.

The estimated cost of the entire line is $26,800,000, or $57,000 per mile. In the bill passed by Congress last year, authorizing the construction of this line, it was provided that the



This map used by permission of Rand, McNally & Co.

Proposed Location of the Alaskan Government Railway

total expenditure for the Alaska railways should not exceed $35,000,000. An appropriation of $1,000,000 was made last year for the work of the commission, half of which was expended in making the surveys. An appropriation of $2,000,000 has been made to carry forward the work this year.

W. C. Edes, chairman of the Alaska Engineering Commission, will have immediate charge of this work, with headquarters at Seward, Alaska. Lieutenant Frederic Mears and Thomas Riggs, Jr., the two other members of the commission will continue the surveys.

Recent Developments in Steam Locomotives*

Increases in Power; Improvements in Economy; Advantages of Superheating, Brick Arch and Mechanical Stoking

By George R. Henderson
Consulting Engineer, Baldwin Locomotive Works, Philadelphia, Pa.

The development of the steam locomotive in the last 10 or 15 years has been brought about mainly for two very good reasons: increase in power and increase in economy. These have been subdivided, the first into improvements in tractive effort and horsepower and the second into economies in fuel and labor. The means of obtaining these various factors are best shown by the accompanying table:

Locomotive Development

For increase of

- **Power**
  - Tractive effort
    - Wt. per driving axle, 40,000—70,000 lb.
    - No. of driving axles, 4—12
    - Tractive effort, 40,000—160,000 lb.
  - Horsepower
    - Size of boiler, 3,000—9,000 sq. ft. H. S.
    - Steam pressure, 180—240 lb. per sq. in.
    - Superheat, 50 deg.—250 deg. F.
    - Horsepower, 1,500—3,000
- **Economy**
  - Fuel
    - Compounding, saving 20%
    - Superheating, saving 25%
    - F. W. heating, saving 10%
    - Arches, etc., saving 5%
    - } 35%
  - Labor
    - Oil fuel
    - Power reverse
    - Coal pushers
    - Fire door operators
    - Grate shakers
    - Mechanical stokers
    - } Reduce labor and increase capacity

Let us examine, briefly, the changes under these different items.

The weight on driving axles has almost doubled, but the weight of rail has also been increased, say from 70 to 100 lb. per yard, and as each pound per yard is good for a wheel load of 300 lb., when the rail is properly supported, we find that the rail has kept pace with the unit wheel load, which, of course, is a necessary requirement. As in the contests for mastery of guns and armor, so have railroad activities increased track weight and wheel loads, the one necessitating or permitting the other to also advance. But the tractive effort of the locomotive has not been kept down to the comparatively meager increase in weight of rail. Then, too, only the largest roads have been able to afford the expense of such heavy track, and those roads which still use 70 or 80 lb. rail also need greater tractive effort. So it has come about that the number of driving axles to a locomotive has been greatly increased.

With the advancements made in boiler pressure and size, superheating has been prominent as a means of still further increasing output, and a great deal of success has been gained in this direction. The benefit of this operates in two ways, primarily to prevent or reduce cylinder condensation, and after that point has been obtained, the increased volume of superheated steam results in more work being performed with the same quantity of water.

At 50 per cent *real* cut-off, 90 deg. F. superheat will reach the point of saturation about the end of the stroke, when the initial pressure is 200 lb. gage, and with 33 per cent *real* cut-off, about 170 deg. F. superheat are required; any further superheat will give economy by expanding the steam to a greater specific volume than when saturated. In ordinary practice, 100 deg. F. superheat will give about 16 per cent more work or volume than saturated steam and 200 deg. will give about 33 per cent more. The diagram will explain the practical working in locomotives.

Let us consider a locomotive whose tractive effort and velocity relation are typified by curve *A*, the boiler supplying dry saturated steam. If we desire to apply a superheater to this boiler, we must reduce the evaporative heating surface about 25 per cent, so that less saturated steam would be available, considering that the coal consumption or rate of firing is maintained constant per square foot of evaporative heating surface, or 75 per cent as much as in curve *A*. This is shown by curve *B*.

Now apply the superheater elements and with 200 deg. superheat, our tractive effort will rise to curve *C* (same as *A*), but with 25 per cent less coal. Now if we increase the coal consumption to its original amount per square foot of grate surface, which has not been altered, the curve will be shown at *D*, or about 33 per cent more work for the same coal as in curve *A*. The upper curves show the corresponding change in horsepower, for superheating, but this will also depend upon the actual size of the boiler. Ordinarily, in estimating heating surface, it is customary to take the evaporative heating surface plus one and one-half times the superheating surface, and call this the equivalent heating surface of the boiler. As the superheating surface is ordinarily about 22 per cent of the evaporative surface, this places the equivalent surface equal to what the same boiler would have in heating surface, if no superheater had been applied. Roughly, we may determine the horsepower of the boiler by dividing the equivalent heating surface by x, where x equals:

Fuel	Coal	Oil
Non-superheater locomotives	2½	2
Superheater locomotives	2	1½

Thus, by combining the increase in boiler size and superheating benefits, we find an improvement of 3 or 4 times in the available horsepower—a figure that harmonizes with the advancements made in tractive effort.

Among the devices which operate for economy, a part save in fuel and a part in labor only, but the saving in fuel is also a saving in labor, although the latter is not always accompanied by a financial saving. Therefore, only the fuel economies result in a direct benefit in expenses, and the fireman gets the benefit of all—fuel and labor saving devices together.

Compounding was one of the first radical methods of saving fuel, and this appeared in two cylinder compound locomotives. The low pressure cylinder soon assumed such a diameter, however, that it became impractical, and four-cylinder compounds resulted, both as tandem, superimposed and balanced. The saving in fuel was about 20 per cent, but in some cases this was more than offset by the increase in maintenance. With articulated locomotives, however, the practical advantage of low pressure steam in the flexible pipe leading to the low pressure cylinders, is perhaps as great as that of fuel economy.

The Triplex locomotive of the Erie Railroad is a six-cylinder compound, the right high pressure cylinder exhausting to the two front low pressure cylinders, and the left high pressure cylinder sends its used steam to the two rear low pressure cylinders, the ratio of compounding being two. The economy of a compound engine is produced mainly by the reduction of cylinder condensation, owing to the later cut-off used and the smaller temperature variations throughout the stroke.

The economy in superheating is likewise produced by the reduction or elimination of cylinder condensation, in connection with the increased volume of superheated steam, as already explained. This can be accomplished in a simple cylinder as well as in a compound, and if we remove cylinder condensation by means of superheat, we cannot expect to obtain, in addition, the thermal advantages of compounding. In other words, having removed the condensation losses by superheating, there is no condensation left which can be removed by compounding. There are mechanical advantages in articulated and similar locomotives, which are sufficient to justify the combination and the reduction of pressure in the flexible pipes by this means is quite important.

The coal consumption with superheated steam is represented by

*From a paper presented before the New York Railroad Club, April 16, 1915.

the Locomotive Superheater Company to be about as follows:

Deg. F. Superheat	Lb. Coal per hp. hour	Deg. F. Superheat	Lb. Coal per hp. hour
0	3.5	150	3.1
50	3.4	200	2.7
100	3.3	250	2.2

This indicates about 25 per cent saving at 200 deg. superheat, as shown in the diagram.

Feedwater heaters have been used to a limited extent; they have been of various types, from heating the water in the tank to heating just before entering the boiler. If a pump is used to draw the heated water, there may be difficulty on account of the steam generated by the pump suction; this may be overcome by supplying the hot water under a head sufficiently great to prime the pump and allow for frictional resistance in the pipes. Water may be heated from 100 to 140 deg. in this way, at an economy of 10 per cent.

Brick arches and similar arrangements also promote fuel economy, and while 10 per cent has often been claimed, it has been set in the statement at 5 per cent, as so much depends upon the arrangement and maintenance. In bad water districts, where flue trouble is excessive, it may not be practical to keep arches in the fireboxes, as they interfere with access to the flues.

Summing up, then, these various modes of obtaining fuel

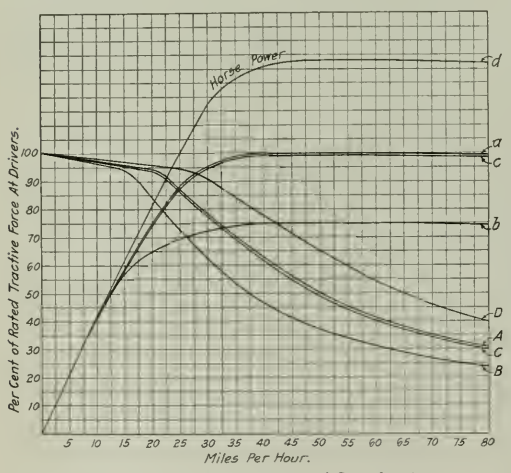


Diagram Showing Advantages of Superheating

economy, we must bear in mind that it will not be possible to realize the sum of the savings shown, but that if we were to combine all of them in a single locomotive we might expect 35 per cent saving over a simple, saturated steam locomotive, without either feedwater heater or brick arch. This is a large economy, however, and well worth the first cost of application and maintenance.

As the items just enumerated reduce the fuel consumption, they will reduce the fireman's labor in the same proportion. There are other means of reducing the manual labor, however, which do not bring a direct return for the money invested, except in so far as they permit a greater output of power, due to the reduction of labor per unit of power generated. Fuel oil is one of the most important of these methods, and while in some localities its price is prohibitive, yet in others it is actually a source of economy, being cheaper than coal. In general, it will permit about 25 per cent greater steam output from the boiler. Where the cost of fuel is too great, a mechanical stoker may be used, and by this means it is possible to put in the firebox twice as much coal as can be supplied by an average fireman.

Coal pushers, fire-door openers, grate shakers, etc., seem rather trifling in themselves, but a trip on a large modern locomotive, where the fireman is supplying coal at the rate of 6,000 lb. an hour, or 100 lb. per minute, will demonstrate the importance of utilizing all these adjuncts in order to get the best work out of the engine. It is a case where a number of small items produce a large result, both in the time saved and in affording greater conveniences to the men.

DISCUSSION

G. M. Basford, chief engineer, railroad department, Jos. T. Ryerson & Son.—During the past ten years improvement in the steam locomotive has been unparalleled in engineering progress. We are so close to this development as to render it impossible to realize its extent and its importance, or to comprehend the possibilities of improvement in railroad operation, which improved economy and the increased capacity due to that economy, renders available. Mr. Henderson says that he has merely scratched the surface of his subject. A very long paper would be required to do more than that. In this generation of human activity the steam locomotive has been brought from a relatively low to a very high position as an efficient, powerful machine. It now takes its place among the great improvements in marine and stationary practice, which the same generation has brought. It is fitting that attention should be directed to this fact. It is important that our electric friends should bear in mind the fact that the steam locomotive of today is on an entirely different basis, as to efficiency, from the steam locomotive of the day when electric locomotives were first introduced. Our electrical friends will find that they have an entirely different competitor to meet and they will probably discover that the day for general use of electric locomotives is put far into the future by the development covered by this paper.

In 18 years the steam passenger locomotive has increased threefold in tractive effort. In 16 years the freight locomotive has also increased three-fold in tractive effort. The largest figure for indicated horsepower produced on the Pennsylvania Railroad testing plant at the St. Louis Exposition ten years ago was 1,641. This was developed by New York Central, Atlantic type locomotive No. 3000, and was considered a marvelous record at the time. Published records of recent performance of a Pennsylvania Railroad Pacific type locomotive show 3,184 indicated horsepower from the same testing plant at Altoona; possibly this plant has produced a larger figure which has not yet been published. This statement reveals an astonishing increase in power. A record of 3,580 indicated horsepower has been made by a very large freight engine at a speed of 15 miles per hour in road service. A prediction of these figures would have astonished everybody ten years ago.

Increased capacity has been accompanied by improved economy. The best record of the St. Louis tests in 1904 showed 16.6 lb. of steam and 2.01 lb. of coal per indicated horsepower per hour. The latest published figures from the Altoona test plant show 14.6 lb. of steam and 1.8 lb. of dry fuel per indicated horsepower hour. In ten years a reduction of 10 per cent in fuel and 12 per cent in water has been effected, which averages 1 per cent per year for the last ten years. No contemporary development in engineering has produced such an improvement. This is specially interesting from the fact that the best record of the St. Louis tests was made by a European locomotive, which, at the time represented the best engineering practice of the world. It is also of interest to note that this European locomotive was equipped with a superheater and a brick arch. This means that the improved economy mentioned has been obtained by a development with and of these important features.

It is impossible to credit this improvement to any one or to several economy-increasing factors. It is due to co-operative development of a lot of factors, all of which tend to increase economy and, therefore, increase capacity. The most important of these factors may be enumerated as follows:

For the last five years boilers have been designed with reference to the steam required for maximum cylinder horsepower. This method has replaced empirical formulas. Firebox design has greatly improved. Much has been done to increase the effectiveness of draft appliances and exhaust nozzles. Greater at-

tention has been paid to enlarged air openings under the grates. Superheating requires no comment in this connection. Compounding has been worked out in connection with superheating with promise of still further development. Feedwater heating has become a practical success. Fire-brick arches have taken a place of great prominence in locomotive design and in operation, particularly with respect to combustion. The author of the paper specifically mentions 5 per cent as being creditable to the arch; in this connection it is important to observe that the arch contributes to the saving of the superheater and helps to secure the advantages of improved boiler design. The arch renders high superheat possible; these factors help and supplement each other.

Mechanical stokers have become a necessity on locomotives of great power. Stokers certainly contribute to increased capacity in addition to the saving they may make. Improved valve gears help the cylinders in economy and in capacity. Labor saving devices for enginemen and firemen produce an economy and increased capacity in that they enable enginemen to secure the utmost capacity from an engine. We are just beginning to consider the use of high grade alloy steels to reduce weights. They offer means of reducing static weights considerably, but more important is the possibility of reducing the dynamic effect of counterbalance weights by reducing reciprocating weights. Herein is a very fertile field for future endeavor. Yet to come is powdered fuel as the most promising possibility of the future.

We hear much about improved economy of locomotives, but do not hear enough about the possible increase in capacity, which the improved economy permits. An improvement of 25 per cent in economy offers a theoretical increase of 33⅓ per cent in capacity. Assume 6,000 lb. of coal per hour as a figure for coal consumption. If 4 lb. of coal are required per i. h. p. per hour our 6,000 lb. of coal would generate 1,500 i. h. p. If an economy of 25 per cent in fuel is effected, 3 lb. would generate a horsepower for an hour and 6,000 lb. of fuel would develop 2,000 instead of 1,500 i. h. p. This would be an increase of 33⅓ per cent in capacity effected by an economy of 25 per cent in fuel. In other words, if one has $6,000 to spend for items of anything which cost $4 each, he may buy 1,500 items for $6,000. If the price is reduced to $3 each he can buy 2,000 of them, which means an increased buying capacity of 33⅓ per cent for a reduction of 25 per cent in price. This is the ratio of the theoretically possible increase in capacity corresponding with improvements in economy.

I have records showing in actual service an average of 36 per cent saving in coal per ton mile for seven different railroads. This saving effected an average increase of 63 per cent in tons hauled per train. This represents the difference between very large, modern locomotives as compared with smaller ones of earlier design. In another case, seven railroads show an average saving of coal per ton mile of 27 per cent, which led to 34½ per cent increase in load hauled per train, also representing large, modern engines as compared with smaller and older ones. These are figures which actually appear on the treasurer's records. It is one thing to provide economy producing factors, and it is another thing to get these economies into the figures of the treasurer. We must all take our hats off to the men who have effected these great results.

J. P. Neff, vice-president, American Arch Company.—The subject treated in the paper is of vital importance to operating men, as well as to motive power men; in fact it has a greater bearing upon operating than mechanical matters as practically all of the benefits of the recent developments in locomotives tend toward reduction of the cost of conducting transportation, the prime operating account.

I will not attempt to discuss this paper in its entirety, but the author makes a statement that I cannot allow to go unchallenged. In his analysis, we find under the second item, "Economy," first division, "Fuel," that brick arches have been given fourth place and have been credited with a saving of 5 per cent. Elsewhere the author makes the statement that "Fire arches and similar arrangements also promote fuel economy, and while 10 per cent has often been claimed, it has been placed in the statement at 5 per cent as so much depends upon the arrangement and maintenance."

It seems to me that if qualifications are to be made it would be advisable to make the same qualifications for the other three fuel saving devices, that is, the diagram might be constructed to read: "Compounding, saving claimed 20 per cent, realized 10 per cent; superheating, saving claimed 25 per cent, realized 15 per cent; feedwater heating, saving claimed 10 per cent, realized 5 per cent. The summation of the realized percentages would then give the 35 per cent which he shows as the total for all fuel saving devices. This suggestion is made on the same grounds, that "so much depends upon the arrangement and maintenance." Many compounds of fifteen years ago have been simpled because the realized saving was more than offset by certain disadvantages in maintenance and operation. Some of the earlier types of superheaters have not shown a realized saving sufficient to give a net result in their favor, and have given way to more efficient type. Ten or fifteen years ago the arrangement and maintenance of brick arches was not what it is today, and Mr. Henderson's statement regarding these arches would be quite true for conditions fifteen years ago.

I believe that I know where Mr. Henderson secured some of his bad impressions on the brick arch subject, and I think I know something of why he has stated that "in bad water districts where flue troubles are excessive, it may not be practical to keep arches in the fireboxes, as they interfere with access to the flues." About 15 years ago, when Mr. Henderson was assistant superintendent of motive power of the Chicago & North Western, I was division foreman of one of the worst water districts on the system and in a general motive power meeting I made an eloquent appeal for the privilege of removing arches and arch tubes from the locomotives on my division, and received permission to discard them. There were three very good reasons for that action at that time:

First, it was impossible to maintain arch tubes for any length of time, the life being in the neighborhood of three months, due to the scaling up, which we were unable to prevent.

Second, the class of engines on that division had very shallow fireboxes, and the arch tubes were located in the tube sheet only 13 in. from the bottom of the mud-ring, giving about 6 in. clearance between the arch and the grate surface at the front end of the firebox. This was a very bad arrangement and impractical from a firing standpoint.

The third reason was that we had a type of brick arch at that time which, when tube attention was necessary, was entirely destroyed.

Therefore the benefits which we got from a badly arranged arch was not sufficient to give us a net saving, due to the high cost of maintenance of arch tubes and brick. Today, however, in this same bad water district, arches are being run successfully, and are showing a good net result; but they have arches of a practical arrangement from the firing standpoint, they have arch tube cleaners which maintain the tubes free from scale and greatly reduce the cost of arch tube maintenance, and they have a different type of brick which can be removed and reapplied, thereby greatly reducing the cost.

In this same bad water country the Chicago, Milwaukee & St. Paul find that it pays to use arches. Furthermore, the Soo Line, operating in this same bad water country, which is as bad as any in the United States, have, after a year's careful experimenting on several locomotives, decided that it is a paying proposition to run brick arches; but the arrangement is of the latest type and the maintenance is of the high standard prevailing today throughout the country. Many other instances might be mentioned, but the three given should be sufficient, as they represent the worst water conditions in this country. Many roads that would not consider arches ten years ago are now making them standard, even in their worst water districts, simply because the arch tube cleaner has made it possible to run arch

tubes with safety. In the last five years at least 12,000 locomotives have been equipped with arches.

It is not fair to attempt to express the whole virtue of fire arches in percentage of fuel saving, for the reason that the amount of fuel saving depends not so much upon the arrangement and maintenance (which today is of a high standard), but rather on the conditions of operation. When burning a low volatile grade of coal at a low rate of combustion, a low fuel saving must result, but when burning ordinary bituminous coal at a high rate of combustion a high fuel saving does result from fire arches. Just what the average of all conditions over the country would be is impossible to say. We do not make a claim of 10 per cent fuel saving for fire arches, but we do claim, and can very well prove, that a properly designed brick arch in a bituminous coal burning engine makes a 10 per cent better locomotive. A locomotive equipped with an up-to-date arch will easily give 10 per cent more indicated horsepower hours per ton of coal than the same engine not so equipped. When the limit of sustained horsepower depends upon the endurance of the fireman, this limit can even be raised 15 per cent by the use of a properly arranged arch. Many road tests have proved this and indisputable testing plant figures in this country, as well as abroad, verify this figure. I have heard many road foremen state that an engine equipped with an arch is good for one more car in passenger service than the same engine not so equipped, when speaking of the ability of the engine to make a rigid schedule.

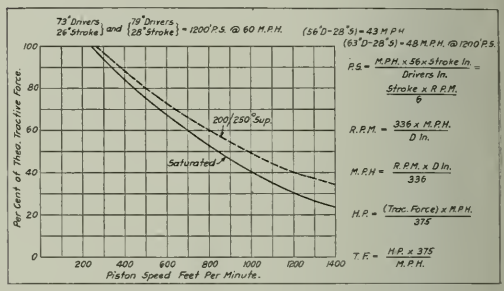
I would therefore suggest that Mr. Henderson revise his diagram putting fire arches where they seem, to me, to belong, in the class of "Capacity Increasers," using the conservative figure of ten per cent.

L. R. Pomeroy, of the United States Light & Heating Co., said that the use of a wide firebox and a more rational arrangement of the parts in modern locomotives had done much to increase capacity and produce economical results. Mr. Pomeroy made use of the accompanying figures and diagram, which is taken from that published in the *Railway Age Gazette*, January 15, 1915, page 96, to show that mechanical stoking is necessary in order to realize the full capacity of large modern locomotives:

Item		4-6-2 P. R. R. class K-4s 1	2-10-2 B. & O. 2	2-10-2 Erie 3
1	Weight on drivers, lb.	200,000	336,800	327,250
2	Tractive force, lb.	41,845	84,500	83,000
3	Diameter of drivers, in.	80	58	63
4	Boiler pressure, lb.	210	200	200
5	Cylinders, diam. and stroke, in.	27x28	30x32	31x32
6	Evap., h. s., sq. ft.	.....	5,573	5,801
7	Superheat., h. s., sq. ft.	.....	1,329	1,377
8	Equiv., h. s., sq. ft.	5,766	.....	.....
9	Grate surface, sq. ft.	70	88	88.1
10	Horsepower by approx. formula (boiler pres.) x 0.017 x (cyl. dia.)	2,600	3,000	3,200
11	Horsepower from diagram	2,700	3,100	3,100
12	Tract. force at 60 m. p. h. (for 4-6-2)	15,700	.....	.....
13	Tract. force at 35 m. p. h. (for 2-10-2)	.....	34,500	34,000
14	Piston speed at 60 m. p. h.	1,180	.....	.....
15	Piston speed at 35 m. p. h.	.....	1,080	1,000
16	Coal per hour at rate of 2.7 lb. coal per hp. hr. given by Mr. Henderson as appropriate for superheat of 200 to 250 deg. F.	(2,600 hp.) 7,020	(3,000 hp.) 8,100	(3,200 hp.) 8,640
17	Coal per hour as checked from given water rate of 21.6 lb. per hp. hour, with varying rates of combustion: (6, 7 and 8 lb. water per lb. coal)			
	4-6-2, 2,600 hp. x 21.6 ÷ 6 = 9,360			
	2,600 hp. x 21.6 ÷ 7 = 8,000			
	2,600 hp. x 21.6 ÷ 8 = 7,000			
	Average	8,120	.....	.....
	B. & O. 2-10-2,			
	3,000 hp. x 21.6 ÷ 6 = 10,800			
	3,000 hp. x 21.6 ÷ 7 = 9,255			
	3,000 hp. x 21.6 ÷ 8 = 8,100			
	Average	.....	9,385	.....
	Erie 2-10-2, 3,200 hp. x 21.6 ÷ 6 = 11,500			
	3,200 hp. x 21.6 ÷ 7 = 9,850			
	3,200 hp. x 21.6 ÷ 8 = 8,650			
	Average	.....	.....	10,000
18	Coal per sq. ft. of grate per hr. (Item 16 ÷ Item 9.)	100	92	97.5
19	Reduction in tractive force due to 5,000 lb. per hour	29%	38%	48%

The Master Mechanics' Association Locomotive Dictionary shows a No. 3 scoop as representative. The manufacturers rate such a shovel for ordinary bituminous coal, as 19½ lb. per shovel; at 5,000 lb. of coal per hour such a shovel would mean 256 scoops per hour, 4.26 per minute, or 1 shovelful every 14 seconds. These figures show quite conclusively that 5,000 lb. per hour is a fair assumption for comparison as a "fireman rating."

On this assumption (5,000 lb. per hour as the working limit



Relation of Speed Factor in Saturated and Superheated Steam Locomotives, with Some Convenient Formulas

for average firing) the practical realization of these designs of locomotives is somewhat short of the design expectancy, viz.:

P. R. R. 4-6-2 ..... $1 - \frac{5000 \times 100}{7020} = 29$ per cent less

B. & O. 2-10-2 ..... $1 - \frac{5000 \times 100}{8100} = 38$ per cent less

Erie 2-10-2 ..... $1 - \frac{5000 \times 100}{8640} = 48$ per cent less

The logic of the comparison is obvious. To realize the possibilities of design the fireman must be supplemented by some form of stoker, or oil fuel used.

B. P. Flory, superintendent of motive power, New York, Ontario & Western, referred to the advantages produced in the modern locomotive by the use of outside valve gears.

C. E. Chambers, superintendent of motive power, Central Railroad of New Jersey, stated that while superheaters undoubtedly increase capacity and economy there is an undoubted increase in maintenace costs, a point which should not be lost sight of.

Mr. Henderson illustrated his talk with a number of lantern slides, which included a proposed locomotive of the 2-8-8-8-8-2 type with the cab at the front end. In closing he referred to the 107 locomotives which the Baldwin Locomotive Works have recently built for the French government. These engines weigh about 14 tons each, have a firebox in the middle and a smoke stack at either end, and are for use on rough track in moving guns, etc.

LET THE INTERSTATE COMMERCE COMMISSION RULE*

By T. C. Powell
Vice-President, Cincinnati, New Orleans & Texas Pacific

The makers of the constitution could not in the nature of things anticipate the immense development of our internal transportation system. In those days transportation by water was the most important method and the limited movement on land was incidental to the water transportation, and in so far as the constitutional convention and Supreme Court were able to base their opinions upon known conditions, they provided the proper government of common carriers by water and the individual states have never had much to say about the regulations on the navigable rivers and waters of the United States.

The legislators and jurists of the eighteenth century did not have an opportunity of passing upon the regulation of

*From an address at the annual dinner of the Friendly Sons of St. Patrick on March 17, 1915.

steam and electric railroad facilities, and even when the first state railroad commissions were created, there was so little precedent to guide them that each state commission wanted to extend authority over each railroad which entered or passed through that particular state, and wanted to regulate each of these railroads as far as they extended, even into other states.

Fortunately, most of the railroad systems were short and there were only two or three commissions and the conflict of authority did not assume any great importance. Now, we have a commission in nearly every state. During the last two years there were introduced into the state legislatures over 1,700 bills regulating railroads. These diverse opinions, sectional jealousies, also the lack of information and honest variations in judgment have wrought "confusion worse confounded."

One state law requires screens for car windows and the adjoining state declares screens to be an offense against the law. One state demands that the railroads handling freight within its borders shall give preferential rates on native-grown commodities, while another state traversed by the same railroad insists that its citizens shall enjoy the lowest rates in existence, "and poured 'round all" is the national authority of the Interstate Commerce Commission.

No business man believes that this condition favors the development of commerce. It would be much better for the railroads and the stockholders thereof, who are numbered by the thousands, and the public who are not stockholders, and particularly for the business men, if by constitutional amendment the several states would agree to give up this destructive individual authority and place the responsibility for the proper regulation of all common carriers by land and water on all classes of traffic, within and without the borders of each of the several states, in the hands of and under the jurisdiction of a national commission.

If this country is to resume its commercial standing and to go forward to greater prosperity, such an amendment to the constitution must be approved by the several states. I hope such action will come soon, because, as it appears to me, this is the only thing that will forestall governmental ownership and operation of our railroads.

HEARING ON WESTERN FREIGHT RATE ADVANCES

The western freight rate advance hearing at Chicago before Commissioner Daniels during the past week has been devoted to testimony of shippers and their representatives and rate experts of western state railroad commissions protesting against the proposed advances in the rates on specific commodities. Testimony on the advances on cotton piece goods was given on April 12 and 13, and on coal and coke on April 14, 15 and 16. This was followed by testimony on grain and grain products from April 17 to 21, and on fruits and vegetables on April 22 and 23.

That the increase in rates on cotton piece goods would operate to place manufacturers of overalls at St. Joseph, Mo., at a further disadvantage in selling in competition with prison-made garments was testified by H. G. Krake, manager of the traffic bureau of the Commercial Club of St. Joseph; J. D. Richardson, president of the Richardson Dry Goods Company; R. W. Powell, vice-president of the Britton Dry Goods Company; T. C. Holland, secretary and treasurer of the Wheeler & Motter Mercantile Company, and R. L. Campbell, vice-president of the Tootle-Campbell Dry Goods Company. Mr. Krake said that at present the rate on cotton piece goods from the Mississippi river to St. Joseph is 32 cents. The short line mileage from Quincy, Ill., is 204 miles; from Jefferson City, Mo., 125 miles; from St. Louis and Sedalia, 204 miles; from St. Louis the rate is only 17½ cents, and the railroads are asking to advance the rate to St. Joseph to 37 cents without any change in the rate to Jefferson City and Sedalia, he said. Mr. Richardson said his company sells goods in competition with the prison-made garments of Jefferson City, and that the disadvantage would be increased by the difference in rates. Other testimony on cotton piece goods was given by C. C. Wilbur, traffic manager of M. E. Smith & Co., Omaha, and D. E. Nettels, traffic manager of the Postex Cotton Mills of Post City, Tex. S. H. Johnson, assistant freight traffic manager of the Chicago, Rock Island & Pacific, was called to give some brief testimony in rebuttal.

General testimony on coal rates was given by representatives of the Illinois Coal Operators' Association, followed by representatives of the Iowa shippers. F. H. Harwood, vice-president of the New Kentucky Coal Company of Chicago, testified in opposition to the proposed advance of 10 cents per ton on coal from the Indiana and Illinois mines to points in Iowa, Missouri and Minnesota. He said the advance would result in greater tonnage moving via Duluth and the Great Lakes from eastern coal fields. Charles N. Moderwell, also representing the Illinois Coal Operators' Association, said that the advance would curtail the market for Illinois coal in the Northwest. The Illinois and Indiana coal industry is in such condition that it cannot stand an advance unless it is uniform, he said. W. B. Martin, commissioner of the Dubuque Shippers' Association, said that the proposed advances on eastern and Illinois and Indiana coal to the west bank of the Mississippi river involve the same amount of advance that was under consideration by the Interstate Commerce Commission in the eastern five per cent rate case. At that time, he said, the roads sought to advance the rates to Chicago, and in addition to advance the rates from Chicago to the river by five cents per ton. Both increases were denied, but the carriers are now seeking to increase the rates from Chicago 10 cents per ton.

Representatives of a number of Chicago packers having plants on the Missouri river opposed the application of southwestern railroads for an increase in the rate on slack coal from the Pittsburg, Kan., mining district to Omaha, South Omaha, St. Joseph and Sioux City. W. W. Manker, assistant traffic manager of Armour & Co., and R. O'Hara, rate expert for Swift & Co., presented figures to show that existing rates from these fields were on a higher basis than from competitive fields for similar distances. Mr. Manker said that the proposed rates from Missouri and Kansas to Missouri river points where Armour & Co. have packing plants would mean an advance of from $10,000 to $12,000 a year to Armour & Co. The total freight charges paid on fuel by this company, he said, amount to $278,000 per year. J. O'Halleran, representing a sugar refinery at Clinton, Iowa, protested against the advance from Franklin county, Illinois, which he said was unreasonable. He thought the earnings per car under the present rates were sufficiently remunerative. F. J. Danner, traffic manager of the Davenport, Iowa, Commecial Club, testified against the proposed advances in coal rates on behalf of the members of his association, and presented a table showing the tonnage of coal consumed by the various industries. The largest consumer of coal on this list was the Bettendorf Company of Bettendorf, Iowa. A. P. Humburg, commerce attorney of the Illinois Central, asked the witness if he had heard of a letter written by President Bettendorf of this company to Clifford Thorne, vigorously advocating the granting of the advances in rates. The witness said he had heard of the letter and that he had no authority to represent the Bettendorf Company in this proceeding.

C. E. Childs, commissioner of the traffic bureau of the Sioux City, Iowa, Commercial Club, presented figures to show that coal pays more per car than certain other commodities, including livestock and packinghouse products. He said he thought the roads would have a much better argument to advance those rates. D. L. Kelley, rate expert of the South Dakota Railroad Commission, testified that the proposed advance in rates on bituminous coal would seriously retard the industrial development of South Dakota, which, he said, is now held in check by the in-

ability to secure an ample fuel supply upon a reasonable transportation basis.

Mr. Kelley submitted several exhibits covering rates on coal from the docks and mines to representative points in South Dakota, with the earnings, volume of tonnage and comparisons with rates in other sections of the country to show, he said, that the haul to South Dakota consuming points is from two to three times the average haul on bituminous coal for the entire country, but that notwithstanding that situation the rates per ton mile are higher. He said the proposed advances would cost coal consumers of South Dakota alone over $91,000 a year.

John E. Sargent of Kansas City, representing a large number of coal mines in the Southwest, testified that the coal interests are not opposed to the requests of the railways for increased rates, but are interested in the competitive relationships. "I have nothing to say as to whether the railways should or should not get the increase they ask for," he said, "except that possibly the railways need more revenue as much as we. What we do say is that there should be an absolutely uniform advance." Mr. Sargent then described the difficulties arising because of the conflict of state regulation with interstate rates, especially with reference to the situation at Kansas City, where the state line separates two large consuming points which are adjacent. He said it would mean ruin to the Missouri coal mines if the interstate rates are raised and the state rates are not advanced. E. R. Trotter of Kansas City, testified as to the displacing of coal by fuel oil, and said that the proposed advance on coal would place it at a further disadvantage as compared with oil. J. C. Storm of Amarillo, Tex., took the stand as an individual protestant to describe what he termed an unfair situation as to the rates in general applying to Amarillo. He compared rates on numerous commodities to a number of cities, showing other cities had lower rates. "All coal rates are too low," he said, "but when you put them up you ought to take it off of something else. If coal is shipped at these low rates somebody else must pay the fiddler."

The grain interests began their opposition to the advances on grain on April 17. A. E. Helm, commerce counsel of the Kansas Public Utilities Commission, made an opening statement defending the action of the western state railroad commissions in protesting against the proposed increases and declaring that the railroads were seeking to levy an additional toll upon one of the most profitable products they handle. Judge Helm said that in reply to the testimony offered by the carriers it was proposed to show that the relative proportion of the products of agriculture handled by the western railways is much greater than that handled by the eastern roads, and that the present rates on these commodities are higher than the average of rates on all tonnage, while the operating ratio is lower than upon almost any other class of carload freight moving in substantial quantities. He also said it was proposed to show that the exhibits offered by the carriers contained many substantial errors and do not reflect representative conditions; that the exhibits to be filed by the protestants will show that both the present and the proposed rates on grain and grain products are very much higher than the rates upon these commodities for similar distances in Central Freight Association territory, and that the percentage of excess of these rates over the grain rates for similar distances in the East is greater than the percentage of excess of class rates in the West over the class rates in General Freight Association territory. "We shall show," he said, "that the products here involved now sustain more than their full share of the burdens of transportation, and that any addition to these charges will be unreasonable and unjust to the farmers of the West who pay the freight on these commodities."

W. M. Hopkins, formerly manager of the transportation department of the Chicago Board of Trade, testified that the grain rates should not be advanced because a saving equal to the proposed increase might be effected if a more economical method of handling grain were practiced by the carriers, and that grain already pays more than its share of the total transportation charges. Mr. Hopkins said that grain is a very profitable commodity for the carriers, because the great grain fields are located in the Central West, thus giving the carriers a long haul and a large revenue on grain seeking eastern or southern territory of consumption. He also presented figures in reply to statements made by E. B. Boyd, chairman of the Western Trunk Line Committee, while on the witness stand for the carriers, that the proposed rates on grain were lower than the rates in the Northwest or in the territory east of Chicago.

To illustrate what he called the uneconomical methods of handling grain, Mr. Hopkins mentioned the unsatisfactory character of many of the cars furnished for grain loading, failure to furnish receipts, unnecessary delays in road haul movements, delays at terminals and unnecessary switching. The claims for loss and damage, he said, should not be given consideration as justification for imposing higher transportation charges, because the losses that arise are due to negligence of the carriers.

"The carriers claim that grain is not paying its share of the transportation costs," he said. "In 1914, the average freight revenues of the North Western, Burlington, Great Western, St. Paul, Rock Island, Illinois Central and Minneapolis & St. Louis were $57,072,122. Had all the traffic paid wheat rates, the revenue would have been $90,127,414; had it paid corn rates, $76,254,889. Against an average revenue per ton of freight of $1.65616, wheat shows, $2.60 and corn $2.20. The average ton mile revenue was 7.7 mills; wheat paid 11.87 and corn, 10.05 mills. The average revenue on freight per train mile was $2.92159; wheat paid $10.01503 and corn $7.53931. The average revenue per car mile on all traffic was 13.906 cents, against 47.33 on wheat and on corn 35.63. The average revenue per loaded car, all traffic, was $29.7619; the average revenue per loaded car on wheat was $103.7566, and on corn, $78.0329."

"Isn't most of the corn moved in the winter months, when transportation costs are high?" asked T. J. Norton, general attorney of the Atchison, Topeka & Santa Fe.

"I think that is true," replied Mr. Hopkins.

Mr. Norton also brought out that under transit arrangements, although the grain may come into a milling point in heavy carloads, yet the flour which moves out on the balance of the same rate makes a very light carload. The witness admitted that although the farmer pays the freight to the point of purchase, a great quantity of grain is sold before its destination is known and the freight from elevator to destination then is not paid by the producer. It was also shown that the witness, in his comparison of grain rates in western and eastern territory, had compared local rates with proportions of through rates in a manner which has been declared improper by the Interstate Commerce Commission.

E. H. Hoagland, of Topeka, Kan., introduced figures covering the amount of grain originating in the states affected to show the tonnage of grain traffic.

"How much of the Kansas corn crop is moved out of the state?" asked Mr. Norton.

"About one-sixth, probably," replied Mr. Hoagland.

"Yet you have used the entire crop figures to determine the density of corn tonnage per mile of line," pointed out Mr. Norton. "You have made no calculation which considers the small load of flour as against the large load of wheat, both of which move on the same through rate?"

The witness stated he had not taken this into consideration. Other witnesses who opposed the advance in grain rates included G. R. Hall, of the Duluth Board of Trade, and J. H. Schaefer, of the Iowa State Retail Merchants' Association.

Railway Extension in Northern Manchuria.—The survey and investigation of the proposed railway line from Chinchow in Shengking Province to Taonanfu in Mongolia are reported to have been completed. It is said that the Chinese engineer who had charge of the survey will probably be appointed chief engineer for the construction of the line.

General News Department

The Interstate Commerce Commission has begun valuation work on the Puget Sound line of the Chicago, Milwaukee & St. Paul.

The bill to repeal the full crew law of New York, which has been before the legislature of that state for several weeks was passed by the Senate on April 20 by a vote of 30 to 18.

The bill to repeal the full crew law, which has been before the legislature of Pennsylvania for several weeks was passed by the lower House on April 19 by a vote of 135 to 68, substantially a two-thirds majority. Representative Palmer, of Schuylkill, in a speech opposing the bill said that if the law were repealed the employees would retaliate on the railroads and secure legislation ten times more drastic than the full crew law. The bill gives specific authority to the Public Service Commission to decide as to the proper number of men to be employed in manning railroad trains.

The Wisconsin assembly has passed a bill prohibiting the giving or offering of any gratuity by patrons of any hotel, restaurant, barber shop or public service corporation engaged in the transportation of passengers. The penalty is a fine of from $5 to $25. The lower house of the Minnesota legislature has passed a similar bill.

The Pacific Mail Steamship Company announces that it has cancelled all sailings of its vessels after November 2, 1915, November 4 being the day on which the new seamen's law goes into effect, imposing restrictions which will make the operation of the company's vessels unprofitable. This company operates 19 vessels, 5 of them in the trans-Pacific trade. The vessels running to Asiatic ports have Chinese crews. No freight contracts will be made beyond July 31.

The Lehigh Valley reports that 289 regular freight trains run during the month of March made a record of being on time 98.4 per cent. Eight daily through freight trains leaving either Jersey City or Buffalo, arrived at their terminals every day on time. The New York State Public Service Commission, Second district, has advised the management that a recent ten-day check of l. c. l. freight between Buffalo and Geneva gave the Lehigh Valley 100 per cent for delivery on scheduled time.

Chairman Walsh of the federal Commission on Industrial Relations has excused Robert T. Lincoln, chairman of the board of directors of the Pullman Company, from going to Chicago to testify in its investigation of the wages and conditions of employment of Pullman conductors and porters. Mr. Lincoln had sent a letter stating that he would be unable to appear at the Chicago hearing on account of his health. At first Chairman Walsh said that a writ of attachment would be issued for Mr. Lincoln, but later he announced that the commission would hear Mr. Lincoln's testimony when it holds its next public hearing at Washington on May 6.

A Texas correspondent writes: "Governor James E. Ferguson plans to gain a first hand knowledge of the condition of the railroads of Texas and their traffic possibilities. He has just finished a tour of the Texas line of the Kansas City, Mexico & Orient, accompanied by a party of officers of that road. The governor was impressed very favorably with the wonderful strides of agricultural development. In his younger days Governor Ferguson was a bridge builder on the Santa Fe, and he is favorably disposed towards railroad investments in Texas. His attitude towards this class of corporations is something of a novelty in a governor of this state."

In the United States District Court at New York on Wednesday the government made a motion for the modification of the recent order, granting bills of particulars to William Rockefeller and eleven other directors, past and present, of the New York, New Haven & Hartford concerning the indictment found against them for violating the Sherman anti-trust law. Assistant Attorney General Swacker asked the court to disallow the request of the directors for particulars on 22 points, and to modify it on others. The order of Judge Hunt required the government to furnish the directors with information as to the acts which it intended to prove, that the defendants had done or were in the act of doing in the three years immediately before February 26, 1915, the date of the indictment, in furtherance of the alleged conspiracy.

One of the small economies practiced by a number of railroads recently has been to print on the face of envelopes used for railroad mail 12 different spaces for the addresses, so that the envelopes may be used 12 times by using a new space each time for the address and crossing out the names previously used. Heavy Manila paper envelopes are used, of such quality that they do not wear out for some time. An officer of the Baltimore & Ohio has sent us an envelope of this kind which is estimated to have traveled 10,000 miles, and has contained 12 communications between various offices on the Baltimore & Ohio system. The envelope is somewhat soiled but is otherwise in good condition. The Rock Island lines have been using this plan for some time where large envelopes are required. Each envelope bears the instructions, printed in large type: "Do not seal unless absolutely necessary. Use one square for address in each case. When empty return to stationery department, Chicago, for further use. (Do not roll.)"

Accident Record—Correction

An officer of the Pennsylvania advises that the details in the account of a derailment on that road at Morris Junction, Pa., February 25, reported in the *Railway Age Gazette*, April 2, page 746, were not correctly given. The train was a freight, not a passenger, and the damage was slight; and no persons were injured.

Continuous Home Route Card

The continuous home route card, to go with a freight car when away from home until it is returned to the owning road, which has been recommended for general use by the committee of the American Railway Association, and which is described on page 884 of this paper, will, on May 1, be put in use, in their exchanges with each other, by the following roads: Bessemer & Lake Erie; Buffalo, Rochester & Pittsburgh; Baltimore & Ohio; Buffalo & Susquehanna; Cleveland, Cincinnati, Chicago & St. Louis; Chicago, Rock Island & Pacific; Chicago & Eastern Illinois; Chicago, Indianapolis & Louisville; Central of New Jersey; Central New England; Chesapeake & Ohio; Cincinnati, Hamilton & Dayton; Delaware & Hudson; Delaware, Lackawanna & Western; Erie; Grand Trunk; Grand Rapids & Indiana; Hocking Valley; Illinois Central; Indiana Harbor Belt; Lehigh & Hudson River; Lehigh & New England; Long Island; Lehigh Valley; Lake Erie & Western; Michigan Central; New York, New Haven & Hartford; New York Central; New York, Chicago & St. Louis; Pennsylvania; Pennsylvania Lines West of Pittsburgh; Pittsburgh & Lake Erie; Pittsburgh, Shawmut & Northern; Philadelphia & Reading; Toledo & Ohio Central; Wheeling & Lake Erie; Western Maryland.

International Engineering Congress

Volume IV of the transactions of the International Engineering Congress, which will be held at San Francisco in September, will comprise an important series of papers on the general subject of "Railways and Railway Engineering." This field will be treated under seven principal topics covering the relation of railways to social development; the present status of railways; the economic factors governing building of new lines, location; the physical characteristics of road including track and roadbed; bridges; tunnels; terminals; construction methods; signals; road equipment, including motive power other than electric; rolling stock in general; floating equipment; electric motive power in general.

Approximately 27 papers are expected for this volume, pre-

pared by authors representing 9 different countries. The list of authors includes many of the most eminent names in this field of engineering work throughout the world.

The volume will be well illustrated with charts, diagrams and half-tones, and will contain discussions contributed by leading American and foreign engineers.

The transactions of the congress as a whole will include nine or ten other volumes, covering the various fields of engineering work.

Operating Revenues and Expenses of Express Companies

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for December, 1914. (The express companies have three months in which to make reports to the commission.)

A.—For the Month of December

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered (miles)	44,923.41	38,625.94	72,262.78	59,780.98	9,676.50	7,080.30	2,839.78	2,839.78	9,607.73	9,323.51
Charges for transportation	$3,167,103	$3,409,080	$4,108,479	$3,954,986	$271,132	$295,023	$57,562	$54,642	$269,671	$298,080
Express privileges—Dr.	1,583,494	1,931,400	2,143,986	1,950,331	143,699	141,870	28,970	27,953	163,577	181,221
Operations other than transportation	41,097	35,149	154,188	185,617	5,211	9,094	887	873	4,060	4,535
Total operating revenues	1,624,707	1,512,829	2,118,681	2,190,271	132,645	162,247	29,479	27,562	110,155	121,394
Operating expenses	1,650,293	1,572,605	2,124,016	2,058,338	137,385	159,107	28,413	30,282	84,456	92,485
Net operating revenue	—25,585	—59,775	—5,335	131,933	—4,740	3,140	1,065	—2,719	25,698	28,909
Uncollectible revenue from transp'n	363	.....	239	.....	.....	.....	.....	.....	5	.....
Express taxes	17,113	17,291	35,320	31,067	4,000	2,850	1,100	1,200	3,813	3,737
Operating income	—43,062	—77,067	—40,896	100,865	—8,740	290	—34	—3,919	21,880	25,172

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered (miles)	8,118.34	8,080.40	34,552.60	33,623.60	112,534.06	99,744.95	5,174.26	5,008.97	299,689.46	296,816.54
Charges for transportation	$225,387	$249,706	$1,544,698	$1,913,020	$3,590,352	$3,054,584	$105,442	$115,428	$13,339,831	$15,272,185
Express privileges—Dr.	123,264	136,385	783,872	967,378	1,812,423	1,523,830	56,736	65,612	6,840,025	7,884,719
Operations other than transportation	3,335	3,577	28,655	35,537	61,974	58,978	3,580	2,823	302,992	364,042
Total operating revenues	105,458	116,898	789,481	981,179	1,839,904	1,589,731	52,286	52,639	6,802,798	7,751,508
Operating expenses	90,742	93,381	594,178	706,226	1,588,482	1,289,486	55,278	52,133	6,353,248	6,978,556
Net operating revenue	14,716	23,517	195,302	274,952	251,422	300,245	—2,992	505	449,550	772,952
Uncollectible revenue from transp'n	11	4	60	54	2,888	.....	1	.....	3,571	59
Express taxes	5,000	4,500	14,582	17,933	35,082	33,000	527	705	116,540	125,037
Operating income	9,704	19,012	180,659	256,965	213,450	267,245	—3,522	—199	329,439	647,856

B—For the Six Months Ending with December

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation	$17,733,604	$18,272,377	$23,977,785	$22,569,404	$1,710,161	$1,789,822	$398,879	$393,688	$1,732,318	$1,845,859
Express privileges—Dr.	9,130,232	9,666,577	12,038,405	11,205,964	870,054	847,369	199,926	197,522	1,051,255	1,121,139
Operations other than transportation	258,702	196,266	1,079,112	1,137,706	31,428	57,880	3,113	5,417	28,341	27,503
Total operating revenues	8,862,074	8,802,067	13,018,491	12,501,146	871,535	1,000,333	204,066	201,583	709,403	752,223
Operating expenses	9,395,500	8,707,936	12,869,482	11,951,819	812,634	893,099	178,854	187,445	540,178	554,716
Net operating revenue	—533,425	94,131	149,008	549,326	58,901	107,233	25,211	14,137	169,225	197,506
Uncollectible revenue from transp'n	2,739	.....	943	67	.....	.....	.....	.....	5	.....
Express taxes	102,244	98,610	213,111	181,085	24,000	17,000	6,600	7,200	24,617	24,833
Operating income	—638,409	—4,479	—65,045	368,178	34,901	90,233	18,611	6,937	144,603	172,673

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation	$1,521,862	$1,716,413	$6,981,852	$8,054,720	$19,580,863	$16,894,594	$616,284	$669,078	$74,253,612	$83,005,623
Express privileges—Dr.	822,436	925,436	3,556,020	4,095,462	10,005,423	8,428,923	331,162	374,479	38,004,917	42,263,633
Operations other than transportation	21,036	21,278	158,406	173,719	373,410	344,204	19,068	15,152	1,974,620	2,139,296
Total operating revenues	720,463	812,255	3,584,237	4,132,977	9,948,851	8,809,875	304,191	309,751	38,223,315	42,881,286
Operating expenses	554,493	573,667	3,210,416	3,528,640	9,208,641	7,666,393	325,216	309,397	37,095,418	39,803,366
Net operating revenue	165,969	238,588	373,821	604,336	740,209	1,143,481	—21,025	354	1,127,897	3,077,920
Uncollectible revenue from transp'n	74	19	230	84	5,309	.....	52	.....	9,355	171
Express taxes	30,000	27,000	88,254	90,232	221,141	195,000	6,184	4,628	716,153	707,885
Operating income	135,894	211,568	285,336	513,969	513,759	948,481	—27,261	—4,274	402,389	2,369,864

*Includes previous year's returns of United States Express Co.

Meeting at Franklin Institute

A paper on Locomotive Stokers was presented at the Franklin Institute, Philadelphia, on Wednesday evening, April 21, by W. S. Bartholomew, president of the Locomotive Stoker Company, Schenectady, N. Y. Lantern slides were employed showing in detail the construction of the various types of stokers now in service and a brief history of the development of mechanical stoking as applied to locomotives was given. There are now in successful service over 600 Street stokers, about 400 Crawford underfeed stokers and about 20 each, of the Standard and the Hanna types. Mr. Bartholomew gave some figures showing the increase in tonnage effected by the use of mechanical stokers on large locomotives. The paper was discussed by representatives from the Baldwin Locomotive Works, the Chicago, Burlington & Quincy and the Baltimore & Ohio.

Association of Passenger Traffic Officers

At the annual meeting of the American Association of Passenger Traffic Officers held in San Francisco on April 15 and 16, Alexander Hilton, passenger traffic manager of the St. Louis & San Francisco was elected president and C. M. Burt, general passenger agent of the Boston & Maine, vice-president. W. C. Hope, general passenger agent of the Central of New Jersey, was re-elected secretary.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railroad Men's Improvement Society.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Signal Association.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The National Industrial Traffic League has announced that its postponed spring meeting will be held at the Hotel Chisca at Memphis, Tenn., on May 13 and 14.

At the Western freight rate hearing in Chicago, on Wednesday of this week, Commissioner Daniels announced that the commission would not submit to the carriers the 38 questions propounded by Clifford Thorne, but would submit a list of its own, which would include a part of the subjects embraced in Mr. Thorne's list.

Trains 31 and 32 of the Southern Railway, formerly running through between Washington, D. C., and Jacksonville, Fla., now run only between Charlotte, N. C., and Savannah, Ga. The Jacksonville sleeping car will be run between Savannah and Jacksonville on Atlantic Coast Line trains 83 and 82. Trains of the Southern Railway south of Savannah run over the tracks of the Atlantic Coast Line, and the announcement of the discontinuance of trains 31 and 32 appears to have led to a report that the trackage contract had been terminated; but this is not the fact, as other trains of the Southern still use the A. C. L. tracks in this territory.

W. B. Biddle, receiver and chief traffic officer of the St. Louis & San Francisco, announced last week that freight tariffs approximately 30 per cent higher than the present Arkansas commission tariffs will be put into effect in Arkansas within the next 10 days, as the result of the decision by the United States district court at Little Rock, granting a perpetual injunction against the enforcement of the commission freight tariffs and the state two-cent fare law. Mr. Biddle said that the rate applied is based upon the Minnesota scale and that the rates proposed with the increased passenger rates, will yield a return estimated at 3.6 per cent on the company's investment in Arkansas.

The Baltimore & Ohio Railroad, according to a new slogan, is the "Best & Oldest Railroad," and on the Cleveland division, this phrase has been adopted and used in official communications and bulletins. J. W. McCombs, agent at Uhrichsville, Ohio, uses it in soliciting the routing of orders of traveling salesmen. . . "One of our plans," says Mr. McCombs, "is to talk to salesmen, inquiring whether they did any business in our city and asking them whether the routing had been specified. Usually we find that there has been no preference expressed and the salesmen are asked to favor this company, while we acquaint them with our service. Nine out of ten salesmen will go through their order books and favor us with their business. I carry a pad of routing orders with me and have found that the plan has secured a large amount of revenue for this station."

E. Pennington, president of the Minneapolis, St. Paul & Sault Ste. Marie, has issued a pamphlet entitled "Why Railroad Passenger Fares Should be Raised and Why a Raise Will Help Your Pocketbook. A Frank Talk to the People and Their Lawmakers," which discusses in a popular way the reasons why the railroads need greater revenues and why passenger fares should be advanced. The pamphlet is divided into seven chapters, as follows: When and by Whom Built; Value and Capitalization; Who Owns the Railroads?; Services Performed and Pay Received; What the Money Goes for and Who Gets It; Passenger Service Underpaid; What More Pay Means. Under the head of "Wages," the names are given of a large number of conductors, engineers, firemen, brakemen and switchmen employed on the Minneapolis, St. Paul & Sault Ste. Marie, the Chicago, Milwaukee & St. Paul and the Chicago, St. Paul, Minneapolis & Omaha during the year 1914, with figures showing, for each man, the amount of wages actually received.

The arguments, as presented at Chicago, for and against the "trap-car" tariffs which were filed by the principal railroads and suspended by the commission, were reported in the *Railway Age Gazette*, April 2 and 9. The subject was again taken up at a hearing before the commission at Washington on Monday of this week. Statements on behalf of the railroad companies were made by George S. Patterson and William D. McHugh. John D. Burchmore appeared for the Industrial Traffic League.

Those opposing the imposition of a charge for trap-car service declared that the tariffs as filed were a hodge-podge of discriminations, excessive charges and unworkable provisions. The proposed minimum of $2 a car in Trunk Line territory, and $4 in Central Freight Association territory, by the difference between them, cause many discriminations. In cities where large numbers of automobiles are made, the shippers save the railroads large sums by loading automobiles at the factories, their men being more skillful than the railroad workmen; and now, they say, it is proposed that the shipper shall pay $4 for the privilege of saving the railroad company $4. Mr. Patterson, summarizing the points in favor of the charges said: "The trap-car saves drayage running from 30 cents to a dollar a ton; gives additional time under the car service rules; enables the loading of carloads and less-than-carloads from the same point in the warehouse regardless of weather conditions, without drayage; enables the shipper to locate at any distance he desires from the freight house without incurring additional drayage expense; secures expedition in the movement of cars to transfer points and, finally, saves the rough handling incident to drayage.

Senator Bryan Opposed to Public Ownership

N. P. Bryan, United States Senator from Florida, was one of the principal speakers at the second annual banquet of the Jacksonville (Fla.) Traffic Club on April 12, speaking on the subject of "Government Ownership."

"There is no reason for the government of the United States to engage in private business," he said. "Government ownership destroys private initiative. . . . The business of the government is politics and in conducting its own business it has no respect for revenues and profits. It is awfully easy to be generous with other people's money. While business men in all lines have been economizing in every way possible during the present war and hard times, see what happened at the postoffice department! This is one great business of the government that really shows a profit. The postmaster general wanted to save the trifling sum of $7,000,000, but 44,000 rural postal employees objected, they wanted their pay raised, and they got it. When 44,000 people in hard times like these can affect the entire nation, what would happen if the million and one-half federal employees united with the three million other employees now working for private concerns and were suddenly transported under government ownership? They would control the balance of power in the country. There would soon be no business—it would be all politics. You cannot legislate for New York state, and make those laws suit the people of Florida."

Other speakers at the banquet were Charles H. Mann, president of the Jacksonville Chamber of Commerce; W. B. Stillwell, of the Southern Pine Company, Savannah, Ga., and W. E. Kay, assistant general counsel of the Atlantic Coast Line.

Illinois Railway Officers Urge Higher Passenger Fares

A large delegation of Illinois railway officers appeared at a hearing before the senate and house committees on public utilities of the Illinois legislature on Wednesday to urge the passage of the bill to increase the state passenger fare from 2 to 2½ cents a mile. President C. H. Markham of the Illinois Central presented the arguments of the railroads in an address in which he pointed out that the railroads have stated their case to the people and that petitions signed by over 75,000 voters of the state, as well as resolutions passed by 101 different commercial and civic organizations, favoring an increase in the passenger fare upon proper showing by the railroads that an increase is reasonable have been addressed to the legislature. He said that there are only 13 out of 48 states in the union that have in effect a maximum passenger rate of two cents a mile, and their population per mile of railroad averages 472. In Illinois the population per mile is 491. In eight eastern states with a population per mile of 1,036 the average maximum fare per mile is 2½ cents, while for the remaining 27 states the fare ranges from 2½ to 6 cents. To show that the 2-cent law has not stimulated travel, he pointed out that the increase in passengers carried per mile for the year ending June 30, 1907, compared with the year ending June 30, 1903, was 22.73 per cent, while for the year ending June 30, 1913, the increase in passengers carried per mile over 1909 was only 17.43 per cent.

To show that the 2-cent a mile rate in Illinois has not been profitable to the railroads he presented compilations covering 13 of the principal lines with an aggregate mileage of 7,753 miles, or 60 per cent of the total, and a valuation within the state of Illinois of $590,204,336, or an average per mile of $76,122. The total net income of these roads was equivalent to 3.99 per cent on the valuation fixed for the purpose of taxation, and the passenger proportion of the value was $175,473,651, and net railway operating income for the year 1914 from passenger traffic was equivalent to a return of 3.6 per cent on the value. Assuming that passenger traffic should earn a return of 7 per cent, he said, the passenger traffic earned 7 per cent only on 51.42 per cent of the value as fixed for taxation, leaving $85,238,671 of value on which no return whatever was earned. "This conclusively proves," he said, "that a maximum passenger rate of two cents is entirely inadequate and it is extremely doubtful whether a 2½-cent rate would yield a fair return on the value of the property devoted to public use in the transportation of passengers."

A. J. Earling, president of the Chicago, Milwaukee & St. Paul, presented an argument against train limit legislation. Hale Holden, president of the Burlington, presented an argument in favor of 2½-cent passenger fares and against the train limit bill. Among other railway executive officers who appeared before the committee were Presidents Gardner of the Northwestern; Felton of the Chicago Great Western, and Bierd of the Alton; A. M. Schoyer, vice-president of the Pennsylvania Lines, and Receivers W. I. Jackson of the Chicago & Eastern Illinois; E. F. Kearney of the Wabash, and W. L. Ross of the Toledo, St. Louis & Western.

Six Months Operation on the Panama Canal

The first half year of commercial operation of the Panama Canal was completed on February 14, the canal having been opened to commercial traffic on August 15, 1914. During that period, according to the Canal Record, 496 vessels other than canal vessels and launches passed through the canal, carrying a total of 2,367,244 tons of cargo. Their distribution over the most important routes is shown in the following table:

Route.	Number of vessels	Cargo tonnage
United States coastwise, eastbound	97	499,439
United States coastwise, westbound	109	493,272
United States Pacific coast to Europe	66	444,855
Europe to United States Pacific coast	16	59,516
South America to United States and Europe	69	378,386
United States and Europe to South America	31	128,922
United States Atlantic coast to Far East	48	287,782
Far East to United States Atlantic coast	2	14,500
Miscellaneous routings	13	60,572
Vessels without cargo	45	.....
Total	496	2,367,244

Of the total, 252 vessels moved eastbound, carrying 1,340,625 tons and 244 vessels moved westbound carrying 1,026,619 tons. Slightly over 41 per cent of the cargo handled was in movement between ports of the United States. Over 21 per cent of all cargo was in movement between the Pacific coast of North America and Europe, and approximately 21 per cent was on the route between the west coast of South America and the seaports on the Atlantic seaboard of the United States and Europe. Traffic between the Atlantic seaboard and the Far East amounted to over 12 per cent of the total. The six principal commodities passing through the canal were, in order of their tonnage: Grain, nitrates, coal, refined petroleum products, lumber and cotton, and these six commodities together formed approximately one-third of the total tonnage. The grain shipments amounted to 303,124 tons, of which all but 15,733 tons were shipped from the east coast of the United States and Canada. Nitrates shipped from the west coast of South America to various ports in the United States and Europe amounted to 204,441 tons. Coal, all moving to the Pacific coast, aggregated 151,745 tons, of which 83,081 tons were shipped from the Atlantic seaboard and 68,664 tons from the United Kingdom. Shipments of lumber amounted to 56,078 tons. All but 600 tons were from the west coast of North America. Cotton shipments amounted to 38,239 tons, from the Atlantic seaboard of the United States to the far East.

The toll levied during the six months period amounted to $2,126,832.

A press despatch from Panama, April 15, says that up to April 1 tolls on the canal amounted to $2,894,300; and that the total cost of operation and maintenance during the same period was $3,020,000, leaving a deficit of $125,700.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Coke to Canton, Ill.

Parlin & Orendorff Company v. Cleveland, Cincinnati, Chicago & St. Louis, et al. Opinion by the commission:

The commission finds that a carload rate of $1.60 a ton on coke from Indianapolis, Ind., to Canton, Ill., is not unreasonable or discriminatory. Complaint dismissed. (33 I. C. C., 442.)

Rates for Compartments

Alfred Mosely v. Atchison, Topeka & Santa Fe. Opinion by the commission:

The commission finds that defendant's passenger-fare rule under which a minimum of one and one-half first class tickets is required for the exclusive use of a compartment on "California limited" trains is not unreasonable. (33 I. C. C., 521.)

Rates on News Print Paper to Oklahoma Points

Corporation Commission of Oklahoma v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Hall:

The commission finds that the fifth class rate of 57 cents a 100 lb. on news print paper from Galveston to Oklahoma City is unreasonable and the following rates are prescribed for the future: to Oklahoma City and McAlester, 38 cents; to Muskogee and Lawton, 40 cents, and to Tulsa, 42 cents. (33 I. C. C., 503.)

Rail-and-Water Rates Through Gulf Ports on Grain

Tampa Board of Trade v. Alabama & Vicksburg et al. Opinion by Commissioner Meyer:

The commission finds that the joint through rail-and-water rates on grain and grain products, from Ohio and Mississippi river crossings and other points of origin to Tampa, Fla., via New Orleans and the Gulf & Southern Steamship Company and via Mobile and the Mallory Steamship Company are unreasonable in so far as they exceed the present rail rates to the ports by more than 10 cents per 100 lb. (33 I. C. C., 457.)

Telegraph and Cable Rates

W. N. White Company v. Western Union Telegraph Company. Opinion by Commissioner Hall:

The commission finds that defendant's standard rates for the transmission of messages by telegraph from New York to San Francisco and by cable from New York to points in England are not unreasonable or discriminatory. The attack on the San Francisco rates was based chiefly on the fact that press messages are accorded lower rates. The decision says: "The right of carriers subject to the act to initiate their charges is too well established to need citation of authority. Such charges are prima facie reasonable, except where otherwise provided by law. Congress has here provided that messages may be classified into 'day, . . . press, . . . and such other classes as are just and reasonable,' and that different rates may be charged for the different classes." (33 I. C. C. 500.)

Rates on Asphaltum, etc., from Pacific Coast Points to Atlantic Ports

Opinion by the commission:

The Southern Pacific and its affiliated lines are authorized to establish a rate of 40 cents a 100 lb. in carloads, minimum 80,000 lb., on asphaltum, barley, beans and canned goods from San Francisco, San Pedro and Wilmington, Cal., moving over the Sunset Gulf route via rail to Galveston, Tex., and steamer thence to Charleston, S. C., Baltimore, Md., Philadelphia, Pa., New York and Boston, Mass., while continuing higher rates from, to and between intermediate points.

Relief from the fourth section was asked because of the competition of water carriers using the Panama Canal. It was shown that this route had lost to the canal route since July 1, 1914, two thirds of its former proportion of asphaltum traffic, three-fourths of its proportion of bean traffic, and two-thirds of its proportion of traffic in canned goods. It was also shown that this very low rate was at least sufficient to cover the "out of pocket" cost on this traffic. (33 I. C. C., 480.)

Ownership of Schooner Pasadena

Opinion by Commissioner Clark:

The schooner Pasadena is owned by the Albion Lumber Company, a corporation, all the stock of which is owned by the Southern Pacific. It is operated principally between Albion and San Francisco, and primarily for the purpose of moving the lumber company's products to market. It also operates between other ports.

The commission finds that so long as the line of the Northwestern Pacific (in which the Southern Pacific owns a one-half interest) between Albion and Christine is not extended to connect with its line between Willits and Sausalito, neither it nor the Southern Pacific does or can compete with the Pasadena in its operation between the ports of Albion and San Francisco, and that the continued ownership and operation of the Pasadena by the Southern Pacific through the Albion Lumber Company between Albion and San Francisco is not and will not be in violation of section 5 of the act to regulate commerce, as amended by the Panama Canal act.

It is further held that in operating the boat between San Francisco and San Pedro and Redondo the Southern Pacific may compete with the Pasadena. In so far as the petition seeks a continuance of this service, it is denied as of May 1, 1915. (33 I. C. C., 476.)

STATE COMMISSIONS

The Board of Public Utilities of New Jersey, having considered a complaint of lack of drinking water on excursion trains between Camden and Atlantic City, recommends that suitable coolers be provided in at least one car of every three on excursion trains.

The California Railroad Commission has issued an order approving a modified traffic agreement between the Southern Pacific and the San Pedro, Los Angeles & Salt Lake by which the latter company will be permitted to engage in local passenger and freight business on the Southern Pacific line between Riverside and San Bernardino. Heretofore the Salt Lake line, although having traffic rights between those points, was not permitted to handle local traffic.

PERSONNEL OF COMMISSIONS

James O. Carr, Republican, of Schenectady, a member of the legal department of the General Electric Company, has been appointed a member of the New York State Public Service Commission, Second district, to succeed Martin S. Decker, Democrat, whose term expired on February 1. Mr. Carr has been with the General Electric for fifteen years.

COURT NEWS

Commutation Tickets—Violation of Stipulations

The Supreme Court of New Jersey holds that the right of a carrier to take up a commutation ticket improperly used is not limited to the occasion when it is presented. If the condition has been violated, the ticket may be taken up subsequently when presented by the owner himself. Trupin v. Central of N. J. (N. J.) 93 Atl. 93.

Pullman Porter Not Railroad Employee

The Supreme Court of the United States, in an action for personal injuries by a Pullman sleeping car porter on an interstate train against the railroad company, holds that the plaintiff was not an employee of the railroad within the meaning of the federal employers' liability act. It was insisted for the plaintiff that he should be regarded as the employee of the railroad because of the fact that, in the case of passengers coming on the train after three o'clock in the morning, he received the railroad

ticket or fare, which he placed in an envelope and afterwards gave to the train conductor. This, however, was an obvious accommodation to the passengers in the Pullman car, and in any event it was merely an incidental matter which could not be deemed to qualify the character of the plaintiff's employment as viewed from the standpoint of the statute.—Robinson v. B. & O. (April 5).

Unguarded Space Between Platform and Cars—Negligence and Contributory Negligence

Action was brought in the federal courts by a passenger on the New Haven road, who was injured at the Grand Central Terminal, New York, in attempting to alight from a car. The station platform was constructed for the new cars, from which the passenger can step to the station platform on the same level. But with the old style of cars there was a distance of 3 ft. between the station platform and that of the car. The company had porters to bridge this open space by putting down a movable bridge over which the passengers could pass. On the occasion in question no board or plank had been put in place, and in stepping from the car the plaintiff fell into the opening. The open space being only 3 ft., he could easily have stepped across it had he observed it. Although some twelve passengers preceded him, he was the only one who fell. He testified that he could have seen the open space had he been looking, but that he did not look. He relied on the bridge being there as usual. One of the company's defenses was contributory negligence. It was held by the circuit court of appeals for the Second circuit, that negligence of the company and contributory negligence of the plaintiff were both questions of fact for the jury, which found for the plaintiff.

Hours of Service Law

In an action for a violation of the hours of service law in the district court of Idaho a locomotive engineman was regularly employed in moving interstate commerce; but for a period of 59 days was on a work train, wholly within the state of Idaho, filling (not repairing) a bridge on an interstate line; and thereafter he went back into interstate commerce. On the work train he was permitted to remain on duty more than 16 hours. It was held that the road was not thereby guilty of a violation of the act. The court said that this was not a case where there was a commingling of service, where the employee was one hour or one day at work in interstate and another hour or another day in intrastate. If the contention of the government were correct, an employee who has once rendered service such as is covered by the act must always be deemed to be within the provisions thereof, regardless of the time which has elapsed since he ceased to render such service, at least so long as he remains in the employ of the same company. United States v. Chicago, M. & St. P., 219 Fed. 632.

Failure to Give Crossing Signal—Frightening Horses

The Supreme Court of South Carolina holds that a statute requiring the sounding of bell and whistle 500 yards from railroad crossings and public places was intended for the protection of persons using the highway or public place, and did not give a right of action to the plaintiff, who was working in a field near the track, and about 200 yards from the crossing when injured by fright of his horse by the passing of a train which had failed to give the crossing signal. The court distinguished the case from that of Clifford v. Southern Railway, 87 S. C. 325, where the plaintiff was traveling along the highway, and was on the crossing before she had any warning of the approach of the train, and had just cleared the track when the train passed, without signal, and missed the hind wheels of her buggy only a few inches. Her horse was so frightened that he threw her out and injured her. In Miss Clifford's case, the company owed her the duty, in her situation, to give the crossing signals. In this case, the company owed no such duty to the plaintiff, because his injury had no connection with the use or intended use of the crossing. In some of the cases such statutes are given a more restricted construction than that of the South Carolina court, and it is held that the signals are required to protect travelers only against actual collision with passing engines or cars. Hutto v. Southern Ry. (S. C.) 84 S. E. 719.

"Attractive Nuisance" Doctrine

In an action for personal injuries to a child the plaintiff based his right to recover on the "turntable" cases, or the "attractive nuisance" doctrine. The defendant railroad company maintained over a street a viaduct and a retaining wall 20 inches wide, with a smooth surface on top. One end of the wall was about 28 inches above the street, and from that end it gradually ascended until it reached a height of 15 ft. Children found the wall attractive, and were in the habit of climbing upon it; which fact was known to the defendant. The child injured climbed upon the wall and fell into the street below. It was held by the Kentucky Court of Appeals that the railroad company did not maintain a dangerous instrumentality attractive to children; it need not construct barriers to prevent children from climbing on the wall, and was not liable for the child's injuries. The only sense in which the wall could be said to be dangerous was that it was easy to climb, and easy to fall from; but so is every tree, pole, fence, ladder or railing. If spikes had been placed on it, as suggested, and the child had been injured by them, there would have been greater reason for holding the defendant liable. If a fence or guard rail had been constructed at the lower end of the wall, it would only have added to the danger by furnishing something else to fall from.—Coon v. Kentucky & I. T. (Ky.) 173 S. W. 325.

Wooden Coal Cars Not Dangerous Appliances—Customary Use

While engaged in unloading a wooden coal car, the trap doors in the bottom of which had become swollen with the wet coal and damp weather, an employee, after striking a refractory door with his iron bar, fell through the opening with the coal into the bunkers below, receiving injuries from which he died. In an action for his death it was shown that the cars used were such as were commonly used by all railroads for such purposes, and that trap doors quite commonly became swollen so as not to open by the removal of the fasteners; and it was not shown that there was any other method of forcing open the doors which would be attended with less danger than the method used. The Supreme Court of Washington, therefore, held that it was not negligence in itself to use the cars. An employer can, without becoming an insurer against accidents to his employees, make use of the common appliances in the prosecution of his business. The question in such cases is not, Would something else have been better? but is rather, Are the appliances and methods used inherently dangerous, and are the dangers concealed from the employees? (Bjornsen v. Northern Pacific (Wash.), 146 Pac., 575.)

Free-haul and Pay Lines—Rates Chargeable for Through Shipment

In an action by the Southern Pacific against the government the appeal to the United States Supreme Court presented but a single question of law, as to the legal rate of compensation to which the company was entitled for the transportation of government property and troops over a continuous line of road, part of which is free-haul and the remaining part is pay-line. Between August, 1897, and March, 1902, the railroad transported for the United States persons and property over the free-haul part of its line from Roseville Junction to Portland, a distance of 664 miles "from points on either side thereof to points on the other side; for example, from San Francisco . . . to Portland, via Rosedale Junction." For such services the company charged nothing for haulage over the free portion of the road, but exacted the local rate between San Francisco and Roseville Junction. The government insisted that it was entitled to the benefit of the San Francisco-Roseville proportion of the through rate. The company argued that, while there is a continuous rail line between San Francisco and Portland, the line itself, from the standpoint of compensation or pay to the company, breaks at Roseville Junction; south of that point it is pay line; north thereof it is free-haul. The court decided that this proposition was erroneous, and that it was not the character of the movement that fixed the rate, but the rate which determined the character of the movement. Apart from this, it held that to accept the company's proposition would give rise to a violation of the act of Congress governing the movement of traffic over the pay line, which gives the government the right to ship over the road at rates not to exceed the amounts paid by private

parties. Judgment for the government was therefore affirmed.—Decided April 12, 1915.

Stopping Passenger Trains at Small Stations—Invalid Statute

The decision of the Supreme Court of the United States reversing the Supreme Court of Wisconsin as to stopping through trains at small stations was briefly noticed in the *Railway Age Gazette* April 16, page 868. The case was brought up by the railroad, the Chicago, Burlington & Quincy, asking a review of the judgment of the State Court, which had sustained an order of the railroad commission requiring the railroad, under a state law, to stop two of its passenger trains, each way daily, at Cochrane. The statute requires a station to be maintained at every village having a post office and containing 200 inhabitants, within one-eighth of a mile of the road, and if four or more trains were run each way daily to stop at least two. The daily passenger service at Cochrane was one passenger and one freight, carrying passengers, each way. The population of the village is about 260. The court holds that the test of the statute was purely artificial. The number of trains cannot be determined by the local needs of a village. This railroad runs only interstate trains. The line is through a sparsely settled country, and 90 per cent of the business is interstate, and the trains assigned to intrastate business are not self-sustaining. The revenue at Cochrane from the passenger traffic for the year ending July, 1911, was only $1,752, of which $986 was from intrastate and $766 from interstate business. The court held the statute invalid and reversed the judgment of the Wisconsin Supreme Court.—Decided April 12, 1915.

Interchange of Cars With Electric Road

In the early part of the year 1908 petitions were filed before the Michigan Railroad Commission by certain merchants of Ortonville and Goodrich, asking for a connecting track between the Michigan Central and the Detroit United at Oxford for the interchange of cars under section 7 (b) of Michigan Public Acts 1907, No. 312, providing that "where it is practicable and the same may be established without endangering the equipment, tracks or appliances of either party, the commission may require steam and interurban railroads to interchange cars, carload shipments, less than carload shipments, and passenger traffic. . . ." The Michigan Central answered denying that it would be practicable to construct and maintain such a physical connection, and denying the authority of the commission. The Detroit United denied the practicability of interchanging carload shipments (supposing a track to have been established), without unreasonable expenditure of money in changing its road and equipment. There was a full hearing. The commission found the construction and maintenance of the connection to be feasible and the expense of construction $500. It also found the proposed interchange to be reasonable from the point of view of the Michigan Central. An order was made requiring the connection to be made, and thereafter an interchange in accordance with the provisions of section 7. The physical connection was installed, and no question was afterwards made respecting this. But the Michigan Central complied, to the extent of installing the physical connection, under protest. The Detroit United was willing and able to accept cars and carloads of freight [for delivery within belt line limits] but the Michigan Central had so far refused to deliver freight to the Detroit United. There was no controversy on the other parts of the order. The Supreme Court of Michigan (168 Mich. 230) awarded a peremptory writ of mandamus directing the Michigan Central with respect to intrastate traffic, to make the interchange. This judgment was brought under review by the Supreme Court of the United States. The court holds that the state has power to make a reasonable order requiring a carrier to permit empty or loaded cars owned by it to be hauled from its line on the connecting line for the purposes of loading or delivery of intrastate freight, and the same with the cars of other carriers. The order was held only to apply to intrastate traffic, to which the jurisdiction of the commission is limited, and the presumption must be indulged, until the contrary is made to appear, that the state will not so construe or enforce the order as to interfere with or obstruct interstate commerce. The judgment was affirmed.

Railway Officers

Executive, Financial, Legal and Accounting

D. E. Hedges, auditor of the Tennessee, Alabama & Georgia at Chattanooga, Tenn., has resigned.

M. A. Johnson has been appointed auditor of receipts of the Missouri, Kansas & Texas of Texas, with headquarters at Dallas, Texas, succeeding S. H. McCartney, resigned.

The appointment of H. U. Mudge, president of the Chicago, Rock Island & Pacific, and Jacob M. Dickinson as receivers of that road is commented on elsewhere in this issue.

S. H. McCartney, auditor of receipts of the Missouri, Kansas & Texas of Texas, has been appointed secretary and auditor of the Nevada-California-Oregon, with headquarters at Reno, Nev.

Edward S. Moore has resigned as vice-president in charge of purchases of the Chicago, Rock Island & Pacific, with office at Chicago. At the annual meeting on April 12, he declined re-election as a director, and he also declined re-election as vice-president.

H. I. Miller, chairman of the board of the Buffalo & Susquehanna Corporation, receiver of the Buffalo & Susquehanna Railway, vice-president of the Mexico North Western and of the Denver & Salt Lake, has been elected also president of the Tennessee & North Carolina, with headquarters at New York. Mr. Miller resigned recently as president of the New Orleans Great Northern.

William E. Farris, who has been elected third vice-president of the New Orleans Great Northern in charge of operation, with headquarters at New Orleans, La., was born on November 22, 1870, at Sandborn, Ind., and was educated in the common schools. He began railway work on August 1, 1891, as a telegraph operator and agent on the Evansville & Terre Haute. He remained in the service of this company at various places until April, 1905, when he was appointed agent in charge of the Evansville & Terre Haute and the Chicago & Eastern Illinois terminals at Terre Haute, Ind. On December 31, 1910, he resigned from that position to go to the Buffalo & Susquehanna as assistant general freight and passenger agent; one month later he was promoted to general freight and passenger agent, and subsequently served also as purchasing agent of the same road until his recent election as third vice-president of the New Orleans Great Northern, as above noted.

W. E. Farris

L. R. Wood, assistant auditor of the Oregon Short Line, has been appointed auditor, with headquarters at Salt Lake City, Utah, succeeding C. J. McNitt, who has been retired under the pension rules of that company on account of continued ill health. P. L. Williams, general attorney of the Union Pacific for Utah and general attorney of the Oregon Short Line, with office at Salt Lake City, will be retired on May 1 under the pension system of the Union Pacific, and will be succeeded by George H. Smith, who has been assistant to Mr. Williams.

Walter P. Cooke, first vice-president and general counsel of the New Orleans Great Northern at Buffalo, N. Y., has been elected president, with headquarters at Buffalo, vice H. I. Miller,

resigned. Charles I. James, second vice-president at Baltimore, Md., has been elected first vice-president with headquarters at Baltimore; A. C. Goodyear, third vice-president at Buffalo, has been elected second vice-president with headquarters at Buffalo, and W. E. Farris, general freight and passenger agent, and purchasing agent, of the Buffalo & Susquehanna at Buffalo, N. Y., has been elected third vice-president of the New Orleans Great Northern, with headquarters at New Orleans, La.

Operating

J. E. Lovejoy has been appointed assistant superintendent of the Phoenix division of the Arizona Eastern, with headquarters at Phoenix, Ariz., vice J. G. Lindsay, assigned to other duties.

John Kirk, superintendent of terminals of the Elgin, Joliet & Eastern at Gary, Ind., has been appointed superintendent of the Gary division, with office at Gary, and C. H. Doorley, assistant superintendent of terminals at South Chicago, Ill., has been appointed superintendent of terminals at East Joliet, Ill.

W. H. Davidson, assistant trainmaster of the Delaware & Hudson at Albany, N. Y., has been appointed trainmaster of the Champlain division, with office at Plattsburg, vice J. H. Galivan, deceased. F. R. Griffin, assistant trainmaster at Plattsburg, has has been appointed assistant trainmaster of the Saratoga division, with office at Albany, vice Mr. Davidson, and the office of assistant trainmaster, Champlain division, has been abolished.

Traffic

The office of division freight agent on the Southern Railway at Selma, Ala., has been discontinued, and E. M. Jordan has been appointed commercial agent, with headquarters at Selma.

Engineering and Rolling Stock

H. B. Cartwright, acting assistant engineer of the Seaboard Air Line at Jacksonville, Fla., has been appointed assistant engineer, with office at Jacksonville, vice L. R. Hoyt, assigned to other duties.

H. H. Vaughan, assistant to vice-president of the Canadian Pacific at Montreal, Que., at his own request, has been released from the immediate supervision of the construction and maintenance of locomotives and cars, in order that he may devote his attention to important contract engagements that he has become interested in. He is being retained as consulting engineer, and W. E. Woodhouse, superintendent of motive power, Eastern Lines, at Montreal, has been appointed chief mechanical engineer.

Samuel Tobias Wagner, whose appointment as chief engineer of the Philadelphia & Reading with headquarters at Philadelphia, Pa., has already been announced in these columns, was born in 1861 in Philadelphia. He graduated from the University of Pennsylvania in 1881 with the degree of bachelor of science, and was awarded the senior civil engineering prize; and three years later the degree of civil engineer was awarded to him. Mr. Wagner was in the employ of the Phoenix Iron Company consecutively as draftsman, assistant superintendent of shops and superintendent of shops until 1893, except for about one year when he was resident engineer of erection on the construction of the Louisville & Jeffersonville bridge over the Ohio river. From 1894 to 1900 he was assistant engineer on behalf of the city of Philadelphia in charge of the design and construction of the Pennsylvania avenue subway and tunnel, on the line of the Philadelphia & Reading in Philadelphia. After that he was engaged for a number of years in the installation of the water supply for the city of Philadelphia. Mr. Wagner entered the service of the Philadelphia & Reading in 1902 as assistant engineer, and was engaged on grade crossing work and other improvements in Philadelphia until his recent appointment as chief engineer, as above noted.

S. T. Wagner

B. J. Schwendt, signal engineer of the Toledo & Ohio Central, and the Zanesville & Western, has been appointed superintendent of telegraph and signals of the same roads, retaining jurisdiction over the signal department, with headquarters at Columbus, Ohio, effective on April 1, 1915. Mr. Schwendt was born July 25, 1884, at Greenspring, Ohio, and obtained his early education in the grammar and high schools of that place. In March, 1902, he went to work for the Minot Light & Telephone Company, Minot, N. Dak., as assistant plant fireman, from which position he was advanced by successive steps to station helper, electrician, wireman, lineman, installer, and in August, 1903, was given charge of the telephone department. During the first three months of 1903 he was granted leave of absence and was employed by the ice contractor of the Great Northern, cutting, shipping and housing ice at points between Larimore, N. D., and Seattle, Wash. In November, 1903, he entered Ohio State University at Columbus, graduating in 1907 with the degree of mechanical and electrical engineer. During the summer months of 1905-6 he was employed by the Allis-Chalmers Electrical Company, in the Bullock works at Cincinnati, Ohio, as winder and assemblyman. In June, 1907, he entered the service of the Union Switch & Signal Company and was engaged in the installation of electric and mechanical interlockings and automatic signals on the Pennsylvania lines West, the Baltimore & Ohio, and the Erie. During this time he served in various capacities, from laborer up. In March, 1909, he was appointed supervisor of signals for the Toledo & Ohio Central, Hocking Valley, Kanawha & Michigan, and the Zanesville & Western, with headquarters at Columbus, Ohio. On January 11, 1912, he was appointed signal engineer of the Toledo & Ohio Central and Zanesville & Western.

B. J. Schwendt

OBITUARY

Robert S. Brown, district passenger agent of the Baltimore & Ohio Southwestern at Louisville, Ky., died on April 21, at his home in that city at the age of 61.

Charles E. Potts, formerly until July, 1913, assistant treasurer of the Chesapeake & Ohio at Richmond, Va., died at his home in Ashland, on April 19, at the age of 63.

Charles Walter Rhodes, assistant treasurer of the Baltimore & Ohio, died suddenly on April 14, in Baltimore, Md. He was born on January 28, 1853, near Westminster, Md., and in February, 1869, entered the service of the Baltimore & Ohio.

Burton Johnson, formerly from January, 1897, to November, 1906, general freight agent of the Wisconsin Central, died at his residence in Chicago on April 18, aged 62 years. Mr. Johnson entered railway service in 1879 with the Chicago & North Western as a clerk in the general freight department and remained with that road until January, 1897, at which time he held the position of second assistant general freight agent. He then went to the Wisconsin Central as general freight agent.

Colonel Alexander Boyd Andrews, first vice-president of the Southern Railway, with office at Raleigh, N. C., died on April 17, at his home in that city. He was born on July 23, 1841, in Franklin county, N. C., and from 1859 to 1861 he served as purchasing agent, paymaster and general superintendent for the contractor on the Blue Ridge Railroad. After the Civil war he leased, equipped and operated a railway ferry for the Raleigh & Gaston, now a part of the Seaboard Air Line, and the Petersburg Railroad, now a part of the Atlantic Coast Line, at Gaston, N. C. From July, 1867, to November, 1875, he was superintendent of the Raleigh & Gaston and the Raleigh & Augusta, and then was superintendent of the North Carolina division of the Richmond & Danville. He was elected president of the Western North Carolina in 1881, and completed that road. From 1878 to 1880 he was also superintendent of the Atlantic & North Carolina, now a part of the Norfolk Southern, and superintendent of the North Carolina division of the Richmond & Danville. In 1883 he was appointed assistant to president of the Richmond & Danville, remaining in that position until 1886, when he was elected third vice-president, and from December, 1889, to June, 1894, was second vice-president of the same road. From July, 1892, to June, 1894, he was also general agent for receivers of the same road. He then went to the Southern Railway as second vice-president, and since October 1, 1895, was first vice-president of that road, also of the Mobile & Ohio, and the Alabama Great Southern, and president of the Danville & Western, Blue Ridge, Tallulah Falls, and Augusta Southern.

A. B. Andrews

Ivory Coast Railway.—The railways on the Ivory Coast will have in the future a great effect on the commercial development of the Ivory Coast. The scheme for the railways in this colony is that one railway (the main line) starting from Abidjan is to go to Bouake, and from there be pushed on to Bobo-Dioulasso, crossing the river Volta in the Upper Sudan. A branch line will run from Dimbokoro to Daloa (in the administrative circle of Upper Sassandra), and passing through Man (Touba circle) will connect with the railway of French Guinea.

Indian Railway Operation.—The ratio of operating expenses to traffic receipts on the railways of British India stood in 1912 at 48.92 per cent. In consequence of the rise in wages in India the ratio has shown a certain tendency to increase of late years; but in 1912 it experienced a considerable reduction and approximated to the level at which it stood ten years previously. The course taken by the ratio during the decade ending with 1912 inclusive was as follows:

Year	Per cent	Year	Per cent
1903	47.52	1908	60.24
1904	47.36	1909	56.06
1905	47.85	1910	53.10
1906	49.89	1911	53.17
1907	51.42	1912	48.92

The ratio has fluctuated considerably upon the principal Indian lines, being affected by their extent, their situation and current local labor conditions. Upon the Bengal & North-Western (one of the most prosperous of the Indian systems) the ratio was 34.16 per cent in 1912; upon the Bengal Dooars, 36.05 per cent; upon the Bengal & Nagpur, 45.74 per cent; upon the Bombay, Baroda & Central India, 49.67 per cent; upon the Burma, 59.47 per cent; upon the East Indian, 37.62 per cent; the Eastern Bengal, 59.14 per cent; the Great Indian Peninsula, 53.96 per cent; the Madras & Southern Mahratta, 54.53 per cent; and the South Indian, 51.68 per cent.—*Engineering.*

Equipment and Supplies

LOCOMOTIVE BUILDING

The Kansas City Southern is reported to be in the market for 6 switching locomotives.

The Rapid City, Black Hills & Western has ordered one Prairie type locomotive from the Baldwin Locomotive Works.

The Algoma Lumber Company, Algoma, Ore., has ordered one Prairie type locomotive from the Baldwin Locomotive Works

The Champion Lumber Company, Philadelphia, Pa., has ordered 2 90-ton Shay geared locomotives from the Lima Locomotive Corporation.

The Pennsylvania Lines West have issued inquiries for 50 freight locomotives. These are in addition to the 144 locomotives which will be required by the Pennsylvania Lines East of Pittsburgh.

The Pennsylvania Railroad has issued inquiries for material for 76 road and 68 switching locomotives, which it will build in its Juniata shops. As the Pennsylvania Lines West have also issued inquiries for 50 locomotives, this will make a total for all the Pennsylvania Lines of 194 locomotives.

The Illinois Central has ordered 4 Mikado type locomotives from the Lima Locomotive Corporation. These are in addition to the 50 Mikado type locomotives recently ordered from the same company. They will have 27 in. by 30 in. cylinders, 63-in. driving wheels, a total weight of 284,400 lb., and a weight on drivers of 213,100 lb.

CAR BUILDING

The Lehigh Valley will reinforce 2,000 freight cars with steel underframes.

The Wilkesbarre & Hazelton has ordered 10 interurban cars from the J. G. Brill Co.

The Chicago, Indianapolis & Louisville is having 300 box cars rebuilt by the Haskell & Barker Car Company.

The St. Louis, Troy & Eastern has ordered 300 gondola cars from the American Car & Foundry Company.

The Chicago & North Western, which was reported in the *Railway Age Gazette* of last week, as being in the market for 2,500 freight and 50 passenger cars, has issued inquiries for 2,000 steel underframe box cars, 50 steel underframe caboose cars and 50 all-steel passenger cars. These cars are to be delivered this summer and the estimated expenditure will be about $3,000,000.

The Pennsylvania Railroad's passenger equipment program calls for 146 all-steel passenger cars divided as follows: 30 coaches, 54 combination passenger and baggage cars, 42 baggage and mail cars, 15 baggage and express cars and 5 horse express cars. Bids were asked on Saturday for building 90 of these cars and inquiries issued for materials for the other 56, which will be built in the company's shops at Altoona. This equipment will be purchased for replacement purposes. As the Pennsylvania Lines West have also asked prices on 35 all-steel passenger cars, there will be a total for all the Pennsylvania Lines of 181 cars.

The Pennsylvania Railroad has issued inquiries for 7,643 freight cars, to be built by outside companies and for materials for 2,102 freight cars to be built at the company's shops at Altoona. The freight car program calls for 2,000 all-steel box cars, 2,500 gondola cars, 4,919 coal and coke cars, 224 refrigerator cars and 102 flat cars. The company plans to build in its car shops at Altoona, 1,000 of the 2,000 box cars, 1,000 of the 2,500 gondola cars and all of the flat cars. These 9,745 freight cars will be for replacement purposes only. As the Lines West have also issued inquiries for 6,500 freight cars, the total freight

car requirements for all the Pennsylvania Lines aggregate 16,245 cars.

The Pennsylvania Lines West have issued inquiries for 6,500 freight cars and 35 all-steel passenger cars, these being in addition to the 9,745 freight cars and 146 passenger cars which will be required by the Lines East of Pittsburgh. The Lines West have some 90,000 freight cars, with an annual normal vacancy of 5,000 cars. Last year the Lines West ordered no new cars. Any cars which will be ordered this year will be replacements and not additions. The 6,500 freight cars will include 100 refrigerator, 1,500 gondola, 2,500 box, 2,300 hopper and 100 miscellaneous cars. The 35 passenger cars will be divided as follows: 6 dining cars, 10 coaches, 10 baggage and mail cars, 2 postal cars and 7 baggage cars.

IRON AND STEEL

The Lehigh Valley is in the market for a car wheel borer.

The Pennsylvania is in the market for two 100-ton electric cranes.

The Chicago, Rock Island & Pacific is in the market for approximately 30,000 tons of rails.

The Bay State Street Railway has ordered 1,200 tons of girder rails from the Pennsylvania Steel Company.

The New York, Chicago & St Louis has ordered 1,500 tons of bridge material from the Pennsylvania Steel Company.

The Delaware, Lackawanna & Western has ordered a 25-ton gantry crane from the Toledo Bridge & Crane Company.

The Missouri, Oklahoma & Gulf is reported to have ordered 2,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Chicago, Burlington & Quincy is inquiring for three wheel presses, a forging machine, a double-ended punch and shear, a 5-ft. radial drill, six shapers, one slotter, 11 lathes of various kinds and sizes, tool grinders, saws, etc., and two 240-hp. water tube boilers.

SIGNALING

The New York Central has contracted with the General Railway Signal Company, Rochester, N. Y., for the complete installation of a 224-lever electric interlocking plant at Tower 31, Utica, N. Y. This machine will be the G. R. S. standard model 2 with unit levers. The switch movements will be Model 4, giving a dynamic indication, and the signals Model 2A.

Steel Cars in Egypt.—All-steel passenger cars are being adopted on the Egyptian State Railways. A first consignment of a recent order for 30 has been received from Leeds, England.

Why Not Investigate Merchants?—It is an easy matter and quite the popular one to roast the railroads, but how about the big merchants? It is announced in Chicago that Sears, Roebuck & Company recently declared an annual dividend of $20,000,000 and yet we have not heard of anyone who is in favor of a law curbing the rapacity of this octopus. We are told that the great mercantile house of Marshall Field & Company of Chicago took in more money last year than the entire system owned by the great Atchison, Topeka & Santa Fe Railway Company, and neither Congress nor any state legislature has been asked to get after Marshall Field & Co. and demand the conduct of the business on what is termed a reasonable return for the money invested, and nobody has had the temerity to arise and demand that Sears, Roebuck & Company or Marshall Field & Co. be made to give a full accounting as to capitalization, profits and the like. The Iowa Farmer does not know whether the railways are losing money. The claim is made that they are unable to get further credit. . . . They declare that they are able to prove this contention to the satisfaction of any unprejudiced jury if given an opportunity. Why not treat them as any other business enterprise would be treated and permit them to at least present the argument that will substantiate their contention for an advance in rates?—*Iowa Farmer.*

Supply Trade News

Munn & Co., patent attorneys, have removed their offices to the Woolworth building, New York.

Wilber H. Traver, manager of the mining department of the Chicago Pneumatic Tool Company, died in Houghton, Mich., on April 15.

The Du Pont Fabrikoid Company, Wilmington, Del., has moved its New York sales office from 90 West street to Room 1614 Equitable building, 130 Broadway.

William F. Gillies, formerly in charge of the New York sales branch of the Ingersoll-Rand Company, New York, has been appointed branch manager of the same company at Pittsburgh

The White Enamel Refrigerator Company, St. Paul, Minn., has been awarded an order for Bohn all-steel collapsible bulkheads, Hatch ventilators and plugs for 500 refrigerator cars for the Atchison, Topeka & Santa Fe.

R. Harvey White, formerly signal engineer of the Chicago Railway Supply Company, Chicago, and at one time editor of The Signal Engineer, has joined the selling force of the National Carbon Company, Cleveland, Ohio.

A. J. Poole, formerly superintendent of motive power of the Seaboard Air Line, has become associated with the Galena Signal Oil Company in the capacity of railway expert, with headquarters in Atlanta, Ga., effective April 15.

W. B. Carnes, formerly in charge of the New York office of the Lima Locomotive Corporation, has been appointed western representative, with offices in the McCormick building, Chicago. He has been succeeded in New York by William T. Middleton.

The Bucyrus Company, South Milwaukee, Wis., has moved its southern sales office from Birmingham, Ala., to 1105 Hennen building, New Orleans, La. E. L. Byron, southern sales manager, will remain in charge, and R. S. Byron will be associated with him.

Marvin F. Wood, formerly of Wood & Van Nest, now has offices at Room 414, 30 Church street, New York. Mr. Wood is representing the new Washrite Compound for cleaning the exterior of passenger and baggage cars, and for polishing the interiors of cars and buildings.

Alexander Taylor has been promoted from assistant secretary to secretary of the Lake Superior Corporation, the Algoma Steel Corporation and subsidiary companies, succeeding Thomas Gibson, who recently became president of the Lake Superior Corporation. Mr. Taylor has also been made a director.

Luther Steadman Bent, at one time president of the Pennsylvania Steel Company and a director in numerous corporations, died of paralysis on April 19 at his home in Overbrook, Pa., at the age of 86. Mr. Bent became manager of the Pennsylvania Steel Company in 1874, and in 1880 was made president. He held that office until 1896, when he retired.

The Westinghouse Electric & Manufacturing Company has received an order from the Chicago & Milwaukee Electric for 15 quadruple equipments of type No. 557-A, 140 hp. motors with double end type "HLF" control. These equipments are to be placed in high speed passenger express service between Chicago and Milwaukee. The cars will be arranged for train operation.

The American Locomotive Company, which has been negotiating for some time for a large contract for shrapnel, is now supposed to have closed contracts with the Russian government for shrapnel aggregating $65,000,000 in value. The company has purchased $500,000 of the special machinery which will be necessary, and has had options on $500,000 worth more of such machinery for several weeks.

The Firth Sterling Steel Company, McKeesport, Pa., is running double time on the manufacture of shrapnel shells, turn-

ing out about 2,500 daily, and the National Tube Company, the Pressed Steel Car Company and a number of other companies in the Pittsburgh district are also said to be turning out from 1,000 to 3,500 shrapnel, each, daily. The Standard Steel Car Company is about to start work on a large order for shells.

Lee H. Parker has been appointed president of the Spray Engineering Company, Boston, Mass. Mr. Parker has had a wide experience in the engineering field, having been for a number of years with the General Electric Company, and for the past ten years with the Stone & Webster Engineering Corporation. He also has had considerable executive experience in representing large London interests in South America for many years.

The Lackawanna Steel Company has closed contracts for delivery to the Allies of 50,000 tons of shrapnel steel. According to the terms of the agreement 5,000 tons must be shipped every ten days. It has been reported that this company since the beginning of the war has received orders for 500,000 to 600,000 tons of shrapnel, the total value of these orders being estimated at from $22,500,000 to $27,000,000. The Carnegie Steel Company and the Crucible Steel Company of America have also obtained large orders for shrapnel steel.

Merrill G. Baker, whose appointment to the position of assistant general manager of sales of the American Vanadium Company was announced in the *Railway Age Gazette* of last week, was formerly assistant to the general manager of sales of the Cambria Steel Company. Mr. Baker was born in Indiana county, Pa., in 1880, from which his parents moved to Johnstown, Pa., in 1884. He worked his way through preparatory school, paying his expenses by doing night work as a telephone operator, and later attended Dickinson college, from which he graduated with the class of 1904. He entered the employ of the Cambria Steel Company on January 3, 1905. He worked in various of that company's operating departments until July, 1906, when he entered the sales department. In September, 1912, he was appointed assistant to the general manager of sales in charge of the rail and structural departments.

John S. Griggs, Jr., electrical and mechanical engineer, and David Moffat Myers, mechanical engineer, have consolidated their practices and formed the firm of Griggs & Myers, with offices at 110 West 40th street, New York. Mr. Griggs was for 12 years senior partner of the consulting firm of Griggs & Holbrook, New York. He has been in practice as a consulting engineer in New York for 20 years, and has made steam and electrical installations in several important office buildings and industrial plants. Mr. Myers was formerly mechanical engineer for the United States Leather Company, New York, in charge of the efficiency work in its steam plants. In 1906 he started a private consulting practice. He has specialized on the efficient operation and design of industrial plants, with special reference to steam and fuel economy and to the use of exhaust steam in the production of high over-all efficiency. He is also the author of "Preventing Losses in Factory Power Plants."

In the *Railway Age Gazette* of last week it was stated that the Westinghouse Air Brake Company was reported to have received an order for 1,000,000 shrapnel from France. An officer of the company has said: "We have just closed a contract with representatives of the French government for 1,000,000 three-inch shrapnel shells, cartridge cases and time tubes, for what is known as the 75-millimetre Schneider gun. This gun shoots 16 shots a minute, and is considered one of the most effective implements of war of the French army and navy. The contract aggregates $20,000,000, and we have one year in which to complete it. We are about ready to begin work on the contract, and are completing the installing of machinery in three of our buildings which have heretofore been unoccupied. The shrapnel is in three parts. One part is the steel shell, another the cartridge case and the third the timefuse tube. We will do all the work on the shrapnel except placing in them the explosives. That will be done on the other side of the water. It requires skilled mechanics to manufacture these shells, every part of which must be in perfect order when delivered. We will be able to turn out daily from 3,500 to 5,000 completed shells by working double turn. The contract is enormous, of course, and we are very glad to get it. It means much for the financial condition of this section. We will manufacture only the one-size shrapnel shells for the reason that our present contract will keep us busy for the next 12 months."

Railway Construction

Alma & Jonquieres.—The Quebec legislature has granted this company an extension of time in which to build from Herbertville, Que., northwest to Lake St. John, between Great Discharge and Little Discharge, 20 miles; also to build from St. Joseph de Alma easterly to Jonquieres, 30 miles. The company was organized in 1912, and Canon & Parent, Quebec, were the solicitors.

Athabasca & Fort Vermillion.—Incorporated in Alberta with $1,000,000 capital, to build from Athabasca, Alta., northwesterly to Trout Lake and to Fort Vermillion, about 300 miles. J. M. Kernan, J. V. Rawle, A. E. Walsh and J. Dalganeau, Athabasca; S. Clarke, Fort Vermillion, and J. Keith, Edmonton, are interested.

Central Canada.—This company, which is building a line from a junction with the Edmonton, Dunvegan & British Columbia at McLennan, near Round lake, Alta., northwesterly to the Peace river crossing has track laid to Paul's, about 30 miles, it is said, and grading on the remaining 22 miles to the Peace river crossing is now under way. J. D. McArthur & Co., Winnipeg, Man., has the contract to build the line. W. R. Smith, Edmonton, Alta., chief engineer. (December 11, p. 1107.)

Chesapeake & Ohio.—A contract has been given to Rinehart & Dennis to build a section of 28 miles of the Chesapeake & Ohio Northern through the Little Scioto valley in Ohio. (April 9, p. 811.)

Chesapeake & Ohio Northern.—See Chesapeake & Ohio.

Currituck & Dare.—A charter has been granted in North Carolina to build a line from the Virginia-North Carolina state line south to a point in Dare county. No work has as yet been done and the company has not yet completed its organization. W. H. Gallop, Jarvisburg, N. C., may be addressed.

Edmonton, Dunvegan & British Columbia.—This company, which is building from Edmonton, Alta., north and then west via Dunvegan to the western boundary of Alberta, about 415 miles, has been completed to Round lake, 150 miles from the British Columbia boundary, and grading has been finished to Smoky river, an additional 30 miles. Work was started last year on the section from Smoky river to Spirit lake, 65 miles, and surveys were under way from that point west to the British Columbia boundary. The J. D. McArthur Co., Edmonton, Alta., is carrying out the work. (December 4, p. 1067.)

Fellsmere Farms Company.—See Fellsmere Railroad.

Fellsmere Railroad.—An officer of this company, which operates a line from Sebastian, Fla., in St. Lucie county, Fla., south and west to a point west of Fellsmere, 9.94 miles, writes that under the name of the Fellsmere Farms Company, an extension is being built to Broadmoor, 3.5 miles. The track is being laid on a marl fill, made with a dipper dredge through an area of deep muck lands; there will be two trestle bridges over canals on the line. The company expects to develop a traffic in farming produce, etc. (March 26, p. 770.)

Gulf, Florida & Alabama.—Grading work was resumed recently on the extension building from the present northern terminus at Broughton, Ala., north to Kimbrough, and track laying will be started in about three weks. Work is also under way on a bridge over the Alabama river near Kimbrough, and the company plans to build a new coal pier at Pensacola, Fla. (December 18, p. 1165.)

Huron & Northwestern.—Articles of incorporation have been filed in South Dakota by this company with a capital of $25,000 and headquarters at Huron. The plans call for building a railway from Huron northeast through the counties of Beadle, Spink, Clark and Day to Roslyn, 105 miles. The incorporators include F. W. Henderson, Summit, S. D.; W. Pelham, Sioux Falls, S. D.; C. E. Wolfe, F. Budack, Wahpeton, N. D., and C. B. Adams, Chicago, Ill. The same interests have also incorporated the Huron Investment & Construction Company, with a capital of $50,000.

Illinois Central.—This company has awarded a contract for

200,000 cu. yds. of filling required on trestle work on the Indiana division near Bloomfield, Ind., to H. W. Nelson, Chicago.

Kent Coal & Railway Company.—Application has been made in New Brunswick for incorporation to build a railway from Rexton, N. B., southwest to a point on the Intercolonial between Kent Junction and Adamsville, thence via Chipman to Minto, about 80 miles; also to build from Rexton to Richibucto Head. Inches & Hazen, solicitors, Fredericton, N. B.

Kentucky Roads.—Construction work on the line from Barbourville, Ky., north to Manchester, about 25 miles, will be started in May, it is said, and it is expected that the work will be finished and the line put in operation this coming autumn. C. L. Heidrick, Brooksville, Pa., will make the surveys, and E. W. Gerheart, Traders bank building, Scranton, Pa., is said to be interested. (April 2, p. 767.)

New York Subways.—The New York Public Service Commission, First district, has awarded the contract for the construction of Section No. 4 of Routes Nos. 4 and 36 to the Litchfield Construction Company, the lowest bidder at $1,937,509. This section is a part of the Broadway subway in the borough of Manhattan in Seventh avenue, between Fifty-first and Fifty-ninth streets. (April 16, p. 871.)

Ontario Roads Electric.—The Ontario legislature has passed acts authorizing the Hydro-Electric Power Commission of Ontario to investigate, report on, construct and operate electric railways under certain conditions, and some 300 municipalities have asked for surveys and reports on the feasibility of constructing lines through their districts. The commission has made preliminary surveys on about 1,500 miles of line chiefly in southwestern Ontario and expects to issue reports to the municipalities in the near future. A report on the construction of a 100-mile line in the district immediately north and east of the city of Toronto has been made, and the ratepayers in 11 municipalities have passed by-laws and their councils have signed contracts with the commission asking for the construction of a line about 80 miles long through this district. This work will probably not be started until the government has announced whether or not it will grant subsidies to these railways, and until the city of Toronto has arranged for a satisfactory entrance to the heart of the city. The city officers of Toronto are now working on this proposition. Frederick A. Gaby, Toronto, is chief engineer of the Hydro-Electric Power Commission.

Smoky Valley & Peace River.—The Alberta legislature has been asked for a charter by this company to build from the Canadian Northern near the junction of Solomon creek and the Athabasca river in Alberta, northerly and westerly to the junction of Sheep creek with Smoky river, thence north through the Peace river country to a junction with the Canadian Northern Western near Dunvegan. Short, Woods, Biggar & Collisson, Edmonton, Alta., are solicitors for applicant.

Texas Roads.—Surveys are now being made, it is said, for building a line from Marfa, Tex., on the Southern Pacific north via Fort Davis to Toyahvale, on the Pecos Valley Southern, about 55 miles. B. Q. Musgraves, of Fort Worth, and associates are said to be making the surveys.

RAILWAY STRUCTURES

Chicago, Ill.—The Illinois Central has just awarded a contract for the concrete work for its new viaduct over Seventy-ninth street, to the Bates & Rogers Construction Company, Chicago. A contract for 100,000 cu. yds. of grading in connection with this improvement was awarded to J. D. Lynch, Monmouth, Ill.

The Pennsylvania Lines have awarded a contract for the foundation work on the new freight terminal which they will build in Chicago.

Hamilton, Ohio.—The Cincinnati, Hamilton & Dayton is contemplating the erection of a four-stall engine house at this point.

Pensacola, Fla.—See Gulf, Florida & Alabama, under Railway Construction.

Washington.—The Great Northern has awarded a contract to Henry & McFee, Seattle, Wash., for the construction of 1,500 ft. of snow shed on the west slope of the Cascades between Tye and Embryo. The estimated cost of the work is $225,000.

Railway Financial News

Boston & Maine.—The lower branch of the New Hampshire state legislature has rejected a bill providing for the relief of the Boston & Maine as suggested by the joint state public service commissions of New Hampshire, Massachusetts and Maine. The Springfield Republican says that representatives of the Boston & Maine have decided to abandon all efforts to obtain from the present legislature any enabling act for the reorganization of the road. Both House and Senate had previously passed an amended so-called Eastman bill providing for the incorporation of the New Hampshire subsidiaries of the Boston & Maine in the event of the failure of the Boston & Maine reorganization plan. This bill is awaiting the signature or veto of the governor. The legislature voted to adjourn on Wednesday.

Chicago, Rock Island & Pacific.—See an account of the receivership in another column of this issue and also editorial comments thereon.

Indiana Harbor Belt.—This company in the fiscal year ended December 31, 1914, had operating revenues of $3,329,172, an increase of $25,263 over 1913. Its operating expenses of $2,401,613 were $98,686 less than in the previous year, so that the net operating revenue was $124,049 greater. The gross income was $116,813 greater. The deductions from gross income, however, totalling $1,282,076, were $232,082 greater than in 1913, so that there was a deficit for the year's operations of $347,890 as against a deficit of $232,621 in 1913. The stock of the Indiana Harbor Belt is owned 30 per cent by the New York Central, 30 per cent by the Michigan Central, 20 per cent by the Chicago, Milwaukee & St. Paul, and 20 per cent by the Chicago & North Western. The road operates a total mileage of 110 miles in the Chicago switching district. Of this, 45 miles is main line and branches, 27 miles is operated under contract, and 37 miles under trackage rights, there having been an increase of five miles in 1914 because of addition trackage rights secured in the Union Stock Yards district.

The increase in operating revenue above noted was due primarily to an increase in l. c. l. traffic brought about by the partial opening of Gibson Transfer on January 22. The decrease in operating revenue includes a decrease of $54,057 in transportation expenses made possible by improved terminal facilities at Norpaul and Blue Island, and by the use of heavier and more efficient locomotives. The company was required to pay $172,360 more in hire of freight cars because of the abolition, effective January 1, of the intermediate per diem reclaim, and the placing of the cars of the company's proprietary lines on the per diem instead of the mileage basis, effective April 1. There was also an increase of $54,801 in interest on unfunded debt made necessary by additional advances by proprietary lines amounting to $620,000 for working funds and construction expenditures.

In 1914 the company derived earnings from switching service of $3,210,904. The total number of revenue earning cars handled was 749,346, as against 667,857 in 1913, there having been an increase of 26,909 loaded interchange cars, an increase of 85,657 empty interchange cars and a decrease of 31,077 cars received from industries. The average receipts per car were $4.285, as against $4.736 in 1913 and the switching revenue per mile of road was $29,852, as against $30,165 in the previous fiscal year.

Nashville, Chattanooga & St. Louis.—James H. Crichlow, of Murfreesboro, Tenn., has been elected a director, succeeding Colonel N. C. Collier, deceased.

New York Central.—Stockholders have ratified the resolution of the directors authorizing the issue of $100,000,000 20-year 6 per cent convertible debenture bonds and an increase of $100,000,000 in the capital stock to provide for the conversion of the bonds. These are the debenture bonds which were recently sold by the Morgan syndicate.

ANNUAL REPORT

THE DELAWARE AND HUDSON COMPANY—EIGHTY-FIFTH ANNUAL REPORT

GENERAL OFFICE.

New York, N. Y., April 12, 1915.

To the Stockholders of
The Delaware and Hudson Company:

The President and the Board of Managers submit the following statements of the affairs of the Company for the year ended December 31, 1914:

The results from operation of the Coal Mining Department were:

Year.	Coal Mined.	†Revenues.	‡Expenses.	Net Revenue.
1914	7,400,695 tons	$15,517,041.94	$14,553,052.94	$963,989.00
1913	7,170,553 "	16,045,308.03	14,748,615.71	1,296,692.32
Decrease	*230,142 tons	$528,266.09	$195,562.77	$332,703.32

† Excluding dividends received from stock of Coal Companies owned.
‡ Excluding taxes.
* Increase.

The results from operation of the Railroad Department were:

Year.	Miles Operated.	Operating Revenues.	‡Operating Expenses.	Net Operating Revenues.	Percentage of Expenses to Revenues.
1914	903.99	$22,595,028.50	$15,048,452.04	$7,546,576.46	66.60
1913	903.99	24,153,494.73	15,210,306.85	8,943,187.88	62.97
Decrease.		$1,558,466.23	$161,854.81	$1,396,611.42	*3.63

‡ Excluding taxes.
* Increase.

RAILROAD DEPARTMENT.

REVENUES AND EXPENSES.

The general distribution of the Operating Revenues and of the Operating Expenses of the Railroad Department was as follows:

	1914.	1913.	Increase or Decrease.
REVENUES:			
From Coal Freight Traffic	$10,844,092.56	$11,436,959.90	—$592,867.34
" Merchandise Freight Traffic (including switching)	8,153,085.76	8,794,428.57	—641,342.81
" Passenger Traffic	2,946,665.48	3,277,928.68	—331,263.20
" Express Traffic	324,725.08	334,279.74	—9,554.66
" Transportation of Mails	137,374.27	121,793.50	15,580.77
" Miscellaneous Sources	189,085.35	188,104.34	981.01
Total Operating Revenues	$22,595,028.50	$24,153,494.73	—$1,558,466.23
EXPENSES:			
For Maintenance of Way and Structures	$1,670,364.05	$1,787,613.86	—$117,249.81
" Maintenance of Equipment	3,649,672.52	3,753,963.16	—104,290.64
" Traffic Expenses	314,327.01	305,965.69	8,361.32
" Transportation Expenses	8,602,635.57	8,584,722.10	17,913.47
" General Expenses	811,452.89	778,042.04	33,410.85
Total Operating Expenses	$15,048,452.04	$15,210,306.85	—$161,854.81
Net Revenue from Operation	$7,546,576.46	$8,943,187.88	—$1,396,611.42
Percentage of Expenses to Revenues	66.60%	62.97%	3.63%

GENERAL INCOME ACCOUNT OF THE DELAWARE AND HUDSON COMPANY, YEAR ENDED DECEMBER 31, 1914, IN COMPARISON WITH YEAR ENDED DECEMBER 31, 1913.

	1914.	1913.	Increase or Decrease.
COAL MINING DEPARTMENT:			
Gross Revenues	$15,517,041.94	$16,045,308.03	—$528,266.09
Gross Expenses	14,553,052.94	14,748,615.71	—195,562.77
Net Revenues	$963,989.00	$1,296,692.32	—$332,703.32
Taxes Accrued	323,102.21	495,000.00	—171,897.79
Operating Income	$640,886.79	$801,692.32	—$160,805.53
OTHER INCOME:			
Dividends and Interest	717,068.64	386,733.52	330,335.12
Gross Income, Coal Department	$1,357,955.43	$1,188,425.84	$169,529.59
RAILROAD DEPARTMENT:			
Gross Operating Revenues	$22,595,028.50	$24,153,494.73	—$1,558,466.23
Gross Operating Expenses	15,048,452.04	15,210,306.85	—161,854.81
Net Operating Revenues	$7,546,576.46	$8,943,187.88	—$1,396,611.42
Taxes Accrued	671,119.13	623,107.27	48,011.86
Operating Income	$6,875,457.33	$8,320,080.61	—$1,444,623.28
OTHER INCOME:			
Hire of Equipment	$70,987.13	$213,752.30	—$142,765.17
Outside Operations	Loss 15,147.45	Loss 26,667.42	Loss 11,519.97
Dividends and Interest	1,006,156.29	1,121,996.84	—115,840.55
Miscellaneous Items	41,615.01	54,322.20	—12,707.19
Total Other Income	$1,103,610.98	$1,363,403.92	—$259,792.94
Gross Income Railroad Department	$7,979,068.31	$9,683,484.53	—$1,704,416.22
DEDUCTIONS FROM INCOME:			
Rentals	$1,997,770.87	$2,020,228.43	—$22,457.56
Interest on 1st and Refunding Mortgage Bonds (1943)	1,223,434.99	1,108,160.00	115,274.99
Interest on 1st Mtge. Bonds (1917)	350,000.00	350,000.00	.....
Interest on Debenture Bonds (1916)	558,920.00	558,920.00	.....
Interest on 1st Lien Equipment Bonds (1922)	433,935.00	435,038.63	—1,103.63
Interest on Debenture Bonds (1914)	.....	4,000.00	—4,000.00
Interest on Divisional Bonds	75,000.00	75,000.00	.....
General Interest and Discount	170,480.92	205,160.92	—34,680.00
Total Deductions	$4,809,541.78	$4,756,507.98	$53,033.80
Net Income Railroad Department	$3,169,526.53	$4,926,976.55	—$1,757,450.02
GENERAL:			
Miscellaneous Income:			
Dividends and Interest on Securities Owned	$13,516.00	$13,516.00	.....
Rentals, Real Estate	25,895.51	37,844.21	—$11,948.70
General Interest and Discount	50,703.42	16,634.56	34,068.86
Total Income	$90,114.93	$67,994.77	$22,120.16
Taxes Accrued	9,734.33	8,661.56	1,072.77
Net Income General	$80,380.60	$59,333.21	$21,047.39
Net Income Carried to General Profit and Loss	$4,607,862.56	$6,174,735.60	—$1,566,873.04
	10.84% on	14.53% on	
Percentage to Capital Stock	$42,503,000.00	$42,503,000.00	.....

FINANCIAL.

CAPITAL STOCK AND FUNDED DEBT.

The Capital Stock of The Delaware and Hudson Company on December 31, 1914, was $42,503,000; no additional shares were issued during the year.

The Debentures of 1914, originally amounting to $2,500,000, have been reduced by payments of $200,000 per annum, and were completely retired on January 1, 1914, by the payment of $100,000.

The Public Service Commission, of New York, Second District, on October 9, 1913, as stated in the Annual Report for 1913, authorized the issue of $4,500,000, First and Refunding Mortgage Gold Bonds, at 95 or better, this Company having applied, on March 26, 1913, for authority to issue $5,000,000. The full amount thus authorized was sold early in 1914, at 95. The proceeds amounted to $4,275,000, of which $2,685,000 was applied, as hereinafter noted, to reduction of Floating Debt; and the remainder, $1,590,000, in accordance with the application to and authority from the Commission, to expenditures which were, at the date of the application, yet to be made for specific additions and betterments then in progress. Accordingly, the latter amount was deposited with the Farmers' Loan and Trust Company as Trustee. Expenditures amounting to $627,646.02 out of this fund have been made and the deposit correspondingly reduced. The application is still under consideration, by the Commission, as to the $500,000 not yet authorized.

FLOATING DEBT.

The Floating Debt of the Company was $3,018,533.51 on December 31, 1914, a decrease of $1,481,466.49 during the year. The amount on December 31, 1913, $4,500,000, was reduced to $1,815,000 by the proceeds from of $2,827,000 First and Refunding Mortgage Bonds, that portion of the issue of $4,500,000, previously referred to applicable to expenditures prior to 1914. Subsequently, this debt was increased $1,203,533.51, in part to finance, temporarily, additions and betterments and in part for advances to subsidiary companies (principally the Wilkes-Barre Connecting Railroad Company), which will hereafter be repaid.

SINKING FUNDS.

There was paid during the year to the Trustee under the First and Refunding Mortgage the sum of $311,440, being one per cent of the par value of the First and Refunding Mortgage Gold Bonds outstanding on June 1, 1914, making the total paid to December 31, 1914, $1,484,990. In accordance with the terms of the trust agreement, this sum has been expended in additions and betterments to the property covered by the mortgage.

A summary of the operations of the Sinking Fund under the First Lien Equipment Trust Indenture, from the date of its creation to December 31, 1914, follows:

RECEIPTS:

Annual payments to Trustee, years 1908 to 1914, both inclusive, at $650,000 per year	$4,550,000.00
Interest on cash balances and investments	256,730.05
Total receipts	$4,806,730.05

DISBURSEMENTS:

Equipment acquired as follows:		
One hundred and two locomotives	$2,433,460.28	
Five milk cars	15,217.82	
One gas electric car	25,217.46	
One Pintsch gas transport car	2,319.78	
Two gasoline tank cars	1,944.45	
One bridge-erecting car and trailer	14,534.62	
One steam wrecking crane	14,002.90	
One snowplow	5,040.42	
Twenty-two cabooses	23,034.42	
Total equipment		$2,534,772.15
Three hundred fifty-seven (357) The Delaware and Hudson Company First Lien Equipment Bonds of 1922 purchased and retired (including accrued interest)	362,896.77	
Securities and cash in hands of Trustee	1,909,061.13	
Total disbursements		$4,806,730.05

In accordance with the ordinance passed on May 9, 1899, and amended on May 10, 1910, $200,769.51 has been accumulated during the year in the Coal Department Sinking Fund. This has been applied to the purchase of coal lands in the Wyoming region and to the reimbursement of the Treasury for advances to The Schuylkill Coal and Iron Company and the Shanferoke Coal Company for the acquisition of similar lands in the Schuylkill region.

DIVIDENDS.

On December 31, 1914, a dividend for the year 1915, upon the outstanding $42,503,000, of Capital Stock of the Company, at the rate of nine (9) per cent upon the par value thereof, amounting in the aggregate to $3,825,270, was declared, out of the earnings of the current and preceding years, payable as follows:

Two and one-quarter (2¼) per cent upon the Capital Stock, in favor only of stockholders of record on February 25, 1915, and payable on March 20, 1915.

Two and one-quarter (2¼) per cent upon the Capital Stock, in favor only of stockholders of record on May 29, 1915, and payable on June 21, 1915.

Two and one-quarter (2¼) per cent upon the Capital Stock, in favor only of stockholders of record on August 28, 1915, and payable on September 20, 1915.

Two and one-quarter (2¼) per cent upon the Capital Stock, in favor only of stockholders of record on November 27, 1915, and payable on December 20, 1915.

COAL MINING DEPARTMENT.

During 1914, this Company mined 7,400,695 long tons of anthracite, out of a total of 68,342,601, including output of washeries, produced in the region. This is 230,142 long tons more than in 1913, notwithstanding that early in 1914 severe storms interfered with operations to the extent of about 200,000 tons reduction of output. The number of breaker hours worked was 46,159, a decrease of 193.

During 1914, five separate strikes caused temporary idleness at one or more collieries, the total loss being equivalent to closing one colliery for 42 hours or 4 6/9 working days of nine hours each. This compares with 54 5/9 working days of nine hours each in 1913. The idle time in both years would have been avoided had the employees continued at work and permitted the differences to be adjusted in the orderly manner provided by agreement.

In the report for last year reference was made to the tax of 2½ per cent of the value of anthracite when prepared for market, imposed on and after June 28, 1913, by the State of Pennsylvania. The legality of this tax is now before the courts for determination.

A new washery was completed and placed in operation, to reclaim coal from the culm bank at Marvine Colliery in the northern part of Scranton. The work of connecting the underground operations of Plymouth No. 2 with Plymouth No. 5 has been completed and it is intended to abandon Plymouth No. 2 breaker and handle all the output through Plymouth No. 5. An electric plant at Olyphant Colliery, Olyphant, Pa., has been erected, and furnishes light to five collieries located at Scranton and Olyphant and a portion of the power required at Olyphant and Eddy Creek collieries, located at Olyphant, and Marvine Colliery, at Scranton. Additions are contemplated which will enable it to furnish power to other collieries in the same vicinity.

Development work was continued and facilities increased during the year, in order to maintain the output.

The charges therefor, to Extraordinary Expenses of the Coal Mining Department, amounted to $782,644.57 as against $970,535,80, in 1913, as follows:

STATEMENT SHOWING AMOUNTS EXPENDED ACCOUNT EXTRAORDINARY EXPENSES YEAR 1914.

Sinking shafts and sbaft improvements	$36,390.19
Tunnels and new openings	130,812.98
New engines, new boilers, boiler houses and fittings	103,093.79
Rope haulage, slopes, planes and ropes	41,120.15
Concrete barns, etc	2,427.70
New pumps and new pump rooms	53,068.78
Electric plants and machinery	240,969.44
Other new buildings	31,097.22
Conveyors	30,143.91
Improvements to breakers and washeries	41,516.18
Miscellaneous	72,004.23
Total	$782,644.57

RAILROAD DEPARTMENT.

OPERATING REVENUES.

The decrease in operating Revenues, as compared with 1913, was $1,558,466.23. The revenue from Coal traffic decreased $592,867.34; the revenue from Merchandise traffic decreased $641,342.81; the revenue from Passenger traffic decreased $331,263.20; and the revenue from Miscellaneous sources increased $7,007.12.

OPERATING EXPENSES.

The decrease in Operating Expenses, as compared with the year 1913, was $161,854.81. Maintenance of Way and Structures Expenses decreased $117,249.81; Maintenance of Equipment Expenses decreased $104,290.64; Traffic Expenses increased $8,361.32; Transportation Expenses increased $17,913.47, and General Expenses increased $33,410.85.

The ratio of Operating Expenses to Operating Revenues in 1914 was 66.60 per cent and compares with 62.97 in 1913.

CAUSES AFFECTING INCOME.

The report for 1913 contains a statement of the causes then adversely affecting railway revenues and enhancing railway expenses. Many of these causes had then recently been accentuated and estimates of their effect upon an whole year's operations were given. Experience has demonstrated that these estimates were not excessive. All these causes were in full force during the year 1914. Moreover, the whole period was characterized by severe depression in the general business of the country and, in the territory occupied by your lines, the weather conditions of the early months of the year were exceptionally adverse, the cost of removing snow and ice being approximately $83,000 greater than the previous year.

The increase in Transportation Expenses of $17,913.47, in the face of a considerable decline in traffic, is a direct consequence of the conditions explained in last year's report, and which are not within the control of the management.

The so-called Full Crew law of the State of New York was in operation during the entire year, as compared with but four months in 1913, and resulted in an increase in expenses of $77,080.33. During the whole year this statute added $117,790.83 to the Transportation Expenses of the Company. The total cost of compliance with the law, since it became effective on September 1, 1913, to the end of 1914, was $158,501.33. The cost for eleven roads, including the principal lines in New York, during the first year that this law was in force was $1,149,843.90. In view of this wholly unnecessary expense which does not in the slightest measure contribute to safety, the Presidents of the railways affected have presented to the Governor and the Legislature a petition for repeal. Three bills, with that object in view, are pending. The cost of compliance with the so-called Full Crew law of Pennsylvania aggregated $37,351.79, as compared with $40,194.49 for 1913. It is significant that the people of Missouri by a referendum vote, recently defeated a similar Full Crew law by 324,085 votes against it to only 159,593 in its favor. Attempts to enact similar statutes have failed in the legislatures of Colorado, Delaware, Virginia and Ohio and have been vetoed by Governor Foss of Massachusetts and Governor Cruce of Oklahoma. A proposed statute of the same character was referred to the Railroad Commission of Connecticut by the State Assembly and the former, in a very strong opinion, condemned it both as to its theory and its consequences if enacted.

In the Report for 1913, reference was made to awards of arbitrators granting increases in rates of pay and modified working conditions to locomotive engineers, effective on May 1, 1912; to locomotive firemen, effective on May 1, 1913, and to conductors and trainmen, effective on October 1, 1913. As the outcome of long negotiations with the engineers and firemen, relative to the meaning and application of the awards, the Operating Expenses of 1914 include further allowance to them of $23,495.28, on account of services performed in 1912 and 1913, which is in addition to the increases in expenses for those years stated in former annual reports. The award to the firemen, in effect during eight months of 1913 and the entire year 1914, resulted in a comparative increase in expenses of $11,666.12. The award to the conductors and trainmen, in effect during three months of 1913 and the entire year 1914, resulted in a comparative increase in expenses of $100,810.10. Increases in rates of pay were also granted to other classes of employees.

The increases shown under General Expenses were caused chiefly by the demands occasioned by the important cases before the Interstate Commerce Commission, by required compilations of special information desired by that body and by work undertaken in connection with the Federal Valuation of railway property.

RAILWAY MAIL PAY.

The conditions under which the mails are carried over the lines of this system continued to be unsatisfactory, as they are generally throughout the United States. The injustice of grossly inadequate returns for these services has lately been accentuated by the extension of the parcel post, on January 1, 1914, to include fifty pound packages within the first two zones and twenty pounds for longer distances. This increase in the weights carried was not accompanied by any increase in the payments to the railways although it has resulted in diverting to the mails a large quantity of express traffic for which the railways were formerly compensated, under their contracts with the express companies, and has, in a smaller degree, even encroached upon the freight movement. Under the system of payment now in force the payments for the several mail routes operated by this Company were fixed, against its protest, for a period of four years beginning with July 1, 1913, in accordance with a weighing conducted during the early months of 1913. As the parcel post was then just inaugurated, had had little time for development, and the maximum weight carried was eleven pounds, it follows that, unless the law is changed, this Company will carry the parcel post mail until July 1, 1917, practically without compensation.

No action in rectification of railway mail pay has been taken by Congress. The Joint Congressional Committee on Railway Mail Pay, of which former Senator Bourne is Chairman, after an investigation which lasted two years, recommended a new basis of payment which it stated would add approximately $3,000,000 per year to the mail pay of the railways, and the Committee said:

"We believe our suggested rates are certainly not too high from a governmental standpoint, though they may be too low from a railroad standpoint."

The Joint Committee also sustained the objections of the railways to quadrennial weighings, to free messenger service and to free compartment cars for mail purposes. Notwithstanding these facts, the House of Representatives added a "rider" to the measure containing appropriations for the postal service which, if it had become a law, would have very materially reduced the mail pay, that the Joint Committee had reported was already too low. Fortunately the "rider" was not accepted by the Senate.

In 1907, by an arbitrary executive act which reversed the practice of forty years, the divisor used to determine the "average daily weight" which is the basis of mail pay on every railway was increased from 90 to 105, thus reducing the resulting averages and greatly reducing the mail pay of all companies. In a decision rendered on May 18, 1914, in Chicago & Alton Railroad vs. United States, the Court of Claims of the United States decided that this change was one which the Postmaster General had authority to make. Appeal from this decision is now pending in the Supreme Court. The steps necessary to protect the interests of this Company, in case the principle of law involved should be determined favorably to the railroads, have been taken.

Interstate Commerce Commission.

The Interstate Commerce Commission's inquiry concerning rates, rules, regulations and practices in the transportation of Anthracite, begun in 1912, continued throughout the year. Taking testimony was concluded in October, and briefs were filed and arguments heard during January, 1915. No decision has yet been announced. In the advanced rate case, hereinafter referred to, the Commission recognized the contention that th investment in property devoted to public use, rather than the par value of stocks and bonds, must be the proper basis for computations intended to test the reasonableness of the returns derived from the services rendered. This is obviously sound as earnings result from the use of assets, earning power is that which gives value to assets. Property devoted to public use constitutes assets and should therefore be the basis of all computations concerning returns. Stock and bonds are liabilities. For the purposes of this inquiry the property accounts were restated, as far as possible, so as to bring them into conformity with the present accounting system prescribed by the Interstate Commerce Commission, and among the most significant facts developed in connection with the anthracite inquiry was that the combined net operating receipts (that is, the balance left from gross receipts after paying operating expenses and taxes) of all the railways serving the Anthracite region, for the year that ended with June 30, 1914, amounted to only 5.06 per cent of the cost of their property devoted to public use. Since the creation of the Commission there have been only nine years in which this ratio has exceeded seven per cent, while in nine years it fell below six per cent, and in two years it was only slightly above four per cent. This rate of return upon property is lower than it ought to be in the general public interest.

The Annual Report for 1913 contains a statement of the conditions which led this Company to participate in the general five per cent advance in freight rates which was then under suspension by the Interstate Commerce Commission. The effort to obtain a partial readjustment of tariff rates, in view of the added cost of producing railway services, has at last been sanctioned, as to some of the changes attempted, by a majority of the Commission. A majority of the Commission at first opposed most of the changes, and an order, cancelling the new tariffs, was issued, over the dissent of two Commissioners, on July 29, 1914. Nevertheless, at that time the Commission said:

"In view of a tendency towards a diminishing net operating income as shown by the facts described we are of opinion that the net operating income of the railroads in official classification territory, taken as a whole, is smaller than is demanded in the interest of both the general public and the railroads; and it is our duty and our purpose to aid, as far as we legally may, in the solution of the problems as to the course that the carriers may pursue to meet the situation." *31 I. C. C., pp. 351-384.*

This proceeding was reopened by an order of the Commission, entered on September 19, 1914, and further hearings were granted, at which the carriers produced testimony covering their operations during the period subsequent to the former closing of the case, on May 29, 1914, and relating to the financial consequences of the European war. Concerning these data, the Commission said:

"These figures serve to emphasize our previous finding of the needs of carriers in official classification territory, taken as a whole, for increased net revenue." *32 I. C. C., pp. 325-327.*

The majority of the Commission concluded that these conditions justified the proposed advances on all freight traffic except (1) rail and lake traffic, (2) bituminous coal and coke, (3) anthracite and iron ore, and (4) rates controlled by unexpired orders of the Commission. The commodities thus excluded form a very substantial part of the traffic carried by The Delaware and Hudson Company. Estimates based on the traffic handled during the year that ended with October, 1914, excluding state traffic to which the action of the Interstate Commerce Commission does not directly apply, show that in 1914, $13,851,634 of a total revenue of $18,941,192 came from the excepted classes, leaving $5,089,558 with reference to which rates have been advanced. Assuming that the increase is exactly five per cent, the additional revenue accruing to this Company would be $254,478. This is equivalent to about one-fourth of one per cent on the total cash invested in its property devoted to public use. A subsequent order of the Commission, in recognition of the relationship of the rates to and from various points and districts, granted permission to increase certain rates a trifle more than five per cent where necessary to preserve the relationships of the existing rate structure. This, however, will not substantially increase the additional revenue produced by the advance. The tariffs providing for the advance on interstate traffic became effective on January 15 and February 23, 1915.

In its opinion of July 29, 1914, rendered in connection with the original order cancelling the proposed advances, the Commission recommended to the carriers certain expedients for increasing net revenues. Effort to apply these suggestions has been made and has in some instances resulted in adverse action by state authorities. So far as they are applicable to this Company, however, it is estimated that, including the increase in the price of mileage tickets from two to two and one-quarter cents per mile and the withdrawal of round-trip passenger rates, already in effect, they can be made to produce approximately $130,000 per annum or about one-eighth of one per cent upon the property of this System devoted to public use.

The Federal valuation of railways in charge of the Interstate Commerce Commission is proceeding slowly and the great difficulties and tremendous expense, both to the Government and to the railways, are becoming increasingly apparent. The estimates given to the Committee on Appropriations of the House of Representatives by the Director of Valuations, in charge of the work of the Commission, indicates a cost to the Government of from $18,000,000 to $21,000,000 and a minimum time for the completion of the task of not less than four years from July 1, 1915. The same authority indicated a cost to the railways greatly in excess of the cost to the Government. He advised the Committee that a particular road "which is poor and cannot afford it, has been obliged to do a great deal of work and is laying out a great deal of money," actually spending, for the purposes of the valuation, at the rate of "one hundred dollars a mile." The estimates given when legislation providing for this work was pending were about one-eighth of the amount which is now admitted as the expense to the Government alone. It is probable that the work would never have been authorized if Congress had been advised that the cost would even approximate the amounts that are now certain to be required. A Presidents' Conference Committee, a Committee of Engineers, and a Committee on Financial History and Accounts have been organized by the railways and are co-operating satisfactorily with the Valuation Board established by the Commission. The latter has completed inventories of four roads, none of them of the largest, but valuations have not yet been placed upon the different units of the property embraced, much less upon any of these railways as an entirety. This Company has found it desirable to undertake an examination of the records of its long existence and a considerable amount of field work in order to protect its interests in the valuation. This work is progressing satisfactorily.

Additions and Betterments.

Renewing and strengthening bridges on the main lines to make them capable of carrying Class E-5 Consolidation Engines, as mentioned in the annual reports for 1912 and 1913, continued through 1914, resulting in charges of $73,929.94 to Additions and Betterments, and of $51,945.42 to Operating Expenses. About ninety per cent of this program was completed, and it will be fully completed in 1915. Strengthening bridges between Saratoga Springs and North Creek, to make them capable of carrying engines of Class E to E-3 inclusive, undertaken in 1913, as mentioned in the report for that year, was completed in 1914. Improving and lengthening the bridge carrying the Troy road and tracks of the United Traction Company over the tracks of this company at Menands, N. Y., to provide increased horizontal and vertical clearances and room for additional main tracks in connection with the reconstruction of the Troy road as a State highway, as mentioned in the report for 1913, was completed in 1914 at a total cost of $74,532.26, of which $31,061.22 was expended during 1914. Of the total cost, $51,950.26 was charged to Additions and Betterments, and $22,582 to Operating Expenses. In connection with the bridge improvement program, it was found necessary to reinforce abutments of Bridge No. 11 at Troy, N. Y.; No. 12 at Voorheesville, N. Y.; No. 42.02 at Barnerville, N. Y.; No. 46.85 at Cobleskill, N. Y.; No. 52.44 at Richmondville, N. Y.; No. 18.64 at Mechanicville, N. Y.; No. 55.28 at Fort Edward, N. Y., and No. 70.13 at Fort Ann, N. Y. There was expended on this work, to December 31, 1914, $62,878.81, of which $43,898.99 was charged to Additions and Betterments, and $18,979.82 to Operating Expenses. The elimination of grade crossing at Bainbridge, N. Y., mentioned in the annual report for 1913, was completed during 1914 at a total cost of $15,669.31, one-half to be borne by The Delaware and Hudson Company, and one-half by the State of New York.

The installation of block signals between Plattsburgh and Rouses Point is in progress, $15,634.88 having been expended during the year. This work will be completed early in 1915. An extensive improvement in the block signal system, consisting of the installation of distant signals at the end of double tracks and for passing tracks leading from single track line, and the extension of overlaps to a minimum distance of 2,000 feet where distant signals are not in use, was undertaken during the year. This was practically complete on December 31, 1914, the expenditures to that date having been $35,514.03, of which $29,950.03 is chargeable to Additions and Betterments and $5,564 to Operating Expenses. A small amount of work remaining to be done on the Champlain Division will be completed early in 1915.

Improvements at Albany, including purchase of additional lands, the erection of general office building and freight terminal, and construction of bulk delivery and freight house tracks, as mentioned in the annual report for 1913, progressed satisfactorily, and will be completed during 1915. To December 31, 1914, $790,026.28 had been expended on these improvements.

Fifteen Class E-5 consolidation locomotives, ten Pacific type Passenger locomotives and seven steel-center-sill, double truck, four wheel cabooses, all paid for from funds accumulated under the First Lien Equipment Trust Indenture, were received during the year.

The program of development of the yards at Carbondale, mentioned in the annual report of 1913, continued during 1914, and $27,543.30 was expended thereon. Construction of tracks to serve the new washery at Providence, Pa., known as Marvine Breaker No. 2, mentioned in the annual report for 1913, continued during the year. There was expended $26,856.33 during 1913, and $16,908.54 during 1914, a total of $43,764.87, all chargeable to Additions and Betterments. The work will be completed in 1915. Addition of four boilers and one blower to the Mechanicville Power Plant, mentioned in the annual report for 1913, was completed in 1914. Increasing the height of the smoke stacks of this power plant by 100 feet, in order to effect fuel economies, was begun and will be completed during 1915. There had been expended to December 31, 1914, $38,185.53, all charged to Additions and Betterments.

The installation of a 50,000-gallon tank at Hudson, Pa., mentioned in the annual report for 1913, was completed during the year. A pumping plant, to furnish an adequate supply of water for the new shops at Colonie, N. Y., was completed early in 1914 at a total cost of $14,256.11, all charged to Additions and Betterments. New and modern track scales were installed at Green Ridge, Pa., during the year to take the place of scales that had become inadequate on account of the increased capacity of freight cars.

The net changes in the property accounts, on account of Additions and Betterments to the Company's railroad during the year (including expenditures on account of items mentioned above) amounted to $1,820,738.87.

Station and yard improvements, including new passenger station at Ticonderoga, N. Y., undertaken during 1913, as mentioned in the report for that year, were completed during 1914. This work was paid for from accumulations under the operating contract with the Ticonderoga Railroad Company.

Construction of the Wilkes-Barre Connecting Railroad, to connect the Pennsylvania Railroad and the lines of this Company, near Wilkes-Barre, mentioned in the annual reports for 1912 and 1913, progressed rapidly during 1914, and it is expected that the line will be opened for operation early in 1915.

ALLIED STEAM RAILWAYS.

The Greenwich and Johnsonville Railway Company shows a decrease in Operating Revenues for the year 1914 of $14,569.85, as compared with the previous year. The Operating Expenses decreased $6,542.42. The Net Income was $20,140.83, a decrease of $6,162.83. A dividend of six per cent for the year ended June 30, 1914, was declared.

The Quebec, Montreal and Southern Railway Company shows a decrease in Operating Revenues of $8,835.17, as compared with the previous year. The Operating Expenses decreased $16,955.83. Income from Hire of Equipment increased $11,514.33. The Net Income, not allowing for interest due The Delaware and Hudson Company, amounted to $149,051.37, an increase of $19,758.62.

The Napierville Junction Railway Company shows a decrease in Operating Revenues of $14,668.78, as compared with the previous year. Operating Expenses show an increase of $11,816.45. Net Income amounted to $24,858.11 or 4.14 per cent on Capital Stock outstanding, a decrease of $28,015.02, compared with the previous year. A dividend of three per cent for the year ended December 31, 1914, was declared. The Freight Revenue decreased $23,019.77, while Passenger Revenue increased $8,080.19. The latter increase was due to the inauguration of through passenger train service over the Napierville Junction Railway between Montreal and points on The Delaware and Hudson. The increase in expenses was due to increased maintenance charges and increased passenger train service. The cost of maintenance, while higher than in the preceding year, was not abnormally high, inasmuch as during the first years of the Company's existence the renewals were naturally relatively small.

ALLIED ELECTRIC RAILWAYS.

Gross Operating Revenues of the United Traction Company decreased $47,271.94; Hudson Valley Railway Company, $43,508.29; Schenectady Railway Company, $89,198.93, and Troy and New England Railway Company $940.36, while those of the Plattsburgh Traction Company increased $1,832.01. Decreases in Net Operating Revenues were as follows: United Traction Company, $201,379.52; Hudson Valley Railway Company, $48,659.08; Schenectady Railway Company, $92,294.20; Troy and New England Railway Company $634.31, and the Plattsburgh Traction Company $713.74.

The business depression, particularly during the latter part of the year, adversely affected the revenues of all the traction companies, while, at the same time, various causes increased cost of operation. The unusually severe weather in the earlier months of the year very greatly increased the cost of removing snow and ice. The United Traction Company's cost of power is steadily increasing, owing to operation of heavy modern steel cars and inability to purchase the additional power as cheaply as that covered by the first contract. Effective July 1, 1914, various operating employees were granted increases in wages. These increases amounted to about $15,000 for the last six months of the year. Similar increases were granted to employees of the Hudson Valley Railway Company, aggregating approximately, $3,000.

Dividends of two per cent for the year 1914 were declared on the Capital Stock of the United Traction Company; six per cent on that of the Schenectady Railway Company; two and one-half per cent on that of the Troy & New England Railway Company, and four per cent on that of the Plattsburgh Traction Company.

The Hudson Valley Railway Company, after years of continued effort, has secured the right to cross Broadway in the Village of Saratoga, which will enable it to install a belt line service in Saratoga and to materially improve the through service between Albany and Glens Falls. A new concrete viaduct has been constructed over the Hudson river, connecting Glens Falls and South Glens Falls. A new bridge over the Barge canal south of Fort Edward has been completed; and the Whitehall bridge in Fort Edward has been raised 2.4 feet, to facilitate traffic on the Barge canal.

The use of heavier cars and the increased frequency of service of the United Traction Company have necessitated the erection of a new substation at the corner of Chapel street and Sheridan avenue, Albany, to centralize the power distribution in that city so that delays to traffic may be avoided. This sub-station will have an ultimate capacity of 9,600 K. W., and be completed in the Spring of 1915 at a total estimated cost of $150,000. The transmission system connected with the Twenty-fifth street sub-station, Watervliet, was enlarged during the year by the installation of an additional set of transmission lines to the Mechanicville power plant, a distance of twelve miles, and 3,102 feet of cable to Congress and River streets, Troy, and 6,892 feet of cable to a connection with the line of the Schenectady Railway Company and the installation of one 600 K. W. rotary converter. There were also installed 10,649 feet of cable on Cohoes road, and 5,015 feet on the Cohoes Belt Line. The feeder on Madison avenue, Albany, was extended 4,789 feet.

All equipment was maintained in an efficient condition, but owing to reduced earnings and heavily increased expenses part of the ordinary painting of cars was deferred, and will be undertaken during the year 1915.

On December 11, 1914, the Public Service Commission, Second District, State of New York, issued an order directing the United Traction Company to make changes in its facilities and services in Albany which, if they can lawfully be required, would necessitate capital expenditures that would involve raising $1,106,580.43 and entail material and continuing additions to operating expenses without being productive of any additional revenue. Among other things, the Company was ordered to purchase forty-two additional cars seating forty passengers each; to provide higher powered snow-fighting equipment; to extend its lines in Arbor Hill and New Scotland road; to extend its underground conduit and feeder system, and to provide itself with a private and exclusive telephone system. The Company was also ordered to provide more frequent service on certain lines. In many respects the changes that were ordered are believed not to be in the ultimate interest of the public, but must impair the ability of the Company permanently to render satisfactory service, and the capital expenditures would be excessively burdensome and unreasonable at this time, especially in view of present financial conditions throughout the country and the decreased patronage of these street car lines. The recent capital expenditures of the United Traction Company should be considered in connection with this order. The following shows such expenditures from January 1, 1907, to November 30, 1914, inclusive, together with the amounts still to be expended upon work now in progress, classified according to the principal items.

Item.	Expended.	To Be Expended.	Total.
Engineering	$9,122.23	.....	$9,122.23
Rights of way	15,186.00	.....	15,186.00
New lines and extensions	142,142.59	.....	142,142.59
Roadway and track	383,882.27	$17,782.91	401,665.18
Paving	265,163.93	48,860.37	314,024.30
Bridges	9,000.00	.....	9,000.00
Distribution system	273,251.98	134,846.49	408,098.47
Signal apparatus	7,434.85	.....	7,434.85
Power plant equipment	49,585.04	1,303.06	50,888.10
Cars and electric car equipment	539,742.92	3,517.60	543,260.52
Buildings and fixtures	10,587.59	.....	10,587.59
Shop machinery and tools	10,324.91	.....	10,324.91
Other additions and betterments	72,552.80	.....	72,552.80
Total	$1,787,977.11	$206,310.43	$1,994,287.54

In addition to the expenditures for paving included in the foregoing, paving requirements of the cities of Albany and Troy, if the present plans are carried out, will make necessary a further expenditure of $166,825.60 by this Company.

The capital expenditures required by the order would not be self-sustaining, but instead would cause additional expenses for maintenance and for other operating purposes, while the increased frequency of service required on some lines would cause added expense without bringing in any additional revenue, and this added service is not justified by the patronage at the present time. After the order was entered, application to the Commission for a rehearing was made and denied, although the Company offered proof of the financial conditions, including the changes brought about by the war, and of other matters, arising subsequent to the hearings in July, that were believed to be relevant and important. The Courts have been appealed to in the matter and proceedings under the order have been stayed pending a decision by the Appellate Division.

As compared with 1907, the rates of wages of the conductors and motormen employed by the United Traction Company show an increase of more than twenty-seven per cent, a result of resort to arbitration in settlement of labor difficulties. The pay of other employees has increased proportionately. The total pay-roll for the year 1914 was about $240,000 higher than it would have been except for these increases.

ALLIED BOAT LINES.

The Operating Revenues of The Champlain Transportation Company show a decrease of $16,263.02, and the Operating Expenses show a decrease of $2,431.34, making a decrease in Net Operating Revenue of $13,831.68 for the year. The Operating Revenues of The Lake George Steamboat Company show a decrease of $2,682.86, and the Operating Expenses show a decrease of $3,571.53 as compared with 1913, making an increase in Net Operating Revenues of $888.67 for the year. As the traffic of the boat lines consists largely of those traveling for pleasure, the Season of 1914 was adversely affected by the unfavorable business conditions throughout the country.

LITIGATION.

In the litigation heretofore reported in connection with the contract under which this Company operates the Ticonderoga Railroad, accounting proceedings are pending before a Referee, in conformity with the recent decision of the Court of Appeals.

The action brought against the Company in 1913 by Katherine S. Weld and others for an accounting of royalties under the Henry B. Rockwell coal lease of 1859, is still pending. A new action for an accounting has been begun by William S. Birdsall and others interested in the royalties payable under the coal lease of James Stott made to this Company in 1890. The suit is still pending. The suit for an accounting under the coal lease of William Miles and others to this Company, made in 1880, which was begun in August, 1913, is in course of settlement.

On December 29, 1914, The Rensselaer & Saratoga Railroad Company brought suit against The Delaware and Hudson Company, involving the interpretation of the lease under which the property of the former is operated by this Company. The suit involves the ownership of 8,000 shares of stock of The Rensselaer & Saratoga Railroad Company now carried as a Treasury asset of this Company. The matter is proceeding in regular course and the General Counsel is very hopeful of a decision favorable to this Company.

The Rensselaer & Saratoga Railroad Company claims that under its contract with The Delaware and Hudson Company the latter should pay any income tax which is assessed against the former. The assessment for the ten months ended December 31, 1913, amounted to $6,659.77, of which $533.33 was erroneously assessed, leaving $6,126.44 to be paid. The lower court has decided a suit brought to test this question unfavorably to this Company but appeal was taken and is now pending in the Appellate Division.

GENERAL REMARKS.

On July 1, 1914, the Workmen's Compensation law became effective in the State of New York. It provides for death benefits and compensation to employees during disability due to injuries received in their employment. The extent to which this Company's railway traffic is interstate renders it unlikely that it will be materially affected. Suitable provision has been made by the allied traction lines, hotels and other companies affected, whereby they have become self-insurers, as provided under the Act, having made the required deposits with the Commission as a guarantee of compliance with the Act.

Public attention cannot be too forcibly directed to the increasing difficulties under which the most solvent railways must compete for the capital necessary for their continued development to keep pace with the forward strides of general industry. So far as this competition is with States and Municipalities, it has recently become more intense by reason of the advancing rates offered and the freedom of such investments from the Federal income tax and the inquisitorial features attending its enforcement while, so far as it is with manufacturing or industrial corporations, the same effect has sprung from the longer establishment and enhanced stability of the issuing corporations. The public offerings of State and Municipal bonds, exclusive of those taken for the sinking fund of New York City, increased from $143,590,868 in 1902 to $383,150,828 in 1912, and the aggregate annual issue of such bonds paying four per cent or higher increased during the same period from less than $60,000,000 to substantially $380,000,000. Not only do these issues compete with those of railways for the share of the limited investment fund required by the latter, but the augmented governmental activities that they suggest, tend to increase the general burdens of taxation, of which so disproportionately large a share is invariably imposed upon the railways. It is not surprising, therefore, that from 1902 to 1914, the annual taxes paid by American railways increased from $54,465,437 to $157,371,100. Many, however, may not have realized that in 1914 the various taxing authorities demanded and collected $38.26 out of every $100.00 which the railways had left out of their operating gross receipts after the payment of wages, other operating expenses and interest on indebtedness, as against $15.92 out of every $100.00 in 1902, or that in the later year the railways paid $2.39 in taxes for every dollar which they paid twelve years earlier. Especially in view of the drain upon the World's resources that is attending the great European war and that is likely to continue long after that war has closed, these facts ought to receive earnest thought. They indicate a great necessity and a great opportunity for unselfish, unprejudiced and constructive statesmanship.

By order of the Board of Managers,

L. F. LOREE,
President.

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*Illustrated.

The vote of 135 to 68 in the Pennsylvania House in favor of the repeal of the state extra crew law is as significant in its way as was the overwhelming referendum vote of the people of Missouri for the repeal of similar legislation. It is one among many indications that public sentiment is running very strongly against legislation imposing unnecessary restrictions and expenses on railways. The change in public sentiment regarding regulation of railways which has occurred within the last two years is so great as to be almost astonishing. The train crew law in Missouri was killed by publicity. The railways told the facts and the people did the rest. The vote in the Pennsylvania House also was a result of publicity. The railways told the facts and the law-makers and public responded in the only way that rational people could. The great change in public sentiment which the votes in Missouri and in the Pennsylvania House reflect has itself been effected by publicity. The leaders of the railways decided some years ago that as publicity had proved such an effective means for destroying abuses in the railway business, it probably would be an equally effective means for stopping unjust attacks on the roads and protecting them in their rights. This view is being fully justified. The campaigns of publicity which the railways have conducted have both secured the repeal of a little bad legislation and have prevented the enactment of a lot of it. The more the facts about both railway management and railway regulation are dragged out and exposed to the sunlight the less bad management and the less bad regulation there will be. The railways know that abuses in management have not been able to stand publicity and if they keep on using it they will find that crooked regulators and crooked regulation are just as incapable of standing it.

Pennsylvania Extra Crew Legislation

The earnings of the steam railways of the United States for the fiscal year ended June 30, 1914, resulted in a total operating revenue of over $3,000,000,000, only about $217,000,000 of which was paid out in dividends, while over $250,000,000 was paid for locomotive fuel, this item representing about 25 per cent of the total cost of conducting transportation. Moreover, the cost of fuel for locomotives is increasing each year to such an extent that almost every important railway is taking active steps to educate its employees along the lines of fuel economy. Much has been accomplished by means of improved appliances on locomotives in obtaining a greater percentage of useful work from each pound of coal burned, but the burning of coal on grates has been continued because no one has seemed able to perfect a better method. It has long been recognized that the ideal method of burning coal, and the one which produces practically perfect combustion, is that of burning it in suspension in a pulverized form. A solid cubic inch of coal exposes only six square inches for the liberation of heat, while in powdered form, a cubic inch of coal exposes from 20 sq. ft. to 25 sq. ft., making possible a much more uniform production of gas. Until recently no experimental work has resulted in a practical application of this method to the production of steam, but experiments conducted during the past year have proved highly successful in using pulverized coal in locomotive fireboxes under difficult operating conditions. An outline of this work and its results will be found elsewhere in this issue. The possibilities of making use, in pulverized form, of the low grade coals in the West which now have to be passed over as unsatisfactory for locomotive use, will be readily recognized, as well as those of using dust, screenings, slack and culm which accumulate from all mining operations. The successful use of pulverized fuel in locomotive fireboxes should open the way for a marked reduction in expenditures for fuel on railways.

Pulverized Fuel for Locomotives

The Interstate Commerce Commission in the industrial railways case and again in the five per cent case indicated to the railways that it believed they were rendering at terminals many free services which, because they were free, worked unfair discriminations in favor of those who received them. It said that the railways should make reasonable charges for these services both to remove the discriminations and to secure needed increases in their net earnings. In an attempt to conform to the views of the commission the eastern railways filed tariffs fixing rates for the spotting of cars, and both eastern and western railways filed tariffs imposing charges for trap car service and other similar services for which previously they had not been charging. The shippers naturally attacked these tariffs. Hearings regarding

Difficulties in Charging for "Free Services"

them have been going on before the commission ever since. It is now evident that the case of the railways for the specific tariffs which they filed fixing rates for spotting cars has broken down, and it looks as if their case involving charges for trap car service is going the same way. It has been admitted by the counsel for the eastern lines that the spotting tariffs on file with the commission are discriminatory, and, as a practical matter, unworkable. The hearings have failed to establish or even indicate any fundamental principle which will serve as a guide in determining where special terminal charges should be made or the amounts that should be charged. This is chiefly due to the enormous multiplicity and diversity of the conditions which have been shown to exist at different centers of industry. The varied conditions which exist are the product of years of development of both commercial industries and the transportation industry, and, although a continuance of the practices which have grown up around these conditions may result in some unfair discrimination, it has become only too evident that any attempt to revolutionize the conditions and practices in pursuance of a desire to establish theoretical equity will do far more harm than good. As George Stuart Patterson, of the Pennsylvania Railroad, has suggested, the subject is one which could be more satisfactorily handled by means of informal conferences between the commission and representatives of the railways and the shippers than it can be by means of formal hearings and orders. It seems clear that in any formal order the commission makes it should confine itself to removing palpable discriminations and that any other action it takes should be directed to bringing about conferences between all directly concerned for the purpose of establishing correct fundamental principles around which conditions and practices may develop in future.

PUBLIC REGULATION OF RAILWAY WAGES

THE able paper on public regulation of railway wages which Professor Frank Haigh Dixon of Dartmouth College presented at the last meeting of the American Economic Association points out clearly and forcibly the defects in our present system of dealing with labor controversies on railways. A part of Professor Dixon's paper is published elsewhere in this issue. The three prime shortcomings of our present system indicated by Professor Dixon are, first, that it does not prohibit strikes in advance of investigation of the merits of controversies; second, that it does not provide that investigations or arbitrations shall be conducted by experts; third, that it does not make it necessary for advances in wages resulting from arbitration awards to be considered in the regulation of railway rates.

The remedy for the first of these shortcomings is to reverse the provisions of the Newlands act. Under this law postponement of lockouts and strikes until after investigation of the merits of controversies is entirely voluntary, while obedience to the awards of arbitration boards is compulsory. The law ought to be so changed as to prohibit lockouts or strikes until after investigations of the questions involved by impartial public authorities, and, arbitration having thus, in effect, been made compulsory, obedience to the awards should be made voluntary. The public has a right to insist that there shall be no interruption of railway service until competent representatives of the public have investigated and made public their findings regarding the points in dispute.

In order that investigations or arbitrations may be conducted by impartial experts rather than, as now, by boards composed partly of experts who are partisans and partly by non-partisans who are not experts, there is need, as Professor Dixon indicates, for the appointment by the government of investigators or arbitrators whose tenure of office shall be as permanent as that of members of the Interstate Commerce Commission or of the Interstate Trade Commission. Only by having permanent public officials assigned to this duty will we establish a system of settling wage disputes which will be consistent and just as between the parties directly concerned and which will adequately protect the rights and interests of the public.

Perhaps the best way to establish a direct and equitable relationship between the regulation of rates and the regulation of wages would be to give the latter function to the Interstate Commerce Commission. It is understood that the commission is not anxious to get the job, and this is not at all surprising. But every dollar of railway wages must be paid out of railway rates, and since wages take 45 cents out of every dollar earned it is evident that if changes in wages are not to be fully and frankly recognized in the regulation of rates, the effects on railway net earnings will be very unhappy.

One of the most important wage arbitrations ever conducted, that between the western railways and their engineers and firemen, has just been concluded at Chicago, and the arbitrators are now considering their award. Regardless of what the award may be, it is likely to give an impetus to the discussion of the regulation of railway wages. To those who wish to inform themselves, regarding this important subject Professor Dixon's clear and authoritative paper will be very valuable.

THE NOISE NUISANCE

A PROMINENT eastern railroad, one which has an energetic press agent, recently announced that employees had been notified that the company wished their co-operation in avoiding complaints of noises around sleeping cars at night. Rather mild language. Another superintendent, one on an important western road, suggested, unconsciously, one reason why mild language is so generally used in dealing with the noise nuisance, when he said that, "We must be careful and not positively prohibit the use of the bell or the whistle, as these signals are sometimes absolutely necessary, and the failure to use them may tangle us up in court controversies."

These incidents indicate the difficult nature of this problem. It is difficult because it is not of first importance. Where the noise nuisance is of first importance the question is simple. On the New York Central, for example, between Woodlawn and the Grand Central Terminal, New York City, about 12 miles, four-track, through a thickly settled district, trains pass every few minutes all day; but never a whistle is heard, and very little is heard of the bells. The rule is absolute; no use to be made of these noise-makers except in case of positive imminent danger to life or limb. But on any road, as soon as the engineman is allowed some discretion, trouble begins. The superintendent tries rigid orders, and the plan does not work. He tries keeping silent (himself) and complaints begin to come in. Enginemen prove to have all kinds of defects of judgment; and innumerable investigations produce only partial improvement; and, not deeming the problem a vital one, the superintendent at last gets tired and contents himself with mild language, like that quoted above.

But why should enginemen's deficiencies of judgment be taken for granted? They must be educated, if any progress is to be made, and the only way to educate is by the time-honored but slow processes of all education: deal with individuals, drive each point home before distracting the learner with another, and enforce "review lessons" as many times as may be necessary. We speak of enginemen more particularly, because the whistle, the bell and the pop-valve are the most prominent nuisances; but the procedure is the same, in principle, with all classes of employees.

Is it a common thought that we are doing pretty well already; that further progress would cost more than it would be worth? Surely not, if we reflect for a moment, even superficially. In various other matters, no more important than this, we are not satisfied with a percentage of 99.75; we strive for 100. Why not here? It is true that being awakened in a sleeping car by an outrageous noise at 2 a. m. is not the worst misfortune in the world. One can go to sleep again and wake up at daylight with the spirit of forgiveness toward both the man who made the noise and the employer who tolerates him. But the way to make friends of passengers is to run things so that forgiveness will not have to be exercised very often. Again, a campaign

to secure 100 per cent in repression of unnecessary noise helps powerfully to secure perfection in other things where carefulness is required in small matters. Ticket sellers say that they make fewer mistakes when business is brisk than when passengers come to the window five minutes apart. On the same principle an engineman keeps his mind more alert if he is required to watch out in several different directions simultaneously.

This comment was started by the suggestion that some of our educational methods do not seem to produce wholly satisfactory results. Except in favorable circumstances, circulars and reasoning and suspensions and reprimands all leave much to be desired. In this situation, the most practicable suggestion that we have heard is to replace arguments with facts. The arguments are all well known. They need strengthening, but apparently can be made stronger only by being backed up by more facts.

Why not have printed a full and carefully written record of all noise offenses that have occurred on your division for several months past? Go far enough back to make a long list; then have these facts impressed on the men's memories. The superintendent who feared to prohibit too positively, lest his employees should sound the whistle too little, practically admitted that he could not trust his men's judgment. One way to improve judgment—the present methods having proved unsatisfactory—will be to compel the men to do a lot of thinking on the subject. With enough records—vivid, forcefully expressed records—this can be done.

Aside from enginemen the class most needing attention is the workmen around large stations at night—including express company employees. In most stations, the percentage of good service in this respect already is high. In a large railway station the suppression of all noises is at times impossible. In attempting to give sleeping-car passengers complete quiet we are taking a large contract. But, as already suggested, to strive for perfection in this matter will improve the service in other directions; so the striving is well worth while.

DEVON AND ILFORD

A PROMINENT railway officer remarked recently, in discussing the automatic train-stop problem, that it is a "live question." As a good many things seem to indicate that among the great majority of railroad officers this question is in a somewhat somnolent condition, the remark quoted is of special interest. One reason why in some quarters the question is still a live one is to be found in reports of train accidents like those in Connecticut and in England, given in another column of this issue. Disastrous train accidents have been comparatively infrequent in this country for many months now, and a short-sighted optimist might conclude that to drop the strenuous discussions of former collision days would be entirely justifiable. But any one disposed to take this view should remember two things—that when business is dull the disasters diminish in even larger proportion than does the volume of traffic (indicating an increase later); and, secondly, that however infrequent the spectacular smash-ups which excite the public, the wideawake railroad officer is never deceived, even in the dullest times. To the superintendent who lays his plans for safety, not according to newspaper clamor or the published interviews of congressmen or commissioners, but according to the known errors of locomotive runners (errors which do not become public) the question of securing perfect observance of signals is always a live one; and if the superintendent is a live one, and is on an important and busy road, he finds that this question cannot be separated from the automatic-stop question; automatic stops have already got a respectable standing.

In short, the principal question at issue, both at Devon and Ilford, is the hackneyed one of whether enginemen can be educated to 100 per cent efficiency as lookout men; or, more in detail, whether runners, with the aid of another man on the engine, instructed to act as monitor, can observe all signals with such unerring regularity as to make automatic train-stopping devices unnecessary. And, as a part of this main question, we have a second one, which bothers the great majority of railroad officers, namely, can the men in charge of the maintenance of signals be depended on to keep automatic devices in such perfect condition that they will prove really desirable as an additional safeguard, over and above the minds of the best-trained force of enginemen? In this connection, the term "best-trained" means, of course, the best that may be expected to be found in actual service; not the best that can be theoretically planned for.

We have called these two accidents notable. Devon is notable because the officers of the New Haven road have given very careful attention to the training of enginemen for two years and more. An investigator would be warranted in expecting to find there the best attainable conditions; good men, well trained, with adequate inspection. In view of the excellent records of the principal English lines, Americans expect to find these good conditions prevailing in England at all times. If mistakes occur on these roads, still more may they be expected on the "average" road. On both the New Haven and the Great Eastern we find the system of visual signals faultless; and on both of them the requirement that firemen shall aid in keeping a lookout proved to be worthless, or worse.

This editorial is not written for the purpose of going over the old arguments; the reader who wants those can refer to our files of last summer. The question today is, Is this a live problem? If it is, why does everything move so slowly? The American Railway Association committee seems content to drop automatic stops; to pin its faith on improvement in discipline. Assuming that the art of discipline is so well understood that co-operative study or investigation is unnecessary, the position of the committee, having been accepted by the association, absolves the association from the duty of further action. But suppose the committee is wrong; suppose that some automatic device ought to be thoroughly tried; suppose that the whole question ought to be tried out, to a conclusion, for the general good; is our officer, quoted at the beginning, doing his full duty? The New Haven, the New York Central, the Central of New Jersey, the Erie, the Lackawanna, the Pennsylvania, the Burlington, the Chicago & Eastern Illinois, the Maryland & Pennsylvania, and we don't know how many other roads, are encouraging outside experimenters; but where are the signs of progress? What active interest are the roads themselves taking? The Chicago & Eastern Illinois has the most business-like program; but it has been criticized. And, criticism or no criticism, the apparent indifference of the principal roads to this apparently useful experiment suggests that, as regards the American railroad profession as a whole, the automatic stop question, though perhaps alive, is in great need of clarification.

It is possible, perhaps, to clarify a little by a study of Lieutenant Colonel Von Donop's report; though his conclusion is characterized by the time-honored English mildness and indirection. He shows up the mistake of the Great Eastern in putting audible warnings at home signals—which in most cases is an almost useless expenditure of money—but speaks of the correction of this mistake as merely "desirable," not of pressing importance. The Board-of-Trade inspectors as a body have long since declared unequivocally for automatic stops or cab signals, but the writer of the present report seems to have forgotten that declaration. Again, he asks for an "unmistakable" warning at the distant signal; but that is hardly a correct statement of the point. Runners do not mistake so much as they ignore. "Inescapable" would be a better word. Perhaps the most instructive thing in this British report, for us, is the calm ignoring of the automatic-stop question; if the Englishmen are sound in their position, our live question should be, not discipline vs. automatic stops, but, rather, discipline vs. automatic stops or audible distant warnings.

The questions here suggested may be summed up about like this: Do we want some mechanical or electrical appliance to supplement the best engineman's vigilance? Does this want exist continuously, or only when the public is excited by a disaster? If the need is just as great now as it was in 1913, should not the problem be settled in months instead of being allowed to drag through years?

Letters to the Editor

THE YARDMASTERS' CONVENTION

Seattle, Wash., April 17, 1915.

To the Editor of the Railway Age Gazette:

The second annual convention of the United Yardmasters' Association will be held at Seattle, Wash., from June 15-19, next. We would like to have men from the mechanical, claims and transportation departments of different railroads attend this meeting to point out to us the deficiencies in our work so that we can consider means to remove them.

Other railway organizations such as the Car Service Association, the Master Mechanics' Association, the American Railway Engineering Association, etc., hold meetings and exchange ideas. The mechanical men discuss broken drawbars and damaged car sills, the claim agents talk about the losses to their companies resulting from rough handling of cars, etc. These meetings are excellent and do much good, but they remind one of a temperance lecture telling a Y. M. C. A. audience of the terrible effects of liquor when it was evident that no one listening to the speaker ever took a drink. To a certain extent these associations are doing what the temperance lecturer is doing. Few of them have ever told a switchman that he was doing wrong when he was careless and damaged the car and contents. It has remained for the yardmaster to talk to the engineer and switchman about carelessness. The same applies to the per diem question. The average switchman knows nothing about per diem and cares less. With proper training the roads can save much money without any additional expense. This can best be done by securing the intelligent co-operation of the yard forces.

Representatives from the mechanical and claim departments can do much good by attending this convention and discussing these problems with the members.

John Flaherty,
General Yardmaster, Northern Pacific.

INTERSTATE COMMERCE COMMISSION STATISTICS

Nashville, Tenn.

To the Editor of the Railway Age Gazette:

Beginning with statistics for the year 1911, the Interstate Commerce Commission abandoned the ten territorial groups and substituted three districts, "substantially identical with the three great classification territories," and subdividing the roads into three classes, according to the magnitude of their operations. No one will question the wisdom of this change; but the southern and southeastern roads have good reason to believe that the results shown for "Roads in Class 1, Southern district," do not fairly reflect the conditions surrounding the average or typical southern road, particularly when compared with the results shown for "Class 1, Eastern district."

It is stated in the commission's report that "Each operating carrier is assigned to that district in which the major part of its operations lies, *or with which it seems most closely allied in character*" (italics my own). But there are those who will object to the inclusion of the Norfolk & Western, Chesapeake & Ohio, and Kanawah & Michigan, in the Southern district, on account of their being more analogous to the Trunk lines with regard to traffic density, rate structure, and geographical location, notwithstanding the greater portion of their mileage may be located south of Mason and Dixon's line.

The dividing line between official and southern classification territories is not so clearly defined as to admit of an absolute segregation of roads. However, it is well known that rates between Richmond, Norfolk, and Portsmouth, on the one hand, and points in CFA territory are made by the use of percentages of the New York-Chicago rate, and subject to the official classification. Moreover, this system of rate making applies to and from all of the Ohio river crossings, and is projected into southern territory to Nashville, Tenn., and Memphis. As rates to southern territory are constructed on the river crossings, or Virginia cities combination, there can be but a small proportion of competitive traffic handled by the Chesapeake & Ohio or Norfolk & Western on rates that are not made on the Trunk lines basis and subject to the official classification.

Comparing the gross and net operating revenues, we find the following reported for the year 1912:

	Gross Operating Revenue.	Net Operating Revenue.
Eastern district, class 1	$21,166	$6,294
Norfolk & Western	19,766	6,997
Chesapeake & Ohio	13,152	5,150
Kanawah & Michigan	17,860	6,426
Southern district, class 1	10,235	2,962
*Southern district, class 1	9,376	2,591

Eliminating the Norfolk & Western, Chesapeake & Ohio and Kanawah & Michigan.

The effect of including these lines in the Southern district is most striking when a comparison of the freight density and average receipts per ton, per mile, is made.

It will be helpful in making such a comparison to also consider the former grouping. The present Eastern district comprises old Groups I, II, III, and a part of VI, while the present Southern district comprises old groups IV and V. Group I included the New England states; Group IV, the Virginias and Carolinas; Group V, the rest of the Southern states..

Group or District.	Year.	Tons one mile per mile of road.	Average Receipts per ton, per mile cents.
I	1910	873,877	1.115
II	1910	2,797,011	.641
III	1910	2,020,779	.588
VI	1910	906,835	.751
Eastern, all roads	1912	2,131,165	.647
Southern, class 1	1912	2,326,286	.638
Norfolk & Western*	1912	3,994,718	.424
Chesapeake & Ohio*	1912	2,957,056	.407
Kanawah & Michigan*	1912	3,845,189	.404
IV	1910	1,098,029	.655
V	1910	715,992	.802
Southern, all roads	1912	952,994	.700
Southern, class 1	1912	1,058,531	.684
†Southern, class 1	1912	767,697	.831

*Included in Southern district averages.
†Omitting the Norfolk & Western, Chesapeake & Ohio, and Kanawah & Michigan.

It is at once apparent that the inclusion of these three roads in the Southern district distorts the averages to the extent that they mean little, if anything. It will be noted that although the freight density of the Eastern roads (class 1) was more than twice as great as that of the Southern roads, the average receipts per ton per mile were only 0.46 mills less. Out of 35 roads in class 1, Southern district, only nine had average receipts less than .684, and only 13 had a density of 1,000,000 tons or more. Included in these are the three roads mentioned. These roads, though comprising less than 11 per cent of the mileage, handled more than 35 per cent of the tonnage.

It is true that no grouping can, in the very nature of things, be exact, but a grouping which covers so wide a field as to reduce the results to an average far removed from the actual conditions surrounding the majority of roads included, is, to say the least, not very illuminating.

While on the subject of statistics, I have been wondering why no one has suggested that perhaps the four elaborate tables, published annually by the commission, showing the number, classification and percentages of rolling stock, etc., equipped with air brakes and automatic couplers, have outlived their days of usefulness. Less than one per cent of the total number of engines and cars is not now so equipped, and it is just possible that the percentages will not change much in the next few years. The energy expended in preparing these tables might be conserved to a more beneficial use. For example, I imagine that railway executives, bankers, and others would be glad to have the commission publish tabulated statements, showing by years the amount and character of railway bonds maturing. Such a statement could well include a few recent years, as well as the years to come, with data showing the amounts paid, extended, defaulted, etc. I believe such figures would be of more general interest and value than air brake and coupler statistics.

J. L. Hopkins.

The Success of Main Line Electrification*

A Discussion of Conditions Which Affect It, with Operating Data Dealing with Results on the New Haven

By W. S. Murray

Consulting Engineer, New York, New Haven & Hartford, New Haven, Conn.

The part of the New Haven system that has been electrified constitutes its most important division, extending from New Haven to New York, and on its main line, yards, sidings, and spurs every class of railroad movement is being daily made by electricity. The route mileage electrified is 73 miles, of which 61 is of four tracks and 12 of six tracks, thus giving a total main line mileage, measured in single track, of 316. To this may be added 184 miles of yards, sidings, and spurs, thus making a grand total, measured upon a single-track basis, of 500 miles. It is of interest to note that of the yards electrified one includes 35 miles, the other 25 miles.

Four-Track Tangent Catenary Construction, Showing Anchor Bridge with Sectionalizing Switches Installed on It,

Electric power is supplied from a single station, centrally located, but this will, in a short time, be supplemented by other supplies to be applied at the east and west ends of the electrification zone. There are 100 passenger, freight and switching electric locomotives, and 69 multiple-unit cars. One main electrical shop has been completed, the capacity of which permits the maintenance and repairs of the above-mentioned electric motive power.

To date over $15,000,000 has been expended on this electrical transportation plant. While such a figure represents the cash outlay, there have accrued to its appropriation accounts, during the process of construction, large credits for steam equipment replaced, as, for example, the 150 steam locomotives which have been transferred to other parts of the New Haven system, and the steel bodies of the multiple-unit equipment, which would have been purchased even had not the electrification been undertaken.

Passenger Service.—All passenger service west of Stamford, Conn., is electrically operated. For the winter timetable, excluding Sundays, the schedule calls for 68 trains per day into Grand Central Terminal, two through trains terminating in Harlem River station and the same number of trains out of the Grand Central Terminal and Harlem River, or a total of 140 trains per day. The Harlem River Branch service includes 19 trains each way per day, except Sundays, between New Rochelle and Harlem River. On the New Canaan branch 16 trains are operated each way between Stamford and New Canaan. This makes a total week-day schedule of 210 trains per day. Additional trains in and out of Grand Central Terminal are operated on Saturdays, and extra trains are also run on the Harlem River branch on Sundays.

Of the 70 through trains per day between Grand Central Terminal, or Harlem River, and New Haven, 46 are electrically operated the entire distance, steam locomotives being used between New Haven and Stamford on the remaining 24 trains. Of the 210 trains per day, 114 are hauled by electric locomotives, multiple-unit equipment being used on the remaining 96 trains. There are 48 a.c.-d.c. locomotives used in passenger service. The multiple-unit equipment at the present time comprises four a.c. motor cars, 21 a.c.-d.c. motor cars, and 46 trailers.

The average number of electric train miles per day is about 6,600, of which 1,400 are made by multiple-unit equipment, the remaining being trains hauled by electric locomotives.

The passenger locomotives make an average of 8,200 miles per day, some of the individual locomotive mileage being as high as 450 to 500 miles. Forty-one of the 48 passenger locomotives

*From a paper presented at a joint meeting of the Franklin Institute and the Philadelphia section, American Institute of Electrical Engineers, January 20, 1915.

View in Westchester Yard, Harlem River Branch; the Cross Catenary Span in the Immediate Foreground Serves Ten Tracks

used in a.c.-d.c. service were originally designed to haul trains of 200 tons trailing weight in local service, 250 tons in local express service, and 300 tons for through express service between New York and New Haven. The remaining seven a.c.-d.c. passenger locomotives were originally designed to haul local trains of 350 tons trailing weight or express trains of 800 tons trailing weight at a maximum speed of 45 miles an hour. In actual service these locomotives attain a maximum speed of 55 miles an hour.

The multiple-unit motor cars make an average of 2,100 miles per day. The proportion of trailers to motor cars for a.c.-d.c. equipment averages two trailer cars to one motor car.

Freight Service.—There are 36 alternating current locomotives used in freight service. These are geared locomotives of 1,400 horsepower each and were designed originally to haul a trailing load of 1,500 tons in through service at 35 miles an hour, although they are used at times for heavy passenger service in the a.c. zone during the summer months, when the heating of trains is not required. Some of these a.c. locomotives are used in transfer service between Oak Point and Westchester freight yards on the Harlem River branch, others in way freight and switching service, but the majority are used on through freight trains between Harlem River and Bridgeport or New Haven. Outside of the fast freights, which are usually under 1,500 tons trailing weight, most of the freights are hauled by two locomotives, the trailing tonnage averaging from 2,500 to 3,000 tons, although, as an experiment, tests have been made in using three locomotives with trains of over 200 cars and 4,500 tons trailing weight. About 20 freight trains are hauled daily at the present time by electric locomotives between Harlem River and Bridgeport or New Haven.

Switching.—Electric switchers are used in the three main switching yards on the Harlem River branch, located at Westchester, Oak Point and Harlem River; also at Stamford, Port Chester, New Rochelle, Mt. Vernon and at Van Nest, the latter yard being principally used for storage.

At Oak Point and Harlem River the switchers are used principally for unloading and loading floats and making up trains. One switcher was placed in service in March, 1911, at Stamford, and the remaining 15 have been in operation since September, 1912. They have been highly successful in operation, and their reliability is evidenced by the fact that to date there has only been one case of grounded main motor, although the 16 locomotives have made approximately 50,000 miles each. Some of these locomotives have been at times in continuous service 24 hours a day for 30 days, the only attention received being the renewal of blower or compressor motor brushes, or contact shoe of pantograph trolley at such times as change was made of the operating crew. Four of these electric switchers have been found to do about the same work as six of the steam switchers, which they have displaced.

Our experience to date has taught us that electrification points to three principal places where economy of operation can be secured, and in the order of their importance they may be mentioned as follows: Saving in fuel; saving in motive-power maintenance and repairs; and saving in train miles.

Assets created by electrification, which may at times be controlling factors, as, for example, the reclamation of city terminal property, after the removal of gas and smoke by the elimination of steam locomotives, are of most important consideration. In cases, however, that do not involve large city terminal electrification, the general credits and debits resulting from electrification work may be said to about offset each other, and thus the value of the returns can be based upon the three items first mentioned. If we know the number of freight and passenger train miles in a division proposed for electrification, and the cost of each one of the train miles, today we can say with very little chance of error what the cost of each one of those train miles in freight and passenger service will be when that division is operated by electricity. If we were to duplicate the steam train movement by an electric train movement, a certain economy would be shown, but by reason of the ability to concentrate in single train movements greater tractive efforts and higher speeds, greater individual tonnages can be translated, and thus the third item of economy appears in the reduction of train miles.

Experience with the movement of billions of ton miles in freight, passenger and switching service by electricity has justified the early predictions that one pound of coal burned under the boilers of a central electric power station and converted into electrical energy and transmitted to an electric engine will develop twice the drawbar pull at the same speed as a similar pound of coal burned in the firebox of a steam locomotive; and, second, that the maintenance and repairs on electric locomotives of the straight alternating-current type are on the order of one-half of those required for steam locomotives of equal weight on drivers. It is thus seen that the problem of electrification merely revolves around the question of the density of traffic in which the economies aforesaid can be practiced, and, therefore, the denser the traffic the greater the requisite motive power for its movement, and hence the greater the saving to be effected.

TABLE I

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY. STATISTICS OF ELECTRICAL OPERATION—NEW YORK AND SHORE LINE DIVISIONS. FOR THE MONTH OF NOVEMBER, 1914, COMPARED WITH THE MONTH OF OCTOBER, 1914.

Cos Cob Power House.

	November		October	
	Total	Per KWH	Total	Per KWH
Coal consumed (tons)	12,439.44	2.78 lbs.	12,280.84	2.75 lbs.
Water consumed (gallons)	38,778,000	4.33 gal.	35,835,000*	4.01 gal.*
Cost of coal	$34,004.07	.381c	$33,526.69	.375c
Cost of water	1,582.15	.017	5,915.55*	.057*
Cost of other supplies	317.20	.004	655.85	.007
Maintenance of power plant and machinery	3,655.27	.041	3,434.87	.038
Wages and salaries	6,050.62	.008	6,704.00	.075
Total Cost, Maintenance and operation	45,695.31	.511	49,336.96*	.552*
Fixed charges (interest, taxes and insurance)	16,106.89	.180	16,106.89	.180
Total cost	61,802.20	691	65,443.85*	.732*
Power Consumption (KWH)				
Passenger Service (Elec. Locos.)	2,894,465		3,072,145	
Passenger Service (M. U. Cars)	630,039		499,307	
Freight Service	1,508,306		1,404,262	
Switching Service	984,255		848,613	
Non-Revenue Service	10,340		6,191	
Total used by Electric Locomotives and Motor Cars	6,027,405		5,920,398	
Signals	107,405		117,445	
Other company purposes	380,052		399,401	
Line loss	543,235		617,804	
Total used for company purposes	7,067,757		7,055,048	
New York, Westchester & Boston	676,144		630,058	
Other companies	1,205,699		1,755,139	
Total power used	8,949,600		8,940,245	
Maximum daily output	Tuesday, November 24th 343,300 KWH		Friday, October 30th 316,630 KWH	
Maximum swing	30,000 KWH		29,800 KWH	
Maximum daily output	Friday, Nov. 6—7.00 P.M. Tuesday, November 3rd		Sunday, Oct. 4—8.27 A.M. Sunday, October 18th	
Average Daily Output	249,800 KWH 301,902 KWH		256,155 KWH 288,389 KWH	
Power Purchased from N. Y. C.				
Power purchased (K.W.H.)	1,244,021		1,306,017	
Cost of power	$16,097.67		$16,348.47	
Cost per K.W.H. (Cents)	1.294		1.252	
Total Power:				
Total power consumed (K.W.H.)	10,193,621		10,252,262	
Total cost of power (including fixed charges)	$77,899.87		$81,792.32*	
Cost per K.W.H. (cents) (charges)	.764		.798*	

*Revised.

It is perfectly possible to keep the maintenance and repairs of the electric locomotive down to one-half of those of steam under the most favorable conditions of steam maintenance, and in many cases below this figure. On the other hand, due to the peculiar nature of the electric engine, which has not as yet been enough appreciated, it will be only by the most rigorous and careful inspection and conformity to rules of operation that this relation can be maintained. Indeed, if electric engines be treated as has been the custom of treating steam locomotives, then their repairs, instead of costing far less, will cost far more than those of the steam engine.

An inheritance by the New Haven of the old steam locomotive engineers for the operation of their electric engines is a case

where the tail of the dog wags the body. While it is a good argument that these men understand the roadbed and signals better than anyone else, this argument fails when engineers without electrical experience or training can bid in the electric runs, depending upon their seniority and record of service. The condition might be alleviated by one set of men, once in remaining in; but there is a constant change, and it is a long time before the steam locomotive engineer divorces himself from the fact that he is not operating a steam locomotive. During his period of learning how to operate the electric engine he does not suffer, the people do not suffer, but the road suffers, and the locomotive suffers most. Here, therefore, we see the necessity of electrically trained men.

While all of the main line tracks of the New York division are electrified, there still remains in passenger and freight service, as the statistics of electrical operation, and give operating information with reference to:

1. The amount, distribution and cost of electric power generated at Cos Cob station. (Table I.)
2. Statistics and operating costs of electric passenger service.
3. Statistics and operating costs of electric freight service.
4. Statistics covering line and equipment failures.

I would ask those who review these statistics with an analytical eye to bear in mind that they are taken from an electrical plant which, from its inception, has been handicapped both from a construction and operating point of view. The underlying principle applying to the New Haven electrification required that its motive power equipment be designed to operate on both alternating and direct-current power, and that, further, on account of inadequate shop facilities in the past it has been necessary, since

TABLE II

STATISTICS OF ELECTRICAL OPERATION NEW YORK AND SHORE LINE DIVISIONS.
MONTH OF NOVEMBER, 1914, COMPARED WITH MONTH OF OCTOBER, 1914.

Passenger Service.

	Express trains.				Local trains				Multiple unit trains			
	Eastbound		Westbound		Eastbound		Westbound		Eastbound		Westbound	
	November	October	November	October	November	October	November	October	November	October	November	October
Train miles	49,436	50,385	53,768	54,032	29,128	32,941	23,839	28,622	21,569	19,338	22,552	19,363
Locomotive miles	87,208	85,220	88,898	89,162	41,148	45,008	31,558	39,722	29,937	28,504	32,220	28,857
Car Miles	386,883	404,166	410,574	425,363	157,770	182,564	137,502	172,338	76,544	74,004	79,202	72,793
Ton miles	23,880,554	24,483,292	24,654,186	25,697,939	7,314,489	8,444,023	6,432,307	7,819,994	5,093,352	4,755,814	5,296,525	4,634,919
K. W. H. used	1,120,801	1,133,588	1,231,060	1,220,947	643,284	719,423	524,871	651,374	346,385	305,267	341,496	279,137
Locomotive miles per train mile	1.66	1.69	1.65	1.65	1.41	1.37	1.32	1.39	1.39	1.47	1.43	1.40
Car miles per train mile	7.83	8.02	7.64	7.87	5.42	5.54	5.77	6.02	3.55	3.83	3.52	3.76
K. W. H. per train mile	22.67	22.50	22.90	22.60	22.09	21.84	22.02	22.76	16.06	15.79	15.14	14.42
K. W. H. per locomotive mile	13.62	13.30	13.85	13.70	15.63	15.98	16.63	16.40	11.57	10.71	10.60	9.67
K. W. H. per car mile	2.90	2.80	3.00	2.87	4.08	3.94	3.82	3.78	4.53	4.12	4.31	3.83
K. W. H. per 1,000-ton mile	46.93	46.30	49.93	47.51	87.95	85.20	81.60	83.37	68.01	64.19	64.48	60.22

Operating Costs.

	Locomotive repairs		Power		Locomotive Supplies		Engine house Expenses		Enginemen		Trainmen		Total	
	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.
Trains hauled by locomotives:														
Cost per train mile (cents)	17.15	13.80	19.33	19.89*	2.23	1.53	.57	.54	8.81	8.37	9.51	9.55	57.60	53.68*
Cost per locomotive mile (cents)	10.61	8.56	11.96	12.29*	1.39	.95	.38	.34	5.41	5.20	5.88	5.91	35.63	33.25*
Cost per car mile (cents)	2.45	1.93	2.76	2.79*	.32	.21	.08	.08	1.26	1.17	1.36	1.34	8.23	7.52*
Multiple unit trains:														
Cost per train mile (cents)	15.27	11.83	11.39	11.42*	.24	.16	.91	.78	5.17	5.20	8.84	7.53	41.82	36.92*
Cost per motor car mile (cents)	10.51	7.98	7.84	7.70*	.17	.11	.62	.53	3.56	3.51	6.08	5.08	28.78	24.91*
Cost per car mile (cents)	4.32	3.12	3.22	3.01*	.07	.04	.25	.21	1.46	1.37	2.52	1.98	11.85	9.73*

*Revised.

as previously shown, a considerable amount of steam operation, made necessary by the New Haven having had to avoid capital expenditure for power house and motive power equipment. It can be readily understood that a large reduction in operating expense can be effected when the division is placed on a 100 per cent electrical basis.

OPERATING RESULTS

Essentially necessary is a wholesome confidence on the part of railroads undertaking electrification that the result predicted will be attained, and what we are doing on the New Haven today electrically from an operating standpoint could not be better epitomized than by the presentation of one of the last monthly operating reports. They are shown herewith, and are known securing new shop facilities, to make very heavy repairs throughout the entire electric motive power of the road. I have, therefore, to offer this word of caution in analyzing the statistics that are presented, for it is to be noted that the cost of locomotive repairs is high. For example, referring specifically to the table of operating costs of electric passenger engines, Table II, it is to be noted that in the month of October the repairs are recorded as 8.56 cents per locomotive mile, while for November these repairs have increased to 10.61 cents per locomotive mile. At first this would seem to indicate that the new shop facilities were increasing rather than diminishing maintenance costs. This, however, may be explained by the fact that all of the passenger engines have been undergoing general repairs, and invoices for material were passed in greater amounts for November than for October. Many

of the electric locomotives have not received a general overhauling since 1907, and during this time their log sheets of operation show some of the locomotives have made over 350,000 miles.

Showing, however, what can be done with electrical equipment under the care of a better maintenance, I present in Table III monthly costs and mileages for one of these locomotives made since these engines have passed through the shops. Notwithstanding the engines are of the alternating current-direct current type, it is of interest to note that their records so far show an average

TABLE III

PERFORMANCE OF N. Y., N. H. AND H. R. R. ELECTRIC PASSENGER LOCOMOTIVE 032.

	1913					
	July	Aug.	Sept.	Oct.	Nov.	Dec.
Labor	32.90	83.01	61.59	23.67	20.18	89.17
Material	20.68	38.61	67.96	21.64	34.56	104.86
Total labor and material	53.58	121.62	129.55	45.31	54.74	194.03
Mileage	4802	5517	4695	4716	4687	4592
Cost per mile	.011	.022	.028	.010	.012	.042
Average cost per mile	.011	.017	.020	.018	.017	.021
Total miles to date	4,802	10,319	15,014	19,730	24,418	29,005
	1914					
	Jan.	Feb.	Mar.	April	May	June
Labor	200.97	85.94	36.52	65.42	91.01	70.70
Material	95.79	27.12	29.15	32.57	70.01	90.28
Total labor and material	296.76	113.06	65.67	97.99	161.02	160.98
Mileage	4,392	6,017	5,310	5,270	5,889	5,839
Cost per mile	.068	.019	.012	.019	.027	.028
Average cost per mile	.027	.026	.024	.024	.024	.024
Total miles to date	33,397	39,414	44,724	49,995	55,884	61,723
	1914					
	July	Aug.	Sept.	Oct.	Nov.	Dec.
Labor	212.36	74.45	147.53	219.47	55.25	.....
Material	131.49	156.72	173.96	780.92	146.09*	.....
Total labor and material	343.85	231.17	321.49	1000.39	90.84*	.....
Mileage	6,165	7,401	5,459	5,678	6,714	.....
Cost per mile	.056	.031	.058	.176	0	.....
Average cost per mile	.027	.027	.030	.039	.036	.....
Total miles to date	67,888	75,289	80,748	86,426	93,140	.....

NOTE.—Cost in dollars * Cr.

cost of under five cents per locomotive mile. It is of particular interest to note that locomotive No. 032, which received its overhaul first, has now operated 93,140 miles at an average cost of 3.6 cents per locomotive mile.

The maintenance figures for the 10 engines first through the shops give a sharp contrast to those in the general table of passenger engine operating costs (Table II) and emphasize the lack of maintenance to which the electric locomotives were subjected in the early days of their operation. Had conditions permitted

TABLE IV

STATISTICS COVERING ELECTRIC PASSENGER MOVEMENT AND "POWER RATE" CONSTANTS FOR DIFFERENT SERVICES—EASTBOUND.

	New Haven express trains	Stamford express	Stamford local	Port Chester trains	New Rochelle trains	Total
Number of trains	52	901	667	185	2	1807
Number of locomotives	84	1407	859	214	2	2566
Number of cars	307	7,954	3,875	1,000	10	12,436
Tonnage	35,625	566,931	279,904	67,824	619	950,065
Train miles	3,120	18,921	14,003	2,405	8	38,457
Locomotive miles	5,048	30,954	18,894	2,889	8	57,793
Car miles	29,304	148,134	80,263	13,000	49	270,741
Ton miles	2,108,700	11,886,253	5,832,923	882,492	2,456	20,712,824
K. W. H. used	66,076	495,835	343,846	58,933	222	874,912
W. H. Pr. T. M.	31.4	34.2	59.0	66.7	90.2	42.2

Stamford local trains include one train, New Rochelle to Stamford.

our electric passenger engines to be of the straight alternating-current design, in my opinion their average maintenance would not have exceeded four cents per locomotive mile.

During the past six years of electric operation there have been collected some very valuable data with regard to the amount of power required to operate trains of variable tonnage in passenger, freight and switching service. Based on this data, the power required to operate trains under normal or peak conditions of schedule can be calculated with results practically coinciding with the estimates.

By means of wattmeters installed on all locomotives and motor cars it has been possible to record the differences of power required by trains operating under local and express conditions. The long period over which these statistics were kept and power rate constants thus developed has permitted us to abandon an elaborate tabulation and consolidate the information in a more general statement. Of value to those who are interested to follow more closely these results, Tables IV, V and VI will be of assistance. These tables are compiled from the June, 1914, statistics of electric passenger and freight train operation between Woodlawn and points east to New Haven. At that time the overhead system had only recently been completed to New

TABLE V

STATISTICS COVERING ELECTRIC PASSENGER MOVEMENT AND "POWER RATE" CONSTANTS FOR DIFFERENT SERVICES—WESTBOUND.

	New Haven express trains	Stamford express	Stamford local	Port Chester trains	New Rochelle trains	Total
Number of trains	49	958	604	185	0	1,796
Number of locomotives	78	1,502	791	185	.....	2,556
Number of cars	434	6994	3941	972	.....	12,341
Tonnage	31,903	574,569	261,202	62,559	.....	930,203
Train miles	2,940	20,118	12,684	2405	.....	38,147
Locomotive miles	4,620.5	33,044	17,402	2,497.5	.....	57,564
Car miles	24,855.5	146,870	81,076	12,591	.....	265,992.5
Ton miles	1,899,957	12,005,689	5,441,943	811,539	.....	20,210,128
K. W. H. used	60,900	486,203	346,035	62,734	.....	956,772
W. H. Pr. T. M.	32.0	40.3	63.7	77.3	.....	47.4

Haven, and there was but a small percentage of electric service, both as regards passenger and freight between Woodlawn and New Haven. While the tonnage in both passenger and freight service has been greatly increased since that time, these tables, however, may be taken as giving reliable data in connection with the electric train movements recorded. The watt hours per ton mile (abbreviated in tables as W.H.P.T.M.) are secured through meters recording input power to the electric motors. To determine the actual amount of power taken from the contact wire, these figures should be divided by 97 per cent, thus allowing an average loss of 3 per cent for the step-down transformers installed on the electric engines and motive power. As examples of the increments of electric service, since the extension of the electrification to New Haven, while it is to be noted that the total electric passenger ton-miles for June, 1914, were approximately 41,000,000, and that of the freight 9,400,000, the former has now increased to 62,000,000, and the latter to 44,000,000.

Of special interest to the writer with regard to the tables covering electric passenger operation is the variation in watt hours per ton-mile for the various express and local services.

TABLE VI

STATISTICS COVERING ELECTRIC FREIGHT MOVEMENT AND "POWER RATE" CONSTANTS FOR EASTBOUND AND WESTBOUND SERVICE.

	Eastbound	Westbound	Total
Number of trains	109	116	225
Number of locomotives	109	117	226
Number of Cars	2,939	2,829	5,768
Tonnage	106,905	86,706	193,611
Train miles	5,273	5,564	10,837
Locomotive miles	5,486	5,784	11,270
Car miles	142,542	135,792	278,334
Ton miles	5,184,893	4,161,888	9,346,781
K. W. H. used	170,259	137,048	307,307
W. H. Pr. T. M.	32.8	33.0	32.9

For example, it is to be noted that the power rate for New Haven express trains eastbound is 31.4 watt hours per ton-mile, this rate being increased slightly for trains operating to Stamford; the rate rises quite rapidly for trains operating in local service to Stamford, and continues to rise for local trains operating to Port Chester and New Rochelle respectively. It is, of course, well known that the rate of power supply per ton for express operation is very much lower than that required for local operation, as in the case of the latter the train suffers,

under the conditions of braking, the loss of the kinetic energy stored in it under the conditions of acceleration. The increasing watt hours per ton-mile as shown in the tables are practically proportional to the diminishing distance between train stops. It may also be said that the distance between stops increases progressively east of New York City, and if, for example, suburban territory under consideration for electrification has to be served by train schedule with distances between stations approximately the same as those obtaining on the New Haven Road, the "power rate" constants as shown in these tables will be found to be sufficiently accurate in the study of power necessary to train movement.

In the tabulated statistics covering electric freight operation the point of principal interest is the difference between the rate per ton-mile as indicated in the June tabulation as against those tion of heavy freight trains. It was first thought that when these large train units were placed on the line the power house would be subjected to very heavy drafts of power under conditions of accelerating them. The reverse, however, was found to be the case, and where, previous to the operation of these trains, the power station output curve showed peaks of a fluctuating character, these heavy trains have served to smooth out the curve of power station output. A reasonable explanation of this would seem to rest in the fact that when a number of the heavy trains are under translation, and it becomes necessary to accelerate one from rest, the supply of current necessary to this acceleration, while not reducing the line voltage materially, does so, however, to a point which corresponds to a speed of the trains in translation lower than the speed at which they are actually operating, and thus these heavy trains, by their own mass energy, as in the

TABLE VII

STATISTICS OF ELECTRICAL OPERATION— NEW YORK AND SHORE LINE DIVISIONS.
MONTH OF NOVEMBER, 1914, COMPARED WITH MONTH OF OCTOBER, 1914.

Freight Service.

	Past freight.				Slow Freight				Local Freight			
	Eastbound		Westbound		Eastbound		Westbound		Eastbound		Westbound	
	November	October	November	October	November	October	November	October	November	October	November	October
Train miles	3,283	3,484	4,954	7,576	8,485	9,177	6,152	4,880	2,880	3,240	2,933	3,240
Locomotive miles	3,283	3,486	8,042	11,128	16,529	18,036	11,269	9,824	2,956	3,321	3,012	3,321
Loaded car miles	130,147	140,202	159,377	219,435	484,644	529,559	203,556	209,889	29,965	33,803	32,990	37,339
Empty car miles	335	203	60,545	106,040	57,346	59,801	184,978	177,831	16,304	16,339	12,072	20,456
Caboose miles	3,283	3,484	4,954	7,576	8,485	9,177	6,152	4,880	2,880	3,240	2,933	3,240
Ton miles	4,399,743	4,589,492	5,941,893	8,677,627	21,121,401	22,885,161	10,496,232	10,448,521	1,301,163	1,414,569	1,432,065	1,702,877
K. W. H. used	108,740	112,033	186,401	265,088	566,983	571,972	340,830	294,602	118,423	110,757	106,650	114,828
Locomotive miles per train mile	1.00	1.00	1.62	1.47	1.95	1.97	1.83	2.0.	1.03	1.03	1.03	1.03
Loaded car miles per train mile	39.64	40.24	32.17	28.96	57.12	57.71	33.09	43.01	10.40	10.46	11.25	11.52
Empty car miles per train mile	1.10	1.06	13.22	15.00	7.76	7.52	31.07	37.44	6.66	6.04	5.12	7.31
Ton miles per train mile	1,340.16	1,317.31	1,169.41	1,145.41	2,489.26	2,493.75	1,706.15	2,141.09	451.79	436.60	488.26	525.58
Ton miles per locomotive mile	1,340.16	1,316.55	738.86	779.80	1,277.84	1,268.72	931.43	1,063.57	440.18	426.55	475.45	512.76
Percentage of tonnage to rating	96%	95%	.....	.....	94%	93%	.....	.....	.....	.....	.....	.....
Ton miles per hour	26,779	27,335	19,109	18,092	26,008	27,912	18,637	23,297	2,614	2,679	3,423	3,622
Average Speed (m. p. h.)	19.98	20.75	15.93	15.79	10.45	11.19	10.92	10.88	5.79	6.14	7.01	6.89
K. W. H. per train mile	33.12	32.16	37.63	34.99	66.82	62.32	55.40	60.37	41.12	34.18	36.36	35.44
K. W. H. per locomotive mile	33.12	32.11	23.18	23.82	34.30	31.71	30.24	29.99	40.06	33.35	35.41	34.58
K. W. H. per car mile	.81	.78	.83	.80	1.03	.96	.86	.75	2.41	2.07	2.22	1.83
K. W. H. per 1,000-ton miles	24.72	24.41	31.37	30.54	26.84	24.99	32.47	28.20	91.01	78.29	74.47	67.43

Ton miles are based on weight of trailing load.
Percentage of tonnage to rating is found by dividing the total tonnage of trains as they leave Harlem River by the rating of locomotive hauling those trains.
Ton miles per hour is found by dividing ton-miles by the total running time of trains between terminals.
Average speed is found by dividing train-miles by total running time of trains between terminals.

Operating Costs.

	Locomotive repairs		Power		Locomotive Supplies		Engine house Expenses		Enginemen		Trainmen		Total	
	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.
Cost per train mile (cents)	15.51	15.98	28.51	27.90*	.54	.63	.48	.58	10.66	10.44	17.83	17.46	73.53	72.99*
Cost per locomotive mile (cents)	9.69	10.19	17.82	17.79*	.34	.40	.30	.37	6.67	6.66	11.14	11.13	45.96	46.54*
Cost per 1,000-ton miles (cents)	9.95	10.16	18.30	17.73*	.35	.40	.31	.37	6.84	.663	11.45	11.09	47.20	46.38*

* Revised.

shown under the general tabulation of freight service (Table VII), where it is to be noted that the kilowatt hours for fast and slow freight are, on the average, considerably below 30 watt hours per ton mile, this rate being based upon the tonnage of the trailing load. Allowing for the weight of the electric engine, the watt hours per ton-mile will be reduced to 26, and, as some 200,000,000 ton-miles have been actually recorded by meter registration in freight service, it may be said that 30 watt hours per ton mile on level track is a reliable figure, with slight margin to cover electric freight operation in a combination of fast and slow service; *i.e.*, without stops for trains averaging between 1,500 and 3,000 tons trailing load.

It is of interest at this juncture to point to an interesting experience we have had in connection with the electrical operacase of a flywheel, automatically release a large amount of power, which becomes available for the accelerating train.

The matter of savings to be effected in engine repairs are subject to local conditions, for, while it may be said that steam locomotive repairs, upon an average, may be placed at 10 cents per locomotive mile, on the other hand there may be situations where the railroad has, for example, to use water of severe scaling characteristics and thus run up the cost of repairs excessively.

In the matter of train miles the savings to be effected are dependent upon local conditions, but it can be stated as a general conclusion, based on a very considerable experience, that electric engines of the order of 100 tons on drivers should be maintained at a rate not exceeding five cents per locomotive mile,

and that the coal bill for transportation is cut to at least one-half.

Having determined for any situation what savings can be effected by the substitution of electricity for steam, then, as previously stated, the commercial justification of a change to the new motive power is entirely based upon whether these savings will cover the interest, insurance, depreciation and taxes on the electrical investment necessary.

The motive power feature of electrification, like its other parts, has virtually reached the pound stage. Electric locomotives of approximately 100 tons will, under present conditions of cost of labor and material, vary between 18 cents and 20 cents per pound. This figure is practically irrespective of speed-torque characteristics, a high-speed passenger locomotive and a low-speed switcher not varying greatly in cost upon a pound basis. Multiple-unit cars, now usually built of steel, do not vary greatly in the density of traffic and in the use of a large number of electric engines by which we can save enough money to pay for the capital expenditure necessary to the supply of power to them for the operation of many trains.

In conclusion, I would plead for an especially conservative point of view on the part of the public with regard to electrification. While the savings to be effected under certain conditions of electrification may be considerable, on the other hand the construction investment necessary to these savings may be very great. So many roads in this country have either passed or lowered their dividends that it is hardly necessary to emphasize the fact that only a healthy condition of finance throughout the country will warrant the consideration of electrification, and again I would say that partial electrification, such as that applying to yards only and not main line, while it might prove of

TABLE VIII

STATISTICS OF ELECTRICAL OPERATION— NEW YORK AND SHORE LINE DIVISIONS.
FOR THE MONTH OF NOVEMBER, 1914, COMPARED WITH THE MONTH OF OCTOBER, 1914.

Line and Equipment Failures.

	Line failures																													
	Catenary insulator failures				Dead end failures				Other line failures				Equipment failures				Signal failures				Outside interference				Failures of employes				Total failures			
	Nov.		Oct.		Nov.		Oct.		Nov.		Oct.		Nov.		Oct.		Nov.		Oct.		Nov.		Oct.		Nov.		Oct.		Nov.		Oct	
	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay	No.	Total Delay
Between Woodlawn and Stamford	1	22	1	14	..	..	..	..	1	..	1	8	..	...	1	143	..	..	1	..	2	..	3	..	.	..	..	..	4	22	7	165
Between Stamford and New Haven	2	..	..	..	..	..	..	..	3	41	4	47	6	141	5	23	1	15	..	..	2	..	..	..	.	..	..	..	14	197	9	70
On New Canaan Branch	..	..	..	..	..	..	..	..	..	..	..	..	..	...	..	...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	...
On Harlem River Branch	..	..	..	..	..	..	..	..	1	13	1	7	..	..	..	...	..	..	..	..	..	..	..	..	..	..	..	..	1	13	1	7
In Yards	..	..	..	..	3	..	1	..	2	7	4	..	4	28	1	...	..	..	..	..	..	..	..	..	1	..	..	..	10	35		...
Total	3	22	1	14	3	..	1	..	7	61	10	62	10	169	7	166	1	15	1	..	4	..	3	.	1	..	.	.	29	267	23	242

Equipment Failures.

Class of service	Heated parts		Broken parts		Grounds		Miscellaneous		Total failures		Miles per failure		Minutes detention per failure	
	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.	Nov.	Oct.
Passenger	1	4	2	1*	20	25*	12	6	35	36*	7,071	7,328*	11	13*
Freight	1	2	1	2	3	2	0	1	5	7	13,183	9,596	56	60
Switch	0	0	0	0	0	0	0	0	0	0	40,964	39,624	0	0
Multiple	3	0	2	1 *	2	0	11	11	18	12*	3,554	4,331**	18	7*
Total	5	6	5	4*	25	27*	23	18	58	55*	7,213	7,672*	17	18*

from the above figures, but, if anything, may be quoted as being slightly higher in cost per pound. As a concrete example, I would say that a first-class, high-speed, 100-ton, straight alternating-current electric passenger locomotive, capable of handling a 250-ton trailing load in normal large city suburban service, should cost $40,000. A steam locomotive which would do the same work would probably not cost more than $15,000, but the savings effected due to the greater operating economy of the electric engine would represent a figure of twice or three times the amount invested in the electric engine. Thus we might say that for every electric engine we purchase we would be justified at least in making a capital investment of $40,000 to cover the cost of electric power houses and transmission equipment necessary to supply that electric engine with current. By this reasoning we again approach the answer as to the conditions affecting the success of main line electrification in the fact that it is advantage to a public, might at the same time prove to be a serious and unfair burden for the railroad to carry.

PRUSSIAN STATE RAILWAYS.—In a semi-official communication just issued in Berlin, the communal authorities are warned, in making up their revenue estimates, not to count on receiving any communal income tax from the Prussian state railways on account of lines passing through their districts. The communication says that, while there has recently been some increase in the railway earnings, the falling off in the receipts during the first month of the war was so great as to leave little prospect of a credit balance for the year, and the communes must therefore not count on getting anything from them for the fiscal year 1915.

Public Regulation of Wages of Railway Employees*

Expert Arbitrators Needed; What Is the Base of Reasonable Compensation? Should Arbitration Be Compulsory

By Frank Haigh Dixon
Professor of Economics at Dartmouth College

"The food and clothing of our people, the industries and the general welfare of the nation, cannot be permitted to depend upon the policies and the dictates of any particular group of men, whether employers or employees, nor upon the determination of a group of employers and employees combined. The public utilities of the nation are of such fundamental importance to the whole people that their operation must not be interrupted, and means must be worked out which will guarantee this result."

These concluding words of the arbitrators in the dispute between the locomotive engineers and the railways in 1912 give warning of a situation to which the public has been singularly indifferent. The railway provides a service which is a necessity of the entire people, and the interruption of this service is a national calamity. Wage increases in this industry are usually sooner or later shifted to the shoulders of the people at large in the form of increased rates. The public's interest in railway labor controversies is supreme, and should assert itself far more effectively than it has thus far in the consideration or adoption of any plans for wage regulation.

There are today on the payrolls of the railways of the United States nearly two million men, who receive in wages annually a billion four hundred million dollars. Forty-five per cent of the gross revenues of the carriers is paid out again in wages; and of the total expense of operating all the railways in the country, nearly 65 per cent is chargeable to labor.

This great body of wage earners is by no means homogeneous. Its membership ranges all the way from the alert, intelligent, well-paid engineer down to the shifting class of day laborers engaged in track work. Neither are all classes organized to the same degree of efficiency and power. The bargaining strength of the great mass of track workers amounts to little. Above these, but below the top, is a considerable group of occupations with organizations that are generally affiliated with the American Federation of Labor, such as the wood and metal workers, machinists, signalmen, clerks and station agents. Finally at the top are the four brotherhoods directly engaged in train service. Although these four unions contain not quite a fifth of the whole number of employees, they represent the dominant element in the railway labor world, and it is largely in connection with them that experiments in wage regulation have been tried out in this country.

THE TENDENCY TOWARD STANDARDIZATION

Concerted movements among employees in train service began in 1907, and have grown in frequency until now, except for minor local grievances, they may be said to be well-nigh the only method by which the demands of the brotherhoods are presented. At first the roads resisted, but the brotherhoods became so effective in such cases in securing the same results from the roads successively that they would have obtained from them collectively that the railways gave up the fight, and have for several years conducted their important negotiations as a group. Territorial controversies have now become the rule, and have such strategic advantage for the men that they are not likely to be abandoned. One territory is now matched against another where formerly it was one road against another. The most significant result has been the marked movement toward complete standardization of wages and working conditions throughout the territory involved. The railways have resisted this movement on the ground that differences in physical characteristics of roads, in traffic density, and in ability to pay have made complete standardization inequitable. It has been generally held by arbitrators that a worker is entitled to his hire, that if a road cannot pay a proper wage it must seek relief in an enhancement of its earnings, and that the public will not permit a road to furnish an inferior service through the employment of an inferior grade of men at wages below the prevailing level. This position must be accepted as sound. There is likewise much in the contention of the employees that many of the weaker roads are so interlocked with the more prosperous ones that their inability to pay standard wages is more apparent than real.

Whether or not there is justification also for disregarding differences in physical and traffic characteristics on different roads, which heretofore have been important considerations in the determination of rates of pay, this much is clear: Such disregard is tantamount to unfair discrimination among employees. It is a disregard of the individual in the larger strategic interest of the organization as a whole.

That the brotherhoods have in mind ultimately a national standard of wages and working conditions, there is some evidence, but a national movement will not be inaugurated until it is found to be strategically advantageous. The first duty of the unions while in the midst of a conflict is to win their case, and they use such arguments as are most effective at the moment. The argument for national standardization was urged by the conductors and trainmen because they were trying to raise the eastern wages up to the level of the west. When they reach the west they are very likely to lay stress on the greater cost of living in that territory, and to insist upon a restoration of the previously existing differential in favor of the western area. The result of it all is to raise the lower end of the wage scale and to smooth out many of the differences in working conditions on different roads and in different territories.

A further movement is now in progress to secure the association of all the brotherhoods in one united demand upon the roads. On more than twenty-five railway systems federation of the four brotherhoods is in effect, and on others working agreements exist between two or three of these organizations. Recently the articles of federation of these four unions have been revised to permit co-operation with other organizations whose membership is exclusively employed by railway companies, such as the telegraphers and railway clerks. For a number of years the conductors and the trainmen have co-operated in their wage demands. The present association of the engineers and firemen in a joint movement in the west may well be considered, in the light of earlier unhappy relations, as a fraternization of the lion and the lamb. Faced by this new ideal of a united labor force in an undivided country, the public may well give heed and devote its best thought to a consideration of its own interest in the outcome.

REGULATION UNDER FEDERAL LAW

The first important federal statute which attacked the railway wage problem was the so-called Erdman act enacted in 1898. The statute covered interstate railways and employees engaged in train service. It designated as mediators two federal officials, the Commissioner of Labor and the chairman of the Interstate Commerce Commission. As controversies assumed larger dimensions and the concerted movement became a regular and apparently a permanent method of negotiation, it was realized that a board of three members, in which the decision lay

*From a paper presented before the American Economic Association.

with one man alone, was too small a body to which to entrust issues of such magnitude. This was the motive for replacing the Erdman act in 1913 with the so-called Newlands act. Certain changes in the form of procedure long recognized as needed were also adopted. The Newlands act provides first for mediation by a board of mediation and conciliation consisting of a permanent commissioner and two other government officials. They are given the power not possessed by the former mediators of proffering their services. In case the controversy goes to arbitration, the board may consist of six members rather than three, if the parties prefer—two representing each side and two intermediaries chosen by a majority vote of the four. In case of failure to choose in this manner, the selection is made by the federal mediators.

We have therefore witnessed in this country a series of concerted movements extending over great stretches of territory and covering the period from 1907 to the present time, in which four different methods of settlement have been applied: Mediation under the Erdman act, arbitration under the Erdman act, mediation followed by arbitration under the Newlands act, and arbitration by voluntary agreement outside the statute. Which of these methods, if any, is a panacea for labor troubles on interstate railways? At the outset it may be asserted that the avoidance of labor conflicts is not the sole object or the ultimate goal of wage-regulating legislation, and that the absence of strikes is not a final index of the success of the laws which have been described. It is of course obvious, particularly when the transportation industry is under consideration, that the maintenance of normal operating conditions is an end greatly to be desired. From the standpoint of the general public, which can only occasionally be made to look below the surface, this appears to be the one and only object of all legislation relative to mediation and arbitration. Moreover, although it would be rash to assert that there will never be another railway strike of large proportions, the likelihood of such an outcome of any controversy is growing more and more remote. We have not had a railway strike of any magnitude for twenty years. It is true that the balance of power in the control of wage conditions has passed for the moment from the railways to organized railway labor. It is true that strike votes are always taken, and that these result in entrusting to the grand officers of the brotherhoods the power to call a strike at their discretion. But these polls are in most instances mere devices to strengthen the strategic bargaining power of the organizations. It is always the confident expectation of the grand officers that possession of the power will make its exercise unnecessary.

Prompt adjustment of the instant controversy was the service that the able mediators under the Erdman act, Judge Knapp and Dr. Neill, performed. They succeeded in nearly every mediation which they conducted in reaching an adjustment to which both sides were willing to agree, and today railway managers and employees are unanimous in commending the work of those public servants. They prevented labor conflicts, an outcome which satisfied the public, and they compromised the disputes with such a degree of success that, although neither side was satisfied, both were willing to abide by the result and the employees were contented to delay for a season a renewal of their attack upon the railway "wage fund."

The wisdom of so framing the statute as practically to designate two specific individuals as mediators became evident, as these gentlemen grew more and more familiar with the complex details of the wage schedule and were able to adjust controversies with increasing intelligence. It more than once happened that they were called in to pass on the merits of an existing schedule which they themselves had had a part in constructing. The element of permanence in the mediating body made possible the development of an expert proficiency in the work of adjustment. The weakness of the method was contained in its very nature. It was a mediation and not an arbitration. The function of the mediators was in no real sense to enter into the merits of the controversy.

This policy of seeking an adjustment rather than a judgment on the merits of the issue is well shown in the engineers' and firemen's case of this present year in western territory in which President Wilson intervened. When the employees presented their demands, the railways canceled existing schedules and made counter-demands. To these the employees vigorously objected, insisting that they would give up nothing that they had gained in their years of struggle, and refusing to consider any terms except those which they themselves had proposed. The federal mediators when called in, accepted the point of view of the employees, apparently because they found that there was no other way to avoid a strike. This "compromise" the employees promptly agreed to, contending that they had gone half way in accepting arbitration at all, since they had earlier asserted that they would never again resort to a method which had produced results so unsatisfactory to them. Hence the railways were put in the position before the public of declining the proposal of a federal mediation board which the employees had accepted. They had been out-manœuvered and their capitulation was inevitable even before they made their call at the White House.

It is worthy of note that in no instance has the original demand for a modification of existing schedules come from the railways. Railway managers have apparently felt it wiser to let well enough alone. They have preferred to cut down or readjust their working forces in times of light traffic rather than bring on a struggle by upsetting fundamental conditions. This is partly to be explained by the fact that during most of the period under consideration railways dealt separately with their own employees, and were in a weaker position strategically than now under the plan of concerted movements. Moreover, it is more than probable that increases in wages did not distress them so seriously in the days when the capacity of their plants left some leeway for expanding business, and when there was a more generous margin between income and outgo.

In view of the fact that controversies have always had their origin in a demand from the side of the employees, the verdict even though a compromise has always resulted in giving something to the men. Even if the railways' unwillingness to grant the demands has merit, there is no way of enforcing their claims. Playing a game in which the cards are stacked against them, they must acquiesce in the outcome, which usually whittles down but never rejects the demands of the employees.

As the size of the contesting forces has widened the gap between employer and employee, as the conflicts have become more serious, and as the increasing gravity of the railways' financial condition has made a wage increase a matter of genuine alarm, resort has been taken more commonly to the method of arbitration. This has meant the choice of one, or under the amended statute two, non-partisan arbitrators. Selection has been a task of the greatest difficulty. In almost no case have the representatives of the contestants been able to agree on the independent member or members of the board, and the burdensome duty has fallen on the government mediators.

SHORTCOMINGS OF THE ARBITRATORS

The independent arbitrator, like the juryman, must have no preconceptions. His affiliations with life must be untainted by contact with railways. If he has ever had experience in an arbitration, he is likely to have incurred the displeasure of one side or the other sufficiently to render him unacceptable. But it is obvious that while impartiality and diplomatic skill are necessary, ignorance of the questions at issue is not. A wage schedule is a complex affair and its complexity is growing with the tendency to lay greater stress on working conditions and less on rates of pay. In the conductors' and trainmen's case, for example, the board had to consider the demands of conductors, baggagemen, brakemen and flagmen in passenger, freight and yard service, in local and through service, in electric and steam service; and it had to pass upon questions such as length of the working day, overtime and how computed, compensation for deadheadings, for double-headed trains, and for holding men

away from their home terminals. The representatives of the two factions are experts chosen for their thorough knowledge of the issues and their skill in presenting them. The umpire enters the hearings usually with no acquaintance even with the elementary principles of railway wage schedules. He listens to the highly technical testimony of witnesses—employees and operating officials—and at the conclusion of the hearings he is set upon in conference by the other two so-called arbitrators. His superficial half-knowledge results in inconsistent rulings, and his lack of background leads him to the natural conclusion that there is merit in the contentions of both sides, and that justice lies somewhere between. The unsatisfactory verdict, frequently ambiguous and conflicting in its different provisions, gives opportunity for a further continuance of the struggle on the individual railways that have been parties to the concerted movement. These decisions of arbitration boards lay down no helpful precedents for future action, and have no general educational value. The situation is in no wise improved when two umpires take the place of one. What is needed in the independent arbitrators is not merely a high degree of mentality or diplomatic skill, or profound knowledge of the labor problem in general, but rather a thorough familiarity with conditions of railway labor.

But not alone in the actual awards have the decisions of the boards been unsatisfactory. In many cases the explanations of these decisions have been unimpressive, and the reasoning unacceptable. A careful reading of the decision in the conductors' and trainmen's case leaves one with a lurking suspicion, which it is difficult to dispel, that the board decided first on the amount of increase to be granted and later found a reason therefor. The engineers' board of 1912 discussed at some length the insoluble problem as to what is the basis of a fair wage. They were forced to the conclusion that the science of economics furnished no answer, and that they could only approximate an answer by comparing railway wages for similar service in other parts of the country and wages in other industries of like character.

It becomes clear then that a substitution of arbitration for mediation has lost to the country and to the contestants the expert service of trained mediators. Moreover, because of the method of selection, and the type of men chosen as intermediaries, the arbitration procedure has become largely a formality resulting in compromise verdicts, which as shown by the discussion have not been thus far as satisfactory to either side as were the agreements under the mediation process. We have not therefore obtained either from the mediation method or that of arbitration results of enduring value. Under the policy of mediation we have developed experts in the interpretation of railway wage schedules, but these experts have been debarred by the very nature of their office from considering issues on their merits. Under arbitration, the forms of a judicial hearing have been conscientiously observed, attempts have been made to weigh evidence and to reach just conclusions; but the men upon whom the burden of decision has fallen have not been experts. One of the important consequences of this is that the public, whose agents the independent arbitrators are supposed to be, has been at a disadvantage, and has not been adequately represented.

It must be clear that we need above all things else, for the handling of these great labor disputes, a group of independent persons who have become expert through permanence of tenure. It would be natural to expect that any permanent body of arbitrators would quickly become unacceptable to one side or the other or both. The long continued success of the mediators under the Erdman act was in large part due to the fact that they made no pretense of settling questions on their merits. A settlement after thorough investigation will not usually strike the middle point between the contesting sides. Again it is the fear of the employers that such a board would "get into politics" and of the employees that it would fall into the hands of the employing class.

If such a board of official arbitrators were created and the parties to the contest should refuse to invoke their services, ought they to be compelled to do so? Ought we to attempt to introduce compulsory arbitration? Such a proposal does not at the present time command serious attention. The enthusiasm for it in this country has perceptibly cooled in recent years.

Is compulsory arbitration desirable?

Compulsory arbitration has not realized its early promise in countries where it has been tried. One of the fairest and most sagacious students of the labor problem in the South Seas, Dr. Victor Clark, has reached the conclusion that compulsory arbitration has been successful only among unorganized laborers and that the powerful trade unions have not been prevented from striking when it has been to their interest to do so. Compulsory arbitration succeeded in the early years when the laborers were securing constant increases in their wages, but the ardor of the unions has cooled as the verdicts have become less favorable. It is of interest to note that even in decisions under compulsory arbitration the lure of the compromise is ever present.

As a matter of fact the situation is hopeless, and will remain so, as long as we delude ourselves into thinking that we can under present economic conditions find a basis for wages in any theory of ultimate reasonableness. It may be that we are not merely chasing a will-o-the-wisp when we are hunting for a reasonable wage, but we are at any rate seeking the unattainable. No more in the determination of a wage scale than in the determination of a railway rate is there an exact mathematical formula for reasonableness. So long as the two parties to the dispute are free to dicker undisturbed by outside influences, the conclusions reached will be the resultant of the bargaining skill and brute force of the contending factions; if arbitrators intervene guess-work and compromise will play their part. Moreover, we are dealing here with an industry in which an interruption of service quickly becomes intolerable. Consequently we cannot permit the contestants to settle their differences by employing the customary weapons of labor warfare. So we set up devices under the sanction of law as a substitute for force. As a rule and in the long run these arbitration boards will give to the men what they might if left undisturbed have secured by their own efforts. The public has gained peace but it has not reached any final solution of the wage problem.

No escape from the obstacles with which this question is beset will here be attempted, but it is submitted that the gravity of the situation will be much relieved, and the question far more intelligently handled, if provision is made for a compulsory investigation by non-partisan experts of the issues involved in any controversy, and for the proper presentation of the results. Specifically, the principle of the Canadian Industrial Disputes act should be adopted in this country. This act declares a lockout or a strike to be illegal until the matters in dispute have been investigated by a government board, and pending the investigation conditions are to remain as they were before the dispute arose. The investigating boards are temporary, appointed for the immediate controversy and discharged when their reports have been rendered. They consist of three members, one representing each side and a third chosen as umpire by the two; or, if the two fail to agree, by the minister of labor. However, these boards are not merely for investigation. In fact, their main purpose is to effect a conciliation and avoid a strike. Our experience with the railway labor situation as summarized in this discussion would lead us to expect that a board chosen in the Canadian fashion would not meet the requirements. While in Canada the same man has frequently served as chairman on different boards; there is no requirement that he shall do so. In this country, in the present temper of labor and capital, there is little likelihood that the same man would be acceptable for long. If a new man is chosen each time he lacks the necessary knowledge and expereince.

The need of expert investigators

Those responsible for the investigation and its results should be permanent government officials devoting their time exclusively

to this work. While an investigation is under way, they might very properly be assisted and checked by representatives of the two sides.

The call for expert investigators is so imperative as to require little argument. In the first place the merits of the immediate issues need to be studied by those who possess the necessary qualifications, and all the facts that would be helpful in creating an enlightened public opinion should be disclosed. Mediators and arbitrators, limited as they have been in time, and restricted to issues directly submitted, have in most cases confined themselves to the immediate wage contract. As a consequence one adjustment has been of little or no assistance for the next. It might well be one of the functions of such a body to make the public realize that a reasonable wage is impossible of attainment. We need much enlightenment on such fundamental issues as the relation of wages to cost of living, and to railway operating efficiency. Such questions as the following are demanding intelligent answers: Is there any logical relation between railway wages and railway output? between wages and the capacity and efficiency of the plant? For example, is there any proper connection between a trainman's wages and an increase in trainload? between an engineer's wages and an increase in tractive power? Again, have the risks and responsibilities of trainmen increased or decreased with the introduction of modern operating tools and methods? Is the working life of a trainman shorter than that of his fellow worker in similar industries outside? How does the railway employee's wage compare with that of workers in other highly skilled occupations? Are the brotherhoods receiving wages out of proportion to those of other classes of railway labor? Is there and should there be any relation between railway wages and railway revenue? Is the question of fair wages involved with the questions of fair interest and fair profits?

A group of permanent investigators would develop skill in weighing evidence, would build up a body of valuable precedent, would accumulate an experience that would be enriched constantly with the passing of years. For these labor struggles move in cycles, and the issues that investigators had passed upon would appear again in familiar form as the basis for later demands. Moreover, these men would acquire facility in the presentation of the results of their investigations in terms that the public could understand. It is essential, if public opinion is to be invoked in aid of settlements, that the issues shall be freed of all technicalities and stated in a manner to arouse public interest and stimulate public discussion. The difficulty of such a task is often underestimated.

The success of the investigators in settling disputes during the progress of the investigation would depend upon the personality of the government investigators and their skill in building up a reputation for impartiality. The tendency would of course be for them to become increasingly unpopular as time went on, for their conclusions concerning issues investigated, if of a character to command public confidence, would frequently strike hard at the contentions of one side or the other. But whether these investigators are to be permanently acceptable to the opposing factions is not after all the controlling consideration. These are public questions and it is the public that demands enlightenment.

As already noted, such a plan would forbid strikes or lockouts during the period of investigation. After the results were published, this restraint would be removed. But the likelihood of a labor outbreak following the publication of the results of an investigation would be remote. The very fact that the contestants would be compelled to delay their conflict would have a tendency to develop a spirit of compromise. This is of great psychological import in any impending quarrel. Again, the territory involved is so vast, the leaders of the labor organizations are so mindful of their great responsibilities, the railway managers are so sensitive to public opinion and so watchful of their earnings, that strikes in any event are not at all probable in the future in connection with this class of controversies. Moreover, the probability of a strike is very greatly lessened when the public has once become thoroughly informed on the issues and is prepared to take a hand.

As for the amendment of our existing statutes covering mediation and arbitration, this may, except in details, properly be left until the results of compulsory investigation have been appraised. It has been suggested that the Newlands act should not be confined to employees in train service, but should be extended to include all railway employees; and it has been proposed that there should be some sort of co-ordination between the board of mediation and conciliation and the Interstate Commerce Commission in the matter of increased wages and increased rates. It may be, as has many times been suggested, that the Interstate Commerce Commission will be obliged eventually to give more attention to operating expenses and to take over the regulation of railway wages. It is clear that the commission at present is not disposed to fall in with the suggestion usually made by arbitration boards, and raise rates to compensate for the increased wages that the boards have awarded. That these boards have taken a sound position in insisting that they have no concern with the ability of a road to pay has already been conceded in this discussion. But the fact remains that the margin of railway net revenue is growing constantly narrower, and that the railways are contemplating with much concern the steady increase in wages which they are unable to check and the hardening of rates which they are unable to disturb.

No final solution of so perplexing a problem as that of the relations of capital and labor is to be expected within the near future, even in the field of public service corporations, but we can begin at once to study the whole question in a thoroughgoing fashion and with the use of the most highly developed scientific methods, and thus lay the foundation for a larger participation of the public in the settlement of disputes in which its interest is so fundamental.

ELECTRIC INTERLOCKING AT AULON, TENN

An all-electric interlocking plant has recently been put in service at Aulon, Tenn., at the crossing of the Nashville-Memphis main line of the Nashville, Chattanooga & St. Louis with the Illinois Central's line leading to its new yard in South Memphis, and with the main line of the Louisville & Nashville, all of which are double tracked. The Union, a single track belt line railway, also crosses the L. & N. at this point. The tower is a two-story brick structure. The machine is of the G. R. S. unit-lever type, containing 88 spaces, having 53 working levers operating 61 functions. The power for the plant is furnished by the Memphis Consolidated Gas & Electric Company, at 220-volts, a. c., with a frequency of 60. For the electric lights, both in the tower and in the signals, and for one winding of the track relays, the current is transformed to 110 volts. The track circuits are alternating current, but for the mechanisms and control d. c. is used. Emergency power is supplied by Edison storage battery A-4-H type, consisting of 90 cells of 150 a. h. capacity. This is available for the operation of the interlocking machine and all switch and signal motors, as well as for lighting purposes.

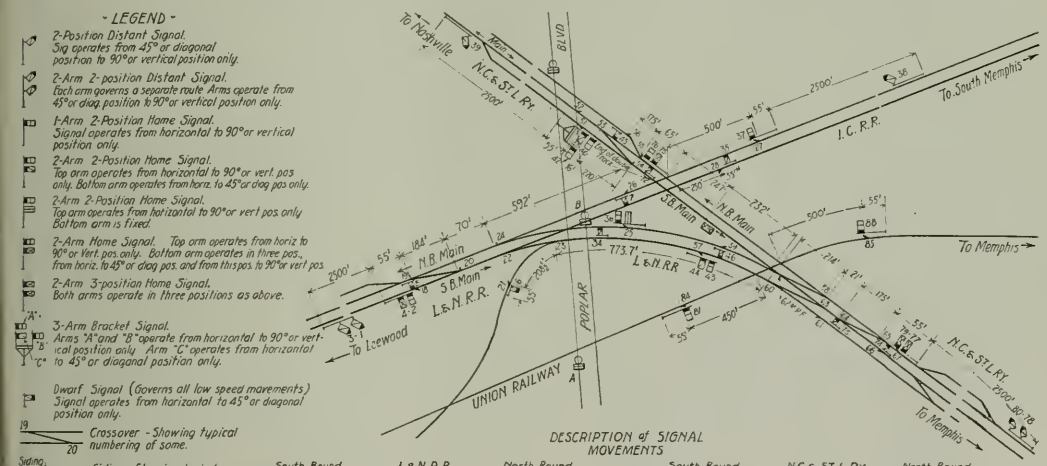
The high signals are G. R. S., model 2-A, with top-post mechanism, mounted on iron posts, working in the upper quadrant. Home signals have three positions wherever there is another home signal in advance; otherwise, they operate in two positions. The home signals are semi-automatic; the 45 to 90 deg. positions being controlled by the track circuits, so that after a train enters a section the signal cannot be cleared by the leverman until the train passes the insulated joint at the end of the track circuit for that section. Distant signals are two-position, operating from 45 deg. to 90 deg., each distant signal being operated by a lever in the tower and also controlled by a circuit breaker on the home signal in advance. The dwarf signals are G. R. S., model 3, solenoid type, working in two po-

sitions, 0 to 45 deg., and are controlled entirely from the tower. On the top of the tower there is a low-voltage electric horn for giving signals to call the attention of switching crews, and also for calling the maintainer when he is needed. The night indications of signals are green for proceed, yellow for caution and red for stop. Derails on the high speed tracks are Morden lifting type and on low-speed tracks of the Hayes type. Both detector circuits and 53-ft. detector bars are used.

Poplar boulevard, which crosses all four railroads, is a street on which there is a dense traffic, many automobiles using it, especially at night. Realizing that the occupants of automobiles might frequently fail to hear the ringing of the ordinary crossing bell, and fail to note the approach of trains, a signal of the Brach type was installed—the "automatic flagman." This gives both a visible and an audible warning. It contains eight stationary electric lamps with red lenses showing on the street in both directions. These lamps are automatically lighted one after the gine to move over the crossing; but since the signals go to stop automatically as soon as the leading end of a train passes them the control wire is looped in multiple through the back contacts of all the track relays in the circuit which include the sections of track crossed by the street; so that the bell continues to ring, through the track relay control, after the signal has gone to stop, and until the train has passed the crossing.

Previous to the installation of this plant, the numerous switches were operated by switchtenders and by trainmen, using hand signals. Six switchtenders were employed regularly, three of whom were operators. Switches were only lined up for through trains. Freight train and switching crews had to throw the switches themselves and also protect their trains by flags, when necessary.

The instructions for trainmen were formulated with special care and were accompanied by large scale charts prepared by the signal engineer of the Nashville, Chattanooga & St. Louis.



Descriptive Chart Prepared for Trainmen; Electric Interlocking at Aulon

other in a manner to give the effect of a swinging red lantern. Above the lights in large lettering, is the sign, "Railroad Crossing," and a large locomotive-type bell, which sounds as trains approach.

The unusual conditions under which the "automatic flagman" and bells were to operate were taken into consideration, and special circuits were designed to meet these conditions. As all the railroad lines cross Poplar boulevard, a proceed indication must be given by a home signal in every case before it is necessary for the automatic flagmen to start operating. The control circuits for the automatic flagmen were therefore looped in multiple through the circuit breakers on all of the home-signal levers which govern a route over the crossing. The contacts on the levers are normally open; that is, when the signals are at stop; and they are closed when the lever is changed to clear a signal. Thus the automatic flagmen would continue to operate only so long as there is a signal clear to permit a train or engine to move over the crossing; but since the signals go to stop automatically as soon as the leading end of a train passes them the control wire is looped in multiple through the back contacts of all the track relays in the circuit which include the sections of track crossed by the street; so that the bell continues to ring, through the track relay control, after the signal has gone to stop, and until the train has passed the crossing.

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The instructions for trainmen were formulated with special care and were accompanied by large scale charts prepared by the signal engineer of the Nashville, Chattanooga & St. Louis. This chart, which is illustrated, was posted on the bulletin boards of all the roads several weeks in advance.

The apparatus was furnished and installed by the General Railway Signal Company, under the supervision of G. S. Pflasterer, signal engineer of the Nashville, Chattanooga & St. Louis. The rubber covered wire, of which there is 160,000 ft., was furnished by the Kerite Insulated Wire & Cable Company, New York

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Railway Extension in Italian North Africa.—The 20-mile railway from Azizia to the foot of the Garian mountains in Tripolitania was opened to public use on January 21, 1915. This is known as the Azizia-Henscir el Abeat division, and in addition to the terminal towns serves stations at Bir Cuca, Laim Aimirat and Cave. The two trains that formerly operated daily in each direction between Tripoli and Azizia, now run to Henscir el Abeat.

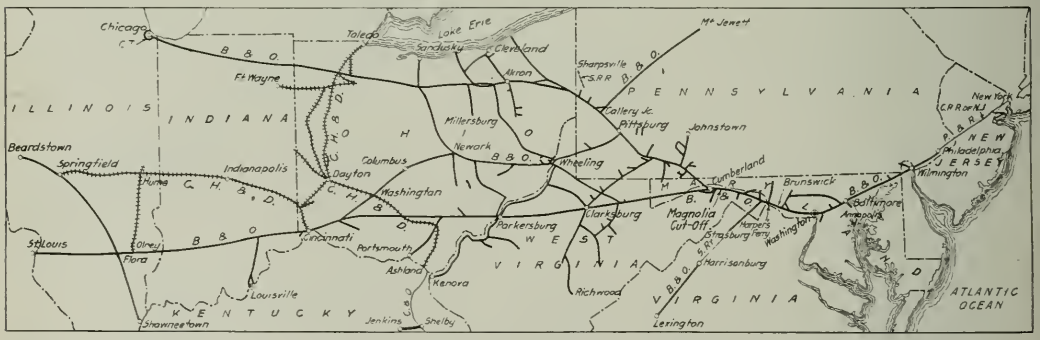
Reasons for Building the B. & O. Magnolia Cut-off*

Low Grade Double Track Line 12 Miles Long Costing $6,000,000 Relieves a Serious Operating Problem

By A. W. Thompson
Third Vice-President, Baltimore & Ohio

During the period of 17 years in which the construction of the original line of the Baltimore & Ohio between Harper's Ferry, W. Va., and Cumberland, Md., was under consideration, many routes were surveyed on both sides of the Potomac river. On account of a lapse in the company's Virginia charter and a provision in the law extending the charter, that the route must lie in the state of Virginia, the company was forced to adopt a line south of the river. This location had other decided advantages, however, as it reached the fertile valleys bordering on the tributaries of the Potomac, avoided interference with the Chesapeake & Ohio canal then far advanced in its construction, and was cheaper than a line north of the river by $2,625,000. The final location of this line was made in September, 1839, and the road opened to Cumberland in November, 1842. On account of the necessity for avoiding heavy construction work a line with heavier grade but shorter than the circuitous route following the river was adopted. The original line included three tunnels, all branch, and ascending a 0.3 per cent grade to the foot of a 20 mile helper grade of 0.75 per cent at a point 8 miles west of Pinkerton on the Connellsville division. The estimates show that it would require approximately $17,755,000 to construct a new line and revise the present one on such a basis. At the summit of the mountain the 1.23 per cent line through Sand Patch tunnel could be replaced by one commencing at Garrett, Pa., having a 0.3 per cent eastbound grade with a tunnel 13,500 ft. long. This revision would cost $4,312,000. These new lines and revisions would permit operation on a 0.3 per cent basis from the Fairmont coal fields eastbound to the summit of the Allegheny mountains with a helper grade of 20 miles.

On the east side of the summit the grade is descending eastbound until the location of the recent Magnolia improvement is reached. At this point the completion of this work provides a 0.1 per cent eastbound grade to Cherry Run, where a 0.3 per cent helper grade has been established eastward to Hedgesville. From



Map of the Baltimore & Ohio System Showing Location of the "Neck" Between Cumberland and Brunswick in Which the Magnolia Cut-Off Improvement Is Located

of which have now been eliminated, the last being a part of the Magnolia cut-off improvement.

HANDLING COAL TO TIDEWATER

In January, 1844, the new road was offered a contract for hauling 175 tons of coal, pig iron and bar iron for 300 days in the year at a rate of 1½ cents per ton mile. From this beginning the semi-bituminous coal trade on the Baltimore & Ohio has grown to 30,000,000 tons a year, the gross revenue from which is 0.4 cents per ton mile. If a new project were considered for handling this traffic from the Maryland, West Virginia and Pennsylvania fields to tidewater, undoubtedly a line with grades against eastbound traffic not exceeding 0.2 per cent could be built over these ridges with a tidewater terminal located at some point on the Potomac river.

During the growth of this business the question of more economical operation has been constantly studied and many surveys have been made covering various lines from the Fairmont, W. Va., region to tidewater. It has been found possible in these surveys to establish an eastbound low grade line beginning at Van Voorhis on the Fairmont, Morgantown & Pittsburgh Hedgesville to Harper's Ferry surveys have been completed which show that for $3,500,000 a low grade line can be constructed, having a maximum eastbound grade of 0.1 per cent. These surveys have been made looking toward the future when it is thought the eastbound tonnage will have grown to such proportions that more economical operation will be necessary and the large expenditures will be justified.

EAST END OF CUMBERLAND DIVISION

The congestion on the 102-mile freight division between Cumberland and Brunswick was serious as early as 1900, and various improvements were considered, including the Magnolia cut-off. Owing principally to the heavy expenditures necessary to add to the track facilities along the Potomac river, however, they were postponed from time to time. At Cumberland, two double-track lines, one from Pittsburgh and Chicago, and the other from Cincinnati and St. Louis, meet and form the main line east. At Patterson Creek, 8.1 miles east of Cumberland, a freight cut-off joins the main line from the Cincinnati-St. Louis line, which eliminates handling this freight through Cumberland. These two double-track lines merge into a three-track road from Patterson Creek to Little Cacapon, 13.9 miles, at which point there is a westbound passing siding. From the latter point to Magnolia, 7.5 miles, there are but two tracks with a westbound siding

*Abstracted from a paper presented before the Engineers' Society of Western Pennsylvania, November 24, and published in the December, 1914, Proceedings. A description of the interesting construction features of this important work was published in the *Railway Age Gazette* of July 17, 1914.

at Magnolia. An additional freight running track is provided from Magnolia to Hansrote, 9.5 miles, at the foot of the helper grade. From Hansrote to Orleans Road, 4.7 miles, there are two tracks on an 0.8 per cent grade, eastbound, against the

follows: 14 per cent fast freight, 84 per cent slow freight, 2 per cent package local. The average daily movement on the east end of the Cumberland division for a 10-day period, ending March 10, 1914, is shown in the following table:

Average Daily Movement—East End Cumberland Division
For Period 10 Days Ended March 10, 1914

East	Miles	Passenger trains	Fast freight trains	Slow freight trains	Total	Loads	Empties	Total	Gross tons per mile of road	Tons per train	Ratio
Keyser to Patterson Creek	20.2	6.4	.3	9.0	9.3	561	3	564	37,920	4,477	43.1
Cumberland to Patterson Creek	8.1	13.4	5.8	11.6	17.4	929	32	961	48,797	2,804	55.4
Patterson Creek to Cherry Run	57.1	13.4	6.1	20.7	26.8	1,506	38	1,544	88,048	3,285	100.0
Cherry Run to Cumbo	10.8	13.4	6.1	20.6	26.7	1,359	31	1,390	78,590	2,943	89.3
Cumbo to Brunswick	26.4	13.4	5.7	12.6	18.3	922	30	952	50,387	2,761	57.2
West											
Brunswick to Cumbo	26.4	16.2	4.3	13.9	18.2	266	744	1,010	24,563	1,349	60.0
Cumbo to Cherry Run	10.8	16.2	5.3	20.3	25.6	331	1,103	1,434	35,459	1,385	86.7
Cherry Run to Patterson Creek	57.1	16.2	5.3	21.7	27.0	387	1,237	1,624	40,907	1,515	100.0
Patterson Creek to Cumberland	8.1	16.2	3.5	11.7	15.2	250	537	787	21,819	1,435	53.3
Patterson Creek to Keyser	20.2	6.2	1.8	9.6	11.4	116	648	763	16,980	1,489	41.5
Patterson Creek & Cherry R.—E.&W.	....	....	11.4	42.4	53.8	1,893	1,275	3,168	128,955	2,396	....

ruling movement from Hansrote to the summit at Doe Gully tunnel. From Orleans Road to Cherry Run, 25.3 miles, there are three tracks with a four-track section from Sir John's Run to Hancock, 5.1 miles. At Cherry Run the main line which is double track, ascends an 0.8 per cent grade for a distance of 7 miles to the summit at North Mountain. From Cherry Run to Cumbo there is a low-grade, eastbound double-track freight line, 14 miles long, which passes around North Mountain and joins the main line again at the latter point. From Cumbo to Fawver, 3 miles, there is a double-track line and from Fawver to Opequon, the foot of a helper grade, there are three tracks, the third being the eastbound running track, and an 0.8 per cent ascending grade begins at Opequon, which continues to the summit at Hobbs, 7.3 miles. From this point to Engles, near Harper's Ferry, 5.8 miles, there is a double-track line with an 0.8 per cent descending grade and a westbound third track. From Engles to Weverton, 6.2 miles, there is a double-track line. Brunswick yard, the east end of the freight division, is situated just east of Weverton.

The division is operated for a general grade of 0.3 per cent, eastbound, using helper engines over the two 0.8 per cent grades. With the completion of the Magnolia cut-off, helper engines at Hansrote will be eliminated, which will permit a continuous movement of freight trains between Cumberland and Martinsburg, the part of the road of greatest traffic density. From Martinsburg east over the third summit, the use of helper engines will be continued until the low-grade line between Martinsburg and Harper's Ferry will have been built. The elimination of the 2½-mile helper grade at Hansrote was delayed on account of the very rough country and the circuitous route of the river, pending a decision in regard to a general change which would shorten the line and reduce the curvature in addition to eliminating the helper grade.

The Traffic and Resulting Congestion

A diversified business is handled over this line, the preponderance of which is soft coal. There are three points of interchange with other roads, at Cumberland with the Pennsylvania, the Cumberland & Pennsylvania, the Georges Creek & Cumberland and the Western Maryland, at Cherry Run with the Western Maryland, and at Martinsburg with the Cumberland Valley. At the latter two points, 47 and 71 miles respectively east of Patterson Creek, 43 per cent of the eastbound freight leaves the B. & O. for eastern Pennsylvania and New England delivery, coal being the principal commodity diverted. The Cumberland Valley is also the route of the Central States Despatch.

The greatest density of traffic on the B. & O. system, that is, the number of trains handled as well as the ton miles per mile of road, obtains between Patterson Creek and Martinsburg. There have been handled annually 20,000,000 net tons of freight per mile of road between these points and an average of 15,000,000 net tons per mile of road over the entire freight division between Cumberland and Brunswick. This traffic is divided as

As shown in the table, the heaviest tonnage is handled between Patterson Creek and Cherry Run, the number of trains being approximately the same in each direction. The eastbound gross tonnage amounted to 68.1 per cent of the total, consisting of 97.5 per cent loaded, and 2.5 per cent empty cars, while the westbound freight movement comprised 23.8 per cent loaded and 76.2 per cent empty cars. Of the total cars operated, 97 per cent carried full rated tonnage, which is a very high average. The highest average miles per car per day for the system obtains on this division for two reasons, first, because of the through movement and the large number of cars handled and second, because of the small amount of business originating in this territory.

The most serious congestion in handling this heavy traffic was, of course, on the helper grade between Hansrote and the summit at Doe Gully tunnel. Six or seven eastbound freight trains were always in the vicinity of this helper grade, either moving or waiting for track and on account of the helper engines having to use the westbound track down the grade, the westbound traffic was frequently delayed and the delay to helper engines, in turn, delayed eastbound trains.

Improvement in Operation 1910-1914

The congestion in this portion of the line, referred to as the "neck of the bottle," became so serious in the latter part of 1910 that conditions were given particular study with a view to taking care of the business offered at that time, as well as to provide for increased business. Had a revision of grade and line been worked out and decided upon at that time, and the money appropriated, the completion of the work could not have been accomplished in time to take care of the business offered, as it would have required at least 18 months to two years to complete any scheme presented for the Magnolia cut-off, and from four to six months to get any relief whatever from third track along other portions of the division. It was therefore necessary to do something at once and existing financial conditions demanded exceptional care in making expenditures.

In order to secure immediate results it was decided to order Mikado locomotives for immediate delivery, to construct additional automatic signals, and build third tracks where they could be laid on that portion of the line not affected by the proposed Magnolia cut-off, establish signal indications for the operation of trains, and provide more and better supervision. The Mikado locomotives ordered for this division weigh 284,500 lb., and have 55,000 lb. tractive power with 26.2 per cent greater hauling capacity than the consolidation locomotives previously used. A vigorous campaign was also started for a better carload, a decrease in the number of cars hauled, and an increase in the number of revenue tons per train.

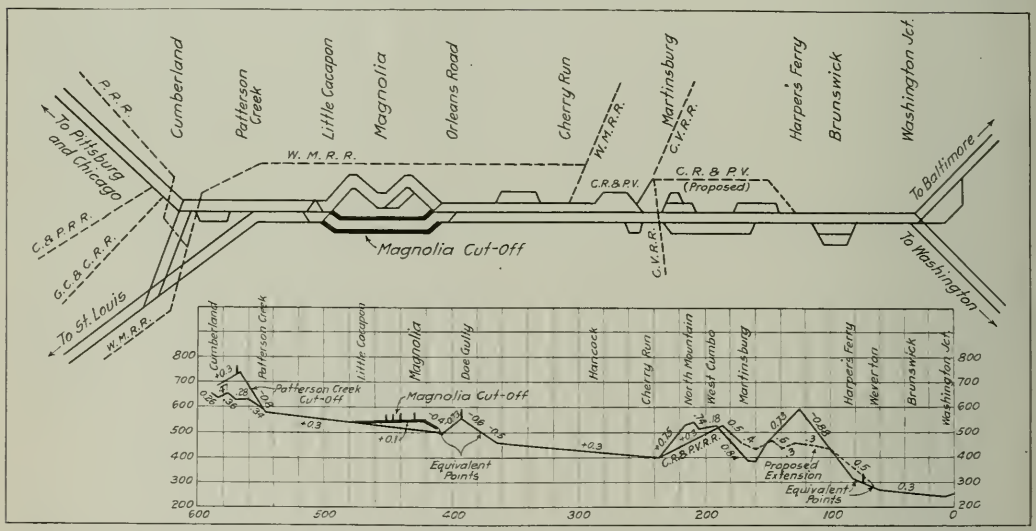
The various passing sidings and freight tracks both east and west of the 17-mile section of road which was to be improved by the Magnolia cut-off, were coupled and extended, thereby securing maximum freight running trackage for a considerable

distance at each end of the proposed improvement. Interlocking towers were placed five miles apart and crossovers constructed between tracks to permit of parallel movements. In this three-track layout, the middle track was equipped with automatic signals to permit movements in both directions and the operation of all trains in this district was placed under signal indication, eliminating train order movements, the third-track system particularly lending itself to increased efficiency because of its flexibility in permitting almost four-track operation. No 16 frogs were installed in crossovers, which, when used, were covered by upper-quadrant, low-speed signal blades. A main-track coaling tipple, ash pits and water facilities were placed at Sir John's Run, half way on the freight run east from Cumberland, which resulted in a reduction in the cost of operation. Additional supervision was secured by placing well-trained men both on the road and in the superintendent's office. Particular attention was given to following the makeup of trains to reduce the number of breaks-in-two to a minimum, and further to see that each train was given its full tonnage rating. Inspectors were also placed in the coal region to see that each car was loaded to its capacity.

During the four years 1910-14 the average carload on this division increased 13.4 per cent, the increase in average capacity of system cars during the same period being 5 tons, or 13.5 per cent. As an indication of the results secured by these measures the following table shows a comparison of operating statistics for this division between the fiscal years 1910 and 1914, indicating a considerably increased volume of business and a marked increase in efficiency:

Operating Statistics

Description	Fiscal years 1910	Fiscal years 1914	Increase or decrease	Per cent
Miles of road	117.00	117.00	.....	....
Miles of main track	344.47	369.73	25.26	7.3
Miles main track and sidings	468.07	504.27	36.20	7.7
Passenger train miles	778,198	997,152	218,954	28.1
Passenger car miles	6,413,969	7,227,397	813,428	12.7
Avg. trac. power per pass. loco.	Light Pacific	Heavy Pacific	.....	....
Avg. mileage per pass. loco.	15.5	18.9	3.4	21.9
Cars per train	456,625	760,060	303,435	66.5
Type of passenger locomotive	29,500	40,200	10,700	36.3
Avg. number of pass. locos.	4,310	4,475	165	3.8
Tractive power of pass. locos.	8.25	7.25	1.00	12.1
Pass. car miles per mi. of road	54,800	61,800	7,000	12.8
Gross ton miles	3,976,266,271	4,460,587,008	484,320,737	12.2
Pass. car miles per locomotive	34,500	31,870	2,630	7.6
Pass. car mi. per mi. main track	18,630	19,540	910	4.9
Net ton miles	1,997,887,181	2,316,743,150	318,855,969	16.0
Revenue train miles	2,826,043	2,165,716	660,327	23.4
Freight engine miles	3,117,261	2,318,263	798,998	25.6
Loaded freight car miles	68,539,339	69,990,517	1,451,178	2.1
Empty freight car miles	39,899,356	43,752,856	3,853,500	9.7
Total car miles	108,438,695	113,743,373	5,304,678	4.9
Percent loaded to total	63.18	61.53	1.65	2.6
Type of freight locomotives	Saturated Hand-fired Consol.	Superheater Stoker Mikado	.....	....
Avg. number of freight locos.	72.9	84.1	11.2	15.4
Trac. power of freight locos.	3,054,510	4,448,890	1,394,380	45.6
Avg. trac. power per frt. loco.	41,875	52,831	10,956	26.2
Avg. mileage per frt. loco.	42,800	27,600	15,200	35.5
Gross ton mi. per mi. of road	33,970,000	38,130,000	4,160,000	12.2
Gross ton miles per mile of main track	11,540,000	12,080,000	540,000	4.7
Gross ton miles per frt. loco.	54,650,000	53,000,000	1,650,000	3.0
Gross ton miles per 1,000 lb. tractive power	1,302,000	1,003,000	299,000	23.0
Train load—Gross	1,408	2,060	652	46.3
Train load—Net	707	1,070	363	51.3
Engine load—Gross	1,276	1,927	651	51.0
Engine load—Net	641	1,000	359	56.0
Car load—Net	29.2	33.1	3.9	13.4



Track Diagram and Profile of the East End of the Cumberland Division Showing Location of the Magnolia Cut-off and Proposed Improvements Between Cumbo and Harper's Ferry

In the four years ended June 30, 1914, the revenue train load increased 51.3 per cent with a decrease in the freight train mileage of 23.4 per cent. The following table shows the decrease in number of trains run in that period and the increase in the net ton mileage:

Comparisons of Car and Ton Miles

Number of freight trains run in 1910	36,082
Number of freight trains run in 1914	28,527
Decrease	7,555
Per cent decrease	20.0
Total freight car miles in 1910	108,438,695
Total freight car miles in 1914	113,743,373
Increase	5,304,678
Per cent increase	4.9
Net ton miles in 1910	1,997,887,181
Net ton miles in 1914	2,316,743,150
Increase	318,855,969
Per cent increase	16.0

A comparison of the freight movements in this territory for 1914 and 1910 is shown in the table on the following page.

Comparison of Freight Movements

	Trains	Per cent Inc. Dec.	Loads	Empties	Total	Per cent Inc. Dec.
Keyser, East 1910	4,749	....	207,207	1,470	208,677	....
Keyser, East 1914	3,964	16.5	246,414	4,638	251,052	20.2
Cumberland, East 1910	8,795	....	344,744	4,194	348,938	....
Cumberland, East 1914	5,450	38.0	333,034	12,459	345,494	1.0
PATTERSON CRK., E.1910	13,544	....	551,951	5,664	557,615	....
PATTERSON CRK., E.1914	9,414	30.5	579,448	17,097	596,545	6.9
Brunswick, West 1910	9,039	....	118,219	233,956	352,175	....
Brunswick, West 1914	6,307	30.2	107,546	266,770	374,316	6.3
Martinsburg, West 1910	3,412	....	28,160	138,095	166,255	....
Martinsburg, West 1914	2,406	29.4	35,742	154,743	190,485	14.6

These improvements in operation made it possible to take care of a rapidly increasing business, postpone for three years the construction of the Magnolia improvement, thereby saving the interest on a large sum of money that would otherwise have been expended immediately, and to provide additional time for studies of the contemplated line revision.

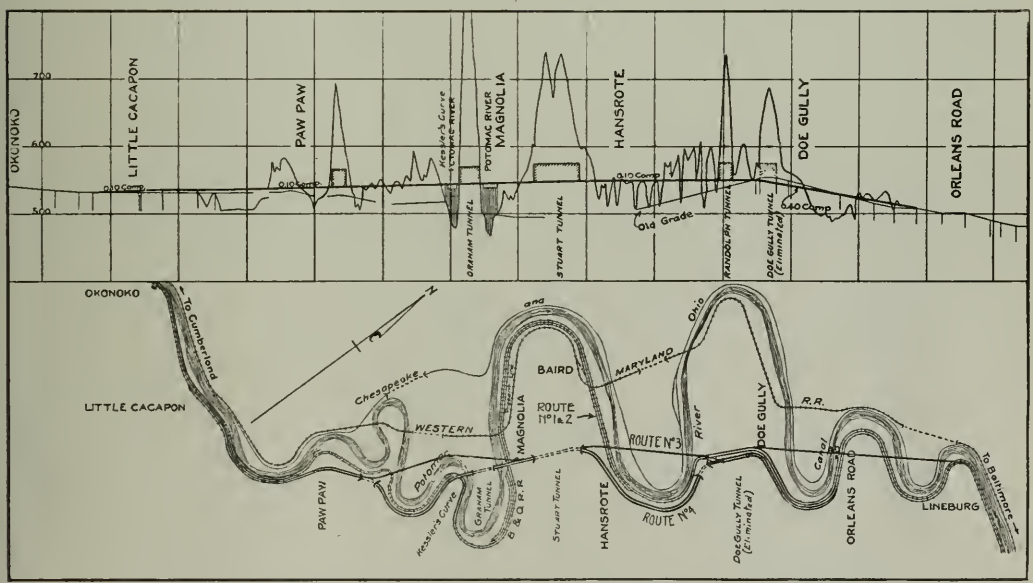
CHANGES IN LINE AND GRADE

The various studies that have been made as to improvements in the operation of the east end of the Cumberland division have shown that it is possible to obtain grades of 0.1 per cent or 0.2 per cent against eastbound traffic which is the loaded and ruling movement, and of 0.15 per cent against westbound traffic with 0.4 per cent helper grades on certain sections. The various studies pointed clearly to the fact that a 0.1 per cent grade is justified as compared with either a 0.2 per cent grade or the present method of operation. This grade would permit a maximum eastbound train load, based on the most economical operation, and the maintenance of a proper balance of power between eastbound and westbound movements. The general proposition to obtain better gradients over the entire division will necessitate the building of a low grade line along the river from Cumbo yard to Harper's Ferry, in addition to the Magnolia cut-off. The former line has been investigated and the recommendation made that any future construction of additional tracks between North Mountain and Harper's Ferry should be along this route.

Before the adopted line of the Magnolia cut-off was located and construction commenced, the studies included locations of both 0.1 per cent and 0.2 per cent lines, as it would be possible to obtain either of these grades on the Cumbo-Harper's Ferry lines. The present 0.3 per cent grade line from Cherry Run to Cumbo will have to be operated with a light helping engine on either 0.1 per cent or 0.2 per cent grades. The completion of the Cumbo-Harper's Ferry lines and the Magnolia cut-off would leave very little additional grade reduction necessary to obtain a 0.1 per cent grade against eastbound movement and a 0.15 per cent grade against westbound traffic, especially if it is considered necessary to revise on that basis only one track for slow freight in each direction.

CONSIDERATIONS IN LOCATING MAGNOLIA CUT-OFF

In taking up the study of the Magnolia cut-off improvement, an investigation covering several years was made of the train movement and tonnage handled, motive power, probable future locomotive tractive power and train loads. The relation of loaded eastbound movement to empty westbound movement being also carefully studied. It was finally decided that an eastbound grade of 0.1 per cent was possible, which would permit the most economical operation, and that a westbound 0.4 per cent grade would take care of the balance of traffic in that direction.



Location of Four Routes Considered for the Magnolia Improvement and Profile of the Adopted Line

The question as to the construction of a new two or four-track line was also given a great amount of study. Four possible propositions were considered; first, a temporary third track alone, the present line retaining the eastbound helper grade; second, two additional tracks along the present line, retaining the helper grade; third, a four-track low grade cut-off abandoning the present line; and, fourth, a two-track eastbound low grade cut-off using the present line for westbound movements. Before the final decision was reached a total of 29 propositions covering various grades and alinements were covered, following practically three routes. These various studies included plans for building the new line in parts over a term of years, and the estimated cost of the lines varied from $1,425,000 to $15,575,000. The following table shows the estimated cost of a few of these

lines; also the annual operating costs, with and without interest, for the present traffic and for double that traffic:

Summary of Cost of Construction and Operation of the Different Lines

Line	Cost of new construction	Number of trains — Present: Annual cost of operation	Present: Annual cost of operation including interest	Double: Annual cost of operation	Double: Annual cost of operation including interest
Present Line and Grade:					
No. 1—Three tracks throughout	$2,235,000	$615,087	$726,837	.....	.....
No. 2—Four tracks throughout	3,375,000	615,087	783,837	$1,230,174	$1,398,924
0.1 per cent *E.B.* — 0.3 per cent *W.B.*					
No. 3—Four tracks throughout	15,575,000	258,724	1,037,474	517,448	1,296,198
0.1 per cent *E.B.* — 0.4 per cent *W.B.*					
No. 4—Two tracks throughout*	6,000,000	284,580	584,580	569,160	869,160

*Two new tracks with present line will make four track line.

The following table shows the saving in distance and curvature for the four principal routes considered:

Statement Showing Saving in Distance and Curvature

Line	Eastbound: Dist. Miles	Eastbound: Saving Miles	Eastbound: Curvature Deg.	Eastbound: Saving Deg.	Westbound: Dist. Miles	Westbound: Saving Miles	Westbound: Curvature Deg.	Westbound: Saving Deg.
No. 1..	20.8	...	2,130	.....	20.8	...	2,130	.....
No. 2..	20.8	...	2,130	.....	20.8	...	2,130	.....
No. 3..	12.5	8.3	495	1,635	12.1	8.7	305	1,825
No. 4..	15.2	5.6	1,380	750	20.8	...	2,130	.....

IMPROVEMENTS EFFECTED BY CUT-OFF

The recommended line No. 4, which was finally adopted and built at an estimated cost of $6,000,000, is a double track line, using the present operated tracks for westbound traffic. This has made it possible to secure a four-track line and derive the benefit from a low grade with the least expenditure. Furthermore, it is believed that the following important characteristics have been secured. First, a minimum grade both eastbound and westbound which will permit the most economical operation; second, a 0.1 per cent grade eastbound, possible over the entire freight division, which will fit in with a general grade revision scheme from the coal fields to tide water; third, a 0.4 per cent grade for westbound business which is practically justified by the probable balance of future traffic; fourth, a four-track system between Little Cacapon and Orleans Road, which will take care of a largely increased volume of business and probably take care of the traffic over the division for a great many years. This section is the first portion of a four-track system, which will gradually be extended from Patterson Creek to Brunswick, a distance of 95 miles.

The Magnolia cut-off was more essential to the development of the Baltimore & Ohio as a system than is shown by the advantages to be gained by economies in operation. In view, however, of the heavy expenditure necessary to provide the additional tracks for the purpose of eliminating congestion that has heretofore existed in the handling of traffic over the east end of the Cumberland division, particularly this 17-mile section, it is reasonable to expect a reduction in the operating costs. Some of the direct savings that may be expected are as follows:

Elimination of Hansrote Helping Station—		
Operation of helping engines	$35,000	
Water station facilities	2,000	
Interlocking tower	3,000	
		$40,000
Overtime account of facilitated movement		20,000
Train mileage, increased tonnage, wages, fuel and supplies, including proportion of locomotives and car repairs	125,000	
Less mileage allowance to crews	20,000	
Total direct saving per annum		$205,000
Total direct saving per month		17,080

The flexibility in operation brought about by the elimination of the cause of congestion will result in a saving equivalent to the cost of operating eight road and two helper engines. It also will avoid bad situations beyond the improved section which will be beneficial in the coal regions where the traffic is assembled, as well as at points of destination, especially tidewater, permitting a quicker movement of traffic over the entire system. Conservatively estimated on the basis of the present business this saving should amount to approximately $500,000 a year.

While it has not been definitely decided, it seems from an operating standpoint that the new line can be better operated by using both new tracks for eastbound freight trains and the present main tracks and third track for east and westbound passenger trains and all westbound freight trains. Although the line is shorter by the new route, this advantage from the standpoint of passenger traffic is offset by the old line having no tunnels and being along the Potomac river for the entire distance. Facilities for handling passenger traffic will, however, be greatly improved by the elimination of the helper stations and the removal of the eastbound fast and slow freight trains from the old line.

WESTERN RATE ADVANCE HEARING

Testimony of the representatives of shippers and of the western state railway commissioners against the proposed advances in freight rates on fresh meats and packinghouse products occupied the hearing before Commissioner Daniels at Chicago this week in the western rate advance case. This is to be followed by testimony on the livestock rates from May 1 to May 5. Testimony on the advances on fruit and vegetable rates and on rice and rice products was heard on April 22, 23 and 24. The testimony on grain and grain products was not completed in the time allotted for it in the schedule on April 21, although several night sessions have been held, and supplemental testimony will be presented on the days allotted for unfinished evidence at the end of the hearing.

One of the witnesses for the shippers of grain and grain products was W. J. Thompson of the United States Department of Agriculture, who introduced exhibits to prove that the farming industry is unprofitable and in too weak a condition to stand the proposed advance of one cent per 100 lb. in the grain rates. He presented figures based upon returns from 273 farms to show that the net return only averaged 3½ per cent on the value of the property used. Under cross-examination by T. J. Norton, general attorney of the Atchison, Topeka & Santa Fe, Mr. Thompson said that he had not taken into consideration the fact that the farmer gets a living for himself and his family, and that he had not included money the farmers receive for butter, eggs and other similar products. Mr. Norton entered objection to the entire testimony as being irrelevant. Commissioner Daniels ruled that the question of whether the shipper was making a profit or a loss had nothing to do with the reasonableness of a freight rate, but said that since the question of returns had been raised he would admit the testimony for what it was worth, although he was not strongly persuaded, he said, that the average farmer keeps cost accounts.

C. W. Hillman and Jean Paul Muller testified as expert accountants for the shippers and the state commissions as to the cost of handling grain traffic. Mr. Hillman presented an extended analysis of the operating revenues and expenses of the Chicago & North Western to show the margin between the cost of moving grain and the revenue received by the railroad per car for the month of November, 1914. He divided the operating revenues and operating expenses of the road between freight and passenger service, and then attempted to separate the expenses of handling the wheat, other grain and grain products traffic. The result was to show that the cost of carrying a car of wheat into Chicago from Sioux City, Iowa, 526 miles,

was $29.41; from Council Bluffs, Iowa, 470 miles, $26.53, and from South Omaha, 478 miles, $26.84. On other grain his figures were $28.44, $25.81 and $26.33, respectively, and on grain products $25.16, $23.53 and $23.91, while he figured the cost from the average station, 399 miles, as $27.26 on wheat, $25.74 on other grain and $24.72 on grain products. The average earning per car, he said, as shown by waybills covering the movement of 33 cars of wheat from 25 typical stations in Minnesota, Nebraska and South Dakota, was $108.29 for an average haul of 406 miles. On other grain, 947 cars, with an average haul of 444 miles, the average earnings per car were $116.13; and 546 cars of grain products traveling an average distance of 438 miles, yielded an average revenue per car of $42.76.

Mr. Muller, who appeared for the National Council of the Farmers' Co-operative Grain Dealers' Association, testified that grain traffic is a more profitable tonnage than the average of all freight traffic, basing his conclusion upon an analysis of the operating revenues and expenses of the Chicago, Rock Island & Pacific; Atchison, Topeka & Santa Fe; Chicago, Burlington & Quincy and Chicago, Milwaukee & St. Paul. On the Rock Island, he said, 21.27 per cent of the total operating expenses could be charged directly to the freight and passenger accounts without the necessity of any allocation. By various methods he charged 67.22 per cent of the total operating expenses to freight traffic. He then divided the freight expenses as between road haul and switching and terminal movements, and by dividing the total road costs by the reported number of loaded freight car miles, with an allowance of 40 per cent for the cost of empty return haul, he obtained a road movement cost per loaded car mile of 6.928 cents. The average haul as determined by an examination of the movement of 3,731 cars through various western states was 359 miles. This multiplied by the road haul cost per mile gave a total average road haul cost on grain and grain products of $24.87 per car. The average unit terminal cost was obtained by dividing the total number of loaded freight car miles by the average distance hauled, adding the relative percentage for empties, and then dividing the results so reached into the total yard and terminal cost. This gave a terminal unit cost of $2.53 per car, or on the basis of four terminal movements per car, two at each end of the haul, a total terminal cost of $10.13 per car, which, added to the road haul cost, gave a total expense of $35 per car, while the average revenue was $58.32 per car. The net operating revenue, he said, is therefore equivalent to a gross profit of 66.66 per cent at an operating ratio of 60.01 per cent as compared with a gross profit of 38.87 per cent on all freight at an operating ratio of 72.01, and a gross profit of 33.74 per cent on all business, both freight and passenger, at an operating ratio of 74.77 per cent. On grain alone, he said, the returns are equivalent to a gross profit of 124.34 per cent at an operating ratio of 44.57 per cent.

By similar methods he apportioned 59.16 per cent of the total operating expenses of the Santa Fe to the freight traffic and arrived at a total road haul cost of $27 per car and a terminal cost of $10.16 per car for grain and grain products. The average revenue for an average haul of 394 miles, as shown by the movement of 11,581 cars, was $72.91 per car. For the St. Paul he found the cost for grain and grain products was $30.70 per car, and the net operating revenue per loaded car of grain and products, he said, was equivalent to 65.28 per cent at an operating ratio of 60.5 per cent as compared with a gross profit of 58.66 per cent on all freight at an operating ratio of 63.03. For the Burlington road he placed the cost per car at $30.56, as compared with an average gross revenue of $71.65 per car, making a gross profit on operating costs of 136 per cent at an operating ratio of 42.37 per cent.

On cross-examination by C. C. Wright, general solicitor of the North Western, Mr. Wright compared Mr. Muller's formula for separation of costs between freight and passenger service with that of Mr. Hillman, and asked Mr. Muller if he agreed with Mr. Hillman. "We never have agreed on anything," said Mr. Muller. He said he had charged to freight all company freight hauled, whether or not used for passenger service, saying that Mr. Hillman's separation of this item into freight and passenger service was impracticable.

Mr. Wright also drew an admission from the witness that in previous cases, as in this one, he had always used his formula on the heavily loaded commodities to show that they stood more than their share of the transportation costs. His contention was that the same formula would not work on the lighter loaded commodities. "If your figures here show that grain is earning too high a rate," he said, "it must necessarily follow that some other commodities are earning too low, must it not?" "That is true," said Mr. Muller.

Mr. Hillman admitted under cross-examination that he had used the gross weight basis in dividing the expenses of the North Western because of a decision of the United States Supreme Court, but he stated that he did not consider it proper in view of his experience as an accountant. Mr. Wright also challenged his calculations as making no allowance for empty car movements. Mr. Hillman insisted that his method of separating costs was better than that used by Mr. Muller.

H. W. Danforth, president of the National Council of Farmers' Co-operative State Associations, also testified in opposition to the advances in grain rates, saying the average return on farms in the corn belt states is only 3 to 3½ per cent.

J. A. O'Brien of Brownsville, Tex.; E. P. Byers of Ft. Worth, Tex.; C. E. Childs of Sioux City, Iowa, and A. A. Mullens of Iago, Tex., testified in opposition to the proposed advances in rates on fruit and vegetables from Texas. The witnesses disagreed as to whether the dealer or the grower would have to pay the advance.

When the hearing on advances of 3½ cents per 100 lb. in the rates on meat and packing house products was taken up on Monday, Mr. Heinemann introduced 82 exhibits, most of which were prepared to show that fresh meats and meat products pay higher freight revenue per car, per ton, and per train mile than the other traffic handled by western railroads. Mr. Heinemann said that the proposed advance from Omaha, St. Joseph and Kansas City to the Mississippi river and points east would total $3,063,694. On fresh meats alone the increase would mean $2,251,203, not including the advances which would be paid on westbound tonnage. He compared rates on meat between the Mississippi and Missouri rivers with the divisions of the transcontinental rates, saying that the latter are far below the danger line, often used by railroad officials, of 15 cents per car mile, and that it looks as if the carriers were trying to make the packers bear the burden created by unremunerative rates on other hauls and other commodities. He also objected to the attempt to increase the cost of one of the prime necessities of life.

"The railroads," said Mr. Heinemann, "have declared that they never intended to increase the rates on packing house products above the charges contemporaneously in effect on fifth class articles. Arkansas is one of the greatest cured meat consuming sections in the United States. Yet an examination of the proposed tariffs shows that to 10 representative points the carriers are planning to put in rates on packing house products from three to 17 cents higher per 100 lb. than fifth class rates.

"The Interstate Commerce Commission, in fixing southwestern cattle rates, established a scale on hogs 114 per cent of the cattle rate; sheep and goats, 125 per cent; packing house products, 139 per cent and fresh meats 168 per cent of the cattle rates. This relationship the carriers in this case would destroy by putting in hog rates 113 per cent of the cattle rate, sheep and goats, 122 per cent; packing house products, 151 per cent and fresh meats, 189 per cent of the cattle rates. This is another graphic illustration of the manner in which the railroads seem to be endeavoring to saddle the heaviest burdens upon the packing industry.

"Not content with seeking to advance our rates on long hauls, the carriers are also endeavoring to boost our charges for interplant movement between our various Missouri river houses. Between Kansas City and St. Joseph we now pay 35.5 cents per

car mile on fresh meats and 24.2 cents on packing house products. Both rates yield considerable in excess of the so-called 'danger mark' of 15 cents. The carriers are also asking permission to cancel a number of carload rates on packing house products between Missouri, Kansas and Iowa points. This would have the effect of advancing those rates all the way from 17.5 to 128 per cent."

NEW CLEARANCE REGULATIONS IN ILLINOIS

Following an investigation of the subject of clearances on railroads as affecting safety of operation, the state Public Utilities Commission of Illinois has just issued regulations specifying the minimum horizontal and vertical clearances which may be established in the construction and reconstruction of any railroad or building adjacent thereto, unless permission has first been given by the commission to deviate therefrom.

Separate regulations are made for steam and electric railroads and for street railways. Only those portions relating to steam railroads are given below.

VERTICAL CLEARANCES

1. Except as hereinafter provided, no through truss bridge shall be constructed in any track, nor shall any bridge or other structure be constructed across any track over which freight or passenger cars are operated, having a vertical clearance less than 22 ft. above the top of rail for a lateral distance of 5 ft. from the center line of track. From a point 5 ft. horizontally distant from the center line of track and 22 ft. above the top of the rail, the clearance lines may extend downward at an angle to points which are 8 ft. 6 in. distant on each side of the center line of the track and 17 ft. above the top of rail.

2. At passenger stations and coach yards where passenger equipment only is handled, vertical clearances may be less than 22 ft.

3. Overhead loading platforms spanning tracks over which freight cars are handled for icing or other loading purposes may have a vertical clearance less than 22 ft., when such platforms or structures are so constructed as to open upward or outward by means of counter weights or other devices, so that such platforms shall furnish the full amount of vertical clearances specified in Rule 1 at times when cars are being switched.

4. Except at passenger terminals and in coach yards where passenger cars only are handled, all awnings and canopies spanning any track or supported at the sides thereof where such track is in an open thoroughfare, must have full vertical clearance as provided for in Rule 1. Canopies and awnings at freight houses adjoining a track not in an open thoroughfare, may be constructed with a minimum vertical clearance of 15 ft. 6 in., provided such obstruction does not extend closer than 5 ft. 6 in. from the center line of track. In every case where there is a canopy or awning at a freight house, the edge of which has a vertical clearance less than 22 ft., a warning sign shall be erected at some suitable place at each end of such canopy or awning, warning the train employees of the insufficient clearance and prohibiting them from riding on the sides of cars while in motion.

5. Where tracks other than thoroughfare tracks serve engine houses, car shops, elevators, warehouses, coal and ore tipples and industrial plants, vertical clearances less than 22 ft. may be used, provided that in no case shall this vertical clearance be less than 17 ft. for a distance of 4 ft. from the center line of track. From a point 4 ft. horizontally distant from the center line of track and 17 ft. above the top rail, the clearance line may extend downward at an angle to a point which is 7 ft. distant from the center line of track and 14 ft. above the top of rail.

6. In all cases where overhead structures span tracks with a vertical clearance less than that provided for in Rule 1, a rule must be issued by the Railroad Company prohibiting trainmen and other employees from occupying the tops of cars while in motion within certain prescribed territorial limits.

HORIZONTAL CLEARANCES

10. Except as hereinafter provided, and at switch turnouts, the distance from the center of any track to the center of an adjoining track shall not be less than 14 ft.

11. The distance from the center of any switching lead which lies adjacent and parallel to any other track (excepting a track of like character) where the switches are not operated mechanically, shall not be less than 18 ft. from center to center of tracks. The distance from center to center of two adjacent switching leads shall not be less than 21 ft.

12. Any two tracks given up wholly to passenger service, lying adjacent and parallel to each other, and leading from the main track into a passenger terminal or coach yard, may be constructed with track centers less than 14 ft., provided the track centers on the opposite sides of any such pair of tracks are not less than 14 ft., or where the face of any building or other structure is not less than 8 ft. 6 in. from the center of the adjacent track.

13. Any two adjoining freight tracks given up to freight loading and unloading purposes, such as tracks at freight houses, private industries, team tracks and like purposes, may be constructed with track centers less than 14 ft., provided the track centers on the opposite sides of any such pair of tracks are not less than 14 ft., or where the face of any building or other structure is not less than 8 ft. 6 in. from the center of adjoining track; provided also that it shall be permissible to construct on one side of any such pair of tracks a high platform for loading and unloading freight at freight houses, not less than 5 ft. 6 in. from the center of adjoining track as hereinafter specified.

14. Except as hereinafter or hereinbefore provided, no track shall be constructed adjacent to any building or other structure, nor shall any signal post, switch stand, building or other structure be constructed adjacent to any track which has a horizontal clearance of less than 8 ft. 6 in. from the center of track, measured at right angles thereto, it being understood that the horizontal clearance of 8 ft. 6 in. shall be maintained in respect to buildings from the level of the top of the rail to a point on the vertical clearance line as herein established. The clearance line for structures other than buildings and low platforms shall extend from a point 4 ft. above the top of rail, downward at an angle to a point 5 ft. 6 in. distant from the center line of track to a point which is level with the top of rail.

15. Platforms for loading and unloading of freight including livestock, the tops of which are approximately level with the floor of freight cars, may be constructed adjacent to only one side of freight tracks which are not in an open thoroughfare at a distance less than 8 ft. 6 in. from the center of track, but not less than 5 ft. 6 in. therefrom; provided, that in every such case, warning signs shall be erected at a suitable location at each end of such platform, calling trainmen's attention to insufficient clearance and prohibiting them from riding on the sides of cars while in motion.

16. Passenger loading platforms, the tops of which are level with the platforms of passenger cars, may be constructed next to tracks which are given up wholly to passenger service, at a distance less than 8 ft. 6 in. from the center line of such tracks, provided the passenger coaches are equipped with platform gates and kept closed while the train is in motion. Passenger loading platforms which do not exceed a height of 4 in. above the top of rail, may be constructed a distance of not less than 4 ft. 6 in. from the center line of track; and platforms which do not exceed a height of 8 in. above top of rail may be constructed a distance not less than 5 ft. 1 in. from the center line of track.

17. The horizontal clearances specified herein shall not apply to mail cranes when the arms of same are in position to support mail sacks for delivery to trains, provided the top arm of such mail crane when in position to support mail sacks for delivery is not above a point which is 6 in. below the lower sill of the engine cab window of the engine pulling the train which is supposed to pick up mail sacks, if such arms when in position to support mail sacks encroach upon the horizontal clearance of 8 ft. 6 in. from the center line of track.

The Use of Pulverized Fuel for Locomotives

An Outline of Results from Tests Extending Over a Year and Recently Concluded; What May Be Expected

The use of pulverized coal for heat-producing purposes is not new, this fuel having been extensively used for many years in cement and metallurgical furnaces, but while experiments have from time to time been conducted with a view to its use in the generation of steam, they were never developed to a practical and commercial conclusion.

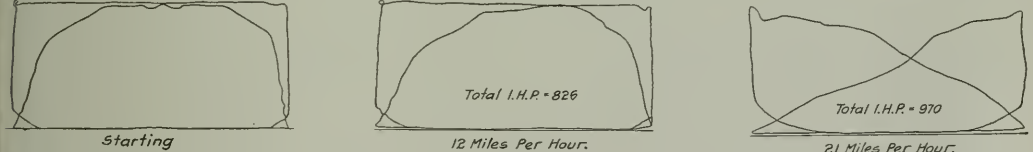
There are many reasons why a successful application of a means of burning pulverized fuel in locomotive fireboxes should be looked upon favorably. Such combustion is smokeless and there are no cinders or sparks thrown from the stack. The first of these items would bring the use of pulverized coal into careful consideration in congested terminal districts where public opinion is forcing the railways towards expensive electrification projects, while the second shows its value in the operation of steam locomotives through forests and other regions where fires are easily set. Furthermore, with the rapid inroads which are being made in the more superior qualities and grades of fuel supply of the United States, and, in fact, of the world, the cost of coal is rapidly increasing. With the application of pulverized coal burning apparatus, use can be made of the dust and refuse from mines as well as peat, petroleum coke, coke brieze lignite and other low grade coals which are under present conditions unsatisfactory for steam production in locomotives.

To produce the best results as regards complete combustion and the least trouble from ash and slag, pulverized coal should contain not more than one per cent moisture and be of a uniform fineness, so that not less than 95 per cent will pass through a 100 mesh and not less than from 80 to 85 per cent through a 200 mesh screen. Coal must, of course, be dried either before grinding it or when burning, this being an item of expense that is necessarily present regardless of whether the coal is burned on grates or in suspension in the powdered form. When coal which is not dry is fed into a furnace the moisture is evaporated, which means that an added quantity of coal must be burned to maintain the temperature, the latter being reduced about 72 deg. F. for each one per cent of moisture entrained. As this cannot be overcome by feeding additional fuel with the same percentage of moisture, the loss of heat is about two per cent for each one per cent of moisture, this loss being further increased when applied to the usable heat above the temperature of the escaping smokebox gases. If the coal is dried before grinding, however, the cost for drying will be almost saved because of the decreased power required for pulverization and also because of the improved combustion resulting from the greater degree of fineness obtained in the dried as compared with the moist coal.

The cost for preparing pulverized coal varies with the cost of the coarse coal and with the moisture content. However, from data obtained during the past 10 years, assuming the cost of the coal at from $1 to $2 a ton, a total cost for preparation will vary from 25 cents to 50 cents in the case of a plant having a capacity of two tons (of 2,000 lb.) per hour to a cost of 10 cents to 20 cents in a plant of a capacity of 25 tons per hour. The amount of fuel required for drying the coal averages from one to two per cent of the coal dried. It will, of course, be necessary in railroad work to equip the existing principal coaling stations with machinery for crushing, grinding, drying and conveying the coal to a suitable storage plant as well as to the locomotive tenders.

The work of developing equipment for burning pulverized coal in steam locomotives has been carried out during the past year and a half and the results have now assumed a final and definite form, so that it is possible to give in what follows a general idea of what has been accomplished. The equipment referred to in this article has been developed by the Locomotive Pulverized Fuel Co., 30 Church street, New York, and while it is not possible to describe it at present in detail, it is expected that a more detailed description of the apparatus will be available at a later date. In order to determine the commercial practicability of the appliances which have been developed, application was made to a ten-wheel locomotive of about 31,000 lb. tractive effort, 200 lb. working steam pressure, 22 in. by 26 in. cylinders, 69 in. diameter driving wheels, 55 sq. ft. of grate area and equipped with a Schmidt superheater.

The experimental work has been carried out on this locomotive almost continuously since early in June, 1914, on a ruling grade from 6½ to 8 miles long and also on a district of 92 miles. Some of the indicator diagrams obtained are shown in one of the illustrations. As originally built the locomotive had an exhaust nozzle 5 in. in diameter, this being approximately 19.6 sq. in. in area. The nozzle used with the pulverized coal apparatus was rectangular, 5½ in. by 8 in., giving an area of 44 sq. in. With the original nozzle the back pressure at speeds of from 15 to 20 miles an hour was from 8 lb. to 11 lb., while with the rectangular nozzle the back pressure at the same speeds was from 1 lb. to 3 lb. The reduction in back pressure much more than compensated for the steam consumption of the turbo-generator as well as for any use made of the steam blower while at the same time increasing the locomotive's capacity and reducing wear and tear on the machinery. The turbo-generator, which is of 10 kw. capacity, is placed at the forward end of the locomotive in front of the smokebox or in any other convenient location, and supplies current for two motors driving the conveying and blowing machinery at the firebox end which carries the coal into the firebox.



Indicator Diagrams Taken on a Locomotive Using Pulverized Coal as Fuel

The smokebox temperatures obtained were from 425 deg. to 490 deg. F., while the corresponding firebox temperatures ranged from 2,600 deg. to 2,850 deg. F. On no occasion did the locomotive stall because of insufficient steam; in fact, the safety valves were open at all times when the engine stalled. The tests were all conducted under the most severe conditions possible, namely, cold weather, low volatile coal, coarse pulverization of the coal, full tonnage rating and in many instances more than full rating.

The tonnage hauled on the maximum ruling grade ranged from the regular summer rating to 15 per cent greater than the summer rating in freezing weather and the locomotive accelerated the train in numerous instances on the ruling grade to speeds of from 20 to 25 miles per hour.

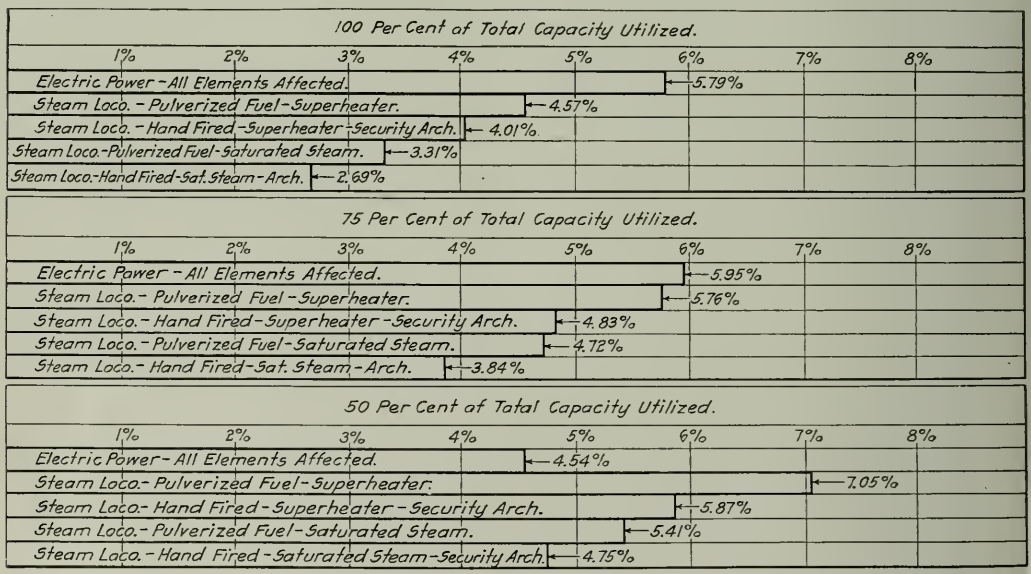
The coal used in these tests was ordinary bituminous coal and contained from 21 to 26 per cent volatile matter and about 15

per cent of non-combustible. When fed at the rate of 2,500 lb. to 4,000 lb. per hour the various smokebox gas analyses showed an average of less than 1 per cent of free oxygen or carbon monoxide and from 11 per cent to 14 per cent of carbon dioxide. The evaporation obtained ranged from 9½ lb. to 12¾ lb. of water per pound of coal from and at 212 deg. F.

The coarsest grade of the coal ran 39.6 per cent through a 200 mesh screen, 20 per cent on a 200 mesh screen and 40.4 per cent on a 100 mesh screen. The finest grade ran 66½ per cent through a 200 mesh screen, 95½ per cent through a 100 mesh screen and 98½ per cent through an 80 mesh screen. According to statements made before the American Society of Mechanical Engineers, the most satisfactory results are obtainable from coal which will run from 80 to 82 per cent through a 200 mesh screen and 95 per cent through a 100 mesh screen. Analyses of the coal used showed that it ranged from .67 per cent moisture, 65.16 per cent fixed carbon, 21.63 per cent volatile matter, and 13.12 per cent ash with 13,671 B.t.u. per lb., to .88 per cent moisture, 25.67 per cent volatile matter, 63.05 per cent fixed carbon and 10.4 per cent ash with 13,912 B.t.u. per lb. In the statements before the American Society of Mechanical Engineers referred to above, 30 per cent volatile matter was generally mentioned as a minimum for the best results. The capacity of each combination conveyor, feeder and mixer ranged from about 250 lb. of coal per hour at the lowest speed of 23 revolutions per minute of the feed screw to about 1,600 lb. of coal per hour at a speed of 133 revolutions per minute, this capacity being susceptible increase or decrease as the demands of the locomotive may require.

The locomotive steamed satisfactorily throughout the tests; in fact, more steam was produced than was required, and there was no smoke. The exhaust steam assumed at times a slightly grayish color, but at no time was there any evidence of dust or ashes, and no cinders or sparks were emitted. There is a saving of from 15 per cent to 25 per cent in coal consumed as compared with ordinary hand firing, but it has so far been impossible to compute this definitely. No change is necessary in the boiler of the locomotive other than to remove all of the smokebox draft appliances and the grate and ashpan equipment. The pulverized coal blowers and controllers are attached to the front of the tender coal space and the coal tanks can be applied to many tenders as at present constructed. This coal container is so arranged as to be usable for either pulverized coal or fuel oil, and the entire equipment can be readily changed without extra cost for burning fuel oil. The ordinary brick arch is used in the firebox and special brick work is used below the arch and mud ring. The refuse runs down into a collection pan below the firebox in the form of a slag which when hardened is of a glassy nature and is very easily broken and falls out when the pan is opened. About 2.5 per cent of the weight of the coal fired when it contains 15 per cent of non-combustible is deposited in the slag pan in the form of concentrated slag as compared with about 15 per cent accumulation in the ashpan when coal is burned on the grates. This is due largely to the slag containing no combustible whatever, whereas ordinary asphan residuum usually contains considerable combustible.

The cost for preparing pulverized coal should, it is believed, be more than offset by the difference in mine cost of the mine refuse and sweepings as well as lignite and other inferior grades of coal, as compared with fuel that must be used when burning on grates. Considerable savings in the matters of inspection, maintenance and operation are also indicated through the complete elimination of grates, ashpans, smokebox netting, handhole plates and spark hoppers, firing tools and squirt hose, as well as trouble due to loss of fuel from the open coal space. There is no soot collection in tubes and terminal and intermediate delays due to cleaning and dumping fires and blowing out tubes are also avoided and the facilities for performing such work are practically eliminated. There being no cinders, cutting of superheater elements, etc., is eliminated. The cost of building fires is also reduced to a minimum, as no special fuel or labor is required for this purpose, it being only necessary to light a piece of oily waste or other similar material to start the fire The fire can be extinguished when the locomotive is on sidings and at terminals, or when drifting, thus saving fuel, and it will restart from the heat of the furnace within an hour without relighting. When building fires, 200 lb. steam pressure



Comparison of Thermal Efficency of Electric and Steam Motive Power, Showing Percentage of Power Delivered at the Rail for 100 Per Cent B. T. U. in the Coal

can be obtained from water at 40 deg. F. in 45 or 50 min. The physical requirements of firing a locomotive are reduced to those of firing with oil while at the same time a more constant firebox temperature and more uniform steam pressure are claimed to be available under varying operating conditions. Relieving the fireman of the arduous physical exertion of hand firing should result in an improved standard of applicants for this position, making it correspondingly easier to develop higher class enginemen.

The following figures should be of interest as bearing on the cost of electrification as compared with that of equipping an average modern type of locomotive for burning pulverized fuel: Cost of a new Consolidation type locomotive of 50,000 lb. tractive effort, equipped with superheater and

(a) for handfiring and burning coal on grates, approximately	$22,000
(b) for burning fuel oil in suspension, approximately	22,750
(c) for mechanically stoking and burning coal on grates, approximately	24,000
(d) for automatically stoking and burning pulverized coal, lignite, peat or fuel oil in suspension, approximately	26,500
(e) cost of electric locomotive, approximately	50,000

Throughout the entire series of tests no trouble whatever was experienced with explosions, no tendency was found for any explosion to take place and there was no blow-back and noise such as occurs where fuel oil is used. In general, the firing of pulverized coal is conducted by means of one of two methods, one being known as the short flame method and the other as the long flame method. In the application to locomotives a combination of the two methods has been employed.

One of the illustrations shows a diagram of the thermal efficiency of electric and steam motive power under different conditions. The top portion of this diagram, in which 100 per cent of the total maximum capacity or load factor is assumed as utilized, is obviously an ideal condition, the condition in which 50 per cent is utilized being more nearly the average for steam road operation. It will be noticed that under these conditions pulverized coal shows up as extremely advantageous. These figures do not consider any emergency power plant or storage battery equipment for electrical operation.

TWO NOTABLE TRAIN ACCIDENTS

A derailment that occurred at Devon, Conn., on the New York, New Haven & Hartford, on March 23, in which an important express train was thrown off the track at a derailing switch, approaching an open drawbridge, and was prevented by a very small margin from falling down a high bank, was due to the engineman believing that he got a clear distant signal"; and coincidently with the report of the details of this accident we have the Board of Trade report from London giving the particulars of the collision which occurred on the Great Eastern, at Ilford, on January 1, from a similar cause. At Devon there was only one personal injury, and that slight; but at Ilford ten passengers were killed. The details of these two accidents will be of interest to readers who look upon the prevention of this class of mistakes as one of the most important problems connected with "safety first."

The train derailed at Devon was the Boston express leaving New York at 4 p. m. and the accident occurred about 5:30. The weather was clear. On sighting the home signal the engineman saw that it was against him and he applied the brakes, reducing speed to about ten miles an hour at the moment he went off the track. The engine and first three cars went over the derail, but all remained upright and the damage was small. There are several fixed spans in the bridge between the shore and the draw so that the train was stopped a considerable distance short of the opening; but the engine rested near the edge of the bank near the abutment. The engineman at fault was a runner of experience, with a good record.

The collision at Ilford occurred at about 8:40 a. m. on a clear day. A suburban passenger train from Gidea Park to London, moving at low speed, through a crossover from the local to the express track, about 300 ft. west of the station, was run into by a train from Clacton to London, coming on at high speed on the express track. It struck the seventh car in the Gidea Park train at somewhere from 25 to 50 miles an hour. Besides the ten passengers killed upwards of 500 passengers notified the company of personal injuries or shock sustained. The signals and switches at the point of collision are controlled by Ilford West Box. Between this and Ilford East Box there is controlled-manual block signaling and there is no question but that the signals were set against the Clacton train. The engineman, Fred P. Bloomfield, has been in the service 23 years, and a runner three years and six months.

The distant signal at which the mistake was made is about 3,300 ft. from the point of collision; and at the East Box home signal, which is 1,350 ft. from the point of collision there is an automatic apparatus for putting torpedoes on the rail when the signal arm goes to stop. Neither the engineman nor anyone on the train admits having heard the torpedoes, but several competent witnesses outside convinced the inspector that the "detonators" acted properly. The engineman's testimony at the hearing was not very clear. He said that he saw the home signal at stop and that he shut off steam, though apparently not promptly; and the inspector concludes that probably the sound of the torpedoes was the first thing that made him realize his danger. Between the distant and the home signal the steam from the engine beat down and this, he says, interfered with his seeing the home signal until close to it. Bloomfield's firemen, George Albert Adams, said that he was engaged in firing when they passed the distant signal, so that he did not see in what position it was.

The inspector (Lieut. Col. P. G. von Donop) devotes considerable space to a discussion as to just where the engineman finally shut off steam, and of the reason why he did not shut off sooner, there being a good view of all the signals; but his interrogatories evidently threw little light on the main question, and he found the collision to be "entirely due to want of care on the part of Bloomfield in noting the position of the signals"; and the final conclusion is: "This collision, which was attended with such sad results and which was mainly due to the fact of the driver not noticing that his distant signal was at danger, points to the desirability of the provision of some arrangement for giving a driver an unmistakable warning as to the position of his distant signal when he passes it. Several railway companies have already made trials of devices designed for this purpose, and on some lines such devices are already in use to a limited extent. The Great Eastern does not, however, appear to have as yet taken any steps toward the provision of any such warning arrangement at their distant signals, though in the neighborhood of London they have provided a large number of emergency detonator machines at their home signals. It is, however, at the distant signal that the warning is especially needed, and in the face of this accident the attention of the company is called to the desirability of this provision."

RESULTS OF OPERATION OF TEXAS CAR EQUALIZATION PLAN

By O. C. Castle
Car Service Agent, Sunset-Central Lines

February 28, 1915, marked the close of the fifth month's operation of the car equalization plan entered into on October 1, 1914, between the International & Great Northern and the Sunset-Central Lines, which was described in the *Railway Age Gazette* of January 15, 1915, page 95, and January 29, page 177.

The object which the originators of this plan had in mind was two-fold: The protection of each road against misuse of its cars by the other party during periods of extreme shortage and increased flexibility of equipment with a reduction in switching expense, through the elimination of cross interchange of empty cars.

While there is no tangible basis on which to estimate the saving in switching expense, there can be no doubt that there has been a considerable saving. Before the agreement was entered

into the average number of cars of each party in use on the line of the other party was slightly in excess of 100. This number rapidly increased until on February 28, the number averaged about 500. For the Sunset-Central, for instance, it is quite obvious that the difference in these averages represents 400 Sunset-Central cars which are allowed to remain on the International & Great Northern tracks until they may be moved to us under load, whereas, under the former practice they were returned empty as soon as possible after being released, crossing on the interchange track an approximately equal number of International & Great Northern cars which we were returning empty. It will be recalled that an earlier report of operations showed how the percentage of empty to total deliveries had been reduced from 68.1 to 28.6.

Respecting the protection of our equipment against abuse, it has not been necessary to invoke that feature of the arrangement, for the reason that there has been almost a continuous surplus of all classes of cars throughout the five months covered by this report. This condition, however, has made it possible to develop that side of the equalization proposition that has to do with keeping the per diem payments approximately equal during the periods of surplus, when neither road is in need of its equipment.

In the absence of any agreement for a common use of cars, or for reciprocal storage of surplus foreign cars, it is the almost universal practice in times of surplus for roads to rid their rails of foreign cars by sending them home empty, at the same time applying their own cars for loading to the very lines whose cars are being returned empty. The excess empty haul caused by this ridiculous practice was estimated by the American Railway Association as amounting to 153,849,432 miles during the month of January, 1908, when the panic of 1907 turned an extreme shortage into a stupendous surplus in less than six weeks. With an equalization plan in operation, however, the only empty interchange of cars is that required to keep the balance approximately equal from day to day, and even this may be dispensed with by extending the plan to provide for the storage, free of per diem, of excess cars not needed by their owners.

The per diem figures for the five months furnish striking evidence of the practicability of the plan from the accounting and financial side. The figures, by months, follow:

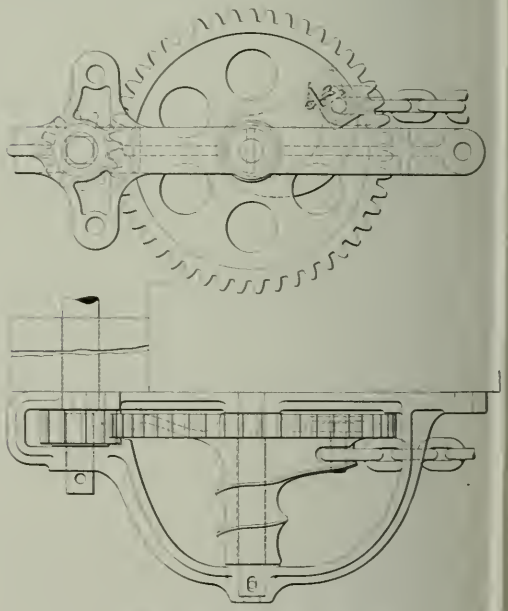
	Per diem paid I. & G. N.	Per diem rec'd from I. & G. N.	Dr.	Cr.
October, 1914.....	3,644.10	3,271.05	373.05	.....
November, 1914.....	5,335.65	5,639.40	.....	303.75
December, 1914.....	6,517.80	6,103.30	414.50	.....
January, 1915.....	6,926.40	7,245.35	.....	318.95
February, 1915.....	6,763.95	7,046.10	.....	282.15
Total	29,187.90	29,305.20	.....	117.30

FREIGHT CAR HAND BRAKE

In the development of the geared hand brake shown in the drawing special attention has been given to the securing of a powerful brake without sacrificing rapidity of action. This device, known as the Peacock freight car brake, consists of a malleable iron frame, a geared drum and shaft, and a pinion secured to the lower end of the brake shaft. The brake is operated by the usual type of shaft, the lower end of which is forged to a square section where it passes through the pinion, a cotter through the end securing it in position. Sufficient clearance is provided through the pinion so that finish is unnecessary and the space between the shaft and the gear readily frees itself from dirt which would tend to collect were a closer fit used.

The drum and gear are cast integral, holes being cored through the web of the gear to lighten it as much as possible and also to prevent the accumulation of dirt on its upper surface. The surface of the drum is formed into a shallow spiral groove, the bottom of which is over two inches in diameter. This eliminates the twisting and cutting of the chain, caused by the small drum usually employed. The upper portion of the drum is so designed that the center line of the chain follows a parabolic curve as the drum revolves, the end of the chain being secured at a point near the rim of the gear. This facilitates taking up the slack without loss of time or sacrifice of leverage when the effective application begins.

The chain is secured to the drum by a bolt in double shear which passes through a slotted hole. When in place the pull of the chain moves the bolt in the slot until its head occupies a pocket on the upper surface of the web from which it cannot be directly removed. A cotter through a lug on the web of the gear prevents the head of the bolt from sliding out of the pocket should the pull on the chain be released. The drum revolves on a straight unfinished bar of cold rolled steel, the lower end of which rests in a pocket in the frame. The drum is bored out with ample clearance and is packed with graphite grease to prevent corrosion when the car is standing out of service. A



Geared Hand Brake for Freight Cars

cotter through the lower end of the bar and the frame prevents it from turning and cutting the frame.

The brake has a gear ratio of 12 to 48, and with a force of 100 lb. exerted at the rim of a 16 in. brake wheel it is claimed to produce over 1,700 lb. pull on the chain. This is more than four times the force exerted on the chain by the usual type of hand brake where the chain is wound on a 1½ in. drum at the lower end of the brake shaft.

To successfully meet the conditions imposed upon a hand brake for freight equipment cars the cost must be low. With this consideration in view the use of finished parts has been avoided as far as possible, the only finished surface in the device being the bore of the drum. As shown in the drawings the frame is designed for application to cars having platform end sills, but the brake may be designed for application to freight cars of any type. It is manufactured by the National Brake Company, Buffalo, N. Y.

Portuguese Railway Fares Increased.—Press despatches report that the Portuguese railway companies have determined to raise fares 10 per cent. owing to the dearness of coal, and that the prices of other commodities, including gas, sugar and bread, have also risen.

General News Department

The anti-tipping bill recently passed by the Minnesota house of representatives has been killed by the senate committee on general legislation.

The House of the Michigan legislature has rejected the bill proposing an increase in passenger fares on railroads in Michigan based on a sliding scale in accordance with their gross earnings. The bill had been passed by the Senate.

The Ohio Public Utilities Commission, by a law just enacted, has the power to suspend proposed advances in transportation rates for 60 days, and puts on the railroads the burden of proving that a proposed increase is reasonably necessary.

The express car on Train No. 1 of the Louisville & Nashville was robbed on the line between Mobile and New Orleans, on the night of April 23, the safe in the express car being blown open. The baggageman was shot and dangerously wounded.

A large number of suits against railroads operating in Illinois have been filed by the state's attorneys of Henry, Warren and Mercer counties, Illinois, to recover fines of $100 each for alleged violation of the law which requires railroads to reimburse shippers for loss of grain in transit.

Col. B. W. Dunn, chief inspector of the Bureau for the Safe Transportation of Explosives and other Dangerous Articles, will give an illustrated lecture on proper methods of packing and handling explosives and other dangerous articles, at the Y. M. C. A. Auditorium, Chicago, on Friday evening, April 30.

The Pennsylvania Railroad in March ran 70,196 passenger trains, and 64,067 of them—91.3 per cent—arrived at their destinations on time. The Pittsburgh Division ran 5,292 trains and 94.5 per cent of them made a perfect record. On the electric line of the West Jersey & Seashore, out of 2,480 trains, 98.2 per cent arrived on time. Three divisions had more than 97 per cent of their trains arrive on time.

In the United States District Court at Toledo, Ohio, April 27, fines aggregating $2,700 were assessed against six railroads. The defendants admitted violations of the hours of service law. The roads fined and the amounts were: Cleveland, Cincinnati, Chicago & St. Louis, $100; Toledo Terminal, $200; Cincinnati, Hamilton & Dayton, $1,600; Michigan Central, $100; Lake Shore & Michigan Southern, $400; Wabash, $375.

The steamships Finland and Kroonland, formerly in the service of the Red Star Line between New York and Antwerp, are now advertised to carry passengers from New York to San Francisco, through the Panama Canal, the first sailing to be Saturday, May 1. The Finland is scheduled to sail on that day, and it is said that 350 first-cabin passengers have already engaged passage.

"Travel Stamps"

Harry I. Miller, chairman of the board of directors of the Buffalo & Susquehanna Railroad, and connected with a number of other railroads, is president of a corporation recently organized in Virginia, and having headquarters at 115 Broadway, New York City, to sell "travel stamps," to be used by merchants or manufacturers to draw trade, using them after the manner in vogue with trading stamps or coupons. The stamps are to be redeemed in certificates good for passenger transportation, railroad, street railroad and steamboat. The name of the corporation is Travel Stamps, Inc., and one of the directors is Newman Erb, president of the Minneapolis & St. Louis and a director in other roads. It is proposed to sell "travel stamps" to retailers and manufacturers of all classes of goods, in four denominations, redeemable for one mile, one-quarter, one-tenth and one-twentieth miles, stamps to be given to purchasers, free, with purchases amounting to five cents and upward. A mile travel stamp, or its equivalent in smaller denominations, will be exchanged for "any or all kinds of first-class passenger transportation, either by boat or rail." The company expects to open offices at important railway terminals for the redemption of stamps. It is proposed in New York City to make a stamp or stamps equivalent to two miles exchangeable for one subway, surface-car or elevated ticket.

To make the stamps practically equivalent to money, an agreement has been entered into with the New York Trust Company to keep on deposit with that institution at all times a sum of money more than sufficient to redeem all stamps outstanding.

New York Excess Crew Law

The "full crew" law of the state of New York remains on the statute books. The bill to repeal it, which was passed by the Senate, was defeated in the Assembly on the last day of the session by a vote of 68 in favor of repeal and 60 against. Seventy-six votes (a majority of the whole Assembly) would have been necessary to carry the repeal.

Extensive Use of the Continuous Home Route Card

The continuous home route card for freight cars, recommended by the Committee of the American Railway Association, which was described in the *Railway Age Gazette* last week, has now been adopted by over 100 roads. From an account printed in the Equipment Register it appears that in addition to the roads named by us last week (page 903) the list includes the following:

Alabama Great Southern	Louisville & Nashville
Ann Arbor	Louisville, Henderson & St. Louis
Atlanta & West Point	Mobile & Ohio
Atlanta, Birmingham & Atlantic	Nashville, Chattanooga & St. Louis
Atlantic Coast Line	New Orleans & North Eastern
Augusta Southern	New Orleans, Mobile & Chicago
Baltimore & Ohio Southwestern	New York, Ontario & Western
Bangor & Aroostook	New York, Philadelphia & Norfolk
Boston & Albany	Norfolk & Western
Boston & Maine	Rutland
Canadian Pacific	St. Louis & San Francisco
Central of Georgia	Southern Pacific
Central Vermont	Southern
Cincinnati, New Orleans & Texas Pacific	Sunset Central Lines
Coal & Coke	Tennessee Central
Cumberland & Pennsylvania	Toledo, Peoria & Western
Cumberland Valley	Toronto, Hamilton & Buffalo
Duluth, South Shore & Atlantic	Vandalia
Georgia	Virginia & Southwestern
Georgia, Florida & Alabama	Western of Alabama
Huntingdon & Broad Top Mountain	Wrightsville & Tennille
Kanawha & Michigan	Yazoo & Mississippi Valley

All except the Atlantic Coast Line will put the new card in use on May 1; the A. C. L. a month later. It was in 1893, at the Car Accountants' convention in Indianapolis, that the continuous home route card was first proposed.

Employees' Clubs on the Lehigh Valley

The employees' club, on the Wyoming division of the Lehigh Valley, now has 300 members. It meets monthly at division headquarters. This is one of a series, the management having encouraged the organization of clubs on every division of the road. Enginemen, firemen, conductors, trainmen, yardmasters, machinists, boiler-makers, engine house foremen, section foremen, track supervisors, agents, clerks and division officers make up its membership. A small membership fee is charged to defray the expenses of the monthly meetings which are held the first Monday night of

each month, when a paper prepared by an employee of the division is read. Among the subjects which have been dealt with are: Car demurrage; the making of a valuable conductor; fuel economy; air brakes; handling of freight at transfers; first aid to the injured; signals; train operation on the Wyoming division; new book of rules; efficient and safe handling of locomotives; freight claims, causes thereof and resultant expense; duties of section foreman and handling of long trains on heavy grades.

At the first annual dinner, held recently at Wilkes-Barre, 218 employees were present. The price of the dinner was two dollars a plate. Including loss of time, the cost to many of the men amounted to from six to twelve dollars each, an indication of the interest being taken by the men in the organization.

Cole-Scoville Truck

In the description of a 2-10-2 type locomotive recently built by the Baldwin Locomotive Works for the Erie, which appeared on page 706 of our March 26 issue, a statement was made to the effect that the locomotive was equipped with the Cole trailing truck. The correct name of this truck, which is of the outside bearing type, with a hinged or floating yoke, is the Cole-Scoville truck.

International Railway Fuel Association

The following is the program of the seventh annual convention of the International Railway Fuel Association, to be held at Hotel La Salle, Chicago, May 17 to 20:

MONDAY, MAY 17

Morning session, 9:30 to 12:30.

Invocation; address by president; address by A. M. Schoyer, vice-president, Pennsylvania Lines West; report of secretary-treasurer; appointment of committee to audit books of secretary-treasurer; appointment of special committees; unfinished business; new business.

Paper: Powdered Coal—Preparation and Use in Locomotive and Stationary Boilers, by W. L. Robinson, supervisor fuel consumption, Baltimore & Ohio.

Afternoon session, 1:30 to 4:30.

Paper: Fuel Conditions in South America, by J. W. Hardy, sales agent, West Kentucky Coal Company.

TUESDAY, MAY 18

Morning session, 9:30 to noon.

Paper: Analysis of Dependent Sequence as a Guide to Fuel Economy, by Harrington Emerson, consulting engineer.

Paper: Smoke Prevention, by E. W. Pratt, superintendent of motive power and machinery, Chicago & North Western.

Afternoon session, 1:30 to 4:30.

Paper: Standardization of Coal Preparation, by H. C. Adams, president Jones & Adams Coal Company.

Report of committee on Fuel Stations, H. J. Slifer, consulting civil engineer, chairman.

WEDNESDAY, MAY 19

Morning session, 9:30 to noon.

Paper: Relation of Mechanical Stokers to the Fuel Problem, by committee on Firing Practice, D. C. Buell, director Railway Educational Bureau, chairman.

Paper: Fuel Oil for Locomotive Use, by G. M. Bean, Pacific Coast representative American Arch Company.

Afternoon session, 1:30 to 4:30.

Paper: Waste of Fuel in Railway Stationary Plants, by Joseph W. Hays, combustion expert.

Report of committee on Storage of Coal.

THURSDAY, MAY 20

Morning session, 9:30 to 1:00.

Reports of standing and special committees on: Drafting Locomotives; Fuel Tests; Fuel Accounting; Constitution and By-Laws; Subjects for Eighth Annual Meeting.

Election of officers.

Balloting for place of meeting, eighth annual convention.

Adjournment.

The Traveling Engineers' Association

The following is the program for the twenty-third annual convention of the Traveling Engineers' Association, to be held in the Hotel Sherman, Chicago, from September 7 to 10:

TUESDAY, SEPTEMBER 7

Morning session: Opening exercises and consideration of subject: What effect does the mechanical placing of fuel in fireboxes and lubricating of locomotives have on cost of operation? W. L. Robinson (B. & O.), chairman.

Afternoon session: Recommended practices for the employment and training of new men for firemen; L. R. Pyle (M., St. P. & S. S. M.), chairman.

WEDNESDAY, SEPTEMBER 8

Morning session: The advantages of the use of superheaters, brick arches and other modern appliances on large engines, especially those of the Mallet type; J. E. Ingling (Erie), chairman.

Afternoon session: How can the road foreman of engines improve the handling of the air brakes on our modern trains? C. M. Kidd (N. & W.), chairman.

Evening: The entire evening will be devoted to examining the exhibits.

THURSDAY, SEPTEMBER 9

Morning session: Difficulties accompanying prevention of dense black smoke and its relation to cost of fuel and locomotive repairs; Martin Whelan (C. C. C. & St. L.), chairman.

Afternoon session: The electro-pneumatic brake; by W. V. Turner (Westinghouse Air Brake Company).

FRIDAY, SEPTEMBER 10

Morning session: The effect of properly designed valve gear on locomotive fuel economy and operating; W. E. Preston (Southern).

Afternoon session: Scientific train loading; tonnage rating; the best method to obtain maximum tonnage haul for the engine over the entire division, taking into consideration the grades at different points on the division; by O. S. Beyer, Jr. (Rock Island).

Election of officers and adjournment.

Engineers' Society of Western Pennsylvania

At the structural section bi-monthly meeting of the Engineers' Society of Western Pennsylvania, to be held in the Society Rooms in the Oliver building, Pittsburgh, Pa., on Tuesday, May 4, a paper will be presented by F. M. McCullough, assistant professor of materials of the Carnegie Institute of Technology, entitled "Local Sands and Gravels as Aggregates in Concrete."

United Yardmasters' Association

The United Yardmasters' Association will hold its second annual convention at Seattle, Wash., on June 15 to 19. A large number of yardmasters from different sections of the United States and Canada have already expressed an intention to be present.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 3d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railroad Men's Improvement Society.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Signal Association.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meetings, 2d Monday in June.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday afternoon in month, except June, July and August, La Salle Hotel, Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meetings, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

David Harlowe, who recently resigned as a member of the Wisconsin Railroad Commission, has opened an office at 35 Mack block, Milwaukee, Wis., as consulting traffic manager.

The Ann Arbor has filed a suit in the Federal Court at Detroit, asking a permanent injunction restraining the state officers of Michigan from enforcing the law fixing passenger fares in the State at a maximum of two cents a mile.

The Eastern Trunk Lines and their connections, have given notice of a general increase of about two per cent. in the freight rates on wrapping, book and news paper; this in addition to the 5 per cent advance made recently.

The Chesapeake & Ohio has followed the Baltimore & Ohio in asking authority from the state of West Virginia to make a general increase in passenger rates. The present rates, based on two cents a mile, are declared unremunerative, and it is desired to advance all rates to the basis of at least 2½ cents a mile.

The Boston & Albany has announced new passenger rates, to become effective May 1, based on the opinion given by the State Public Service Commission in its recent investigation. From Boston to Worcester, 44 miles, the old rate is one dollar; new, $1.04; Boston to Springfield, 99 miles, old rate, $2.25; new, $2.40; and others in proportion. Some of the rates, for short distances, are advanced one cent.

The war tax on tickets in Canada is as follows: Five cents on every parlor car seat and 10 cents on every sleeping car berth; railway and local steamship tickets 5 cents for each $5 or fraction thereof, according to the value of the ticket; but there is no charge on a ticket costing $1 or less. That on ocean steamship tickets varies according to the value; $10 and under, no tax; $10.01 to $40, $1; $40.01 to $65, $3; $65.01 and up, $5. The tax applies on all tickets reading between or from points in Canada, whether such tickets are sold in Canada or in a foreign country.

Panama Canal Earnings

Up to March 1, 1915, the earnings from tolls on vessels using the Panama Canal, according to the Canal Record, fell short of meeting the expenses of operation and maintenance of the canal by $261,098. From the beginning of the present fiscal year on July 1, 1914, to March 1, 1915, a period of eight months, the total expenditure attributed to operation and maintenance, was $2,595,613. The total earnings from tolls in that period were $2,334,515. In other words, on a business requiring the expenditure of $2,595,000, the government has lost approximately 10 per cent. The operation and maintenance figures include all the diversified expenditures necessary for keeping the canal open and in order and the work of moving vessels through the locks. To such expenditures have been added a pro-rated part of the expenses of the civil government, of the sanitary work and of general administration, which three items have amounted to $574,570 during the period.

Illinois Manufacturers' Association Sees Discrimination in Low Passenger Fares

The directors of the Illinois Manufacturers' Association have addressed a communication to the House Utilities Committee of the Illinois legislature saying: "It is unfair to the shippers of this state to be compelled to pay freight rates based upon an allowance for a deficiency in the transportation of passengers. While it is true that the price of the goods in the end absorbs the freight the fixing of a rate so high that it will take care of a loss in passenger service is not an equal distribution. Fully 50 per cent of the passenger travel is for pleasure, and is not incident to the transaction of business. It should therefore be treated to a large extent as a luxury and placed on a sound

economical basis. A conservative estimate of the amount of money paid by the manufacturers and other shippers of Illinois for railroad freight service is over $1,000,000,000 annually. This amount should not be subjected to increase in order that passengers may be carried below the cost of transportation. It is therefore hoped that the members of the committee will report favorably on the measure authorizing an advance of one-half cent per mile in passenger rates."

Statement of Western Railways on Cummins Amendment

R. B. Scott, of the Chicago, Burlington & Quincy, H. A. Scandrett, of the Union Pacific, and Charles Donnelly, of the Northern Pacific, have filed a statement with the Interstate Commerce Commission, outlining their position as to the effects of the Cummins amendment to the act to regulate commerce, which becomes effective on June 3. The statement is as follows: "At the present time, in the case of property which is transported subject to the rules and conditions of classification there are two lawful rates: First, what is termed a reduced rate, which is applicable when the property is transported subject to all the terms and conditions of the uniform bill of lading, and second, a rate that is 110 per cent. of such reduced rate—this higher basis of rate being applicable when the property is not carried subject to all the terms and conditions of the uniform bill of lading.

"While there may be some question as to whether this or that stipulation contained in the uniform bill of lading is made unlawful by the Cummins act, there is no such question as to certain stipulations, such as those in regard to the presentation of claims. We have, then, this situation: One rate if certain conditions are incorporated in the bill of lading, and a different and a higher rate, if they are omitted.

"In that situation Congress enacts a law which prohibits the carrier and the shipper from agreeing to abide by certain of the terms of the uniform bill of lading. The rate, therefore, which was conditioned on the shipper agreeing to all the provisions of the uniform bill of lading is cancelled by act of Congress. The legal effect is no different than if the carriers cancelled from their tariffs the lower rate.

"In either event, the higher basis of rates remains. It was the lawful basis before the enactment of the Cummins act; it would have been a lawful basis if the carriers had of their own initiative cancelled the lower basis of rates, and it will be none the less a lawful basis after the Cummins act becomes effective."

This statement was filed in reply to a question by Commissioner Clark as to what would be the status under the law without any action by the Commission or by the carriers.

Canada to Cuba

Grand Trunk freight car 30017 has just returned to Canada after a unique itinerary, which began at Chicago last December. From the Grand Trunk it went to the Wabash; to the Chicago, Burlington & Quincy; to Wiggins Ferry; to the Mobile & Ohio; to the Atlantic Coast Line; to the Florida East Coast; a ferry to Havana, where it was photographed as a curiosity; returned to the Florida East Coast; to the Atlantic Coast Line; to the Norfolk & Western; to Wiggins Ferry; to the Terminal Railroad Association, St. Louis; to the Chicago & Eastern Illinois; to the Toledo, St. Louis & Western; to New York, Chicago, St. Louis; to Lehigh Valley; to New York, New Haven & Hartford; to Lehigh Valley, and to the Grand Trunk at Niagara Falls.

All-Steel Trains in South Africa.—Owing to the increasing cost of timber for coach building, the possibility of constructing passenger stock of steel is being considered by the authorities of the Union of South Africa railways, and the chief mechanical engineer has been authorized to order two trains of steel coaches for trial.

Congo Railway Completed.—The railway line from Kabala (Congo) to Lake Tanganyika, on the line of the Great Lakes, which follows the course of the Lukuga, and will unite the Lualaba River to Lake Tanganyika, was laid to kilometre 267—that is to say, to its terminal point—about March 15. This event marks a notable date in the history of the Belgian Congo.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

William Wrigley, Jr., of Chicago, has filed a complaint with the Interstate Commerce Commission against the charges for switching cars on industrial sidings at San Francisco and other Pacific coast terminals.

Hearings will be held by the commission beginning Monday, May 17, on various proposals of the eastern railroads to advance certain freight rates in official classification territory. These include the rates and regulations governing the transportation of beer and non-alcoholic beverages, tobacco, grain, rags and scrap.

The commission has further suspended from May 1 to November 1 tariffs of the New York Central, Pennsylvania, Baltimore & Ohio, Erie, Lehigh Valley and other railroads proposing advances in the charges for handling freight by lighter and float from and to points in New York harbor within and outside the free lighterage limits These rates were originally suspended from January 1.

A hearing will be held before Examiner Mackley at San Francisco on June 22 relative to the ownership and operation of the steamship Great Northern. This is the ship owned by the Great Northern Pacific Steamship Company (controlled by the Great Northern) which after being launched at Philadelphia carried passengers through the Panama Canal, as it was on its way to the Pacific coast, where it is to be used in regular service.

Examiner Kelley of the Interstate Commerce Commission held a hearing at Chicago on April 26, in the matter of the withdrawal of regulations covering the concentration of dairy products, and on April 28, on minimum weights for shipments of packinghouse products, fresh meats and other articles transported in peddler cars. On April 30, Examiner Bell will hold a hearing in the matter of stopping cars in transit to complete loading or partially unload shipments.

Classification of Display Racks

W. & J. Sloane v. Southern Pacific et al. Opinion by the commission:

The commission finds that defendants' rule resulting in the imposition of higher charges on display racks, in less than carload lots, weighing less than 1,000 lb., than for similar racks weighing 1,000 lb. or more, is unreasonable, and awards reparation. (33 I. C. C., 509.)

Lack of Concurrence in Through Rates

E. I. Du Pont De Nemours Powder Company v. Wabash et al. Opinion by the commission:

The Wabash filed and posted a through tariff, naming a through rate of 90 cents a net ton on bituminous mine-run coal in carloads from Springfield and Riverton, Ill., to Mooar, Ia., in which the delivery line, the Chicago, Burlington & Quincy, was not named as a party and had not concurred. Charges were collected on shipments from and to the points named on the basis of the combination of intermediate rates. The commission awards reparation against the carrier which issued the tariff, on the showing that the complainant relied on the through rates published, to its injury. (33 I. C. C., 507.)

Change of Destination—Compensation Therefor

Doran & Company v. Nashville, Chattanooga & St. Louis, et al Opinion by the commission:

The complainants made five shipments of lumber from Chattanooga via the Nashville, Chattanooga & St. Louis to Nashville, thence via the Louisville & Nashville to Cincinnati, the original destination. At that point three cars were reconsigned to Toronto, Ont., and charges were collected at a rate of 28 cents a hundred pounds. On the other two cars, which were reconsigned to London, Ont., charges were collected at a rate of 25 cents. These rates were the sums of the intermediate rates to and from Cincinnati, whereas the joint through rates from

Chattanooga were 22½ cents to London and 23 cents to Toronto. Requests for reconsignment filed with the agents of the railways while the shipments were en route from Chattanooga to Cincinnati were denied on the ground that the tariff did not authorize reconsignment of lumber on the basis of the through rate.

The commission finds that defendant's refusal to allow reconsignment and diversion of lumber on the basis of the through rate from the point of origin to the new destination with a reasonable charge for the extra service performed, where the contents of the car remain unchanged, where the change of destination or route does not involve an out-of-line haul, and request is made in a reasonable time, was unlawful and unreasonable. It is held that the charges collected on the shipments in question were unreasonable to the extent that they exceeded the charges that would have accrued at the joint through rates plus a maximum additional charge of $5 per car for the extra service incident to reconsignment at Cincinnati. Reparation is awarded on that basis. (33 I. C. C., 523.)

Advances in Freight Rates from the East to St. Paul and Minneapolis Disapproved

Minneapolis Civic & Commerce Association et al. v. Algoma Central & Hudson Bay et al. (Rail-Lake-and-Rail Rates to St. Paul). Opinion by the commission:

It is held, that the proposed 90-cent scale of rates from trunk line and central freight association territories to the twin cities has not been justified by the respondents and that the 28-cent scale of differentials in the rates to the twin cities over the rates to Duluth is unduly discriminatory as against the former; that the present 83-cent scale of rates to the twin cities is not unreasonable or unlawfully discriminatory against those communities, nor is the 21-cent scale of differentials over the rates to Duluth unduly preferential of that port as alleged; that for the future any class rates to the twin cities in excess of a 21-cent scale of differentials over the rates to Duluth will be unjustly discriminatory as against the twin cities, and any class rates to the latter communities on a scale of differentials lower than 21 cents, first class, will be unduly discriminatory as against Duluth. A scale of rates, rail-lake-and-rail, from trunk line and central freight association territories to the twin cities based upon a rate of 83 cents, first class, prescribed for the future. Carriers will be expected to bring their commodity rates into harmony with the class rates. (33 I. C. C., 577.)

Rates on High Explosives to Grand Trunk Stations

Opinion by Commissioner Harlan:

Certain of the eastern carriers have proposed to cancel the joint through rates on high explosives from Baltimore, Wilmington and Philadelphia to points in the undeveloped districts of Michigan on the Grand Trunk Western, whereupon there will be left in effect intermediate rates considerably higher than the present rates. Considerable of this traffic to these points moves via various lines to Buffalo, thence through Canada over the Canadian member of the Grand Trunk System, the Grand Trunk Railway of Canada and thence to destination over the Grand Trunk Western, the domestic member of that system. Both the members of the Grand Trunk System for a number of years have joined with the lines east of Buffalo in maintaining through routes and joint rates to these destinations.

It is offered in justification that it is against the policy of the Grand Trunk Railway of Canada to maintain joint through rates on high explosives. The commission believes that it should have jurisdiction over joint rates from one point in the United States through Canada to another point in the United States. It does not at this time wish, however, to make a definite ruling upon questions involving a possible conflict of authority as between the rate regulating bodies of this country and of Canada, without a more ample consideration of the matter. It, therefore, expresses no final conclusion respecting the question of its jurisdiction.

The points in Michigan on the Grand Trunk Western may be reached over reasonably convenient routes lying wholly within the United States, as a number of the carriers operating south of the lakes in United States territory are parties to the tariffs in question. The protestants are entitled to through routes and reasonable joint rates, and the respondents are, therefore, expected to withdraw the cancellation until such routes have been established via the domestic lines at the through rates now in effect. The Grand Trunk Western will be expected to join in all such rates and routes to local points on its rails. (33 I. C. C., 567.)

Rates on Iron Ore from Mines on the Mesabi Range

In re rates, practices, rules and regulations governing the transportation of iron ore. Opinion by Commissioner Meyer:

In this case the commission finds that the present rate of 60 cents a long ton on iron ore from mines on the Mesabi range in Minnesota to vessels at Two Harbors and Duluth, Minn., and Allouez Bay, Wis., is unreasonable and that it should not exceed 55 cents.

The case began in informal proceedings, started in December, 1908, by Leon E. Lum The complaint was later made a formal one. The commission, however, finally decided to institute an investigation regarding the rates, practices, etc., relating to the carriage of iron ore in this territory.

In 1913 the Duluth & Iron Range shipped 1,567,000 tons of ore from the Vermillion range, 8,546,000 tons from the Mesabi range, or a total of 10,113,000 tons from both ranges; the Duluth, Missabe & Northern shipped 12,329,000 tons from the Mesabi range; the Great Northern, 13,154,000 tons from the Mesabi range; the Northern Pacific, 40,000 tons from the Cuyuna range; and the Soo line, 696,000 tons from the Cuyuna range. The following table shows the average annual number of long tons expressed in thousands for five-year periods:

Average for five years ending Dec. 31—	D.&I.R.	D.,M. &N.	G.N.
1911	7,566	11,255	7,168
1912	7,801	10,664	8,477
1913	8,680	11,368	10,395
1914	7,968	9,938	11,181

It was shown, also, that since 1911 the ore tonnage of the Great Northern had been greater than that of any of the other roads, but that it was probable that the Great Northern would have a relatively smaller tonnage after 1914 because of the cancellation of a contract by which the Steel Corporation, through a subsidiary, had agreed to ship certain yearly minimum tonnages over the Great Northern.

The rate on ore from the Vermillion, Mesabi and Cuyuna ranges to the docks at Two Harbors, Duluth, Allouez Bay and Superior is uniformly 60 cents a long ton, regardless of distance. The weighted average haul, obtained by dividing ton-miles by the tons, from the Mesabi range, is 108 miles over the Great Northern, 77 miles over the Missabe and 67 miles over the Iron Range. The average haul from the Vermillion range is 89 miles, and from the Cuyuna range, 112 miles.

The rate of 60 cents was attacked as unreasonable in and of itself. There was no charge of discrimination, except that it was argued that a rate in excess of a reasonable rate would be tantamount to a rebate to the Steel Corporation, which controls the Iron Range and the Missabe. "It is suggested by carriers that the commission is not called upon to enforce the anti-trust act or the commodities clause in this case, but the fact that the Steel Corporation, through a subsidiary, the Oliver Mining Company, is the largest shipper over these roads cannot be ignored. The fact that the same corporation indirectly controls two of the roads and owns the larger portion of the ore shipped over them, demands a strict interpretation of any standard of reasonableness which is adopted, although the right of these roads to earn a fair return upon the property devoted to public use is not questioned."

Detailed cost figures were introduced by both sides. The work of considering these figures was simplified by the position taken by the carriers that the Iron Range and the Missabe were built primarily to carry ore, and that ore was so large a part of their traffic that the non-ore traffic could be regarded as a by-product.

The commission, basing its opinion largely upon the valuations made by the state of Minnesota, believed that no great error would be made in concluding that the fair value of the properties for the purposes of the case were not in excess of $22,130,635 for the Iron Range, and $28,464,955 for the Missabe as of June 30, 1912.

Taking these maximum valuations as an average for the five-year period ending June 30, 1914, the total operating expenses, taxes and capital charges at 7 per cent are estimated as 44.69 cents a long ton for the Iron Range and 42.05 for the Missabe. For the same valuations the results for the five years ending in 1913 are 45.04 cents for the Iron Range and 40.03 for the Missabe. If the valuations submitted by the carriers be substituted the results would be 56.96 cents, 54.88 cents and 54.26 cents for the

years 1912 to 1914 respectively for the Iron Range and 43.15 cents, 42.42 cents and 46.70 cents respectively for the Missabe. It is further held that practically every comparison that can be suggested between the ore lines of the Great Northern and the Iron Range and the Missabe point a very large profits on the ore traffic of the Great Northern, perhaps equal to those on the other two roads, and any rates found reasonable for the Iron Range and Missabe will make this traffic profitable to the Great Northern. The 60 cent rate yields average earnings per gross ton mile for the three roads of 7.098 mills and net earnings 6.338 mills.

The representatives of the road serving the Cuyuna range said that even if no order were entered with respect to them the rates fixed for the Mesabi range would be controlling. The Soo ond Northern Pacific would doubtless be justified in participating in the ore traffic at a considerably less rate than 60 cents.

An order will be entered to the effect that the rates on ore from the Mesabi range should not exceed 55 cents. No order is made with reference to the rates from the Vermillion and Cuyuna ranges. (33 I. C. C., 541.)

Trap Car Service at Chicago

William D. McHugh, attorney for a number of railroads entering Chicago, has filed a brief with the Interstate Commerce Commission on behalf of the carriers in support of the tariffs abolishing free trap car service in Chicago and immediate vicinity, and imposing a charge of four cents per 100 lb. for such service. Mr. McHugh says in the brief, that there are in Chicago over 10,000 industries, all of which ship merchandise. Of these, about 3,000 have private sidings to which, under the present tariffs, the trap car service is available. The present tariffs require that for trap car service there must be loaded a minimum of 6,000 lb. for western, and 10,000 lb. for eastern lines. An exhibit compiled for this case, listing all the trap cars handled on five of the principal railroads in Chicago for the first five days of five representative months of 1914, comprising 1,180 trap cars, shows that this service was rendered to only 71 shippers, and 822 trap cars out of a total of 1,185, were handled for only six shippers. Of the L. C. L. merchandise received and delivered by the railroads in Chicago daily, 1,564 tons is handled by tunnel, 2,636 tons by lighter, 993 tons by trap car, and 6,771 tons by team.

The average number of trap cars moved daily in Chicago is 121, and the average weight of the load is 15,500 lb. Probably because his tonnage is not equal to the minimum requirements, Mr. McHugh says, the ordinary shipper cannot avail himself of this trap car method of relieving himself of the expense of transporting his merchandise to the stations of the railroads. Consequently, the trap car service is, in effect, a privilege accorded only to the large shippers. The 7,000 industries that must transfer their merchandise by team at their own expense, are in competition with those industries for which the carriers provide these free services and are, therefore, compelled to pay an expense from which the large shippers are free.

The purpose of the carriers in filing the tariffs now under investigation, he says, is "to abolish this favoritism and make the uniform rate a rate for transportation from station to station, which is the service rendered to all shippers, and then to provide that if any shipper desires a special service, that of having his merchandise transported between the railroad stations and his warehouse door there shall be a reasonable and fair charge imposed for that special service."

To show that the proposed charge is reasonable, the brief points out that the revenue which would accrue to the carrier for the trap car service on the average load would be $6.20 per car, while under the Lowrey tariff, $6 per car is the minimum charge for switching throughout the Chicago district; and that testimony in this case shows that the cost of the movement of the average trap car amounts to $6.87. Moreover, the average income from the trap car service would not equal the average of the cash outlay in the way of absorptions made by the carriers in the trap car service with the connecting lines. It is also asserted that the testimony shows that the charge of four cents a hundred pounds for trap car service as a substituted service for the teaming is a charge really less than the average teaming cost to the shippers.

STATE COMMISSIONS

The Railway Commission of Canada has adopted an order requiring railways, when they have to refund money on a ticket which has not been used, or has been but partly used, to make payment within 30 days; or, if the ticket reads over two or more lines, then within 60 days.

At the hearing before the Kansas Public Utilities Commission on the application of the Kansas roads for authority to make advances in freight and passenger rates, the Atchison, Topeka & Santa Fe filed a statement showing that it cost that company $1,126,310 during the year 1914, to comply with state and federal laws and regulations affecting railroad operation. The expense was divided as follows: Hours of service laws, $244,636; excess crew laws, $60,862; boiler inspection laws, $226,087; safety appliance laws, $253,506; postal car requirements, $48,180; twenty-eight-hour stock laws, $8,601; semi-monthly pay laws, $7,462; headlight laws, $32,110; specific orders of state commissions, $78,414; other enactments $166,452.

Texas Commissioner Wants Exclusive State Jurisdiction Over Rates

William D. Williams, of the Texas Railroad Commission, has announced his intention of writing to all members of Congress, asking their support for an amendment to the act to regulate commerce to prevent the exercise by the Interstate Commerce Commission of any authority over state rates, such as those involved in the Shreveport rate case. The proposed amendment, which was recommended at the last meeting of the National Association of Railway Commissioners, is as follows:

"And, provided, that nothing in this act, nor the exercise of any authority by the interstate commerce commission by virtue thereof, shall absolve any railroad or other common carrier from obeying any rate, rule, regulation or practice of any state with respect to the transportation of passengers or property, or the receiving, delivery, storage or handling of property, wholly within one state, and not shipped to or from foreign country, to or from state or territory as aforesaid, unless any such common carrier shall have secured the judgment of a court of competent jurisdiction holding such rate, rule, regulation or practice imposed as aforesaid, to be unreasonable."

In a letter to the Texas Congressmen, Commissioner Williams says: "It seems to me obvious that the road which we are now following leads inevitably to the destruction of state regulation and to the very bitterest of commercial wars between the several states. All state-made rates must be reasonable and must under the law, afford a proper return and profit to the railroad company doing the haul. If state rates are made which do this they ought not to be set aside by the courts, or the interstate commerce commission, or by any other authority."

PERSONNEL OF COMMISSIONS

Frank A. Wightman has resigned as a member of the Missouri Public Service Commission to become superintendent of safety of the St. Louis & San Francisco, with headquarters at Springfield, Mo. Eugene J. McQuillen, formerly circuit judge at St. Louis, has been appointed a member of the commission, to succeed Mr. Wightman.

COURT NEWS

The New Jersey Court of Errors and Appeals has sustained the order of the Board of Public Utility Commissioners of that state denying the application of the West Jersey & Seashore to lease its property to the Pennsylvania for 999 years. Chief Justice Gummere, who wrote the opinion, said it was a rightful use of the powers of the legislature to delegate such regulative power to the Utility Commissioners.

In the United States District Court, at Trenton, N. J., April 27, the Lehigh Coal & Navigation Company was in-

dicted, on 30 counts, for accepting illegal rebates from the Central of New Jersey, on shipments of coal from Nesquehoning, Pa., to points in New York and New Jersey. The transactions appear to be the same as those on which the railroad company was found guilty of violation of the law a few weeks ago.

The Baltimore & Ohio has brought suit in Kanawha county, West Virginia, against the attorney general of that state and aginst other state officers, for an injunction to forbid the enforcement of the law of that state limiting passenger fares to the basis of two cents a mile. The Baltimore & Ohio sets forth in its complaint that it is operating its passenger trains in that state at a loss of $9,000 a month. Announcement was made some time ago that fares would be advanced about May 1.

Judge Trieber, of the United States district court at Little Rock, Ark., has granted the application of the Kansas City Southern for authority to make passenger rates in Arkansas on the basis of 3 cents a mile, and freight rates higher than those which had been fixed by the railroad commission of that state. The railroad commission was perpetually enjoined from enforcing either the two-cent passenger rates or the reduced freight rates. A short time ago the court issued a similar injunction applying to the St. Louis & San Francisco.

Change of Destination—Limitation of Liability

A carload of goods and live-stock was shipped from Crescent, Okla., to Hill City, Kan., but the point of destination was changed by order of the shipper at Salina, Kan., to Buffolo Park, Kan. The Kansas Supreme Court holds that the entire transportation was governed by the regulations of interstate commerce, under which a carrier may limit its liability for damages to the reasonable value of the property declared in the shipper's contract.—(Kirby v. Union Pacific (Kan.), 146 Pac., 1183.)

Crossing Accidents—Looking and Listening

The Missouri Court of Appeals holds that a person who passes with a team over as much as 80 feet of the public road, when his view was unobstructed, without looking and listening, is guilty of contributory negligence, as a matter of law, although the defendant was negligent in not sounding the whistle or bell. Prior decisions of the Missouri Supreme Court have held it to be negligence to so pass over clear spaces of less than 30 feet.—(Owens v. St. Louis Southwestern (Mo.), 174 S. W., 116.)

Florida Rules Governing Use of Terminals for Rival

The Supreme Court of Florida holds that Rules 3, 15 and 17, governing the transportation of freight, promulgated by the State railroad commission, do not contemplate that a common carrier, having switching and terminal facilities for its own use, at a particular point, shall be forced, at least without adequate necessity, compensation and protection, to collect and distribute within its own switching limits for a competing line, car loads of freight destined to or arriving from points reached by its line; such carrier having no part of the line haul.—State v. L. & N. (Fla.), 67 So., 875.

Spur Track—Release for Damages by Fire

A contract between a railroad company and the owner of land adjoining its right of way provided for the construction of a spur, partly on the right of way, and partly on the adjacent land, for the material advantage of the parties, but primarily for the benefit of the owner of the land. A clause of the contract indemnified the railroad against loss and damage or expense by fire to cars and contents standing on the siding, and released it, in general terms, from all claims of whatsoever character for damages resulting to the property of the owner of the land, by reason of fire originating from the engines of the railroad. Action was brought against the railroad for the burning of a large quantity of pulp wood, stored around the side track, by the escape of fire from an engine passing on the main line. The West Virginia Supreme Court holds that the clause of the contract released the railroad from damages by fire from locomotives on the main line as well as those on the siding. West Virginia Pulp & Paper Co. v. B. & O. (W. Va.) 84 S. E. 334.

Live Stock Law—Failure to Fence

In a locality where the Texas stock law was in force, making it unnecessary for a railroad to fence against animals, and making it unlawful for a stock owner to permit his cattle to run at large, a railroad, being forbidden under the Texas statutes to permit Johnson grass to go to seed, placed poison on the right of way, which killed cattle trespassing thereon. It was held by the Texas Court of Civil Appeals that the railroad need not foresee that stock might be running at large, nor need it employ guards to prevent cattle trespassing and being poisoned.—(Ft. Worth & R. G. v. Brown (Tex.), 173 S. W., 943.)

Lease for Elevator Space—Exempting Railroad from Liability

A railroad leased ground for a grain elevator, the lessee to assume all risk of damage arising from the movement of cars, or from the operation of the railroad in any respect, whether the result of negligence or otherwise. A freight car got off the track and was pushed through the elevator building. In an action against the railroad to recover for the damage, the Kansas Supreme Court holds that the clause exempting the railroad from liability is not in contravention of public policy, and is valid. (Griffiths Grain Co. v. St. Joseph & G. I. (Kan.), 146 Pac., 1134.)

Excess Crew Law—Construction

The Arkansas Supeme Court holds that the "Full Crew Law" of that State, which provides that it shall not apply to any company whose line is less than 50 miles in length, applies to all railroads whose entire mileage operated is more than 50 miles, whether they have 50 miles within the State or not; that the classification of railroad lines of more than 50 miles in length and lines of less than 50 miles is reasonable and proper, and that it is not an unconstitutional regulation of interstate commerce when applied to a foreign railrood engaged in such commerce.—(Kansas City Southern v. State (Ark.), 174 S. W., 223.)

Liability of Initial Carrier—Live Stock

In an action against the initial carrier for damages to a carload of horses, it was contended by the defendant that the plaintiff should not recover, because his caretaker accompanied the horses and knew exactly where the damages were inflicted, and consequently the Carmack amendment did not apply, in the absence of any difficulty in locating where the injury occurred. The Texas Court of Civil Appeals, however, holds that the act fixes absolute liability on the initial carrier, which is liable, despite the insolvency of the connecting carriers, and the fact that the statute was passed so that shippers who did not accompany their shipment would be able to hold someone liable.—(Texas Mexican v. King (Tex.), 174 S. W., 336.)

Recovery of Undercharge

After repeated interviews and correspondence with the representatives of the Louisville & Nashville, a passenger bought two round-trip tickets from Nashville to Salt Lake City, by way of Chicago and Denver, and to return via Denver, Amarillo, Ft. Worth and Memphis; and paid for each ticket $49.50. This was $29.15 less than the legal rate on each ticket. The passenger could have gone to Salt Lake at the rate which he paid, but over other routes. He was in no way at fault in the matter. He merely told the agent the points to which he wished to go, and that he did not wish to go and return by the same route. The agent fixed the routing and named the fare. The Tennessee state courts gave judgment for the defendant in an action to recover the undercharge; but this has now been reversed by the United States Supreme Court, holding that the rate filed under the Interstate Commerce Act is the only lawful charge, from which there can be no deviation on any pretext. Ignorance or misquotation of rates is not an excuse for paying or charging either less or more than the rate filed. It was not a case of

misrouting. A misstatement or misquotation of the rate over a given route is one thing; misrouting is another. The court held that there was no misrouting, in any proper sense, the route given by the company being that requested by the passenger.—Decided April 5, 1915.

Contracts as to Crossings

The Chicago & North Western agreed that the Milwaukee Northern might maintain its tracks across the C. & N. W. right of way and under its tracks, the M. N. agreeing, in case the N. W. built an additional track, to pay the expense of adjusting the physical situation so as to accommodate the new track. The C. & N. W. built a new track, and in an action on the contract the Wisconsin Supreme Court holds that the contract is binding on the Milwaukee Northern, notwithstanding the statute (1913, § 1797-56), declaring that every crossing, hereafter made, shall be above, below or at grade, as the railroad commission shall determine, and that the commission shall fix the proportion of the expense. The purpose of the statute was merely to promote safety as regards future established crossings—not to deal with existing crossings.—(C. & N. W. v. Milwaukee Northern (Wis.), 151 N. W., 804.)

Hours of Service Act—Emergency

In an action to recover penalties for violation of the hours of service act, by requiring telegraphers in a night and day office to remain on duty for more than 9 hours in 24-hour periods, the answer alleged as a reason for the requirement, that a train despatcher in the office became "abusive, insubordinate and defiant," and it became necessary to dismiss him, because his retention would have endangered the public, and that he was replaced as soon as possible. The Circuit Court of Appeals, Eighth Circuit, holds that this stated a cause of "emergency," within the meaning of the statute, and constituted a defense. The Court said that the danger arising from fatigue is not greater than that arising from disobedience, wilfulness, or malice. (United States v. Denver & R. G., C. C. A., 220 Fed., 293.)

Extra Fares—Powers of Commission

In an action for improper ejectment, the defendant pleaded an order of the Alabama railroad commission authorizing the collection of 15 cents extra from persons boarding the train at ticket stations without tickets. The plaintiff, on a trip where the ticket fare was 13 cents, got on the train without a ticket and was ejected on his refusal to pay the 15 cents additional. The preamble of the commission's order mentioned certain lines, but omitted the defendants'. The order, however, began: "That no railroad in Alabama," indicating that it applied to all railroads in the State. It was held by the Alabama Supreme Court to apply to the defendants' road, as otherwise it would be void for discrimination. The Court held the order to be authorized by Laws 1907, p. 711, giving the commission power to change rates, regardless of Code 1907, § 5563, fixing rates generally.—(Kimbrell v. L. & N. (Ala.), 67 So., 586.)

Georgia Railroad Tax

The roads now operated by the Central of Georgia under lease from the Augusta & Savannah and the Southwestern, were built under special charters, by which the property was not subject to be taxed higher than one-half of 1 per cent upon the annual income. The state controller having sought to tax the whole property to the lessee, the United States Supreme Court holds that only the tax provided for in the charter can be collected. Under the charter the holder of the exclusive privilege of operating thereby granted might obtain its revenue by doing the whole business itself, by letting in others to share a part of it, or by making a lease of the whole. The court considered that no change in the matter of tax exemption could have been expected to follow from the demise of the road, any more than it would have followed from the admission of another carrier to partial rights, or of an individual to carry his own goods. A similar decision was at the same time made in the case of the Georgia Railroad, leased by the Louisville & Nashville and the Atlantic Coast Line.

Railway Officers

Executive, Financial, Legal and Accounting

H. S. Buefcher has been appointed general claim agent for the Texas & Pacific, with headquarters at Dallas, Tex., in place of W. L. Chew, resigned.

E. J. Pearson, first vice-president of the Texas & Pacific, has been elected president of the Trans-Mississippi Terminal Company, with office at New Orleans, La., succeeding E. F. Kearney, resigned.

D. E. Hedges continues as auditor and assistant treasurer of the Tennessee, Alabama & Georgia, with headquarters at Chattanooga, Tenn. It was erroneously stated in our issue of last week that Mr. Hedges had resigned as auditor.

Guy J. Bunting, assistant general auditor of the Chicago, Milwaukee & St. Paul, at Chicago, has been appointed general auditor, with headquarters at Chicago, succeeding B. A. Dousman, who at his own request has been assigned to special duties in Milwaukee as assistant general auditor.

Henry W. Miller, assistant to the president of the Southern Railway at Atlanta, Ga., has been elected vice-president, with headquarters at Atlanta, and the office of first vice-president has been abolished as a mark of respect to the late Col. A. B. Andrews, the only incumbent since the organization of the company.

F. A. Lehman, who has been acting general superintendent of the eastern lines, Western district, of the Atchison, Topeka & Santa Fe, at Newton, Kan., for the past six months, will return to the position of assistant to vice-president, with headquarters at Chicago, on May 1. E. Raymond, who took Mr. Lehman's place temporarily, returns to Newton as general superintendent.

The receivers of the Chicago, Rock Island & Pacific have announced the following appointments: George H. Crosby, vice-president, secretary and treasurer, has been appointed secretary and treasurer; H. M. Sloan, assistant to the president, has been appointed assistant to the receivers; M. L. Bell has been appointed general solicitor, and F. Nay has been appointed controller, all with offices at Chicago. White & Case, of New York, have been appointed general counsel.

Operating

The office of T. W. Evans, general superintendent, Second district of the New York Central, has been removed from Syracuse, N. Y., to Buffalo.

A. C. Ridgway, second vice-president of the Chicago, Rock Island & Pacific, has been appointed chief operating officer for the receivers, with headquarters at Chicago.

F. A. Wightman, who has been a member of the Missouri Public Service Commission, has resigned to become superintendent of safety of the St. Louis & San Francisco, with headquarters at Springfield, Mo.

M. A. Mulligan, general yard inspector at South Bethlehem, Pa., has been appointed acting superintendent of the New York division of the Lehigh Valley, with office at Jersey City, N. J., vice M. C. Roach, deceased.

Traffic

J. E. Gorman, first vice-president of the Chicago, Rock Island & Pacific, has been appointed chief traffic officer for the receivers, with office at Chicago.

Engineering and Rolling Stock

J. A. Shaw, electrical engineer of the Canadian Pacific, at Montreal, Que., has been appointed general electrical engineer, with headquarters at Montreal.

C. W. Van Buren has been appointed general master car builder of the Canadian Pacific, with headquarters at Montreal, Que., in place of R. W. Burnett, resigned.

H. A. Macbeth, division master mechanic of the New York, Chicago & St. Louis at Conneaut, Ohio, has been appointed superintendent of motive power, with headquarters at Cleveland, succeeding E. A. Miller, deceased. T. C. Baldwin has been appointed master mechanic, with headquarters at Conneaut, to succeed Mr. Macbeth.

Purchasing

F. D. Reed, assistant to the vice-president and purchasing agent of the Chicago, Rock Island & Pacific, has been appointed general purchasing agent, with headquarters at Chicago. Mr. Reed was born April 22, 1868, at Fort Dodge, Iowa, and was educated in the public schools of Chicago. He entered railway service September 24, 1884, as wheel inspector of the car department for the Pennsylvania Lines West of Pittsburgh, at Chicago, which position he held until March, 1885, when he became clerk and timekeeper. In September, 1890, he was made chief clerk of the car department and held that position until July, 1895, when he was appointed assistant chief motive power clerk at Fort Wayne, Ind. In February, 1900, he was appointed chief motive power clerk and remained in that capacity until April, 1904. He then entered the service of the Chicago, Rock Island & Pacific as chief motive power clerk at Chicago. In February, 1906, he was made general storekeeper at Silvis, Ill., and held that position until May, 1910, when he was appointed assistant to the vice-president of the purchasing department, at Chicago. On June 1, 1911, he was also appointed purchasing agent of the same road.

F. D. Reed

OBITUARY

Eli A. Miller, superintendent of motive power of the New York, Chicago & St. Louis, with offices at Cleveland, Ohio, died at his home in Cleveland, on April 18, after having been ill with pneumonia since April 7. Mr. Miller was born May 1, 1847, in Washington county, Pa., and was educated in the public schools. He entered railway service in 1865, with the Cleveland & Pittsburgh, and was consecutively laborer and helper until 1866. From 1866 to 1871, he was machinist apprentice and machinist with the Pittsburgh, Cincinnati & St. Louis, at Dennison, Ohio. From 1871 to 1873, he was machinist for the Louisville & Nashville, at Bowling Green, Ky. In 1873, he was made foreman of the Pittsburgh, Cincinnati & St. Louis, and later, in 1880, he was made roundhouse foreman of the same road, at Columbus, Ohio. In 1882, he was appointed master mechanic of the New York, Chicago & St. Louis, at Conneaut, Ohio, which position he held until May 1, 1905, when he was appointed superintendent of motive power of the same road, with office at Cleveland.

E. A. Miller

E. H. Calef, general freight agent of the St. Louis, Iron Mountain & Southern, died on April 21, at his home in St. Louis, Mo., at the age of 48.

Samuel Bancroft, Jr., chairman of the board of directors of the Huntington & Broad Top Mountain Railroad & Coal Company, died on April 22, in a hospital in Philadelphia, Pa., at the age of 75.

John F. Boniger, secretary and treasurer of the Texas-Mexican Railway, died at Laredo, Tex., on April 21, aged 49 years. He had been secretary and treasurer of this company for the past 22 years.

Lieut.-Colonel Lacey R. Johnson, who was appointed general welfare agent of the Canadian Pacific in March of this year, died on April 17, at the age of 60. He had been in the service of the Canadian Pacific since 1882.

William E. Chamberlain, formerly, from July, 1898, to April, 1904, general manager of the New York, New Haven & Hartford, died on April 22, at his home in Brookline, Mass., at the age of 80. At the time of his death Mr. Chamberlain was general manager of the Armstrong Transfer Company.

William H. Bancroft, vice-president of the Oregon Short Line, and first vice-president of the San Pedro, Los Angeles & Salt Lake, died at Salt Lake City, on April 22, of appoplexy. Mr. Bancroft was for several years vice-president and general manager of the Oregon Short Line, but retired from active service on February 1, 1914, retaining the title of vice-president. He was born on October 20, 1840, at Newberg, Ohio, and entered railway service in April, 1856, as telegraph operator and ticket clerk of the Michigan Southern. From 1861 to 1869, he was division operator, clerk and despatcher on the Erie, and from 1869 to 1872, was despatcher, superintendent, clerk and train despatcher on the Kansas Pacific. On October 20, 1872, he was appointed assistant superintendent of the Atchison, Topeka & Santa Fe, and in May, 1875, was appointed superintendent of the St. Louis, Lawrence & Western. For a short period in 1878 he was chief despatcher of the Missouri, Kansas & Texas, and from April, 1878, to July 28, 1886, was superintendent of various divisions of the Denver & Rio Grande. From August 15, 1884, to July 29, 1886, he was also receiver of the Denver & Rio Grande Western. On the latter date he was appointed general superintendent of the Denver & Rio Grande, which position he held until 1890, when he entered the service of the Union Pacific as general superintendent of the Mountain division. This position he held until March, 1897, when he was made vice-president and general manager of the Oregon Short Line. On January 15, 1904, he was made general manager of the Union Pacific. In April, 1904, he returned to the Oregon Short Line as vice-president and general manager, which position he held until February 1, 1914. From November, 1904, to February, 1905, he was also acting general manager of the Southern Pacific. In March, 1905, he was also elected first vice-president of the San Pedro, Los Angeles & Salt Lake, and on November 1, 1906, also president of the Utah Light & Railway Company.

W. H. Bancroft

Equipment and Supplies

CAR BUILDING

The Chicago & North Western, it is reported, may increase its recent inquiry for box cars from 2,000 to 3,000.

The Chicago, Milwaukee & St. Paul has ordered 2,000 freight cars from its West Milwaukee shops and 7 sleeping cars from the Pullman Company.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 400 40-ton box and 100 40-ton steel automobile cars from the American Car & Foundry Company.

The Pennsylvania Lines West have divided an order for 150 steel underframes, between the Ralston Steel Car Company and the Greenville Steel Car Company.

The Russian Government is reported to have placed an order for 17,100 air brakes with the Westinghouse Air Brake Company. This item has not been confirmed.

IRON AND STEEL

The Chicago, Burlington & Quincy has ordered 2,000 tons of rails from the Illinois Steel Company.

The Chicago Railways Company has ordered 20,000 tons of girder rails from the Lorain Steel Company.

The Buffalo, Rochester & Pittsburgh has ordered 2,000 tons of steel rails from the Carnegie Steel Company.

The Atlantic Coast Line has ordered 6,000 tons of steel rails from the Tennessee Coal, Iron & Railroad Company.

The Kansas City Southern has ordered 6,000 tons of steel rails from the Algoma Steel Corporation, Ltd. These rails are to be rolled under the American Railway Engineering Association specifications, with the nick and break test.

SIGNALING

Block Signals on New York Elevated Lines

The New York State Public Service Commission, First District, is keeping up a pressure on the Interborough Rapid Transit Company, New York City, to completely equip all of the lines operated by it, both subway and elevated, local as well as express tracks, with the most complete automatic block signal protection.

The express tracks in the subway have complete automatic block signal protection, with automatic train stops and with signals and stops at the approach to the stations placed close together for the purpose of regulating the speed of trains which are to stop at the stations. For several years past the company has been extending the use of block signals, including the train stops, on the local tracks, although on these the trains, in most cases, stop about every quarter mile, and the speed consequently is always low. Following a slight collision on the elevated lines, last December, the State Commission called upon the road to present plans for complete signaling of the elevated lines. The president of the company, in his reply, expressed the intention to provide complete signaling equipment on the new express tracks of the elevated lines, now being built, but in regard to the local tracks said that complete signaling would reduce the capacity of the lines; the present practice being to run trains on these lines constantly with speed under control. With this arrangement, trains in the congested hours may be run as close together as is necessary. The Commission, however, is not satisfied with the attitude of the road and has adopted a resolution calling upon the company to make a trial installation on the elevated lines not later than October 1, next; to make a thorough test as soon as practicable, and by June 1, 1916, to be prepared to submit to the Commission all necessary information as to whether such trial system shall be extended throughout the whole of the elevated lines. This resolution evidently contemplates the introduction of "speed control" signaling throughout all the lines.

Supply Trade News

The Carbo Steel Post Company, Chicago, has started construction work on a new plant at Cambridge, Ohio.

The Dearborn Chemical Company, Chicago, has opened an office in Edificio del Banco Anglo Sud-Americano, Buenos Aires, Argentine, in charge of Edward C. Brown.

The B. W. Parsons Co., dealing in railway material and mill supplies, has moved its offices in St. Paul, Minn., from the Pioneer building to 1306 Merchants Bank building.

The C. W. Hunt Company, Inc., manufacturers of coal handling and conveying machinery and small motor trucks, has moved its New York office from 45 Broadway to the eleventh floor of the new building of the Adams Express Company, 61 Broadway.

The Chicago office of the Westinghouse Electric & Manufacturing Company has taken over the sale of Nuttall gears, pinions and trolleys, manufactured by the R. D. Nuttall Company, Pittsburgh, Pa., for the electric railway, mining and industrial fields in the Chicago territory.

The eleventh annual convention of the Associated Advertising Clubs of the World will be held in Chicago, June 20 to 24, in the Auditorium theater. Various departmental meetings will also be held in the Auditorium hotel. One of the features of the convention is to be the educational exhibit of trade and technical publications. A very comprehensive program is planned and many prominent business men will speak. It is expected that over 10,000 men will attend the convention.

The Linde Air Products Company, New York, has purchased a factory site in St. Louis on Forest Park Boulevard, between Sarah street and Boyle avenue; and the work of erecting buildings will be started as soon as plans can be drawn and contracts awarded. The St. Louis plant will be the fourteenth erected by the company, and with its completion Linde oxygen will be distributed from 39 points. In addition to oxygen the Linde Air Products Company also produces nitrogen and other rarer gases contained in the atmosphere.

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company, held in Jersey City, on April 19, the former board of directors was re-elected for the ensuing year. The vote recorded was the largest ever represented at an annual election—19,519 shares out of a possible 20,000. The directors re-elected the following officers: George T. Smith, president; George E. Long, vice-president; J. H. Schermerhorn, treasurer; Harry Dailey, secretary, and Albert Norris, assistant secretary and assistant treasurer.

L. S. Brach Supply Company, New York, is about to move its factory to larger quarters at 129 Sussex avenue, Newark, N. J. An extensive laboratory for the testing of the company's apparatus has been included in the new factory, besides ground space for the erecting of signals for testing before shipment. Included in the products that will be manufactured in the Newark plant are: Brach automatic flagman, arresters, hydrogrounds, recorders, switch devices and concrete products. The Solderall Company, a subsidiary, will also have its products manufactured in this plant.

The report of the United States Steel Corporation and its subsidiary companies for the quarter ended March 31, 1915, shows total net earnings for that period of $12,457,809, and a deficit, after payment of interest and preferred dividends, of $5,389,861. This compares with total net earnings of $10,933,170, and a deficit of $5,606,283 for the previous quarter, and with the total net earnings of $17,994,381, and a deficit, after dividends, of $6,289,644 for the quarter ended March 31, 1914. During the quarter last mentioned, however, the Steel Corporation was paying dividends of 1¼ per cent. on its common stock, while at present no dividends are being paid on that stock.

Railway Construction

Alabama, Tennessee & Northern.—This company is planning to start work soon on the extension projected last year from the present northern terminus at Reform, Ala., north for about 70 miles to a connection with the Illinois Central.

Boston (Mass.) Roads.—Governor Walsh has signed a bill ordering the removal of the elevated structure in Charlestown, and the construction of a subway 1.25 miles long to Sullivan square to replace it.

Chesapeake & Ohio.—Contracts for the construction of 29.8 miles of the Chesapeake & Ohio Northern from a connection with the Chesapeake & Ohio in Kentucky to a connection with the Norfolk & Western near Waverly, Ohio, have been let to W. W. Boxley & Co., Roanoke, Va.; the Rinehart & Dennis Company, Charlottesville, Va.; Winston & Company, Richmond, Va., and the Robert Grace Contracting Company, Pittsburgh, Pa. (April 23, p. 913.)

Chesapeake & Ohio Northern.—See Chesapeake & Ohio.

East & West Coast.—Construction work on the line from Bradentown, Fla., southeast via Manatee, East Manatee, Alsace, Lorraine, St. Claire, Myakka City, East Myakka, Parkton, Pine Level and Belgium to Arcadia, 49.8 miles, has been completed with the exception of the stations and section houses, and the line is to be put in operation on May 1. The maximum grade is 0.5 per cent, and the maximum curvature 2 deg. There is one steel bridge and about three miles of wooden trestle on the line. The company expects to develop a traffic in lumber, naval stores, citrus fruits, livestock, etc. Allen W. Jones, president; W. B. Wilson, vice-president, Bradentown.

Florida Roads.—The Port Commission of Jacksonville, Fla., has given a contract to A. J. Mills, Jax, Fla., to build the connecting railroad and freight yards within the city of Jacksonville. M. Corse, chairman, and F. W. Bruce, chief engineer, Jacksonville. (February 26, p. 389.

Lexington & Eastern.—See Louisville & Nashville.

Louisville & Nashville.—The Lexington & Eastern is building a five-mile spur line up First creek in eastern Kentucky from a connection with the North Fork extension to the lands of the Haley Coal Company.

Louisiana Roads Electric.—A company is being organized to build an electric line from Rayville, La., south to Alto, thence to Egypt, 22 miles. The company expects to develop a traffic in cotton, general freight and passengers and farm products; three stations will be put up on the line. T. J. Coenen, Rayville, is back of the project. (April 16, p. 871.)

Meridian & Memphis.—Construction work on the extension from Union, Miss., west to Sebastopol, about 13 miles, has been suspended, it is said, until the completion of a new survey which may require a change of line. (January 29, p. 211.)

New York Subways.—The New York Public Service Commission, First district, has awarded a contract for the construction of Section No. 2 of Route No. 12 to the Inter-Continental Construction Corporation, the lowest bidder at $2,744,263. This section is a part of the Eastern Parkway subway in the borough of Brooklyn, between Prospect Park Plaza and a point about 600 ft. east of Nostrand avenue. (March 26, p. 720.)

Bids will be opened by the commission on May 18, for the construction of Section No. 2 of Route No. 49, which is that part of the Gravesend avenue elevated railroad in Gravesend avenue and Shell road, between Bay Parkway and Avenue X, in the borough of Brooklyn. The Gravesend avenue elevated railroad will connect the Fourth avenue subway with Coney Island.

Ocilla Southern.—This company has secured trackage rights over the Hawkinsville & Florida Southern from Pope City, Ga., to Hawkinsville, and as soon as the Ocilla Southern extension is completed into Pope City, probably by July next, trains will be operated into Hawkinsville. (March 26, p. 720.)

Ocmulgee Valley.—Work is now under way, it is said, on the line from Lumber City, Ga., southwest to Jacksonville, about 20 miles, and track has been laid on about 10 miles. C. S. Smith, president; J. C. Work, chief engineer, Lumber City. (March 26, p. 720.)

Portland Railway, Light & Power.—It is reported that this company contemplates the construction of a new line from either Cottrell on the Mount Hood line or through Sandy, Ore., for a distance of 18 miles.

Southern New England.—Work is now under way on about 58 miles of the line building from Palmer, Mass., southeast via Brimfield, Fiskdale, Southbridge, Sandersdale, Webster, Douglas, Millville, Woonsocket, R. I., and Pawtucket to Providence, R. I., about 75 miles. John Marsch, Southbridge, Mass., is the contractor. The cost of the work will be about $80,000 a mile. The maximum grade will be 1 per cent compensated and the maximum curvature 6 deg. The work is very difficult, about 60 per cent being rock work. There will be 22 steel and 74 wooden bridges, also one viaduct 1,200 ft. long and 125 ft. high on the line. This company, which was organized by the Grand Trunk, started work in 1912, and early this year petitioned the state legislature of Rhode Island for an extension of time to July, 1917, in which to complete work on the section in Rhode Island. Under the terms of the original charter the section in Rhode Island was to be finished by July, 1915. E. C. Smith, president, J. M. Morrison, chief engineer, St. Albans, Vt. (February 12, p. 289.)

Western Maryland.—This company has arranged for trackage rights over two lines of the Baltimore & Ohio, one from Rockwood, Pa., for about 20 miles into Somerset county and the other from Connellsville, Pa., to Fairmont, W. Va. In each case the Western Maryland will build short spurs to reach coal mines. The construction involved in these spurs, which are now being located, will not exceed eight or ten miles.

West Virginia Roads (Electric).—Work is now under way, it is said, on an electric line for the Princeton Power Company from Princeton, W. Va., southwest to Bluefield, 12 miles. Much of the grading work has been completed and track laying is expected to be started in the near future. S. J. Evans, president, Princeton.

RAILWAY STRUCTURES

Beloit, Wis.—The Rockford & Interurban Railway will build a timber bridge of 55 spans of 16 ft. length over the Rock river near Beloit. The estimated cost is $12,000. Work is to be done by company forces. Creosoted yellow pine will be used. W. S. Hubbard of Rockford, Ill., is the chief engineer.

Chicago, Ill.—The contract for the foundation work for the Pennsylvania Lines' new freight terminal at Chicago, mentioned in last week's issue, was let to the Sumner-Sollitt Company, Chicago.

Lexington, Ky.—The Chesapeake & Ohio has not yet completed plans for new shop buildings at Lexington. A contract has recently been let to the Combs Lumber Company, Lexington, for building a seven-stall roundhouse at Netherland, just outside of Lexington.

New York.—A bridge is to be built over Westchester creek at One Hundred and Seventy-seventh street, in the borough of the Bronx. Detail plans have not yet been completed. The plans will call for a structure to carry double track for the operation of electric street railway cars.

Pittsburgh, Pa.—Plans are being made by Allegheny county officers to build a suspension bridge with a double deck approach viaduct, over the Ohio river at Pittsburgh. The proposed structure will require 15,000 tons of steel, and will carry tracks for the operation of steel railway cars. The cost of the work will be $1,500,000. J. G. Chalfant, county engineer, Pittsburgh, may be addressed.

Reading, Pa.—The Philadelphia & Reading has let contracts for rebuilding a bridge under the Lebanon Valley tracks over Sixth street, Reading, as follows: Masonry and concrete work to Seeds & Derham; structural steel work to the McClintic-Marshall Company, and waterproofing to James Kelly. The new structure will consist of deck-plate girders, covered with solid concrete floor waterproofed, and all exterior girders will be incased in concrete.

Sidney, Ohio.—The Cincinnati, Hamilton & Dayton has asked bids for a new steel bridge at Sidney to be built at an approximate cost of $20,000.

Railway Financial News

Atlantic Coast Line.—J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, are offering $5,000,000 Atlantic Coast Line general unified mortgage 4½ per cent bonds of June 1, 1914-1964 at 89¼, yielding about 5.10 per cent interest on the investment. These bonds are issued under the mortgage which provides for $200,000,000 of bonds, of which $88,921,685 are reserved to retire underlying liens and of which, including the present issue, there are now $29,951,000 bonds outstanding. The proceeds from the sale of the bonds are to be used to reimburse the company for expenditures for additions and betterments and for refunding underlying debt which has matured and been paid off.

Baltimore & Ohio.—Kuhn, Loeb & Company and Speyer & Company, both of New York, have bought from the Baltimore & Ohio $40,000,000 4½ per cent secured notes, one-half maturing in two years and one-half maturing in three years. This amount embraces the entire authorized issue of such notes. The subscription list for the Baltimore & Ohio 4½ per cent secured gold notes has been closed by Kuhn, Loeb & Company and Speyer & Company, the $40,000,000 notes offered for subscription today having been over-applied for. Offering price was 99½ for the two-year, and 99 for the three-year notes.

Chicago, Rock Island & Pacific.—A minority stockholders' committee has been formed, consisting of N. L. Amster, Warren C. Crane, Alfred J. Keppelmann and Frank W. Bauder, of New York; E. S. Dickerson, of Philadelphia; George G. Prentice, of New Haven; Peter G. Ten Eyck, of Albany; Nathaniel French, of Davenport, Iowa; George W. Smith, of Maine, and Courtlandt Linkroum, of New Jersey.

Delaware, Lackawanna & Western.—Suit has been brought by minority holders of the Morris & Essex against the Delaware, Lackawanna & Western, which leases the Morris & Essex, claiming that $1,500,000 more should have been paid to stockholders in the last 10 years than was paid because of the improper increase in the funded debt of the Morris & Essex. About $10,000,000 of this increase was to reimburse the Lackawanna for expenditures made on the Morris & Essex and charged to the Morris & Essex property account, which expenditures would have been, if made on the Lackawanna itself, charged to expenses.

Erie.—Drexel & Company, of Philadelphia, and the Guaranty Trust Company, New York, are offering $6,000,000 Genesee River Railroad first mortgage 6 per cent sinking fund bonds, due July 1, 1957, at 103¾, yielding about 5.75 per cent. These bonds are secured by a first mortgage on the new Genesee River cut-off of the Erie and are guaranteed principal and interest by the Erie.

Missouri, Kansas & Texas.—Holders of more than 73 per cent of the $19,000,000 outstanding 5 per cent notes due May 1 had up to April 27 agreed to extend their notes at 6 per cent. The time for the deposit of these notes has been extended to May 1. Additional security, consisting of $1,309,000 5 per cent consolidated mortgage bonds of the Missouri, Kansas & Texas, has been deposited with the Central Trust Company as trustee. The company has made no arrangements for the payment of non-assenting notes. Some of the notes—the exact amount can only be estimated—are held abroad and of the notes held in England some have already been mailed for deposit in the United States. Under the British treasury ruling the notes cannot be deposited in England but must be sent to this country if their holders desire to extend them.

Morris & Essex.—See Delaware, Lackawanna & Western.

New York, New Haven & Hartford.—Stockholders on Saturday, April 24, approved the following proposals made by the board of directors:

1. The reduction in the capital stock to $157,117,900, by the cancelation of $22,899,100 stock now in the treasury.

2. The acceptance of amendments to the company's charter to bring it in conformity with recent legislation enacted in Connecticut and in Rhode Island.

3. The authorization of an issue of bonds by the New Haven, as successor to the New York, Providence & Boston, and as successor to the New Haven & Northampton, under mortgages of those companies dated 1892 and 1906, respectively.

Wabash.—Judge Adams, of the federal district court, has signed an order authorizing the sale of the Wabash at an upset price of $21,000,000. The upset price had previously been fixed at $34,000,000.

The reorganization plan has been completed by representatives of the leading security interests in the property. A committee of seven, consisting of an equal number of members from the Wallace protective committee and the Pierce committee of the refunding and extension bonds and a representative of the stockholders' committee, was appointed to proceed immediately with the work of reorganization.

Kuhn, Loeb & Company, New York, have agreed to underwrite the plan, under which it is proposed to raise $27,720,000 of new capital by an assessment of $30 a share on the stock. The holders of the $35,600,240 first refunding and extension 4s will be given for their bonds a new and special preferred stock. Three classes of stock will be issued, common, preferred and the special preferred. Holders of the present common are to receive something more than a half of their holdings in new common with the remainder in new preferred, upon payment of the assessment. Holders of the present preferred are to get more than a half in new preferred and the remainder in new common, upon payment of the assessment.

Western Pacific.—The Wall Street Journal says that there are rumors to the effect that Governor Johnson, of California, has dropped his plan to buy the Western Pacific for California and that these reports are circumstancial and it is believed that the governor, on the advice of his lawyers and experts who went thoroughly into the matter, has decided that the plan is not feasible.

Railway Extension in Argentina.—The firm of Anastasio Lopez y Cia. (San Luis, F. C. P., Argentina) has secured a concession from the province of Mendoza to construct a 71-mile line from General Alvear to San Rafael, province of Mendoza. The concession includes branch lines to Las Malvinas, 25 de Mayo, and Cuadro Nacional, about 30 miles of track in all, and such other branches up to a distance of 6 miles from the main line as may be necessary to connect the system with centers of production needing an outlet. These additional branch lines are estimated at another 30 miles for the present. The region traversed is said to be well irrigated and under intensive cultivation. The system adopted for the new line is that of the so-called economical secondary railway with a 75-centimeter (2.46 ft.) gage. Steam traction will be used at first, but it is planned to electrify later. Work will be commenced in about six months.

German Railway Employees.—According to reports the employees of the Prussian State Railways who are in sympathy with trade unionism have a very real grievance against the government. The railway administration has for a number of years obliged men entering the service to sign a declaration that they would not become members of a trade union or a Socialist society, and would not attend meetings or read newspapers of the kind. On the outbreak of war, these restrictions remained unrelaxed so far as concerned railwaymen employed prior to mobilization, but new employees who have been engaged to take the place of those with the colors have not been compelled to sign the declaration. The result is a most anomalous and unfair position. Socialist and trade union newspapers are now allowed to be sold at the railway bookstalls, and to be sent to men at the front, but the bulk of the railway employees are not permitted to read them, although they can buy these publications at the stations where they are engaged, which they could not do prior to the war. The concession is, of course, due to the government's desire to placate the members of the German Socialist Party. The position is especially resented because about one German railway man in six, or a total of some 100,000, has already been called up for military service. The Minister of Railways has had his attention drawn to the matter in the Reichstag, but has declined to interfere or to discuss the subject, excusing himself on the ground of the "political truce."—*Railway Gazette.*

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies 7,176 were mailed to regular paid subscribers to the weekly edition, 225 were provided for counter and news companies' sales, 1,052 were mailed to advertisers, exchanges and correspondents, and 297 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 175,100, an average of 9,216 copies a week.

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Contents

*Illustrated.

Wabash Reorganization Plan

The Wabash reorganization plan, outlined in another column in this issue, is drastic, but whether drastic enough or not only time can show. Stockholders are assessed $30 in cash per share and receive new preferred and common stock to a total par value of the amount of stock which they are surrendering in the case of the preferred, and of 95 per cent of the par value of the stock which they are surrendering in the case of the common. The first and extension mortgage bondholders are exchanging a bond for a preferred stock, and while they are receiving, it is true, stock with a par value 20 per cent greater than the face value of the securities which they are surrendering, they are also surrendering coupons calling for interest payments amounting to about 12 per cent and are compelled to underwrite the $30 assessment on the stock under pain of forfeiture of their equities, with the exception of the very small amount which would probably accrue to them as their pro rata share of the selling price under foreclosure of the property. The interest charges of the new company are but $3,183,915, as against present interest charges, all of which, of course, are not being paid, however, of $5,795,278. In the fiscal year ended June 30, 1914, the property earned a sum available for interest payments of $2,680,975, or an amount less by $502,940 than the sum required for interest under the new plan. Under the plan the new company will have funded debt and equipment trust obligations amounting to $26,000 per mile of road. This is conservative, and if rates and operating conditions are such as to permit of a reasonably low operating ratio, the property ought to show a return on at least the first preferred stock, and in time on the second preferred stock. As will be seen, however, rates and operating conditions in 1914 were not such as to permit even the total interest charges on the funded debt to be earned. The main points about the plan which are notable are the large scaling down in fixed charges, the conservatism with which stock is issued against paper equities surrendered, and the fact that no provision is made for any large amount of money to be spent on additions and betterments to the property, the plan providing but for $3,500,000 working capital for the new company after the payment of receivers' certificates, expenses of reorganization, etc. This is not more than the current necessities of a railroad company and does not allow of any capital expenditures.

The Continental Telegraph Alphabet

A telegraph operator on a prominent western road asks us to advocate the use on railroad wires of the Continental alphabet, in place of the Morse. He calls for the change in the interest of "safety first," for, as everyone admits, there is less liability to error in reading. The Morse operator, like the stenographer, is doing a prodigious amount of guessing, every day, and the wonder is that so very, very few wrong guesses go uncorrected. Besides safety, our correspondent makes a strong plea on the ground of convenience and the lessening of the wear on the nerves, an argument which, he says, is backed up by the cable and wireless operators who use the Continental. On principle, we are disposed to endorse our correspondent's view; but the number of operators who cannot be displaced, yet who could not easily perfect themselves in a new language, make the practical question rather confusing. The writer of these lines has been familiar with the Morse alphabet from boyhood, and he would weep to see it displaced. The sound of "Morse" when sent by some of the renowned old-timers is as pleasant to the ear as the classical verses which were committed to memory in the primary school. In an office where the Continental is used he feels as little at home as he would in the parliament of Norway. But "safety first" does have an application here. The Morse alphabet has a record for safety; but with the Continental the attainment of safety is no doubt much easier. Simplicity tends to safety, and the elimination of the spaced letters and the long dash simplifies the work greatly. Again, there is the question of uniformity. The nations of the world are practically agreed on the Continental for international telegraphing. In despatching, the question may not be of the first importance, for it looks as though everybody would soon be using the telephone; but for long distances the dots and dashes still have a great field of usefulness, and "safety first" has an application even in message work. The Continental is already in use on land lines in this country to a considerable extent, notably on long lines of the Postal Company, and its use is said to be increasing.

Proposed Ohio Legislation

A bill has been introduced in the upper house of the Ohio legislature which, if passed and made effective, would reduce the rate on intrastate shipments of coal in Ohio proportionately to the reduction of the rate from Nelsonville to Toledo from $1 to 75 cents. Regardless of the question of the reasonableness of Ohio intrastate coal rates, this particular piece of state legislation is vicious in principle. In 1910 the Ohio railroad commission ordered the Ohio rates reduced proportionately to a reduction of from $1 to 85 cents in this Nelsonville-Toledo rate. An appeal was made to the courts and the case is now being tried by the Supreme Court of Ohio. To attempt to pass a law which would reduce rates by a substantial amount further even than the state commission reduced them, while the highest state court is engaged in determining the reasonableness of the commission-made rates, is about as indefensible as any state regulation of railroads could be. It is pertinent, moreover, to briefly describe the method used by the Ohio commission in arriving at the 85-cent rate. The cost of service was estimated by the commission, and this was taken as 60 per cent of the total cost, the other 40 per cent taking care of fixed charges, taxes, profits, etc.; but when the commission came to determine the cost of service they divided it into two parts—one the cost of haulage, which they found to be 39.02 cents, and one the terminal cost, which they found to be 20 cents. Instead of adding these two together and then adding two-thirds they added two-thirds to the cost of haulage but nothing to the terminal cost, thus arriving at about 85 cents, whereas if they had followed out their own formula and taken the total cost of service at 59.2 cents, which was what they determined it to be, and added two-thirds, the rate would have been 98.386 cents. It will be remembered that the rate which the commission reduced was $1.

AWARD IN ENGINEERS' AND FIREMEN'S ARBITRATION

THE award made in the arbitration of the demands of the engineers and firemen of western railways is published elsewhere in this issue. As to its effect on existing schedules and conditions it is impossible to make any accurate analysis until it has been applied to the actual operating conditions on each road and until it has been determined in what instances the present rules or rates will be retained by the employees in preference to those granted. Under the "saving clause" of the arbitration agreement any changes in rules or working conditions will result in an increased expense to the railroads.

Apparently a greater increase in the payrolls will be brought about through the operation of the new rules than by the direct increases in wage scales granted. The enginemen's brotherhoods have stated that the increases will amount only to about $1,000,000 a year. The general managers' committee has declined to make any premature estimate.

Some advances in pay are given for the smaller engines, both freight and passenger, but most of the money to be paid out on account of the higher wage scales will go to the engineers and firemen in switching service and to the hostlers, who are given a very substantial increase. In the classification of engines according to the weight on drivers as a basis of compensation the board has followed the eastern award to the firemen, and it is difficult to make any comparison with the present rates because the present classifications on western roads are a mixture of the cylinder dimension and the weight basis and vary greatly on the different roads.

As Messrs. Park and Byram observe in their statement filed with the award, benefits will accrue to the men who are most deserving of more pay and better rules, rather than to the men who are now receiving the highest pay and the most liberal rules.

Whether the award will have any tendency toward standardization will depend on the extent to which the men prefer to retain the present schedule provisions, and they will of course prefer those that give them the most money or which they consider most favorable to them in other ways. But as the railroad arbitrators show, any considerable degree of standardization was impossible under a one-sided agreement which permitted standardization only in an upward direction, by making universal the most favorable rules and rates to be found anywhere, and did not afford any opportunity for an equalization by taking away some rule or rate now in effect to replace it with one that could be uniformly applied. Such a standardization was offered the employees in the counter-proposals of the railroads and was refused because the men preferred to stand for their demand for a pyramiding of the most favorable rates of wage to be found in any schedule upon the most favorable rules in existence.

The award of the board shows that the majority fully recognize the interrelation of rates of wages and rules, and as a result the most unreasonable demands of the men were either denied or so modified that they will not have the cumulative effects on other rates or rules which the subtle wording in which they were submitted would have produced. In other instances, the board recognized that while certain conditions might need correction, in most cases they could be properly adjusted only with reference to local conditions or other special circumstances, and not by a hard and fast rule applying to all roads.

EFFECTS OF TRAIN LIMIT LEGISLATION

PRESIDENT EARLING, of the Chicago, Milwaukee & St. Paul, in a recent statement to the Public Utilities Committee of the Illinois House, presented some statistics regarding the expense to which the St. Paul road would be put in Illinois if the train limit bill pending in the legislature should be passed. The bill in question would prohibit freight trains from containing more than 50 cars. All important railways have invested large sums in grade reductions, long passing tracks, large yards, locomotives of large tractive power, etc., to enable them to handle freight in large train loads and secure the operating economies thus attainable. Mr. Earling's statement regarding the effect the proposed legislation would have on the St. Paul is summarized elsewhere. He shows that it would render valueless an investment in Illinois of $4,091,753. A return of 6 per cent on this would be $245,500 annually. Beside rendering this investment valueless the legislation, Mr. Earling shows, would cause an increase in the operating expenses of the St. Paul in Illinois of $441,155. The loss per annum on investments rendered valueless and in increased operating expenses would therefore be $687,000.

The mileage of the St. Paul in Illinois is 415 miles, and therefore its loss per mile would be $1,654. The total railway mileage of the state on June 30, 1913, was 12,013. If the total loss per mile on all the railways would be as great as Mr. Earling estimated it would be on the St. Paul, the proposed legislation would cost the railways of the state almost $20,000,000 a year. This estimate of the total cost in Illinois is, of course, a rough approximation, but it gives a clew to the enormous increased burden that would be put on the railways directly and on the public indirectly.

Limitation of the length of freight trains is advocated in the interest of public safety. Those who are seeking it claim that it would reduce railway accidents. If it would reduce railway accidents to any considerable extent it might be desirable in spite of the increase in expenses it would cause. But as a matter of fact, the proposed reduction of the length of trains would not reduce accidents. It would be certain to increase them. If the length of trains was reduced this would obviously make it necessary to run more trains in order to handle the business. But past experience shows that the

most certain way to increase railway accidents is to increase the number of trains run under any given set of conditions. Furthermore, the statistics show that there is a closer relationship between the number of accidents and the number of freight trains run than there is between the number of accidents and the number of passenger trains run. A careful analysis of the statistics for the period from 1903 to 1914 shows that during this period in 90 per cent of the cases when there was an increase in freight train mileage there was an increase in the number of accidents of all kinds, and when there was a decrease in freight train mileage there was a decrease in accidents of all kinds. The following table gives the freight train miles per year during this period and the number of all classes of persons killed and injured in accidents resulting from the movement of trains.

Casualties to All Persons—Accidents Resulting from Movement of Trains

	Freight train miles	Killed	Injured
1903	526,000,000	9,605	48,361
1904	535,000,000 Inc.	9,801 Inc.	52,916 Inc.
1905	546,000,000 Inc.	9,433 Dec.	55,613 Inc.
1906	594,000,000 Inc.	10,367 Inc.	63,417 Inc.
1907	630,000,000 Inc.	11,474 Inc.	71,630 Inc.
1908	587,000,000 Dec.	9,851 Dec.	64,714 Dec.
1909	568,000,000 Dec.	8,470 Dec.	54,238 Dec.
*1910	635,000,000		
1911	626,000,000 Inc.	9,957 Inc.	70,922 Inc.
1912	612,000,000 Dec.	10,185 Inc.	77,175 Inc.
1913	644,000,000 Inc.	10,550 Inc.	86,688 Inc.
1914	612,000,000 Dec.	9,893 Dec.	79,388 Dec.

*Complete accident statistics for 1910 are not available.

The table shows that in 1905 there was an increase in freight train mileage and a decrease in the total number of persons killed. Again in 1912 there was a decrease in freight train mileage and an increase in the total number killed and the total number injured. In every other instance during this period an increase in freight train mileage was accompanied by an increase in casualties and a decrease in freight train mileage was accompanied by a decrease in casualties.

The proposed legislation is not in the interest of safety. It would be impossible to suggest legislation which would have a more certain tendency to reduce safety. The bill ought to be entitled, "An act to increase the cost of rendering transportation service to the public and to add to the number of people killed and injured on railways."

THE DISTURBANCE OVER THE WESTERN ARBITRATION

THE board which arbitrated the demands of the engineers and firemen of the western railways has made its award, and the representatives of the engineers and firemen are vigorous in their denunciations of it. They criticize the attitude of Arbitrator Charles Nagel, and announce that they will seek a congressional investigation of the action of the Mediation and Conciliation Board in appointing him, and the part he took in the arbitration. They charge that his business and professional affiliations necessarily prejudiced him against the demands of the engineers and firemen, and that his attitude was hostile to them during the hearings.

In order that a fair and rational opinion may be formed regarding this case, its outcome and the complaints of the representatives of organized labor, it is necessary to review the case from the beginning. In October, 1913, the engineers and firemen presented to the railways requests for increases in wages and numerous changes in the rules controlling their conditions of service. The railways, in reply, gave notice of the termination of the existing contracts and made counter proposals. The employees responded by demanding still larger increases of wages and additional improvements in their conditions of service.

The Board of Mediation and Conciliation finally was asked to intervene. After it had made numerous futile proposals, it suggested to the employees that both the demands of the railways and the secondary and additional demands of the employees be dropped and that only the original demands of the employees be arbitrated. The employees having everything to gain and nothing to lose by this plan, accepted it. The railways, having everything to lose and nothing to gain by it, rejected it. The railways were thus put in the position of refusing to arbitrate, although they had first asked for arbitration. When a breach seemed inevitable, President Wilson appealed to the roads in the name of patriotism to accept this one-sided basis to save the country from a great railway strike when its prosperity was imperiled by the war in Europe. Thus put into a hole by the federal board of mediation and pushed still further into it by the President, the railways, practically under duress, agreed to a plan by which they had everything to lose and nothing to gain.

In accordance with the provisions of the Newlands Act the railways and the employees appointed two representatives each on the Board of Arbitration. These four could not agree on the two impartial arbitrators. Judge Peter C. Pritchard and Charles Nagel, formerly secretary of Commerce and Labor, were therefore appointed by the Board of Mediation. Between the time of their appointment and the beginning of the arbitration nine days elapsed. This was ample for both sides to investigate them. As both had national reputations, nothing could have been easier than to have learned all about their antecedents and affiliations. But no objection was made to either of them. The public hearings, the filing of briefs and the arguments took five months. During this time no objection was made to either of them. But after the arbitrators had been conferring some time, and the representatives of the employees knew what the award would be, they began to bombard President Wilson and the Board of Mediation and Conciliation with telegrams charging Mr. Nagel with unfitness because of his business connections, and demanding his removal.

The implication that the Board of Mediation and Conciliation appointed Mr. Nagel in a spirit of hostility to the engineers and firemen will not bear scrutiny in view of the board's previous action in putting the railways in a position where they were forced to accept a basis of arbitration entirely unfavorable to them. Furthermore, the action of the employees in postponing their complaints about Mr. Nagel until they knew what the award would be, convicts them of utterly unfair practice. If there was anything questionable in his affiliations the representatives of labor should have informed themselves about this and made their objections to him before the arbitration began. Messrs. Stone and Carter in a public statement assert, however, that they did not inform themselves on this subject. Why didn't they? Were they not being paid by the engineers and firemen to represent them in all matters bearing on the controversy? Mr. Nagel had been a member of the President's cabinet. He had been for years one of the most prominent men, politically, professionally and in business in St. Louis. Everybody in that city who reads the newspapers, and many persons throughout the country, know him by reputation. And yet Messrs. Stone and Carter say they knew nothing about him and never took the pains to inquire! Messrs. Stone and Carter think they have drawn an indictment of Mr. Nagel. What they have drawn is an indictment either of their own fairness, or of their competency to represent their brotherhoods in matters of importance.

Their avowed failure to inform themselves concerning the arbitrators was on a par with the way they conducted the entire case. They led their followers into making demands so unreasonable that no fair body could have granted any considerable part of them. Such a bad case needed skillful handling—a need accentuated by the fact that the railways had made very elaborate and thorough preparations for the presentation of their side. The representatives of the labor unions met the issue largely by the methods of the pettifogger, the muckraker and the barnstormer. They put into the records the most outrageous misquotations of statements which they attributed to railway officers and railway publications. They agreed at the start that the financial ability of any road to pay reasonable wages was not a factor in the case and then deluged the record with muckraking misrepresentations regarding the alleged financial mismanagement of western railways. It was the bad case of the employees

and the incompetent way it was presented, and not the attitude of the arbitrators, which caused their defeat. The purpose of the disturbance which Messrs. Stone and Carter are now kicking up seems to be to put on Mr. Nagel the odium of a result for which they themselves are responsible.

Since the representatives of the employees want a congressional investigation, the *Railway Age Gazette* hopes that the railways will join them in asking for it. But if there is to be one let us have it go into the entire history of this controversy. Let us also have it go into the entire labor situation on the railways of the United States and the methods which the government should adopt for dealing with them. That situation needs thorough ventilating. The procedure for mediation and arbitration provided by the Newlands Act is not adapted to permanently prevent strikes and lockouts or to get wages and conditions of work put on the right basis. The sooner all the pertinent facts regarding the labor situation on the railways of this country are presented to Congress and it takes action accordingly, the better it will be for the railways and their employees, and especially for the general public.

NEW BOOKS

Proceedings of the Master Tinners', Coppersmiths' & Pipefitters' Association. Compiled and published by W. E. Jones, secretary of the association, Chicago & North Western Railway, Chicago, Ill. 83 pages, 6 in. by 9 in. Bound in paper.

This book is the report of the second annual convention of the American Railroad Master Tinners', Coppersmiths' & Pipefitters' Association, and contains papers on Oxy-Acetylene Welding, Shop Efficiency, Alloys and Their Uses, Tin Roofing vs. Canvas Roofing, and Specialized Training.

The Mechanical World Pocket Diary and Year Book. 298 pages, net, 4 in. by 6 in. Bound in cloth. Published by Emmott & Company, Ltd., Manchester, England. Sold in the United States by The Norman Remington Company, 308 North Charles street, Baltimore, Md. Price 50 cents, postpaid.

This well known book contains a large amount of information covering a wide range of engineering subjects, all of which has been brought up to date in the new edition. Aside from the revision of material which the book formerly contained, a number of new sections have been added including some useful notes on gear cutting, a new section dealing with limit gages and another containing information relative to the strength of flat plates. A large number of tables are given, several of which are included for the first time this year, and many additional illustrations have been introduced. The present edition marks the twenty-eighth year of publication of the Pocket Diary and Year Book, and it has met with much favor because of its moderate price and the concise form in which the subject matter is arranged.

The Mechanical World Electrical Pocket Book. 224 pages, net, 4 in. by 6 in. Bound in cloth. Published by Emmott & Company, Ltd., Manchester, England. Sold in the United States by The Norman Remington Company, 308 North Charles street, Baltimore, Md. Price 50 cents, postpaid.

The electrical pocketbook is a companion volume of the well-known Mechanical World Pocket Diary and Year Book. The 1915 issue has been thoroughly revised and a number of new sections added. The section on electricity on shipboard has been rewritten and considerably extended, while additions have been made to the sections on electricity in coal mines, motor starters and others. A number of sections have been revised and condensed, and as it now stands this little volume contains a large amount of up-to-date information covering the whole range of electrical engineering which should be especially useful to those in charge of electrical plants and machinery. Aside from the engineering information the book contains a number of mathematical tables and also includes a conveniently arranged diary. It is well indexed and its convenient size and low price commends it to those who desire a ready source of general information on electrical subjects.

Letters to the Editor

THE TRAINMASTER AND THE ENGINE-HOUSE FOREMAN

Haileyville, Okla.

To the Editor of the Railway Age Gazette:

The discussions in the *Railway Age Gazette* on the relation between the trainmaster and the engine house foremen cover a broad field and are applicable to other departments as well. The friction alluded to is only the result of lack of harmony prevailing among the employees of the departments and of breadth of mind sufficient to appreciate the other man's duties and responsibilities.

The trainmaster and the chief despatcher are responsible for the movement of trains; the engine house foreman is responsible for the condition of the power to handle the trains. Without good power transportation suffers in the end. The engine house foreman is supposed to send the engines out in such shape that they will make successful trips to the end of the division; to enable him to do this he must have support from the operating department in various ways.

The transportation department should give to the engine house foreman a "sight" report at 7 a. m. and 7 p. m. showing what is moving toward him, together with the individual engine numbers, the names of the enginemen and firemen on the engines, whether they are handling full or light trains, and whether the engines in transit are experiencing any mechanical trouble; at the same time he should be given an approximate call for trains, barring accidents, of course, that will be required for the 12 hours ahead. With the above information at hand the foreman will be in a position to determine fairly well how soon and with what success he can turn the engines. This is not done in many cases, and on some roads not at all, and for that reason we cannot expect too much from the man in charge of the roundhouse or shop. When there is a demand for an engine at a particular hour and the engine house foreman is not ready for it the trouble begins. Then it is that the trainmaster or chief despatcher will in all probability criticize the foreman or will beg him to let the engine go and *we* will take the chances. If the chance is taken and a failure occurs, who gets the worst of it? No one but the transportation department as a train is out on the road with no engine and light mileage will of necessity have to be made to expedite the movement of this train, to say nothing of the delay to the freight; with all of this the engine house foreman will be severely criticized both by the superintendent and master mechanic.

There is no more reason why the transportation department should deal harshly with the mechanical department because an engine cannot be produced just at the time desired than there is for the mechanical department to criticize the transportation men because they do not hurry the power into the terminal. Each has its duties to perform and each should be the judge as to the better way to handle its own matters. I have seen cases where an engine pulled into a terminal and before it had time to reach the roundhouse the trainmaster or chief despatcher would telephone the engine house foreman and say, "Here is the 999, how soon can you get it ready? We want it for an extra east right away." They will keep this up until the patience of the man trying to turn the engine is exhausted. It may be that this engine does not reach the roundhouse promptly, possibly is blocked by a switch engine, or something else occurs which is likely to cause delay in a yard; then when the engine house foreman has put all his energy on the engine and reports it ready to the chief despatcher, a transportation problem, such as incoming trains bunching near the terminal, yardmaster being unable to get the train ready, or similar difficulty prohibits the engine being run at the time wanted. Again, it is customary

to avoid paying time-and-a-half to machinists, boiler makers and other mechanics for overtime; therefore it is necessary to close the work down possibly between 5 and 7 a. m. and 5 and 7 p. m.; if this custom prevails it is known to all that during these hours no work can be done on engines. Then why embarrass the engine house foreman by trying to work out the impossible?

In my experience of several years working with engine house foremen and handling heavy divisions, it has been my aim to work harmoniously with them, giving them all the assistance that I possibly could, and keeping them advised of the situation at all times. I have never found one yet that would not strain a point to help out and do it cheerfully. There is a way to secure the desired results and to maintain a friendly feeling at the same time.

J. L. Coss,
Despatcher, C. R. I. & P.

FACTOR OF ADHESION IN STEAM LOCOMOTIVES

St. Marys, Pa.

To the Editor of the Railway Age Gazette:

The article that appeared in your issue of April 9, 1915, page 778, under the title "Why Use a High Factor of Adhesion in Steam Locomotives," is one that has deserved more consideration from motive power men than it has received, and there is no doubt in the mind of the writer as to the correctness of the stand that the author has taken.

For some years past the reduction of the cost of transportation seems to have been a matter of the greatest consequence. The superheater, mechanical stoker and other appliances are really responsible for the great economic claims made for the Pacific and Mikado types, rather than the locomotives themselves. Consolidation and Mikado type locomotives of the following dimensions been working on the same road on heavy grades with curves as sharp as 12½ deg. for three or four years, and there appears to be very little difference in their performance. While no conclusive records have been kept the coal consumption of the Mikados does not indicate any saving over the Consolidations:

	Consolidation	Mikado
Diameter of boiler	79 in.	79 in.
Grate area	57 sq. ft.	57 sq. ft.
Total heating surface	3,143 sq. ft.	3,682 sq. ft.
Total weight of locomotive	199,850 lb.	226,300 lb.
Weight on drivers	178,950 lb.	179,950 lb.
Cylinders	22 in. by 28 in.	22 in. by 28 in.
Diameter of drivers	51 in.	51 in.
Total weight of locomotive and tender	339,100 lb.	368,600 lb.
Steam pressure	200 lb.	200 lb.
Tractive effort	45,169 lb.	45,169 lb.
Superheater and mechanical stoker	None	None

The writer has been opposed to the building of 4-4-2, 4-6-2 or 2-8-2 types of locomotives for a road on which the conditions would permit the use of the 2-6-0, 2-8-0 or 2-10-0 types, for the reason that considerably more unproductive weight is necessary in an engine having a four-wheel engine truck than in one with a two-wheel truck. The trailer truck is only a source of expense, and the weight resting on it could be put to much better service. Of course, on roads where the curvature is very sharp it may be necessary to use a trailer truck, but where such conditions do not exist the writer can see no good reason why the natural development of the Mogul and Consolidation types should not be utilized. There are Moguls hauling passenger trains and giving excellent service, demonstrating that it is not necessary to use a four wheel engine truck in passenger service.

The primary arguments in favor of the Mikado, are the greater tonnage that it will haul, and a saving in fuel and water. Of course the Mikado shows up better in the various tests and comparisons made, but most of these are anything but fair to the Consolidation, for the reason that the Mikado has invariably been a heavier engine, usually equipped with a superheater, and sometimes with a mechanical stoker or other appliances that the Consolidation did not have. Had the Consolidation and the Mikado been of the same total weight, exclusive of the tender, with the trailer truck weight of the Mikado put on the drivers of the Consolidation, and had the same ratio of adhesive weight to tractive effort used in the Mikado been given to the Consolidation, with the same superheater, mechanical stoker, etc., the results would have been as much in favor of the Consolidation as they now stand against it.

Another argument in favor of the Mikado is that we cannot get sufficient firebox and boiler capacity in the Consolidation type. Let us look into the necessity for the deep firebox first. The Erie Triplex locomotive has not an exceedingly deep firebox; this allows the placing of a 63 in. driving wheel under the firebox, and yet the boiler generates sufficient steam for three sets of large cylinders. It is doubtful if there has been a Mikado built with driving wheels larger than 63 in. In this connection the writer has not thought it impossible, assisted by a mechanical stoker and superheater, to develop a long narrow firebox that would meet the conditions more successfully than the present wide firebox fired by hand. A great many boiler troubles arise from the fireman's being unable to utilize the entire grate area of a firebox containing only 57 sq. ft. on long, hard runs. This is especially true in the summer, when he frequently fires with a bank at the back end to protect himself from the intense heat. Moreover, firemen often become almost exhausted by the time they have completed two-thirds or three-quarters of the trip and allow the fire to become dirty or die next to the tube sheet, leaving the locomotive burn what coal it will to obtain enough steam to get to the terminal. The use of such a long firebox would permit of larger diameter drivers being placed beneath it.

The length of rigid wheel base seems to have been an objection offered for not developing the Consolidation type, but this is no argument when we consider some of the advertising matter that has been put before the public. For example, I quote from two advertisements in the *Railway Age Gazette:* "The Erie locomotive, although it has a rigid wheel base of 22 ft. can traverse curves of 16 deg"; and "the locomotives illustrated are operating on grades of 4 per cent and curves of 16 deg."

Where a road has curves no sharper than 10 deg. in its main line, it is questionable if a 2-8-2 or a 2-10-2 are the proper types of locomotives to build when considered from the point of mechanical efficiency. Let us see if we cannot obtain a rigid wheel base for the 2-8-0 and 2-10-0 types sufficient to provide boiler capacity that will take care of the natural development of these classes for roads not having sharper curves than 10 deg.

To find the middle ordinate for the rigid wheel base of a Mikado, the rigid wheel base of which cannot be far from 17 ft. 6 in., on a 16 deg. curve, using the formulas

$$M = \frac{C^2}{8R} \text{ and } C = \sqrt{M\ 8\ R}$$

In which M = the middle ordinate,
C = the rigid wheel base of the locomotive,
R = the radius of the curve;

we have

$$M = \frac{17.5 \times 17.5}{8 \times 359.26} = .10655 \text{ ft. or } 1.2786 \text{ in.}$$

therefore using .10655 ft. for the middle ordinate of a 10 deg. curve we have,

$$C = \sqrt{.10655 \times 8 \times 573.69} = 22 \text{ ft. } 1\ 3/16 \text{ in.}$$

The 2-10-2, by the same method, would have a rigid wheel base of 28 ft. 1 3/16 in. It will therefore be seen that another pair of driving wheels could be used if the firebox were constructed like that of the Erie Triplex. Taking the dimensions of the Mikado in question, the natural development of this locomotive would have been a 2-10-0, with proportion something like the following:

Total weight of locomotive, exclusive of tender	276,600 lb.
Weight on front engine truck, approximately	26,000 lb.
Weight on driving wheels	250,000 lb.
Cylinders	28 in. by 32 in.
Steam pressure	180 lb.
Tractive effort, approximately	61,000 lb.
Factor of adhesion	4.09

Equipped with superheater and mechanical stoker.

E. F. Given.

Arbitration Award In Enginemen's Wage Controversy

Engineers and Firemen on Western Roads Given Only Slight Increase in Pay and Changes in Working Rules

The board of arbitration appointed under the Newlands law last year to settle the controversy between the western railroads and the engineers' and firemen's brotherhoods on the demands of the enginemen for increases in wages and changes in the rules controlling conditions of service, filed its award in the United States district court at Chicago on April 30. The award grants some comparatively slight increases in pay and a number of rules making changes in working conditions and in the basis for computing compensation, although with many important modifications in the form of the demands as submitted by the men, while some of the rules asked for were denied entirely.

The board of arbitration consisted of J. C. Pritchard, of Asheville, N. C., former judge of the United States circuit court, chairman; Charles Nagel, of St. Louis, former secretary of commerce and labor; H. E. Byram, vice-president of the Chicago, Burlington & Quincy; W. L. Park, vice-president of the Illinois Central; F. A. Burgess, assistant grand chief of the Brotherhood of Locomotive Engineers, and Timothy Shea, assistant president of the Brotherhood of Locomotive Firemen and Enginemen.

The award was signed only by the first four of the arbitrators named. Mr. Burgess and Mr. Shea presented a minority report, protesting against the award as unfair and unsatisfactory. Chairman Pritchard also filed a memorandum saying that in his opinion some of the rates agreed upon are not as high as they should be, but that he had joined with other members of the board in making the award because some of the rules agreed upon accord to the men substantial benefits which should not be denied them. Mr. Park and Mr. Byram also filed a statement that their signatures to the award do not imply approval of it in principle or in detail, saying that the agreement under which the arbitration was held gave no latitude to the board to adjust or reconcile unequal conditions.

The various developments in the controversy and the hearings before the board have been fully reported in previous issues of the *Railway Age Gazette*. The demands of the enginemen were comprised in 16 articles which were submitted to the board. It was estimated by the railroads that if the demands were granted in the form submitted the increase in their payrolls would amount to $41,000,000 a year, or about 51 per cent. The award of the board with a comparison of the demands made by the men on each article, is as follows:

ARTICLE I.—BASIS OF DAY'S WORK AND OVERTIME.

Passenger Service.—The minimum passenger rate for engineers shall be $4.30, and for firemen $2.50; 100 miles, or less, 6 hours and 40 minutes, or less, shall constitute a minimum day's work in all classes of passenger service except as otherwise specified herein; miles made in excess of 100 pro rata.

On short turn-around runs, no single trip of which exceeds 80 miles, including suburban service, overtime shall be paid for all time actually on duty or held for duty in excess of 8 hours (computed on each run from the time required to report for duty to end of that run) within 12 consecutive hours; and also for all time in excess of 12 consecutive hours computed continuously from the time first required to report to final release at end of last run. Time shall be counted as continuous service in all cases where the interval of release from duty at any point does not exceed one hour.

All other passenger overtime shall be computed on the basis of 15 miles per hour from the time required to report for duty until released, and separately for each part of a round trip run. All passenger overtime will be paid for at the rate of 75 cents per hour for engineers and 45 cents for firemen, and will be computed on the minute basis. When employees of any road elect to retain their present overtime basis, no part of this article is to be used in computing or paying passenger overtime.

Freight Service.—The minimum freight rate for engineers and firemen shall be according to class of locomotive, as provided in Article II, for 10 hours, or less, or 100 miles, or less; miles made in excess of 100 pro rata. Overtime in freight service is to be computed on the basis of 10 miles per hour, and paid pro rata on the minute basis.

General.—Road engineers and firemen required to perform a combination of more than one class of road service during the same trip will be paid at the rate and according to the rules governing each class of service for the time or miles engaged in each, but will be paid for the entire trip not less than a minimum day at the highest rate applying for any class of service performed during such trip. Where two or more engines of different weights on drivers are used during a trip or day's work, the highest rate applicable to any engine used should be paid for the entire day or trip.

In the article proposed by the employees it was provided that in passenger service five hours or less should constitute a day's work, and that overtime should be paid for on a basis of 20 miles per hour. In all other service except passenger and switching service, it was provided that overtime should be computed on a basis of 10 miles per hour and paid for at the rate of 15 miles per hour.

ARTICLE II.—RATES OF PAY.

Passenger Service.—The minimum rates of wages per day shall be:

	Engineers	Firemen—Coal	Firemen—Oil
Engines less than 80,000 lb. on drivers	$4.30	$2.50	$2.50
Engines 80,000 lb. and less than 100,000 lb. on drivers	4.30	2.55	2.55
Engines 100,000 lb. and less than 140,000 lb. on drivers	4.40	2.60	2.60
Engines 140,000 lb. and less than 170,000 lb. on drivers	4.40	2.70	2.55
Engines 170,000 lb. and less than 200,000 lb. on drivers	4.45	2.85	2.70
Engines 200,000 lb. and less than 250,000 lb. on drivers	4.45	3.00	2.85
Engines 250,000 lb. and less than 300,000 lb. on drivers	4.65	3.20	3.05
Engines 300,000 lb. and less than 350,000 lb. on drivers	4.80	3.40	3.25
Engines 350,000 lb. and over on drivers	4.80	3.60	3.45
Mallet engines regardless of weights on drivers	5.00	4.00	3.85

Freight Service.—The minimum rates of wages per day shall be:

	Engineers	Firemen—Coal	Firemen—Oil
Engines less than 80,000 lb. on drivers	$4.75	$2.75	$2.75
Engines 80,000 lb. and less than 100,000 lb. on drivers	4.80	2.85	2.75
Engines 100,000 lb. and less than 140,000 lb. on drivers	4.85	3.00	2.85
Engines 140,000 lb. and less than 170,000 lb. on drivers	5.10	3.20	3.05
Engines 170,000 lb. and less than 200,000 lb. on drivers	5.30	3.45	3.30
Engines 200,000 lb. and less than 250,000 lb. on drivers	5.45	3.70	*3.55
Engines 250,000 lb. and less than 300,000 lb. on drivers	5.60	3.80	3.80
Engines 300,000 lb. and over on drivers	5.75	4.00	4.00
Mallet engines less than 275,000 lb. on drivers	6.00	4.00	4.00
Mallet engines 275,000 lb. and over on drivers	6.50	4.25	4.25

*Oil differential not to apply on engines weighing over 215,000 lb. on drivers.

Existing rates of pay per day that are higher than the above minima are hereby awarded.

Work, Wreck, Pusher or Helper, Mine Runs, Circus Trains, and Trains Established for the Exclusive Purpose of Handling Milk.—Through freight rates will apply on all work, wreck, pusher or helper, mine runs, circus trains, and to trains established for the exclusive purpose of handling milk; all according to class of engines; overtime to be computed on minute basis. Through freight rules in this award as to mileage and overtime to apply.

Belt Line or Transfer Service.—The board recognized that in belt line or transfer service the grade of work is clearly different from ordinary switching service, and may, therefore, properly be entitled to higher rate of pay; but the information before the board shows that conditions over the Western territory vary so widely in this service that they are unable to reach an agreement regarding a fair rate for such service. The board, therefore, refers the question of belt line or transfer service back to the engineers and firemen and the managements of the different roads for local settlements, which shall take into consideration the difference between belt line or transfer service and switching service, in fixing the rates of pay.

Grades of 1.8 Per Cent and Over.—The territory in which there exists a differential in rates of pay by reason of gradients has been long established, and we make no change in respect thereto. On railroads where a differential in the rates of pay for engineers and firemen is allowed under schedules in effect October 10, 1913, on account of grades or mountain service, either by excess rates or constructive mileage, such differential shall be maintained in addition to the rates granted by this award.

Narrow-Gage Locomotives.—This request is declined.

Electric Locomotives, Electric Either Multiple Unit or Single, Gasoline or Other Service.—Wherever electric service is installed as a substitute for steam, or is now in operation on any of the railroads parties to this arbitration, or on any of the tracks operated or controlled by any of them as part of their system, the locomotive engineers and firemen shall have the preference for the positions of engineers, or motormen, or helpers on electric locomotives or multiple-unit trains; but this right of the engineers and firemen shall not operate to displace any man operating electric power on any of the railroads parties to this arbitration, on May 1, 1915.

Since the use of electric locomotives or multiple-unit trains upon steam

railways is in so early a stage of development, and there is as yet no approximation to stable conditions, but a wide variation in existing practices, the board find themselves unable, from the evidence before them, to make any uniform rules regulating rates of pay and conditions of service for engineers, or motormen, or helpers employed on such trains. The minimum day's wage of $4.30 for engineers or motormen, and $2.50 for helpers in passenger service, and $4.75 for engineers or motormen, and $2.75 for helpers in freight service is, however, awarded; but the day's work covered by the same, both as regards hours of service and mileage covered, is that which now exists in electric service on the various roads, not that covered under the preceding headings pertaining to "freight and passenger service." This award is without prejudice to existing contracts for such service.

Additional Pay.—Through or irregular freight trains doing work such as loading or unloading freight, stock or company material, switching at stations, spurs, mines, mills, or required to pick up or set out cars, unless cars to be picked up are first out, or cars to be set out are switched together at terminals, or doing any other similar work, shall be paid for same at overtime rates in addition to time or mileage made on the trip.

In the article submitted by the employees the scale for passenger service ranged from $4.50 to $5.60 for engineers and from $2.90 to $3.75 for firemen. In all other classes of service, except passenger and switching service, and Mallet locomotives, the scale ranged from $5 to $6.70 for engineers and $3.25 to $4.50 for firemen. For Mallet type engines they asked rates ranging from $7.50 to $8.25 for engineers and $4.90 to $5.50 for firemen. A separate classification was made for locomotives weighing between 200,000 and 225,000 lb., and between 225,000 and 250,000 lb., while all engines weighing over 250,000 lb., except Mallets, were to be paid the highest rates asked. For divisions where the grade is 1.8 per cent or over, an increase of 10 per cent over valley rates was asked, and for narrow gage locomotives a 5 per cent increase over present rates was asked. For service on electric locomotives the article submitted provided a scale ranging from $4.50 to $5.60 for motormen in passenger service, and of $3.35 for helpers. In other service except passenger and switching the scale provided for rates ranging from $5 to $7 for motormen and $3.75 for helpers. For switching service the article proposed rates ranging from $4.75 to $6 for motormen and $3.10 for helpers.

ARTICLE III.—LOCAL OR WAY FREIGHT.

A minimum of 30 cents per 100 miles, or less, is to be added for local freight service to through freight rates for engineers and firemen, according to class of engine. Miles over 100 to be paid for pro rata.

The employees had asked for an increase of 10 per cent over through freight rates for local or way-freight service, and also for overtime rates in addition to time or mileage made on the trip for through or irregular freight trains doing such work as loading or unloading freight or picking up or setting out cars.

ARTICLE IV.—SWITCHING SERVICE.

Rates of Pay.—The minimum rate of wages per day of 10 hours or less; overtime pro rata on minute basis, shall be:

	Engineers	Firemen
Engines less than 140,000 lb. on drivers	$4.25	$2.70
Engines 140,000 lb. and over on drivers	4.40	2.75
MALLET ENGINES		
Engines 275,000 lb. or less on drivers	5.15	4.00
Engines over 275,000 lb. on drivers	5.40	4.00

Beginning and Ending of Day.—Time to begin when required to report for duty and to end at time engine is placed on designated track or engineer or fireman is released, exclusive of time off for meals.

Meals.—Engineers and firemen in switching service shall be allowed one hour for meals between the hours of 11:30 a. m. and 1:00 p. m., and between the hours of 11:30 p. m. and 1:00 a. m., but if required to work the meal hour or any part thereof, they will be paid for the hour in addition to the minimum day, and be allowed 30 minutes under pay for meals. The time for meals will commence at the time engineer and firemen are released from care of engine. Engineers and firemen will not be required to work longer than 6 hours without being allowed 30 minutes for meals.

Existing rates of pay per day that are higher than the above minima are hereby awarded

The employees had asked for rates ranging from $4.75 to $6 for engineers and $3.10 to $4 for firemen. They also asked that engineers and firemen required to begin service other than between the hours of 6 a. m. and 8 a. m., should be paid two cents an hour in addition. They also asked for overtime at the rate of time and one-half after 10 hours.

ARTICLE V.—BEGINNING AND ENDING OF A DAY.

In all classes of road service, an engineer's or fireman's time will commence at the time he is required to report for duty, and will conclude at the time the engine is placed on the designated track or relieved by hostler at terminal.

The article proposed asked for the payment of 30 minutes as preparatory time in addition to all other time or mileage made on the trip or day, and payment for one hour where rules or schedules require the men to be on duty more than 30 minutes before the time ordered to leave, and when required to be on duty more than one hour, payment for actual time.

ARTICLE VI.—TERMINAL DELAY.

Initial Terminal Delay.—Compensation for initial terminal delay is not allowed beyond that involved in the rule, that pay shall begin in all cases at the time an engineer or fireman is required to report for duty.

Final Terminal Delay.—For freight service final terminal delay shall be computed from the time the engine reaches designated main track switch connection with the yard track.

For passenger service, final terminal delay shall be computed from time train reaches terminal station.

Final terminal delay, after the lapse of 30 minutes, will be paid for the full delay at the end of the trip, at the overtime rate, according to class of engine, on the minute basis. If road overtime has commenced, terminal overtime shall not apply, and road overtime will be paid to point of final relief.

The employees asked payment for initial terminal delay from the time they are called to leave the roundhouse or other point until the departure of trains, and for final terminal delay from the time they arrived at passenger depot or switch leading from main line into yard, until relieved from duty, on the minute basis in addition to time or mileage made on trip.

ARTICLE VII.—AUTOMATIC RELEASE AND TIE-UP.

The request contained in the first paragraph of this article is denied.

Continuous Time.—Engineers and firemen in train service tied up under the law will be paid continuous time from initial point to tie-up point. When they resume duty on continuous trip, they will be paid from tie-up point to terminal on the following basis: For 50 miles or less, or 5 hours or less, 50 miles pay; for more than 50 miles and up to 100 miles or over 5 hours and up to 10 hours, 100 miles pay; over 100 miles or over 10 hours, at schedule rates. It is understood that this does not permit running engines through terminals or around other crews at terminals unless such practice is permitted under the pay schedule.

The rule submitted by the employees provided that engineers and firemen arriving at terminal or end of run are automatically released, and when used again may begin a new day. This paragraph was denied. The continuous time rule provided that engineers and firemen tied up between their terminals will be paid continuous time, no deductions to be made for time tied up.

ARTICLE VIII.—HELD AWAY FROM HOME TERMINALS.

Engineers or firemen in pool freight and in unassigned service held at other than home terminal, will be paid continuous time for all time so held after the expiration of 22 hours from time relieved from previous duty, at the rate per hour paid for the last service performed. If held 14 hours after the expiration of the first 32-hour period, he will be paid continuous time for the next succeeding 10 hours, or until the end of the 24-hour period, and similarly for each 24-hour period thereafter. Should an engineer or fireman be called for duty after pay begins, his time will be computed continuously.

The rule proposed by the employees provided for the payment of continuous time for time held at other than home terminals, including rest period, after the expiration of 15 hours from the time relieved from previous duty, at the rate per hour paid for the last service performed.

ARTICLE IX.—DEADHEADING.

Deadheading on company's business on passenger trains will be paid for the actual mileage at 4.3 cents per mile for engineers, and 2.5 cents per mile for firemen, and for deadheading on other trains at 4.75 cents per mile for engineers and 2.75 cents per mile for firemen; provided, that a minimum day at the above rates will be paid for the deadhead trip if no other service is performed within 24 hours from time called to deadhead. Deadheading resulting from the exercise of seniority rights will not be paid for.

The rule proposed by the employees provided that deadheading on company business should be paid for at the same rate and on the basis as the engineer and fireman on the train.

ARTICLE X.—HOSTLERS.

The minimum pay for hostlers will be $4.20 per day of 12 hours, or less, overtime pro rata. Only roundhouse employees who, in handling engines,

are required to have a knowledge of main line train movements will come under this designation. Engineers and firemen will have preference for positions as hostlers. This will not operate to disqualify those who now hold such positions, nor to prevent same being filled from other classes of employees who may be eligible thereto, who can qualify. All other roundhouse employees handling engines during 25 per cent, or more, of their daily assignment will receive $3 for 12 hours, or less, overtime pro rata. On roads where the right to legislate for hostlers has been conceded by the company to the engineers or firemen, such right as specified in individual schedules shall not be affected by the adoption of this article.

The article submitted by the employees provided that at points where an average of 6 or more locomotives are handled within 12 hours, hostlers shall be maintained; that hostling positions shall be filled from the ranks of the firemen and paid $3.35 per day, and $4.75 per day when required to make main line movements. It was also provided that when main line or road hostlers are paid the same rate as engineers in switching service, such positions shall be filled from the ranks of the engineers.

ARTICLE XI.—EFFICIENCY TESTS.

We recognize the necessity of making efficiency tests, but when such tests are made they should not be conducted under conditions that are hazardous to the employees.

The article submitted provided that the practice of conducting surprise tests by turning switch lights and placing red lights or flags, unaccompanied by torpedoes, beside the tracks, or wiring down automatic signals to proceed position be eliminated.

ARTICLE XII.—ASSISTANCE FOR FIREMEN.

On coal-burning locomotives, either passenger or freight, coal will be shoveled forward at specified points, whenever necessary, or by men riding on locomotives for that purpose, so that it can be reached by firemen from deck of the locomotive. Coal of proper size for firing purposes will be placed on all tenders. It is understood that the committees on individual roads will take up with their respective officers the question of shoveling coal forward on tenders and determine the points where men shall be located to do this work.

The rule is substantially that asked by the employees.

ARTICLE XIII.—TWO FIREMEN.

When a second fireman is deemed necessary on coal-burning locomotives in freight service weighing more than 200,000 lb. on drivers, the matter will be taken up with proper officials of individual railroads by the committee. Failing to reach a settlement, the matter shall be referred to an adjustment commission to be composed of five persons, two of whom are to be chosen by the railroad company, two by the committee, and one to be selected by the four thus chosen, who shall be the chairman of the commission. Should the four men fail to agree on the fifth, then three days after the last of the four have been selected, the fifth man shall be named by the United States Board of Mediation and Conciliation. If, for any reason, the selection of the fifth man cannot be made by the United States Board of Mediation and Conciliation, he shall be named by the United States district judge of the district in which the controversy may have arisen. All expenses incurred in connection with the settlement of such matters shall be borne equally by the two parties to the controversy.

When two firemen are employed on a locomotive as a result of the application of the preceding paragraph, they shall each be paid the rate for the class of engine next below, per Article II of this award.

The employees' rule provided that on coal burning locomotives weighing 185,000 lb. or more, when used in freight service two firemen should be employed.

ARTICLE XIV.—MISCELLANEOUS.

Cleaning of Locomotives.—On railroads where firemen are required to clean locomotives, they shall be relieved of such cleaning.

Setting Up Wedges, Filling Grease Cups, Cleaning Headlights, also Placing Supplies on Locomotives.—Where engineers and firemen are required to set up wedges, fill grease cups, or clean headlights, they shall be relieved of such service at all points where competent roundhouse force is employed. Neither will they be required to place on, or remove tools or supplies from locomotives, fill lubricators, flange oilers, headlights, markers or other lamps at points where roundhouse force or an engine watchman, is employed.

These rules are substantially as requested by the employees.

ARTICLE XV.—OFFICIAL RECORD OF WEIGHTS ON DRIVERS.

For the purpose of officially classifying locomotives, each railroad, party to this arbitration, will keep bulletins at all terminals showing actual weight on drivers of all engines in its service.

This rule is substantially that requested.

ARTICLE XVI.—THROWING SWITCHES AND FLAGGING.

The complexity of the service and the variety of the rules are such that this board does not deem it wise to undertake to formulate a general rule upon [illegible]'s subject at this time.

The rule proposed by the employees provided that engineers and firemen would not be required to throw switches, flag through blocks, or fill water cars.

GENERAL REGULATIONS

In awarding the above rates, rules and conditions it is understood that the engineers or firemen on any railroad may elect to take any daily rate, rule, or condition as herein awarded, but the board denies right of the men to take a part or whole of any rule herein awarded and couple it with a part or whole of any rule in the present schedule and thereby create a new condition not contemplated by the award.

Nothing herein is to be construed to deprive the engineers or firemen on any railroad from retaining their present rules and accepting any daily rate that may be awarded, or retain their present daily rate, and accept any awarded rule. It is further understood that the foregoing does not in any manner conflict with or nullify any part of Article 12 of the arbitration agreement, which reads as follows:

"That any rates of pay, including excess mileage or arbitrary differentials, that are higher, or any rules or conditions of employment contained in individual schedules in effect October 10, 1913, that are more favorable to the employees than the award of said board, shall not be modified or affected by said award."

STATEMENT BY CHAIRMAN

The memorandum filed by Chairman Pritchard is as follows:

"I deem it proper to say that in my opinion the freight rates, as well as the yard rates for firemen and engineers, agreed upon by the board, are not as high as they should be. Nevertheless, the rules as respects weight on drivers, time constituting a day's work, initial and terminal delay and overtime, passenger rates and rules, and other rules, accord to the men substantial benefits which should not be denied them. Therefore, in order that the provisions of the award may be put into effect and the men permitted to enjoy the benefit accruing therefrom, I conceive it to be my duty to join other members of the board in making this award.

"I am satisfied that as respects many of the propositions submitted to us we have approached as near as may be at this time a standardization of many important rules and rates which will, in the future tend to remove many things that have been the cause of innumerable controversies between the railroads and their employees."

STATEMENT OF RAILROAD ARBITRATORS

The statement filed by Arbitrators Park and Byram is as follows:

"That our signatures to the award may not imply approval of it, in principle or in detail, a brief word of explanation seems necessary.

"Any scheme of standardization or approach to it which does not permit of equalization of dissimilar rates and rules, in our opinion, is unsound. The agreement under which the arbitration was held gave no latitude to the board to adjust or reconcile unequal conditions. It was one-sided. It permitted standardization only if upward.

"To such provisions of the award as confer benefits upon men whose present rates and conditions merit adjustment we are in hearty accord; to those who, in our judgment, the testimony showed to have been liberally paid and properly treated, we feel that nothing additional is due, and, in agreeing to changes in their rates and rules and to other conditions of the award, it was only because it was made apparent that these changes were necessary if we were to have an award at all. It appeared to us that for the maintenance of the principle of arbitration for the adjustment of labor disputes, which is the public interest, our duty lay in this direction, even though additional burdens of expense and regulation follow."

MINORITY REPORT OF BROTHERHOOD REPRESENTATIVE

The minority report filed by Messrs. Burgess and Shea, the brotherhood representatives on the board, declared that the decision has not in any manner settled the questions submitted for arbitration and simply postpones any further action on the questions involved for a period of 12 months. It is declared that the board "has substantially disregarded testimony of witnesses for employees relative to the long hours and heavy tonnage trains, and, in fact, all the prevailing conditions in the western country, giving little or no consideration to the exhibits, which in a graphic way clearly set forth the increased productive ef-

ficiency of engineers and firemen, disregarding the evidence contained in numerous reports by railway officials as to the work of firemen on large engines having almost reached the limit of human endurance." It is also asserted that "a great opportunity to bring about industrial peace and the hearty co-operation of the employers and the employees has been lost by the failure of the board to equitably and justly settle the questions involved." The information shown by some of the railroads' exhibits, they say, is calculated to mislead and inaccurately represent the actual facts, for while the wages "in some instances might appear liberal when the aggregate amounts only are considered, close investigation in every case revealed the fact that the engineers and firemen had either run a great number of miles or worked from 13 to 20 hours a day during the month. An attempt to pursue such a method would compel the toiler to work more hours instead of raising the rate per hour."

"The whole theory is so repugnant to us," they say in conclusion, "that we feel it our duty to advise not only all railroad employees, but every organization of labor to seek by every influence to secure the revocation of a law that has the smallest tincture of that principle embodied therein. The unfairness of the award as handed down by a majority of this board compels us to file a dissenting opinion. To do otherwise would tacitly give assent to an award that does not permanently settle any of the questions involved and one that unquestionably will create chaos and ill feeling among all classes of train service employees and particularly engineers and firemen."

Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers, and W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen, in a statement given to the newspapers said that they had been "grossly deceived in being compelled to submit the case to a jury on which sat not only two railroad officials, but also one alleged neutral arbitrator who has shown by his conduct and demeanor throughout the whole hearing that he was the violent partisan of the railroads." Even before the award was filed they attempted to cast discredit upon it by sending protests to President Wilson and the members of the United States Board of Mediation and Conciliation at Washington, demanding the removal of Mr. Nagel as an arbitrator, on the ground that they had just discovered that he was a trustee of the Adolphus Busch estate of St. Louis, and a director of the Union Trust Company of St. Louis, and of the Northwestern Mutual Life Insurance Company of Milwaukee, all large holders of railroad securities. Messrs. Chambers and Knapp of the Board of Mediation and Conciliation, and later President Wilson, replied asking that the protest be withheld, but it had already been filed with the board of arbitration. After an exchange of telegrams and a conference with the President the Board of Mediation and Conciliation declined to act on the protest, saying that Mr. Nagel's connection with the Busch estate was known to the board before his appointment. It was not recalled that any of the board knew he was a director of the companies named, but a knowledge of that fact would have been favorable rather than otherwise to his appointment. The telegram continued:

> You doubtless had as much information regarding Mr. Nagel's business connections as any member or officer of this board prior to his appointment, and you had ample time to make further inquiries before the organization of the arbitration board and the acceptance of his services, and certainly before the extension of the life of that board, which was the act of yourselves by agreement with the railroad representatives independently of the board of mediation and conciliation.
>
> The foregoing statement is not made for the purpose of escaping any responsibility on the part of any member or officer of this board for Mr. Nagel's appointment, for nothing was known before his appointment nor has been brought to our knowledge since his appointment which in our opinion disqualifies him as an arbitrator, and our confidence in his ability and integrity remains unchanged.

Messrs. Carter and Stone announced that they would not attempt to appeal from the award to the courts, but that they would abide by it for a year. At a meeting in Chicago on Sunday and Monday of the general chairmen of the two organizations to consider the award, resolutions were adopted recommending that the executive officers of the brotherhood endeavor to obtain a congressional investigation of the award and of the appointment of Mr. Nagel.

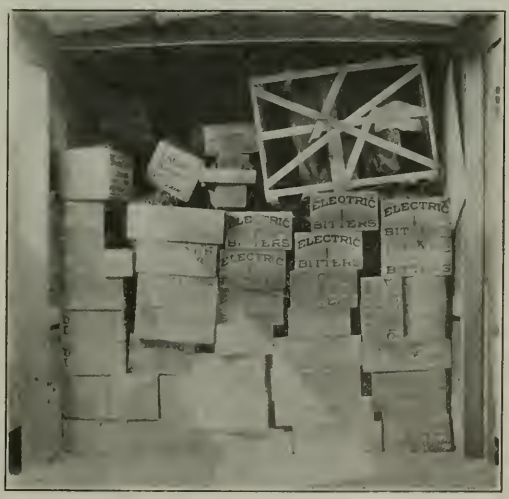
CAREFUL LOADING OF PACKAGE FREIGHT

The Chicago & Alton, at its freight houses in Chicago and St. Louis, has been making some interesting experiments in the loading of package freight with a view to economizing space (and therefore saving cars), and also looking to the reduction of

Bulkhead Used in Chicago & Alton Freight Cars

breakages and a consequent diminution of claims for loss and damage.

O. Ashworth, freight claims inspector, as a result of his study of a large number of damage claims, concluded that better



Twenty-five Ton Load After a Journey of 284 Miles; Bulkhead Removed

stowing in the cars would prevent a good deal of damage, and he suggested the use of bulkheads in the cars to hold packages in place. In the past, merchandise cars have been loaded with only about 12,000 lb. to 20,000 lb., with a view to keeping at the minimum the damage from shifting. In commencing the experiments with bulkheads, it was found that to secure the best results, packages should be loaded to the roof. With each of the two ends—two half cars—nearly filled, loading was stopped and the bulkheads were put up. For these old doors of worn-out box cars were utilized. These were braced with scantlings 2 in. x 4 in., the pieces being attached to the center of the old door by a pivot, and the ends held in place by cleats at the sides of the car. The cost of nails, lumber and labor in applying the bulkheads was trivial, and the same material is used over and over again.

It developed that usually cars could be loaded with 40,000 lb. of freight, while in one instance, a car was loaded with 49,500 lb.

Of 31 cars which were loaded for test purposes, and which contained 12,440 packages, only one turned out other than perfect. In this car one package was found damaged to a trifling amount. Under former methods of loading, and without the protection of bulkheads, damage claims are reported to have averaged three per car, amounting perhaps to $10 a car. Thus in carrying six or seven hundred tons of freight there was an estimated saving of perhaps $700 to $1,000 in the prevention of claims and the saving of the time of 60 cars; or, if there is a surplus of cars, still there is the saving of the unnecessary haulage of 60 cars, and saving of track room at freight houses, etc.

The prevention of damages in transit is, of course, a constant element in the successful carrying on of the freight business in a way to satisfy shippers and consignees.

WHERE THE DELIVERING AGENT FALLS DOWN

By D. C. Davis

Shippers of less than carload freight, of uniform kind or in uniform containers, frequently *mark* one or more packages too many for one consignee and destination and one or more too few packages for another consignee and destination.

These shipments may be sent in ferry cars to a transfer and the receiving clerk may never see them; or they may be loaded into the car by the shipper's drayman at a station and the receiving clerk may never have an opportunity to check the markings with the shipping order; or the receiving clerk may have an opportunity to check the shipment and not notice the errors in marking, being satisfied as long as he counts up the number of packages and finds it corresponds with the number called for on the shipping order. In either case the shipper is furnished with a bill of lading and the railroad's responsibility begins.

The result of such an error would then be something like this: The agent at, say, San Francisco receives six boxes of soap for John Jones, while he holds billing for five boxes only (one over). The agent at Boston receives four boxes of soap for William Smith, while he holds billing for five boxes (one short).

The agent at San Francisco, knowing Jones to be a reliable man, and on the accommodation list, credit good, turns over all the boxes to Jones and puts out a request for correction of billing, which may or may not come along in six months or a year. Anyhow, it is all forgotten and Jones is in a box of soap, innocently or otherwise.

Right here is where the delivering agent falls down. He should never have delivered this package to Jones without presentation of bill of lading, or other proof of ownership.

In the meantime let us look into the Boston situation. William Smith has been billed for five boxes of soap and has only received four boxes. He waits a while and then puts in a claim for the other box. Investigation is made, the goods are found to have been received and checked O. K. at originating point; short at destination, one box; somewhere in between shipping point and destination a box has gone astray or has been stolen. Good checking through transfer stamps may enable the investigator to finally locate where the over package went to. The difficulties of this, however, increase with the distance the two destinations are apart.

Then come up questions of duplicated orders and depreciation in price and quality of goods and before the matter is eventually settled, if it ever is settled, there have elapsed months, perhaps years, and considerable labor, back haulage or corrections of billing, and other things too numerous to mention, to be adjusted.

The decision of the I. C. C., June 23, 1913, that where merchandise is improperly addressed, the shipper making the error must bear the burden of the resulting freight charges and the fact that the correct address was noted on the bill of lading is not material, will go far towards making shippers more careful in marking their shipments properly, but there will always be a large amount of freight improperly addressed as long as shippers hire as shipping clerks boys who do not realize the importance of properly marking every package or clerks who are careless or inattentive to their duties. A good shipping clerk is a valuable asset to any firm.

The writer of this article is in a position where he has observed hundreds and perhaps thousands of errors similar to the above and is convinced that if shippers will instruct their shipping clerks to use extra care in checking the packages with the shipping order or bill of lading, before presenting goods to the railroad for shipment, a great improvement will be made in the overs, shorts and claims.

Furthermore, if the railroad receiving clerks will be careful to check the marks on the packages with the shipping order when received and the delivering agent will deliver only on presentation of bill of lading or other proof of ownership, the marks on the package not being a sufficient proof of ownership, as demonstrated above, a great deal of useless labor, expense and mis-delivery of packages can be avoided.

SAVING WASTE GRAIN

The Rock Island agent at the Silvis (Ill.) transfer, constructed a rat-proof grain bin last fall, holding 25 to 30 bushels of grain, and began systematically to save the grain recovered in the sweeping of empty cars placed at the platform for loading. This was done at practically no expense, as it was necessary to clean the cars before loading and regular employees were utilized in the work. As opportunity offered he also collected any grain spilled from bad order cars in the Silvis yards. This grain was sold from time to time and the receipts turned into the company treasury through the local agent. While this grain was damp and more or less dirty, it made good chicken feed and no difficulty has been found in selling it at $0.80 per hundred pounds. The amount recovered in four months was as follows:

November, 1914	$15.05
December, 1914	71.80
January, 1915	64.10
February, 1915	116.60
Total	$267.55

The Deniliquin Railways of New South Wales.—It is stated that the government of New South Wales contemplates taking over the Deniliquin & Moama Railway line, which forms the connecting link between the first-named town and the Victorian railway system at Echuca. Should this be done and the line be extended further northwards, and should the proposed line from Moulamein to Moama (immediately north of Echuca) be carried through, an enormous area of wheat land will be opened up.

Reclamation of Scrap on the Great Northern

Large Savings Made by Reworking All Wrought Iron Scrap Into Bar Iron at the Company's St. Cloud Mill

The geographical location of a railroad governs to a large extent the practices to be followed in the reclamation of scrap material. Some roads find it to their advantage to concentrate the classifying, reclaiming and salvaging at one principal point on the system, while other roads salvage and reclaim a great amount of material at the various shop points, leaving the classifying to be done at the scrap docks. This latter practice the Great Northern has found it expedient to follow, owing to the number and location of its shops; and its shop men are so trained that but little usable material finds its way to the general scrap docks. Thus it is only necessary to classify the scrap, salvaging

Fig. 1—Scrap Pile at St. Cloud, Minn.; Great Northern

what material is picked up from the road, such as track material, wreckage, etc., which is brought directly to the scrap dock.

The bulk of the scrap is received at St. Cloud, Minn., 75 miles west of St. Paul, where it is sorted and held for shipment to the scrap dealers, with the exception of the wrought iron scrap which is salvaged or worked over into first class bar iron in the rolling mill at that point. On the extreme west end of the system the scrap is classified and sold direct to the mills in that vicinity. By following this plan a large amount of cross hauling of the reclaimed material is eliminated, the stores department is relieved of a large amount of accounting, since the material reclaimed is turned directly into the local stock, and the shops receive direct credit for the amount of material they reclaim.

While the company has met with marked success in operating on this basis the chief point of interest is the reworking of the wrought iron scrap at St. Cloud. At this point the company operates a full fledged rolling mill for this purpose, and since it was started in August, 1913, it has reworked all of the wrought scrap originating on the entire system at a substantial profit. During the year 1914 this mill produced 8,863,835 lb. of bar iron, divided into various classes as follows:

Round iron, common	6,326,865 lb.
Square iron, common	42,780 lb.
Flat iron, common	1,852,635 lb.
Deformed iron, common (for reinforced concrete)	14,505 lb.
Hexagonal iron, refined	91,480 lb.
Round iron, refined	507,407 lb.
Flat iron, refined	28,163 lb.
Total	8,863,835 lb.

This was done at a cost of less than 90 cents per 100 lb., on an average, this figure including the cost of the scrap at current prices and all overhead charges, and it is conservatively estimated that a saving of over 25 per cent has been made on the market price of the iron rolled.

The mill is operated as a distinct unit and is under the direct jurisdiction of the superintendent of motive power in charge of shops. All the work connected with it is done on a contract basis, the standard rolling mill scale being followed consistently. The wrought scrap is sold to the mill by the stores department, as to an entirely independent concern, at the prevailing scrap prices, and the mill sells, as it were, direct to the stores department, charging for the material the cost of production, which includes the scrap cost and all overhead charges. This price is carried in all the general price lists and is changed monthly. As the mill is able to supply the needs of the system there is no confusion with the outside market prices. The work of the mill is done on a shop order basis, the orders being issued by the stores department for a sufficient quantity to warrant the changing of the rolls.

The workmen in the mill are all experienced mill men, it being found quite desirable to obtain them from other mills rather than to attempt to educate the local men to do the work. The force consists of one head roller who has charge of the mill and with whom the contracts are made, two roughers, two stranders, two finishers, one catcher, one hooker-up (these men pass the heated bars through the rolls), two heaters, two helpers, two

Fig. 2.—Wrought Iron Scrap Ready to Be Made Into Piles for Rolling Mill

straighteners, two shear men and four pilers, all of whom are paid out of the contract price.

The scrap as it is received from the system is shown in Fig. 1. It is classified from this pile and delivered to the scrap bins, with the exception of the wrought iron scrap. The rods in good condition and of a diameter generally used at different points, are cut to length, straightened and applied against any orders for such material. The wrought iron scrap which is not thus handled is cut to proper length for piling, sorted and delivered to the piling bench. Fig. 2 shows a pile of the smaller pieces just outside of the mill. As it is required it is shoveled through the window onto the piling bench shown in Fig. 3. Here it is made up into piles varying from 75 lb. to 250 lb. in weight. The flat iron is used for the sides and battens of the piles.

The wrought iron axles are sheared to length as shown in Fig. 4. This iron is rolled into what is known as the refined

iron mentioned in the output table given above. It is used for engine bolts, all rivets except those used in boiler work, and such other material as requires a better grade of iron. The iron made from the piles is known as common iron. The piles are heated in two large oil furnaces of the reverberating type, each having a capacity of 1,900 lb. per heat. These furnaces are located in front of the rolls, one on each side, and each furnace is used in rotation; that is, while one is feeding the rolls the other is heating its charge to the proper rolling heat. The heated piles are carried from the furnace to the mill, a rear view of

Fig. 3—Piling Bench at St. Cloud Rolling Mill

which is shown in Fig 5, by long tongs suspended from an overhead trolley which runs between the two furnaces and the roughing rolls shown on the left in the photograph.

The mill is what is known as a 12-in., three-stand mill, there being three sets of housings. The rolls in the different stands are connected by flexible couplings and the entire mill is driven by a 125-hp. Buckeye engine. The housings of the mill were built by the company and the rolls purchased from the United Engineering & Foundry Company, Pittsburgh, Pa. For the entire work of the plant 44 separate rolls are required. These are maintained in condition by a machinist, a special room being assigned

Fig. 4—Sheared Wrought Iron Axles Which Are to Be Rolled Into Refined Iron Bars

to this purpose (see Fig. 6). The rolls are such that the following sizes of bars may be rolled:

Round iron	½ in. to 1⅞ in.
Square iron	½ in. to 1½ in.
Hexagonal iron	⅞ in. to 1⅜ in.
Flat iron	¼ in. to 1 in. by 2 in.
	⅜ in. to 1 in. by 1½ in.
	⅜ in. to 1 in. by 1¾ in.
	⅜ in. to 1 in. by 2 in.
	⅜ in. to 1 in. by 2½ in.
	⅜ in. to 1 in. by 3 in.
	⅜ in. to 1 in. by 3½ in.
	⅜ in to 1 in. by 4 in.
	½ in. by 1⅞ in.

In addition to this deformed iron is rolled for concrete reinforcing bars. All but the ½-in. round iron is rolled to size in one heat. This is made into billets in order to produce the necessary homogeneity of metal for the small bar.

As the finished bar comes from the rolls it is placed on a hot bed. Bars have been rolled as long as 200 ft. The maximum output made by the mill is 75,000 lb. for one day (a day

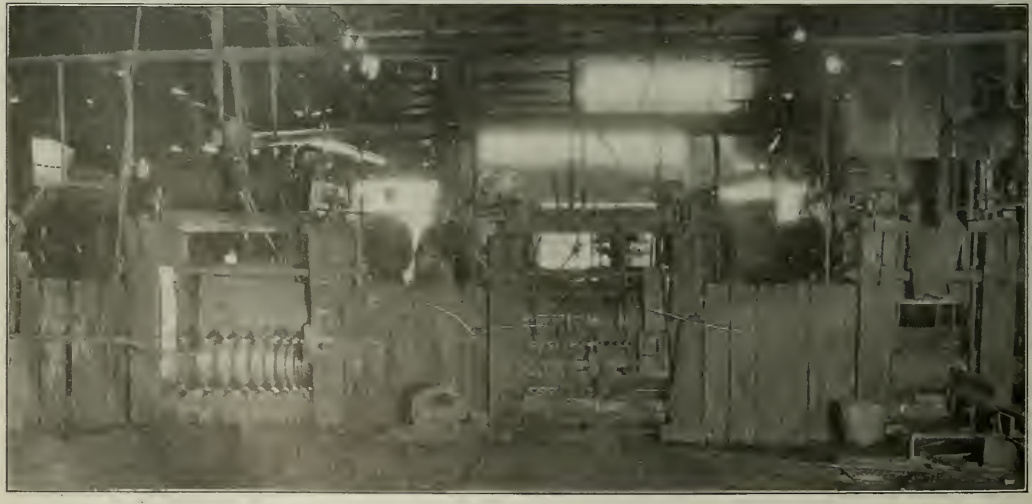


Fig 5 - Rear View of the Rolling Mill; Roughing Rolls on the Left

is governed by the run of the heats) and 1,480,000 lb. for one month. The bars are taken from the hotbed while still hot, passed over a series of large diameter rollers and cut to length, usually 16 ft., on an alligator shear. They are then weighed on track scales and placed in stock as shown in Fig. 7. The refined iron

Fig. 6—Shop for Maintaining the Mill Rolls

is distinguished from the common iron by red paint on the ends. Taken as a whole the mill occupies a space 250 ft. long by about 45 ft. wide.

With all this material collected at this point it has been found expedient to manufacture bolts, rivets and grab irons at St. Cloud for the entire system. During the year 1914 over 1,600,000 bolts were made at an average cost per 100 lb. of $1.20 without nuts, this cost including the cost of the iron as produced by the mill, labor and the necessary overhead expense. In addition to this 322,740 ½-in. carriage bolts were made at an average cost of $1.60 per 100 lb. without nuts. One hundred and seventy-six thousand rivets were also made at an average price of $1.25 per 100 lb. boxed. This latter item alone represents a saving of over 300 per cent. The bolts and rivets under 9 in. in length are made in an automatic Ajax bolt machine which is fed directly from a furnace handling the 16-ft. rods. This machine will produce on an average of 1,500 lb. of rivets per hour and 4,000 bolts. Fig. 8 shows some of the carriage bolts thus made. The bolts over 9 in. in length are made on a continuous motion bolt machine, which will produce 1,200 bolts per hour.

As stated in the first part of this article the local shops do what reclaiming is possible. For instance, a group of machines

Fig. 8—Carriage Bolts Made on Automatic Bolt Machine

is used in the freight car repair shop at St. Cloud for reclaiming the bolts and nuts taken from the cars under repairs. It consists of a four-head threading machine, a small shear and a six-spindle nut tapping machine. Those bolts and nuts that are found suitable for use are placed directly in bins in the shop for immediate use. Those bolts that are slightly damaged are

Fig. 7—Storage Yard for Finished Bar Iron

sheared off, rethreaded and placed directly in the available stock, and the nuts that are badly rusted are tapped and also made available for immediate use. Large quantities of bolts are thus reclaimed with all the otherwise necessary accounting and transshipping eliminated.

In addition to the manufacture of bar iron at St. Cloud the Great Northern makes all of its heavy bar iron from 2 in. up to 12 in. square for the system at its Dale street, St. Paul, Minn., shops under a 4,000 lb. hammer. The scrap is made into piles of 250 lb. and hammered into slabs and held in stock for shop orders for heavy bar iron. This shop slabs 11,000 lb. per day. In cases of emergency the material is worked into driving axles. The company also maintains its brass foundry at this point, where all the brass scrap is received and used. This foundry provides the necessary brass castings for the entire system and has a capacity of 15 tons.

TRAIN ACCIDENTS IN MARCH[1]

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of March, 1915:

Collisions

Date.	Road.	Place.	Kind of Accident.	Kind of train.	Kil'd.	Inj'd.
1.	C. R. I. & P..... C. & N. W.....	Cedar Rapids.	xc	F. & P.	1	8
31.	Cleve. & Pitts.....	E. Liverpool.	rc	P. & F.	0	1

Derailments

Date.	Road.	Place.	Cause of Derailm't.	Kind of train.	Kil'd.	Inj'd.
1.	Southern	Juliette	d. track	P.	1	1
1.	Boston & Maine.....	Pownal.	d. coupler	F.	0	0
4.	Central Vermont.....	Cambridge.	unx	P.	0	7
3.	Georgia	Buckhead	unx	P.	1	1
†5.	Atch. T. & S. F.....	Elsinore.	.....	P.	1	14
14.	Chicago & E. I.....	Shelburn.	unx	P.	1	2
16.	Macon & B.....	Upson, Ga.	unx	P.	0	5
23.	N. Y. N. H. & H....	Devon.	neg	P.	0	1
26.	Baltimore & Ohio....	Meyersdale.	b. wheel	F. & P.	0	4

The trains in collision at Cedar Rapids, Iowa, on the first, were a switching engine of the Chicago, Rock Island & Pacific and a passenger train of the Chicago & North Western, the switcher running into the passenger train, which was standing still. The engineman of the switcher, who was out on the running board, started, as soon as he saw the danger, to go back into the cab, but he was knocked off and killed; and eight other trainmen were slightly injured. The collision was due to the inexperience of the firemen, who was running the engine while the engineman was outside the cab.

The trains in collision near East Liverpool, Ohio, on the 31st, were an eastbound passenger and an eastbound freight, the passenger running into the freight. The caboose and three freight cars were damaged. One employee was injured. The passenger train, running under a permissive block signal, approached the freight, which had been stopped near the station, at uncontrollable speed.

The train derailed at Juliette, Ga., on the first, was southbound passenger No. 6, and the baggage and the express cars were overturned. The baggageman was killed and his helper was injured. There were 50 passengers on the train, none of whom are reported injured. The tender was the first vehicle to leave the track, and it is said that the cause of the derailment was a loose rail.

The train derailed on the Boston & Maine at Pownal, Vt., on the first, was a westbound freight, consisting of two engines and 70 cars. The train, moving about 30 miles an hour, broke apart at the eleventh car from the rear end by the failure of a draw-bar, which became loose in consequence of the loss of nuts from the yoke strap bolt. The separation of the cars caused the application of air brakes in emergency; and this caused such a shock that the fifteenth car from the engine was separated from the sixteenth by the pulling out of its draw-bar. This draw-bar, when it fell to the track, derailed the four following cars. One of the derailed cars struck the passenger station and demolished it, and another in the same way destroyed the freight house.

The train derailed near Buckhead, Ga., on the night of the third, was eastbound passenger No. 4, and four passenger cars were overturned. A freight car on a side track took fire and it, together with the locomotive, were badly damaged by the flames. The fireman was killed and one passenger was injured. In the four cars overturned were about 60 or 70 passengers, yet only one was seriously injured.

The train derailed near Cambridge, Vt., on the fourth, was an eastbound passenger, and two coaches fell down a bank. Four passenger, two employees and an express messenger were injured. The cause of the derailment was not determined.

The train derailed near Elsinore, Cal., on the fifth, was a southbound passenger. The rear coach had its rear truck derailed at a frog, just before reaching the bridge over the San Jacinto river. The truck slewed and pulled the car out of line and it was detached from the car ahead and was overturned, dropping about 17 ft. This car had a steel underframe and was but slightly damaged. One passenger was killed and the conductor and 13 passengers were injured. The train is said to have been running not more than 12 or 15 miles an hour, but the rail, on the curve (of 12 deg.), approaching the bridge was somewhat worn, and the roadbed was soft by reason of a heavy rainfall.

The train derailed at Shelburn, Ind., on the 14th, was the southbound Dixie flyer. The engine and three cars ran off the track and the station building was damaged. The engineman was killed and two trespassers were injured. The cause of the derailment was not discovered.

The train derailed near Upson, Ga., on the 16th, was mixed train No. 6, and one freight car, one mail car, the baggage car and two coaches fell through a trestle bridge 17 ft. to the ground below. The mail clerk and five employees were injured.

The train derailed at Devon, Conn., on the 23rd, was an eastbound express. The engine and first three cars ran off a derailing switch and stopped close to the abutment of the bridge over the Housatonic river. The fireman jumped off and was slightly injured. The train had run past distant and home signals set against it, and went off the derailing switch at about 10 miles an hour. The engineman at fault was a runner of experience, with a good record.

The trains involved in the wreck at Meyersdale, Pa., on the 26th, were an eastbound freight and a westbound passenger. The freight was derailed by the breaking of a wheel, and one car fell against the passenger train, which was passing on the adjacent track. Two passenger cars were badly damaged, and four passengers were injured.

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

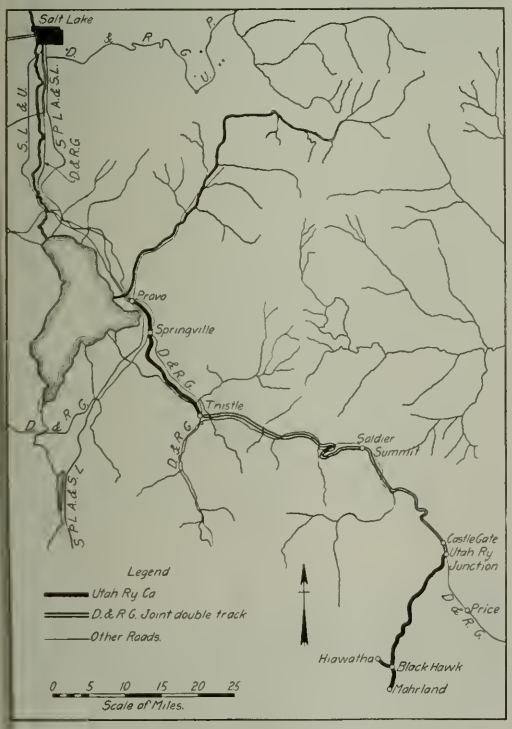
THE NEW FLAGMAN.—No flagman should be put on duty until he has learned the road and passed a satisfactory examination. The conductors should use care in working the new flagman, being careful they go back, carry the necessary signals with them; and to caution them in going back, especially at night, about how far they should go. Unless the new man is cautioned he will likely go back half the distance he should, partly on account of not knowing how far to go, poor judgment of distance at night, and for fear his train will go off and leave him in the woods. While we should never have in our employ a flagman so irresponsible as to make it necessary for the conductor to follow him and see that he does what the conductor tells him to do, yet I know of two cases in the past few years where, if this had not been done, collisions would have occurred.—*E. H. Daniel, in the Railroad Herald.*

Construction of New Line to Reach Utah Coal Fields

Required Movement of 100,000 Cubic Yards Per Mile, Much of Which Disintegrated Badly Upon Exposure

The Utah Railway Company was incorporated on January 24, 1912, as the Utah Coal Railway Company, which name was changed to the Utah Railway Company on May 4, 1912. The purpose of the organization was to construct a standard gage railroad from Provo to the coal fields of Carbon and Emery counties, Utah.

The coal fields to be served are a part of the Book Cliffs coal field, in the western extension of the Uintah coal region in the Rocky mountains, being, for the most part, that portion of this field south of the angle defined by the canyon of the Price river and lying along the easterly escarpment of the Wasatch range which forms the easterly rim of the Salt Lake basin. They are



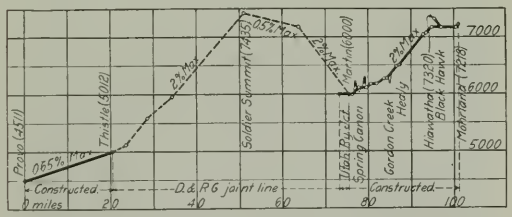
Map of New Line of the Utah Railway Between Provo, Utah, and Mohrland

known locally as the Castle Valley coal fields, Castle Valley being located at the base of the escarpment.

The coal outcrop in this section of the Uintah coal region is in the escarpment and at an elevation of 7,500 to 8,500 ft. above sea level, hence well up on the sides of or near the summit of the more elevated portions of the Wasatch range, making necessary the use of trams or other devices for carrying the coal from the mine openings to the tipples which are usually located near the foot of the escarpment. Coal seams in this section are usually nearly level, and carry little, if any, water.

Coal was being mined at the time of incorporation at Spring Canyon, Hiawatha, Black Hawk and Mohrland, as well as at openings along the Huntington river, capable of producing a large tonnage of a high grade of bituminous coal, for which there was a market. The output of these mines was limited and the marketing irregular by reason of insufficient railroad facilities. Three years previous, a line of railroad had been constructed from Price, Utah, to serve the mines at Hiawatha, Black Hawk and Mohrland, but it had proved inadequate for the requirements.

That portion of the coal field under consideration is cut through by the Price and Huntington rivers, and on account of the Price River canyon, Soldier Summit, Soldier Creek and Spanish Fork canyons being occupied by the Denver & Rio Grande, careful study was given the country for other routes, but Soldier Summit being the lowest summit available it was decided to encounter the difficulties consequent upon its use, as well as the use of canyons leading therefrom, occupied by an existing line of railroad, in preference to adopting a route calling for the crossing of the range by summits of a much greater elevation. In fact, the next lowest summit considered was at an elevation nearly 1,500 ft. greater than that of Soldier Summit, which has an elevation of 7,450 ft. above sea level. After careful study of the country by means of preliminary instrumental surveys it was decided to adopt a maximum grade of 2 per cent compensated for curvature, and a maximum curvature of 8 deg.;



Profile of New Line of Utah Railway and Joint Line with D. & R. G. Over Soldier Summit

all curves having a radius of less than 2,865 ft. being spiraled for a speed of 25 miles per hour.

The country traversed between Provo and Thistle presents no unusual features, about two-thirds of this distance being along and upon a bench of cultivated land said to have been formed by wave action of an ancient lake, while the remaining one-third is in the canyon of the Spanish Fork river alongside the D. & R. G. track and near the bottom of the canyon.

From Utah Railway Junction to Mohrland the line as located is just outside the foot of the abrupt slope from the projecting sandstone-capped promontories or fingers of the escarpment. The country at the foot of the cliff-like escarpment slopes rather abruptly to Castle Valley and at intervals is deeply cut by drainage channels, none of which, with the exception of Gordon Creek show a surface flow, except after storms or during periods of melting snow. Most of these channels show evidence of rushes of water in considerable volume, which, by reason of the steep slope, have moved many boulders which are profusely distributed along the drainage courses. The shale which forms most of the ground surface that is not denuded sandstone, disintegrates under exposure to such an extent that it gullies freely under a flow of water, resulting in an uneven washing and wearing down of the surface, leaving it in the form of heavy corrugations deeply cut by gullies with steep slopes. Many of these gullies have cut down to ledges of sandrock which form the floor of the wash, while at places during storms the water rushes over the outcrop of these ledges forming water falls of considerable

height. To the east and 1,500 to 2,000 ft. below the line can be seen the comparatively level Castle Valley, some six miles distant.

As the surveys progressed and the possibilities of the country developed it was decided to fix the western terminus of that portion of the line to be constructed at that time, at Provo, Utah, in the Utah valley, 48 miles south of Salt Lake where a junction was possible with two steam lines, the Denver & Rio Grande and the San Pedro, Los Angeles & Salt Lake, and one electric line, the Salt Lake & Utah, all of which have direct lines with favorable grades between that point and Salt Lake or Ogden.

In fixing the location of the line between Thistle and Castle Gate traversing the deep, narrow and crooked canyons of Spanish Fork river, Soldier creek and Price river, with the restrictions as to grades and elevation mentioned, care and patience was necessarily exercised. The fact that the D. & R. G. has a through line, double-tracked for a portion of the distance, located for the most part in the bottom of these canyons, was something of an obstacle in addition to the extreme roughness and moun-

Typical Construction Work North of Blackhawk

tainous character of the country traversed, but the interests back of this project at no time lost sight of the desirability of securing a line that could handle economically the traffic of a heavy output from the coal fields to be served.

Grading on this line was begun near Mohrland, the southern terminus, in September, 1912, and near Thistle in November of that year, although at that time the location of the line on several sections had not been fixed and several revisions and modifications were afterwards found desirable. After the location of the entire line had been substantially fixed and construction started at both ends, negotiations were entered into with the D. & R. G. with a view to avoiding, as far as possible, interference with its existing and operated tracks. These negotiations finally developed into an arrangement whereby the D. & R. G. improved its line and completed a second track between Thistle and Helper with favorable grades and curvature, with an arrangement under which this trackage could also be used by the new company. It was also arranged for the D. & R. G. to use jointly the Utah Railway trackage under construction between Provo and Thistle. As this arrangement provided trackage for the Utah Railway Company from Thistle to near Castle Gate, over D. & R. G. property and tracks, no construction was started between these points, construction being confined to that portion of the line between Provo and Thistle, and between Castle Gate (Utah Railway Junction) and Mohrland.

Between Provo and Thistle, 20.7 miles, the line was so constructed as to permit of its being used as an east bound track by the D. & R. G., with a maximum grade rate of 0.65 per cent against east bound traffic, and a maximum curvature of 4 deg.

Looking North from Blackhawk Along the Utah Railway

Where practicable, conforming with the above standards, it was constructed alongside the operated track, which was in part reconstructed and modified to conform therewith. For about one-third of this distance it was necessary to detour from the operated line to a maximum distance of about one mile.

The principal features of interest on this part of the line consisted of changes in the channel of Spanish Fork river and the rectification of the main line and other trackage of the D. & R. G. between these points. The construction of this 20.7 miles was supervised and handled by the D. & R. G. in behalf of the Utah Railway Company, and the track was laid and put in operation as an east bound track for the D. & R. G. August 1, 1914.

Although construction on a connection with the D. & R. G. between Castle Gate and Helper, designated as "Utah Railway Junction," and Mohrland, 26 miles, was commenced at Mohrland in September, 1912, the final location of this portion of the line was not completed until the spring of 1913, when the entire work was placed under construction. This location, although made with care, called for an unusual percentage of curved line,

The Gordon Creek Steel Girder Viaduct on the Utah Railway

about 46 per cent of the total length being curved and over 62 per cent of this curved line being on curves of 6 deg. or over, the total angle in the 26 miles of line being 3,090 deg. 56 min.

On account of the extremely rugged nature of the country, the surface of which consists largely of sandrock and black shale common to the coal formations in this section of the mountains, some heavy and expensive work was necessary to secure a railroad of the type desired. In view of the high cost of grading consequent upon the irregularities of the country, efforts were made to so fix a location as to give a fair balance to the excavations and embankments, as on many sections of the line little or no borrow was to be obtained except by blasting.

Although the shale which constituted a large per cent of the

excavated material had an earthy appearance upon the natural surface, when penetrated it developed a hard, almost rocky nature, quite difficult for drilling and blasting, although upon exposure to the atmosphere, it frequently crumbled rapidly into an earthy form. Large masses of this shale rock taken from the excavation and placed alongside the grade would crumble in a few months to a mound of earthy material, giving little indication of its formidable character to the grading forces, or the expense required for its removal. Swelling of the material removed from an excavation was frequently as much as 50 per cent, yet after a few months' exposure it would slack and shrink to nearly its original bulk. Culverts and other structures placed under embankments of this material were affected by this unstability, in some cases quite unfavorably, as, dependent somewhat upon the manner in which the material was placed, different action would result, the swelling and shrinking sometimes resulting in the movement of certain parts of certain layers of the embankment. In one or two cases where embankments built of this material abutted on solid formations, by reason of this resistance portions of these embankments seemed actually to creep up-hill in their efforts to expand during the swelling period.

As to future permanency of embankments constructed of this unstable material, it is the opinion of those most familiar with its characteristics that the outer portions of these embankments will disintegrate or slack upon exposure to the atmosphere, thereby filling the interstices of the broken material underneath to such an extent that continued slacking will not proceed to a great depth into the embankment, but that the outer surface will in effect be sealed by the slacking of the more exposed portions and that thereupon further disintegration will take place slowly, if at all.

While usually massive and coarse sandstone was encountered, occasional layers were found that might be termed a good grade of building stone. The larger portion of this sandstone seems to partake somewhat of the nature of the shale with which it is associated and it is not unusual to find heavy layers of this sandstone, the surface of which slacks and crumbles quite freely after exposure to the atmosphere for a few months.

The grading of the roadbed for this 26 miles of single track railroad called for the moving of slightly over 2,673,000 cu. yd. exclusive of 1,638 lineal feet of single track tunnels. Of these roadbed quantities about 62 per cent was classified as solid rock, 26 per cent as loose rock and 12 per cent as earth. The tunnels, 615 and 803 feet long, respectively, were both on 8-deg. curves, through rock and shale formations. No water was found in driving these tunnels.

On account of the aridity of the climate, no unusual drainage features were encountered. Only one bridge was required to serve drainage. This was at Gordon creek, which is in a deep gash or gully where crossed by this line. While the normal flow of this stream is not over 20 sec. ft., it is subject to rushes of water from summer storms or cloudbursts which indicate at times 4,000 sec. ft. The bridge or viaduct across this stream has a height of 135 ft. above the creek bed, and a length between back walls of end abutments of 624 ft. The bridge consists of 5 spans of 80 ft., and 1 span of 60 ft., deck plate girders supported by 1 steel bent and 4 steel towers, these towers carrying 40 ft. steel girder tops. The entire bridge is on a 6 deg. curve. Over Spring Canyon creek two 60-ft. deck plate girders were used, this crossing serving for drainage as well as for a branch line of railroad underneath. One temporary wooden bridge 105 ft. long was used over the Southern Utah Railway, the uncertain future of that line of railroad not justifying a permanent structure at the crossing. For mining waterways, rock wall culverts, arch and box type, or beam girders on concrete walls were used, as well as cast iron pipe with rock end walls. The largest arch used was a 16-ft. span with a length of 175 ft.

The roadbed for one foot or more in depth, as was thought necessary, was formed of selected material, which was hauled considerable distances in some cases. Before the track was laid this was brought in by teams, and after track had been laid by trains. While this selected material was in no case first class for the purpose, it served to cover and protect the shale and to a great extent retard or prevent its disintegration, and to form a reasonably firm and somewhat elastic roadbed to shed such moisture as was likely to fall thereon and upon which the track has been successfully maintained at a reasonable cost to date. There being no natural ballast available in this section of the country, no ballast was used, the track being put to line and surface with the roadbed material. It is to be expected the embankments built of shale will continue to settle and shrink, which will in some cases call for raising and resurfacing of the track. Should these settlements cease or become unimportant, ballasting may thereupon seem justified, but it was thought that the use of expensive ballast hauled long distances would not be justified upon these settling embankments so long as the track could be maintained thereon at a reasonable cost without ballast.

The main track was laid with 90-lb. A. R. A. type "A" rail, with Bonanza joints and 18 7 in. by 8 in. 8-ft. ties per 33-ft. rail. Sidings and spurs were laid with 75-lb. rail. Two steel water tanks, each of 50,000 gal. capacity, were erected.

The grading, tunnelling and work connected therewith was done under contract with the Utah Construction Company of Ogden, Utah. The steel bridge material was furnished by the American Bridge Company of New York and erected by Gerrick & Gerrick Company of Seattle, Wash. Track laying and surfacing was done by company forces. H. S. Martin was in charge of construction work under the direction of William Ashton, chief engineer.

WESTERN RATE ADVANCE HEARING

Testimony of protestants against the proposed advances in the rates on livestock occupied the hearing before Commissioner Daniels at Chicago in the western rate advance case throughout most of this week, the testimony on packing house products having been concluded on April 30. This will be followed by some unfinished testimony of protestants, and the hearing is expected to be concluded on May 10.

R. O'Hara, rate expert for Swift & Co., presented 31 exhibits to show that the increases on packing house products should not be allowed. He disputed statements by railroad witnesses regarding the percentage of empty car mileage in the packing house business, saying that for all the roads in the case for the year ending June 30. 1912, the percentage of loaded car mileage was 71.09, and for the year ending June 30, 1914, the loaded mileage for the Swift Refrigerator Line was 55.4 per cent. He said the proposed advances would add $488,747 to the annual transportation charges paid by Swift & Co., that it is extremely doubtful that such an advance could be passed on to the consumer, and that it seems likely that the livestock shipper would have to bear the burden.

W. W. Manker, assistant traffic manager for Armour & Co., presented 29 exhibits, in which an effort was made to show that the rates on packing house products are amply remunerative and pay a much greater revenue per ton mile than the average of other commodities. The present advance, he said, would disturb an adjustment as between the rates on livestock and fresh meats and packing house products which has been approved by the federal courts, and that in the advances proposed there is no uniformity shown. Mr. Manker said that the total amount of freight charges paid by Armour & Co. on materials and supplies used in the operation of its plants was $1,841,899 in 1914, and included in this list of supplies are several commodities on which the rates have been advanced. In addition the increases on fresh meats and packing house products would cost this company, he said, $415,784 a year. He disclaimed knowledge of the capitalization or dividend rate of his company.

C. O. Cornwell, assistant traffic manager of the Cudahy Packing Company, claimed that the proposed rates would be discriminatory and would disturb existing relationships, and said he did not believe the carriers had made a careful and con-

scientious effort to adjust the proposed advances upon any equitable basis, while they would limit the volume of the movement of packing house products in parts of the territory.

A. F. Stryker, secretary and traffic manager of the Live Stock Exchange of South Omaha, based his chief protest on the fact that it was proposed to advance rates out of Omaha 3½ cents, while the Chicago & Alton and the Wabash have contracts with the packers for rates from Kansas City which already give that city an advantage of 5 cents over Omaha, and the proposed rates would increase Omaha's disadvantage to 8½ cents. The difference in rates militates against Omaha, he said, because cattle raisers can obtain better prices in Kansas City on account of the lower rates on the product.

A. B. Caswell, manager of the Milwaukee Tanners' Freight Bureau; J. F. Nicholas of Charles Friend & Co., Chicago, and W. V. Hardie of the Oklahoma City Chamber of Commerce, protested against the proposed advance in the rates on hides.

H. G. Krake, commissioner of the Traffic Bureau of the St. Joseph Commerce Club, protested against the disadvantage under which the St. Joseph market operates in competition with Kansas City, and also against the increase in the rates on hides.

Fred Pettijohn, a cost accountant associated with the Mutual Audit Company of Louisville, submitted an extended analysis of the operating expenses of the Chicago & Alton for the month of October, 1914, to show the cost of transporting meat. Of a total operating expense on the western division for the month of $290,498, he assigned $215,981 to freight and $40,089 to fresh meats and packing house products; whereas the gross revenue received by the Alton on this traffic was $70,583. Out of this he said the road paid switching absorption amounting to $7,658, leaving a net revenue of $62,925. Adding to the operating expense $11,704 to cover hire of equipment and $89.96 as the proportion of train cost on company material, he obtained $51,884 as the total cost chargeable against the packing house traffic; or 6.69 mills per ton-mile against a ton-mile revenue of 11.24 mills. In other words, he said the Alton handled this traffic at an operating ratio of 59.48 per cent, making a profit of 40 per cent. From a similar analysis of the Northwestern traffic and expenses he figured a profit of 36 per cent on a relative smaller volume of tonnage because of the higher rates. Mr. Pettijohn was cross-examined at length by Dr. M. O. Lorenz, statistician for the Interstate Commerce Commission, and by C. C. Wright, general solicitor for the Chicago & North Western, who seriously questioned some of the methods used by the witness in making his calculations.

"By whom are you employed in this case?" asked Mr. Wright. "Clifford Thorne employed me to work up the packers case," replied Mr. Pettijohn.

"Are you employed for and in behalf of all these large packing concerns?" asked Mr. Wright. "I couldn't tell you, Mr. Wright, who all the packers are behind this movement; the check comes through M. Thorne."

Mr. Thorne then stated that the money was given by the packers to pay Mr. Pettijohn and all his assistants. "The attorney for the packers gave the money," he said, "and his name was Luther Walter. I know nothing further."

"The money was contributed by the packers, Armour & Co., Swift & Co., Morris & Co. and Sulzberger & Sons Company," said Mr. Walter.

C. S. Balch, statistician of the Chicago & North Western, testified in rebuttal of the statements made by accountants for the protestants as to the cost of operation. He said that investigation showed that on all the cars moved by the North Western out of South Omaha to Iowa, Illinois and Wisconsin for November, 1914, the earnings, after taking out the switching charges at Chicago and Omaha, equaled only $52.99 per car, and that taking the figure of 10.1 cents per car mile arrived at by the witnesses for the protestants as the cost of hauling each car one mile, it would cost $49.60 to haul a car to Chicago, leaving a net of $3.39 to pay taxes and overhead charges, on an operating ratio of 93.7 per cent.

F. A. Leland, chairman of the Southwestern Tariff Committee, also testified in rebuttal, pointing out objections to the exhibits filed by witnesses for the packers and replying to their objections to the exhibits he had filed in his direct testimony. He also submitted a number of supplementary exhibits.

The first witness on behalf of the protestants against the advances in the rates on live stock was T. W. Tomlinson of Denver, secretary of the American National Livestock Association. He said the proposed advance is an attempt on the part of the carriers to shift the burden of transportation to the interstate shippers, and presented a number of comparisons to show that the present rates, as well as the proposed rates, are much higher than the rates for similar distances under the Illinois, Iowa, Missouri, Kansas and Texas state tariffs. He also said that many of the proposed rates are higher than the rates approved by the Interstate Commerce Commission in the Oklahoma City case. He said that the cost of expedited special service, as claimed by the railroads, is "largely mythical"; that there has been no improvement in the service given live stock traffic within recent years; that on the contrary the time schedules have been lengthened. He also claimed that live stock moves in trains that carry as a rule as much revenue tonnage as the average of all trains, and that the large empty movement of live stock in cars is explained by the fact that there is a surplus of box cars moving westbound, and there is no necessity to load live stock cars as long as that condition exists. "The present rates on live stock are higher than ever before in the history of the industry," he said. "I estimate that shippers of live stock now pay directly or indirectly from 20 to 25 per cent more for marketing their stock than they did 15 or 20 years ago. This increase has been caused by flat advances in the rates themselves, by higher charges for feeding in transit, by the withdrawal of rebates, by the withdrawal of free transportation formerly accorded buyers who wished to go out to pick up stock, and by the change in rates from charges per car to cents per hundred pounds."

C. B. Heinemann, assistant traffic manager for Morris & Company, also testified in opposition to the advances on live stock in southwestern territory. He took the position that the existing basis of rates has been adjusted upon a schedule prescribed by the commission, and that the rates were ample to cover the carriers' necessities. He offered exhibits to show that the carriers had not followed out the commission's suggestion that rates on feeder stock be 75 per cent of the beef cattle rates, and said he believed the scale prescribed by the commission in the Oklahoma City case, if properly observed, would give the carriers all the compensation which they could reasonably expect.

W. W. Manker, assistant traffic manager of Armour & Co., also testified against the proposed increase on live stock in southwestern territory, contending that the rate scale fixed by the Interstate Commerce Commission is higher now than the state rates and that the difference would be increased by an advance.

J. D. Jackson, president of the Cattle Raisers' Association of Texas, testified that the cattle industry is in no position to pay higher transportation charges, and that there has been no material change in the conditions to justify an increase in rates. Similar testimony was given by H. A. Stonebreaker, a member of the executive committee of the American National Livestock Association.

The English Railways and the Government.—The Board of Trade has announced that under a new agreement between the government and the railways which have been taken over under the Act of 1871, 25 per cent of the war bonus granted to railway employees will be borne by the companies. It has also been agreed that in future the compensation payable to the companies by the government during the period of control shall be the sum by which the net receipts of the railways during that period fall short of the aggregate net receipts for the corresponding period of 1913, without any reduction.

The Rivers and Railroads in the United States*

The Considerations That Should Lead to the Development of Railroads Rather Than the Building of Canals

By F. Lavis
Consulting Engineer, New York

The paper on the above subject by Wm. W. Harts (abstracted in the *Railway Age Gazette*, February 5, 1915) calls very timely attention to one of the problems of the economics of transportation which is often misunderstood or entirely ignored. This ignorance or misunderstanding has resulted in the expenditure of a great deal of money without adequate benefit, and not only has this been the case in the past, but it still continues. Our national policies in these matters seem to be too often conceived in a generally haphazard manner, rather than to be founded on sound economic laws, and in the general development of the whole resources of their countries certain European nations seem to be guided by more orderly processes of thought and action than we are. But even in Germany, the greatest exponent of order and system, it is by no means a fact that the development of its waterways has resulted in the attainment of unqualified success in low costs of transportation thereon. It has frequently been assumed that this is the case, but it has been shown† that in Germany, as elsewhere, many of the items which should be included in the cost of water transportation have been omitted. Such success as *has* been attained, however, has been largely due to the fact that the matter of deciding on the projects on which public moneys shall be spent has been generally left to a comparatively small body of men of training and experience in the particular class of work or problems involved, whereas, in the United States, this is generally decided by the votes of the people.

It is probably true that in the development of their waterways some of the European nations have attained a greater measure of success than we have, but in the general realm of transportation, including that by railways, it is undeniable that we have far out-distanced the rest of the world. This success has, generally speaking, been the result of policies formulated by a few men or by small groups who have brought our railroads to the high plane of efficiency on which they rest today. *Rest* is used advisedly, as apparently the initiative which has achieved these results is now held in abeyance by the passing of the control of our transportation systems into the hands of those charged by the state with their regulation and who have not the personal incentive to strive "to make a dollar earn the most interest."

Under our form of government it is inevitable that the final decision in regard to the expenditure of money for public improvements must rest on the approval of the people as a whole, and it is perhaps too much to expect that any large proportion of them can be so educated as to be able to form independent judgments on all matters of this kind.

The State of New York is just about completing a new canalized waterway from the Great Lakes to the navigable waters of the Hudson river at a cost of approximately $130,000,000 or more. The construction of this canal was authorized by vote of the people of the state only a few years ago, and apparently they were influenced by two arguments, both of which are, in the writer's opinion, fallacious. These arguments are: (1) That by providing competition the canal would compel the railroad lines to keep freight rates down, and (2) that the actual cost of transportation would be less by the canal than by railroad.

It does not seem necessary at this time to go into much detail to show how these arguments fail. The theory of competition is scarcely tenable, in view of the almost absolute control of railway rates by both state and federal regulation. The actual cost of transportation by canal is only less when the interest on the investment in the canal and the cost of its administration and maintenance is ignored in calculating it.

Taking into consideration the interest on the investment and the cost of maintenance, amounting to 6.6 mills per ton mile, it has been shown* that the total cost of transportation on the Erie canal is about 8.6 mills per ton per mile, and this for low grade, bulk freight alone, whereas the freight receipts of the New York Central were only 6.2 mills per ton mile for all classes of freight, indicating a considerably lower figure even than this for the low grade bulk freight.

It is also shown that the cost of construction of the old Erie canal was not less than about $165,000 per mile, and the new canal will cost double that, which may be compared with the capitalized value of the New York Central Railroad at about $180,000 per mile.

Prof. Engels, an eminent German authority, has stated† that to improve a German river involved an expense equal to that of building a double track railroad on easy gradients through a mountainous country; that is to say, from $100,000 to $150,000 per mile.

The question of the value of waterways for the purpose of providing competition for the railways is very ably discussed‡ by M. Colson, an eminent French authority, who uses as an illustration a specific case in France where the relations are apparently somewhat similar to those of the New York Central and the Erie canal. The argument is paraphrased to fit this latter, with which we are all familiar. It is argued that if lower rates were the desired object, there is probably no doubt that if the New York Central had been presented with, say, one-half the cost of the barge canal, and half the estimated annual cost of administration and maintenance, it would have been glad to guarantee a freight rate of 2 mills per ton mile (the actual net transportation cost on the canal) on such items of bulk freight as may be expected to pass through the canal during the season the canal is open. The lower rates would thus be secured and the state would have saved many millions of dollars. Probably, however, there would be a great outcry and protest against the subsidizing of a particular railroad to obtain a reduction of rates in a certain local section, without obtaining the same reduction in the rest of the country or state, yet this is really what is done, except that the cheap rates are obtained for a certain small part of the population by spending the money for a canal rather than by giving it to the railroad.

The importance of a study of the questions raised by the author of the paper needs no argument, especially in view of the existing financial and economic crisis. All who have broad knowledge of the newer civilizations, that is, those of North and South America, as well as Africa, Australia, etc., cannot but be impressed with the tremendously large number of important things to be done, and the difficulty of getting money enough to carry out even a small part of them, including often those of considerable merit. The Balkan war

*Abstract of a discussion in the March Proceedings of the American Society of Civil Engineers.

†Waterways and Railways, by H. G. Moulton.

*Cost of transportation on the Erie canal, Bulletin of the Bureau of Railway Economics, 1911.

†Eng. News, Jan. 21, 1915, p. 116.

‡Bulletin Int. Ry. Congress, Nov., 1913, p. 958.

and the present European war, so far as their effects have any bearing on the financial situation, are but the culmination of a vast and far-reaching crisis in the affairs of the world produced by the great *demands* for capital for legitimate and urgently required developments of new countries, and the totally inadequate *supply*. It is, therefore, doubly necessary *now* that the greatest care be exercised in selecting for development only those projects which are sound when judged from the broadest economic viewpoint.

So far as concerns the conclusions of Mr. Harts that it is time that we awoke to the wastefulness of much of the expenditure for improvements of rivers and to the desirability of applying the money towards increasing the facilities and depth of water in our ocean ports, the writer is in entire agreement.

The development of our ports must be planned on an adequate basis to take care of a large overseas commerce, and our interior lines of communication must be so developed to carry our products from one part of the country to another at the lowest possible cost per ton mile. In the present state of the art, with possibly a very few exceptions in respect to certain natural deep inland waterways, the railway is the best and cheapest means of inland transportation of which we have knowledge, and unless there is a distinct revolution along lines as yet undreamed of, is likely to remain so for some time to come.

Mr. Harts also referred to the three stages in the economic development of inland water routes, the first before the advent of the railroads when the waterways provided practically the only means of access and communication, and when owing to the rapid growth of the country they were prosperous; the second, the era when the competition of the railroads almost entirely superseded water transport, and the third looking forward to a time when the waterways of this country may be utilized to some such extent as they are in many parts of Europe as almost equal in importance to the railway companies as lines of transportation for low grade freight.

We cannot of course say that this third era will *never* develop in this country, but it seems somewhat improbable, if the development of the art of transportation by railway continues to develop in the future to any such extent as it has in the past. In Europe the railways have never entirely superseded the rivers and canals or offered the effective competition they have in this country, and it must be remembered that a great many of the mercantile and industrial centers of Europe were built up along the water routes and established there long before the advent of the railroads. Of course many of the largest of the modern industrial and manufacturing enterprises have grown up coincidentally with the railways, but the majority of them are but developments from those of an earlier period, built up alongside navigable rivers and canals.

Another point of considerable difference is that in Europe, society and the industries, having been organized before the advent of the railroad as the primary agency of transport, were developed as a number of comparatively small self sustaining groups that is, self-sustaining so far as concerns the necessities of life. In the United States, however, the development of the railway as an efficient and cheap means of transport, reaching all parts of the country, before the development of the principal industries, has enabled these latter to be located where the soil, climate and other conditions were best suited to them, and then to distribute the finished product to the point of consumption.

In the United States the country has been developed by the railways, and while many industrial establishments have been so located as to enjoy the benefits of both rail and water transportation, the railway is always of paramount importance. In spite of some adverse criticism of some details and of some of the figures used, the statement of Mr. James J. Hill that, in comparison with the rates of wages, the cost of freight transportation on the railways of this country is only from one-third to one-quarter as much as in Germany, is undoubtedly substantially correct. Taking into consideration, therefore, the limitations of flexibility of water transportation routes, the necessity that business shall come to them and that they can seldom if ever be carried to the business, the fact that some cargoes, notably coal, deteriorate from wet and dampness, that there are other inherent difficulties in connection with inland water transport, increased hazard, and insurance rates, and considering the efficiency of our railroads, there seems little reason to expect now that there will be any general development of fluvial or canalized inland transportation, unless there is a revolution in methods which are entirely beyond any present expectations, and which, therefore, it is useless to attempt to provide for.

MIKADO AND PACIFIC TYPE LOCOMOTIVES OF MODERATE SIZE

The Baldwin Locomotive Works has recently completed ten Mikado and six Pacific type locomotives for the Nashville, Chattanooga & St. Louis, and although not particularly large for their respective types, the engines are interesting examples of modern motive power.

The Mikado type locomotives exert a maximum tractive effort of 49,400 lb., and with a weight on drivers of 205,000 have a factor of adhesion of 4.15. They are equipped with Schmidt superheaters and Security sectional arches, and are so designed that Standard stokers can be subsequently applied if desired. The firebox throat has a depth of 24 11/32 in., measured from

Mikado Type Locomotive for the Nashville, Chattanooga & St. Louis

the underside of the barrel to the bottom of the mud ring. The tubes are electrically welded into the back tube sheet.

The cylinders are arranged with outside steam pipes, and the steam distribution is controlled by 15-in. piston valves which are set with a lead of 3/16 in. Neither relief nor by-pass valves are used. The valve gear is of the Walschaert type, controlled by the Ragonnet power reversing mechanism. The pistons have cast steel dished bodies with iron bearing shoes cast on, the width of the piston head being 5¼ in.

The locomotives are equipped with Cole long main driving boxes, and with the latest design of Hodges trailing truck, the spring rigging being cross-equalized between the rear driving wheels and the trailing truck. This is accomplished by pinning together, on the center line of the locomotive, two transverse beams, one of which is connected by links with the rear driving springs, while the other is connected with the rear truck equalizer. It is claimed that this construction assists in maintaining a correct weight distribution on both sides of the locomotive when passing over uneven places in the track, and that it also reduces stresses on the frames and equalizing gear.

The Pacific type locomotives are in general similar to the Mikados, although they have smaller cylinders and boilers, and the wheel loads are somewhat lighter. The tractive effort exerted is 33,800 lb., with a ratio of adhesion of 4.25, the weight on the drivers being 143,500 lb. As in the Mikado type, the spring rigging is cross-equalized back of the rear driving wheels. The boiler center line is 9 ft. 6 in. above the rail, which allows room for a furnace throat as deep as that applied to the Mikados. The Schmidt superheater and Security brick arch are used in these engines also.

The tenders of both locomotives are of the Vanderbilt type, carried on Standard forged and rolled steel wheels. The engine truck wheels are steel tired and of the same make.

The tables contain the leading dimensions of both types:

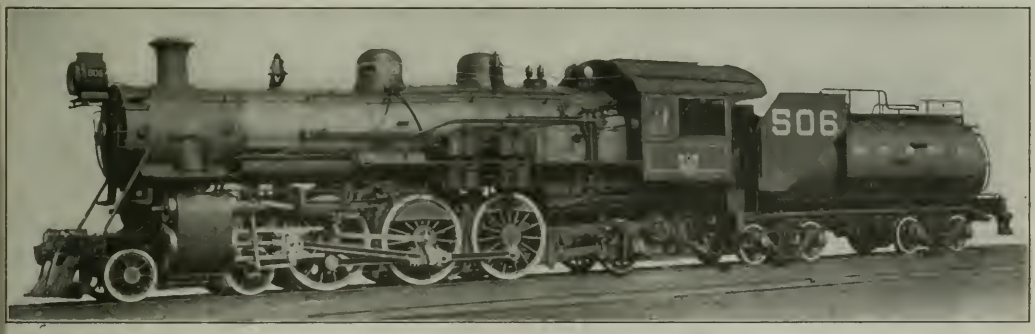
General Data		
Gage	4 ft. 8½ in.	4 ft. 8½ in.
Service	Passenger	Freight
Fuel	Soft coal	Soft coal
Tractive effort	33,800 lb.	49,400 lb.
Weight in working order	219,550 lb.	264,300 lb.
Weight on drivers	143,500 lb.	205,000 lb.
Weight on leading truck	37,400 lb.	20,700 lb.
Weight on trailing truck	38,650 lb.	38,600 lb.
Weight of engine and tender in working order	375,000 lb.	490,000 lb.
Wheel base, driving	13 ft.	15 ft. 9 in.
Wheel base, total	34 ft. 1 in.	34 ft. 4 in.
Wheel base, engine and tender	69 ft. 4 in.	69 ft. 7 in.
Cylinders		
Kind	Simple	Simple
Diameter and stroke	23 in. by 28 in.	25 in. by 30 in.
Valves		
Kind	Piston	Piston
Diameter	13 in.	15 in.
Wheels		
Driving, diameter over tires	69 in.	58 in.
Driving, thickness of tires	7 in.	8 in.
Driving journals, main, diameter and length	10½ in. by 12 in.	10½ in. by 21 in.
Driving journals, others, diameter and length	9½ in. by 12 in.	9½ in. by 12 in.
Engine truck wheels, diameter	36 in.	33 in.
Engine truck journals	5½ in. by 12 in.	5½ in. by 12 in.
Trailing truck wheels, diameter	44 in.	36 in.
Trailing truck journals	8 in. by 14 in.	8 in. by 14 in.
Boiler		
Style	Wagon top	Wagon top
Working pressure	185 lb. per sq. in.	180 lb. per sq. in.
Outside diameter of first ring	66 in.	76 in.
Firebox, length and width	114⅛ in. by 66 in.	114⅜ in. by 84¼ in.
Firebox plates, thickness	Sides, back and crown, ⅜ in.; tube, ½ in.	Sides, back and crown, ⅜ in.; tube, ½ in.
Firebox, water space	Sides and back, 4 in.; front, 5 in.	Sides and back, 4 in.; front, 5 in.
Tubes, number and outside diameter	186—2 in.	241—2 in.
Flues, number and outside diameter	24—5⅜ in.	34—5¾ in.
Tubes and flues, length	20 ft. 6 in.	20 ft. 6 in.
Heating surface, tubes and flues	2,678 sq. ft.	3,553 sq. ft.
Heating surface, fire-brick tubes	27 sq. ft.	27 sq. ft.
Heating surface, firebox	186 sq. ft.	224 sq. ft.
Heating surface, total	2,891 sq. ft.	3,801 sq. ft.
Superheater heating surface	592 sq. ft.	840 sq. ft.
Equivalent heating surface*	3,779 sq. ft.	5,061 sq. ft.
Grate area	52.4 sq. ft.	66.6 sq. ft.
Tender		
Tank	Vanderbilt	Vanderbilt
Weight	156,450 lb.	155,700 lb.
Wheels, diameter	36 in.	36 in.
Journals, diameter and length	5½ in. by 10 in.	5½ in. by 10 in.
Water capacity	8,500 gal.	8,500 gal.
Coal capacity	14 tons	14 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

PREMIUMS FOR FREIGHT TRAIN SPEED

On the Cleveland division of the Baltimore & Ohio special credits are awarded to freight train men for making good time. The arrangement applies to both through and local trains. When a crew makes a run between division termini—from Chicago Junction and Cleveland to Holloway, or from Chicago Junction to New Castle—in satisfactory time, all of the members receive credit, and these credits, according to a circular issued by the superintendent, W. C. Lechlider, "will have great influence in clearing up personal records." This arrangement was put in effect at the beginning of the year, and we are informed that for the first three months the results have been found highly satisfactory. The lengths of the runs are 123, 126 and 133 miles. Bulletins were issued after the end of the first month, and at a number of times since, so that the interest in the scheme has been well kept up; and there is hardly a man in the train service on the whole division who has not already been given credit marks for good runs or for making definite suggestions for improvement. A number of men have received enough credit marks to clear their records of certain reprimands.

In through freight train service the number of hours overtime paid for in March was 392, and this was 100 hours less than the number paid for in February. In the overtime statement for March some of the principal items were: Meeting



Nashville, Chattanooga & St. Louis Pacific Type Locomotive

trains 83 hours; taking and leaving cars 57 hours; engine failure 17 hours; trains ahead 16 hours; accidents 7 hours.

There are at this time in service on the Cleveland division about 40 freight train crews.

In a statement for the months of February and March, showing the degree of promptness with which "quick despatch" trains were moved on different divisions of the Baltimore & Ohio, the Cleveland division stands at the head of the list in both months.

THE WABASH REORGANIZATION PLAN

On April 28 the three committees, two representing the first refunding and extension mortgage bonds and one the stockholders, signed the reorganization plan of the Wabash, which provides for the formation of a new company and the raising of $27,720,000 cash to pay off receivers certificates, expenses of the receivership, and furnish working capital for the new company. Kuhn, Loeb & Company, New York, are to form a syndicate to underwrite this reorganization plan.

Under the plan the underlying $62,302,000 bonds will remain undisturbed, interest having been paid on these bonds by the receivers, and the $2,541,000 equipment obligations maturing after December 31, 1915, will remain undisturbed, as will also the debenture mortgage bonds, of which there is but $315,000 outstanding, not controlled by the joint reorganization committees. This makes a total of $65,158,000 undistributed obligations. The new company will issue $46,200,000 5 per cent profit sharing preferred (non-cumulative) stock A; $48,720,000 5 per cent convertible preferred (non-cumulative) stock B; $43,540,000 common stock, and $1,500,000 4 per cent notes due May 1, 1920. This is a total of $139,960,000 new securities, and a grand total of $205,118,000 to be issued or assumed by the new company. The old company had a capitalization of $198,160,000, exclusive of guarantees, floating debt, etc., and before the issue of receivers' certificates or other obligations of the receivers. The present total capitalization of the old company and the obligations incurred by the receivers, excluding, however, undetermined guarantees, is $222,319,377. The total charges, inclusive of receivers' certificates, are at present $5,795,278. Under the reorganization plan the total interest charges would be $3,183,915.

The various classes of securityholders and creditors affected are as follows, exclusive, of course, of the holders of underlying bonds which remain undisturbed:

First Refunding and Extension Mortgage Bondholders.—There is $40,600,000 of these first refunding and extension mortgage bonds outstanding and there is in addition $5,684,000 coupons in default on these bonds. Holders of these bonds under the new plan are to receive payment in cash for their January 1, 1912, interest coupon ($20 per bond, or a total of $812,000) and 120 per cent of the face value of their bonds in new convertible preferred stock B, the total amount being $48,720,000. The price which they pay for this is the surrender of their old bonds and the agreement which they must enter into to underwrite the raising of the needed $27,720,000 cash in the event that the preferred and common stockholders of the old company do not enter into the plan and pay the assessment as provided in the plan. In the event, therefore, that none of the stockholders submitted to the assessment, the first and refunding mortgage bondholder would have to surrender his bond and pay $682.76 per bond in cash, less $20 which he would receive in cash for the coupon due January 1, 1912, making a net cash payment of $662.76, for which he would receive $1,137.93 in new profit sharing preferred stock A, $1,200 in new convertible preferred stock B, and $1,072.41 in new common stock.

Preferred Stockholders.—There is outstanding $39,200,000 of old preferred stock. This stock under the plan is to pay an assessment of $30 per share in cash and give up the old preferred stock certificate with a par value of $100 and receive in exchange $50 par value of new profit sharing preferred stock A, amounting in all to $19,600,000, and $50 in new common stock, amounting in all to $19,600,000.

Common Stockholders.—There is $53,200,000 common stock outstanding on which an assessment of $30 in cash per $100 share is to be paid by the holders thereof and the stock certificates surrendered, and holders are to receive in exchange $50 per share in new profit sharing preferred A stock, a total of $26,600,000, and $45 per share in new common stock, amounting in all to $23,940,000.

Unsecured Creditors.—Creditors of the company are to receive 25 per cent of their claims in new convertible preferred stock B at par and 75 per cent in new common stock at par (the total amount of stock so issuable is not exactly determinable and is not included in any of the total figures for capitalization given above or below).

In the event that the stockholders do not submit to an assessment of $30 per share their equity is apparently wiped out and the burden of reorganization falls on the present holders of the first refunding and extension mortgage bonds. In the event that a part or all of these bondholders do not accept this burden, the only equity which they will have is their pro rata share of the difference between the price which the sale of the property subject to the underlying bonds will bring under foreclosure sale and the sum necessary to pay off the receivers' certificates. The upset price of the property subject to the underlying bonds has been fixed at $21,000,000 by the court and there are $15,950,000 receivers' certificates outstanding beside a judgment for $950,377, known as the Compton judgment. The fact that a syndicate headed by Kuhn, Loeb & Company is to underwrite this plan means that if the stockholders do not pay their assessment, and a part or all of the necessary cash is not raised by the first and extension mortgage bondholders, the underwriting syndicate will raise the cash, paying to dissenting bondholders their proportion of the residue after the sale as mentioned above, and will take the securities which would have been distributed to stockholders and bondholders under the plan had they paid their asessments.

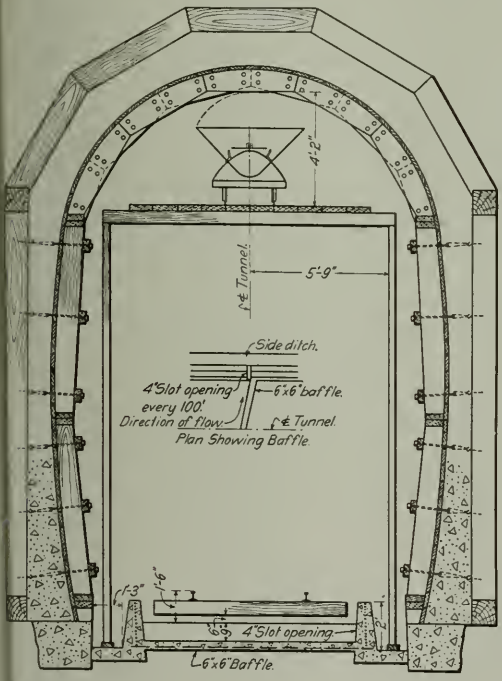
LINING TUNNELS ON THE NEW LEWISTOWN-GREAT FALLS LINE OF THE ST. PAUL

On the extension of the Chicago, Milwaukee & St. Paul from Lewistown, Mont., to Great Falls, described in the *Railway Age Gazette* of April 2, 1915, there are six tunnels aggregating 5,333 ft. in length, all of which are lined with reinforced concrete, except one 250 ft. long. The linings have a minimum overhead thickness of 15 in., and a sidewall thickness of 12 in. The accompanying drawing shows a typical cross section of the lining and the special concrete gutters which were provided to care for the drainage in tunnel No. 1. Tunnels No. 3, 4, 5 and 6 required no special provision for drainage. Wooden forms lined with sheet metal and built in sections 16 ft. long were used. These were wedged up to position at the bottom and after the concrete was poured and set the wedges were removed and rollers substituted to enable the form to be moved to a new position. Each form was allowed to remain in position for 48 hours after the concrete was poured before being moved.

At tunnel No. 1 the concrete plant consisted of three mixers, one being set in front of and above each portal on falsework and one at a shaft, 118 ft. deep, 750 ft. from the west end of the tunnel. The shaft was sunk by the forces which drove the tunnel and was finally lined with concrete for ventilating purposes. Gravel and cement were delivered at the tops of the banks adjacent to the mixers at the portals by wagons and were delivered from these points to the mixers by gravity chutes as required. The mixers discharged the concrete directly into steel dump cars which were operated on a double track placed on a staging. This staging was built as high as possible to permit the operation of trains through the tunnel. The dump cars delivered the concrete to a point opposite the form to be poured and discharged it di-

rectly into that portion of the form below the springing line. For that portion above this the concrete was poured into a shallow box from which it was shoveled into the form. The lagging above the springing line was made in sections about 3 ft. wide, so that it could be removed from the form centers to enable the arched portion of the lining to be placed more readily. The concrete mixer at the shaft discharged into small cars which were lowered in a cage down the shaft to the staging where the concrete was dumped into the delivery cars.

To make sure that all voids adjacent to the segmental timbers were filled it was decided to force cement grout back of the concrete lining. To accomplish this, a plant consisting of a Ransome-Caniff grout mixer, a 40-hp. kerosene burning engine and a 10 in. by 10 in. single-stage air compressor was installed. The grout mixer was mounted on a small push car or set to one side of the track on the ground in the tunnel, as circumstances



Cross Section of Tunnel 1 Showing Side Drains and Method of Placing Concrete Lining

required, and from this the grout was conducted through a 2 in. air hose to 2 in. pipes previously placed in the crown of the arch. The pipes left in the crown of the arch to receive the grout were spaced about 5 ft. center to center and grout was forced into one pipe until it made its appearance at the next pipe but one when the connection of the air hose was made to the next pipe. The air pressure used was 60 lb. to 100 lb., according to the conditions. The plant was operated with five men and an engineer who succeeded in placing 280 batches of 2⅔ cu. ft. of grout each in 10 hours. An average of 230 batches per 10 hours was maintained throughout the five tunnels.

The same general scheme was used for lining all of the other tunnels with some minor differences due to local conditions. Tunnel No. 4, which was affected by an adjacent slide, required retimbering for a distance of 200 ft. at the east end, and to provide against the heavy lateral movement, induced by the slide, the wall timbers when reset were so placed as to provide an additional thickness of concrete of 18 in. In addition to this excavations were made between the wall timbers into which concrete was poured to form stiffener ribs. It was necessary at this tunnel to elevate the gravel for concrete 250 ft., which was accomplished with an inclined industrial track operated by a cable and hoisting engine. The concrete mixing plant at tunnel No. 4 consisted of one mixer mounted at each portal and the mixing of concrete for tunnels No. 3, 5 and 6 was handled with a single mixer at each.

In all of the tunnels excepting tunnel No. 4, which ran 8 cu. yd., the lining averaged 5 cu. yd. per foot of tunnel. At tunnel No. 1, where two 10-hr. shifts were used and three concrete mixers were in operation, as high as 58 ft. of lining was placed in 24 hours, and this rate of progress continued for three weeks toward the end of the work. At the other tunnels, excepting No. 4, 16 ft. of lining was completed every 10 hours with a single shift, and when two shifts were used that rate continued. The average cost of the concrete lining was about $16 per cu. yd.

This work was done by company forces under the general direction of C. F. Loweth, chief engineer, and E. O. Reeder, assistant chief engineer. F. B. Walker was assistant engineer in direct charge of the work.

COST OF TRAIN LIMIT LEGISLATION

A. J. Earling, president of the Chicago, Milwaukee & St. Paul, in a statement at the hearing before the committee on public utilities of the Illinois House of Representatives recently, in reference to proposed train limit legislation, presented a detailed estimate showing that a law limiting the number of cars hauled in one train to 50 would render valueless investments totaling $4,091,753.32, which have been made by his company on its 415 miles of line in the state of Illinois and would involve an increase in freight train miles in the state of 20.08 per cent., equivalent to an additional operating annual cost of $441,155.04. The investments consist of three items: expenditures made for improvements in the line to permit the hauling of heavier trains, the excess cost of locomotives having greater hauling capacity, and the increased cost of freight cars designed to be handled in longer trains.

For the purpose of this estimate the improvements in line only on the Chicago & Council Bluffs division were considered. These improvements are of five kinds: (1) increase in standards of track construction, (2) extensions of yard and passing tracks, (3) strengthening of permanent bridges, (4) increase in size of turntables, engine houses and other facilities, and (5) reduction in grades. Under the first head it was assumed that to haul the present business with lighter engines the same track mileage would be needed, but that the standards could be placed on a basis of 75-lb. rails, lighter fastenings, less ballast and fewer ties. The difference between the cost of the present track structure and the lighter track amounts to $589,950 for the 146 miles of double-track line considered. The estimated cost of yard and side tracks in excess of the lengths required for 50-car trains amounts to $1,056,200. In estimating the value of these extensions the cost of the necessary grading, track structure and right of way was included.

Under present operating conditions all structures are designed for Cooper's E-50 loading. If lighter locomotives hauling 50-car trains were in service, these bridges could be designed to carry not greater than Cooper's E-36 loading. As the ratio of the steel in structures for an E-36 loading and for an E-50 loading is about 0.8, the estimated excess investment is based on 0.2 of the cost of the steel work now in place and 25 per cent of the cost of the substructures, which could be smaller and lighter if they carried lighter structures. The reproduction cost of the present Mississippi river bridge at Savannah is estimated at $331,000 and as the original structure, built in 1880 for a lighter loading, cost approximately $225,000, one-half of the difference, or $53,000, is considered chargeable to the C. & C. B. division in

Illinois, and is included in the estimate of the excess cost of heavy bridges which totals $342,600.

It was assumed that on account of the large equipment now operated, the size of water stations, clinker pits and coaling stations has been increased 25 per cent as compared with the initial construction. The original light equipment required a 56-ft. turntable while at present a 90-ft. one is being used, while during the same time the depth of engine houses has been increased from 70 ft. to 96 ft. It was assumed in making the estimates that the ratio of cost of the engine houses is directly proportional to the length of the stall, the increase amounting therefore to about 30 per cent. In addition to this the present locomotives require more expensive facilities than the earlier light engines, it being assumed that 10 per cent of the cost of these facilities represents the additional investment. The total estimate for the item of buildings is $207,600.

It is a difficult matter to determine the exact investment for grade reductions and changes of line, largely on account of the early cost-keeping methods. The total figure used, $546,150, was obtained from an early estimate by the chief engineer, with allowances for other grade reductions made in changes of line, an estimate of the cost of certain items such as freight on material paid to foreign companies, transportation of men over company lines, engineering and legal expenses, etc., and the expenditures made by the operating department to raise sags, widen banks and cuts.

The excess cost of the locomotives which have been purchased to handle heavier trains, assignable to the state of Illinois on the basis of locomotive mileage, is estimated at $742,011.32. This figure was secured by determining the average cost of all engines purchased between July 1, 1899, and June 30, 1907, and a similar figure for the engines purchased between July 1, 1907, and June 30, 1914. The difference between these figures, amounting to $4,463.32 is taken as the excess paid for each locomotive during the latter period to secure greater power. This rate applied to the number of engines purchased during that time gives the total excess investment for the system, from which the portion chargeable to Illinois is secured.

In order to arrive at the cost of properly equipping freight cars to be handled in long trains, a detailed statement was prepared showing the cost of all freight equipment cars, including cabooses, that have been built with metal draft arms, with steel center sills, and with steel underframes, also cars equipped with friction draft gears, and for each car an estimate was made of the investment which would have been necessary if the car had not been equipped with these improvements. The difference between these figures applied to the total number of cars showed an excess investment of $5,043,541 for the system, of which $607,242 is chargeable to Illinois on the basis of freight car mileage in that state.

The estimated cost of operating additional trains if a 50-car limit bill was passed, was prepared as follows: It was assumed that all cars exceeding 50 in trains operated on the present basis would have to be made up into new trains moving between the same two points daily, except that for each particular run not to exceed 10 cars daily could be absorbed in trains now operating with less than 50 cars or could be held over for the same run the following day. In other words, it was assumed that all of the traffic moving on a particular day would have to move on that same day if this bill was passed. If, for example, four trains running between Chicago and Savannah handled 63 cars each on a certain day, there would, under the new system, necessarily be five trains each with 50 cars, the two additional cars being held over until the following day. If, however, there were four trains run that day between Chicago and Savannah, each with 68 cars, it was assumed that it would be necessary under the proposed law to run six trains that day, five with 50 cars and one with 22 cars. The estimates were prepared on two assumptions; first, that all trains would run between their present destinations with 50 cars and the other that they would be stopped at the state line and there made up into trains of the maximum length which can be hauled on the division. Under these assumptions, it was shown that 416,184 and 292,815 additional train miles, respectively, would be required. On the basis of $1.06 for each additional train mile this would involve an annual additional operating cost of $441,155.04, or $310,383.90, respectively. The first figure representing increase in train mileage is 20.08 per cent of the total train mileage in the state at present.

THE GOLDEN RULE APPLIED TO FREIGHT CLASSIFICATION

The following is taken from The Houghton Line, a trade publication of E. F. Houghton & Co., Philadelphia:

I remember once our sales department came to me and asked me to represent them before the Southern Freight Classification Committee, in a protest against what our folks considered was an unjust classification. I asked for the facts and arguments. They gave them to me. I read them over, and I said: "I don't see any argument in here which would influence me if I were a railroad man."

A railroad man is working for the railroad. It is the railroad's duty to serve the public, but it is every railroad man's duty to remember that the public are also his stockholders. I asked them what argument I could give the railroad that would be worth while from the railroad man's idea. They could furnish me with no such argument, and I refused to appear before the committee.

The next year, when the Classification Committee again met at Atlantic City, our folks came to me with what they supposed was a terrible grievance. We had lost all of our trade because of the unjust classification, and the people who formerly bought from us were buying tallow locally; not that the tallow was better, but it was so much cheaper when you took into consideration the excessive freight charges. And I said to them: "Here is an argument for the railroad.

"The railroad has lost business. They collect no freight on the local tallow at all. They are mutually interested with us in a lower classification. They can benefit their stockholders by such a classification." And forthwith I appeared before the committee at Atlantic City, and the committee being composed of railroad men—good railroad men—wise railroad men—saw the point at once. They didn't detain me 10 minutes, and the request was granted.

But while I was only 10 minutes doing my little turn before the committee, I sat in that committee room pretty nearly three hours waiting for my case to be called, and I was impressed and amazed at the general attitude of every man who had a case before the committee. Each one was protesting against an individual injustice to himself. He wanted the railroad to do something which would enable him as an individual to beat out his competitors, which would be to his personal individual advantage, just as if the railroads existed for the personal advantage of any individual concern. Not one single argument did I hear which presented to these railroad men some advantages for the railroad. It is as if a man would come to you and want to buy goods on which he knew you were going to lose money, merely that he might make more for himself.

And that is the general attitude of the public towards public service corporations in general and railroads in particular.

Women as Railway Porters in England.—The Great Central Railway of England is making experiments to see how far women can be employed as railway porters to set free men of military age. At present two women are being employed at Marylebone in this capacity. The experiment is the result of suggestions from the railway executive committee, and it is expected that other railways will follow the Great Central's example.

General News Department

In Pennsylvania the bill before the legislature to repeal the "full crew law" has been passed by the lower House, and in the Senate has been reported out by the committee, by a vote of seven to six.

The United States civil service commission will receive applications until June 8 for the position of examiner of accounts for the division of valuation of the Interstate Commerce Commission; salary from $2,220 to $3,000 yearly.

A press despatch from Seward, Alaska, reports that on Thursday, April 29, the first spike on the new government railroad was driven by Martha White, who was the first white child born in that region. The engineering commission in charge of the construction of the railroad has issued notices discouraging men looking for work; but very few are to be employed this season.

The new freight terminal of the St. Louis Southwestern, situated at the foot of East Fifth street, Fort Worth, Tex., was opened on May 1. The office building is two stories high and 40 ft. square, and is built of reinforced concrete and brick. The freight warehouse is 420 ft. long, has three scales, has creosoted plank flooring and 27 receiving and delivering doors. The entire building is under tile roofing.

Dr. F. H. Newell, consulting engineer of the United States Reclamation Service, has been appointed professor of civil engineering at the University of Illinois, effective May 1, succeeding Prof. Ira O. Baker, who has resigned after 40 years of service. Prof. Baker tendered his resignation over a year ago, but has held the position pending the selection of a successor. He will probably continue to be connected with the department.

Special Train to Atlantic City Mechanical Conventions

The Pennsylvania Lines have announced that for the accommodation of those who will attend the conventions of the Master Mechanics' and Master Car Builders' Associations at Atlantic City next month, a special train will be provided, leaving Chicago at 5:30 p. m. on Monday, June 7, and arriving at Atlantic City about 5 p. m. the following day. The summer tourist fare will be $31.15 for the round trip, tickets good to return within 30 days, with an extra fare of $4.

Air Brake Law More Rigid

In the United States Circuit Court of Appeals at Richmond, Va., May 4, the judges affirmed unanimously a decision of the District Court, holding it unlawful for a railroad to require the use of hand brakes to control the speed of trains while on the road; that is to say, presumably, at all places where the law requires the train to be equipped with air brakes in condition for use. The contention of the road was that, with long trains on descending grades, the use of the hand brakes, to supplement the air brakes, was necessary to safety. The court held, in substance, that excepting in extraordinary emergency the use of the hand brakes in such a situation is contrary to the air-brake law.

National Transcontinental Road to Be Opened

The Canadian Government announces that in consequence of the declination of the Grand Trunk Pacific Railway to take a lease of the new government railroad, the government itself will at once proceed to put the line in operation from Moncton, N. B., to Winnipeg, Man. At the same time the government will take over and operate the Lake Superior division of the Grand Trunk Pacific, which is the branch of the National extending to Fort William. The officers of the government railway system, now operating the Intercolonial, will take charge of the operations on the new line. Between Winnipeg and Fort William, where the Grand Trunk Pacific has been running trains for some months, the employees will be taken into the government service. It appears that trains have been run, by or in behalf of the contractors on about 300 miles of the line east and west of Cochrane. Cochrane is at the junction of the Temiskaming & Northern Ontario, about 500 miles north of Toronto. The government has for several months been running trains three times a week on the National between Moncton and Levis, opposite Quebec, about 466 miles.

Railroad Laws in New Jersey

In New Jersey, as in New York, the interests opposed to the repeal of the excess crew law succeeded in preventing repeal. Mr. Stevens, of Cape May, had introduced two bills, one to repeal the law now on the statute books, and the other to specifically give authority to the public utility commissioners to decide as to the number of men required on trains; but neither bill ever came up for discussion.

Other railroad legislation played but a small part in the sessions of the legislature. There are six new statutes bearing on railroad interests, but none of them is of great importance.

Governor Fielder vetoed the Pierce grade crossing bill, which passed both houses, a comprehensive law being already on the statute books. This existing law leaves the elimination of grade crossings entirely in the hands of the Board of Public Utility Commissioners. The Pierce bill proposed the elimination of one crossing annually for each thirty miles of railroad. No attempt was made in the Senate to pass the Pierce bill over the veto.

The new laws this year are:

Chapter 350, authorizing first class cities to operate connecting railroads.

Chapter 402, providing for a penalty of $1,000 for railroads refusing to honor passes held by State officers.

Chapter 401 allows a new railroad to take over a line already in existence.

Chapter 57 defines the powers of railroads and municipalities in the adjustment of costs for grade crossing changes.

Chapter 408 gives free passes to members of new boards created this year.

Chapter 404 regulates the construction of physical connections between railroads, the Utilities Commission being clothed with power to require the establishment of connections.

Opening of the Van Buren Bridge

The new bridge of the Van Buren Bridge Company across the St. John river, connecting the Bangor & Aroostook Railroad in Maine with the International Railway in New Brunswick, was opened on May 1 in the presence of a large number of visitors, including officers of New England and Canadian railroads and members of the American Congress and the Canadian Parliament. This bridge, a riveted lattice, consisting of five spans, each 160 ft. long, was begun only last September, and a large part of the work has been done while the temperature was around zero, and at times much lower. To build the concrete piers under these conditions, housings were used around each pier, and by using steam pipes and salamanders, the concrete was successfully made in spite of the low temperatures. The cantilever method of erection was used, thus avoiding risk of interruption of the work by the breaking up of the ice in the river.

The president of the Van Buren Bridge Company is P. R. Todd, president of the Bangor & Aroostook Railroad; consulting engineer, W. J. Wilgus, of New York City; resident engineer, T. A. Lang. The railroad of the Van Buren Bridge Company is 1.2 miles long, Van Buren, Me., to St. Leonards, N. B. On the Canadian side it crosses the National Transcontinental and a branch of the Canadian Pacific, a single interlocking plant (electric) serving for both of these crossings.

By the opening of this route the all-rail distance from a large part of New Brunswick and Quebec to Southern New England is shortened about 200 miles.

The contractors for the substructure were: Cyr Brothers, of

Waterville, Maine, and for the bridge, the Dominion Bridge Company, Limited, of Montreal. Hill & Hammond, of Woodstock, N. B., were contractors for the roadbed, track-laying, ballasting, fencing, and telephone line, and the General Railway Signal Company of Canada, Limited, of Montreal, for the interlocking plant.

Industrial Relations Commission at Washington

The Federal Industrial Relations Commission resumed hearings in Washington, D. C., on May 4. The inquiry opened with H. B. Perham, president of the Order of Railway Telegraphers, as the first witness, who declared that the Pennsylvania Railroad oppressed its employees. He was followed by Robert T. Lincoln, chairman of the board of directors of the Pullman Company, who was questioned regarding conditions of employment of porters and conductors.

Mr. Perham said that the only organizations of employees recognized by the Pennsylvania were those of the engineers, firemen, conductors and brakemen.

"It has discriminated," he said, "against the railroad telegraphers who belong to the organization by discharging them, and denying them promotion. It has pursued the same tactics against the organized shopmen and broke up the organization of the clerks by discharging all those who would not withdraw from the unions."

Foremen and minor officials had bluntly informed men that they were discharged "because of their labor activity," though there was some technical charge assigned for their dismissal.

The road's police system, he said, cost about $800,000 a year. He gave instances of alleged espionage and arrests of union men, and charged that the strike in May, 1911, was precipitated when officers of the company sought to compel 1,000 employees to withdraw from labor unions. He said that the Voluntary Relief Association of the railroad company was not voluntary. Employees, in joining, signed an agreement to forfeit all their accumulation of premiums if they went out of the service of the company. Last year, he said, 4,141 employees, who had thus paid $3,707,080, left the employ of the company and lost all they had paid in.

Mr. Lincoln's testimony in large measure covered the same ground as that covered in the hearings at Chicago and reported in the *Railway Age Gazette* April 9, page 786. Asked if he thought the salary of $27.50 now paid a negro porter as a minimum is enough to maintain his family in comfort and decency, he replied, "Absolutely not." The Pullman Company, he said, was not opposed to organized labor, provided it permitted the company to engage men outside the union. The way for men to negotiate with employers about wages or working conditions, in his opinion, was to appoint committees to interview officers. Asked if he thought paying porters $60 a month and posting notices in all cars requesting that tipping be abolished would have any effect, Mr. Lincoln said he thought tipping would continue.

Mr. Lincoln said that the Pullman Company employed from 6,000 to 6,500 porters. There were 45 district superintendents, and these places were filled from the ranks of the conductors.

The chairman of the commission asked Mr. Lincoln if it were true that the employees had made complaints of their condition and treatment and that their petitions never reached the board of directors. Mr. Lincoln said he thought "it would be rather hard to get the board together for such a purpose."

Mr. Lincoln said that the custom of paying tips was not a nice one. "But it is an old custom and one to which the colored race is accustomed. The public seems to be fond of it. The little services a porter can do seem to justify the tip."

"Do you know that there is a widespread criticism of your company on account of it?" asked Mr. Walsh.

"No, I never heard of such a suggestion," replied Mr. Lincoln.

Asked about losses of linen and the system of penalties to restrain this loss, Mr. Lincoln said that two-thirds of the whole number of employees of the company were paid the good service bonus last year, so that not many could have been punished for loss of linen. The fines for linen lost amounted to $60,000 last year, but the actual losses were far greater than that. Men were not fined a month's salary for their delinquencies and no men had been discharged, as had been reported, for trying to organize unions.

Mr. Lincoln described the relief association maintained by the employees, and said that the Pullman Company underwrote the mutual assessment plan of death payments. The company had no direct plan for relief of employees in sickness or in case of accident.

Solicitor Daniels of the Pullman Company testified concerning legal matters. Where a Pullman employee was hurt in a railroad accident, a suit at law against the operating company was the regular course pursued. He told of a Pullman employee who got a judgment against the Pennsylvania Railroad recently for $14,000 for injury in an accident.

"And we had to pay the judgment," added Mr. Daniels. The Pullman Company is forced by many of its contracts to settle all such judgments for injury by accidents. "The strongs roads," said Mr. Daniels, "compel us to do this and the weak ones can't."

On Wednesday, W. W. Atterbury, vice-president of the Pennsylvania Railroad, testified at length. He presented a prepared statement which explained the policy of the road and rehearsed at length the dealings of the company with the telegraphers' brotherhood and with the federal mediation board in 1909 and 1912; he replied in detail to charges of unfairness to organized labor. He said that the company did not oppose organization of its employees, but did insist upon the "open shop" principle and opposed unions with affiliations which might bring on sympathetic strikes

"We would welcome closer relations with our employees," said Mr Atterbury, "if it could be brought about under proper auspices. We would more than welcome an organization of all Pennsylvania Railroad employees among themselves without entangling outside alliances. Such an organization undoubtedly would be good for the railroad, and anything that is good for the railroad is good for the employees. Our position is identical with that of the federal government respecting the postal railway employees. The government forbids these employees joining an organization that might call them out of their work through sympathy."

"Is the question asked whether a man is a member of a union?"

"No. We never ask the question in employing a man unless he begins to bother us. We are acting on the defensive and not the offensive."

"Is the relation between labor and the employer getting better?"

"I should say so. In the last ten years there has developed a new code. It is different from that of twenty years ago. In the Pennsylvania Railroad all of us come up from the ranks. We are one big family, and we try to avoid outside interference with our affairs. I should be very much surprised if we ever see a great railroad strike again. Industrial conditions are getting better. Labor and employer are closer in touch."

Mr. Atterbury said he was not opposed to many features of the Canadian arbitration law which requires the giving of 30 days' notice before a strike can be declared, and allows the government to present both sides of the dispute.

Concerning the manner in which the railroad kept in touch with sentiment among its men, Mr. Atterbury said:

"Confidential investigators, in no way connected with the railroad's police department, are employed to ascertain and report the conduct and sentiment of employees and the movements, actions and plans of labor leaders and organizers. These men are not empowered to make arrests.

"Labor leaders, with control of the workmen through membership in labor organizations, can cause employees to leave their work, resulting in a strike and interfering with train operations, without giving any previous warning. As the railroad company has the responsibility of maintaining adequate train service and is subject to fines by the government for delays to the mails, it must keep itself informed of the movements of labor agitators. It is necessary that trained men be employed to conduct these investigations.

"Confidential investigators are also employed to identify themselves as employees in various departments to secure correct information as to any efforts of labor organizers among employees which tend to destroy the harmony and friendly feeling which for many years have generally existed between this company and its employees. Investigators are also employed to learn the grievances, if any, of the employees which have been reported to labor organizations for adjustment, in order that such satisfactory settlement as conditions will permit may be made, and to keep the officers fully informed of conditions which they

should know, to permit them properly to manage the property. . . .

"We know what is going on. There are volunteers who give us information. There are about 400 in the police department, and we are prepared for anything that might happen. We do not leave anything undone to keep our trains running that is legal and lawful."

In answering the question whether it was possible for the state to give police protection Mr. Atterbury said:

"In theory, yes, but in practice, no. There is so much opposition to the state protecting corporations that we have found it necessary to look after protection for ourselves.

"We have the finest body of men in the United States in Pennsylvania, the state constabulary. Yet every labor organization is bitterly opposed to its enlargement. It is a dream of the millennium to expect police protection from the states, with all the different political winds blowing through the legislature. If the states should properly protect us it would be an ideal situation. We ought not to attend to the police duty of the states, but we are forced to do it."

American Society for Testing Materials

The eighteenth annual meeting of the American Society for Testing Materials will be held at the Hotel Traymore, Atlantic City, N. J., June 22 to 26.

At the first session meeting, on Tuesday, June 22, at 11 a. m., opening business will be conducted and reports will be received from the committees on Standard Specifications for Coal, and on Standard Specifications for Coke.

At the second session, on Tuesday, at 3 p. m., reports will be received from the committees on Standard Specifications for Wrought Iron; Standard Specifications for Cast Iron and Finished Castings; Corrosion of Iron and Steel, and Standard Tests of Insulating Materials.

The subjects assigned for the remaining sessions are as follows:

Third, Tuesday, June 22, 8 p. m., Non-Ferrous Metals.

Fourth, Wednesday, June 23, 10 a. m., Steel.

Fifth, Wednesday, June 23, 8 p. m., Heat Treatment of Steel.

Sixth, Thursday, June 24, 10 a. m., Testing Apparatus. Among the four papers to be presented at this session will be one by C. D. Young, engineer of tests, of the Pennsylvania Railroad, entitled: The New Physical and Chemical Laboratory of the Pennsylvania Railroad at Altoona.

Seventh, Thursday, June 24, 3 p. m., Cement and Concrete.

Eighth, Friday, June 25, 10 a. m., Ceramics, Gypsum and Lime.

Ninth, Friday, June 25, 3 p. m., Preservative Coatings and Lubricants.

Tenth, Saturday, June 26, 10 a. m., Road Materials, Timber and Rubber.

Recreation periods are provided for Wednesday afternoon and Friday evening, and a smoker is announced for Thursday evening. Special rates have been secured in the hotel for the members of the society and their guests. In addition to the reports of the standing committees and the presentation of monographs on the special subjects, the convention will consider four proposed amendments to the by-laws affecting membership and the adoption of standards.

Air Brake Convention

The twenty-second annual convention of the Air Brake Association was held at the Hotel Sherman, Chicago, May 4 to 7, L. H. Albers, New York Central Lines, presiding. The convention was opened with prayer by Rev. Martin J. Magor. Robert Quayle, general superintendent of motive power and car department, Chicago & North Western, welcomed the association to the city with an inspiring address, calling particular attention to the opportunities of the air brake men in assisting their respective roads in performing their service to the public. He complimented the association on the work it has done to improve conditions in train operation and clearly pointed out the importance of the work of the air brake expert.

President Albers in his address laid particular stress on the standardization of air brake equipment and economical practices in the operation and maintenance of the air brake, believing that if more care was exerted in the cleaning of triple valves, more time could be given between the periodic cleaning which would show a substantial saving.

During the opening exercises W. J. Hatch, the retiring president, was presented with the past president's badge, and S. J. Kidder was given a loving cup as a token of the honor and esteem in which he was held by the association. A letter was also read to the association from F. W. Brazier, superintendent of rolling stock, New York Central Lines, who was invited to address the association, but was unable to be present.

The secretary reported a total membership of 1,119 members and a cash balance in the treasury of $427.91, as of May 1, 1915. A complete report of the convention will be published in next week's issue.

The following is a list of exhibitors at the convention:

American Steel Foundries, Chicago.—Brake beams. Represented by W. E. Fowler, Jr., and P. O. Johnson.

Ashton Valve Company, The, Boston, Mass.—Gages, testers, wheel press recorders and valves. Represented by J. W. Motherwell, H. O. Fettinger and J. F. Gettrust.

Barco Brass & Joint Company, Chicago.—Barco flexible joints, metallic car connections. Represented by F. N. Bard, C. L. Mellor and L. W. Millar.

Crane Company, Chicago. Air brake fittings. Represented by Frank D. Finn, F. W. Venton and John Jordan.

Detroit Lubricator Company, Detroit, Mich.—Lubricators. Represented by A. D. Homard and A. G. Machesney.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Flake graphite. Represented by Mr. Snyder.

Garlock Packing Company, Palmyra, N. Y.—Fiber packing. Represented by T. P. Dunham and J. P. Landreth.

Green, Tweed & Co., New York.—"Palmetto" packing. Represented by F. M. Thomson and V. B. Nickerson.

Johns-Manville Company, H. W., New York.—Packing expander rings and slack adjuster. Represented by J. E. Meek, G. Christenson and P. C. Jacobs.

N. Y. & N. J. Lubricant Company, New York.—Non-fluid oil, brake cylinder lubricant, N. F. O. triple valve lubricant. Represented by J. H. Bennis and F. E. Sparks.

American Railway Association

General Secretary W. F. Allen announces that the spring meeting of the American Railway Association will be held at The Biltmore, Madison and Vanderbilt avenues, Forty-third and Forty-fourth streets, New York City, on Wednesday, May 19, beginning at 11 a. m. Reports will be presented by the committees on transportation, on maintenance, on relations between railroads, on the safe transportation of explosives and other dangerous articles, on electrical working and on legal and traffic relations. The election of a second vice-president will take place at this meeting, and also of members of several committees.

American Association of Railway Surgeons

At the annual meeting of the American Association of Railway Surgeons held in Chicago on Monday, Dr. J. P. Kasper, chief surgeon of the Atchison, Topeka & Santa Fe at Topeka, Kan., was elected president; Dr. J. M. Burke, of Petersburg, Va., was elected vice-president, and Dr. L. J. Mitchell, of Chicago, was re-elected secretary and treasurer.

Association of American Railway Accounting Officers

R. A. White, general auditor of the New York Central Railroad, has been elected president of the Association of American Railway Accounting Officers, and L. A. Robinson, comptroller of the Chicago & North Western, first vice-president; J. A. Taylor, comptroller of the Central of New Jersey, second vice-president, and E. R. Woodson, secretary, have been re-elected.

Central Railway Club

At the regular meeting of the Central Railway Club to be held at the Statler Hotel, Buffalo, N. Y., on Friday, May 14, S. S. Riegel, mechanical engineer of the Delaware, Lackawanna & Western, will present a paper entitled: The Locomotive of Recent Developments.

New England Railroad Club

At the regular meeting of the New England Railroad Club to be held at the New American House, Boston, Mass., on Tuesday, May 11, Henry Cave, president of the Cave Welding Company, will present a paper on Recent Developments in the Oxy-Acetylene Process, which will be illustrated with stereopticon views.

The American Society of Mechanical Engineers

At the meeting of the American Society of Mechanical Engineers to be held at the Engineering Societies building in New York, on Tuesday, May 11, a paper will be presented by John Calder, entitled Metal Spray Processes in Engineering and art.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

American Association of Dining Car Superintendents.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.

American Association of Railroad Superintendents.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

American Electric Railway Association.—E. B. Burritt, 29 W. 39th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

American Electric Railway Manufacturers' Association.—H. G. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

American Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Railway Tool Foremen's Association.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

American Wood Preservers' Association.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.

Association of American Railway Accounting Officers.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C.

Association of Manufacturers of Chilled Car Wheels.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Bridge and Building Supply Men's Association.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Tuesday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

International Railway General Foremen's Association.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

Maintenance of Way and Master Painters' Association of the United States and Canada.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Hotel Sherman, Chicago, Ill.

Master Car and Locomotive Painters' Association of the United States and Canada.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

National Railway Appliances Association.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March, 1916, Chicago.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Offices.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railroad Men's Improvement Society.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

Railway Business Association.—Frank W. Noxon, 30 Church St., New York. Annual meeting, Decemher, 1915, Waldorf-Astoria Hotel, New York.

Railway Club of Pittsburgh.—J. E. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Menadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Fire Protection Association.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

Railway Signal Association.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Signal Appliance Association.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Society of Railway Financial Officers.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, September, 1915.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

Traffic Club of St. Louis.—A. P. Versen, Mercantile Library Bldgs., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Kansas City, Mexico & Orient	740	$169,176	$27,000	$206,236	$38,472	$36,316	$8,488	$82,722	.....	$9,925	$175,923	$30,313	$8,961	$21,348	.....
Oahu Railway & Land Co.	109	71,289	19,086	96,664	8,085	9,099	682	21,562	.....	3,964	43,391	53,273	7,334	45,939	$9,347
Pittsburgh, Shawmut & Northern	294	132,028	8,612	142,141	13,420	36,801	2,419	48,917	.....	4,262	105,818	36,323	1,597	34,726	—15,810

MONTH OF MARCH, 1915

Alabama & Vicksburg	143	$83,204	$26,579	$120,122	$18,105	$30,617	$3,690	$47,243	$1,882	$5,529	$107,247	$12,875	$8,600	$4,275	$5,176
Alabama Great Southern	309	293,982	72,791	398,463	45,669	81,680	12,475	154,757	2,589	10,451	301,350	97,114	15,172	81,915	18,393
Ann Arbor	294	129,541	37,565	179,353	13,273	27,408	5,784	75,481	268	7,186	129,399	49,954	10,580	39,328	6,948
Arizona Eastern	367	171,803	29,006	211,794	24,212	20,946	2,047	50,714	1,112	10,740	109,772	102,022	12,460	89,334	1,887
Atchison, Topeka & Santa Fe	8,514	5,381,641	1,928,279	7,988,692	901,014	1,439,628	204,851	2,383,191	.....	155,528	5,083,689	2,905,003	407,534	2,496,504	—293,350
Atlanta & West Point	93	55,405	32,927	102,476	12,377	20,091	4,921	34,229	1,844	3,980	77,111	25,365	5,525	19,789	—244
Atlanta, Birmingham & Atlantic	639	195,959	29,546	245,089	39,744	45,339	11,093	99,120	.....	11,247	206,543	38,546	13,100	25,445	—25,860
Atlantic & St. Lawrence	167	122,500	21,260	158,198	15,348	23,615	4,325	76,540	.....	3,674	123,501	34,697	10,800	23,897	—6,513
Atlantic Coast Lines	4,701	2,258,379	772,888	3,302,789	362,474	440,251	48,468	1,006,441	15,453	73,318	1,944,414	1,358,376	138,000	1,220,238	—16,834
Baltimore & Ohio—System	4,516	5,803,992	983,977	7,352,832	611,426	1,054,494	168,510	2,671,373	43,435	179,904	4,729,089	2,623,743	281,234	2,340,391	279,117
Bangor & Aroostook	631	369,875	47,802	434,008	39,998	57,549	2,724	104,148	1,965	9,878	216,203	217,805	12,525	205,272	2,652
Belt Ry. Co. of Chicago	24	.....	.....	266,977	11,843	30,562	688	98,191	.....	5,930	147,215	119,762	11,690	108,073	—7,186
Buffalo & Susquehanna R. R. Corporation	253	99,824	6,197	108,859	18,968	42,424	1,050	34,279	.....	6,005	102,728	6,132	2,600	3,532	—19,558
Central of Georgia	1,924	797,449	204,838	1,110,235	137,689	170,281	31,799	357,105	1,743	37,894	735,192	375,043	50,287	323,615	—22,530
Central New England	304	295,513	33,385	344,945	35,751	32,316	1,526	98,170	.....	4,089	171,627	173,317	16,000	157,316	76,337
Chesapeake & Ohio Lines	2,372	2,640,588	421,248	3,270,842	347,785	677,127	51,871	1,127,894	17,983	67,940	2,273,284	997,558	115,009	882,424	14,803
Chicago & Alton	1,033	769,744	283,789	1,159,552	122,555	286,306	39,063	463,127	9,638	32,707	953,395	206,157	43,021	162,869	117,956
Chicago & Eastern Illinois	1,282	864,093	205,411	1,168,884	138,528	237,330	26,318	442,512	9,279	36,800	890,659	278,225	53,600	224,383	—51,954
Chicago & North Western	8,108	4,024,008	1,510,717	6,161,048	566,573	977,125	119,154	2,458,810	45,221	146,434	4,312,887	1,848,161	375,000	1,472,195	—459,166
Chicago, Burlington & Quincy	9,367	4,684,577	1,437,939	6,856,419	810,721	1,296,154	135,208	2,374,765	96,394	175,367	4,888,609	1,967,810	331,048	1,636,762	—714,222
Chicago Great Western	1,429	770,044	234,547	1,098,573	90,448	202,194	44,698	433,415	7,443	26,725	804,752	293,822	47,150	246,134	—43,088
Chicago, Indianapolis & Louisville	618	378,802	134,430	556,722	50,431	75,862	19,354	198,626	220	15,128	359,619	197,103	26,895	170,140	61,863
Chicago, Milwaukee & St. Paul	10,071	5,401,673	1,407,411	7,544,390	519,357	1,096,910	133,450	2,839,677	51,879	160,338	4,678,016	2,866,374	386,466	2,473,753	—310,906
Chicago, Peoria & St. Louis	255	103,517	19,136	130,015	19,512	27,234	6,083	56,928	.....	5,165	114,922	15,094	5,700	9,394	2,367
Chicago, Rock Island & Gulf	477	159,055	41,301	219,736	19,958	22,920	10,372	97,704	2,331	8,711	161,995	57,741	8,096	49,536	28,115
Chicago, Rock Island & Pacific	7,852	3,592,802	1,329,196	5,288,860	500,092	843,827	149,306	2,198,264	42,294	140,858	3,873,494	1,415,366	273,757	1,141,201	—113,689
Chicago, St. Paul, Minneapolis & Omaha	1,753	1,010,860	365,704	1,478,044	101,023	220,267	28,299	579,376	13,791	35,894	978,518	499,526	79,129	420,237	48,759
Cincinnati, Hamilton & Dayton	1,003	525,413	103,540	701,586	134,035	183,374	17,347	324,534	3,054	18,490	679,703	21,884	34,613	—12,875	2,326
Cincinnati, New Orleans & Tex. Pac	337	621,906	118,982	784,101	72,966	161,940	26,049	251,230	8,134	18,712	539,033	245,068	31,000	213,983	—11,810
Cincinnati Northern	246	96,668	14,359	115,640	20,119	27,089	2,915	41,663	.....	3,800	95,585	20,055	5,500	14,549	15,137
Cleveland, Cincinnati, Chic. & St. Louis	2,381	2,047,268	616,905	2,916,739	300,648	652,301	77,575	1,139,719	21,807	64,641	2,246,726	670,013	128,000	540,910	332,345
Colorado Midland	338	91,041	8,714	110,133	16,052	34,194	7,748	47,584	682	5,743	112,003	—1,869	10,000	—11,869	—173
Colorado & Southern	1,089	466,355	81,475	594,764	61,094	150,046	8,646	191,320	3,390	20,694	435,190	159,574	35,600	123,973	—14,173
Cumberland Valley	164	179,138	49,364	240,719	32,427	25,548	6,612	80,032	875	9,313	154,807	85,912	5,794	80,117	12,095
Delaware, Lackawanna & Western	959	2,207,627	586,774	3,149,484	277,558	592,294	76,084	1,137,627	26,001	76,289	2,151,928	997,557	186,600	810,794	320,356
Detroit & Mackinac	400	70,434	22,094	98,292	8,355	18,154	1,783	33,044	.....	2,653	63,989	34,303	7,503	26,800	—8,100
Detroit, Grand Haven & Milwaukee	191	124,000	39,000	189,020	18,757	36,116	6,329	113,190	646	4,890	179,927	9,093	3,360	5,673	—6,930
Duluth & Iron Range	273	74,180	18,381	98,778	28,773	43,972	932	59,203	1,747	7,809	142,436	—43,658	6,633	—50,291	23,445
Duluth, Missabe & Northern	369	44,356	23,652	74,110	27,670	56,198	1,683	56,138	1,680	10,984	154,354	—80,244	3,740	—83,984	110,487
Duluth, South Shore & Atlantic	628	167,887	52,003	235,088	34,031	33,277	7,793	91,669	3,372	10,381	180,324	54,764	16,000	38,762	—20,261
El Paso & Southwestern Co	1,027	530,799	105,206	685,757	97,542	91,037	22,515	176,345	6,065	25,434	418,937	266,820	34,889	231,930	—52,535
Elgin, Joliet & Eastern	776	702,855	2	745,690	71,089	125,800	5,169	210,545	.....	21,073	433,672	312,018	40,890	271,128	—53,424
Florence & Cripple Creek	87	88,742	15,950	106,312	10,020	12,624	2,509	29,226	.....	3,289	67,659	48,653	5,652	43,001	13,395
Florida East Coast	745	285,483	298,724	674,572	61,775	67,785	7,883	170,067	3,757	13,874	321,853	352,719	20,491	332,222	—36,699
Fort Worth & Denver City	454	290,602	89,950	403,936	54,124	76,088	5,762	164,887	1,901	15,371	318,033	85,903	12,621	73,283	26,330
Georgia, Southern & Florida	395	125,006	44,491	190,317	25,784	37,067	6,315	81,397	—279	10,806	161,091	29,226	10,122	19,060	—4,081
Grand Trunk Western	347	427,000	117,000	582,751	49,509	149,411	18,475	276,992	4,757	15,512	514,656	68,095	35,920	32,155	—30,652
Gulf & Ship Island	308	115,370	22,236	146,294	18,022	30,782	7,445	36,268	253	6,673	94,393	51,901	7,935	43,904	10,393
Illinois Central	4,767	3,735,179	979,823	5,103,745	659,259	1,126,755	100,748	1,835,505	28,835	130,801	3,872,332	1,231,414	269,400	960,829	—369,634
Indiana Harbor Belt	110	.....	.....	291,328	20,966	28,260	3,357	127,644	.....	7,948	188,175	103,153	8,080	95,037	—14,990
International & Great Northern	1,159	530,184	115,598	704,097	128,037	165,498	23,785	357,745	2,842	33,071	710,978	—6,880	40,000	—51,252	75,974
Kanawha & Michigan	177	169,159	24,982	200,429	28,779	65,155	3,377	65,345	3	6,186	168,845	31,584	11,060	20,524	—52,527
Kansas City Southern	827	646,226	99,922	812,326	75,593	74,816	25,818	287,869	.....	36,771	496,436	315,890	48,170	267,044	—31,000
Lake Erie & Western	900	398,187	53,725	472,821	61,586	84,042	10,010	192,675	.....	12,955	361,267	111,554	22,000	89,526	1,508
Lehigh & New England	294	170,419	1,178	183,842	26,902	31,015	2,956	49,128	.....	5,913	115,914	67,928	5,104	62,823	—24,534
Lehigh Valley	1,443	2,750,762	262,237	3,232,529	289,796	621,875	81,813	1,243,065	9,489	83,515	2,329,452	903,077	142,500	760,435	251,481
Long Island	398	331,941	486,561	931,456	132,992	127,835	9,088	448,829	6,228	30,697	755,669	175,787	78,014	97,751	34,586
Louisiana & Arkansas	279	131,035	14,824	149,683	22,743	25,237	2,963	40,634	.....	4,261	95,838	53,845	7,500	46,345	3,629
Louisiana Ry. & Navigation Co	350	153,868	24,671	188,592	31,697	19,665	5,688	68,974	.....	6,447	132,471	56,121	11,500	44,621	38,351
Louisville & Nashville	5,034	3,208,279	810,928	4,319,740	794,371	865,684	113,255	1,418,055	20,349	98,718	3,307,852	1,011,888	171,047	839,538	—337,651
Louisville, Henderson & St. Louis	200	77,171	28,684	112,532	24,945	17,627	5,627	36,484	.....	3,180	87,503	25,028	3,800	21,172	5,042
Maine Central	1,210	690,337	227,448	974,216	121,435	153,562	10,190	354,992	1,842	33,223	675,743	298,473	53,080	245,893	53,851
Michigan Central	1,806	1,859,950	634,554	2,763,909	350,953	496,320	55,868	1,139,914	43,321	61,183	2,147,559	616,351	121,000	494,973	—67,497

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Midland Valley	380	$59,948	$30,724	$97,366	$20,959	$18,633	$2,242	$36,855	.....	$4,783	$83,472	$13,893	$4,749	$9,064	$4,888
Minn., St. Paul & Sault Ste. Marie	4,104	1,702,855	398,727	2,252,953	195,517	338,900	55,815	769,047	$12,031	$1,622	1,421,613	831,340	87,435	743,905	—22,780
Missouri & North Arkansas	365	69,640	22,660	99,117	31,595	24,497	2,408	52,986	.....	6,004	117,489	—18,372	6,000	—24,487	—16,386
Missouri, Kansas & Texas System	3,865	2,013,855	574,481	2,784,387	386,249	308,981	54,293	1,042,547	21,343	85,274	1,890,111	894,276	112,584	781,264	382,921
Missouri, Oklahoma & Gulf	334	78,616	15,303	98,406	24,160	22,963	4,276	48,880	111	14,003	114,393	—15,987	5,277	—21,274	—751
Missouri Pacific	3,920	1,604,297	331,794	2,122,003	299,715	448,535	55,988	923,555	6,073	52,820	1,786,685	335,318	98,590	234,653	—105,754
Monongahela	75	105,909	1,855	109,124	19,496	6,411	535	22,598	.....	2,130	51,170	57,954	1,810	56,144	—22,093
Nashville, Chattanooga & St. Louis	1,231	658,191	183,924	923,237	161,286	173,401	51,203	359,772	9,044	32,018	786,700	136,537	26,000	110,259	—106,453
New Orleans & North Eastern	204	235,613	40,342	303,901	31,901	67,695	9,840	110,817	5,565	10,986	236,804	67,097	14,500	52,597	5,882
New Orleans Great Northern	283	100,538	17,881	130,206	17,200	22,570	3,198	190	5,787	190	89,495	40,711	3,169	37,427	—17,271
New Orleans, Mobile & Chicago	403	128,123	19,362	152,913	28,296	17,629	3,844	54,206	Cr. 6	7,398	111,366	41,547	6,386	35,059	—12,867
New Orleans, Texas & Mexico	286	106,194	19,536	131,978	16,900	20,235	4,578	53,393	.....	9,893	104,998	26,980	1,501	25,479	42,191
New York, Chicago & St. Louis	568	838,245	76,150	953,559	92,233	169,034	42,074	462,399	4,447	21,970	792,157	161,402	40,000	121,308	24,415
New York, New Haven & Hartford	2,003	2,736,172	2,033,278	5,351,512	499,850	850,704	35,046	2,013,967	51,867	131,492	3,586,672	1,770,841	190,000	1,578,145	522,014
New York, Ontario & Western	568	452,238	71,887	629,020	63,863	126,215	9,349	278,011	.....	16,971	494,409	134,611	20,000	114,610	17,364
New York, Philadelphia & Norfolk	112	245,985	30,772	296,203	25,737	64,327	4,139	133,501	4,289	10,598	242,590	53,612	9,500	44,088	15,033
Norfolk & Western	2,044	2,969,380	331,168	3,424,121	394,572	655,359	54,002	1,011,351	8,467	66,221	2,181,892	1,242,228	68,000	1,074,087	12,409
Norfolk Southern	900	275,251	64,611	358,712	48,881	48,660	7,043	135,605	69	18,764	259,023	99,689	9,977	89,711	1,820
Northern Pacific	6,497	3,437,903	913,583	4,771,441	429,906	570,807	106,350	1,477,678	68,962	88,670	2,692,384	2,079,056	376,532	1,701,827	362,938
Pennsylvania *Company*	1,757	2,955,947	711,655	4,025,642	479,325	828,982	70,725	1,589,273	30,912	110,126	3,109,343	916,298	256,975	658,789	22,761
Pennsylvania *Railroad*	4,512	10,662,121	2,774,829	14,624,857	2,034,382	3,292,195	192,670	5,669,072	214,021	424,810	11,827,151	2,797,706	633,111	2,161,232	—299,800
Philadelphia, Baltimore & Washington	717	823,208	613,436	1,588,993	234,283	341,230	25,789	707,066	31	56,418	1,364,816	224,177	53,970	170,144	42,298
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	2,205,068	601,945	3,117,130	343,838	653,310	65,198	1,195,031	26,791	80,622	2,364,789	752,341	154,542	597,782	35,489
Rutland	468	151,638	81,868	264,772	28,770	46,579	9,537	109,615	925	6,336	201,761	63,010	16,859	46,151	38,329
St. Joseph & Grand Island	258	75,897	19,932	102,843	18,014	21,620	4,922	49,093	.....	4,946	98,595	4,247	7,620	—3,378	—24,195
St. Louis & San Francisco	4,749	2,453,300	718,048	3,393,720	384,233	534,133	65,854	1,119,913	.....	98,516	2,182,688	1,211,032	108,949	1,100,400	274,756
St. Louis, Brownsville & Mexico	548	131,128	54,543	201,745	32,060	23,548	5,781	65,604	.....	10,579	137,305	64,440	6,500	57,813	—5,103
St. Louis, Iron Mountain & Southern	3,364	1,906,583	381,880	2,478,581	341,178	479,101	65,593	764,644	7,289	70,300	1,728,106	750,475	111,032	637,049	—287,557
St. Louis Merchants' Bridge Terminal	9	.....	186	166,499	17,082	10,403	772	81,824	.....	6,060	116,141	50,359	6,540	43,817	13,625
St. Louis Southwestern	943	468,506	78,375	576,622	53,552	93,380	25,804	167,145	3,006	27,798	370,588	206,033	35,207	170,496	—73,494
St. Louis Southwestern of Texas	811	215,385	55,543	294,537	70,425	68,720	11,606	165,166	674	18,114	314,329	—19,792	15,024	—34,954	57,688
San Antonio & Aransas Pass	724	178,498	60,984	259,427	78,645	56,939	6,448	144,899	.....	12,134	298,982	—39,555	14,077	—53,742	30,717
San Pedro, Los Angeles & Salt Lake	1,132	554,929	215,804	839,992	63,895	106,892	31,531	261,974	18,896	17,669	500,857	339,135	46,025	293,099	112,928
Seaboard	3,101	1,427,276	410,919	2,072,233	221,282	299,201	67,574	702,064	16,517	56,648	1,363,086	709,147	86,014	620,923	—144,803
Southern in Mississippi	281	44,887	19,484	69,668	21,249	9,953	2,860	37,502	.....	3,751	75,316	—5,647	8,375	—14,051	—16,224
Southern Pacific	6,517	4,772,721	2,544,623	8,168,656	820,894	1,247,048	164,435	2,575,171	144,861	228,728	5,138,547	3,030,109	340,848	2,686,208	178,430
Spokane International	163	37,955	10,652	51,193	9,152	4,297	2,154	18,240	3	3,166	37,011	14,182	3,858	10,324	—14,828
Union R. R. of Baltimore	9	111,238	18,021	130,927	16,663	.....	.....	4,429	.....	2,342	23,434	107,492	5,936	101,557	3,580
Union R. R. of Pennsylvania	31	.....	.....	223,008	24,964	81,989	204	125,103	.....	4,335	236,595	—13,587	5,300	—18,887	46,090
Vicksburg, Shreveport & Pacific	171	65,768	27,294	106,115	25,305	27,390	2,674	41,338	1,819	4,981	103,507	2,608	7,100	—4,492	—26,294
Washington Southern	36	36,769	46,349	112,275	16,586	12,397	1,021	42,652	2,201	3,021	77,877	34,398	3,236	31,019	—2,970
West Jersey & Seashore	356	169,780	234,182	442,634	93,527	94,977	11,286	236,459	2,237	14,508	452,994	—10,359	28,464	—38,836	—18,242
Western Maryland	661	661,313	63,611	756,209	96,333	133,298	21,578	260,030	3,540	19,405	534,114	222,095	25,500	196,595	197,199
Western Ry. of Alabama	133	70,600	30,546	111,898	18,738	22,113	5,329	32,532	1,744	4,783	85,239	26,659	5,113	21,525	—8,884
Wheeling & Lake Erie	459	333,470	39,472	410,862	39,600	92,650	11,005	178,065	1,196	13,533	336,048	74,814	31,152	43,661	184,190
Yazoo & Mississippi Valley	1,382	798,694	147,752	998,059	148,073	140,268	17,637	382,721	2,082	26,041	716,519	281,540	51,000	230,225	—20,009

EIGHT MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

*Kansas City, Mexico & Orient	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oahu Railway & Land Co.	109	$614,450	$175,963	$844,631	$82,948	$71,690	$5,217	$172,381	.....	$34,555	$366,791	$477,840	$57,522	$420,318	$28,468
Pittsburgh, Shawmut & Northern	294	1,168,731	84,927	1,269,921	235,278	341,575	13,333	420,908	.....	32,743	1,043,837	226,084	13,013	213,071	5,812

NINE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Alabama & Vicksburg	143	$716,087	$387,448	$1,130,173	$174,869	$284,719	$33,074	$435,286	$24,632	$50,767	$1,003,347	$126,826	$68,986	$57,840	—$151,983
Alabama Great Southern	309	2,459,974	793,426	3,557,836	415,118	863,402	123,276	1,264,028	27,146	83,191	2,754,115	803,721	138,498	665,021	—193,959
Ann Arbor	294	1,216,506	409,530	1,738,266	178,438	240,878	45,018	712,473	3,427	66,697	1,246,932	491,334	111,720	379,173	10,443
Arizona Eastern	367	1,190,102	235,359	1,539,063	248,520	204,342	18,988	425,328	9,441	92,523	999,105	539,957	116,370	423,038	—296,121
Atchison, Topeka & Santa Fe	8,514	48,657,385	17,740,521	72,422,988	9,810,380	12,583,408	1,563,912	20,666,194	.....	1,389,846	45,965,666	26,457,321	3,550,164	22,892,393	1,827,332
Atlanta & West Point	93	446,041	327,546	895,940	132,500	207,940	48,389	286,430	14,819	40,850	730,534	165,406	58,504	106,632	—82,645
Atlanta, Birmingham & Atlantic	639	1,464,064	393,043	2,030,920	319,736	400,213	110,933	882,704	.....	94,069	1,807,656	223,264	108,293	114,568	—300,612
Atlantic & St. Lawrence	167	900,618	242,344	1,254,303	168,141	195,615	37,579	551,307	.....	30,920	983,562	270,742	97,200	173,542	75,161
Atlantic Coast Lines	4,701	15,627,765	6,115,223	23,635,100	3,485,360	4,095,792	510,315	8,481,750	85,862	667,433	17,282,647	6,352,453	1,242,000	5,107,092	2,031,475
Baltimore & Ohio—System	4,516	51,541,230	10,741,903	67,446,586	6,740,092	12,092,699	1,431,669	26,153,544	411,604	1,583,823	48,411,922	19,034,665	2,454,356	16,567,946	12,811

*Reorganized July 6 and 8, 1914. No cumulative figures shown.

Traffic News

The Louisville & Nashville has asked state authority to advance passenger fares on all branch lines in Alabama from 2½ cents a mile to three cents.

Vigorous protests have been filed by newspapers against the increase in freight rates on paper, announced last week, to take effect May 27, in Official Classification territory.

The Chicago, Milwaukee & St. Paul has made arrangements to operate 125 special trains to California and the North Pacific coast for conventions and meetings of various organizations between May 1 and September 5.

The Cape Cod Canal, connecting Buzzards and Cape Cod bays, Massachusetts, announces that rates for passage through the canal have been reduced. Vessels drawing 18 ft. of water may now pass through the canal. The company has added to its tariff a schedule of rates for towing sailing vessels through the canal.

The Baltimore & Ohio on May 1 advanced passenger rates in West Virginia to the basis of 2½ cents a mile, attaching to each ticket a conditional rebate coupon, saving the passenger from loss in case the railroad commission should be able to carry out its purpose to forbid the discontinuance of the two-cent rate.

The railroads carrying grain from Buffalo to the Atlantic Seaboard have filed new tariffs reducing from ten days to five days the time allowed for free storage of grain in the elevators at Buffalo. This storage allowance is an element in the rate of transportation from Buffalo to the seaboard and shippers are expected to protest against the change.

The post office department has filed with the Interstate Commerce Commission a complaint that railroad freight charges on stamped envelopes from Dayton, Ohio, are unreasonably high as compared with rates on similar goods sent by ordinary shippers. Stamped envelopes are charged first-class, and other envelopes and paper, it is alleged, are carried at third-class and fifth-class.

The nominating committee of the Traffic Club of Pittsburgh has nominated the following candidates for the various offices of the club to be voted upon at the June meeting: President, William H. Sproull; first vice-presidents, T. W. Bennett, Ralph W. Cooke and W. E. Whitemore; second vice-presidents, Charles B. Ellis, Edwin C. Jepson and John F. Lent; secretary, P. L. Wells, and treasurer, James T. Meison.

The southeastern railways have notified the Interstate Commerce Commission that they have prepared an amended classification providing that after June 3 freight rates will be increased 10 per cent, unless shippers accept the railroads' bill of lading; but this change is understood to be based on a new form of bill of lading, the terms of which have not been made public. The carriers are considering changes in rules which, evidently, are designed to provide for increased rates where the liability of the carrier is increased by the Cummins law, while retaining those conditions, printed in the bill-of-lading form, which are not affected by this law.

The Merchants' Association, New York City, reports that the freight sent from New York to Pacific coast ports through the Panama Canal during the first eight months of business amounted in value to $41,202,591, which is 90 per cent of the value of all freight moving through the canal from the Atlantic to the Pacific. Three companies are now operating a regular steamship service through the canal, and since the beginning of January a vessel has left New York on an average of every three days. The passenger steamships of the International Mercantile Marine Company, which have been put on the route between New York and San Francisco, as announced in the *Railway Age Gazette*, April 30, p. 945, are to sail fortnightly. Of the freight shipped from New York during the last eight months, more than nine-tenths started from some point outside of New York City; and some of it came from as far west as Davenport, Iowa, and Sheboygan, Wis. Among the commodities carried have been starch from Iowa, beer from St. Louis and Milwaukee, cotton goods from North Carolina and flour from Minneapolis.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The hearing before the commission on proposed advances in western passenger fares set for May 17, has been postponed to July 6, at the request of the western state railway commissions.

The commission has suspended from May 1 to August 29 a proposed increase of 30 cents a ton in the rate on bituminous coal from Chicago to Redwing, Minn., and intermediate points on the Chicago Great Western, applicable on traffic originating at mines in Kentucky.

The commission has suspended tariffs of the Louisville & Nashville and the Cincinnati, New Orleans & Texas Pacific proposing to cancel the present joint through rates on bituminous coal in carloads from the Kanawha district of West Virginia to points in Kentucky.

The commission has suspended a tariff of the Chicago & North Western proposing changes in the rules governing the eastern shipment of wool. This tariff provides for the withdrawal of the commodity rate of 86 cents a 100 lb. on wool in carloads from Belle Fouche and other points in South Dakota to Winona, Minn., destined to Buffalo, Pittsburgh and other eastern termini.

A hearing on the tariffs filed by the railroads canceling the privilege of stopping freight trains for loading and unloading in transit was held before Examiner Bell of the commission on April 30. James Webster, assistant freight traffic manager of the New York Central Lines, testified for the eastern lines and W. A. Poteet, chairman of the Trans-Missouri Freight Bureau, testified on behalf of the western lines.

Jurisdiction Over Urban Electric Lines

Opinion by the commission:

Electric railways, other than street passenger railways, participating in the interstate movement of persons or property are in this case held subject to the requirements of the commission relative to the filing of reports of finances and operations and accidents. Railway companies which provide both street-car or other intrastate service and interstate service should, however, restrict the scope of their monthly reports of accidents so as to include only accidents resulting from the operation of cars engaged in the transportation of passengers and property in interstate commerce. (33 I. C. C., 536.)

Fourth Section Applications in Rates on Grain to Jackson and Meridian, Miss.

Opinion by the commission:

The carriers are authorized to continue rates on grain and grain products from Omaha, Neb., St. Louis, Mo., and Ohio river crossings to Jackson and Meridian, Miss., on the basis of combination on Vicksburg, Miss., lower than rates concurrently applicable on like traffic to intermediate points.

Authority to continue rates between Vicksburg, Miss., and stations on the Alabama & Vicksburg applying on grain and grain products, that result in higher charges on grain and grain products from Omaha, St. Louis and Ohio river crossings to intermediate points than to Jackson and Meridian are, however, denied. (33 I. C. C., 613.)

Rates on Toasted Wheat Biscuit

Kellogg Toasted Corn Flake Company v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The rates charged by defendants for the interstate transportation of toasted wheat biscuit and toasted wheat krumbles in carloads in western trunk line and southwestern territories are found to be discrimatory in that they exceed the rates on cream of wheat, Post tavern porridge and like uncooked cereal foods in carloads between the same points. The commodities are of substantially the same value; the transportation conditions are sub-

stantially similar, and both classes are rated the same in the official, southern and western classifications, different ratings being maintained only in the territory in controversy by special commodity tariffs and exceptions to the classifications. (33 I. C. C., 534.)

Rates on Paper From New England Points to New York

Opinion by the commission:

Paper in less than carloads is rated third class in the official classification. Respondents, the Boston & Maine, the Boston & Albany and the New York, New Haven & Hartford, publish less than carload commodity rates from producing points on their lines in New England to New York and New York delivery points lower than third class. In the tariffs under consideration it is proposed to cancel these commodity rates leaving the class rates in effect. The Boston & Maine has since proposed a scale of rates higher than the present rates, but somewhat lower than the rates under consideration. It is found that these rates and the rates proposed by the Boston & Albany and the New Haven in the suspended tariffs are justified. (33 I. C. C., 609.)

Joint Rates With the Chicago, Ottawa & Peoria

Chicago, Ottawa & Peoria v. Chicago & North Western et al. Opinion by Commissioner Harlan:

The complainants operate an electric railway in Illinois from Princeton in an easterly direction through Peru, La Salle, Ottawa and Morris to Joliet, with branch lines southward from Ottawa to Streator and northward from Hicks Junction to Ladd. It is a part of the Illinois Traction system, although it has no physical connection with that system and already has joint rates on interstate traffic with some of the trunk lines. In this proceeding it asks that the defendants be required to establish through routes and joint rates on all interstate traffic between points on defendants' lines and points on its own rails. The commission finds that there is no public necessity for the routes and rates asked for, as the shippers and receivers of freight at all the towns reached by the electric railway now have joint rates over steam roads to all points reached by such roads, at as low rates, and with as efficient service as would result from the establishment of the through routes and joint rates asked. (33 I. C. C., 573.)

Lumber Transit Privileges at Buffalo

Buffalo Lumber Exchange and Buffalo Chamber of Commerce v. Alabama Central et al. Opinion by Commissioner McChord:

The commission finds that the carriers have not justified proposed increased rates on hardwood lumber from southern points, stopped in transit at Buffalo, and reconsigned to points east, northeast and southeast thereof. It was shown that these proposed increased rates were largely the result of a dispute between the carriers as to divisions.

The rates, regulations and practices of the southern carriers applying on this traffic were not found unreasonable or discriminatory, except as to the rule published by Morgan's Louisiana & Texas providing for the application of combination rates on shipments routed over certain lines, which was found unreasonable. (33 I. C. C., 601.)

Proportional Rates on Grain Products From Omaha to Destinations South of the Ohio

Opinion by Commissioner Clements:

The Illinois Central has proposed to increase the rates on grain products from Omaha to destinations local to its lines in the Mississippi valley in order to bring them in harmony with the general rate adjustment as between Omaha, Kansas City and St. Louis, primary grain markets. No change is proposed in the grain products' rates to Mississippi river points, or to competitive points on the Illinois Central.

The commission finds that the carrier has justified the increases in the rates from Omaha to the destinations here involved south of Montgomery, Miss. It has not, however, justified increases in the rates to stations north of Elton, Miss., nor the full increases to destinations south of and including Elton, to and including Montgomery. Maximum rates to these stations are prescribed for flour, coarse grain products and oatmeal. (33 I. C. C., 621.)

Joint Rates With the Campbell's Creek Railroad

Campbell's Creek Coal Company v. Ann Arbor et al. Opinion by Commissioner Meyer:

The commission in its original findings in this case held that the Kanawha & Michigan discriminated against the Campbell's Creek Railroad in that it awarded main-line or Kanawha district rates on coal from points on the Kanawha & West Virginia and the Coal & Coke, while it did not award such rates to points on the Campbell's Creek. The carrier was directed to eliminate this discrimination, either by cancelling the main-line rates from points on the Coal & Coke and the Kanawha & West Virginia, or by establishing these rates as joint rates with the Campbell's Creek. The Kanawha & Michigan elected to cancel the main line rates with the Coal & Coke and the Kanawha & West Virginia.

The commission now holds that main-line or district rates applying from points on the Coal & Coke and the Kanawha & West Virginia should be continued, and that through routes and joint rates should be established from points on the Campbell's Creek. Such rates should not exceed the main line or distinct rates applying from points on the other two roads. (33 I. C. C., 558.)

STATE COMMISSIONS

The New York State Public Service Commission, Second district, has suspended, until July 1, proposed increases in commutation passenger fares on the Long Island Railroad.

The railroads have completed their testimony before the Kansas Public Utilities Commission on their petition for authority to increase passenger fares, and the commission has adjourned to a date to be fixed later, when the commercial travelers, who are opposing the advance, will be given an opportunity to be heard.

PERSONNEL OF COMMISSIONS

Clinton White, a member of the Massachusetts Public Service Commission and of its predecessor, the Railroad Commission, for many years, announces that on May 17 he is going to retire, that being the day on which he will reach the age of 70.

COURT NEWS

The Supreme Court of Missouri has authorized 11 railroads in that state to file briefs in the case instituted by the attorney general of the state against the Chicago & Alton to recover excess charges collected while the freight and passenger rate laws were in litigation. The circuit court of Saline county decided this case in favor of the railroad, holding that the attorney general could not recover the charges on behalf of the state or unnamed shippers.

In the Supreme Court of the United States the government has won its suit against the Erie Railroad to recover penalties for violation of the safety appliance laws in the movement of freight trains between Jersey City, N. J. and Weehawken, about two miles. The road had claimed that the movement of trains in question was essentially a yard or switching movement; but the court finds that, by reasonable interpretation, these should be called main line movements. The lower court is ordered to grant a new trial, two decisions, those of the district court and of the circuit court of appeals, having been in favor of the road. This decision settles in favor of the government a similar suit against the Chicago, Burlington & Quincy, relating to movements in Kansas City.

Right of Way—Abandonment

The conveyance of a strip of land to a railroad company for a right of way, "to have and to hold the same for and so long as the same is used for railroad purposes," is held by the Minnesota Supreme Court to convey an easement only, and not the absolute fee-simple title. An easement so held may be lost by abandonment. In the present instance a track of the Duluth Transfer, owned by the Northern Pacific, had been taken up by the latter, and for ten years no use had been made of the right of way for any purpose. It was held that there was an intentional abandonment of the right of way. Norton v. Duluth Transfer (Minn.), 151 N. W., 907.

Duty to Keep Ticket Office Open

Railroad companies in Kentucky are required by statute to keep their ticket offices open at least 30 minutes immediately preceding the schedule time of departure of passenger trains. A passenger without a ticket boarded a train at a station where there was a ticket office. The train was about seven minutes late. The ticket office had been kept open until about seven minutes after the schedule time of departure, when the agent left the office to attend to outside duties. The passenger arrived at the station after schedule time. It was held by the Kentucky Court of Appeals that he might be required to pay the extra flat charge of 10 cents, the statute having been complied with. Ponder v. Lexington & Eastern (Ky.), 174 S. W., 786.

Derailing Devices—Unreasonable Order

The Litchfield & M. allowed an electric road to cross its line under an agreement that the latter was to construct and maintain a derailing device, and L. & M. trains always to have precedence. An order of the Illinois Railroad and Warehouse Commission, reversing the obligations and rights under the agreement, required the electric road, running about 40 trains a day, to install interlocking, at a cost of $4,200, gave it equal rights of crossing, and required the L. & M., running four or five trains a day, to assume the expense of operating the interlocking and to stop its trains, when necessary, at an expense of $1.08 for a loaded train and 83 cents for a train not loaded. The Illinois Supreme Court holds the order to be unreasonable; and that a fair apportionment of the cost of operation would require each road to bear the expense in proportion to the number of times which each used the crossing. Railroad and Warehouse Commission v. Litchfield & M. (Ill.), 108 N. E., 347.

Establishment of Stations—Reasonableness of Order

The Railroad Commissioners of Florida having issued an order requiring the Florida East Coast to establish and maintain an agency station at Mims, the Florida Supreme Court holds that the duty of a railroad company to provide fit and suitable roadbeds and tracks and rolling stock may be distinguished from the duty to provide stations along its line. The one is an essentially higher and more important duty than the other. In the latter case the fact that the performance of the duty will be unremunerative may be considered. In the present case it appeared that the road is operated at a loss, that its stockholders receive no dividends, that there is no sinking fund, that its income is not sufficient to pay the interest on its bonds, and that ample accommodation for the business received existed at Mims. It was held that if these facts were true the order was unreasonable, and the railroad company was entitled to an opportunity to prove them. No evidence having been taken, the order was subject to be set aside. State v. Florida East Coast (Fla.), 67 So., 906.

Taxation—Intangible Elements of Value

The Supreme Court of the State of Washington upholds as valid and constitutional the assessment, for 1913, of the Northern Pacific's operating property within the state, as a unit, at $126,000,000, including an added item of $12,290,000 on account of density of traffic and volume of business along its line, the nature of the country through which its line ran, the facilities for transacting railroad business owned by private individuals, such as warehouses and docks, the proximity of extensive coal mines enabling it to obtain coal at reduced cost, regardless of its ownership, the resources of the country adjacent to its line, and the density of population and development of the tributary territory, considered as intangible elements affecting the value of its operating property.

It was also held that, in the absence of any willful fraudulent acts charged against either the state board of tax commissioners making the assessment or the state board of equalization adopting it, or any charge that such boards refused to hear evidence as to value or acted arbitrarily, the assessment, where the difference between the assessed value and the actual value was as small as 10 per cent, would not be interfered with by the court purely on the ground that it was excessive, and because of a radical change in conditions resulting in large decrease in net earnings of the property and a permanent impairment of its value. Northern Pacific v. State (Wash.), 147 Pac., 45.

Railway Officers

Executive, Financial, Legal and Accounting

Alden B. Muller has been appointed secretary and treasurer of the Texas-Mexican, with office at Laredo, Tex., succeeding John F. Boniger, deceased.

William Gerig, vice-president, general manager, treasurer and chief engineer of the Pacific & Eastern at Medford, Ore., has resigned to take a position in connection with the work on the union depot at St. Paul.

G. J. Bunting, whose appointment as general auditor of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, has already been announced, was born July 14, 1881, at Portsmouth, Va., and was educated in the common and high schools. After his graduation from high school he completed his education under private tutorage. In 1900 he was made general accountant of the Cashie & Chowan road in North Carolina and later held positions with two large public accounting agencies, the Audit Company of New York and the Indiana Audit Company. In May, 1909, he was appointed examiner of accounts for the Interstate Commerce Commission and remained in that position until July 15, 1911, when he was appointed general accountant for the Chicago, Milwaukee & St. Paul at Chicago. On March 15, 1913, he was appointed assistant general auditor of the road, from which position he is now promoted.

G. J. Bunting

Walter Platt Cooke, whose election as president of the New Orleans Great Northern, with headquatrers at Buffalo, N. Y., has already been announced in these columns, was born on April 28, 1869, at Buffalo, N. Y. He was educated in the public and high schools of his native town, and in 1891 graduated from Cornell University. He engaged in the practice of law in Buffalo, and is a member of the firm of Kenefick, Cooke, Mitchell & Bass. Mr. Cooke is an executor of the Frank H. Goodyear estate, and has been in charge of the estate for several years. Mr. Goodyear was one of the founders of the Great Southern Lumber Company, and his estate owns a large interest in that company as well as in the stock of the New Orleans Great Northern Railroad. Mr. Cooke has been chairman of the executive committee for four years of the Great Southern Lumber Company and of the New Orleans Great Northern Railroad, and for over a year has been first vice-president and general counsel of the railroad company.

W. P. Cooke

J. R. Stephens, chief engineer of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, has been appointed assistant to the president, with headquarters at St. Louis, succeeding A. Robertson, promoted.

E. N. Renfrew, auditor of agencies of the New York, New Haven & Hartford, the Central New England and the New England Steamship Company at New Haven, Conn., has been appointed auditor of miscellaneous receipts, with office at New Haven. He will have charge of all miscellaneous revenue and will also continue to perform the duties of auditor of agencies.

L. R. Wood, whose appointment as auditor of the Oregon Short Line, with headquarters at Salt Lake City, Utah, has already been announced, was born November 20, 1875, at Denison, Iowa, and was educated in the common, high and business schools. He entered railway service February 10, 1899, in the traffic department of the Fremont, Elkhorn & Missouri Valley. From February 20, 1900, to July 1, 1905, he was stenographer to the auditor of disbursements of the Union Pacific, and from July 1, 1905, to January 1, 1910, he was general clerk in the general auditor's office of the Union Pacific-Southern Pacific system. In January, 1910, he was made assistant chief clerk to the vice-president and controller of the same road, and held that position until March 1, 1912, when he was made chief clerk to the auditor of the Oregon Short Line. On April 11, 1914, he was appointed assistant auditor of the Oregan Short Line, from which position he is now promoted.

Henry Watkins Miller, whose election as vice-president of the Southern Railway, with headquarters at Atlanta, Ga., has already been announced in these columns, was born on August 8, 1868, at Raleigh, N. C., and was educated in the public and private schools of his native city. In October, 1885, he entered the service of the Richmond & Danville as loading clerk at the Raleigh freight house and as relief telegraph operator. He was advanced to billing clerk and then chief clerk at this station, and later became rate clerk in the division freight office. In September, 1888, he left the traffic department to become chief clerk and secretary to the third vice-president of the same road, becoming secretary to the second vice-president on the organization of the Southern Railway, and from 1894 to December, 1901, was secretary to the first vice-president. He was then appointed assistant to the first vice-president, and in December, 1910, was appointed assistant to president, which position he held at the time of his recent election as vice-president of the same road as above noted. He has also served as secretary of various subsidiary lines of the Southern Railway, and has recently been elected vice-president of the Danville & Western; Blue Ridge Railway; Augusta Southern; Tallulah Falls, and the Hartwell Railway Company. He is also president of the Kentucky & Indiana Terminal Railroad Company, and of the Durham Union Station.

H. W. Miller

Operating

A. L. Christiansen has been appointed superintendent of car service of the Elgin, Joliet & Eastern, with office at Joliet, Ill.

J. L. Marquette, trainmaster of the Western division of the Chicago & Alton, has been appointed assistant superintendent, with headquatrers at Slater, Mo.

F. M. Metcalfe has been appointed to be in charge of the bureau of efficiency of the Northern Pacific, with headquarters at St. Paul, succeeding Charles T. Banks, resigned.

Traffic

John Redding, contracting agent of the Wabash at Toledo, Ohio, has been promoted to commercial agent, with headquarters at Toledo.

John S. Campbell has been appointed district agent of the Pennsylvania Lines and Union Line at Portland, Ore., succeeding F. N. Kollock, retired under the pension system.

A. S. Edmonds, general agent of the Missouri Pacific-Iron Mountain System, at Philadelphia, has been appointed traffic manager of the Chesapeake Steamship Company, of Baltimore.

E. M. Meagher, chief clerk in the office of the general freight and passenger agent of the Buffalo & Susquehanna, at Buffalo, N. Y., has been appointed acting general freight and passenger agent, with headquarters at Buffalo.

J. F. Blumensteil, division freight agent of the Detroit, Toledo & Ironton at Springfield, Ohio, has resigned to engage in other business. H. A. Fidler, assistant general freight agent at Ironton, Ohio, has been transferred to Springfield.

Horace Emerson has been appointed commercial agent of the Atlantic Coast Line, with headquarters at Sumter, S. C. E. M. Finch, commercial agent at Montgomery, Ala., has been appointed commercial agent, at Ocala, Fla., vice H. H. Brand, deceased, and the position of commercial agent at Montgomery has been abolished. Pendleton Goodall, commercial agent at Cincinnati, Ohio, has been appointed commercial agent at St. Louis, Mo., vice C. H. Trimble, deceased, and E. H. Smith succeeds Mr. Goodall.

J. M. Johnson, vice-president in charge of traffic of the Missouri Pacific-Iron Mountain System and the Denver & Rio Grande, has moved his headquarters from St. Louis to Chicago. W. A. Rambach, assistant to the vice-president, with headquarters in Chicago, has been appointed assistant freight traffic manager in charge of rates, etc., with headquarters at St. Louis. J. N. Githens, assistant to the vice-president, has been appointed assistant freight traffic manager in charge of solicitation, with headquarters in St. Louis. W. I. Jones, assistant to the vice-president, has been promoted to general freight agent of the Iron Mountain, to succeed E. H. Calef, deceased. C. C. P. Rausch, assistant-general freight agent at St. Louis, has been promoted to general freight agent. His duties will consist of appearing before the different railroad commissions and such other work as may be assigned him. D. R. Lincoln, assistant-general freight agent, with headquarters in Kansas City, has been transferred to St. Louis, with the same title, but with increased duties and responsibilities. W. H. Alexander, assistant-general freight agent at St. Louis, has been transferred to Kansas City to take up the work formerly performed by Mr Lincoln.

Engineering and Rolling Stock

W. H. Winterrowd, mechanical engineer of the Canadian Pacific at Montreal, Que., has been appointed assistant to the chief mechanical engineer, with headquarters at Montreal.

E. A. Hadley, assistant engineer of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, has been appointed chief engineer, with headquarters at St. Louis, succeeding J. R Stephens, promoted.

O. E. Selby, engineer of bridges and structures of the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria & Eastern at Cincinnati, Ohio, has been appointed principal assistant engineer, and J. B. Hunley succeeds Mr. Selby.

Harry A. Macbeth, who has been appointed superintendent of motive power of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, succeeding E. A. Miller, deceased, was born on September 23, 1867, at Wellsville, Ohio. He was educated in the common and high schools and entered railway service in October, 1883, with the New York, Chicago & St. Louis. He was machinist apprentice from 1884 until 1887, machinist from 1887 to 1891, gang foreman from 1891 to 1898, when he was appointed general foreman. This position he held until 1905, when he was appointed master mechanic, and he has served in that capacity for the last 10 years, recently with headquarters at

Conneaut, Ohio, from which position he is now promoted to superintendent of motive power.

Charles W. Van Buren, who has been appointed general master car builder of the Canadian Pacific, with headquarters at Montreal, Que., as has already been announced in these columns, was born on October 18, 1867, in Rensselaer county, N. Y. He went to the common schools until he was 16 years old, and for a year attended night school in New York City. In 1889 he began railway work on the New York Central & Hudson River. He was a carpenter at the West Albany shops until 1891, when he was made foreman, and two years later he was put in charge of car department work on the Adirondack division at Herkimer, N. Y. In 1896 he was transferred to Utica in charge of car department work on the Adirondack and the Mohawk divisions of the New York Central & Hudson River and the West Shore. He entered the service of the Canadian Pacific in July, 1905, as general car inspector on the lines east of Port Arthur. The following year he was appointed division car foreman of the Eastern division, remaining in that position until July, 1909, and then served as master car builder of the eastern lines of the same road, with headquarters at Montreal, until May, 1911. He then went to the Union Stock Yard & Transit Company, Chicago, as assistant general superintendent, remaining with that company until January, 1915, when he was appointed general foreman of the Milwaukee Refrigerator Transit & Car Company, at Milwaukee, Wis., which position he held until his recent appointment as general master car builder of the Canadian Pacific, as above noted.

Purchasing

E. J. Urtel, chief clerk in the president's office of the Buffalo & Susquehanna, at Buffalo, N. Y., has been appointed purchasing agent, with headquarters at Buffalo.

OBITUARY

Union B. Hunt, former chairman of the railroad commission of Indiana, died at Indianapolis on May 3.

E. H. Calef, general freight agent of the St. Louis, Iron Mountain & Southern, whose death on April 21, at his home in St. Louis, Mo., was briefly noted in these columns last week, was born in St. Louis in 1867. His entire railway career was on the Missouri Pacific-Iron Mountain system. He began railway work in January, 1884, as a messenger in the freight claim department and later became traveling freight agent in the Indian Territory and other fields. In 1899 he was appointed commercial agent at Sedalia, Mo., and in March, 1905, was appointed division freight agent of the Iron Mountain at Little Rock, Ark. In September, 1908, he was made assistant general freight agent, with headquarters at St. Louis, and on June 1, 1913, he was appointed general freight agent of that road, with office at St. Louis.

E. H. Calef

The Railways of Belgium.—It is reported from Brussels that the Germans have not only repaired almost all the railways in Belgium which were damaged through the war, but that they are also engaged on the construction of a new line from Aix-la-Chapelle via Visé-Glons to Brussels, avoiding Liége and the awkward curve of Ans. The railway on completion will considerably reduce the length of the connection between Germany and Brussels, Ghent, Antwerp and the coast.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Western Maryland is in the market for 10 locomotives.

The Chicago Great Western is asking for bids on 5 switching locomotives.

The French Government has issued specifications for 100 large locomotives.

The Cuba Railroad has ordered 10 ten-wheel type locomotives from the American Locomotive Company.

The Pennsylvania Railroad has given its Juniata shops authority to proceed with the construction of 50 superheater Mikado type (L-1-s) locomotives.

CAR BUILDING

The Cold Blast Transportation Company is in the market for 300 refrigerator cars.

The Atchison, Topeka & Santa Fe is said to be intending to build or buy a hospital car.

The Pittsburgh Steel Company has ordered 10 hopper cars from the Standard Steel Car Company

The Contractors' Service Company, New York, is in the market for 45 50,000 to 60,000-lb. capacity, steel underframe flat cars not less than 32 feet long.

The Western Maryland, reported in the *Railway Age Gazette* of April 16 as contemplating the purchase of a number of passenger cars, is about to issue inquiries for these cars and for 1,000 coal cars.

The Ponca Refining Company, reported in the *Railway Age Gazette* of April 16, as having ordered 100 tank cars from the American Car & Foundry Company, has now increased that order to 120 tank cars.

The New York Municipal has ordered 100 steel subway cars from the American Car & Foundry Company. These cars are in addition to the 200 ordered in the latter part of 1914 and will be of the same type.

The Pennsylvania Equipment Company is in the market for 100 or 150 40-ft., 80,000 to 100,000 lb. capacity flat cars, 1 second-hand combination passenger and baggage car and 2 combination passenger, mail and baggage cars.

The Central Locomotive & Car Works is reported to be asking bids on trucks, castings and forgings for 1,000 freight cars, said to be in preparation for building 1,000 cars for the Minneapolis & St. Louis. This item has not been confirmed.

The Russian Government is understood to have closed or to be about to close contracts with the Pressed Steel Car Company for railroad equipment variously estimated to be worth from $10,000,000 to $40,000,000. The contracts are said to include from 10,000 to 17,500 all-steel freight cars.

IRON AND STEEL

The Illinois Central is in the market for 2,000 tons of angle bars.

The Boston & Maine is asking bids on about 1,000 tons of steel.

The Norfolk Southern is inquiring for 1,500 tons of steel rails.

The Lehigh & New England is receiving bids on 300 tons of bridge material.

The Southern has ordered 1,575 tons of steel rail from the Pennsylvania Steel Company.

The Minneapolis & St. Louis has ordered 5,000 tons of rails from the Illinois Steel Company.

The New York, New Haven & Hartford is inquiring for about 200 tons of steel bridge material.

The Chicago, Indianapolis & Louisville has ordered 3,000 tons of rails from the Illinois Steel Company.

The Pittsburgh & Lake Erie is reported to have ordered 5,700 tons of rails from the Carnegie Steel Company.

The New York Central is asking for bids on 300 tons of shapes for three bridges to be constructed at Jersey City.

The Chicago, Milwaukee & St. Paul has ordered 119 tons of steel rods from the Minneapolis Steel & Machinery Company.

The Dallas Union Terminal has ordered 215 tons of steel tor train sheds at Dallas, Tex., from the American Bridge Company.

The Central of New Jersey is asking for bids on 500 tons of fabricating steel for a bridge to be constructed in eastern Pennsylvania.

The Cincinnati, Hamilton & Dayton has asked for bids on three steel bridges for immediate delivery to cost approximately $200,000.

The Texas & Pacific has ordered 273 tons of steel for a railroad crossing for the Dallas Terminal, Dallas, Tex., from the American Bridge Company.

The Wisconsin & Northern has ordered 134 tons of steel for a 261-foot deck plate girder viaduct at Gresham, Wis., from the Wisconsin Bridge & Iron Company.

The Atchison, Topeka & Santa Fe has ordered 230 tons of steel for two 100-foot turntables, one at Amarillo, Tex., and one at Wellington, Kan., from the American Bridge Company.

The Russian Government is said to have issued inquiries in this country for bridge steel and rails to the value of $100,000,000. Negotiations are nearing completion with the Lackawanna Steel Company, whereby that company will supply 20,000 tons of rails.

The Government Railways of the Union of South Africa, reported in the *Railway Age Gazette* of April 16 as having ordered 30,000 tons of rails from the Dominion Iron & Steel Company, have ordered 35,000 tons from that company. They are also reported to have ordered 35,000 tons from the Algoma Steel Corporation, Ltd.

MACHINERY AND TOOLS

The Chesapeake & Ohio is in the market for a planer and a vertical turret lathe.

The Waterloo, Cedar Rapids & Northern will spend $300,000 during the next three months for equipment for its power plant at Waterloo, Iowa.

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction is asking bids through the J. G. White & Co., Inc., for 11 machine tools to be installed in its shops at Minneapolis.

The Alaska Engineering Commission has awarded to the Browning Company, Cleveland, Ohio, a contract for a locomotive crane to be used on the construction of the new Alaska railroad.

The Seaboard Air Line has ordered about $50,000 worth of machine tools to replace tools damaged in the recent fire at the Portsmouth, Va., shops. Work on the rebuilding of these shops has been commenced and it is expected that more machine tools will be purchased later.

The Missouri, Oklahoma & Gulf is inquiring through the Arnold Company of Chicago for five lathes, five grinders, three boring mills, two drills, two presses, a planer, a universal milling machine, a portable crane and hoist, a portable valve facing machine, portable valve setting rollers, a triple-head bolt cutter, a pipe-cutting and threading machine, a draw cut shaper, a bar shear, six portable vises, a 3,300-lb. steam hammer, a forging machine and bulldozer, 2-in. bolt header and forging machine, a pressure blower, a case-hardening and spring furnace, a 500-lb. belt-driven hammer, 12-ft. bending rolls and a 12-ft. flanging clamp.

Supply Trade News

The Baldwin Locomotive Works is reported to be negotiating for a large contract for war material.

Edward A. Hill, retired manufacturer of railway supplies, died April 29, at the home of John C. King in Chicago.

S. F. Klohs, mechanical engineer and draftsman, has moved his office from the Monadnock block, Chicago, to room 1309, Great Northern building.

John H. Lloyd, formerly assistant to the president of the Morgan Engineering Company, Alliance, Ohio, died recently in that city at the age of 56 years.

J. R. Wills, for eight years supervisor of signals of the Oregon Short Line at Ogden, Utah, has joined the sales force of the National Carbon Company, Cleveland, Ohio.

The Cast Steel Locomotive Ashpan Company, St. Louis, Mo., has been incorporated with a capital stock of $40,000 by H. M. Pflager, Arthur W. Morey and Fred W. Dieckmann.

H. S. Collette, secretary of J. G. White & Co., Inc., and the J. G. White Engineering Corporation, New York, has resigned from these companies and expects to reside permanently in California.

The Edgar Allen American Manganese Steel Company, Chicago, has changed its name to the American Manganese Steel Company. This company has foundries at Chicago Heights, Ill., and New Castle, Del.

The Louisville & Nashville has recently awarded a contract to the Roberts & Schaefer Company, Chicago, for the equipment of a large 500-ton, four-track reinforced concrete coaling station, for installation at Lexington, Ky.

It is reported that the Franklin, Pa., plants of the Chicago Pneumatic Tool Company will soon be put in operation day and night on an order for shells estimated up to 300,000 received from the Bethlehem Steel Corporation.

On and after May 1, the New York offices and show rooms of The Dahlstrom Metallic Door Company, Jamestown, N. Y., will be located on the fifth floor of the Consolidated Gas Company's building, 130 East Fifteenth street.

John H. Hall, 2 Rector street, New York City, has discontinued his practice as consulting engineer and has entered the employment of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., as metallurgical engineer.

The Pittsburgh Steel Car Company, Pittsburgh, Pa., has been incorporated at Dover, Del., with a capital of $100,000; and will manufacture and deal in steel railroad cars. The incorporators are Norman P. Coffin, Herbert E. Latter, Wilmington, Del., and Clement M. Enger, Elkton, Md.

In recognition of his services to the engineering profession, the Japanese government through its Department of Education has conferred upon J. A. L. Waddell, consulting engineer of Kansas City, Mo., the degree of Hakushi (Doctor of Engineering, the highest scholastic honor in its gift).

The Western Electric Company has recently shipped three boat loads of telephone poles to Greece. The shipment was made in 45 carloads from the concentration yard at Toledo, Ohio, and consisted of 15,000 4-in. top, 20 ft., and 2,000 5-in. top, 25 ft. Northern Cedar poles of first quality. The Greek Government will use the poles in extending present telephone facilities.

The Union Signal Construction Company, Pittsburgh, Pa., has been incorporated at Dover, Del., with a capital stock of $10,000, to manufacture, buy, sell and deal in all kinds of railroad supplies, including signal apparatus. W. D. Uptegraff, Pittsburgh, Pa.; T. W. Siemon and T. S. Grubbs, Edgewood, Pa., are the incorporators. Messrs. Uptegraff and Siemon are officers of the Union Switch & Signal Company.

The Westinghouse Electric & Manufacturing Company has received an order having an aggregate value of $27,500,000 from the British government for 1,000,000 rifles at $27.50 each. The con-

tract was placed through J. P. Morgan & Co. and it is understood that the rifles are being ordered for Russia. It is further reported that there is also an additional order for the same amount; and if the latter report be also true the total orders for rifles will total $55,000,000. The company has been working for some time on some smaller orders for shrapnel. The rifles are not to be made in the company's own plants, but in shops secured with that object in view. The plants will thus not be interfered with, but will be prepared to work on domestic orders for electrical equipment.

In the *Railway Age Gazette* of April 23 it was reported that the American Locomotive Company was supposed to have closed contracts with the Russian government for shrapnel aggregating $65,000,000 in value. Later reports have made it evident that the only company which has received orders for shrapnel from the Russian government is the Canadian Car & Foundry Company. That company closed a contract some time ago for approximately $83,000,000 worth of such material. The contract calls for more than 5,000,000 loaded shrapnel shells, the shot and shells to be shipped separately, and a considerable portion of it has been sublet to American and Canadian companies. The American Locomotive Company has, however, received an order for $68,000,000 worth of unloaded shrapnel shells; but this order has been received from Great Britain rather than from Russia. The company plans to fill about one-half the order at its Richmond and Dunkirk plants and has already purchased a large amount of the special machinery which will be required. The remainder of the order will be filled by the New York Air Brake Company and the Westinghouse Air Brake Company; and it is understood that the latter will divide a part of its share with the Union Switch & Signal Company.

Westinghouse Electric & Manufacturing Company

The directors of the Westinghouse Electric & Manufacturing Company at their meeting on Wednesday issued the following statement: "The company will not require additional capital for its present volume of business or for any increase expected in the near future. It has made adequate provision, without borrowing, for the execution of the large orders recently received from foreign governments. On the other hand, in case of the radical increase in business which may come with good times, the company would be handicapped in securing additional capital by the following restriction of the trust indenture under which its convertible bonds were issued, viz., the Electric Company will not issue additional stock and title to preference or priority over its assenting stock, nor distribute any capital stock by way of stock dividends, nor issue any capital stock at a price more than 10 per cent below the market price of the stock of the same class at the time the new stock is offered for subscription or sale.

"In order that the company may be in a position when the time comes, to raise additional capital by the sale of stock the following tentative plan has been approved. It is proposed to ask the bondholders to consent to the elimination of the above provision, and in consideration therefor to reduce the price at which common stock—formerly called assenting—may be issued for the bonds upon conversion from 200, the price now fixed by the agreement, to par for the balance of the present calendar year and thereafter 110.

"As an incident to this plan, in case it becomes operative, either common stock to the amount required for conversion under the proposed modification, or new bonds convertible into common stock at the reduced price, would be offered to the stockholders for pro rata subscription at 105, and to the extent that stocks or bonds are sold upon that basis the proceeds would be used in retiring present bonds at redemption price.

"Accordingly under the proposed plan bondholders would receive either (a) cash at the redemption price of 105 and accrued interest, or (b) par in new bonds convertible into common stock at the reduced price, or (c) part cash and part new bonds.

"An agreement providing for this plan is in course of preparation under which the Guaranty Trust Company will be depositary and Kuhn, Loeb & Company managers. It will rest with the managers to determine whether and when the plan shall become operative. A circular announcing the plan in its definite form will be issued shortly."

Railway Construction

Beaumont, Liberty & Houston Traction.—Organized in Texas to build an interurban line from Houston, Tex., east to Beaumont, about 81 miles, also to build from Houston, southwest to Richmond, about 30 miles. E. Kennedy, Houston, and associates are back of the project.

California Southern.—This company has awarded a contract to the Blythe Construction Company, Los Angeles, Cal., for the construction of a new 41-mile railroad from Blythe Junction and Blythe to the lower Palo Verde valley. Grading has been started on the 10-mile branch between Blythe Junction and Blythe. The company intends to buy rolling and motive power in about 90 days. J. M. Neeland, Los Angeles, Cal., is president, and G. W. Rice, Blythe Junction, Riverside county, Cal., is chief engineer.

Canadian Roads.—Construction work, except ballasting on a section of about ten miles, has been finished on the line building from a point on the Grand Trunk Pacific to Indian Bay for the Greater Winnipeg Water District. This line, which is part of the improvements being carried out to provide a water supply for the city of Winnipeg, Man., from Shoal Lake, is expected to be open for operation soon, to carry contractors' supplies and necessary materials for aqueduct construction. A total of 102 miles of track, including spurs and sidings has been laid. S. H. Reynolds is chairman of the commissioners, Winnipeg, Man. (February 27, p. 451.)

Chicago, Rock Island & Pacific.—This company has resumed track elevation at Chicago, Ill., between Seventy-ninth and Eighty-seventh streets.

Cumberland Northern.—Surveys are now being made and bids will be asked for in about 30 days, to build from a connection with the Louisville & Nashville at Barbourville, Ky., north via either Fighting creek or Little Richland creek to the headquarters of Collins fork, and along Goose creek and south fork of Kentucky river to Manchester, about 25 miles. There will be a number of small bridges on the line. An extension is projected north about 30 miles to Beattyville, but this extension will not be built this year. The company expects to develop a traffic in coal, lumber, livestock and general merchandise. C. F. Heidrick, president; M. Posey, locating engineer, Barbourville. (See Kentucky Roads, April 23, p. 914.)

Hampden Railroad.—Governor Walsh has allowed to become law without his signature the bill passed by the Massachusetts legislature extending to July 1, 1918, the time within which this company shall locate and complete its proposed branch lines to Holyoke and Chicopee Falls.

Hiawassee Valley.—Work is now under way by the Wright-Johnstone Contracting Company, Andrews, N. C., on the section from Andrews southwest via Peach Tree to Hayesville, 25 miles. The grading work is about 75 per cent finished. It is expected that the line will be leased and that the lessee will furnish the rails and the rolling stock. The company was organized in 1913, to build a 35-mile line from Andrews, N. C., southwest via Peach Tree to Hiawassee, 35 miles. O. L. Anderson, president, and F. Cloud, chief engineer. H. S. Kinnebrew, Andrews, N. C., is in charge of the work. (October 31, p. 818.)

Midland Railway.—Application has been made for a charter in Georgia by this company, with a capital of $1,000,000, it is said, to build a line from Savannah, northwest to Milledgeville, about 150 miles, also to build branch lines to other points. W. M. Exley, W. H. Webb, L. M. Mikel, K. I. Helmey and C. A. Johnson of Effingham county; J. A. Davis of Burke county, and H. O. Burman of Chatham county, are said to be interested.

Texas Roads.—Plans are being made to build a line from Lamesa, Tex., south to Midland, about 55 miles. Residents of Midland have been asked to raise a bonus of $250,000 in aid of the project. T. J. O'Donnell, Sweetwater, and W. L. Carwile, Dallas, are the promoters.

Wyoming-Montana.—This company has been incorporated at Sheridan, Wyo., with a capital stock of $2,000,000 and proposes

to construct a railroad from Sheridan, Wyo., to Beaver Hills and Big Horn. George Forsyth, Olaf Nelson and D. P. B. Marshall are the incorporators.

RAILWAY STRUCTURES

Beacon, N. Y.—The New York Central has given a contract to John Thatcher & Sons, Brooklyn, N. Y., for building a new passenger station at Beacon, to include a main building 49 ft. by 65 ft., and a baggage room 31 ft. by 42 ft. The contract calls for the construction of the station superstructure and wooden platforms and canopies. The sub-structure is already in place. The new station will be of red brick construction on a rough face concrete base up to the window sills, and the exterior brick walls will be of rough texture. The roof over the main building will be of red tile, and on extensions of slag. The subway now in place will connect the passenger station with inter-track platforms.

Buffalo, N. Y.—The Lehigh Valley has awarded to J. Henry Miller, Incorporated, Baltimore, Md., the first contract for construction work in connection with the new freight and passenger terminal to be built at Buffalo. This contract covers some of the important building work in connection with the new freight and passenger stations proper and, with the incidental work attached to it, will amount to $750,000. The passenger station, which will be built of Indiana limestone, will face main street, extending from Quay to Scott streets. A tunnel will extend under Washington street, in the rear, reaching the head house, platforms and tracks. The site for the passenger station proper has already been cleared. The freight terminal will be located south and east of Scott and Washington streets, and this site also is being prepared for the beginning of construction work.

Bids are wanted, May 15, by Edward B. Guthrie, chief engineer of the Buffalo Grade Crossing Commission, Buffalo, for the excavation and masonry work for two bridges at Lord and Smith streets, where the streets are to be carried under the Pennsylvania Railroad tracks. The superstructures are to be built by the Pennsylvania Railroad. Bids for the masonry and steel for a bridge over the Pennsylvania Railroad at Bailey avenue will probably be received about two weeks later. In addition the Lehigh Valley and the Delaware, Lackawanna & Western will build bridges in connection with the other Bailey avenue work.

Chicago, Ill.—The New York, Chicago & St. Louis has awarded a contract to the Pennsylvania Steel Company for a bridge of 5 spans over the Illinois Central tracks at Seventy-ninth street, Chicago, to be completed November 1, 1915. This bridge comprises about 2,000 tons of steel and completes the grade elimination work of this company under the 1909 ordinance.

The contract for the foundation work for the Pennsylvania Lines' new freight terminal at Chicago was let to the Glones-Sinek Company, Chicago, instead of to the Sumner-Sollitt Company, as was previously reported in these columns. (April 30, p. 955.)

The Union Station Company has asked for bids for the construction of sewers and retaining and curb walls in connection with the work on the new Union Station.

Matawan, N. J.—Bids will be asked for about June 15 by the Board of Chosen Freeholders, Matawan, for a Strauss bascule trunnion bridge to be built over Matawan creek, at a cost of about $40,000. The new structure will carry tracks for the operation of the Jersey Central Traction Company's cars, and this company will pay one-half of the cost of the new bridge.

Philadelphia, Pa.—A bill has been introduced in the Pennsylvania legislature calling for an appropriation of $15,000, to make plans and select the site of a bridge, to be built over the Delaware river, between the cities of Philadelphia and Camden, N. J. It is understood that the proposed structure, which is to be known as the William Penn Memorial Bridge, will carry tracks for the operation of street railway cars.

Portsmouth, Va.—An officer of the Seaboard Air Line writes regarding the report that contracts have been let to build a temporary shop building at Portsmouth; that the company has arranged for a temporary cover on a portion of the burnt shop area, but no decision has yet been reached for the construction of a permanent building.

Railway Financial News

Chicago, Rock Island & Pacific.—The Sheldon proxy committee, which voted for the election of W. Emlen Roosevelt, Charles Hayden and William J. Matheson as directors at the last annual meeting, has issued a circular, which says in part: "Now that the court has taken possession of the property, the committee deems it essential to stockholders that they should be free to adopt for their protection other agencies with fuller powers. The committee, therefore, surrenders all rights granted to it and especially the right to vote at the regular annual meeting next October." The committee says that it was not informed that the railway company was to be put in the hands of a receiver.

A committee has been formed to protect the interests of the holders of the $20,000,000 20-year 5 per cent debentures. This committee is composed of Seward Prosser, president of the Bankers' Trust Company; E. K. Boisot, A. Barton Hepburn, Edwin G. Merrill and James Speyer.

Kansas City, Mexico & Orient.—William Volker has filed a petition asking for the appointment of a receiver for the Kansas City, Mexico & Orient, claiming that the reorganization committee and the United States & Mexican Trust Company are not carrying out the terms under which the road was reorganized.

Missouri, Kansas & Texas.—About 90 per cent of the $19,000,000 notes due May 1 have been deposited for extension.

Pennsylvania Railroad.—Kuhn, Loeb & Co., New York, have bought from the Pennsylvania $65,000,000 general mortgage 4½ per cent bonds. It is understood that the offering price to the public will be between 98 and 98½. The proceeds from the sale will be used along with the proceeds of the $49,000,000 first mortgage bonds recently sold to pay at maturity the $86,827,000 3½ per cent convertible bonds due October 1.

Wabash.—An abstract of the reorganization plan and editorial comments thereon are published elsewhere in this issue.

Railway in Argentina Leased.—The Compañia General de Ferrocarriles de la Provincia de Buenos Aires has contracted a seven year lease of the 25-mile section of the Rosario to Mendoza Railway, running from Rosario to Fuentes.

Economics of Electric Signal Operation.—Density of traffic enters into the question of the selection of the type of apparatus for block and interlocking signals. Where traffic is very dense, quick operation of the signals is desirable in order that trains may follow each other without having to wait for a signal to clear. In such situations also, it is usually out of the question to distribute storage batteries easily, and consequently, if they are used they must be stationary and be charged over a line from a central point. This method quickly becomes uneconomical when low voltages are desirable, or necessary, owing to the large loss of energy in transmission, for the potential cannot be higher than that needed to charge the batteries. With alternating current the potential may be made as high as desired, and the transmission losses cut down. Yet even under very unfavorable conditions stationary storage battery may be the most desirable means of operating a signal system. This is especially true where reliability, at a reasonable cost, is chiefly to be desired. The storage battery may be made of such capacity that it will operate the system for any given time without the necessity for recharging, so that should the line fail, there would be no interruption of signal operation. This is not possible with alternating current apparatus. Storage batteries occupy less space than primary batteries of the same capacity, and need less attention in the way of renewals. It is not necessary, except at rare intervals, to transport heavy supplies to be used in storage battery maintenance, whereas this must be done every time a primary battery is renewed. Storage batteries, however, need the attention of the maintainer every time they are charged, and this occurs much more frequently than the renewal of primary battery.—*W. H. Arkenburgh.*

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WE GUARANTEE, that of this issue 8,750 copies were printed; that of these 8,750 copies 7,191 were mailed to regular paid subscribers to the weekly edition, 225 were provided for counter and news companies' sales, 1,049 were mailed to advertisers, exchanges and correspondents, and 285 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 183,850, an average of 9,192 copies a week.

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Volume 58 May 14, 1915 Number 20

Contents

*Illustrated.

Reclaiming Scrap Material

A railroad officer who had made a tour of inspection of the scrap reclaiming plants on various roads, when asked what impressed him the most, replied that the greatest benefit he had received was in learning what not to do. The reclaiming of scrap is a problem which requires the most careful study. What may be profitable for one road to reclaim may not be profitable for another. An enthusiast, and there are such men handling the reclamation of scrap, must be very careful not to be "penny wise and pound foolish." There are vast opportunities for making money in doing this work and there is also an excellent opportunity to overdo it. The overhead charges, as in no other class of work, must be carefully watched. An able and intelligent supervisor who can devote his entire time to the study of this problem will earn his salary many times over. It is a purely business proposition and it should be run on a business basis. It must be handled in the main for profit only, and in this respect it is different from the general run of railway shops where output is generally the controlling factor. The Railway Storekeepers' Association has been making a careful study of this subject and the report at its convention next week will be looked forward to with a great deal of interest.

Weaknesses of Railroad Advertising

We publish elsewhere parts of an interesting paper by Edward Hungerford on "Railroad Advertising," Mr. Hungerford criticizes the organization and methods used by railways generally in handling their advertising. On the whole his criticisms are justified. On most railways the advertising department is a mere appendage of the passenger department, and its chief function is to exploit the passenger service. Neither its location in the passenger department nor the use of practically all of its appropriation for exploiting passenger service is sound. There are numerous purposes besides that of exploiting the passenger service for which advertising could be effectively used, and if this were done the business of the railways and their relations to the public would be improved. The railways have a great deal more freight traffic than passenger traffic and their freight service is relatively profitable, while their passenger service is relatively unprofitable. Why spend so much money in advertising the least profitable part of the business and so little in advertising the most profitable part? Within recent months railways in various parts of the country have used advertising extensively to present to the public facts regarding the inadequacy of their earnings and the unreasonableness of certain kinds of legislation, such as that for the limitation of the length of freight trains and for unnecessary men in train crews. There can be no doubt that this advertising has tended to create a more intelligent and fair public sentiment regarding railway matters. There are so many good uses that can be made of advertising that it is a pity its principles and possibilities are so little understood in the railway business.

Battle of the Cost Accountants

It is perfectly easy to ascertain what it costs to render any particular railway service. At least, so we have been told for years by a certain class of professional critics of railways. The reason, according to these people, why the roads have not developed a system of cost accounting as a basis for making rates is that they have wanted to surround the traffic manager's job with an atmosphere of mystery in which he could work his will at the expense of his customers. But when self-confessed "experts" employed by the packers and other shippers and their willing coadjutors, the western state railroad commissions, attempt to analyze the costs of handling different kinds of traffic, the results of their calculations seem to depend entirely on what they want to prove. Four cost accountants, three of whom were employed by the state commissions and the shippers, and one by the Interstate Commerce Commission, testified before Commissioner Daniels at Chicago recently, and each of them succeeded in establishing an entirely different cost of handling each of the commodities regarding the rates on which they testified. Each of these "experts" also succeeded, of course, in showing that the methods used by each of the other "experts" in arriving at his results were entirely wrong. If this had been a battle between cost accountants employed by the railways on one side and the shippers and their humble servants, the state commissions, on the other, it might have been understandable, but the inability of even one side to get its "experts" to come anywhere near agreeing shows the stage of development that railway

cost accounting is still in. As long as "experts" of this class continue to thus disagree it is to be feared rates must perforce continue to be based on the unscientific and despised principle of "what the traffic will bear." This fiasco shows how much easier it often is to fulminate against those who act on unscientific principles than it is to formulate scientific principles for them to act on.

THE STUDENT IN THE RAILWAY BUSINESS

A LARGE majority of the higher officers of American railways have risen from the ranks without the advantage of college education and training. In many cases they have not even gone through high school. There is, in consequence, a widespread impression that the knowledge and mental discipline which can be obtained by study is of no advantage, or may really be disadvantageous to one who seeks to rise in railway service. No impression could be more entirely wrong or more adapted to be harmful to the ambitious young men in the service. There is no better educated class of men in the United States than the higher officers of our railways, and a large part of the education of the most "practical" of them has been derived from the study of the literature of their business. This needs to be emphasized for the good of the young men in the service and for the good of the roads themselves, for the need of the roads for officers who know both all that can be learned about their business from practical experience and all that can be learned about it by study, constantly exceeds the supply.

In the first place, the number of college men who have made successes in the railway service is large in proportion to the number of college men who have entered it. Among the college men who within very recent years have been brought prominently before the public by their promotions to positions of great importance are Howard Elliott, who left the presidency of the Northern Pacific to become chairman of the New Haven; Fairfax Harrison, president of the Southern; Julius Kruttschnitt, chairman of the Southern Pacific, and Hale Holden, president of the Burlington. A college training is far from being a drawback in a railway career. It is a great help.

In the second place, there is hardly a high officer of an American railway who has risen without a college training who has not, nevertheless, been a student all his life. It is a great mistake to assume that the "self-made" leaders of the industry have learned all they know in their daily work. The greatest of all this class, James J. Hill, studied at a small academy but never went to college. But Mr. Hill did not quit studying when he left the academy. He is one of the most widely read men in any line of business or professional work in America. To mention other high railway officers who, without college training, have nevertheless become highly educated, would be invidious, because to mention some would be to discriminate against many others equally deserving of mention. The president of one of the large eastern lines, who started railway work as a track laborer and a fireman, says that the turning point in his career was reached when he read Wellington's work on "Economics of Railway Location." The detailed information, the scientific principles and the broad outlook of this book taught him there were many things he could learn from the printed page which he could not learn elsewhere, and from that time he has been a tireless reader of the literature of transportation and of the broad field of economics and industry.

The president of a large western railway not only reads almost everything published on the problems of transportation and industry, but buys and gives as Christmas presents each year to the officers of his road the best recent book he can find on these problems. He seeks thereby to cultivate the same studious habit among his subordinates which he has found valuable to himself. The chairman of another large western road subscribes to all of the economic journals and has them sent to his home address. The president of another great western trunk line is an omnivorous reader not only of books and magazine articles relating to railway and business matters, but also of newspaper clippings, and those who come in contact with him are often astonished at the completeness of his knowledge of everything that the press is saying about railways. A few days ago the presidents of three great railways met by chance. Their railways are all in the same territory. One might have expected that their conversation would have turned to the railway situation in their section. On the contrary, one of them, who carries as heavy responsibilities as any business man in the United States, opened the conversation with the question, "Have you seen Prof. Ripley's new book on 'Railroads'?"

The illustrations given are not exceptions to the rule; they are illustrations of the rule. If one could ascertain the amount and breadth of the study done by the officers of each rank in the railway business he would find that on the average the presidents are the hardest and broadest students of all.

It is not a mere coincidence that the higher officers of the railways usually are not only among the most practical men in the business, but also among the most studious. Broadly speaking, there are only two ways in which people learn. One is by experience and the other is by study, and the one is as indispensable as the other. The experience of others, if properly understood and utilized, is as valuable as one's own experience, and study of books, magazines, convention reports and so on, is the best means to get a broad knowledge of the experience of others in such concentrated form as to make it serviceable. The man who attempts to do an important class of work without appropriate previous experience will usually make a failure of it, however much he may have studied. But the man who relies entirely on his own experience as a means of preparation for higher duties will with almost equal certainty make a mediocre success or a complete failure. A book, or an article, may be written, or a paper edited by a so-called "theorist," but if he is skillful in bringing together the results of the experience of practical men, a reading of his writings will be helpful to the most practical.

Every once in a while you hear a man say that he "hasn't time" to read the literature of his profession. In 99 cases out of 100 such a man will never be promoted to a high position, and if he is will make a failure in it. It is not a coincidence that as a class the presidents of the railways are the hardest and broadest students in the business, because in most cases those who are presidents owe their promotions to the fact that they early learned the necessity of adding to the knowledge derived from their own comparatively narrow experience, the knowledge of the experience of others that can be gained only by broad reading and study. They do not study because they are presidents; but they are presidents largely because they have studied!

ENGINE MAINTENANCE AND FAILURES

THE cost per engine-mile of locomotive maintenance and the mileage per engine failure give the best indications of the economy of the operation of the mechanical department of a railroad. For several reasons, however, these items should not be used to compare the efficiency of the operation of mechanical departments of different roads. In the first place, the operating conditions will to a large extent affect the performance of the mechanical department, bad water, heavy grades and poor track having material effect on the condition of the power. Also, the class of power and the facilities provided for its maintenance will be a large determining factor. The best way to use these figures is to compare one year with another, making a careful analysis of them with a view of correcting the weak points. This will require a thorough study of the conditions on each individual road and will undoubtedly show where profitable investments may be made.

An excellent example of what has been accomplished by following this practice may be found on the Minneapolis, St. Paul & Sault Ste. Marie. The cost of locomotive maintenance per locomotive mile for the year 1914 on the Soo Line proper, that is,

excluding the Chicago division—the old Wisconsin Central—was 8.55 cents, with an average mileage per engine failure of 49,925 miles. Within the past nine years this road has increased its mileage per boiler failure from 9,250 miles in 1906 to 848,720 miles in 1914, notwithstanding the fact that a large part of the territory over which it operates has very bad water. The Chicago division, during 1914, operated at a cost of 5.87 cents per locomotive mile with a record of 50,608 miles per engine failure and 1,872,000 miles per boiler failure. This division, however, has good water. The year before this road, the Chicago division (Wisconsin Central), was taken over by the Minneapolis, St. Paul & Sault Ste. Marie (1908) it was operated with 550 engine failures. In 1914 the total number of failures was 105. In this case the mechanical department has been materially assisted by the introduction of modern power. The Soo Line, taken as a whole, made the best showing of any road owning over 75 locomotives in the matter of boiler defects reported by the Federal Bureau of Locomotive Boiler Inspection, having only 46 locomotives reported as defective out of 529 owned and 313 inspected, with none ordered out of service.

Attention is called to this performance to illustrate what can be done by carefully and effectively studying the problem of locomotive maintenance. The officers attribute their success to perfecting the organization and insisting on careful maintenance and rigid inspection.

NEW BOOKS

Railway Statistics of the United States for the Year Ending June 30, 1914. By Slason Thompson, director of the Bureau of Railway News and Statistics. 140 pages, 5½ in. by 8¼ in. Bound in paper. Published by the author at Chicago.

This is the eleventh edition of Mr. Thompson's annual volume of railway statistics, which is valuable because of the promptness with which it is issued, and because of the interesting character of the classes of information which it includes, such as the comparison with foreign roads and other facts not given in the publications of the Interstate Commerce Commission. The statistics of the essential features of railway construction, maintenance and operation are compiled from annual returns identical with those made to the Interstate Commerce Commission from 446 roads operating 245,894 miles of line, representing nearly 97 per cent of the mileage and fully 98 per cent of the total traffic of the railways in the United States. For previous years comparisons are made with the official figures of the Interstate Commerce Commission.

The railway statistics of the United States are given under the headings of mileage, equipment, employees and their compensation, capitalization, cost of construction, ownership, public service, earnings and expenses, taxes, damages and injuries, accidents and receiverships. The statistics of foreign railways cover 21 countries. An introductory chapter compares the railway progress in the two decades, 1894 to 1904, and 1904 to 1914, and also gives a very interesting analysis of the present situation of the American railways and their relation to government regulation. After showing the reduction in rates, and increases and expenses for the last 10 year period, however, Mr. Thompson shows that there is a brighter side to the railway situation in a number of signs that mark the tempering of the popular mind toward the transportation industry. In this connection he shows that numerically considered there was a practical balance between the number of decisions rendered by the Interstate Commerce Commission during the year for and against the carriers. While there were 111 decisions dismissing complaints there were 112 decisions making reductions or allowing reparation, and 56 decisions permitting advances and 55 denying advances; also the percentage of decisions dismissing complaints, 49.8 per cent, is larger than for any year since the bureau began its analysis of decisions in 1909, and the percentage of decisions awarding reparation or reducing rates, 50.2 per cent, is the smallest for any year. Mr. Thompson points out, however, that the decisions permitting advances are the only ones affording permanent relief to the railways.

Letters to the Editor

A VICE-PRESIDENT IN CHARGE OF LABOR

Wilmington, N. C.

To the Editor of the Railway Age Gazette:

Railroad labor contracts are unlike anything pertaining to similar contracts in other industries. The farmers, the merchant and the manufacturer employ at a fixed rate per unit of time or output, making it necessary only to keep a record of the hours employed or the number of pieces manufactured in order to decide questions arising under the contracts in force. Also, in most cases labor employed by these classes of employers can be closely supervised. On a railroad the conditions are quite different. Labor is widely scattered, often entirely removed from those in charge, and the contracts are based not only on time and piece, but on combinations of both, resulting in such an intricate system that no one but a decided specialist is competent to pass intelligently on questions which arise.

Every railroad man who has anything to do with the supervision of transportation labor knows that a large part of his time is taken up by the adjustment and settlement of matters arising from misunderstandings or from ignorance of the company's labor agreements. In one case which came to the writer's notice a general manager estimated that 60 to 70 per cent of his time during a period of half a year was taken up in handling grievances with brotherhood committees.

So, then, a situation exists of which the unfortunate part is this: That the time of transportation and general officers which ought to be given to matters concerning the economical movement of trains, is given over in large part to the settlement of labor disputes, to the detriment of transportation matters as a whole. Nor can the situation be solved by having at hand subordinates well versed in pay schedule matters, for the reason that the men are generally unwilling to accept a settlement which goes against them until it has been reviewed by the highest officer to whom they can appeal.

This gives rise to the question, "Why not a vice-president in charge of labor?" A man of the proper temperament and a thorough understanding of the questions involved, it seems to the writer, could be of incalculable value to the present American railroad organization.

We have in our present organization men whose sole duty is to see that materials are obtained at the lowest possible cost consistent with good quality. It is a further duty of these men to see that such materials are used with the greatest economy possible. Why, then, is it not imperative, now that wage schedules and the entire relation of the company to its employees has become complex, to have a trained officer handle such relations, with a view to obtaining as much as possible for the money expended as is consistent with service and safety? Also, to see that the labor employed, even as the material purchased by the supply department, is used with the greatest economy; which, in the case of labor, is the same as saying developed to its highest efficiency. In 1913, the Bureau of Railway Economics tells us, the railways of the United States expended 2.16 billions of dollars for operation; of this 63.4 per cent was for labor and 36.6 per cent for material, a ratio of nearly 2 to 1. If, then, we have created a special department to care for material, why not organize a department to look after the purchase of labor, which we buy in so much larger quantities, and to develop it to its highest capability?

On a road having a vice-president in charge of labor any grievances arising among trainmen, shopmen or other employees, after being passed on once by the subordinate officer directly in charge, to the dissatisfaction of the man or men affected, would be immediately referred to this vice-president. He would proceed to meet the men and his ability and authority would enable

him to settle all matters which are adjustable; and this with a minimum of lost time, correspondence and friction. Some will object that questions will still be appealed to the president or higher. This is true, but on the other hand a vast deal of intermediate correspondence and delay, if not actual friction, will be eliminated, and it is believed that the right man in such a position could and would decide matters in such a way that the president need waste but little time in rallying to his support.

The office could be made a broad one, to the great benefit of the whole organization. For instance, besides the mere handling of disputes, this vice-president would be advised of every decision made by any lower officer in regard to labor differences. Classifying these he would be able to advise with the officer by whom the decision was made, and often, by the prevention of a repetition of some decision, avoid the establishment of a dangerous precedent.

His would be the one department charged with the keeping of a complete record of each employee as to: (*a*) date of employment; (*b*) rate of pay; (*c*) promotions; (*d*) discipline.

The heads of the relief and pension departments could, not unnaturally, be brought under his supervision. The fact of his having complete records of all employees would make this desirable, and the keeping of relief or pension records of an employee on the same card or in the same envelope with his service record would avoid duplication of work.

A vice-president with the duties suggested would find his time fully occupied. By taking over duties now performed by other men he would give those men more time to devote to strictly transportation work. This would result in a money saving far exceeding the cost of any salary which could justifiably be paid to such an officer. For, if a general manager, a general superintendent, or any transportation officer, because of press of his "labor" work, fails to properly supervise train loading, the accumulation of foreign cars, etc., he can in a short time cause a money loss which will many times exceed any possible cost of creating and maintaining such an office as is here outlined.

J. Lowell White.

WAGES OF ENGINEERS AND FIREMEN

Fort Worth, Tex.

To the Editor of the Railway Age Gazette:

In the award of the board of arbitration, in the controversy between the western railroads and the engineers and firemen, the minority report of members Burgess and Shea contains some wild assumptions and assertions that indicate they are bad losers, to say the least. The minority practically intimates that if the next demand is not granted, the two organizations will strike; they say that "this award settles nothing"; they refer to immense surplus earnings and dividends, also concealed assets, and demand increased wages as a share in these sums, disregarding the law of supply and demand for labor or any consideration of the value of the work, asking the same wages for oil-burning engines and mechanical stokers as for shovel-fired big engines.

If surplus earnings and dividends justify corresponding increases in wages, will the engineers and firemen work for less wages on the Wabash, Western Pacific, Frisco, Rock Island or other roads where there were deficits? Certainly not, the work is only worth its value.

They say that in 1914 the western railroads paid $43,000,000 in dividends on fictitious stock. In looking over the list of roads, parties to this arbitration, after you eliminate the roads that failed to pay any dividends, if you capitalize this $43,000,000 at 4.3 per cent, you have one billion for value of fictitious stock. Such assertions are reckless and vicious, and should be carefully and publicly denied and actual facts compiled and published.

They practically insist that there will be no peace until all their demands are granted. By their position they make it necessary and advisable to meet their demands with a stern refusal.

Employees in other departments need consideration, especially those that are unorganized.

The average earnings of enginemen are now about as high as the work is worth, even admitting it is hazardous, and the hazard can be reduced by spending more money on tracks and signals, although their vocation is far safer now than it was a few years ago, engines ride easier and hours are shorter.

The writer concedes that they should be well paid, even better paid than other classes of employees, but the time has now come for them to be content with their lot, under present conditions.

Avery Turner.
Receiver, St. Louis, San Francisco & Texas.

THE USE OF A HIGH FACTOR OF ADHESION

Chicago, Ill.

To the Editor of the Railway Age Gazette:

Referring to the inquiry "Why Use a High Factor of Adhesion in Steam Locomotives" on page 778 of the issue of April 9, I would suggest for your correspondent's consideration that the fact that it is customary to reduce the thickness of driving tires from 3½ in. to 1¾ in. by turning, and to bore out the cylinders to a diameter at least ½ in. greater than the new diameter, may throw some light on the adoption of a factor of adhesion which he considers unnecessarily high.

C. E. Miller.

Toronto, Ont.

To the Editor of the Railway Age Gazette:

This subject, referred to on page 778 of the issue of April 9, was recently a matter of much concern on this road and at that time was thoroughly discussed by our mechanical department officers.

Speaking generally, it would appear that practically all new locomotives have been equipped with superheaters, brick arches and other appliances which tend to greatly increase the sustained capacity of the boiler. In superheater engines the steam is to some extent wire drawn in the superheater, hence the pressure at the beginning of the stroke may not be as high as in saturated steam engines, while, owing to the superheater, the mean effective pressure will be higher, thus insuring an appreciable reduction in slipping, which may be taken advantage of in the design of superheater engines. We have been operating superheater engines for more than five years, and the most successful freight engine we have was designed with a factor of adhesion slightly less than 4.5. We do not feel that this should be exceeded, at least for our requirements. Our Pacific type passenger locomotives have a factor of 4.3, with a boiler pressure of 170 lb.

It is difficult to discuss the subject without reference to some specific service, as we have found that where slow heavy freight service is concerned it is possible to reduce the factor to 4.1 and even less by increasing the boiler pressure. This practice has given excellent results. Many freight engines have been built with a factor as low as this, but when the tractive effort is greater than 25 per cent of the weight on driving wheels, there must be an abnormally good rail condition in order to realize the full power, which even then cannot be done unless a low speed is maintained.

It has been our practice to design locomotives for 170 lb. boiler pressure (the boilers being calculated for 200 lb. pressure), using a moderate factor of adhesion; this allows for increasing the boiler pressure and thus increasing the ratio between tractive effort and weight on driving wheels.

L. K. Sillcox,
Assistant Mechanical Engineer, Canadian Northern.

Badges for Welsh Railway Employees.—The Cardiff Railway Company has just issued to all members of its staff of military age, who are desirous of enlisting, but cannot be spared from the service of the company, a tastefully designed badge, indicating the fact that the wearer is engaged in important war work at home.

Aspects of the Financial Problem of the Railways*

Consideration of the Effect Which the Federal Reserve Act Will Have on Needs of Railways for New Capital

By H. P. Willis
Secretary of the Federal Reserve Board

The most fundamental fact in the present railway situation is, I believe, the demand for new capital. For reasons which are known to all and require no detailed discussion from me, the amount of capital invested in new transportation enterprises during the past few years has been insufficient. The mileage of the country has been increased only from 207,977 miles in 1903 to 249,802 miles in 1913. The railroads of the country, considering the difficulties under which they have had to work, have done well in maintaining their investment in plant equipment and facilities generally. It would be wrong, however, to believe that they have kept pace with the advancing development of the country in other directions. What the reason for this relative backwardness is, I shall not attempt to inquire in detail at the present time. Certainly the ten years last past have not been an encouraging time for railroads, nor have they been years during which the investor either was, or could be expected to be, eager and willing to put his funds into transportation enterprises.

Now suddenly a new factor has been added. A struggle of unprecedented violence has broken out in Europe, with the result of destroying enormous quantities of fixed and circulating capital. This destruction of capital has affected every department and branch of enterprise, and will continue to do so from now until the close of the struggle in which nearly all of Europe is engaged. Various estimates have been made from more or less trustworthy sources with reference to the actual destruction of wealth in the course of this world conflict. I do not believe that any of these estimates can be even approximately accurate. Yet we can, with entire safety, recognize that very vast losses are being inflicted upon the world from three sources—the actual physical destruction of forms of capital, the withdrawal of productive workers from employment, and the actual loss of these workers and their productive power in consequence of death on the battlefield or from injuries or disease. Much of these losses of capital is of a kind which cannot be measured in terms of money, and much of it can not be estimated or accurately stated.

What we do know is that when the close of the war shall have been reached, however it may turn out, there will be a very great demand for capital to be used in the upbuilding of industries and in the restoration of those objects of use and production which have been so widely and so ruthlessly destroyed. The natural effect of this shortage of capital will be an increase in the rate of interest, with corresponding competition among those who wish to use capital for the purpose of carrying on business. This demand for capital will be a demand for long-term investment funds, not for money. However it may be masked by temporary circumstances, it will be a real thing involving the readjustment of supply and demand of the means of production. Such readjustment can be had only through an adaptation of methods of production and alteration of the prices charged for the use of the capital in question.

I know that there are some thinkers who believe that, owing to depression there will be a period in which demands for capital will be slack, and the rates of interest low. Whatever temporary force there may be in such a view as applied to short periods, it cannot, in the nature of the case, hold over the long-term operations involved in the process of restoring and rebuilding the business of the world. To restore the lost shipping, to replace railway lines, to rebuild factories and generally to put the world where it was before the opening of the struggle as regards productive facilities, with be the labor of a long period. While this is proceeding, other enterprises throughout the world will have to bear their share of the burden. They cannot, if they would, escape the fact that the new capital they need is urgently desired by others who would be willing to pay for it at high prices.

Thus, the railways, which are among the greatest borrowers of capital in every country, must, in the nature of the case, in common with other industries, find themselves hampered and crippled by anything which stands in the way of their obtaining the resources they require. They are confronted by a peculiar problem because of the practice which has arisen in recent years of financing their necessities in no inconsiderable degree on a short-term basis. We do not exaggerate, therefore, when we say that the capital problem of the railways was serious before the war, that it had been made particularly serious by the practice of short-term borrowing, and that the war itself has now placed the roads in an unprecedented position.

THE FEDERAL RESERVE ACT

While the situation is thus one which presents difficulties worthy of the attention of the best financiers, in so far as the acquisition of capital is concerned, there is a second factor in the situation that deserves very careful consideration, both from the standpoint of what it will do to influence conditions, and of what it will not do. This is the change that has come about in our banking system. Little more than a year ago congress passed the Federal Reserve Act. This act provides for the creation of banks of rediscount whose function it is to make banking resources fluid, and by that means to render capital active in a degree never heretofore possible. I do not exaggerate in the least when I say that this act holds out the greatest promise to business enterprise that has been offered to it for many years.

If the business community contents itself with simply continuing its present methods of operation, it will derive great advantage from the law. It will find (1) that local banks will be able, by rediscounting the paper of local enterprises, to provide the funds needed by such enterprises in their commercial transactions; (2) that there will be no such wide fluctuations of interest rates either geographically or from season to season as now exist; (3) that there will be no necessity of emergency measures to safeguard the country from the possible results of financial panic or stringency. Credit will be more simply available, cheaper, and more equitably open to all.

Not the least of all the advantages to the business man will be found in the provisions with respect to bank examinations, since through these, it may be hoped, many operations which have been open to criticism in the past will be clearly detected and corrected before they have had time to impair the vitality of institutions which might otherwise have continued sound and solvent. This is equivalent to saying that, under the new law, credit, even if there be no change in business methods, will be cheaper and more evenly diffused

*From an address before the fifth annual banquet of the Railroad Men's Improvement Society, New York, February 6, 1915.

as well as more steady and more certainly to be counted upon by those who do business by acceptable methods. But the community will not gain the greatest advantage from the measure if it adheres merely to established types of operation. The new act provides for the creation of a thorough discount market, such as has existed for many years in every European country. This means that every merchant of established local credit may in the future count upon a free sale for his paper throughout the reserve district in which he is situated, and to a somewhat lesser degree generally throughout the country.

The rediscount principle, when fully worked out, taken in connection with the use of the acceptance system, limited though it be to foreign trade transactions, will enable the sound, even though small, manufacturer or trader to get the advantage of the best rates of commercial credit that prevail anywhere within his region of the country. If there is capital to spare—unemployed and seeking occupation—he may expect that, through the general sale of bills under the new system, such capital will be available for the purchase of his paper, and will be so employed. By the judicious use of the acceptance privilege, now for the first time given to national banks, the local bank will be enabled to facilitate the movement of goods into and out of the country, and will at once make the utmost of its own capital, and at the same time enable its clients to gain the widest employment for their resources. The net result of these various influences should be (1) considerable reduction in average rates of interest on commercial paper throughout the United States; (2) very great reductions in the rates in certain sections remote from commercial centres; (3) stability and certainty in distribution of credit; (4) creation of new and more convenient types of paper.

SHORT TIME FINANCING

But while the act will be of enormous advantage to the business world, and through it to every productive, agricultural and industrial enterprise, it is not well for any thinker on the subject to mislead himself into the belief that such legislation will do the impossible. The Federal Reserve Act is not a measure which has to do with long term investment of capital, and those who look to it as a direct means of relief for manufacturing enterprises, like those who look to it as a means of providing agricultural resources, must inevitably be disappointed. Their disappointment will be based not upon the lack of results, but upon the fact that these results will be different, and will be exhibited in a way at variance with that which they had expected. It is worth while for me, therefore, to explain with some care, the relation of the Federal Reserve act to this question of longer term borrowing.

Much has been said of the effect of the Federal Reserve Act in furnishing an elastic currency, and in converting good commercial paper into immediate means of payment through rediscount operations. It was natural that the first attention of the public should be centered upon this subject, since it, above all others, has for many years past seemed to constitute the crux of banking operation. I would not for an instant minimize the importance of what has thus been done; indeed, I regard it as the fundamental purpose of the act. There is, however, much to be said of the effect of the Federal Reserve Act in other directions. One of these neglected phases of the subject relates to the influence of the new law in bringing about a readjustment of the rates of interest upon paper of varying maturities. The Federal Reserve Act specifically limits the paper which is rediscountable by member banks, as well as that which is purchasable in the open market, to notes and bills running not over 90 days, except in those cases where the paper is drawn to finance agricultural transactions, when the limit is extended to six months.

The act, however, wisely gave to the banks the power of regulating rates of discount on a different basis for shorter and for longer term paper; and to the Federal Reserve Board the power to approve such varying rates. It, moreover, permitted a variation of rates as between different sections of the country, so that both a time and a geographical variation were sanctioned. This was an important advance as compared with previous plans for the reformation of the banking system. Under the older plans it had been intended to create a rate of discount which would be uniform throughout the country; while such plans usually contemplated the rediscount only of very short term paper. The Federal Reserve Act was more carefully adjusted to conditions in that it recognized that much of the business of the United States is done on a relatively long period of credit; and that the fact that this period of credit is longer in some cases than in others, in no sense means that the paper is not liquid, and that it is practically certain to be redeemed at maturity, notwithstanding that the maturity is postponed.

The effect of the Federal Reserve Act, then, is to establish a series of maturities, some longer and some shorter, and to permit the placing of different rates of discount on these maturities. This is an idea of great importance. It is not a novel idea, because every well managed bank of large capital and great scope of operation endeavors to apply this policy. But it is of greater importance than ever before for the reason that the Federal reserve banks, owing to their ability to discriminate carefully between different classes of paper, will be able to make effective the discrimination they introduce into the rates applicable to different maturities of commercial paper. Inasmuch as they stand ready to take very short term paper in very large amounts at an unusually low rate of discount, they tend to emphasize the desirability of making obligations run for as short periods as practicable, since, the longer an obligation runs, the higher the rate of interest to be paid on it.

In other words, the Federal reserve banks are rendering to the commercial community the useful service of emphasizing the time element as compared with the mere element of safety in commercial paper. They will place a premium upon good short term commercial paper, and they will tend, so far as practicable, to discourage the financing of long term obligations through commercial capital except in those cases where the borrower is able to pay a relatively high rate of interest because of special conditions under which his product moves to market. The theory upon which the whole act is based, indeed, tends to place stress upon the view that very long term obligations, no matter how safe they may be, cannot be financed through the commercial banks at low rates, and that they are not as appropriate a medium for investment of funds as are the much shorter term maturities already referred to.

THE RAILROADS AND THE BANKS

The principle thus recognized has a most important bearing upon the conditions under which many enterprises are financed. It is true that within recent years railroads and other industrial enterprises have turned in many cases to the banks for the purpose of getting accommodation, and the banks have financed them upon the basis of short term notes, such notes running one, two, three or more years. That these notes have borne relatively high rates of interest has been a natural, not to say inevitable, incident in the situation; and the roads have been obliged to bear the brunt of the resulting expense. In other words, they have placed themselves in the position of long term commercial borrowers at banks. Under the new system they will be no more favorably situated than under the old; indeed, the fact that they are borrowing practically on the basis of long term commercial borrowers, will be emphasized.

The commercial banks will inevitably find themselves more and more inclined to keep their assets invested in paper

and obligations which do not exceed the maturities mentioned in the Federal Reserve Act; or if, for purposes of investment they place a part of their funds in long term obligations, they will take this step simply for the sake of convenience. They will be inclined to discourage the carrying of borrowers who are really seeking for additional capital; and they will tend more and more to convert their holdings of such borrowers' paper into short term commercial paper. They will tend more and more to adopt this policy as time goes on, and as the supply of commercial paper in new forms makes it more adequate to the needs of the situation. The carrying of such short term obligations will, therefore, tend to drift more and more into the hands of purely investment bankers, and they will need to establish a regular and steady flow of the securities into the hands of the public. Within recent years many banking institutions have become large investors in notes running from one to five years. The safety of the obligations is doubtless assured, but they are not strictly banking investments.

The direct inference from what I have said is a thought which has often been suggested within the past year or two in well informed quarters, but which has never been emphasized so positively as today. This is that above all things else it is imperative to facilitate the funding of railway obligations into long term securities, and to place these securities in the hands of the public. What the railroads seek to obtain through the issue of securities is capital for extending their equipment and mileage, and for generally enlarging their investments in fixed forms. The railroad is not in the position of a commercial borrower; and the obligations which take the form of bonds or three year notes, have no such relation to current services and payment therefor, as is the case with paper issued by commercial firms, corporations or individuals. It has long been a familiar fact that the best rates of interest and the most favorable terms were obtained by giving to railroad securities a reasonably long maturity; and it has been equally obvious that the credit of railroads was best safeguarded and the stability of their funded indebtedness was most strongly assured when the securities were widely distributed, and their bonds held by actual bona fide investors who bought them because they sought a safe means of investment for their funds, and intended to hold them because of the income producing power of the securities.

From all standpoints, then, and for all reasons, it is most urgent that the commercial banks of the country should be enabled to relieve themselves of the load of short term obligations representing investments in fixed capital, which they are now carrying. It is not possible to state the amount of such securities which appear among the assets of the banks, national, State and private, but it is large. This sum of values held by banks does not represent commercial banking operations, and will no doubt be gradually eliminated from the banks' assets and added to individual assets. It should not, in so large a measure, at least, continue to figure as a part of the commercial banking resources of the nation. To bring about this change does not imply any reflection on railroad credit; but, on the contrary, must be the outgrowth and most marked success of an effort to strengthen it.

THE PUBLIC AND RAILROAD SECURITIES

How can the public be induced to take up these securities, thus relieving the banks of the necessity of carrying railroad and similar securities, and to hold them firmly and permanently that they may constitute an indefinite investment in the railroads of the country, and may enable the roads to get the advantage of reasonable rates of interest at the same time that they are given the knowledge that they will not be disturbed by any necessity of refinancing themselves at short intervals? The answer to this question can be furnished by making the securities of railways more attractive to, and more popular with investors, and consequently by producing a stronger and more continuous demand for them.

Many persons seem to suppose that the placing of the securities with the public in the way I have indicated necessarily means the raising of interest thereon. This by no means follows. The small investor does not seek a high rate of interest so much as absolute security. He feels absolutely secure when he finds that the railroad which has issued the bonds he buys is earning a revenue sufficient to take care of the interest upon its obligations. In proportion as this revenue is adequate, the safety of the investment is assured; in proportion as safety is assured, rates of interest decline; in proportion as rates decline, the life of the investment can be lengthened. The situation is the exact reverse of that existing with respect to commercial paper, inasmuch as the rate of interest is primarily a matter of safety and long life; whereas in commercial paper the rate is the outgrowth of prompt maturity and certainty of liquidation. Certainty of liquidation is analogous to safety of investment, but far from being identical with it. There is nothing to be gained and much to be lost from attempting to identify the two factors. They should be sharply differentiated from one another; and it should be recognized that conditions which control rates of interest on commercial loans are far from being the same as those which control rates of interest on capital investment.

I have thus described to you some of the fundamental principles of the Federal Reserve Act in its relation to a phase of the banking problem which has received relatively little discussion. I have not attempted to indicate what is the relation of the new banking system to the question of interest rates on long term loans, and yet I think I should, perhaps, say a few words on that point. It should be understood that while, as I have attempted to explain, there is no necessary connection between the rates on short term obligations and notes or bonds running over a period of years, there is, nevertheless, an important relationship between the amount of capital or financial energy required to carry on the banking system of the country and the amount of such energy required for the support of long term operations.

The Federal Reserve Act is essentially a means of economizing the country's gold supply and its credit resources. When fully developed, the act may be expected to set free a considerable amount of capital which has heretofore been needed to carry on short term operations. That is to say, by reason of the fact that short term operations have been provided for on a smaller basis of outlay than in the past, a considerable amount of capital employed in financing these operations will be set free, and will thereby be enabled to go into the long term or investment field.

In so far as this release of capital is effective, it will tend to improve conditions in the general money market, and to lower rates of interest prevailing there. It will, moreover, do an even more important thing than this. By helping to make the line of division between short term and long term undertakings clear-cut and well defined, it will relieve the long term borrower of many incursions into his general field of capital investment from which he now suffers. The effect should be a decidedly more stable and probably a lower rate of interest than would be established without this factor. This in itself will be of very great value to the legitimate borrower who may wish to place securities on the market.

Both of these factors are, however, of that slowly working and conservative kind that figures but little in current discussions of such subjects, and that receives only passing attention from the casual student. They will require a considerable period for their complete development, and when they have been fully applied it will still remain true that the financial problem of the long term investor is essentially dependent upon the demand and supply of capital and in its prac-

tical working out, upon the question what he can offer to the public.

In the case of the railway this becomes a serious matter. As a result of the legislation, with which we are all familiar, intended to control transportation rates, our railroads have become far more stereotyped in practice than formerly. They do not venture to reduce a rate in the hope of stimulating business because they recognize that once reduced, a rate can only with great difficulty be advanced. The railways, whatever the stabilizing influence affecting the rate of interest may be, will, therefore, always have to meet the question whether they can provide the actual net resources that are necessary to take care of their fixed obligations. Undoubtedly the recent advances granted by the Interstate Commerce Commission will be of some service. But will the railroads be permitted to retain those advances? Will public opinion allow the roads to keep for themselves the fruits of these higher rates? Will organizations of employees regard the rates as only a basis for increased wage demands to be taken from the roads as soon as they can by arbitration or other methods, succeed in absorbing them?

A QUESTION OF EDUCATION

This is not a financial problem, it is a question of popular attitude and education. But the problem is financial in this sense: Up to date the railroads have been too largely dependent upon banking institutions for the financing of their obligations. The time has come when the public must be induced and expected to take over these obligations and to carry them as investments. If they cannot or will not do this, then the financial problem of the railroads is truly a serious one. It is undoubtedly a fact that the railways of the country, in order to introduce the technical improvements in their financial situation of which I have spoken, must be able to furnish the basis of all long term credit—a safe surplus of revenue over expense, applicable to the payment of interest. This they cannot do unless they are enabled to earn satisfactory revenue from freight and passengers, thereby providing for meeting their obligations, and giving the holder of such obligations meantime, the confidence that his funds are in safe hands.

Something has been done in this direction by the recent 5 per cent rate decision of the Interstate Commerce Commission. This decision, however, is of more importance in what it suggests than in what it accomplishes. The basis for it is manifestly found in the statement that the railroads are recognized as having distinct and ascertainable needs, and to be authorized to collect sufficient revenue for the services they render to compensate the holders of their securities for the use of the funds intrusted to the carriers themselves. There has been an unmistakable turn in public opinion with regard to this subject. So long as the roads were regarded as possessing unlimited resources, practically indestructible by any kind of legislation or exactions, there was little hope of establishing a business basis for the acquisition of railroad capital.

It is only when the railroad is recognized as being a public utility both as regards the claim on the public and as regards its obligations, that a just balance between service and income can be developed. Such a balance it must now be the effort of the country to obtain. How can it accomplish the result? First of all, the dictates of the situation call for the development of a theory of railroad rates which will result in giving to the carriers a return upon all capital legitimately invested by them. Regulation cannot work in one direction only; it must operate to the advantage of the railways as much as to their disadvantage. It is traditionally a poor rule that will work only one way; and in this case, efficient service to the community dictates that the laborer shall be considered worthy of his hire. If railroads cannot tax the public according to their own will, as we all today, I think, agree that they should not, then the public cannot afford to tax the railroads to such an extent as to destroy the capital of those who have legitimately invested. Neither can the railroads be expected to go on extending their facilities and increasing their services to the public unless they are guaranteed at least that minimum rate of living wage which is demanded by laborers in the interest of society.

It may be an unpopular saying, but nevertheless a true one, that the wages of capital must be paid quite as regularly and quite as fully as those of labor, if capital is to continue to perform its functions in the community. Those who save and invest capital, will not continue to do so if their savings and investments are so affected as to yield them no return. The great mass of the public appreciates the problem and sympathizes with the difficulties of those enterprises in which they are themselves interested much more strongly than in those which are to them only an abstraction. This is true of the railways. There has undoubtedly been a large advance within recent years in the distribution of both stock and bonds of the carriers among the public at large. But rapid as this progress has been it has not yet been rapid enough to meet the requirements of the case. It has not gone far enough to solve the difficulties of the situation. It has not reached the real root of the difficulty.

Too much railroad capital has been derived from the banks and financial institutions, and has been carried by them as part of their investments. Too much railroad capital has been obtained through the sale of shares and bonds under conditions that have not resulted in attracting the real ultimate holder. It is necessary to get the shares and obligations of the railroads into the hands of the mass of the public, and to make the people really and in fact proprietors of the transportation lines. This measure is called for urgently from the financial standpoint for the reasons which I have thus set forth. It is, however, called for much more urgently from the social standpoint. The carriers are public utilities. And this character is not one-sided but must be considered from every aspect. The roads should be public in the sense that they appeal to and depend upon public support as well as in the sense that they must render public service and must meet the requirements of the community for accommodation. When in this sense the railroads have been popularized with the community, a two-fold benefit will result. The banks and investment institutions of the country will be relieved of the necessity of carrying long term investments when they should be devoting their funds entirely to the development of commerce and business, while on the other hand the people who are holders of the securities, will recognize the claims of those who look to the railroads for earnings, as well as to those who look to them for accommodation.

When this result shall have been attained, and in proportion as it shall have been attained, the so-called rate problem will have disappeared. The public will no longer look upon the railway as an incubus, and will begin to regard it as a business partner. It will no longer feel that every dollar paid into a railroad treasury is a dollar deducted from the community's wellbeing, but it will recognize the same mutuality of benefit in dealing with the carrier as is recognized in local communities where men deal with others because they expect those others to deal with them in return.

PUBLIC WORKS IN QUEBEC.—Sir Lomer Gouin, Premier of Quebec province, says that the provincial government continues to subsidize the construction of steel highway bridges. Some 260 bridges have already been put into service, and 56 are now under construction. This has entailed an expenditure, since 1908, of about $700,000. Since 1912 the government has abolished 11 toll bridges and 6 railroad-and-highway grade crossings, at a cost of about $1,400,000.

The Pennsylvania Improvements Through Piqua, Ohio

The Work Includes a New Station and Second Track on Revised Grade, Eliminating Eight Street Grade Crossings

The improvement work recently completed by the Pittsburgh, Cincinnati, Chicago & St. Louis on a six-mile section of line on the Indianapolis division, extending through Piqua, Ohio, 73 miles west of Columbus, is unusually comprehensive, as it effects important economies in the handling of a heavy through traffic, increases the permanency of construction on this section and adds greatly to the facilities for handling both freight and passenger business in a town of 13,000 inhabitants.

EXTENT OF THE IMPROVEMENTS

The operating conditions of the engine district from Columbus to Bradford, 84 miles, are improved by the addition of a second track in the only remaining single-track section in that district, and the reduction of grade from a maximum of 1 per cent uncompensated to 0.7 per cent compensated, the ruling grade on the division. The standard of construction is raised by the widening and thorough drainage of two long cuts, the replacement of an old low level bridge over the Great Miami river and the construction of steel concrete subways over all streets. In addition to the advantages enjoyed by the town as well as the railway in the separation of grades at streets, a new passenger station has been provided, the freight station has been enlarged, and the local freight yard and industry tracks improved. The railway has met the entire expense of the improvement, including damages to personal property.

This six-mile section forms a part of the main line of the Pan Handle from Pittsburgh to Chicago, and also of the line from Columbus to Indianapolis, which forms part of an alternate route from Pittsburgh to St. Louis. The westbound traffic consists largely of coal from the Pittsburgh division and the Norfolk & Western at Columbus and the eastbound business includes meat, merchandise and stock from Chicago and the west and empty coal cars. The average train movement is about 85 trains per day.

In addition to the Pennsylvania trains, the old single track line handled the passenger and local freight trains of the Cincinnati, Hamilton & Dayton between the connection of the Piqua & Troy Branch just west of the passenger station and the Cincinnati, Hamilton & Dayton junction, about a mile east of the station. Under the old arrangement these trains in order to reach the center of Piqua used the Piqua & Troy Branch and the Pennsylvania between Troy and Piqua Junction instead of the C. H. & D. main line on the east side of the Miami river. These movements increased the total for that portion of the Pennsylvania's line to about 97. This operating arrangement had to be terminated when the Pennsylvania tracks were elevated through Piqua on account of the inability of the C. H. & D. to secure ordinances from the city for the elevation of its branch line tracks up to the Pennsylvania connection. A new station was therefore built near the junction and all C. H. & D. through trains now use its main line.

The tonnage rating on the Columbus-Bradford district was limited to 1,700 tons in both directions by the old grade through Piqua and on account of delays in this single-track section it frequently required 16 hours for the run with a full tonnage train. As soon as the first track on the new grade was put in service it was possible to add 200 tons to this rating and cut the running time for westbound traffic and later, similar economies were effected for eastbound traffic when the second track was put on the new level.

All construction work has been handled without interference to traffic. To facilitate the work through town the center line was shifted to the north an average of about 32 ft. The improvements involved the handling of 460,000 cu. yd. of grading; the placing of 40,000 cu. yd. of concrete in bridge substructures, retaining walls, etc.; the erection of three arch culverts, a five-span deck plate girder structure over the Great Miami river and solid floor bridges over eight streets; and the laying, ballasting and surfacing of about 20 miles of new main, side and yard tracks.

GRADING

By laying a continuous 0.7 per cent compensated grade line from the ends of the improvement down to the river crossing, the cuts at both ends were deepened enough to furnish the necessary material for filling across the valley on the higher level. When the plans were made it was expected that the C. H. & D. would elevate its branch line, and on this basis the quantities of excavation and embankment were balanced, allowing 10 per cent for waste. On account of the change in plans, about 20,000 yd. from the west cut intended for the C. H. & D. connection was used to widen the fill for yard tracks.

The cuts are about 7,000 and 9,000 ft. long, respectively, and were lowered a maximum of about 9 ft. They were widened to carry three tracks in order to allow the excavation to be handled without interference to traffic and to provide for a future additional track. The roadway section in these cuts provides for a distance of 17 ft. from the center line of the outside track to the toe of the slope. The banks were sodded during the first season's work, but this did not prove entirely satisfactory on account of the height of the slopes which exceeded 25 ft. in many cases. Where the banks showed any indications of being wet, trenches 2 ft. deep were dug vertically or diagonally down the slope and filled with riprap stone to provide an open drain to the side ditches. These bank drains have been very successful in keeping the slopes in good condition.

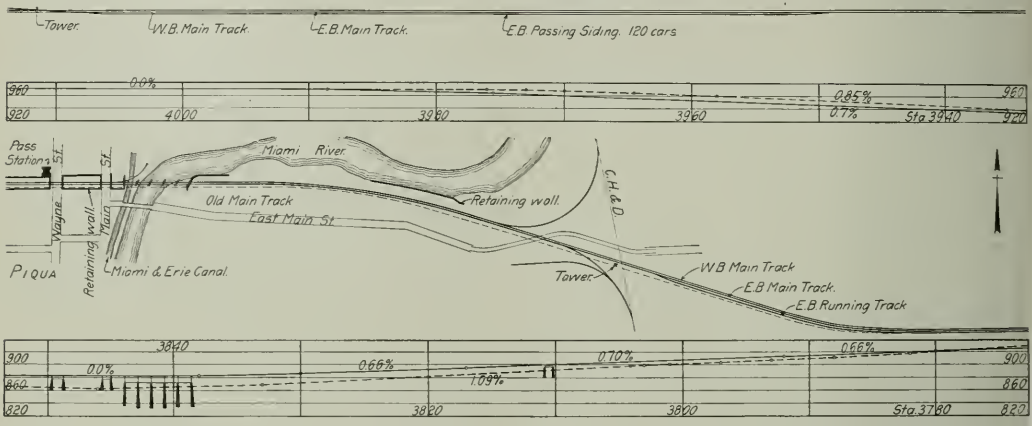
Tile drains 6 in. to 18 in. in diameter were laid in one side ditch in each cut and a similar line of 6 in. to 12 in. tile in the other ditch. Bell end vitrified pipe was used for these drains laid with 1-in. open joints and covered with cinders or loose stones. Catch basins were provided at intervals of about 800 ft. These drains lead to open riprapped ditches. The effect of one of the large drains was clearly shown in the east cut, which had a width of only 9 ft. from the center line of tracks to toe of slope. After one-half of the new cut was finished the side drain was laid, with the result that a temporary cinder ballasted track in that cut was easily kept in condition and the remaining half was noticeably drier when it was excavated. The slopes were finished and the ditches dug by an American ditcher.

The new double-track fill is about 2½ miles long, with a maximum height near the river of about 19 ft. The standard top width is 37 ft., providing a shoulder of 12 ft. from center of track. The material handled was mostly clay, requiring an allowance of 10 per cent for shrinkage on the shoulders. A speed limit of 10 miles per hour was enforced on the new fill and 20 miles an hour was allowed after it became thoroughly compacted. The main track is laid with 100-lb. rail on oak ties with four rail anchors per rail. The roadbed is surfaced with 6 to 8 in. of cinders on which 12 in. of gravel ballast is placed.

The excavation was made almost entirely by two Marion steam shovels, models 60 and 70, and the material was handled by a standard gage and a narrow gage outfit. The grading was planned to avoid the necessity of hauling the material across the old river bridge on account of the interference to traffic that would have resulted. Some trestle was driven west of the river between the street crossings, but the lighter fill on both sides and the big fill adjacent to the river on the east side were made by spreading and raising tracks. Some very good records were made in handling this filling material by keeping the dump in good condition and anticipating as far as possible, other causes

of delay. The standard gage outfit of two 10-car trains with an average haul of about 1½ miles handled an average of 1,200 yd. per day for eight months, working a single shift. The best month's record was about 41,000 cu. yd. The 15-yd. Western dump cars were used in this outfit, averaging 12 to 13 cu. yd. loaded. The narrow gage outfit, using 20-ton dinkies and 3-yd. cars, of the new bridge. The piers are skewed about 30 deg. to bring them in line with the current.

The excavation for the piers was made by two McMyler cranes, one with a 1-yd. orange peel bucket and the other with a 1-yd. clam shell bucket. The footing piles under the east abutment and the three easterly piers were driven by one of the cranes



Plan and Profile of New Two-Track Line on Revised Grade Through Piqua, Ohio

handled as high as 1,300 yd. per day, 17,000 yd. in two weeks, and 30,000 yd. in one month. Three trains of 15 cars each were used in this outfit, the haul being about two miles.

BRIDGES AND RETAINING WALLS

The new river bridge replaces a through truss structure on stone piers and abutments built in 1888. The two river spans, each 138 ft. long, and the approach deck girder span over the Miami and Erie canal, did not provide a sufficient waterway for the floods to which the river is subject and the new bridge was accordingly increased in length to five 105-ft. deck plate girder spans. The danger from floods is further decreased by the raised grade, the old tracks being only about 5 ft. above high

High Water at the Old Miami River Bridge in the Spring Floods of 1913 Showing Piers in Place for the New Structure

water. Prior to the disastrous floods in the spring of 1913, the river channel was changed at the curve above the bridge and the bank protected by levees on the north side and a retaining wall 300 ft. long on the south side connecting to the east abutment with suspended leads in which a No. 2 Vulcan steam hammer was operated. The west pier and the west abutment are founded on limestone, which is only 2 ft. below low water at the pier site, although it dips so rapidly to the east that it was not reached by 15-ft. piles at the next pier. The piers were built in coffer-dams with steel forms above the footings. The maximum height is 47 ft. Three 85-lb. rails were provided in the nose of each pier as ice breakers.

The concrete in the east abutment and the three easterly piers

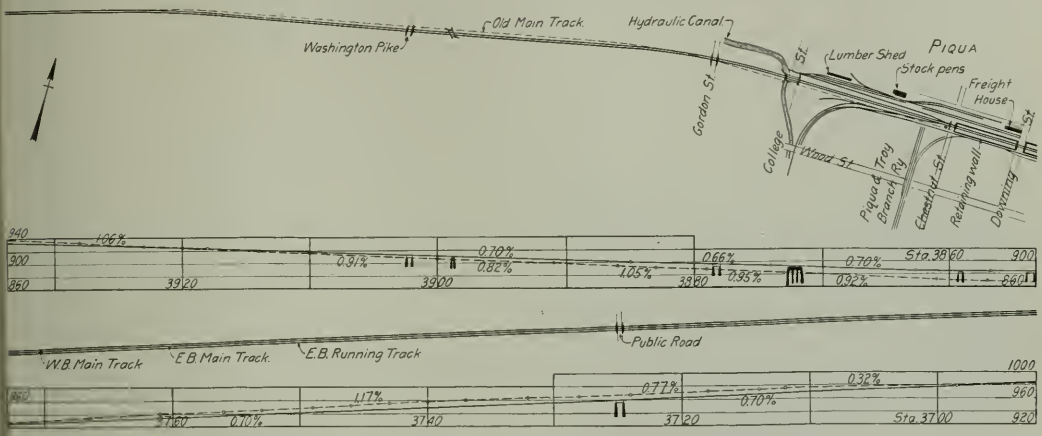
The New Miami River Bridge

was placed from a mixer plant about 60 ft. east of the abutment. The sand and stone were dumped through a trestle in the old line which had been driven to replace a section of the old fill adjacent to the new abutment and piers. From the storage bins under this trestle, the proper proportions of the materials were loaded into an automatic dumping car which was hauled up to the ½-yd. Ransome mixer. The concrete was handled to the forms in buckets by the locomotive crane. The west pier and the west abutment were placed from a portable plant which was also used

for a large part of the retaining walls and subway abutments through town.

The six existing streets and highways crossing the line within the limits of this improvement were carried under the elevated tracks in subways and similar provision was made near the west end of the work for two new streets which it is expected will

It was necessary in only one case to depress the street grade, and in this instance the tracks were carried on a temporary trestle, while the excavation for the street was made with a Thew shovel to an approach grade of 4 per cent. This required the handling of 16,000 yd. of material. A total of 4,700 ft. of retaining wall was built, the longest continuous wall being along



Plan and Profile of New Two-Track Line on Revised Grade Through Piqua, Ohio

be opened. With one exception, these structures consist of concrete abutments and steel columns on the curb lines supporting steel trough decks filled with concrete. The exception is a three-span arch bridge over a street and a canal from which the city takes its water supply. The possibility of adding third and fourth tracks later was considered in designing all subways, either by building the abutments wide enough to carry the additional tracks or by providing for an extension of the substructure. The over-

Three-Span Arch Bridge Over College Street and a Small Canal

head clearance under these subways is 13 ft. at four streets, 15 ft. at three streets, and 17 ft. at the other streets.

The maximum street width is 66 ft., and with one exception the crossings are practically at right angles. The longest trough span is 44 ft. A line of 10-in. clay tile is laid in each trough and in some of the deeper ones, two lines are used in order to save concrete and reduce the dead load. A 3-in. layer of concrete was placed first, on which the tiles were laid, the concrete being tamped solidly around them. The top of the troughs were covered with concrete to a minimum depth of 2 in., and the upper surface of this concrete was waterproofed, four processes being used, namely; Sarco, Johns Manville, Barrett and Erhart. The edges of the trough decks were finished with concrete copings. The arch bridge has three spans of 37 ft. 6 in. each, the arch rings being five-centered. The concrete is reinforced with Clinton wire mesh. The fill over the haunches was made with cinders.

the south bank of the river east of the bridge where a 300-ft. wall containing 6,000 yd. of concrete was placed.

A large part of the walls and subway abutments through town were placed with a mixing plant operating on a 10-ft. gage-track between the walls as shown in one of the accompanying illustrations. This plant was equipped with a storage bin for sand and stone above the 1 yd. Ransome mixer and a 40-ft. tower in which the concrete was elevated for chuting to place. The boiler, hoisting engine and mixer engine, were located on the opposite end of the car from the tower, serving as a counterweight. The sand and stone were handled direct from gondola cars alongside to the storage bins over the mixer by a locomotive crane which was also used to place bags of cement on the charging platform, handle the sections of wall forms and excavate for the footings under the walls. The plant could be moved eas-

Portable Mixer Outfit Used in Placing Concrete Retaining Walls, and the Derrick Car Used to Handle Material from Cars to Hopper Bins

ily to keep the length of chute at a minimum. This plant placed as much as 150 yd. of concrete in a single shift and averaged 35 yd. of concrete and 25 yd. of excavation every working day for the entire season. The plant was operated by a crew of 8 to 10 men with a labor charge of about $35 per day.

A stationary mixer plant was used during the winter for some of the walls. The storage bins were provided with steam coils

and the plant was well housed in to allow work to be carried on in cold weather. About 2,200 yd. of concrete was placed during one month with this plant.

PASSENGER STATION

The new passenger station is a brick structure on concrete foundations with stone trim and tile roof. It is located on an important street near the center of town with its floor level about 3 ft. above the sidewalk grade. A wide terrace across the

A View Through the Town During the Construction of the Retaining Walls, Showing Sectional Forms and Derrick Car for Handling Material

front of the building connects with a passage under the track from which two stairways lead up to the platforms at track level. Additional stairways are provided at the streets on both sides of the one on which the station is located and a carriage drive approaches the rear of the station building from the opposite street.

In addition to the main waiting room the building contains

New Pennsylvania Passenger Station at Piqua, Ohio

a women's room, men's room, ticket office, baggage room and express room. A basement is provided for the furnace and coal room, and a baggage and express elevator connects the station and track levels. The floor in the waiting room is of terrazzo, the walls of brick and the arch ceiling of plaster. The building is provided with electric light and steam heat throughout. The track platforms are 20 ft. wide, of brick on a concrete base with concrete curb. Steel frame shelter sheds and a small shelter house are provided on each platform.

This improvement has been carried out under the general direction of W. C. Cushing, chief engineer, maintenance of way, and B. V. Sommerville, principal assistant engineer, Pennsylvania Lines West, Southwest System. F. H. Watts was division engineer at the beginning of the work and was later succeeded by G. R. Barry. Mr. Watts was charged with the preparation of plans and the close supervision of the construction till promoted and succeeded by Mr. Barry. E. H. May was engineer in charge. H. E. Culbertson & Co., Cleveland, Ohio, had the general contract and handled the grading. The construction of the river bridge and most of the retaining walls and subway abutments was let to the McKelvy-Hine Company, Pittsburgh, Pa.; the concrete arch and the remaining concrete work was contracted to the Hezlep Sinclair Company, Cleveland, Ohio; the steel in the river bridge and the subways was erected by the Ketler-Elliott Company, Chicago, and the sloping, ditching and track work was handled by company forces. F. L. Packard, architect, Columbus, Ohio, designed the new station, and George B. Hicks, Springfield, Ohio, had the contract for the construction of the building.

SAFETY AND SHORT TRAINS*

By Marcus A. Dow

General Safety Agent, New York Central Lines.

This bill to limit the length of trains to a maximum of 50 cars per train, has been presented and its passage urged as a measure of safety, it being the contention of the gentlemen favoring the measure that shortening the length of trains will lessen the chances of accident and reduce the number of injuries. To persons unfamiliar with the details of personal injury work and the prevention of accidents as undertaken by the railroads of today, this argument may appear reasonable, but before accepting it as a conclusion it is essential to consider a number of important facts.

In the first place, the fact must be admitted, even by those the least informed, that safety in reality rests not upon whether there are a few cars more or less in a given train, but upon the way in which that train and others on the same road are handled and operated. There is not now, nor has there ever been a well fortified argument for, nor a sincere demand to shorten the length of trains to increase safety. The Interstate Commerce Commission in all of its exhaustive studies and reports has never pointed out a single case where the number of cars in a train, nor the number of men on a train, nor the number of engines hauling a train was a factor contributing to or causing an accident.

As a matter of fact, if the proposition were fairly considered, it would seem reasonable, if not probable, that the passage of the so-called "short-train" bill will tend to increase the risk of injury rather than decrease it. The density of traffic as measured by the number of trains to handle and get safely over the road, will increase with the shortening of the train, resulting in a greater chance of confusion and increasing the chance of error. This feature, of course, becomes more important on roads where the traffic is heaviest and density of traffic is already a problem requiring the most skillful attention of expert operating men. To suddenly require all roads to multiply the number of trains they must handle without a corresponding increase in trackage and other facilities would necessarily result in confusion and increased hazard.

Much stress has been laid by the supporters of this bill upon the great sacrifice of life and limb on the railroads of this country. Admitting freely that there are far too many persons

*From an argument made by Mr. Dow before the Public Utilities Committee of the Illinois house on Monday, May 10. This committee has since taken unfavorable action on the bill.

injured on our railroads and that many of the accidents resulting in injury can and should be avoided, I wish to point out how these accidents can be prevented and what steps are being taken to prevent them. For years there has been a nation-wide agitation in behalf of greater safeguards for employees of railroads, other industries and the general public. In every state there has been a veritable epidemic of legislation with a view of protecting the workingman from possible injury. Safety devices of every description have been installed, rules formulated, regulations adopted and mechanical safeguards invented and applied until it would seem that accidents never could happen. But, the disquieting feature of the situation has been that up to a year ago in spite of these extraordinary precautions taken to insure immunity from harm, accidents resulting in injuries increased steadily, and the very laws that were made to lessen accidents actually seemed to foster them. It remained for the officials of the railroads and other great industries to discover where the real trouble lay. The conclusion was reached that with all the laws that might be passed and safety devices that might be installed, there would be no successful reduction in accidents until there had been enlisted the co-operation of those in whose interest these precautions were being taken.

In other words, it was found that the human element was knocking all the carefully laid plans of well meaning legislators into a cocked hat, and with this fact in mind there has been launched within the past few years what has universally been called a "Safety First" campaign, and practically every railroad in the United States is now vigorously conducting such a campaign, regardless of the expense incurred thereby. On the New York Central Lines during the year 1912 only 9.65 per cent of all injury cases were due to defective equipment, tools or appliances, the balance being due to fault of injured man or another employee, or else unavoidable. This statement speaks for itself, and supports the contention that the making of laws and installing safeguards is not the solution of the accident prevention problem. Rather does it depend on the extent to which the employees co-operate in an effort to eliminate practices and conditions which are unsafe and which lie within their own power to correct.

I wish to refer to some of the advertising matter that has been sent out by supporters of this "short-train" bill, and call your attention to some things contained therein which will undoubtedly mislead you if you are not acquainted with all the facts. A post card which was mailed broadcast to citizens of this state, as well as to members of this legislature, decries the fact that 593.359 people were killed and injured on the railroads of this country in the three years from June 30, 1911, to June 30, 1914, and particular stress is placed on the fact that 31,851 of those injuries resulted fatally. They do not attempt to further enlighten you by telling you, truthfully, that 16,463 of these persons killed, or more than 51 per cent were trespassers who voluntarily and needlessly risked their lives by going upon the railroad tracks where they had no right to be. Neither do they attempt to explain that 12 per cent of those killed were travelers-on-the-highway killed on grade crossings, or other outside persons, and that only 30 per cent of all those killed were employees of the railroad on duty, while only 3 per cent of the killed were passengers. They point accusingly to the fact that in three years there were 593,359 persons killed and injured on railroads in the country, leading you to believe that railroad work is the most hazardous of all occupations—and that a railroad is a veritable industrial slaughter house, whereas in truth railroad casualties form only a small part of the total industrial accidents annually, conservative statistics of large insurance and casualty companies indicating that more than 30,000 persons in all industrial occupations are killed and more than 2,000,000 injured every year.

These figures do not include other than industrial accidents, such as those occurring in the city streets, etc. The coroner's record for the city of New York indicates that during the year 1913, a total of 5,750 persons met violent death in the borough of Manhattan alone, of which 402 were in street accidents, 867 were due to falling out of windows, down stairways, off from scaffolds, etc., and 215 due to accidental drowning.

Interstate Commerce Commission figures indicate that during the year ended June 30, 1913, on all the railroads of the country there were 181 passengers killed in train accidents, while during that period there were 1,018,283,000 passengers carried, so that there was one passenger killed in a train accident for every 5,625,873 carried, regardless of the distance they were carried. In the city of Chicago alone during 1913 there were 372 persons killed in the city streets by being struck or run over by some moving street vehicle. Chicago has a population of approximately 2,500,000. Therefore, as against 372 inhabitants of Chicago killed in her streets by moving vehicles, and hundreds more of her citizens killed in various other ways in a single year, the railroads of the country transported more than twice as many passengers as Chicago has inhabitants before one was killed in a train accident.

The proponents of this bill have insistently intimated that the railroads almost without exception have accidents every year resulting in fatal injuries to passengers, the statement having been made that it is questionable if any railroad except the New York Central went through last year without killing a passenger. During the year 1913 there were in the United States steam railroads of 299 operating companies, with a mileage of 120,901 miles on which there was not a passenger killed in a train accident, although there were more than four hundred million passengers carried by these roads.

Interstate Commerce Commission figures also indicate that in the year ended June 30, 1913, there were 557 employees killed in train accidents. During that same period the railroads transported 300,558,334,000 tons of freight one mile, with an average of 14.31 tons of freight per car or 210,033,776 loaded cars one mile, so that one employee was killed in a train accident for every 37,708,039 loaded cars moved one mile. And what does this indicate—simply this, that for every hundred loaded cars operated a distance of 377,080 miles one employee was killed, and this, mind you, does not take into consideration the vast number of empty cars handled at the same time. In other words, one railroad employee was killed in a train accident for each hundred loaded cars transported a distance equal to 15 times around the world, or as far as from the earth to the moon and half way back.

Another fact in connection with these figures indicating 593,359 persons injured and killed on the railroads in three years which must not be overlooked, is that the majority of these injuries were of a more or less trivial character. We know that a little over 31,000 of the cases, resulted fatally, of which 51 per cent were trespassers. Of the injuries every case is included where the employee lost more than three days from work, and injuries were reported as such which often consisted of only a bruise or scratch of the hand, or some other minor injury. An examination of the New York Central records of injuries for a year indicates that only one out of every 227 employees injured was permanently disabled.

Less than 10 per cent of all railroad injury cases are due to collisions and derailments, and even the majority of these are in accidents which could only be prevented by greater care on the part of human beings involved in the accidents. The Interstate Commerce Commission employs expert investigators, who make investigations into the causes of wrecks on railroads throughout the country. These investigations are exhaustive and often weeks, and even months are consumed enquiring into every detail of a single train accident. During the 12 years, 1902-1914, the commission investigated directly, through its own agents, 1,570 train accidents, of which only 218, or 14 per cent were caused by defective track, equipment or appliances, and 15 per cent were due to bad weather, outside agencies, unknown causes or unavoidable, while 1,120 or 71 per cent of the train accidents investigated by the commission in the 12 years were found to have been due to the fault of a member of the train crew, a

despatcher, operator or some other employee. The human element! It can never be effaced by all the safety appliances that can ever be invented and applied, nor by all the laws and regulations that can ever be passed and enforced.

On the New York Central the average number of cars per train increased 3.11 cars in 1914 over 1913, notwithstanding which fact there was a decrease in every class of accident. There was a decrease of 73 per cent in trainmen killed and 39 per cent in trainmen injured; of trainmen in yards a decrease of 33 per cent killed and 42 per cent injured; of yard trainmen killed a decrease of 19 per cent and injured 39 per cent. While a part of this decrease was brought about by safety educational work, it is partly attributable to the fact that with an increase in the average number of cars per train, there was a decrease of 18 per cent in the number of trains run. In 1914 there was on all the railroads a decrease in all classes of injuries in train accidents, and it is known that the length of trains did not decrease in that period, but rather did it increase, while the number of trains operated on the roads in general decreased thereby decreasing the hazard.

The contention is made that with a shorter train there would be a better opportunity for the crew to make inspection of the running gear, brake rigging, etc., while stopping at points en route. In the first place, it should be clearly understood that on virtually every railroad today trains are made up in terminals by a yard crew, are inspected before leaving by car inspectors located at the terminal, and then turned over to a road crew, which latter crew has nothing to do with the train until it is made up, inspected and ready to leave the terminal. As far as the more lengthy trains are concerned, the only stops made are as a rule to take water or at meeting points. Little or no switching is done en route so that cars are not handled roughly. The longer trains must necessarily travel at slower speed than the shorter ones, so that possibility of accident to the long train is decreased thereby. As far as making inspections en route, as every crew is required to do when stops are made, this rule is expected to be lived up to and crews must take the time to do the inspecting work required of them and the length of the train, no matter whether long or short, has never been nor can it be given as an excuse for non-compliance with this rule. As to any contention that accidents would result from drawheads pulling out on longer trains, while it is true that drawheads do pull out occasionally, it is an occurrence not confined to long trains and the truth of the matter is when they do pull out it is usually when the train is starting, and at a time when no accident would occur.

To suddenly increase the employees to the number that would be necessary to man the many additional trains the passage of this law would require, would mean another element of increased hazard instead of a decrease in hazards, because every green man that is employed is an experiment at the best.

PIECE WORK IN THE FREIGHT OFFICE

In the freight office of the Chicago, Rock Island & Pacific at Burr Oak (Chicago) the clerks who make waybills and those who examine claims have for the last twelve months been making waybills on typewriters. They have been paid at the rate of ninety cents a hundred items for making waybills and seven cents each for attending to claims for overcharges and damage; and the agent, J. W. Lawhead, in the Rock Island Employees' Magazine for May, gives the results of the year's experience.

Previous to May 1, 1914, waybills were made with pen and ink, each clerk receiving $75 a month and usually about $10 additional for overtime. Three claim investigators received $70 a month, these men helping the bill clerks in the afternoon and being helped by them in the morning. The billers usually got through their work about 9 p. m. Eight Remington machines were put in service in April, but before beginning the year (May 1) it was found that seven would be enough; and on May 16 the billing force was reduced to six men. The office handles 2,000 claims a month and bills out 50,000 items. This work now costs an average of $590 a month, which is $200 less than the former cost, two claim investigators having been taken off at the beginning of the new arrangement. A revising clerk goes over all of the waybills for errors before they are sent out; another man—clerk to the bill department—sorts the tally sheets when they come from the loaders, and still another is the extension clerk, who using a comptometer, puts on each tally, before it goes to the bill clerk, the amount of freight charges for that item. The office force was changed around so that these new positions involved no new expense.

The bill clerks come on duty at 9 a. m., about an hour later than formerly, and usually finish about 6:30 p. m. In the twelfth month, April, 1915, out of 29,638 items billed, the six clerks had made 165 errors, all of which, except six, were caught by the revising clerk. This averages one error to each 175 items. If a clerk's errors amount to more than one in 200 he is subjected to a slight penalty, and has his name posted on a bulletin. Making less than one in 200 in a month he is given a clear record for that month. In March two men made clear records, one having billed 12,580 shipments and the other 12,741, with errors numbering 42 and 62 respectively. The woman with the comptometer makes an average of 2,199 calculations daily, figuring all pre-payments twice. During March she was caught in only eight errors. Mr. Lawhead recommends the comptometer also for other work in the freight office. He has two of them in use.

INCREASING THE AVERAGE DAILY CAR MILEAGE ON THE GREAT WESTERN

During the past year the Chicago Great Western has been giving careful attention to the elimination of delays to cars, with the result that the average mileage per car per day has been materially increased. The following comparison by months with the similar performance one year ago shows the average increase to be from 24 to 27.7 miles, or 15 per cent.

Month	Average per car per day 1913-14	1914-15
April	26.3	28.7
May	26.2	29.1
June	24.8	27.5
July	21.8	26.0
August	21.9	27.6
September	23.0	27.8
October	23.0	28.8
November	23.8	28.0
December	24.7	27.6
January	24.1	27.5
February	24.7	25.7
Average	24.0	27.7

This improvement has resulted largely from three causes. While the road has not been extravagant in the use of power and has taken engines out of service as the traffic has decreased, it has maintained in service a sufficient number of locomotives at all times to handle the traffic promptly and to prevent any delays because of lack of motive power.

A second reason contributing to this result is the 12-hour telegraphic daily reports sent to the general manager by each superintendent at 9:00 a. m. and 4:00 p. m. These reports show the conditions at each terminal in the morning and evening, giving the number of cars on hand awaiting movement in each direction with causes for any delays.

A third measure is the close supervision of cars at all stations by the superintendent of car service who keeps informed regarding conditions at each station on the line and the reasons for any delays in cars at those points. The results of this continuous supervision and attention to this phase of operation by the general manager, the superintendent of car service and other operating officers, show the possibilities in this field.

Tests of Exhaust Ventilators on Passenger Trains

Results of Experimental Work Carried Out During Past Winter; Effects of Position of the Car in the Train

By George L. Fowler
Consulting Mechanical Engineer, New York

During the past winter an investigation was conducted to determine the operative efficiency of the Standard exhaust ventilators used on the passenger equipment cars of the New York Central. Prior to this the only data available as to their operation was that obtained in laboratory experiments conducted by the makers, the Standard Heat & Ventilation Company of New York, to determine the ratio existing between the velocity of the wind blowing over the ventilator and the volume of air that would be exhausted by the action of the ventilator. This data will be referred to later.

The Standard exhaust ventilator is pressed from sheet steel and its general outside appearance is that of a quadrilateral pyramid with one side removed. Its base, which is open, is bolted to a side opening in the deck of the car. Its bottom is the side removed and the shape is such that when air is moving past it, either parallel to the center line of the car or at an angle thereto, an induced current is produced, flowing out at the open side. As this opening communicates directly with the interior of the car, through the base, this induced current is supplied by the air within the car and the exhaustion of this air follows, coupled with the ventilation of the car itself.

The purposes of the investigation were to ascertain the quantity of air removed from the car per hour, under the ordinary conditions of service; the rate of the exhaust removal of air at various speeds, so as to obtain the percentage of efficiency as compared with the results of laboratory investigation, which latter may be regarded as the theoretical or highest efficiency; the effect of wind direction; the effect of the location of the ventilator on the car, or the car in the train; the movement of the air currents within the car; the variation in barometric pressure within and without the car, and the amount of air delivered at the breathing zone.

The car selected for the purpose was a standard steel passenger coach of the New York Central lines. It was 69 ft. 4 in. long inside and had a seating capacity for 84 passengers and a cubic content of about 5,160 cu. ft. The car was fitted with twenty Standard exhaust ventilators, ten on each side, alternating with plain perforated metal deck opening screens of which there were eleven on each side. Both deck and exhaust openings could be closed by a Cheeny deck sash. The deck openings measured 28½ in. by 8¾ in. The exhaust openings were trapezoidal in form and had a free opening of 54½ sq. in., or .378 sq. ft., which was reduced by the dial of the anemometer placed in front of them to .359 sq. ft. No screen or netting was used with them.

INSTRUMENTS

For the purposes of the investigation the car was equipped with a vane anemometer, registering to 100,000 ft. of air flow, placed in front of each of four of the exhaust openings on each side. There was one at each end exhaust, with the other two spaced equally between, which made one for each third ventilator.

A cup anemometer of the regulation government type, was placed on the center of the roof of the car deck on the outside. It was arranged to make and break an electrical circuit for each one-tenth of a mile of the flow of the wind. This electrical circuit was arranged to operate a telegraph sounder by which a signal was given for each one-tenth of a mile of flow of air over the roof of the car.

A Boyer speed recorder was attached to one of the axles of the car, and the wire to the indicator was led up into the car. This made it possible to observe the speed at any instant and also retain a graphical record of the speed of the whole run.

A wind vane of standard government dimensions was placed on the center of the deck roof, in line with the cup anemometer, but at the other end of the car. The stem from this vane extended down into the car and had attached to it a pointer rotating over a dial, thus indicating at all times the angle at which the wind was blowing against the car, as a resultant of its own normal motion and that of the car.

A clock was arranged to make and break an electrical circuit at two-minute intervals. This was connected with a bell which sounded a signal for the taking of readings.

The apparatus used for the determination of the variation in barometric pressure, inside and outside the car, consisted of a wooden box, measuring 7 in. by 7 in. by 8¼ in. In each of five of the six sides of this box, eight holes were bored. These were each 5/16 in. in diameter and were widely scattered over the sides. In the sixth side a hole was bored large enough to admit the insertion of a rubber tube having a bore ⅜ in. in diameter. One end of the tube thus communicated freely with the interior of the box, while the other end was attached to one leg of a U-tube, which was half filled with colored water. The box was bolted to a board which replaced one of the deck opening screens. The small holes opened to the outside air and the rubber tube led down to the U-tube within the car, one leg of which was open to the air inside the car. It was thought that the air entering the box through the small holes, and under the influence of the pressure, would have its velocity greatly reduced by the relative sectional area of the box to that of the holes; that it would be so essentially calm as to produce no effect either for exhaust or pressure at the end of the tube, and that the barometric pressure within would be that of the external air, uninfluenced by the motion of the car. The areas were to each other as about 80 to 1, so that air entering the box at the highest recorded wind velocity, even though unchecked by passing through a rough hole 5/16 in. in diameter and 1 in. long would move through at a rate of less than one mile an hour.

MOVEMENT

The car, so equipped, was handled on regular passenger trains for one round trip between Albany and Buffalo; two round trips between Albany and Syracuse, and one round trip between Albany and Weehawken, a total distance of 1,466 miles. With one exception the trains were express. Between Albany and Buffalo six intermediate stops were made westbound, and sixteen eastbound. Between Albany and Syracuse there were fifteen westbound and twelve eastbound. Between Albany and Weehawken, there were thirty-four southbound and ten northbound.

OBSERVATIONS

Readings at two-minute intervals were made of the speed of the train, the velocity of the wind relative to the car and the direction of the wind relative to the car. At fifteen-minute intervals readings were taken of the anemometers in the exhaust openings, and at intervals between these readings observations were made of the rate at which air moved through the exhaust openings. The readings for these observations were taken at 15 and 30 seconds intervals, the time and speed of the train being also noted. From the time at which the observations were made it was possible, by means of the two-

minute readings, to determine the velocity of the wind relative to the car.

AMOUNT OF AIR REMOVED PER HOUR

The amount of air removed from the car per hour was determined by the regular readings of the anemometers placed in the exhaust openings. The individual readings were widely scattered, but, when grouped and gathered under averages of speeds increasing by increments of five miles an hour, they were found to increase with the speed, and show, as would be expected, that the amount of air removed varied with the speed. The amount of air removed from the car under observation, in the eight runs involved, averaged 296,699 cu. ft. for each of the eight ventilators to which anemometers were attached. If this total is divided by the number of hours that the car was under observation, which was 41, we have an average removal of 7,236 cu. ft. of air per ventilator per hour. This covers all speeds and conditions of operation from standing still to 76 miles an hour. The average speed of all the trains between terminals was 35.7 miles per hour, elapsed time.

The rate of the removal of the air through the exhaust ventilators was obtained by taking readings of an anemometer, placed at one of the openings of an exhaust ventilator, at such short intervals of time, and in connection with the actual speed of the train at the instant, that it was possible to determine the actual rate at which the air was removed at different speeds of train and wind. During the whole period of these investigations, there was little or no wind stirring. The result was that wind velocity relative to the car corresponded very closely to that of the car itself.

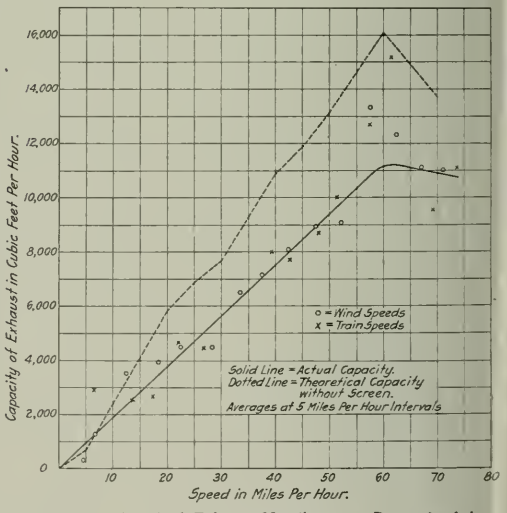
The readings referred to were taken at intervals of 15 or 30 seconds, and at speeds that ranged from zero to 75½ miles an hour for the speed of the train, and from zero to 72 miles an hour for the speed of the wind relative to the car. There were 201 of these observations, and they have been grouped together in five-mile intervals of speed and plotted in the accompanying diagram, under the average speeds. The anemometer readings, thus obtained have been taken to indicate the rate of flow of air through the ventilator at the several observed speeds, and this has been considered to have been uniform throughout the whole area of the exhaust opening. This is warranted by the results of laboratory investigations, in which it was found that, when the direction of the wind currents was parallel or nearly parallel to the center line of the car, the rate of exhaust flow was uniform over the whole area of the ventilator opening. This diagram shows a general progressive increase in ventilator capacity on a straight line up to 60 miles an hour of train and wind speed. In this case, the train and wind speeds being so nearly the same, it is impossible to differentiate between them in the construction of the median line.

For the purposes of comparison the diagram of the ventilator capacities obtained in the laboratory is plotted with those obtained in service. In the case of the laboratory investigation the capacities given are those obtained with the air moving parallel to the center line of the car, and it is interesting to note that there was a steady increase of capacity directly as the speed up to 60 miles an hour, followed by an immediate falling off as that speed was exceeded.

Owing to the absence of wind during the tests the direction of the resultant wind relative to the car indicated only a slight deflection. The average for all of the runs was but 9.35 deg., and it was near this point that the vane stood for most of the time. For this reason it is fair to compare the ventilator capacities obtained in practice with those of the laboratory, as is done on the diagram. If a comparison is made of the relative capacity of the ventilator under the two conditions, it will be found that up to a speed of 60 miles an hour the efficiency in service was about 70.5 per cent of the theoretical capacity of the ventilator, as measured by the laboratory experiments.

For the purpose of making a practical application of these results, let us take the figures already set forth as an example of what was done on the eight runs under consideration. In these we have an average performance per ventilator of removing 7,236 cu. ft. of air, and that at an average speed of 35.7 miles an hour, and under widely varying conditions from standing still to a speed of 76 miles an hour. According to the diagram each ventilator should remove about 6,700 cu. ft. of air per hour. The actual performances through a wide range of conditions check very closely, therefore, with those obtained from a detailed study of an individual ventilator. As the line of the diagram is straight from 0 to 60 miles an hour, the capacity of the ventilator varies directly with the speed, and may be obtained by multiplying the latter by 188.

Again, if we take the average speed of the train during elapsed time from the start to the last reading of the anemometers, and credit each anemometer for the removal of an amount of air corresponding to the elapsed time and the average speed of the train in accordance with the diagrams presented, it will be found that, according to that diagram, each ventilator should have removed 282,797 cu. ft. of air. Comparing the two, we find the average actually removed was 4.9 per cent more than that calculated with the diagram as a base. Hence the diagram



Capacity of Standard Exhaust Ventilator as Determined by Laboratory and Service Tests

may be assumed to represent the conservative capacity of the ventilator, as this small percentage of variation is well with that allowable.

EFFECT OF LOCATION

During the course of the investigations the car was placed in different positions, from being next to the engine to seventh in the train. It will be readily understood that the data available from so small a number of runs is too meager to make definite conclusions possible; but what there is indicates that the location of the car in the train does have an effect on the operation of the exhaust ventilators. In order to determine this it was necessary to consider both the amount of air exhausted and the speed of the train. In this I have taken the total amount of air exhausted and prorated it among the eight ventilators that were fitted with anemometers. This gives the average rate of operation for the car.

According to the diagram the amount of air exhausted varies directly with the speed, so that by dividing the average amount of air exhausted by the average speed of the train a quotient

will be obtained that may be called the base unit of the operation of one ventilator for the particular run under consideration. If we take the averages of all readings and plot them in accordance with the location of the car in the train we find that there is a slow falling away in total capacity as the car is moved back from the engine; until for the seventh car, it is about 14 per cent less than for the first.

The effect of ventilator location on the car is also noticeable. By taking the ventilators, fitted with anemometers in pairs, as they were opposite each other, and averaging each pair for the several trips, it appears that, going back from the front, there is a steady fall in efficiency from the first to the third, with a rise for the fourth.

This indicates that the ventilators at the forward end of the car are most efficient, and that there is a falling off in efficiency at the middle of the car and a rise again towards the rear.

MOVEMENT OF AIR CURRENTS WITHIN THE CAR

Careful observations were made of the movement of the air currents within the car. This was done by means of smoke produced at the points at which it was desired to make observations. The doors and windows of the car fitted closely in their frames. At the cracks of the doors there was never sufficient air movement to operate an anemometer, though a coolness could always be detected. Also in the body of the car below the seven-foot line above the floor, no air currents of sufficient intensity to operate an anemometer could be detected at any time. The anemometer explorations were, therefore, all made in the deck space.

When the car was running at 60 miles an hour, an anemometer placed at the back end of the deck opening, which was 5 ft. 6 in. from the end of the car, showed air velocities of from 180 to 575 ft. per minute when the opening was at the front end. One-quarter of the way across the deck and opposite the opening they were still higher, and when the anemometer was placed close to the ceiling, they ran from 735 to 976 ft. per minute. Out at the middle of the deck, still close to the roof, they fell to from 250 to 440 ft. per minute. As the exhaust was approached on the opposite side of the car, three-quarters of the way across, the velocities increased again to from 600 to 680 ft. per minute. Dropping down into the car they ranged from 700 to 835 ft. per minute, even as low as the deck sill, but no movement of the anemometer could be obtained below the line of the parcel rack. This will give an idea of the velocities at which the air entered the car.

Studies of smoke movement showed that, when produced in the deck, it did not come down into the body of the car, but swept along towards the nearest exhaust ventilator and was carried out. When produced below the line of the deck sill it was quickly dissipated, but slowly came down into the car and then took an upward movement towards the ventilators. When produced in the body of the car in the breathing zone, it started at once for the deck, was nearly dissipated when it reached the sash of the ventilators and was then carried out with great rapidity.

On the run from Albany to Weehawken and return, observations were made as to tunnel conditions and effect. It is the practice of the road to close all of the deck openings and, at times, all of the exhaust ventilators, when passing through tunnels, of which there are three of some length. These are known as the West Point, Haverstraw and Weehawken tunnels. There is a fourth and shorter one at Rondout creek, but the locomotive is out of this before the rear of the train has entered.

In the runs under consideration all deck openings and all of the exhaust ventilators to which anemometers were applied, were left open. Immediately upon entering the tunnels, large volumes of dense black smoke rolled in at the front deck openings. The smoke swept back along the roof of the deck and out at the exhausts. None of it came down into the body of the car and none of it was perceptible to the senses, even to those immediately beneath, when it was so dense overhead as to obscure the head lining. This was true not only of the experimental car, but also in the regular working coach occupied by passengers, whose ventilation was regulated to accord with that used in the experimental car itself.

The runs from Albany to Weehawken, on the West Shore, were made with the twofold object of obtaining data as to the action of the ventilators in tunnels and when running alongside a high bank with a free and clear space on the other side of the car. These conditions obtained on the West Shore, where, for long distances, the track is laid along the bank of the river with high, steep banks on the west and the open river on the east.

It was suggested that, under these conditions, it might be possible that eddy currents, created by the normal wind and the movement of the car close to the bank, might be of such a character as to cause the exhausts to act as intakes. Nothing of the kind could be detected. The ventilators invariably performed their true functions as exhausters of the air within the car, whether running in the open, through tunnels or close to a side bank.

BAROMETRIC PRESSURE INSIDE AND OUTSIDE THE CAR

Under all ordinary working conditions, there was no perceptible difference in the height of the water in the two legs of the U-tube. But, with all deck openings closed, and the 20 exhaust ventilators, with which the car was equipped, open, there was a rise of level on the car side of the U-tube of 1/16 in. when the car was running at a speed of 53 miles an hour, and the wind velocity over the roof was about 54¼ miles an hour, thus showing that, under these conditions, the ventilators were capable of producing a partial vacuum in the car.

AMOUNT OF AIR DELIVERED TO THE BREATHING ZONE

Attention has already been directed to the fact that the circulation of air through the car, under all conditions of service, was of too quiet and gentle a character to be measured or detected by the delicate anemometers used. That there was a circulation, constant and persistent, is shown by the observations of smoke movements. The means adopted to determine the efficacy and efficiency of this movement was that of taking samples of air from the breathing zone of working cars occupied by passengers. These samples were afterwards analyzed for their content of carbon dioxide.

The method is generally known as that of Pettenkofer and "consists in estimating the vitiation of the atmosphere by determinating the amount of carbon dioxide that it contains, and from this computing the amount of air supplied for ventilation."

For the purposes of calculation it was assumed that each passenger would excrete .6 cu. ft. of carbon dioxide per hour, and that the incoming fresh air was diluted with 4 parts in 10,000 of carbon dioxide. The calculation is, then, simply that of estimating the amount of such air that would have to be supplied, for the time and number of passengers concerned, to produce an atmosphere containing the amount of vitiation indicated by the analysis of the samples taken.

The method of collecting the samples was as follows: Two ordinary cautery bulbs were used for pumping the air into the receiving bottles. The admission valves of the two bulbs were held close together and at arm's length from the operator who squeezed them. Their delivery pipes led to the bottom of two clean 8-oz. white-glass bottles. The bulbs themselves had a capacity of about 4 oz. This method insured the delivery of the samples of air to the bottom of the bottle and the forcing of the previous contents out at the neck. In accordance with the practice and recommendations of the Bureau of Mines the bulbs were squeezed at least fifty times in the collection of each sample. The use of two bulbs delivering to two separate bottles was merely to secure two samples as nearly identical as possible for check analyses in case of doubt or accident.

The samples were collected by walking slowly along the aisle

of a working car. Immediately after the collection of the samples the necks of the bottles were closed by the insertion of soft rubber stoppers of the best quality obtainable, and, at the end of the run, these were in turn sealed by dipping in a melted mixture of beeswax and turpentine. Every possible effort was thus made to insure the samples being truly representative of the average condition of the air in the car at the time they were taken. They were all obtained from cars in regular service and the positions of the ventilator openings were recorded.

While the special car was in service, the working coach next to it in the train was used to obtain the air samples, and its ventilators were arranged in the same manner as those of the special car, the only difference between the two being the location of the two cars in the train and its effect on the operation of the ventilators. The effects of this have, necessarily, been neglected.

In a report to the Master Car Builders' Association, in 1908, a committee placed the amount of fresh air that should be supplied for the ventilation of a passenger car at 1,000 cu. ft. per passenger per hour. The results of these tests show that this amount was exceeded in every instance, and that this was accomplished without producing strong air currents or drafts in the breathing zone.

CONCLUSIONS

The conclusions to be drawn from this investigation are that:

One Standard exhaust ventilator will supply sufficient air to the breathing zone to meet the requirements of four passengers on the basis of 1,000 cu. ft. per passenger per hour. Its capacity varies directly as the speed of the train up to 60 miles an hour. The actual capacity in cubic feet per hour equals the speed of the train in miles per hour multiplied by 188. This actual capacity may be taken to be about 70 per cent of the theoretical rating.

The location of the car in the train has an effect on the efficiency of the exhaust ventilator. Speaking generally, the nearer the car to the engine the higher the efficiency. There is probably no mathematical ratio determinable for this.

The location of the ventilator on the car has an effect on its efficiency. The ventilators near the ends of the car have a higher capacity than those at the center, and those at the front have a greater capacity than those at the rear.

No perceptible drafts are created by the Standard exhaust ventilators below the tops of the windows. There is a gentle movement of the air down into the body of the car, and up to the deck in a complex system of currents, that cannot be differentiated.

Smoke or noxious vapors entering the car at the deck openings do not come down into the body of the car, but are drawn out through the exhaust ventilators.

High banks, cuts or tunnels have no effect on the action of the Standard ventilator.

It is not necessary to close the ventilators when passing through tunnels.

The heating of the car near the floor is successfully accomplished.

Women Operate German Railways.—A report received in Paris from Basle says that all the employees on the Berlin Underground Railway are now women. Women are also employed on suburban lines, where they are to be seen cleaning the cars, and even working with the picks and shovels.

Motive Power of the South African Railways.—The total number of locomotives in use on the Union of South Africa Railways at the end of 1913 was 1,458, of which 1,428 were of the standard 3 ft. 6 in. gage and the remainder of 2 ft. gage. The average tractive effort of 75 per cent was 21,626 lb., and the number of locomotives of a tractive effort of over 30,000 lb. was 216. Many of the engines on the books are of an obsolete type, and are gradually being withdrawn from service.

RAILROAD ADVERTISING*

By Edward Hungerford
Advertising Manager, Wells, Fargo & Co.

Advertising was born—50 or more years ago—as a mere incident of the work of the general ticket agent. When that brisk officer rose a bit above the mere details of ticket selling and became general passenger agent, he still carried advertising with him as one of the smaller details of his work—a work to be actually executed by some underpaid office boy or clerk and executed after the fashion of nearly all underpaid work.

The only advertising on the part of the railroads at that time was for passenger traffic. It was rough stuff, bombastic, not logical, not even seeking to be logical. For as far as straight-from-the-shoulder advertising for traffic, or even for a public understanding of their problems was concerned—there was no such thing for the railroads. The railroads advertised "Shortest Route," "Best Route," "Most Popular Route," and, though people went and in many cases found that they were not the shortest, the best or the most popular route, what mattered it? The newspapers had been thrown a little money, and for a little time they would be quiet in their criticisms. And there were some railroads which boasted that they did not have to advertise in the newspapers or the magazines at all. One line said that its advertising appropriations went into the gay stripings of its cars and locomotives—and was quite wrong. Another put its advertising money into its service and was quite largely right—of which more in a moment. Those who put their appropriations into white paper and black ink rarely did it right. A real advertising manager around a railroad office would have been treated as a rarely humorous appendage.

Such conditions could not last, of course. The railroads themselves were the first to discover that their advertising policies were wrong. The discovery came a long time before the finding of the remedy.

It was not so very long after the close of the Civil War that the railroad lines began to multiply in the unpeopled Southwest and the Northwest. Of the possibilities of those rich and undeveloped territories no one with imagination or intelligence might doubt. All they needed for their development—and the enrichment of the railroads that had been built to serve them—was population. In the absence of any other intelligent or organized immigration force the railroads took up the work themselves.

Then it was that advertising came into its first real respect in the railroad offices of the land. It took advertising in the seventies and the eighties, even into the nineties and up to today, to build the fat farms and the fine towns, the budding cities that one sees from the car window as today he crosses Minnesota, the Dakotas, Montana, Oklahoma and West Texas. That advertising was often poor—as our advertising standards of today go—but it was thorough and generous. The results that followed it were astonishing. The response was immediate. The railroads saw that response and invested more advertising funds. The response was increased proportionately. There are counties, metropolitan cities—with trolley systems and country clubs and taxicabs and tango palaces—whole developed states in our land that are young enough to say, and say with truth, that they were builded upon the policy of American advertising.

This has also been the history of the development of western Canada by the advertising of your own railroads. Only you have had two benefits which were denied to the railroads of the United States a generation or so before. You have had the benefit of experience and you have advertised in a day when advertising has begun to come into its own.

One might expect that any profession—you may call it a policy if that suits you better—that had accomplished so much for the railroads would today have a larger recognition than has yet been given it. You might fairly expect that the man who headed

*From a paper presented before the Canadian Railway Club at Montreal, Can., on March 9, 1915.

t upon any great system would be a member of the intimate councils that govern it. Yet, unfortunately, the reverse is the more apt to be true. And no matter how advertising on the railroad has progressed, I think that I am fair in saying that the advertising manager on the railroad has not been permitted to make a similar progress. His position and his progress are hardly to be compared with those of his brethren who occupy similar posts in the staff of great manufacturing and merchandising enterprises. Those men are given every opportunity to perfect and to strengthen themselves, are recognized as the right hand members of the organization. They are "managers" in the full sense of the word. No one dares to doubt their final decision in matters affecting their branch of the conduct of the business. Neither does a railroad executive doubt the decision of the man who is handling the law business of his system—he does not even assume to criticize the contracts which this man may draw up. He does not change the structural plans for bridges or the detailed profile for a projected line across new country.

Does he do as much for the advertising manager?

You know yourselves that the times are far too few when he ever sees an advertising manager. The smart executive has many thoughts and many suggestions on advertising. Most quick-witted and alert men have—and most of their thoughts and suggestions are very good indeed. He may have, and probably does have, more than a little pride in the advertising of his road. But, in many cases, he probably has little more than a head-nodding acquaintance with the advertising manager of his line. That poor soul is "down" in the organization. He works "up" to the president through two or three intermediate executives who may or may not have any intimate knowledge or liking for advertising and who almost certainly will have widely divergent ideas as to its practical application. Frequently he has the exquisite torture of seeing his best publicity ideas so twisted and so changed before they receive the final stamp of approval from the "big chief" and go out into the world to attempt their missions, that he would not know himself these children of his own brain.

Now here is a condition not absolutely prevalent upon the North American continent, but unquestionably dominating far too many of our railroads and preventing them from gaining the fullest advantages from advertising and publicity of every sort. Before we consider the remedy let us give attention to one or two possible causes for this condition. A railroad executive, big-hearted and shrewd-headed, offers what he thinks is a good reason:

"The reason we are willing to defer to the general counsel and do not often assume to criticize him in because we realize that he is a trained man. The points he makes are the result of his specialized education and his experience. Our advertising agent is a very different sort. His book education ceased before he was done in the high school. He has come up with us in the railroad—all the way from office boy. Can you expect us to defer to his judgment or to accept it as something infallible?"

This begins to look as if we had a very definite cause formulating itself. Without losing sight of this point let us turn around and see it from the other angle—from that of the man who is handling the advertising for that very road. He is equally frank.

"Perhaps the old man is right," he admits. "I am willing to admit that one of the main troubles in advertising the railroad is in its advertising man himself. As a rule he has not been selected because of experience or ability—a good many times he has been secretary to some 'big wig' in the traffic department and the advertising job is given him because it was necessary to proffer some slight promotion to a man who has been faithful in the company's service. And eventually he will quit the advertising job. He will be too big for it—the truth is that it will be too big for him—and so he will go and another will come—leaving the whole job to be done over once again.

"The truth of the matter is that a big railroad is just like a big manufacturing concern; its operating end is the manufacturing department, while its traffic end corresponds with the sales department of a factory. One of the weaknesses of the railroad situation today is that some of its leading figures claim that the business is different from any other. There may be minor differences, but in my opinion there is a strong similarity between railroading and manufacturing.

"Yet because of this very feeling that railroading is fundamentally different from other businesses, its advertising is too frequently permitted to also become different. It is not looked upon by these men as a force that may be brought to create traffic—and this despite some of the things that I have told you already tonight—'but as merely a cut and dried, or hit and miss method of making announcements as to train service, excursion rates and the like.'

"Merchandising, like advertising, is a specialized business and requires specialized training and education. And is it to be wondered that a man who has had no special training toward the diplomatic handling of the public has little or no appreciation of the real place of advertising in the progressive business organization? And those having in charge the traffic department of a railroad should be—first of all—good sales managers. Rate clerks can be hired just as easily as an advertising manager can hire a copy writer."

Here then is the case as put by one actual advertising man. And whether we subscribe to it in full or not I think that we all can agree that he has struck at both the cause and the result in far too many railroad advertising departments today. And I do not think, myself, that there is any great problem involved in finding the solution—particularly not when we keep steadily in mind all the while what advertising has done for the railroad, how it has made trains like the International Limited, the Imperial and the Twentieth Century household words, how it has upbuilded whole townships, and counties, and states, and provinces, and so in turn upbuilded the welfare of the railroad.

Just as the legal department of the railroad is its defensive wing, so should the advertising department be its offensive. The advertising manager should sit alongside the general manager and the traffic manager, the counsel and the controller. He should be freed from the detail and left to plan the publicity of the railroad, in its every phase. It should not be alone his work to write time-tables or scurry immigrants out to new localities, to see reporters or to attempt to steal fast freights from his nearest competitor. His work should combine these things and then reach to a far higher plane, the meeting and gauging and shaping of public sentiment of which more in a moment.

The advertising manager of the railroad should be trained—he should train himself if you please—as carefully as that general counsel has trained himself. He should not himself expect to be bidden to sit at the family table without being made ready for the feast. There are plenty of educational forces that stand ready to help him make himself a better man not only for the railroad for which he works, but for the satisfaction of his own peace of mind as well. He should be not only a student of advertising and the things that pertain to advertising, but he should also be a student of changing conditions; he should be what we sometimes call a publicist.

For no matter how intelligently and successfully our railroads may have advertised for immigrants and for passenger traffic of every sort and condition I do not believe that they yet have used paper and ink to the greatest advantage to fight the most of their battles for public sentiment, in repelling the attacks of unjust legislators and commissions. They have rarely used these implements with greatest intelligence. As a rule, if they have advertised for public sentiment through newspaper advertisements, it has been an eleventh-hour measure adopted in a great crisis.

The railroads of the state of New York—splendid advertisers

for passenger traffic each one of them—united in such an eleventh-hour appeal throughout the newspapers of the state against the so-called full-crew bill, which was then before the governor of the state—a bill which would add more than $2,000,000 to their costs of operation. The "ad." was generous in proportions, but the governor laughed at it and signed the bill. He was a shrewd enough molder of public opinion to know that the railroads had thrown away their money.

On the other hand, what a different result might have been written if the railroads steadily and persistently, whether under legislative fire or in times of seeming calm, had told their story quietly and interestingly through the newspapers of the state. It would not have cost them anything like $2,000,000 a year to have brought an intelligent public sentiment to their aid. What it would have cost would have been the expenditure of thought and careful planning by one man in authority—a man trained for just such an emergency as this, plus a most moderate cash outlay for newspaper space, would have produced a campaign that quickly would have ended the "full-crew" menace in New York. In fact, this very sort of a campaign has just been waged by the railroads of Missouri against the "full-crew bill," which had also come into being in that state. Despite the fact that the bill had passed and had become operative as a law a shrewd and deliberate advertising campaign, conducted at a most reasonable cost to the railroad, succeeded in repealing it by popular vote at an election called for that purpose. And it is gratifying to see that the railroads of the United States working toward the repeal of the full-crew bills in some other states, as well as a general increase in their passenger rates are not relying upon the charity or the good nature of the newspapers for free space for the presentment of their case, but are paying for regular advertising for the shrewd, deliberate, forceful statement of their very good arguments. Three days ago the various roads operating in New Jersey, the Central of New Jersey, the Lackawanna, the Pennsylvania, the Lehigh Valley and the Erie, began a campaign in the newspapers, looking to the repeal of the full-crew bill. A similar newspaper campaign is to be carried on in New York. If the campaign in New Jersey is successful, and also against an impending measure to restrict the length of freight trains. The railroads responded to the full-crew bill by running longer freight trains. The labor unions in their turn provided a bill limiting the trains to half a mile in length. The roads are going to fight this. Personally, I am deeply interested in this matter, and I feel that if, instead of waiting for this to take place, they had had an executive, or semi-executive officer; such as the general counsel, the general manager or the chief engineer, a man, who, week in and week out, and month in and month out, had adequately told their story, and shown what it meant to the community in a straightforward and forceful manner, they would be more successful.

Perhaps they have studied the splendid results obtained by a policy of advertising of the telephone companies, a splendid example of the use of advertising of the highest type by a public utility. Perhaps they have read the printed record of the individual campaign waged by the trolley company of Toledo, or those of various traction and lighting utilities which have handled such problems and handled them intelligently.

But they could not have been handled intelligently, or successfully, by some man buried at an inferior desk of a department. They must have been handled by men who were executives, with executive work and executive opportunity—men who were paid and well paid too, to plan in the large ways that the railroad must approach not only its individual patrons, but the entire public upon the printed page. Success of this sort rarely comes in large measure except to men and institutions who go out to meet her in a large way.

To make a brief résumé—we have seen the railroads advertising for emigration, and the advertising responding magnificently to that test. The roads have used advertising also for creating passenger traffic, and I am not so sure but that they might also use it to create freight traffic, but that is open to discussion and to question. But we have not yet seen the railroads taking hold of these great questions of public policy and grasping them with the strength that some other businesses have shown. I imagine this is due to one thing, this very thing I have talked of this evening—that the advertising manager of the railroad has not compelled himself to be recognized by an executive of the railroad organization.

FEDERAL VALUATION PROGRAM

Thomas W. Hulme, general secretary of the Presidents' Conference Committee on Valuation, has issued a circular announcing that the plans of the Interstate Commerce Commission contemplate that valuation work will be commenced on the following lines between July 1, 1915, and June 30, 1917. This program is liable to change and is herein stated for the general information of all interested. Each carrier may expect to receive at least three months and possibly six months' official notice from the director of valuation of the government's intention to commence work on its line.

Eastern District

July 1, 1915, to July 1, 1916

Boston & Maine (complete the work); Boston & Albany; New Haven System, 1,000 miles; Pennsylvania Railroad, 1,500 miles; Central of New Jersey; Pittsburgh & Lake Erie; Bessemer & Lake Erie; Richmond, Fredericksburg & Potomac; Canadian Pacific (in Vermont and Maine); Central Vermont; Grand Trunk (Sherbrooke, Que., to Portland, Me.); Virginian.

July 1, 1916, to July 1, 1917

New Haven System (uncompleted balance); Pennsylvania Railroad; Bangor & Aroostook; Maine Central; Philadelphia & Reading; Buffalo, Rochester & Pittsburgh; Delaware & Hudson; Rutland; Ulster & Delaware; New York, Ontario & Western; Long Island.

Southern District

July 1, 1915, to July 1, 1916

Central of Georgia; Mobile & Ohio; Southern (Eastern half of System); Cleveland, Cincinnati, Chicago & St. Louis; Georgia; Charleston & Western Carolina; Chicago, Indianapolis & Louisville; Nashville, Chattanooga & St. Louis; Pennsylvania Lines West.

July 1, 1916, to July 1, 1917

Southern; Florida East Coast; Pennsylvania Lines West; Atlantic Coast Line.

Central District

July 1, 1915, Ann Arbor; August 1, 1915, Toledo, St. Louis & Western; August 1, 1915, Chicago, Terre Haute & Southeastern; October 15, 1915, Chicago, Milwaukee & Gary; December, 1915, New Orleans Great Northern; December, 1915, Gulf & Ship Island; December, 1915, Texas & Pacific; March, 1916, Minneapolis & St. Louis; April, 1916, Chicago Great Western; May, 1916, Green Bay & Western; July 1, 1916, Duluth, South Shore & Atlantic; November 1, 1916, Texas & Pacific; December, 1916, Louisiana & Arkansas; December, 1916, New Orleans & Northeastern; December, 1916, Louisiana Railway & Navigation Company; April 1917, Michigan Central; April, 1917, Chicago & North Western.

Western District

July 1, 1915, Santa Fe Lines East; October 1, 1916, Missouri Pacific System; October 1, 1916, Texas & Pacific.

Pacific District

July 1, 1915, to July 1, 1916

Great Northern, 3,300 miles; Chicago, Milwaukee & St. Paul (West of Mobridge, S. D.), 1,600 miles; Gallatin Valley; Idaho & Washington Northern; Spokane & British Columbia; Wenatchee Valley & Northern; White Sulphur Springs & Yellowstone Park; Atchison, Topeka & Santa Fe (Coast Lines, California), 1,200 miles; Southern Pacific—Pacific System (New Mexico, Arizona and California), 1,500 miles; Arizona Eastern; Ray & Gila Valley; San Diego & Arizona; San Diego & South Eastern; Twin Buttes; Holton Inter-Urban; Tonopah & Tidewater; Las Vegas & Tonopah; Bullfrog Goldfield; Tonopah & Goldfield.

July 1, 1916, to July 1, 1917

Great Northern (Western District to complete), 2,100 miles, (Pacific District to complete), 500 miles; Chicago, Milwaukee & St. Paul (Pacific District to complete), 350 miles; Spokane, Portland & Seattle; Oregon-Washington Railroad & Navigation Company; El Paso & Southwestern System; Arizona & New Mexico; Atchison, Topeka & Santa Fe (Lines in New Mexico), 1,300 miles; Southern Pacific (Pacific System), 1,000 miles; Miscellaneous Short Lines.

Annual Convention of the Air Brake Association

Moisture in Compressed Air Apparatus and Yard Plants; Operative Freight Brakes; Pneumatic Signals

The twenty-second annual convention of the Air Brake Association was held in Chicago, May 4 to 7, as noted in the *Railway Age Gazette* for May 7, page 983. A report of the convention follows:

PRESIDENT'S ADDRESS

President Albers called attention to the lack of standardization of brake equipment for passenger cars, and suggested that a committee, composed of air brake men from both the Air Brake Association and the Master Car Builders' Association, could by careful study do much to relieve this situation. The L. N. equipment which replaced the old P. M. equipment on the heavier cars, has not given entirely satisfactory results, trouble being experienced with slid-flat wheels, hot wheels and burned brake heads, caused by "stuck brakes." On the New York Central lines it has been found necessary to operate this equipment with its graduated release feature eliminated, which made it necessary to lose two of the features for which this valve was designed, namely, quick recharge and high emergency brake cylinder pressure. The double P. M. and L. N. brake equipment have also caused trouble from "stuck brakes." The new P. C. equipment provided a temporary relief from the troubles experienced with the original valves, but Mr. Albers stated, the complexity of this equipment rendered it difficult to locate immediately and definitely defects which arose in train service. His suggestion was to have a committee work towards a simple standard valve which would be capable of being applied to all but the lighter classes of cars.

Mr. Albers also called attention to the necessity of economy in the maintenance of air brake equipment, with full consideration for safety. On the New York Central, east of Buffalo, tests have been in progress for a period of 18 months, on 18 dining cars, and to this date 16 cars are still in actual service, with an aggregate mileage of 2,321,136 miles, without once having received any attention or lubrication, except that originally applied. None of these cars have given any detention on account of the air brake equipment, nor has any valve been removed except for tests. If the cleaning period, instead of being three months as at present, was extended to four months, the annual saving to a road having 1,000 P. C. equipment cars would amount to approximately $1,640, and if the period was extended to six months the saving would be approximately $3,280. With the P. M. or L. N. type of equipment this saving would be $420 and $840, respectively.

100 PER CENT OPERATIVE BRAKES IN FREIGHT SERVICE

The committee report on this subject was presented by G. H. Wood, Atchison, Topeka & Santa Fe. An abstract of this report follows:

The general opinion is that an operative brake is one in which the piston moves out of the brake cylinder far enough to close the leakage groove, and not more than 10 in. when a full service brake application is made from at least a 70-lb. brake pipe pressure, and remains so until the usual inspection is made, and releases properly in the usual methods resorted to in making ordinary terminal tests; the only other requirement is that the foundation brake gear be connected throughout to bring the shoes to the wheels. The second consideration is the question of what constitutes 100 per cent operative brakes. Our opinion in this respect contemplates each brake in a train be operative as above stated and so connected that they may all be operated from the locomotive. This will constitute 100 per cent operative and meet all the requirements but one, namely, efficiency. The highest efficiency required to meet general conditions is that the train may be controlled by the engineer without the assistance of trainmen with the ordinary hand brake.

Unfortunately, while the requirements of efficiency reduce the difficulty of providing an operative brake, they also result in ability to control trains with a low individual brake efficiency throughout the train or a small percentage of brakes operative for service requirements, while certain other conditions automatically increase the necessary efficiency and number of operative brakes, and the greater the number of cars involved, the more pronounced are these results.

At many terminals we have no provision to charge trains and make inspection in the train yard until the engine is placed on the train. The introduction of the yard pressure lines where the train is made up sufficiently in advance of leaving time, would give an opportunity to make the brake inspection and correct many defects before the engine was placed on the train for departure.

Any one point on a large system attempting to run 100 per cent operative brakes would be immediately confronted with a prohibitive number of cars with inoperative brakes and a congestion that would cause serious delays resulting in this particular point being criticised for tying up traffic. Relief for this particular terminal could only be brought about by allowing inoperative brakes to proceed, or by increasing the amount of the brake work done at the terminals on either side. It can readily be seen that any one railroad attempting to run 100 per cent operative brakes would be placed in almost the same position as the terminal above mentioned, and the same rule in regard to relief would apply between the railroads involved.

The difficulty of establishing the practice of cleaning brakes on cars in trains at large terminals where the tracks extend over a large territory is expensive, as it is hard to get men and material to the cars and men are idle a large part of their time. But again we find that at many small terminals where very little switching is done on the train outside of changing engines and cabooses and where the repair track is close to the train yard, that air brake repairs can be made in trains successfully and economically, as the men in this case can be used on the repair tracks when no trains are in the yard. Yard air lines at these terminals are necessary to test out work of this kind and additional time allowed to trains in terminals to give the car men an opportunity to do the work before, or after, the train is switched. Yard train testing devices must also be provided at terminals in order that cars arriving in trains with brakes "cut out" may be tested to ascertain what, if anything, is wrong, and to test work on the brakes after it is completed.

After the facilities and materials are provided, then comes the proposition of procuring men who are competent and reliable to do the work or men who can be educated in a reasonable length of time. The better supervision we have, the less trouble we have from this source. One of the conditions we find it hard to overcome is the careless manner in which some of the air brake work is done.

We also find trainmen cutting out the brakes that do not release as soon as the others in the train, not waiting until the brake pipe pressure has been raised high enough to release the brakes having the best packing leathers. We find men who have a hobby of keeping the caboose brake cut out, being afraid of sliding the wheels, and others who will cut out cars and bleed them in order to make a switch quickly at some other point. We find enginemen who will cut out tender brakes because the triple does not release promptly or because they are afraid of the hangers breaking, and others who will insist on having the piston travel let out beyond the limit on cars, claiming that the brakes drag—this particularly with small engines. Cars are found with the brake "cut out," and on testing out nothing is found wrong, except that the retainer is turned up, and others with nothing but

a leak at the triple valve union, requiring only a turn of a wrench to stop it. All of these things work against the percentage of operative brakes and are irregularities against which a crusade would have to be waged on every division of every railroad concerned. Some form of defect card must be adopted to be applied by the man cutting a brake out on the road, showing who cut it out and for what reason.

A system must be inaugurated to catch the disabled brakes as soon as practicable after the defect becomes apparent. With this in view, what might be called "dead lines" should be designated at reasonable distances over the road—terminals where facilities are the best, as 100 per cent points where no brakes that are inoperative are allowed to pass, regardless of lading. At all terminals where there are facilities, dead freight loads and empty cars with inoperative brakes should be caught and repaired. All cars on repair tracks should have their brakes carefully tested, and if the cleaning date is over nine months old on home cars, the brakes should be cleaned. This would avoid the necessity of putting the car on the repair track again in so short a time, and when it might possibly contain an important load.

If we wait until the trains are made up in the yard to make inspections we will have delays and bad cars, but if we require the men on all incoming trains to have the train fully charged and then make the required application of brakes before cutting off, the air brake inspection can be made at the time of usual train inspection, and any cars "bad ordered" can be switched out in the usual switching time.

The question arises as to what is to be gained by increasing the number of operative brakes. One reason is to provide a wider margin of safety by the ability to stop in a shorter distance in cases of emergency. The reason more frequently encountered, however, is the resultant reduction of slack action in long trains, which contributes largely to troubles arising from break-in-twos.

Discussion.—F. B. Farmer, of the Westinghouse Air Brake Company, strongly recommended the employment of general car brake inspectors, whose duty it would be to instruct and demonstrate to the cleaners of the freight car air brake equipment how they should do their work, and to check them in their work, thus relieving the car foremen, who in very many instances are not sufficiently familiar with air brake work. He spoke strongly in favor of the incoming tests of the car brakes. This will eliminate a lot of trouble and delay that would otherwise be caused when the brakes are found defective on the outgoing tests. He called attention to the tendency for some of the comparatively level roads to absolutely neglect the maintenance of the retaining valves. This causes a great deal of trouble for roads operating in the mountainous districts, and greatly interferes with the expeditious transportation. In speaking of the "dead line," as described in the report, he stated that at one point on a large road that operated this dead line system, 75 per cent of the brakes cleaned had not run over nine months, showing that this work is not always done as carefully as it should be. Lack of knowledge and hurried work have been a great factor in the improper maintenance of brakes, and many times are the basis for charges of dishonesty in doing the work.

Some roads are having good success with "carding" freight cars with inoperative brakes, permitting them to go to the next terminal. The train men have also been instructed to place "defect cards" on the cars as they become inoperative on the line, and also on those cars that are picked up en route. Considerable educating has to be done to get the men to do this, and only by the assistance of the transportation officials can it be satisfactorily accomplished.

Walter V. Turner, chief engineer of the Westinghouse Air Brake Company, encouraged the members to do all in their power to influence their superiors to give them the proper facilities for keeping the brakes in good condition. Absolute persistence and nerve in carrying out what they believe to be absolutely necessary in the maintenance of brakes is required to get the right results.

ELIMINATION OF MOISTURE FROM YARD TESTING PLANTS

Mark Purcell, Northern Pacific, chairman of the committee on this subject, presented a description of the air cooling plant of the New York Central at the Mott Haven yards in New York City. This plant was installed for the purpose of eliminating the moisture from the compressed air before it was distributed throughout the yards and thus prevent freezing of the air lines, and insure dry air being supplied to the equipment in the yards. The compressors feeding these yards have a capacity of 2,500 cu. ft. of free air per minute. The cooling plant was built on the basis of 3.2 running feet of ¾-in. pipe per cubic foot of free air consumed by the compressor. It is divided into 48 sections, each section having two headers, and 18 pieces of the ¾-in. extra heavy galvanized pipe about 112 in. long. The upper headers are 6 in. in diameter and the lower ones 8 in. in diameter, both being made of extra heavy wrought iron. The 48 sections are arranged in two groups of 24 each, and are so arranged that all the piping is accessible, and sufficient space is provided for the circulation of the atmosphere around the cooling pipes. The air is first received from the compressor into two large storage reservoirs, 4½ ft. in diameter by 11 ft. high. The plant is so arranged that the air may be delivered direct from these reservoirs to the yard or direct through the cooling plant. A roof has been erected over the plant to protect it from the snow in winter and the hot sun in the summer. The plant gives satisfactory service, and from numerous tests made throughout the yard it has been ascertained that it will deliver dry air under all conditions.

Discussion.—Those roads that have not such an elaborate cooling system have found that very good results can be obtained by placing drain reservoirs in the yard piping to catch the moisture as it becomes condensed in the pipes, these reservoirs to be drained twice a day. It was also pointed out that the compressor should have its intake located outside the building where it could obtain as cold air as possible.

The discussion also developed into the consideration of the accumulation of moisture in the air on the locomotive. Briefly summarized, it was believed that sufficient radiating surface should be provided between the compressor and the brake valve, and where possible two main reservoirs were recommended, one of which to be used as a drain for the air system. On large Mallet locomotives it was found expedient to use three main reservoirs. It was also shown that where the compressor or the storage capacity was not great enough to provide the necessary air for operating the train, and where such air was, of necessity, taken directly from the pump without having time to cool, considerable trouble was experienced with moisture in the train line. It was also pointed out that very good results could be obtained by leaving all drain cocks open on the engine and tender during the time the engine is in the roundhouse. In some cases the centrifugal dirt collectors have been found to be of advantage as drains for the train line.

OPERATION OF THE PNEUMATIC SIGNAL DEVICE

The committee report on this subject was presented by L. N. Armstrong, Pennsylvania Railroad, who said in part: Possibly the largest factor in the correct operation of the signal device is maintenance. This is particularly true of the amount of leakage allowed in the signal line. Excessive leakage will destroy the confidence of the crew in the signal system. In order to get the best results the location of the pipe and hose should be as recommended by the M. C. B. Association. In endeavoring to improve the operation of the pneumatic signal system it is necessary to first ascertain the conditions under which the signal is operated. Tests should be made with a recording gage attached to the signal line on the rear car of a train by which can be determined the pressure carried in the signal line, all reductions in this pressure, whether made by pulling the cord or by the hose coupling leaking when passing over crossovers, switches, etc.; and the time required to recharge the line after reductions have been made. It has been found necessary for the train men to make the reductions at the car discharge valve of not less than one second

duration, and pause between the reductions from two to three seconds, or approximately three times as long as the time of reduction. On the longer trains it is necessary to increase this time interval between the blasts. It is believed that the electro-pneumatic signal, which does not have the limitations of the present pneumatic signal, will eventually be adopted. A steam train thus equipped has been in regular service during the past year, covering 180 miles a day with good results.

The construction of the signal valve is such that very careful workmanship is required in order to have the correct clearance between the valve stem and its bushings. The manufacturers have investigated the permissible leakage for signal valves with various sized orifices venting to the atmosphere. Valves which have passed the standard tests using no orifice, passed also when the leakage was six pounds per minute. The results of these tests show that in order to affect the signal valve operation at all, leakage must be excessive and above the amount which should be permitted in service. The committee report also included the method of testing signal valves as used by the Central Railroad of New Jersey at the Elizabethport shops.

Discussion.—The consensus of opinion as to the pneumatic signal was that in its present state it is not an absolutely reliable device. On long trains considerable trouble is experienced with leakage. Where trains are over 18 or 20 cars long, it was believed expedient to increase the signal train line pressure to 60 lb., and on such trains in giving signals from the last car the valve should be held open longer and greater intervals should be allowed between the blasts than on short trains. It was believed that the electro-pneumatic signal system would be of much more value and would give the necessary reliability that should be required in a signal system between the locomotive and cars. Greater care should also be taken in the proper maintenance of the present pneumatic system. Mr. Armstrong, in closing his paper, stated that electric energy sufficient to operate an electro-pneumatic system could be obtained from dry cells or from the electric lighting system on the cars or locomotive.

OTHER BUSINESS

A committee report was also presented on hand brakes for heavy passenger cars in which the need for more efficient hand brakes for heavy passenger equipment cars was shown. This is not to enable the train crew to stop a train at high speed, but rather to enable the switching crew to properly control the cars in yard movement. The present equipment is only good for holding the cars after they have once been stopped. The subject was continued to report at the next convention.

The customary report on Recommended Practices was also presented.

During the convention an afternoon was given to the air brake appliance supply men, who talked to the members concerning their products. On Thursday afternoon the association was addressed by Walter V. Turner, of the Westinghouse Air Brake Company; N. A. Campbell, of the New York Air Brake Company, and J. R. Snyder, of the Pittsburgh Air Brake Company. Mr. Turner spoke of the developments during the past year, and told how the New York subway had increased its capacity by the adoption of the electro-pneumatic brake. Mr. Campbell gave an illustrated talk on the New York electro-pneumatic air brake. Mr. Snyder gave an illustrated talk on the new air brake equipment furnished by his company, laying particular stress on the "No-kicker" attachment.

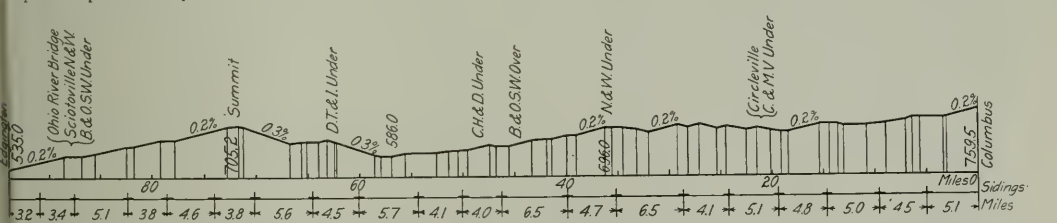
The association was also addressed by E. H. De Groot, Jr., superintendent of transportation, Chicago & Eastern Illinois, and M. H. Haig, mechanical engineer, Atchison, Topeka & Santa Fe.

The following officers were elected for the ensuing year: President, J. T. Slattery, Denver & Rio Grande; first vice-president, T. W. Dow, Erie Railroad; second vice-president, C. H. Weaver, New York Central lines west of Buffalo; third vice-president, C. W. Martin, Pennsylvania Railroad; secretary, F. M. Nellis, Westinghouse Air Brake Company; treasurer, Otto Best, Nathan Manufacturing Company. The executive committee is as follows: T. F. Lyons, New York Central lines west of Buffalo; J. F Barry, New York, Ontario & Western; L. P. Stretter, Illinois Central; Mark Purcell, Northern Pacific; G. H. Wood, Atchison, Topeka & Santa Fe.

It was voted to hold the next annual convention at Atlanta, Ga., on May 2 to 5, inclusive.

NEW LINE OF THE CHESAPEAKE & OHIO NORTHERN

Contracts have been let for the grading and masonry work on 29.8 miles of the Chesapeake & Ohio Northern from Edgington, Ky., to a point near Waverly, Ohio, as mentioned from time to time in our news columns, and the contractors are now moving in and installing their equipment. This company, as a subsidiary of the Chesapeake & Ohio Lines, was organized to build a road from Columbus, Ohio, to Edgington to connect the Hocking Valley with the main line of the Chesapeake & Ohio, but the difficulty of securing funds at a reasonable rate of interest at the present time has made it inadvisable to undertake the construction of the entire mileage for the present. It is planned to connect with the Norfolk & Western near Waverly temporarily and to secure trackage rights over that company's lines into Columbus.



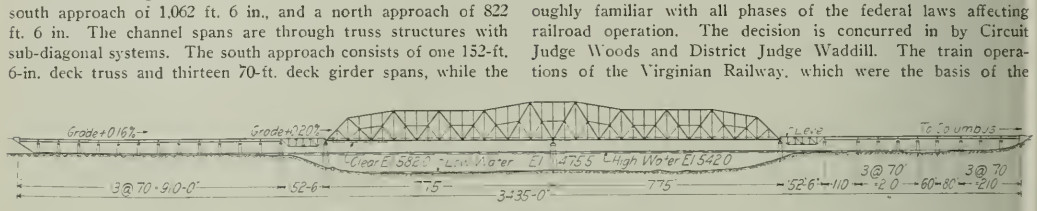
Condensed Profile of the Chesapeake & Ohio Northern, Showing the Entire Line Between Edgington, Ky., and Columbus, Ohio

Starting at Edgington on the south bank of the Ohio river, the new line will swing to the north crossing the river just east of Sciotoville, Ohio, also crossing the Norfolk & Western and the Baltimore & Ohio Southwestern near this point. The temporary connection with the Norfolk & Western is made just south of Waverly on the east bank of the Scioto river, this stream being crossed by the existing line at Waverly and again at Chillicothe. The proposed route then follows the eastern bank of the river for the entire distance to its connection with the Hocking Valley just south of Columbus. It will cross the Detroit, Toledo & Ironton near Waverly, the Cincinnati, Hamilton & Dayton, the Baltimore & Ohio Southwestern, and the Norfolk & Western near Chillicothe, and the Cincinnati & Muskingum Valley at Circleville, the grades at all of these crossings being separated. The maximum grade will be 0.2 per cent compensated northbound and 0.3 per cent southbound.

The construction of the first section of the new line will require the excavation of approximately 3,000,000 cu. yd. of earth and 500,000 cu. yd. of rock, or an average of 120,000 cu. yd. per mile. About 52,000 cu. yd. of concrete, 500,000 lb. of reinforcing

steel, 40,000,000 lin. ft. of timber piling, 700 tons of cast iron pipe and 2,000 tons of structural steel will be required The line will be laid with 90-lb rail and creosoted ties on crushed limestone ballast

The bridge over the Ohio river is the most important piece of work on the line, the substructure of this bridge being now about one-half completed. The structure has a total length of 3,435 ft., consisting of two main channel spans of 775 ft. each, a south approach of 1,062 ft. 6 in., and a north approach of 822 ft. 6 in. The channel spans are through truss structures with sub-diagonal systems. The south approach consists of one 152-ft. 6-in. deck truss and thirteen 70-ft. deck girder spans, while the



Elevation of the New Ohio River Bridge of the Chesapeake & Ohio Northern, Near Sciotoville, Ohio

north approach includes a 152-ft. 6-in. deck truss span and deck girder spans of various lengths from 60 ft. to 110 ft. A clearance of 40 ft. above high water is provided, the variation between low and high water at this point being about 66½ ft. The substructure of the bridge consists of concrete piers and abutments. The alinement is on a tangent across the river and the north approach, with a 1 deg. 15 min. curve on the south approach.

The next most important structure on the line is the crossing of the Little Scioto river about two miles north of Sciotoville. This structure has a total length of 1,080 ft., and consists of eight steel towers and one rocker bent supporting 40-ft. tower girders and 80-ft. intermediate girders. The maximum height at the stream is about 100 ft. In addition to this there will be numerous plain and reinforced concrete arch and box culverts and highway structures of various designs. The small drainage openings will be cast iron pipe with concrete headwalls.

The grading and masonry contracts were awarded to W. W. Boxley & Co., Roanoke, Va., the Rinehart & Dennis Company, Charlotteville, Va., Winston & Company, Richmond, Va., and Robert Grace Contracting Company, Pittsburgh, Pa. The substructure of the Ohio river bridge is being built by the Dravo Contracting Company, Pittsburgh, Pa., and the superstructure is contracted to the McClintick-Marshall Company, Pittsburgh, Pa. This line is being built under the direction of M. J. Caples, vice-president, and William Michel, chief engineer. The Ohio river bridge is being built under the supervision of Gustav Lindenthal, consulting engineer, New York City.

Pullman Service on English Railway Withdrawn.—With a view to economizing coal, all the Pullman cars running on the London, Brighton & South Coast, except those on the "Southern Belle," were recently withdrawn.

HAND BRAKES OUTLAWED

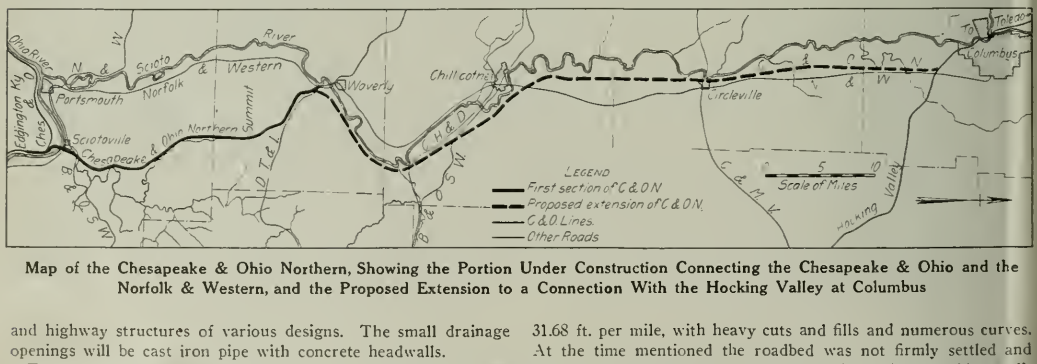
The decision of the United States Circuit Court of Appeals, Fourth Circuit, at Richmond, Va., May 4, briefly reported in our last issue, page 981, holding that the use of hand brakes to control the speed of trains in ordinary service is illegal, was written by Judge Martin A. Knapp, who was for years chairman of the Interstate Commerce Commission and who is thoroughly familiar with all phases of the federal laws affecting railroad operation. The decision is concurred in by Circuit Judge Woods and District Judge Waddill. The train operations of the Virginian Railway, which were the basis of the prosecution by the government, took place in July, 1912. The final arguments before the Circuit Court of Appeals were made November 30 last. The decision confirms that of the District Court at Lynchburg.

Judge Knapp's decision is in substance as follows:

The Virginian Railway was constructed primarily for the transportation of coal at low cost, and unusual expense was incurred to secure favorable grades and permit trains of great length. It appears to be a common practice to operate trains of 100 cars, each carrying approximately 54 tons. These trains are said to exceed in tonnage, if not in number of cars, the trains in ordinary use on any other road in the country.

From Goodview to Huddleston, Va., 13 miles, there is a descending grade to the east, which is the direction of the loaded movement, varying from nearly level to a maximum of 31.68 ft. per mile, with heavy cuts and fills and numerous curves. At the time mentioned the roadbed was not firmly settled and more or less trouble was experienced from the unstable condition of the fills and the sliding of earth and rocks in the cuts. On this account trains were limited by order to a speed of 5 miles an hour at one point and 10 miles an hour at other points. It was found, however, that these very long trains could not be operated safely, at the slow rate of speed required on this grade, when air brakes only were used for their control. This was because air brakes could not be applied with needed effect, if at all, without exerting a pressure which would stop the train, or, if released before the train came to a standstill, would cause such a jerking and surging of the train as to break the train apart; and accidents of this kind were of frequent occurrence. To avoid this danger the company decided upon the use of hand brakes, and accordingly, in May, 1912, promulgated the following order:

"In order to avoid breaking knuckles, pins and couplers in eastbound 100-car trains coming down the six-tenths grade between Goodview Tunnel



Map of the Chesapeake & Ohio Northern, Showing the Portion Under Construction Connecting the Chesapeake & Ohio and the Norfolk & Western, and the Proposed Extension to a Connection With the Hocking Valley at Columbus

and Huddleston, these trains will be held with hand-brakes and the independent engine brake.

"As a general proposition hand-brakes should be set about as follows: Goodview Tunnel to Westgate, 15 brakes; Westgate to Moneta, about 5 brakes; Moneta to Huddleston, about 20 brakes.

"If these brakes do not hold the train sufficiently, additional hand-brakes will be set up, or the independent engine brake used.

"The automatic air brakes will be used if it is seen that the hand-brakes are not holding properly, to make a quick stop on account of being flagged, or in other cases of emergency."

Trains were operated under this order and substantially according to its requirements.

It appears to be conceded that trains of a smaller number of cars could be safely operated on this section of road, even at the slow rate of speed stated, by using only the air brakes and the locomotive power brake. Just how many cars could be handled without the use of hand-brakes is not altogether certain, but apparently there was no difficulty with trains of 50 cars, or even more than that number. In short, the alleged necessity for requiring hand-brakes to be used resulted wholly from the extreme length of the trains, coupled with the low rate of speed at which they were moved.

Was the use of hand-brakes under such circumstances a violation of the federal statute? The original act, approved March 2, 1893, provides that ". . . it shall be unlawful . . . to run any train . . . that has not a sufficient number of cars in it so equipped with power or train brakes that the engineer on the locomotive can control its speed without requiring brakemen to use the common hand-brake for that purpose." The later amendment of 1903 includes this provision:

"That whenever, as provided in said act, any train is operated with power or train brakes, not less than 50 per centum of the cars in such train shall have their brakes used and operated by the engineer of the locomotive drawing such train." [Later modified to 85 per cent.]

The question asked above must be answered in the affirmative. In our judgment the legislation here considered manifests the plain intention of Congress to require the control of trains in ordinary line movement by the train brakes prescribed, and to make unlawful the use of hand-brakes for that purpose. True, the use of hand-brakes is not in express terms prohibited, but this is the necessary implication of the language used and it admits of no other reasonable construction. It was the evident purpose of the train brake provision to prevent the danger resulting from the operation of hand-brakes on the tops of cars in moving trains. In Erie R. R. Co. vs. U. S., 197 Fed., 287, the court took occasion to say that the purpose of the act "was to compel railroads to equip trains in interstate transit with air brakes, thereby contributing not only to the safety of passengers and crews, but saving brakemen, as far as possible, from the dangers incurred in manipulating hand-brakes."

The whole argument of plaintiff in error rests upon the proposition that, since the statute requires that all cars be equipped with hand-brakes, and does not expressly forbid their use for controlling the speed of trains, there is left to "the judgment or discretion of the men operating the trains the decision as to when and under what circumstances the power brake should be used, and as to when and under what circumstances the hand-brake should be used." It is obvious that such a construction would practically nullify the train brake requirement and take all effective meaning from the provision which makes it unlawful to run "any train" unless the locomotives and cars are so equipped that the engineer can control its speed "without requiring the brakemen to use the common hand-brake for that purpose." The contention must be rejected as clearly unsound. It is impossible to believe that the Congress compelled the equipment of locomotives and cars with the appliances specified in the act, for the declared purpose of doing away with the dangerous operation of hand-brakes, and then left it to the carriers themselves to decide when and under what circumstances those appliances should be used.

On the contrary, we deem it beyond doubt that the duty imposed by the provision here considered is mandatory and absolute. There is no express or implied qualification, which in any way relates to the question at issue, and it is not for the courts to introduce an exception which the Congress did not see fit to make. The peculiar and unusual conditions which existed on this section of defendant's road cannot be permitted to excuse an avoidance of the positive requirements of the act. Moreover, those conditions disclose no emergency or extraordinary difficulty. They simply show that the defendant, for the sake of convenience or economy, deliberately ordered the use of hand-brakes in the daily and customary operation of its trains. The justification set up is that trains of 100 cars cannot be moved on this stretch of track, at the slow speed of 10 miles an hour or less, and kept under safe control with the use only of the prescribed power brake. But those operating conditions, which occasioned the need of hand-brakes, are evidently of defendant's own creation. All it has to do to comply with the law is to make up trains of such smaller number of cars as can be safely and properly handled without resorting to the use of hand-brakes. In short, the mandate of the Congress is disregarded in this instance not because compliance involves any physical difficulty which is inherent or practically serious, but merely because it involves some increase of expense. It is too plain for argument that no such reason can serve to condone disobedience to the command of the statute. . . . We are of opinion that the case was correctly decided in the court below and the judgment will therefore be affirmed.

WESTERN RATE ADVANCE CASE

The hearing before Commissioner Daniels at Chicago in the western freight rate advance case, which was expected to have been concluded on Monday of this week, was extended to permit the introduction of unfinished testimony both by representatives of the protestants and the railroads, after it had been announced from Washington that the hearing on the proposed increases in passenger fares on the western roads originally set for May 17, would be postponed until July 6, at the request of the western state railway commissioners.

Testimony of the protestants against the advances in rates on livestock was completed on May 5. A large number of stock raisers from Iowa, members of the Corn Belt Meat Producers' Association, protested against any advance in the rates on livestock on the ground that the business of feeding stock for the market is no longer profitable, but is carried on in the interest of conservation of soil fertility, and therefore is a vital benefit to the agricultural welfare of the country. The farmers also testified that the service given livestock shipments has not improved in recent years, but that schedules in many cases have been lengthened, and they also objected to the accommodation furnished to caretakers of livestock. S. M. Corrie, president of the Corn Belt Meat Producers' Association, said that instead of trying to burden an industry in a critical condition it would be to the interest of the railroads to aid in fostering and building up the livestock business, not only as a means of replenishing the meat supply, but also as the most effective agent in renewing the fertility of the soil. Henry C. Wallace, editor of a farm paper, also urged special encouragement of the industry, saying that the transportation of livestock should be treated by the railroads as the grocer treats sugar, as a staple upon which no profit is expected.

T. W. Tomlinson presented some statistical testimony on behalf of the American National Livestock Association, the Cattle Raisers' Association of Texas and the National Wool Growers' Association. Later Mr. Tomlinson presented a vigorous protest against the introduction of testimony by C. W. Hillman, a cost accountant, put on the stand by the western state commissioners to testify as to the cost of handling livestock. Mr. Tomlinson said he believed Mr. Hillman's exhibits were full of errors and did not reflect correctly the earnings, profit or cost of livestock

traffic. The objection was overruled by Commissioner Daniels on the ground that it questioned the weight and not the admissibility of the evidence.

The subject of cost accounting was given a new prominence in the case when F. H. Millard, formerly connected with the Wisconsin Railroad Commission, and now specially employed by the Interstate Commerce Commission, was put on the stand as a witness for the commission to testify to a cost analysis he had applied to most of the commodities affected by the proposed advances in this case for the Chicago & North Western and the Rock Island Lines. Witnesses for the shippers had previously introduced cost figures for grain, packing house products and livestock, based on conflicting theories which had been objected to by the railways as being full of inconsistencies and errors. Mr. Millard's method, which has been used by the Wisconsin Railroad Commission, attempted to apportion the cost of transporting various commodities and then added a proportion of the return on the property investment based on the value of the commodity. The application of this system to the principal commodities involved in the case on the two roads for the average haul of each commodity resulted in figures higher in almost every instance than the actual earnings of the railroads under the present rates. Rates made on the basis here deduced, he said, would add about $6,500,000 to the revenues of the Rock Island system on carload business, allowing a 7 per cent net return on the value of the property; and about $1,817,000 to the carload revenues of the North Western.

Mr. Millard presented an exhibit outlining his system, with an express disclaimer that the figures presented are necessarily determinative upon the testimony introduced in this case. The method was based on the assumption that the value of the commodities affords a basis for distributing the reasonable return above the cost and that a given commodity is expected to pay above cost a return of 4 per cent plus an additional 1 per cent for each $10 of value per ton, considering the transportation for an entire year. A table showed that for articles with a value of $2 or less per ton, there should be a return equal to 4 per cent on the property devoted to the hauling of that commodity. For commodities valued at from $2 to $5 a ton the return would be 4½ per cent; from $5 to $10, 5 per cent; $10 to $15, 5½ per cent and from $15 to $25, 6 per cent. From this point 1 per cent was added for every $10 of additional value per ton to a maximum of 25 per cent on a value of $205 and over per ton. He said he had checked his method by applying it to all carload business on the Chicago & North Western, adding the present revenue on less than carload business, obtaining a return on the book value of about 6½ per cent.

Mr. Millard first separated freight and passenger expenses, using the basis used in the exhibit filed by L. E. Wettling, accountant for the carriers in this case, except that loss and damage to freight were excluded from the computation of unit costs and the actual amount paid was included in computing the theoretical rate for particular commodities, and 2 per cent of the total freight operating expenses were credited to the freight service, and the same percentage to passenger service to care for the net amount of traffic carried by freight trains for passenger service over the amount of traffic carried by passenger trains for the freight service. Taxes, joint facilities and miscellaneous rents were divided between freight and passenger on the basis of the percentage of operating expenses, and actual amounts were used for hire of equipment. He then separated the road haul expenses and terminal expenses, assigning the road haul expenses to the various commodities on the basis of gross ton miles, including the load, tare and the proper proportion of the empty haul of cars for each commodity. Terminal expenses were assigned to the commodities, one-third on the basis of gross tons handled and two-thirds on the number of cars handled. He then made a mathematical computation of the cost of handling various commodities on the gross ton-mile basis, and computed theoretical rates in cents per hundred pounds for distances up to 1,200 miles, for various net loads. The additional percentages for net return were computed on the value of the property apportioned between the commodities on the basis of ton miles.

According to this method he calculated that coal rates should provide a net return of 4½ per cent; hay 6 per cent; grain 7 per cent; grain products 8 per cent; fruits and vegetables 7 per cent; livestock 19 per cent and packing house products 25 per cent. Witnesses for the packers had asserted that the value of the commodities should not be taken into consideration in fixing rates, except as it affects the liability.

He then presented tables giving the actual cost, including operating expenses, taxes, hire of equipment, joint facilities and miscellaneous rents and his theoretical rates made by adding the percentage of return for distances up to 1,200 miles on each commodity, with figures showing the average haul for each commodity and the actual revenue per ton mile received by the carriers. For the average haul his theoretical rates in cents per ton per mile compare with the actual rates on the two roads, as follows:

Commodity	Rock Island		C. & N. W.	
	Theoretical	Actual	Theoretical	Actual
Grain	.676	.650	.607	.745
Grain products	.827	.561	.725	.448
Hay	1.044	.937	.939	.978
Fruits and vegetables	.940	.759	.931	.809
Live stock	1.921	1.388	1.516	1.313
Packing house products	1.714	.966	1.594	.975
Bituminous coal	.708	.592	.610	.524
Coke	.695	.504	.712	.578

Mr. Millard was subjected to a vigorous cross-examination by representatives of the western state commissioners and by attorneys for the shippers. C. C. Wright, general solicitor of the Chicago & North Western, confined his cross-examination to an effort to elicit as much detail as possible regarding the various methods of computation used. On cross-examination Mr. Millard said that the gross ton-mile basis of computing costs was far more correct than the car-mile basis or the net ton-mile basis which had been used by witnesses for the protestants, saying that the car-mile basis neglects the effect of the loading per car, while the net ton-mile basis neglects the weight of the car. He said that for the Rock Island Lines he had apportioned 62.46 per cent of the total expenses to freight and for the North Western 66.55 per cent, and that he had divided the property account between freight and passengers on the basis of an adjusted division of operating expenses. Asked whether he would advance rates to correspond with changes in price, he said that this should be done only at long intervals; that it was not necessary to allow for temporary fluctuations.

Testimony introduced by W. J. Lauck on behalf of the western state commissioners, brought forth a vigorous objection by Commissioner Daniels that time was being wasted with irrelevant testimony. Mr. Lauck, who had been one of the principal witnesses for the engineers' and firemen's brotherhoods in the recent arbitration proceedings, was put on the stand to introduce similar testimony purporting to show the increased productive efficiency of railway employees and the past history of land grants and stock issues of the western roads, arguing that high expenses of railway operation have been more than offset by the productive efficiency of labor and a resulting great increase in the economical operation of the railroads. At one point Commissioner Daniels ordered one of his statements struck out of the record as being mere surmise. "Has he not the right to give his opinion?" asked one of the attorneys for the shippers. "No, he has not the right," replied Commissioner Daniels, "to give us a lot of superfluous surmise which has no more to do with the reasonableness and justice of these rates than 100,000 other facts which might be taken out of the Encyclopedia Britannica. I am very considerably irritated that the commission is being held here simply to kill time which is allotted to you gentlemen for putting in evidence bearing upon the justice and reasonableness of these rates, or their injustice and unreasonableness if that be so."

U. G. Powell, rate expert of the Nebraska Railroad Commission, introduced some additional exhibits giving figures on prop-

erty investment, income accounts, operating revenues, expenses and taxes of the western railways. He presented tables for 10 roads to show that the average ratio of net income to property investment for 25 years was 5.86 per cent in the northwest, while for the southwest the average was 3.76 per cent. Dr. M. O. Lorenz, statistician for the commission, brought out on cross-examination that his figures showed a gain in rate of return for a long period of years, but a reduction in recent years. The witness ascribed this to increases in the various property accounts.

M. A. Chambers, an accountant for protesting shippers, took the stand to criticize some of the exhibits introduced by L. E. Wettling for the railways on the ground that certain railroads had been omitted. On cross-examination Mr. Wright showed that with the exception of the Great Northern, Northern Pacific and Union Pacific, which lie mostly outside of the territory affected by the advance, all of the roads were unimportant, many in the hands of receivers, and some of them so small that witness said he could not find them on the map.

W. W. Manker, assistant traffic manager of Armour & Company, testified in opposition to the proposed advances in rates on fertilizer from Gulf ports to the central Mississippi valley.

On Monday, J. Pease Norton, a bond expert, testifying for the western state commissioners, presented an exhibit of 137 pages containing a series of tables of bond yields to show that the credit of the railways, as measured by the yield which the public is willing to accept on their securities, has been improving in comparison with government and municipal bonds and public utility and industrial securities. "The true test of the effect of the general financial situation," he said, "would be the pure money rate on long term securities were that figure obtainable. The next best test is the closest approach we have to the pure money rate, represented by government securities and the bonds of the highest class of municipalities. If the yield upon the bond of a company engaged in private business increases faster than the pure money rate, then that is evidence that the credit of the company has declined. If the yield has increased in a less proportion than the pure money rate, then that shows that the credit of the company is on a better plane."

To represent the closest possible approximation to the pure money rate he took the government securities of England, France, Germany and the United States, and the municipal bonds of the 20 largest cities of the United States, and then made comparisons with the yield on railroad bonds for the period 1900 to 1914, showing that the yields had increased as follows:

	1900	1914	Per cent increase
Governments	2.83	3.33	17.7
20 cities	3.2	4.2	31.3
Western roads	3.9	4.4	12.8
Southwestern roads	4.7	5.1	8.5
100 railroad bonds	4.3	4.8	11.5

During the same period Mr. Norton said the pure money rate approximation had increased from 3 to 3.25 per cent and the yield on all the bonds for which he had made computations had advanced 31 per cent.

Comparing railway bonds with industrial and public utility bonds, he said that 13 railways in the western district having revenues of $1,000,000 or more, have issued 4 per cent bonds since 1910, while out of 124 bond issues of public utility companies since 1910 only 6 were at 4 per cent and one of these was guaranteed by the Southern Pacific. But two issues out of 103 by industrial companies having gross revenues of $1,000,000 or more, were at 4 per cent and both issues were guaranteed by railroads. Out of a list of 235 public utility and industrial bonds quoted on the New York exchange, one was a 3½ per cent issue, 21 were 4 per cent, 1 was 4.4 per cent, 17, 4½ per cent, 135, 5 per cent, 58, 6 per cent and 2, 7 per cent.

The shippers' advocates concluded their testimony on Wednesday afternoon, the 12th. The railroads then put on the stand a few witnesses to rebut testimony given by shippers, and it was expected that the hearing would be finished on Thursday.

SAFETY FIRST WORK ON THE SOUTHERN PACIFIC*

By W. H. Whalen,
Division Superintendent, Southern Pacific.

The Pacific system's safety record for five years shows a passenger movement equal to *eight billions* of passengers carried one mile, and without a single passenger fatally injured in a train accident. . . .

To attain the desired safety, the employees of the different divisions of the system have formed themselves into working organizations, known as safety committees. We meet once a month on each division, at which time we sit one or two days considering the different accidents that have occurred during the month, and studying their causes. We also consider suggestions made by the various employees, the number of these suggestions running as high as 220 in some months. Last month we had 125. Each suggestion is weighed carefully and recommendations are made to carry out those considered practicable; some are laid before the management for consideration. To put these suggestions into effect, our company has spent for the year ending June 30, 1914, $42,000, with pending expenditures of $85,000. As a result of one of these suggestions, this company built a subway at the Los Angeles shops, costing $7,000, that employees might go to and from their work under the tracks, rather than crossing over them and experiencing danger from passing trains. In addition, this company has spent $156,000 a year for special officers to assist in controlling the trespassing feature; $150,000 in eliminating grade crossings; $44,000 in protecting 112 additional crossings with alarm devices; $230,000 in providing crossing protection, and $17,000 in installing 40 wigwag signals at crossings; which, with the money expended in carrying out safety suggestions, amounts to $724,000. This is not all, as our signal construction and reconstruction during the past year amounted to $246,400, and their maintenance and operation $417,200, making our total investment in block signals $3,485,000. Eleven additional interlocking plants were installed during the past year at a cost of $160,000. Our fire protecting equipment is valued at $510,000 and the report of the Interstate Commerce Commission for the year 1914 shows that the Southern Pacific excelled all other lines in the United States in miles of road protected by the automatic block system employing electric track circuits.

Forty-one per cent of all of our passenger cars are of all-steel construction, the balance being steel underframe and wooden cars. Only steel cars have been ordered since 1906. Thirteen per cent of all our freight cars are steel, and 53 per cent have steel underframes. During the past year, 1,224 shop machines and tools were furnished with protecting guards and devices, and 1,906 have been so equipped during the past two years.

Our clubs for employees represent an investment of $400,000; their annual maintenance and operation costs $18,000, and approximately $1,000,000 is expended in our hospital system, with an annual maintenance expense amounting to $300,000. The Harriman Research Laboratory was instituted at an expense of $60,000.

The creditable performance in handling passengers shown by the company's records is not traceable alone to this outlay of money, but is due also to the fact that those passengers were entrusted to a thoroughly trained corps of employees who have been trained to think and act in common and in accordance with the standard code of rules. Numerous surprise tests are made by officers of the company, that we may know that the rules are being observed. It requires great effort and self-denial on the part of officers to make the surprise tests, as the work is generally done in the night.

*From an address presented at a number of schools in Southern California.

General News Department

The House Committee on Public Utilities of the Illinois legislature has voted not to report the bill to limit the length of freight trains to 50 cars.

The Wheeling & Lake Erie, on the trains leaving Cleveland for Wheeling at 9 a. m., and Wheeling for Cleveland at 5:05 p. m., runs buffet dining cars on which both the cooks and the waiters are women.

The railroad commission of California has issued an order authorizing the Colusa & Lake Railroad, operating between Colusa and Sites, Cal., to discontinue operation. Passenger trains were discontinued on August 5, 1914.

At a meeting of the local chairmen of the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen, held in Chicago last week, to consider the award of the board of arbitration in their recent controversy with the western railroads, a vote was taken in favor of joining with other organizations in the movement for an eight-hour day.

The Bangor & Aroostook, according to a notice from President Percy R. Todd, is to operate, as agent, the line of the Van Buren Bridge Company, and the jurisdiction of all officers of the B. & A. is extended over the property of the bridge company, as of May 1. The opening of the Van Buren bridge, between Maine and New Brunswick was noticed in the *Railway Age Gazette*, May 7.

The special committee on the Relations of Railway Operation to Legislation, has issued a bulletin showing that on January 1 last there were in service in the United States 12,900 all-steel and 5,700 steel underframe passenger cars, and 43,512 wooden cars. Of the passenger cars acquired by the roads in 1914, 74 per cent were all steel; and of 956 cars under construction January 1, only three were of wood. Seventy-five per cent were all-steel.

The attorney general announces at Washington that he will appeal to the Supreme Court of the United States in the cases of William Skinner and James S. Elton, directors of the New York, New Haven & Hartford, who, on appeal to the district court in New York, were held to be immune from the criminal prosecution which has been begun by the attorney general, because they had testified before the Interstate Commerce Commission in its inquiry relative to the doings of the road.

The headquarters and general offices of the Texas State Railroad have been moved from Rusk to Palestine, Tex. A roundhouse, a coal chute and car sheds are being built to take care of the business at this place. A consolidation is being effected whereby the different lines owned by the state of Texas will be under one management, with headquarters at Palestine. The construction of an extension of the road from Palestine through Corsicana to Dallas, is under consideration by the legislature and the state officers.

The "Travel Stamps" Corporation, noticed in the *Railway Age Gazette* of April 30, page 945, appears to have a nearby competitor before it is started, almost. Boston newspapers contain the advertisement of the New England Trade-Travel Company, 59 Temple Place, which offers "Free travel by train, trolley or steamship—Any place—Any time." The reader is exhorted to deal with the liberal and progressive merchants who give trade travel coupons; but the advertisement gives no names of any such merchants. The reader is asked to speak to his dealer about the plan and to write to the New England Trade Travel Company giving names of favorite department stores, grocers, etc.

Pennsylvania Full Crew Law Repeal

The bill before the Pennsylvania legislature repealing the "full crew" law of 1911 and giving specific authority to the Public Service Commission to regulate the number of men to be employed on trains was passed by the Senate on Monday evening last by a vote of 33 to 16, or about the same proportion between ayes and noes as prevailed in the House when the bill was passed a few weeks ago.

Governor Brumbaugh, during the campaign last autumn, wrote a letter in which he said that he was opposed to any change in the full crew law unless such change should be shown to be in favor of the working people; and this statement has led to much speculation as to whether the governor will sign the present bill. He is expected to give public hearings before taking action.

Not Often Met With?

[From a circular to agents, issued by R. T. Walker, Superintendent, Sunset-Central Lines, Houston, Tex.]

Recently one of our agents was called upon by a patron to see if arrangements could be made to have a ticket placed at a station on a foreign line to be used by a lady in coming to the station at which the request was made. It was then 9:30 p. m. and the ticket was to be used on a train leaving at 4 o'clock the next morning; but the agent immediately took the matter in hand and in a few minutes not only had the ticket placed but had the lady notified it was there for her.

The patron, making a handsome acknowledgment of the said accommodation, added:

"It is not often you meet with such agreeable, courteous gentlemen in charge of railroad offices. . . . I have thought several times since this incident occurred, how much of the unreasonable prejudice that exists in the mind of the public against the railroads would be removed if all employees were of the same type as this agent. . . ."

Moncton to Winnipeg

Reports from Ottawa say that the officers of the Canadian government railways, who have been instructed to establish train service on the National Transcontinental, from Quebec westward, are planning only to run, at least for the present, a train each way, twice a week. The purpose is simply to give the best practicable accommodation to the settlers along the line. The number of trains will be increased if there shall be sufficient demand.

Fifteen locomotives have already been taken across the river, at Quebec, for use on the new line. Between Moncton, N. B., and Levis, Que., 466 miles, where the government has been operating the road since last autumn, a train is run each way three times a week; Moncton to Edmundston Tuesday, Thursday and Saturday; Edmundston to Levis Monday, Wednesday and Friday, with return trips on alternate days.

On that portion of the new road from Winnipeg eastward to Graham, and thence southward to Fort William, where the Grand Trunk Pacific has been operating the line under a temporary lease, a similar arrangement has been in effect. A train runs from Winnipeg to Graham, 252 miles, on Monday, Wednesday and Friday; Graham to Fort William, 196 miles, Tuesday, Thursday and Saturday, the return trips being made on alternate days.

On some parts of the Grand Trunk Pacific economy in coal and wages is carried still farther than this. For example, from Young, Sask., to Hoey, 83 miles, there is a regular train for passengers only once a week; Young to Hoey on Monday, Hoey to Young on Tuesday.

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for February, 1915, are as follows:

The net operating income of the railways of the United States for February increased $52 per mile, or 44.3 per cent, as compared with February, 1914; but February, 1914, was an abnormally poor month, net operating income per mile being 44.0 per cent less than in February, 1913. The increase shown this month, which only partially overcomes the considerable decrease in the same item a year ago, is the result of radical reductions in operating expenses.

Total operating revenues amounted to $205,112,212, a decrease from 1914 of $1,961,957. Operating expenses were $155,031,302, a decrease of $13,966,146. Net operating revenue amounted to $50,080,910, an increase of $12,004,189. Taxes amounted to $10,995,903, a decrease of $296,011. This left $39,028,155 for net operating income, available for rentals, interest on bonds, appropriations for improvements and new construction, and dividends. Operating revenues per mile of line averaged $897, a decrease of 1.9 per cent; operating expenses per mile averaged $678, a decrease of 9.1 per cent; net operating revenue per mile averaged $219, an increase of 30.3 per cent; while taxes per mile were $48, a decrease of 3.5 per cent. Net operating income per mile was $171, an increase of 44.3 per cent. Railways operating 228,678 miles of line are covered by this summary, or about 90 per cent of the steam railway mileage in the United States.

Total operating revenues of the eastern railways per mile of line increased less than one-tenth of 1 per cent as compared with February, 1914, operating expenses decreased 10.2 per cent, net operating revenue increased 81.8 per cent, taxes decreased 3.3 per cent, and operating income increased 158.9 per cent. Even this considerable increase over 1914 failed to bring operating income per mile up to the level of 1913, 1912, or 1911.

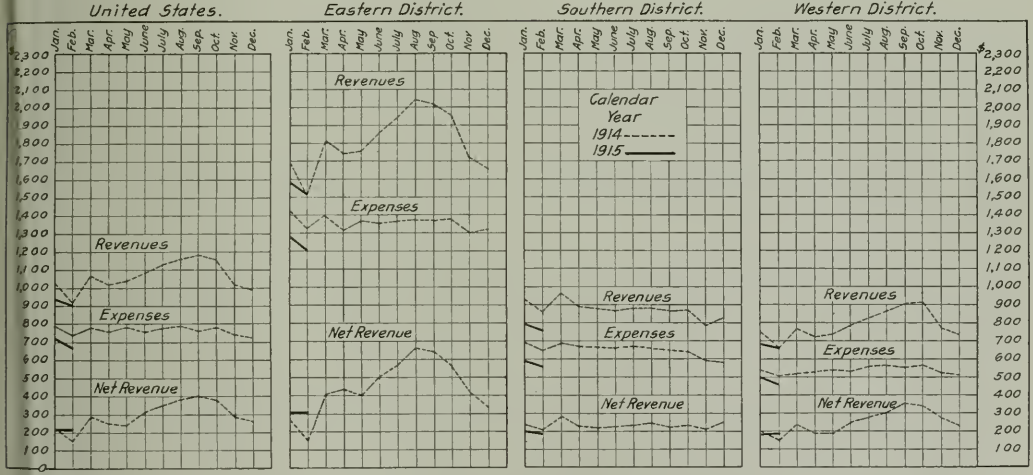
Total operating revenues of the southern railways per mile decreased 10.4 per cent, operating expenses decreased 11.6 per cent, net operating revenue decreased 6.7 per cent, taxes decreased 6.6 per cent, and operating income decreased 6.9 per cent.

Total operating revenues of the western railways per mile increased less than one-tenth of 1 per cent, operating expenses decreased 6.4 per cent, net operating revenue increased 21.0 per cent, taxes decreased 2.5 per cent, and operating income increased 28.8 per cent.

The eight months of the current fiscal year show a decrease in total operating revenues per mile of line of 7.9 per cent as compared with the corresponding period of the preceding year, a decrease in net operating expenses per mile of 9.7 per cent, and a decrease in net operating revenue per mile of 3.2 per cent.

This net operating revenue per mile increased 3.7 per cent in the east, decreased 17.8 per cent in the south, and decreased 3.7 per cent in the west.

February operating income per mile was 44.3 per cent greater in 1915 than in 1914, 19.6 per cent less than in 1913, 18.1 per cent less than in 1912, and 5.8 per cent less than in 1911.



Monthly Revenues and Expenses Per Mile of Line in 1914 and 1915

May Meeting of the Railway Signal Association

The Railway Signal Association will hold its stated May meeting on Wednesday and Thursday, May 26 and 27, at the Hotel Astor, New York City. The board of direction will meet on the 25th. Committee III, on Power Interlocking, will submit revised specifications for electro-pneumatic interlocking, for fiber conduit and for incandescent electric lamps. Committee V, Manual Block, will submit rules for (1) care of dry battery; (2) maintenance of dry cells; (3) maintenance of gravity cells; (4) maintenance of caustic soda cells.

Committee VI, Standard Designs, will submit eight drawings—four revisions and four new ones. Committee X, Storage Battery and Charging Equipment, will submit as information specifications for nickel-iron alkaline storage battery. A report on the cost of electrical energy for a charging line will also be submitted, which will include the cost of types of apparatus for furnishing power, as follows: (1) Motor generator set. (2) Mercury-arc rectifier. (3) Gasolene engine generating set. (4) Gas engine generating set. (5) Steam engine generating set. The special committee on Lightning Protection will submit specifications for air-gap lightning arresters, vacuum-gap lightning arresters, and choke coils for use with lightning arresters. The special committee on Electrical Testing will submit a preliminary report on electrical instruments and various methods of testing.

After the adjournment of the meeting, May 26, the members of the Railway Signal Association will be the guests of the Signal Appliance Association, on a boat trip to West Point. Arrangements have been made to secure the steamer Grand Republic. After reviewing the dress parade, at the Military Academy, the party will have dinner on the boat; and there will be dancing in the evening.

Railway Storekeepers' Association

The twelfth annual convention of the Railway Storekeepers' Association will be held in the Hotel Sherman, Chicago, May 17 to 19. At the meeting committee reports will be presented on the following subjects:

Reclamation—D. C. Curtis (C. B. & Q.), chairman.

Recommended Practices—D. D. Cain (S. A. L.), chairman.

Accounting—P. J. Shaughnessy (Erie), chairman.

Piece Work—W. W. Eldridge (C. B. & Q.), chairman.

Standardization of Tinware—W. F. Jones (N. Y. C.), chairman.

Stationery—E. J. McVeigh (G. T. R.), chairman.

Uniform Grading and Inspection of Lumber—J. H. Waterman (C. B. & Q.), chairman.

Scrap and Scrap Classification—W. Davidson (I. C.), chairman.

Membership—W. D. Stokes (C. of G.), chairman.

Standard Buildings and Structures—L. G. Arnold (A. T. & S. F.), chairman.

Book of Standard Rules—J. G. Stuart (C. B. & Q.), chairman.

Marking of Couplers and Parts—A. J. Kroha (C. M. & St. P.), chairman.

Papers will also be presented on: Handling of Signal Material, and Accounting for Second Hand Serviceable Material.

National Association of Corporation Schools

The third annual convention of the National Association of Corporation Schools will be held at the Hotel Bancroft, Worcester, Mass., June 7 to 11 inclusive. The convention is held in Worcester this year as the result of an invitation tendered at last year's convention by three of Worcester's leading industrial concerns—the Norton Co., the Norton Grinding Co. and the American Steel & Wire Co.

The National Association of Corporation Schools was founded January 24, 1913, and its first meeting was held in New York University, New York. The functions of the association were designated as follows: to develop the efficiency of the individual employee; to increase efficiency in industry; and to influence courses of established educational institutions more favorably toward industry. The first annual convention of the association was held at Dayton, Ohio, September 16, 1913, and the second annual convention at the home of the Curtis Publishing Company, Philadelphia, Pa.

June Conventions Exhibits

Secretary J. D. Conway, of the Railway Supply Manufacturers' Association, has a most favorable report to make of the prospects for the coming exhibition at Atlantic City during the meetings of the American Railway Master Mechanics' and the Master Car Builders' Associations, June 9-17. To date over 200 exhibitors have made arrangements for exhibits, and the average space occupied by each one has increased over 16 per cent as compared with 1914. While the number of exhibitors is somewhat smaller than last year, applications are being received daily, and it looks now as if the exhibit would be almost as extensive as that of last year, despite the business depression which has existed during the past year. More new exhibitors will appear than for a number of years.

The Railway Club of Pittsburgh

At the regular meeting of The Railway Club of Pittsburgh, to be held at the Monogahela House, Pittsburgh, Pa., on Friday, May 28, E. M. Herr, president of the Westinghouse Electric & Manufacturing Company will present a paper entitled "Notes on Some Important Lines of Electrical Power Development."

New York Railroad Club

At the regular monthly meeting of the New York Railroad Club, to be held in the Engineering Societies building, New York, on May 21, a paper will be presented by Gustav Lindenthal, consulting engineer, entitled: Qualities of Good Steel Rails.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

American Association of Demurrage Officers.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

American Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Railway Tool Foremen's Association.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

International Railway General Foremen's Association.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railroad Men's Improvement Society.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Signal Association.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Storekeepers' Association.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly. Normandie Hotel, Detroit.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday afternoon in month, except June, July and August, La Salle Hotel, Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meetings, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.				
Atlantic City	170	$71,734	$56,596	$136,176	$32,383	$24,350	$2,941	$82,633	$98	$1,220	$143,579	—$7,403	$13,500	—$20,903	$9,901
Bessemer & Lake Erie	205	285,067	23,351	318,128	41,326	160,673	9,738	121,307	.....	11,935	333,362	—15,234	17,003	—32,239	96,332
Bingham & Garfield	27	108,752	2,882	112,090	4,979	14,390	1,049	19,919	58	1,621	42,016	70,074	2,457	67,617	—45,486
Birmingham Southern	44	38,391	571	55,078	8,231	10,621	673	16,855	.....	3,456	39,836	15,242	2,158	13,083	—6,831
Boston & Maine	2,302	2,293,827	1,095,457	3,760,715	542,856	547,166	33,231	1,756,472	15,312	114,479	3,009,515	751,199	158,455	592,744	204,594
Buffalo & Susquehanna Railway	91	11,463	4,902	18,516	3,561	5,715	412	11,149	7	2,334	23,179	—4,663	1,600	—6,263	—10,676
Buffalo, Rochester & Pittsburgh	586	618,737	78,708	722,325	80,605	172,023	11,545	260,918	1,110	18,662	544,863	177,462	20,000	157,386	—38,670
Canadian Pacific Lines in Maine	243	150,856	21,350	181,289	10,995	26,255	5,126	69,673	.....	3,305	115,354	65,935	12,000	53,935	31,604
Carolina, Clinchfield & Ohio	248	155,465	10,997	169,443	25,639	25,029	5,932	34,934	.....	10,485	101,312	68,131	14,250	53,877	—27,697
Carolina, Clinchfield & Ohio Ry. of S. C.	18	10,049	927	11,260	1,741	72	1,574	1,991	.....	929	6,307	4,953	750	4,197	—3,920
Central of New Jersey	678	1,719,573	381,757	2,218,566	179,501	476,563	24,698	830,208	11,581	55,039	1,577,560	641,006	119,836	521,168	21
Central Vermont	411	243,088	60,306	327,163	31,310	47,378	9,187	157,982	1,090	6,709	253,656	73,507	15,760	57,729	9,812
Charleston & Western Carolina	341	144,618	21,680	174,445	25,932	21,793	3,287	54,974	.....	3,953	109,875	64,571	5,000	59,571	6,483
Chicago & Erie	270	498,825	40,477	578,767	70,760	76,177	16,960	230,420	1,730	14,039	409,756	169,171	20,500	148,671	145,276
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	65,410	9,364	86,304	7,252	11,289	1,592	43,729	.....	1,426	65,288	21,016	2,870	18,146	22,678
Chicago, Indianapolis & Louisville	618	378,802	134,430	556,722	50,431	75,862	19,354	198,626	220	15,128	359,619	197,103	26,895	170,140	61,863
Chicago, Terre Haute & Southeastern	374	163,033	14,230	181,348	16,496	44,802	2,729	54,763	488	9,681	128,959	52,388	12,500	39,888	—33,581
Delaware & Hudson Co.—R. R. Dept.	881	1,601,910	172,399	1,909,898	127,100	299,819	26,922	652,423	11,421	65,310	1,181,907	727,990	58,500	669,490	439,604
Denver & Rio Grande	2,575	1,189,761	277,597	1,579,046	115,786	316,746	36,742	476,470	23,724	73,088	1,042,556	536,490	81,600	454,802	28,164
Denver & Salt Lake	255	77,009	16,292	99,658	14,337	12,348	1,725	36,229	.....	5,024	69,663	29,995	7,500	22,495	25,377
Detroit & Toledo Shore Line	79	116,663	.....	117,172	9,577	10,355	1,428	34,545	.....	2,823	58,727	58,445	5,750	52,695	—21,379
Detroit, Toledo & Ironton	441	99,191	10,203	117,519	12,702	15,661	3,858	67,076	.....	5,702	104,999	12,520	5,500	7,020	54,111
Duluth, Winnipeg & Pacific	185	97,692	15,192	117,955	7,825	11,078	1,818	41,143	596	6,572	69,032	48,923	5,898	43,026	12,697
Erie	1,988	3,395,057	643,328	4,443,736	373,341	1,033,350	99,884	1,644,333	27,035	122,075	3,299,482	1,144,254	168,654	975,140	37,696
Galveston, Harrisburg & San Antonio	1,350	626,630	255,227	966,487	148,231	143,879	30,446	422,613	11,478	35,052	790,417	176,070	39,624	136,091	69,332
Georgia	307	169,514	51,355	240,418	16,873	46,524	11,471	97,524	424	7,321	180,138	60,281	3,100	56,823	17,101
Grand Rapids & Indiana	575	292,947	120,253	442,486	52,956	85,856	10,172	190,403	60	13,824	353,272	89,214	21,555	67,659	7,726
Great Northern	8,077	3,298,068	935,046	4,747,969	520,359	602,122	94,939	1,496,184	58,069	98,012	2,866,212	1,881,757	326,869	1,554,612	166,026
Gulf, Colorado & Santa Fe	1,937	979,232	196,458	1,254,011	212,315	211,218	28,858	493,421	.....	31,008	976,565	277,446	49,162	228,094	104,721
Hocking Valley	351	321,702	58,044	403,869	39,596	74,494	8,923	153,151	.....	16,851	293,016	110,853	34,050	76,803	—59,777
Houston, East & West Texas	191	88,222	20,460	118,090	15,434	13,773	1,726	45,626	598	3,529	80,681	37,409	4,170	33,113	8,904
Houston & Texas Central	894	341,596	98,021	499,200	107,995	71,575	15,837	207,002	3,882	18,017	424,068	75,132	26,951	47,793	59,791
Kansas City, Mexico & Orient	740	161,921	24,433	196,973	44,466	42,962	8,601	96,013	.....	9,848	202,119	—5,146	9,180	—14,326	.....
Lehigh & Hudson River	97	134,366	9,183	144,617	13,850	20,971	1,431	51,236	.....	4,636	92,125	52,492	4,150	48,342	11,648
Louisiana Western	208	116,217	52,705	186,976	33,635	29,225	6,190	53,911	1,764	6,311	130,998	55,977	9,895	46,059	7,505
Minneapolis & St. Louis	1,646	694,449	154,164	891,515	92,352	129,964	18,006	372,841	94	21,259	634,515	257,000	31,411	225,589	109
Missouri, Oklahoma & Gulf Ry. of Texas	19	9,671	146	10,552	1,319	3,975	201	5,637	.....	467	11,598	—1,046	140	—1,186	—362
Mobile & Ohio	1,122	798,050	84,625	927,936	78,522	150,194	38,969	333,007	2,462	28,021	631,176	296,760	33,153	263,337	75,142
Morgan's La. & Tex. R. R. & S. S. Co.	405	233,980	80,022	354,929	42,810	43,302	10,132	145,475	2,169	11,623	255,354	99,575	20,013	79,367	43,687
Nevada Northern	165	100,435	6,069	109,470	17,069	13,081	784	22,643	53	3,991	57,622	51,849	5,003	46,845	—15,901
New York Central & Hudson River	5,979	8,718,427	3,265,392	13,911,473	1,379,107	3,082,278	238,968	4,843,531	197,147	348,990	10,090,022	3,821,451	850,829	2,969,937	.....
New York, Susquehanna & Western	140	199,693	39,452	278,277	28,754	26,787	4,377	121,240	.....	4,954	186,112	92,166	13,208	78,955	4,463
Northwestern Pacific	401	89,142	113,539	232,714	38,614	45,006	5,953	107,993	.....	6,381	202,861	29,853	16,068	13,762	—32,232
Oregon Short Line	2,162	1,018,405	331,397	1,480,808	186,702	229,097	33,149	385,557	22,072	52,412	908,795	572,013	114,926	456,686	—13,254
Oregon-Washington R. R. & Nav. Co.	2,027	756,979	319,687	1,183,899	131,441	171,808	39,409	393,204	10,524	57,537	802,087	381,812	99,738	281,982	—62,696
Panhandle & Santa Fe	670	258,322	55,044	331,635	74,516	69,154	3,889	105,924	.....	8,609	262,091	69,544	9,357	60,082	25,176
Pere Marquette	2,312	1,089,695	283,003	1,489,783	133,773	340,464	29,723	606,024	3,870	39,554	1,153,320	336,463	46,811	289,646	191,050
Philadelphia & Reading	1,120	3,312,248	472,694	3,972,177	307,744	737,176	43,851	1,416,537	10,653	76,465	2,590,771	1,381,406	99,836	1,281,329	220,448
Pittsburgh, Shawmut & Northern	294	129,628	9,623	141,421	13,991	30,839	1,499	49,213	.....	4,038	109,580	31,841	1,612	30,229	—10,762
Pittsburgh & Lake Erie	225	945,370	111,775	1,103,627	99,079	226,910	13,537	308,603	3,143	27,721	678,993	424,633	49,500	375,133	—224,355
Port Reading	21	122,619	.....	145,052	6,240	6,322	38	42,414	.....	167	55,181	89,870	12,000	77,870	9,459
Richmond, Fredericksburg & Potomac	88	139,151	93,588	267,603	27,515	32,580	2,612	89,795	5,262	7,092	164,657	102,946	6,476	96,467	12,048
St. Louis, San Francisco & Texas	235	47,504	18,503	72,812	20,984	17,981	2,154	46,206	.....	4,161	91,486	—18,673	1,039	—19,712	2,673
Southern	7,022	3,707,836	1,150,123	5,290,249	719,052	894,727	159,882	1,887,328	31,342	167,039	3,817,997	1,472,252	217,013	1,253,272	—65,525
Spokane, Portland & Seattle	556	201,030	98,360	327,607	99,256	38,805	8,070	81,725	3,199	13,688	244,742	82,864	53,400	29,403	—68,494
Tennessee Central	294	92,725	26,058	125,863	31,301	16,397	5,284	48,250	.....	6,599	107,831	18,032	4,466	13,561	—21,461
Terminal R. R. Ass'n of St. Louis	35	.....	194	229,827	20,156	16,149	957	77,937	.....	5,668	120,868	108,959	28,167	80,792	6,879
Texas & New Orleans	469	213,958	79,473	328,741	41,335	87,601	8,069	119,754	2,043	11,037	269,839	58,902	15,805	42,979	57,209
Texas & Pacific	1,887	1,041,122	288,870	1,451,465	178,505	238,998	34,692	682,062	12,192	37,638	1,182,929	268,536	68,700	199,614	—2,436
Toledo & Ohio Central	446	240,361	40,991	297,115	67,814	76,181	7,599	139,291	1,726	10,046	302,656	—5,541	21,000	—26,553	131,724
Toledo, Peoria & Western	248	57,769	32,950	96,318	17,357	29,174	2,539	43,707	.....	3,884	96,661	—342	6,100	—6,445	2,870
Toledo, St. Louis & Western	451	356,268	22,038	404,507	43,653	55,727	15,984	161,256	.....	7,697	284,316	120,191	17,864	102,327	39,872
Trinity & Brazos Valley	315	49,787	9,116	64,442	21,412	17,208	2,418	36,328	.....	7,698	85,064	—20,622	4,585	—25,287	40,478
Union Pacific	3,617	2,370,394	790,681	3,595,229	383,076	643,120	113,056	1,049,773	67,388	121,537	2,376,281	1,218,948	192,672	1,025,720	—208,925
Vandalia	910	644,716	175,558	914,836	99,270	186,959	24,311	367,352	7,792	22,272	707,955	206,881	34,152	172,720	26,833
Virginia & Southwestern	240	123,494	11,023	137,818	36,069	36,090	1,973	41,844	.....	3,843	119,819	17,999	7,069	10,932	—25,127
Virginian	504	412,458	26,487	467,474	59,358	84,651	5,144	107,608	9,298	11,179	275,977	191,498	20,000	171,495	6,344
Wabash	2,519	1,738,214	416,182	2,364,282	269,926	474,796	80,622	1,045,563	12,355	66,586	1,949,056	415,226	78,725	336,093	11,564
Western Pacific	943	267,096	121,004	415,850	70,620	59,459	22,232	136,703	10,558	19,412	318,983	96,867	25,067	71,780	71,878

Traffic News

The House of the Ohio legislature has passed a bill repealing the maximum freight rate law of that state.

The Chesapeake & Ohio and the Southern have reduced their rates on pig iron, for export, from furnaces in Virginia to Newport News, and Norfolk, Va., from $1.52½ to $1 per ton.

The public utilities committee of the House of the Illinois legislature has reported out, without recommendation, the bill to increase the legal maximum passenger fare in Illinois from 2 to 2½ cents a mile.

The Grand Trunk has announced that after May 16 it will cease to run suburban passenger trains between Chicago and Blue Island, Ill., 20 miles, and Harvey, 23 miles. It will run two suburban trains in each direction between Chicago and Valparaiso, Ind., 56 miles, instead of six in each direction as now.

The attorney general of West Virginia has secured an injunction in the Kanawha Circuit Court against the Baltimore & Ohio restraining it from collecting 2½ cents a mile for passenger fares, and the company has discontinued the sale of tickets at that rate, which was begun May 1, a conditional rebate check being given with each ticket.

The Grand Trunk Pacific announces the arrival at Winnipeg of a carload of wheat from the Peace River country in northern Alberta. This region is about 250 miles north of Edmonton and 500 miles north of the United States boundary. The wheat reached Edmonton over the Edmonton, Dunvegan & British Columbia, a new road extending north from Edmonton about 200 miles and then westward.

Car Surpluses and Shortages

The American Railway Association's Committee on Relations Between Railroads, Arthur Hale, chairman, has issued statistical statement No. 4, giving a summary of freight car surpluses and shortages for May 1, 1915, with comparisons.

The total surplus on May 1, 1915, was 290,819, on April 1, 1915, 327,441, and on May 1, 1914, 230,533.

The surplus for April 1, 1915, shown above, includes figures reported since the issue of statistical statement No. 3 (published in the *Railway Age Gazette* of April 16, p. 865.)

The decreases in surplus under April 1, 1915, are chiefly in Groups 2, 3 and 4 (East and Central East), except box cars. There is an increase in the surplus of box cars chiefly in Group 9 (Central South) and Group 11 (Canada).

The total shortage on May 1, 1915, was 1,192; on April 1, 1915, 357, and on May 1, 1914, 1,654.

The figures by classes of cars follow:

Classes	Surplus	Shortage
Box	100,751	288
Flat	16,669	134
Coal and gondola	119,545	130
Other	53,854	640
Total	290,819	1,192

The Cummins Amendment

Western railroads have filed with the Interstate Commerce Commission a supplement to the Western Classification to make it conform to the Cummins amendment. The supplement includes a note which says: "Ratings on livestock vary according to the valuation stated by shippers, and if carriers have no means of determining values of livestock when tendered for transportation shippers will be required to declare in writing the valuation at time and place of shipment. Where shippers refuse to declare value and to execute the livestock contract, animals will not be accepted for transportation." This is followed by maximum valuations on the various classes of livestock, with a provision that where the valuation declared by shippers exceeds the values mentioned, an addition of 3 per cent will be made to the rate for each 50 per cent or fraction thereof, of additional declared value.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The Interstate Commerce Commission has issued a conference ruling that on and after August 1, the commission will not consider on the informal docket any application for authority to waive collection of undercharges on shipments delivered subsequent to July 31. A circular has been issued in which the commission says that in cases where tariffs have erroneously been fixed at too high a figure or have been grossly and palpably unreasonable and the full tariff charges have not been collected, it has been the practice of the commission on the informal docket to authorize the carriers concerned to waive the collection of undercharges. It appears, however, that the concession thus granted has been "much abused and overworked both by carriers and shippers." Numerous instances have come to the attention of the commission in which shippers frequently refused to pay charges when they believed them to be unreasonable and the carriers acquiesced in that course of action, hoping the commission would later authorize them to waive collection. Also, the commission says, just prior to proposed reductions in rates shipments have been solicited and made upon the understanding that the full tariff charges will not be collected, and that the carrier will apply to the commission for authority to waive collection. Such practices, the commission says, are unlawful and work serious discrimination.

Initial Carrier Liable for Increase Charges Resulting from Re-routing Without Instructions

Fred S. Morse Lumber Company v. Louisville & Nashville et al. Opinion by the commission:

A carload of yellow-pine lumber originating at Sanford, Ala., on the Louisville & Nashville was consigned to Middletown, N. Y., routed via the Erie Railroad. On account of floods the initial carrier, without instructions from the owner, forwarded the shipment over another route at a higher rate. The commission finds that the initial carrier had no legal right to divert the shipment involved from the route specified in the bill of lading, and that, therefore, it is liable for the resulting increase in charges. Reparation awarded. (33 I. C. C., 571.)

Commutation Tickets

Wellesley W. Gage v. Erie. Opinion by the commission:

Complainant purchased from defendant a fifty-trip family ticket good between Ridgewood, N. J., and New York. The tariff authority for the ticket contained the following provision:

> This class of ticket under conditions of its contract is valid for passage for one year from date of passage, except where otherwise noted, and good only for transportation of the person whose name appears thereon and members of his immediate family and servants therein. The expression "immediate family" applies to those not only living with, but entirely dependent upon, the person whose name appears on face of ticket.

The commission finds that the carrier acted correctly when it refused to honor the ticket when presented by the son-in-law who lived with, but was not dependent upon, complainant. Complaint dismissed. (33 I. C. C., 593.)

Oregon-Washington's Ownership of Boats on Willamette and Columbia Rivers

Opinion by Commissioner Clark:

Upon application of the Oregon-Washington the provisions of section 5 of the act to regulate commerce, as amended by section 11 of the Panama Canal act, for an extension of time beyond July 1, 1914, during which petitioner may continue to operate boats on the Willamette and Columbia rivers, Lake Coeur d'Alene, and the Snake river; the commission holds that the Oregon-Washington does or may compete with its boats in their operations on the Willamette and Columbia rivers, Lake Coeur d'Alene, and the Snake river within the meaning of the act, but that the operation of these boats is in the interest of the public and of advantage to the convenience and commerce of the people; that their continued operation by petitioner will neither exclude, prevent, nor reduce competition on the routes by water, and that

the application should be granted. The rates, fares, schedules and regulations of these boats governing traffic subject to the act, moved by them, must henceforth be filed with the commission. (33 I. C. C., 658.)

Ownership of Steamboat Line Between Carrabelle and Apalachicola, Fla.

Opinion by Commissioner Meyer:

The Georgia, Florida & Alabama asks that it be allowed to continue to own and operate a steamboat between Carrabelle and Apalachicola, Fla. The commission finds that so long as their respective operations remain as at present, the boat line is but an extension of the rail line and the rail line does not, or may not, compete for traffic with the boat line within the meaning of the act. Petitioner's continued ownership and operation of the rail line and boat line is not, and will not be, in violation of section 5 of the act to regulate commerce, as amended by the Panama Canal act. (33 I. C. C., 630.)

STATE COMMISSIONS

A meeting of representatives of the National Association of Railway Commissioners was held at Chicago on Wednesday to consider what part the state commissioners shall take at the valuation conference before the Interstate Commerce Commission, Division of Valuation, at Washington on May 27.

The railroad commission of Louisiana has issued an order prohibiting the railroads of that state from requiring notice of claims for damage to freight to be filed within four months; the commission declares that the carriers must obey the law of the state allowing two years from the date of shipment in which to file such claims.

COURT NEWS

The Supreme Court of the United States, in an opinion handed down last Monday, decides against the Interstate Commerce Commission in its suit to compel F. W. Ellis, general manager of the Armour Car Line, to answer questions and produce papers relative to alleged unreasonable allowances paid by railroads for the use of Armour's cars.

The Chicago, Rock Island & Pacific, the St. Louis, Iron Mountain & Southern and the St. Louis Southwestern have filed a petition in the United States district court at Little Rock, Ark., asking an order to restrain the Arkansas Railroad Commission from enforcing the state two-cent passenger fare law. The court recently issued an injunction restraining the enforcement of the law as to the St. Louis & San Francisco. The petition will be argued on May 28.

Presentation of Freight Claim—Burden of Proof

In an action for injury to livestock the bill of lading stipulated that claim must be presented within 30 days. The Washington Supreme Court holds that the burden of proof of presentation of the claim rests on the plaintiff. The presentation of claim was an affirmative fact peculiarly within the knowledge of the plaintiff, especially when applied to a shipment accompanied by an agent of the shipper. Moreover, it would ordinarily be an easier matter for the shipper to prove that such a claim had been presented than for the railroad to prove the negative thereof. Henry v. Chicago, M. & P. S. (Wash.) 147 Pac. 425.

Private Siding—Obligation to Furnish Cars

A railroad company contracted with a lumber company for the construction and maintenance of a spur track for the exclusive benefit of the lumber company. Subsequently the lumber company bought the timber on a tract of land to be delivered on board cars on the spur track. In an action by the seller of the timber against the railroad company for refusal to furnish cars at the spur, the Texas Court of Civil Appeals holds that the company was under no contract obligation to the plaintiff to furnish cars or to receive freight from him. The contract between the road and the lumber company was not made for the plaintiff's benefit, and he was an entire stranger thereto. And, under the rule that railroads are only required by law to furnish cars at stations provided for the service of the public, or where the railroads are in the habit of accepting freight from any person offering it for transportation, the defendant was under no obligation to plaintiff at the spur. It was a private track, and, even if the road owed the plaintiff the duty to furnish cars, it had no notice of the contract between him and the lumber company and no knowledge of the facts which would make the damages claimed the probable result of its failure to furnish cars. Beaumont, S. L. & W. v. Moore (Tex.) 174 S. W., 844.

Liability of Initial Carrier—Surrender of Bill of Lading

Goods were shipped under a bill of lading requiring surrender of the original before delivery to the consignee. The shipment was delivered by the terminal carrier upon the consignee's written order without surrender of the bill. Following the ruling of the Supreme Court of the United States in Atlantic Coast Line v. Riverside Mills, 219 U. S. 186, the Michigan Supreme Court holds, in an action by the shipper against the initial carrier, that section 7 of the interstate commerce act covers such a claim, and that the initial carrier is liable. Thomas v. Blair, receiver of Pere Marquette (Mich.), 151 N. W., 1,041.

Diversion of Water—Unexpected Injury

In a building adjacent to the railroad right of way, there were stored 50 odd barrels of lime. The ditch and culvert along the right of way were sufficient to carry away surface waters ordinarily collected in the ditch, but an exceptionally heavy rainfall caused the water to be set back, and to reach the lime, causing a fire which destroyed the buildings. In an action against the company, it was held by the New York Appellate Division that it was not guilty of actionable negligence in maintaining the ditch and culvert, and was not liable for the fire. The injury was not of such a nature as a reasonably prudent man would anticipate. Snook v. New York Central, 152 N. Y. Supp., 564.

Crossing Accident—Contributory Negligence

A boy of 12 years was riding on a baker's wagon, which was driven over a crossing with such gross carelessness on the part of the driver that a collision occurred, resulting in the boy's death. In an action therefor it was held by the Maine Supreme Court that no recovery could be had, not on the ground of imputed negligence of the driver, a doctrine which does not obtain in Maine, but because of the boy's own want of due care. He was a bright and intelligent boy, familiar with the crossing and its approaches, and knew it to be a place of danger, and yet he approached the crossing without taking the slightest precaution, either by looking or listening. Crosby v. Maine Cent. (Me.) 93 Atl., 744.

Power to Condemn Waters

The Pennsylvania Supreme Court holds that a railroad company, chartered under the general railroad laws of the state, cannot, in the exercise of its right of eminent domain, condemn for the use of its engines or other corporate purpose the water of a stream over which it has built its roadbed on a right of way acquired by condemnation, its statutory authority being limited to the appropriation of land and material for the location and construction of the roadway. Connellsville & S. L. v. Marketon Hotel Company (Pa.), 93 Atl., 635.

Duty Toward Trespassers on Tracks

The Kentucky Court of Appeals holds that proof that an engineer looked ahead when several hundred feet from a trespasser will warrant a judgment against the railroad for the man's death on the theory that he was seen and the engineer failed to use reasonable care to avoid injury. If the engineer did see the traveler at this point, he might, in the exercise of ordinary care, have concluded that in proper time the man would have left the track, especially as the conditions were such that he could do so quickly and safely. Willis v. L. & N. (Ky.), 175 S. W., 18.

Liability of Initial Carrier—Non Delivery

A consignor, upon learning that his interstate shipment had not been accepted by the consignee and had not been delivered, directed the initial carrier to have the goods returned at once, and then himself took up the matter with the final carrier, making no further application to the initial carrier. The New York Supreme Court, Appellate Division, holds that the initial carrier

was not liable for damages for the final carrier's failure to return the goods to the consignor; any "injury or damage" in such case not being within section 20 of the Interstate Commerce Act, imposing liability on the initial carrier for damage or injury by connecting carrier, nor within section 1 of that act, defining "transportation," as used in section 20, to include services in connection with the receipt, delivery and transfer in transit. Wien v. N. Y. Cent. (N. Y.), 152 N. Y. Supp., 154..

Conductor Not Subject to Telephone-Operator's Hours

The United States Circuit Court of Appeals, Fifth circuit, in the case of the government against the Florida East Coast Railway, appealed from the District Court for the Southern District of Florida, holds that a conductor who is required to stop at stations and by the use of the telephone to report, transmit, receive, or deliver train orders pertaining to his train is not embraced within the terms of the proviso limiting the hours of service of operators to 9 or 13 hours; and, therefore, may be required to remain on duty for 16 hours in a 24-hour period. The decision was by District Judge Maxey, with whom sat Pardee and Walker, circuit judges. Judge Walker dissented.

Conductor E. M. Little, on January 10, 1914, at and between the offices of New Smyrna and Fort Pierce was on duty from 7 a. m. to 11 p. m., and used a telephone in defendant's office at Quay and Lyrata and transmitted or received orders.

After quoting the law Judge Maxey says: The purpose of the proviso was to prescribe shorter hours for work for operators whose primary and principal duities require them to operate telegraphic instruments and telephones, etc. . . . Such employees must perform their duties at a fixed place. It is evident that the intention of the law is that such employees must have a fixed place for work, and at such place they should not be required or permitted to work a longer time than the number of hours prescribed. If the proviso be construed to include a conductor, what number of hours, it may be asked, shall he be permitted to work during the 24-hour period? Shall it be 16, 13, or 9 hours? Having regard for the language of the proviso, it will be scarcely possible to give a satisfactory reply to the question—a difficulty which affords additional ground for holding that as to such employee the proviso is altogether inapplicable.

It seems to us that it would plainly violate accepted canons for construing statutes to include in the proviso a train conductor, having no fixed place for work except on a moving train, and who, under section 2, may be required or permitted to work 16 hours. His primary and chief duty requires him to look after his train, and stopping at a station to transmit or receive an order affecting his immediate train is a mere incidental service which can not operate to classify him as a telegraph or telephone operator or train despatcher. The contention of counsel for the government is that train conductors are included in the words of the proviso, "or other employee," who by the use of the telegraph or telephone despatches, reports, etc. We have endeavored to show that it was not the intention of the lawmakers to so include them. But for another reason the construction insisted upon by the government is thought to be erroneous. The words "or other employee" evidently refer to employees charged with duties similar to those performed by telegraph operators and train despatchers, in accordance with the following recognized rule for the construction of statutes: "In the enumeration of particulars, general and comprehensive terms are sometimes used in the construction of which reason and good sense require that if you would not violate the intention of the writer their meaning must be restricted to things of a like nature and description with the particulars among which they are found." (3 Words & Phrases, 2328.)

This proviso of section 2 of the "hours-of-service act" was construed by the Circuit Court of Appeals for the Eighth circuit in Missouri Pacific v. United States, 211 Fed., pages 893-897. At page 897 it was said by the court:

> As the word "employee" in the proviso of section 2 includes "operator" and "train despatcher," the conclusion here is irresistible that Congress intended by the use of the words "other employees" to mean an employee engaged primarily in the same class of service as would be performed by an operator or train despatcher.

In our construction of the statute we have steadily kept in view the beneficent purpose of the law. If we have construed it properly, the Congress may enact such further legislation as may be deemed best for the public interests.

Railway Officers

Executive, Financial, Legal and Accounting

W. G. Davidson has been appointed treasurer of the Pacific & Eastern with office at Portland, Ore., succeeding William Gerig, resigned.

F. S. Forest has been appointed secretary of the central committee of safety of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Oregon.

M. F. Harden has been appointed cost accountant of the Central of Georgia, with office at Savannah, Ga. It will be his duty, in co-operation with other departments, to prepare, study and interpret statistics of cost and performance.

George H. Smith, whose appointment as general attorney of the Oregon Short Line and general attorney for Utah for the Union Pacific, with headquarters at Salt Lake City, has already been announced, was born in 1874, and was educated in the public schools of Utah. He was graduated from the law department of the University of Michigan in June, 1899. He entered railway service on July 1, 1899, as law clerk in the law department of the Oregon Short Line, and was appointed assistant attorney on January 1, 1900. In 1905 he was appointed assistant attorney for Utah for the Union Pacific and the Southern Pacific. From the spring of 1905 until March 15, 1915, he was also assistant general atorney for the Utah Light & Railway Company.

G. H. Smith

E. E. Calvin, vice-president and general manager of the Oregon Short Line, has been elected also first vice-president of the San Pedro, Los Angeles & Salt Lake, with headquarters at Salt Lake City, Utah, succeeding W. H. Bancroft, deceased.

Operating

George Johnson has been appointed superintendent of the Pacific & Eastern, with headquarters at Midford, Ore.

George W. Jett has been appointed superintendent of telegraph of the Norfolk & Western, with office at Roanoke, Va., vice W. C. Walstrum, deceased.

Paul McKay has been appointed assistant superintendent of the Portland division of the Spokane, Portland & Seattle, with headquarters at Portland, Ore.

C. A. Hawkins has been appointed superintendent in charge of traffic and operation of the Nezperce & Idaho and the Lewiston, Nezperce & Eastern, with headquarters at Lewiston, Idaho, succeeding W. A. Pease, resigned to engage in other business.

Traffic

M. E. Ward has been appointed commercial agent of the Ft. Smith & Western, with headquarters at Ft. Smith, Ark.

John G. Elgin, city passenger agent of the Baltimore & Ohio, at Louisville, Ky., has been appointed district passenger agent, with headquarters at Louisville, succeeding R. S. Brown, deceased.

James T. Neison has been appointed general agent of the Missouri Pacific-Iron Mountain System, with headquarters at Philadelphia, Pa., succeeding A. S. Edmunds, resigned to engage

in other business. The position of commercial agent at Pittsburgh, Pa., has been abolished.

G. M. Bowman, traveling agent of the Chicago, Milwaukee & St. Paul, has been appointed commercial agent at Cincinnati, Ohio, succeeding E. H. Spence, who has been transferred to Pittsburgh, Pa.

C. C. P Kausch, who has been appointed general freight agent of the Missouri Pacific-Iron Mountain System, with headquarters at St. Louis, was born September 24, 1872, at St. Louis, Mo., and was educated in the public schools. He entered railway service July 1, 1888, as office boy for the Missouri Pacific, and was subsequently rate clerk, tariff clerk, chief tariff clerk and chief clerk of the general freight office. On March 1, 1907, he was appointed assistant general freight agent of the road from which position he is now promoted.

W. I. Jones, whose appointment as general freight agent of the St. Louis, Iron Mountain & Southern, with headquarters at St. Louis, has already been announced, began railway work in 1886 as a locomotive fireman on the Iron Mountain. He was employed in that capacity until October, 1888, when he was transferred to the local office of the Missouri Pacific and after remaining there about 15 months went to the traffic department. He left railway work in May, 1891, returning in March, 1901, as chief clerk to the assistant general freight agent of the Missouri Pacific. In November, 1906, he was promoted to commercial agent at Monroe, La., returning to the general office as chief clerk to the freight traffic manager on November 1, 1907. Mr. Jones was made assistant general freight agent in December, 1910, and on August 1, 1913, he was appointed assistant to the general traffic manager of the same road. In March, 1914, he was appointed assistant to the vice-president.

W. I. Jones

W. H. Tayloe, whose appointment as passenger traffic manager of the Southern Railway with headquarters at Washington, D. C., has already been announced in these columns, began railway work in May, 1886, as a clerk in the ticket auditor's office of the Chesapeake & Ohio, at Richmond, Va. From October, 1886, to July, 1889, he served on various roads in the South as stenographer, and in August, 1889, was appointed stenographer and rate clerk to the general passenger agent of the Richmond & Danville, at Birmingham, Ala. From May, 1890, to August of the following year he was traveling passenger agent, and then to October, 1891, was chief clerk to assistant general passenger agent of the same road. He was then consecutively traveling passenger agent at New York, chief clerk to assistant general passenger agent at Savannah, Ga., and at Washington, D. C., of the same road, and later for about four years was district passenger agent of the same road and its successor, the Southern, at Atlanta, Ga. In August, 1896, he was appointed district passenger agent of the Southern Railway at Norfolk, Va., and from February, 1897, to December, 1900, was assistant general passenger agent at Louisville, Ky., when he was transferred in the same capacity to Atlanta, Ga. In May, 1904, he was promoted to general passenger agent of the same road at Washington, D. C. Then, from August, 1909, to December 31, 1912, he was general agent of the freight and passenger departments of the Southern Railway at Denver, Colo. On January 1, 1913, he was appointed traffic manager of the Chesapeake Steamship Company, with office at Baltimore, Md., which position he held at the time of his recent appointment as passenger traffic manager of the Southern Railway, as above noted.

Engineering and Rolling Stock

Frank A. Merrill, acting engineer maintenance of way of the Boston & Maine at Boston, Mass., has been appointed engineer maintenance of way.

William Brandt has been appointed general foreman of the shops of the New York, Chicago & St. Louis, at Conneaut, Ohio, succeeding T. C. Baldwin, promoted.

W. C. Sealy has been appointed master mechanic of the Ontario lines of the Grand Trunk, with headquarters at Toronto, Ont., in place of J. Markey, deceased.

E. A. Hadley, whose appointment as chief engineer of the Missouri Pacific-Iron Mountain System, with headquarters at St. Louis, Mo., has already been announced in these columns, was born in Lowell, Mass., in 1879, and was educated in the common and high schools, graduating from the Lowell high school in 1897. From 1897 to 1901, he was apprenticed to Smith & Brooks, civil engineers, Lowell, Mass., and there secured a combined course of engineering study and practice. In 1901 he entered the employ of the Boston & Maine, and was subsequently draftsman, assistant engineer and resident engineer until 1910. On June 1, 1910, he was appointed to the position of engineer of design of the Missouri Pacific. During the past 18 months he has been engaged on special engineering investigations for the president's office under the title of assistant engineer.

E. A. Hadley

O. E. Selby, whose appointment as principal assistant engineer of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Cincinnati, Ohio, has already been announced, was born on March 9, 1869. He was educated in the common and high schools and the State University of Iowa. He entered railway service in 1887 as leveler and draftsman for the Chicago, Burlington & Northern. He was subsequently connected with the Illinois Valley & Northern and the Houston Central Arkansas & Northern until 1890, when he became resident engineer on the construction of the Louisville & Jeffersonville bridge over the Ohio river at Louisville, Ky. He remained in that position until 1899, when he was appointed assistant engineer of the Cleveland, Cincinnati, Chicago & St. Louis. In 1905 he was appointed bridge engineer and later engineer of bridges and structures, from which position he is now promoted.

O. E. Selby

C. L. P. Russel, assistant supervisor of the Pennsylvania Railroad at Middletown, Pa., has been appointed supervisor of Division No. 31, with office at Cresson, vice W. B. Groff, Jr., transferred, and S. H. Kuhn, supervisor at Olean, N. Y., has been ap-

pointed supervisor of Division No. 28, with office at Norristown, vice E. J. Ayars, transferred.

G. E. Ellis, signal engineer of the Kansas City Terminal, has been appointed service signal engineer for the Interstate Commerce Commission, with headquarters at Washington, D. C.

Tom Windle, formerly master mechanic of the International & Great Northern at Palestine, Tex., has been appointed master mechanic of the Denver & Salt Lake, with headquarters at Tabernash, Colo.

Henry Bartlett, mechanical superintendent of the Boston & Maine at Boston, Mass., has been appointed chief mechanical engineer, reporting to the president. He will have general supervision over matters connected with motive power and other equipment in so far as may be necessary to preserve the standards and systems of the railroad and to secure adherence thereto. All plans and specifications for locomotives and other equipment will be prepared by him and approved by the general manager. The construction of new equipment will be supervised by him and he will perform such other duties in connection with motive power and equipment as may be assigned to him by the president. Charles H. Wiggin, superintendent of motive power at Boston, will report to the general manager. He will have charge of all locomotives and car shops, engine houses and appurtenances, and of the maintenance, repair, and inspection of locomotives and other equipment. The master mechanics, superintendents of shops, electrical superintendent, general car inspector, general air brake inspector and the general piece work inspector will report to him.

OBITUARY

W. C. Walstrum, superintendent of telegraph of the Norfolk & Western at Roanoke, Va., died on May 8, at the age of 60.

P. P. Mirtz, assistant engineer, mechanical department, of the New York Central, died suddenly on May 11, at his home in New York.

O. S. Cockey, general agent of the freight department of the Grand Trunk at New York, died on May 9, at White Sulphur Springs, W. Va.

Charles H. Bronson, formerly from April, 1890, to 1904, auditor of the Pittsburgh & Lake Erie, died on May 3, at Cleveland, Ohio, at the age of 70.

William Pond Harris, formerly until 1898, superintendent of the Plant System, now a part of the Atlantic Coast Line, died on April 24, at his home in Johnson City, Tenn., at the age of 69. He began railway work in the operating department, and served consecutively on the Delaware, Lackawanna & Western; then as superintendent of the Chesapeake & Ohio; the Louisville & Nashville; Baltimore & Ohio; Atchison Topeka & Santa Fe; Charleston, Cincinnati & Chicago, now a part of the Carolina, Clinchfield & Ohio and the Plant System, until 1898, and since that time he had been out of railway work.

Fuel Supplies on the Swedish Railways.—The Swedish state railways are reported to have recently contracted for 200,000 tons of German coal briquettes and 72,000 tons of German coke. A mixture of the two is to be used as a locomotive fuel on some lines. The price is considerably less than that of English coal.

Efforts Made by English Railways to Release Men for the Colors.—Further action by the railway companies, in order to release men for the army or to allow them to be employed on munitions, is likely to be shortly put into force. No men of military age and physique are now taken on, and where their services can be utilized without disadvantage, women are drafted into the service instead. With a view to reducing clerical labor and thereby release clerks eligible for military service, it is proposed to have all parcels and freight sent prepaid, and so reduce bookkeeping work. The practice in force on many railways of prepaying parcels charges by stamps will possibly be universally adopted. Parcels and freight will probably be collected and delivered by the same cartage service, and thereby save men, horses and drays, and a further economy in this direction is possible by further curtailing the hours when goods are received.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Fort Worth & Denver City has ordered 10 superheater oil-burning, Mikado type locomotives from the Baldwin Locomotive Works.

The Boston & Albany has given the American Locomotive Company an order to convert 10 Consolidation type locomotives to Mikado type.

The Serbian Government is reported to have ordered about $50,000 worth of small locomotive parts from the American Locomotive Company.

The Western Maryland reported in the *Railway Age Gazette* of May 7 as being in the market for 10 locomotives, has issued inquiries for 15 Mallet type locomotives.

The French Government, which was reported in the *Railway Age Gazette* of last week as having issued specifications for 100 large locomotives, is also in the market for 25 or 50 locomotives for the Paris-Orleans line.

The Cuba Railroad, reported in the *Railway Age Gazette* of last week as having ordered 10 ten-wheel type locomotives from the American Locomotive Company, has ordered 15 locomotives from that company. As this order is in addition to another recent order for 15 locomotives, this makes a total of 30 locomotives.

CAR BUILDING

The Virginian has ordered 500 steel underframes from the Greenville Steel Car Company.

The Chicago, Rock Island & Pacific has issued inquiries for 5,000 40-ft., 40-ton all-steel box cars.

The Norfolk & Western is inquiring for 10 70-ft. coaches, 12 70-ft. combination baggage and express cars and 2 70-ft. postal cars.

The Chicago & North Western has ordered 2,000 steel underframe box cars from the Western Steel Car & Foundry Company.

The Bingham & Garfield is in the market for 50 60-ton Clark extension side dump ore cars for use by the Utah Copper Company.

The Toronto, Hamilton & Buffalo has ordered 10 steel underframe and steel frame stock cars from the National Steel Car Company.

The Chicago Elevated Railways have ordered 122 all-steel motor cars from the Cincinnati Car Company. These cars will be equipped with Baldwin trucks.

The Chicago, Milwaukee & St. Paul is reported to be contemplating asking prices on 2,000 cars in addition to the 2,000 it plans to build in its own shops. This item has not been confirmed.

The Fort Worth & Denver City has ordered 1,200 40-ft., 40-ton steel center sill box cars, 300 40-ft., 40-ton steel center sill stock cars, and 200 100,000-lb. capacity, steel gondola coal cars from the Haskell & Barker Car Company.

The Department of Commerce has ordered one all-steel fish-distributing railway car from the Harlan & Hollingsworth Corporation, for use in connection with the work of the Bureau of Fisheries. The car will be fully equipped for movement on fast passenger trains.

The Interborough Rapid Transit has issued inquiries for 974 trucks. The order which this company recently placed with the Pullman Company for 478 subway car bodies has been approved by the New York Public Service Commission, First district.

The Russian Government has ordered 2,000 steel underframe box cars from the Eastern Car Company, New Glasgow, N. S., and 2,000 from the Canadian Car & Foundry Company. It has also ordered 20,000 steel axles from the Cambria Steel Company, and is reported to have placed 8,000 cars with the Pullman Company and 2,000 cars with the Seattle Car & Foundry Company. The negotiations for a large order for cars with the Pressed Steel Car Company, are reported as not yet completed.

IRON AND STEEL

The Havana Central has ordered 1,000 tons of rails from the Maryland Steel Company.

The Chicago, Rock Island & Pacific has ordered 10,000 tons of rails from the Illinois Steel Company.

The Atchison, Topeka & Santa Fe has ordered 2,700 tons of steel for oil tanks from the Kennicott Company, Chicago.

The Chicago, Burlington & Quincy has ordered 1,353 tons of steel for various bridges from the Fort Pitt Bridge Company.

The Chicago, Milwaukee & St. Paul is in the market for 32,000 tons of steel to cover construction of freight cars at its Milwaukee shops.

The Russian Government has issued inquiries for 6,000 to 8,000 tons of railroad spikes to be made to Canadian Pacific standards. It is supposed that these will be used in connection with the double tracking of the Trans-Siberian now under way.

MACHINERY AND TOOLS

The Pennsylvania Railroad is in the market for a 25-ton gantry crane.

The Pressed Steel Car Company is inquiring for a number of machine tools.

The Baltimore & Ohio is in the market for a 60-ft. electric gantry crane, for Georgetown, D. C.

The Delaware, Lackawanna & Western has ordered a vertical milling machine and a 36-in. swinging lathe.

The Lehigh & New England is in the market for a 35-ton double-trolley and a 10-ton single-trolley electric traveling crane and for a number of machine tools for the new shops at Pen Argyle.

Russo-Bulgarian Railway.—It is reported that two Russian delegates have arrived in Sofia with the object of concluding an agreement with the Bulgarian Railway Administration, with a view to establishing direct railway communication between Salonika and Russia.

Wages of Employees of the London Tubes.—It is specially to the credit of the London underground electric railway companies that they have agreed to grant to their employees the same advances of wages as have been conceded to meet war conditions of living expenses by the railway companies of the country generally. It must be borne in mind that the tube railway companies, while suffering from disadvantages arising from the state of war, do not share in the advantages arising from the government guarantee to make up net revenue to that accruing before the war began. As the tube railways have no physical junctions with any of the main lines of the country, they are not represented on the Railway Clearing House, and so they did not come within the scope of the government guarantee. They have no goods traffic, their capitalization is necessarily high, and the dividends on ordinary stock—where they exist at all—are low. Yet they have generously come into line with British railways generally, and the war bonus, to be retrospective from the middle of February, is to be paid to many men besides those embraced in the conciliation scheme. While there is a prospect that part at least of the war bonus wages will be repaid by the government to British railway companies generally, it appears doubtful whether this will be the case in regard to the tube companies. Gratitude is rather a scarce sentiment as from employed to employer, but there surely ought to be some feeling of that sort on the part of the underground railwaymen.—*Railway Gazette.*

Supply Trade News

Charles W. Sherburne, founder of Sherburne & Company, Boston, Mass., died on May 6.

The Van Dorn Iron Works, Cleveland, Ohio, has increased its capital stock from $150,000 to $350,000.

D. J. Normoyle has been appointed manager of the Philadelphia office of the Niles-Bement-Pond Company, Inc.

The Vulcanite Portland Cement Company about May 1 will move into new offices at 8 West Fortieth street, New York.

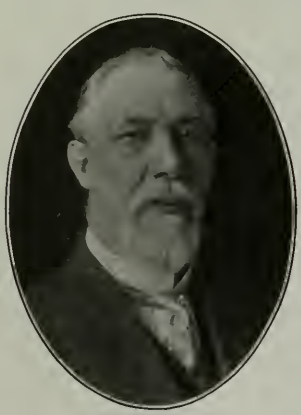
The Taylor Wharton Iron & Steel Company, Philadelphia, Pa., is working on an order for shrapnel shells at its Tioga plant.

The Western Electric Company has moved its Kansas City distributing house into a new warehouse at 608-610 Wyandotte street.

Joseph F. Dixon, Jr., foreign sales manager of the Allis-Chalmers Company, died at his home in Brooklyn, N. Y., on April 30.

The Pyrene Manufacturing Company has moved its head offices in New York to the Vanderbilt Concourse building, 52 Vanderbilt avenue.

George T. Reiss, vice-president of the Niles Tool Works Company, and a director of the Niles-Bement-Pond Company, died at his home in Hamilton, Ohio, on May 5. Mr. Reiss had been in the employ of the Niles Tool Works Company continuously since 1878. He was born in Cincinnati, December 6, 1849. In 1877 he went to Hamilton. He was first employed there as a draftsman, but in 1878 he was given the position of master machinist with the Niles Tool Works Company, and placed in charge of the company's engineering department. He was subsequently chief mechanical engineer and later superintendent of the drafting department. Eventually, he became vice-president of the company and a director of the Niles-Bement-Pond Company. He was an inventor of considerable importance and held a position of prominence in the affairs of the city in which he made his home.



G. T. Reiss

The Brown & Sharpe Manufacturing Company has recently awarded a contract for the construction of a two-story addition to its plant at Providence, R. I.

Charles A. Billings has resigned as manager of the Brooklyn plant of the American Bridge Company, and will devote his entire time to personal interests.

J. W. White, formerly of the Union Switch & Signal Company, has resigned to become special representative of the Electric Cable Company, Bridgeport, Conn.

Charles Spalding, representative of the Gisholt Machine Company, Madison, Wis., in Chicago territory, has transferred his headquarters from the Chicago office to Detroit.

A. W. De Revere has been appointed district sales manager of the Terry Steam Turbine Company, Hartford, Conn., in charge of offices at 524 Monadnock block, Chicago.

The Baldwin Locomotive Works, which is reported to have received a contract for war material, has awarded a contract for

the construction of a large building to be erected adjoining the Eddystone plant.

Paul B. Liebermann, formerly assistant chief engineer of the Sprague Electric Works of the General Electric Company, has become associated with the Hyatt Roller Bearing Company as engineer of tests.

Alfred P. Stewart, who last year purchased a controlling interest in the L. A. Green Equipment Company, steel railroad supplies, announces that he will continue the business under his own name, with offices at 202 Oliver building, Pittsburgh, Pa.

The item in the *Railway Age Gazette* of April 9, page 808, announcing the appointment of a new manager of the Boston branch of Manning, Maxwell & Moore, Inc., incorrectly gave the name of the new branch manager as J. S. Wright. The name given should have been Jos. Wainwright.

Fred A. Geier, president of the Cincinnati Milling Machine Company, Cincinnati, has purchased the interest of Larz Anderson in the Cincinnati Shaper Company and the Cincinnati Gear Cutting Machine Company, Cincinnati. P. G. March will continue as president, and the business will be extended.

E. E. Winship, formerly manager of the Cincinnati branch of Manning, Maxwell & Moore, Inc., has been appointed manager of the Cleveland branch, effective May 1. C. H. Overkamp, formerly of the Conover-Overkamp Machine Tool Company, Dayton, Ohio, has been made manager of the Cincinnati office.

The Davis Manufacturing Company, Milwaukee, Wis., manufacturer of gasoline motors, has closed a contract with the Railway Engineering & Equipment Company, Indianapolis, Ind., for the construction of motors, trucks and underframes for the entire output of railway coaches of the latter company for a period of five years.

P. H. Biggs, sales manager of the Cleveland territory of Manning, Maxwell & Moore, has resigned from that position and has taken an office in the Schofield building, Cleveland, Ohio, under the name of the P. H. Biggs Machinery Company. He will handle machine tools and hydraulic machinery, and represent a limited number of manufacturers in the northern Ohio territory.

The Whiting Foundry Equipment Company, Harvey, Ill., has taken over the foundry equipment business of the Central Iron Works, Quincy, Ill., thereby adding to its line the dust arresters and water cinder mills formerly manufactured by that company. The Whiting Company has retained one of the engineers of the Central Iron Works. It will also be prepared to furnish repairs for Central Iron Works equipment.

The Pittsburgh Steel Car Company recently organized by Pittsburgh capital is planning to erect a plant at Greenville, Pa., which will provide for a capacity of 7,500 steel cars a year. The officers of the company are W. A. Scott, Jr., president; H. B. Scott and L. A. Meyran, vice-presidents; H. W. Best, treasurer; George W. Ramby, secretary, and E. B. Caughey, office manager. The offices are at 512 Ferguson building, Pittsburgh.

The Westinghouse Air Brake Company, in order to fill the portion of the ammunition order recently awarded it by the American Locomotive Company, has erected at its works at Wilmerding, Pa., two temporary buildings, one 65 ft. by 175 ft., and the other 65 ft. by 500 ft., and may also erect other buildings. The necessary machinery is being installed, and it is reported that the company has bought all of the machine tools it will require to fill the order. The company expects to complete the contract in 14 months.

The Pacific Great Eastern Equipment Company has been incorporated with a capital of $3,000,000 and office in Vancouver, B. C., to purchase, hire or manufacture railway cars, locomotives or other rolling stock, deal in rails, contractors' equipment, appliances and tools and to sell or hire the same to railway companies and contractors. The provisional directors are: P. Welch, E. F. White, E. W. Kaufmann, A. H. Sperry and D. C. Pennington, Vancouver, B. C., all of whom are associated with the Pacific Great Eastern Railway.

The Reading-Bayonne Steel Casting Company has recently sold its Bayonne, N. J., plant to the Bayonne Steel Casting Company, and its Reading, Pa., plant to the Reading Steel Casting Company. The Bayonne Steel Casting Company has elected officers as follows: William D. Sargent, president and treasurer, and A. J. Passino, secretary. H. K. Pollard has been appointed sales manager, and Charles Lidstone, superintendent. The officers of the Reading Steel Casting Company are: J. Turner Moore, president; M. G. Moore, vice-president; H. M. Doty, secretary and treasurer; M. G. Moore is also sales manager, and J. Douglas Genger, superintendent. The Reading-Bayonne Steel Casting Company was a combination of these two companies organized about December, 1911.

The Westinghouse Electric & Manufacturing Company which, as noted in last week's issue, page 992, has received a large order for rifles from the British government, has practically completed negotiations for the purchase of the plant and business of the J. Stevens Arms & Tool Company of Chicopee Falls, Mass., and the plants of the Stevens-Duryea Company in Chicopee Falls and East Springfield. The company plans to fill the order at these plants. L. A. Osborne, vice-president of the company, will be in executive charge of the work, and Walter L. Clark, recently vice-president of the Niles-Bement-Pond Company, will be manager of the combined plants in charge of operations. The corporate and commercial identity of the J. Stevens Arms & Tool Company will be retained, and its usual line of rifles will be manufactured. When the war order rush is over the other plants will probably be devoted to the manufacture of the usual line of Westinghouse products.

TRADE PUBLICATIONS

Water Softeners.—The Kennicott Company is the subject of a 29-page booklet prepared by Elbert Hubbard. The booklet is written in a breezy style and will be found of considerable interest.

Door Hangers.—Catalog No. 12, recently received from the Richards-Wilcox Manufacturing Co., Aurora, Ill., illustrates in detail the line of door hangers, grindstones and hardware specialties produced by this company. The book is thoroughly illustrated and contains 296 pages, including an index.

Arc Welders.—The subject of bulletin 1915A, from the Welding Materials Company, Inc., 114 Liberty street, New York, is variable voltage welders. The subject of electric arch welding is dealt with at some length, and a number of illustrations are given, showing its application to locomotive and car work.

Nut Tapping Machines.—Tapper Talks, Nos. 1 and 2 have recently been issued by the National Machinery Company, Tiffin, Ohio, and deal with the National automatic nut tappers which operate on the bent cap principle. Illustrations of the machine at work are included and data given as to the advantages claimed.

Insulating Brick.—Good Furnaces Made Better is the subject of the booklet issued by the Armstrong Cork Company, Pittsburgh, Pa., and dealing with the Nonpareil insulating brick for furnaces and ovens. Illustrations and descriptive matter are included concerning the application of this type of brick for various furnaces.

Valves.—The 1915 catalog, No. 18, from the Golden-Anderson Valve Specialty Company, Pittsburgh, Pa., contains 140 pages, giving in considerable detail descriptive and illustrating matter concerning the various valves manufactured by this company. The valves include a large variety of types for both steam and water service.

Power Plant Oil Filters.—Bulletin No. 10, issued by The Richardson-Phenix Company, Milwaukee, Wis., is devoted to the Peterson power plant oil filter and accessory apparatus for central oiling systems. A large number of half-tone and line engravings are included, and considerable information is given concerning oil filtration.

Cranes.—Book No. 107, issued by the Industrial Works, Bay City, Mich., illustrates and describes the various crane equipments which this company manufactures. These cranes include wrecking cranes, pile drivers, locomotive cranes, lifting magnets, etc. A section is also devoted to other products, such as pillar and transfer cranes, rail saws, transfer tables and wrecking tools. The book contains 88 pages and an insert containing illustrations of a partial set of Industrial wrecking tools. The printing and illustrations are excellent, a high grade of paper being used.

Railway Construction

Alabama Roads.—The Cedar Lake Mill Company, Brewton, Ala., is building a railroad to Brooklyn, it is said, and has decided to extend the line east to Andalusia, about 21 miles.

British Columbia & White River.—An extension of time in which to build this line has been granted by the Canadian parliament. The projected route is from Bear Creek, a tributary of the Chilkat river in British Columbia, to White river, thence to the boundary between Yukon territory and Alaska. C. M. Marpole, G. E. MacDonald, G. E. Wilson, A. McDonnell and Ironside are the provisional directors. (February 26, p. 389.)

Calgary & Fernie.—The Canadian parliament has granted an extension of time in which to build this projected line from Calgary, Alta., southwest to Fernie, B. C. J. R. Lawreym, S. S. Monaham, Victoria, B. C., and A. Mutz, Fernie, are interested. (January 2, p. 50.)

Canadian Western.—An extension of time has been granted to this company in which to build from the International boundary in Alberta via Pincher creek, Cowley and along Old Man river valley to the Livingstone mountains, thence to Calgary, Alta., also to build a branch line west to Michel, B. C. The company was incorporated in 1909, and the provisional directors included J. S. Hough, A. S. Kildall, L. L. Metcalfe and O. L. Boynton, Winnipeg, Man. Hough, Campbell & Ferguson, Winnipeg, are solicitors for applicants.

Charlotte Harbor & Northern.—This company is planning to build an extension, it is said, from Ridgewood, Fla., east to Bartow, four miles, for which surveys are now being made.

Chicago, Milwaukee & St. Paul.—This company has resumed track elevation on its Wilson avenue extension at Chicago, Ill.

Entwistle & Alberta Southern.—Incorporated in Canada to build from a point on the Grand Trunk Pacific, at Entwistle, Alta., south to the Saskatchewan river, about 60 miles. The provisional directors include C. L. Hervey, D. A. O'Meara, Montreal, Que.; T. A. Burgess, L. A. Cote and R. H. Pringle, Ottawa, Ont. (March 12, p. 493.)

Florida Roads (Electric).—Plans are being made, it is said, to build an electric line from Lynn Haven, Fla., south to Panama City, also to other places. Richard Tillis, Montgomery, Ala., is said to be interested.

Glengarry & Stormont.—It is expected that this line will be open for operation about June 1, from St. Polycarpe, Que., on the Canadian Pacific, southwest to Cornwall, Ont., 28 miles. The Canadian Pacific will operate the line.

Gulf, Colorado & Santa Fe.—This company will spend about $300,000 laying heavier rail and fastenings, and about $25,000 for new turn tables at Gainesville and Fort Worth, Tex. F. Merritt, Galveston, Tex., is chief engineer.

Indianapolis Union Railway.—This company has been empowered to issue $4,000,000 in bonds for track elevation work which will eliminate grade crossings by the construction of subways at 11 streets where its track system contains from 2 to 15 tracks. The work will consist of bridges over streets on concrete abutments with earth filling between streets. It will require the rebuilding of the train sheds at the Indianapolis Union station, where there will be 12 through tracks at an elevation of about 15 ft. above street grade. The former grade will be occupied by the baggage rooms, express rooms, etc. The elevation through train sheds will be accomplished entirely on steel structure.

Kanawha, Glen Jean & Eastern.—This company, which operates an 8-mile line from Glen Jean, W. Va., to Tamroy, has under consideration the question of building a two-mile extension.

Kettle Valley Lines.—The Canadian parliament has granted to this company an extension of time in which to build the following branch lines: From Penticton, B. C., to the International boundary at Osoyoos lake; from Summer creek via Allison or Princeton to the junction of Granite creek with the Tulameen river; from One Mile creek to the Copper mountain and Voigt mining camps, 15 miles southwest of Princeton; from Vernon, southerly via Kelowna to Penticton; also to build from a point on the line to be built from Summer creek northerly to Otter Summit, about 30 miles south of Merritt; from near Tulameen for about 50 miles up the Tulameen river valley, from Grand Forks for 50 miles up the north fork of the Kettle river; from Midway to Hedley, and from Penticton to Nicola. (January 29, p. 211.)

Lake Erie & Northern.—The question of carrying out the electrification of the completed section of this line is now under consideration. The company is building between Galt, Ont., and Port Dover via Paris, Brantford and Waterford, 51 miles, and the line has been leased to the Canadian Pacific. The contractors at work from Brantford south to Port Dover expect to complete the work this year, and if the Brantford-Galt section is electrified the southern section will be operated by the same motive power. Martin N. Todd, president, Galt, Ont.

Mississippi Roads.—Surveys are now being made, it is said, to build a railway from Yazoo City, Miss., east to Carthage, about 60 miles, and the Yazoo City Council has voted $50,000 in aid of the project. Walter C. Murphy, Chicago, Ill., is back of the project, and R. H. Douthat, secretary of the Yazoo Commercial Club, is said to be interested.

Mount Airy & Eastern.—Contracts will be let at once, to build a 3-mile extension in Patrick county, Virginia, and an additional extension of three miles is to be built later. The company now operates a 19-mile line from Mt. Airy, N. C., northeast to Kibler, Va. The principal commodities to be carried on the extensions are logs, lumber and farm products.

New York, Westchester & Boston.—An officer writes regarding the report that the Westchester Northern is to be built in the near future from White Plains, N. Y., northeast to Danbury, Conn., that no definite plans at the present time have been made for the construction of that line.

Ohio Roads.—The city council of Youngstown, Ohio, has authorized an issue of $800,000 of bonds to pay the city's share of the cost of a separation of grades of the city streets and the tracks of the Erie, the Lake Shore & Michigan Southern, the Pennsylvania Company and the Baltimore & Ohio at four different crossings. In all cases the streets will go over the tracks. At one crossing the tracks of the Erie will be depressed. In all other cases the railroad tracks will remain at the present grades. The elevation will consist of steel structures with masonry abutments, and the cost of the work will be divided between the city, the railroad companies and a traction company. Work will be done by contract and the cost is estimated at about $3,500,000.

Petersburg & James River (Electric).—Plans have been made by this company to build an electric line from Petersburg, Va., northeast to City Point, 10 miles. The grading work will be light and there will be very few curves; four small bridges are to be built and one sub-station on the line. J. Walter Long, president; B. R. Walters, secretary and treasurer, 801 Real Estate Trust building Washington, D. C.; J. H. Starkey, chief engineer, Rockville, Md.

Red River & Gulf Terminal.—Incorporated in Texas with $75,000 capital and office at Longview, Tex. The plans call for building a line from the northern terminus of the Port Bolivar Iron Ore line of the Gulf, Colorado & Santa Fe north through Marion and Cass counties, thence northwest through Morris and Red River counties, Texas, to a point on Red river southeast of Hugo, Okla., about 85 miles. G. A. Bodenheim, T. C. Morgan, R. M. Kelly, L. L. Featherstone, all of Longview, J. Bradfield and R. N. Taylor, Daingerfield, and W. D. Myers, Houston, are interested.

Richmond & Eastern.—Incorporated in Virginia to build from Richmond, Va., east to Ft. Lee, about five miles. J. C. Robertson, K. T. Crawley and C. B. Anderson, Richmond, are incorporators.

Roby & Northern.—Incorporated in Texas with $10,000 capital to build from Roby, in Fisher county, Texas, north to North Roby, about five miles. The headquarters of the company are at Roby. C. L. White, president; L. C. Eastland, vice-president, both of Hillsboro, and J. C. McWhirter, secretary, Roby, Texas.

Salt Lake & Utah.—This company has awarded a contract to

W. M. Smith, Salt Lake City, for the grading on an extension from Provo, Utah, to Springville, 6.5 miles; this work was started on May 1. The track laying will be done by company forces. There will be one 45-ft. trestle.

Toronto Suburban (Electric)—Grading work on the line building from Toronto, Ont., west to Guelph, 42 miles, is now under way on the section from the Humber river to Islington. The western section of the roadbed was constructed last year and rails and ties are now being laid. A new bridge is being built over the Humber river. (December 11, p. 1107.)

Westchester Northern.—See New York, Westchester & Boston.

RAILWAY STRUCTURES

Birmingham, Ala.—An ordinance is being prepared providing for the construction of a new bridge at Twenty-first street, to replace the present structure. The railroads will be required to build the new structure.

Cincinnati, O.—The Cincinnati, New Orleans & Texas Pacific intends to rebuild its bridge across the Ohio river at Cincinnati. Plans are not sufficiently advanced at present to give definite information.

Hempstead, Tex.—The Sunset-Central lines will build a new bridge over the Brazos river to replace one washed out by floods.

Lowell, Mass.—The city of Lowell will build a bridge to have two spans each 150 ft. long over the Merrimac river at Pawtucket Falls, Lowell. The new structure is to cost $80,000, and it will carry tracks for the operation of cars of the Bay State Street Railway Company.

Monett, Mo.—The St. Louis & San Francisco will build a new depot to replace one destroyed by fire.

Morgantown, W. Va.—The Buckhannon & Northern has given a contract to the Crossan Construction Company, Brownsville, Pa., for the excavation of about 15,000 cu. yd. This is part of the work on a new terminal at Morgantown for the Buckhannon & Northern. No contracts for the buildings or tracks have yet been let.

Nashville, Tenn.—Plans are being made by the Freeland-Klyce Engineering Company, Nashville, for a bridge to be built by Davidson county over the Cumberland river at Hydes Ferry. It is expected that the bridge will be designed to carry double track for the operation of electric cars.

Raleigh, N. C.—The Norfolk Southern is putting up a small shed at the Raleigh yards for the protection of workmen in placing steel underframes on cars. The building will be 40 ft. by 60 ft. The company has also provided additional tracks for handling about 75 cars at one time. The cost of the work will be about $5,000.

St. Paul, Minn.—The Chicago & North Western is asking for bids on channel changes, levee walls, sewer extensions and riprapping in connection with the new union station at St. Paul.

Saratoga Springs, N. Y.—Work is now under way putting up a new passenger station, to be of steel, iron and brick construction, for the Hudson Valley Railway Company, at Broadway and Congress street, Saratoga Springs. The station proper will be 72 ft. long and 20 ft. wide; it is expected that the improvements will cost about $40,000.

South Richmond, Va.—In connection with new terminal facilities for the Southern Railway at South Richmond, a contract has been awarded to Alsop & Pierce, Newport News, Va., for the construction of a new oil house to cost $6,975.

Tillsonburg, Ont.—The Grand Trunk is building with its own forces a small station at Tillsonburg.

Men of English Railways with the Colors.—Up to February 26 a total of 12,233 men, or 14.1 per cent, of the staff of the London & North-Western Railway had joined the colors, and up to March 15, 1,058 had met with casualties, of whom 126 had been killed or drowned in action and 45 had died of their wounds. There were 67 missing and 137 were prisoners of war.

Railway Financial News

Baltimore & Ohio.—The Maryland Public Service Commission has approved the issue by the Baltimore & Ohio of $40,000,000 4½ per cent short term notes, of the proceeds of which $35,000,000 will be used to retire notes maturing June 1, and the remainder for expenditures on property account.

Delaware & Hudson.—A statement was made at the annual meeting which took place this week that about $26,000,000 had been put into the property [apparently it was not specified whether it was the railroad property or coal properties] which had never been capitalized, and which did not appear on the balance sheet.

Delaware, Lackawanna & Western.—A committee representing stockholders of the Morris & Essex, which is leased to the Delaware, Lackawanna & Western, has been formed, consisting of P. L. Hoadley, president of the American Insurance Company, Newark, N. J.; Edward Milligan, president of the Phoenix Insurance Company, Hartford, Conn.; George C. Van Tuyl, Jr., president of the Metropolitan Trust Company, New York, and W. N. Williams, vice-president of the Aetna Insurance Company, Hartford, Conn. This committee asks for the deposit of stock and the granting of proxies to be filed with the Metropolitan Trust Company, New York, and in the request for proxies says that it is of the opinion that the additional dividend of 1 per cent annually provided for in the lease should not only have been paid by the Lackawanna to the stockholders of the Morris & Essex for some years past, but should also be properly payable in the future. Legal proceedings have been begun by the committee to enforce this view.

Michigan Central.—H. E. Anderson has been elected a director, succeeding to the vacancy caused by the resignation some time ago of James Stillman.

Morris & Essex.—See Delaware, Lackawanna & Western.

Nashville, Chattanooga & St. Louis.—A. G. Candler has been elected a director to fill a vacancy.

Traffic Through the Panama and Suez Canals.—The following comparative table gives the number of vessels using the Panama and Suez canals for the months of August, September, October, November and December:

	Panama		Suez	
	No.	Net tonnage	No.	Gross tonnage
August	24	106,288	250	1,402,864
September	57	322,038	323	1,721,195
October	84	420,357	479	2,635,446
November	92	448,801	370	2,635,446
December	99	439,915	397	2,451,424

The Belgian Railways.—The Belgian lines have now been completely taken over by the German war office, and only Germans are employed, even the old porters not being allowed at the stations. To obtain a ticket it is necessary to have a special pass from the military police headquarters and before obtaining this permit the applicant has to state not only where he is going, but for what reason and for how long. All these facts are duly noted down on the pass. Only German coinage is accepted in payment for a ticket, Belgian money being refused. Civilian passengers are only permitted to travel in third-class cars, for which, however, they pay first-class fares. Second-class cars and the so-called first-class cars (some of these are only known as "reserved," the first-class proper having vanished in Belgium a few years ago save on international trains) are labelled to show that they are exclusively reserved for military passengers. Before the traveler reaches the station he is searched by soldiers and the train itself is reached by walking a quarter of a mile or so from the station. The carriages are neither lighted nor heated, and passengers are forbidden to look out of windows when crossing bridges for fear they be shot by sentries. To add to the pleasures of travel, a 10-mile journey may necessitate two or three changes, with a wait of several hours on each occasion.

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*Illustrated.

Freight Car Maintenance

"The freight equipment is in the worst condition it has been for years," according to a statement made by F. C. Schultz, chief joint interchange inspector at Chicago, the largest interchange terminal in the world. As 10,000,000 cars per year are handled at this point the condition there is indicative of the conditions over the entire country. It is a well known fact that the railway shop forces have been greatly reduced during the past year on account of the general depression in business, and this undoubtedly is the reason why the equipment is in such poor condition. However, there is a limit to which this retrenchment can be carried before it becomes a source of excessive future expense. Every road that has found it necessary to make such retrenchments should carefully watch for this limit with the idea in mind that every dollar saved for dividends this year may mean a sacrifice of two dollars next year. The shop forces should now be augmented in order that the summer and fall business may be properly handled. Lack of equipment means loss of revenue and the lack of equipment in proper condition means a loss of revenue and an increase in loss and damage claims.

Decrease in Railway Legislation

Although the legislatures in the states that have two-cent fare laws have shown no disposition to come to the aid of the railways by restoring a part of the reduction in rates made by the passage of such laws, it is evident that there has been a marked tendency on the part of legislators this year to recognize that restrictive and oppressive legislation has gone about far enough. The Special Committee on Relations of Railway Operation to Legislation has just issued a report calling attention to the fact that the amendment to the boiler inspection act was the only law relating to operation passed during the Congress which adjourned on March 4. It also notes that of 1005 bills relating to railway operation introduced in 43 state legislatures up to May 1, only 94 have been enacted into laws, most of which deal with relatively unimportant features of operation. Of the 43 legislatures that have been in session 31 have already adjourned and the others are expected to conclude their sessions shortly. In 1914, with 14 legislatures in session, 236 bills relating to railway operation were introduced and 27 were passed, but for purposes of comparison it is necessary to go back to 1913, when the legislatures of 42 states were in session. In that year, 1,395 bills of the character under discussion were introduced and 230 were passed. There is probably a greater contrast between the characters of the laws passed than between their numbers. In 1913, for example, there were 14 extra crew laws enacted. In 1915 51 bills were introduced relating to the number of men to be employed in train or switching crews, none of which has been passed, and most of the bills which would have added greatly to the expenses of the railways, including the train limit bills, have thus far failed of enactment.

Costly Government Construction in Canada

The results of government construction of the National Transcontinental Railway in Canada will not be hailed by advocates of government ownership of railways as an argument for the adoption of that policy in this country. The line was originally built with the expectation that it would be leased to and operated by the Grand Trunk Pacific. But because of the enormous amount of expense which the government incurred in building it the Grand Trunk Pacific has decided that it cannot afford to lease it and has refused to take it over for operation. It has become necessary, therefore, for the government itself to assume the burden of operating it; and this it began to do on May 1. Since the Grand Trunk Pacific decided it could not operate the line profitably, it is not reasonable to expect that the government will be able to do so, in view of the heavy losses it has regularly suffered from its operation of the Intercolonial. The story of the National

Transcontinental is instructive. Parts of it have been told from time to time in these columns; but it will bear bringing up to date. The construction of the line was turned over to a government commission in 1904. It was to be 1,804 miles long, and the official estimate of its cost made by the minister of finance was $61,415,000. The road was to be leased to the Grand Trunk Pacific, which, after 1922, was to pay for its use a rental of three per cent of its cost. Up to September 30, 1911, however, the line had cost $109,000,000 and the latest estimate of its total cost was $173,000,000, or nearly three times the original estimate. The Grand Trunk Pacific would have been willing to have leased it if it had cost approximately the amount originally estimated; but it was not willing to pay a rental three times as great as it originally expected to. Much is said by advocates of government ownership about the advantages to be derived from the use of the government's credit in raising capital for railway development. But if, as has proved to be the case in Canada, a government will spend three times as much per mile to build a railway as would be spent by a private company, its ability to borrow money at a low rate will fall far short of offsetting the disadvantage resulting from its incompetence and wastefulness in expending the money raised.

TRAIN ACCIDENTS IN APRIL

FOR the month of April our list of train accidents has but two items. Except for these we have seen no report of any collision or derailment in the United States, which was of enough importance to bring it within the "prominent" class from which we make up our record. April is a month in which a light record is always to be expected, but this is the first time in 43 years, or since these records have been kept, that this paper has not printed a monthly train-accident record including at least a half dozen items of considerable importance.

This, of course, does not mean that there were not many accidents last month. The government records, to be compiled a month hence, undoubtedly will show, judging by past years, a list of collisions and derailments involving a loss of somewhere around a half million dollars and a total of many scores of employees injured, with the usual proportion of fatal injuries. But April is the month in which the notable accidents are always at their lowest ebb. The April records of the last 20 years contain only three train accidents of what may be called the first magnitude; Martins Creek, N. J., 1911, twelve persons killed; Bartlett, N. D., 1907, five killed, and Buffalo, Kan., 1903, eleven killed. In the last named case, a rear collision, all of the victims were employees.

In April, 1914, six persons were killed in an electric car, and this year there was an electric-car disaster in Detroit, but these are not included in the train-accident record.

Prior to the establishment of the government accident records, in 1901, the *Railroad Gazette* kept a more complete record, putting into it not only the "prominent" cases, but all train accidents, of which information could be gathered, where any person was killed, or where many were injured, or where the money loss was very large. April had the same peculiarity then. For the first six of the last 20 years (years 1896-1901) the reports of passengers killed in April stood as follows:

Passengers Killed in Train Accidents

	April	Average per month for the whole year		April	Average per month for the whole year
1896	6	10.7	1899	2	9.4
1897	2	5.0	1900	3	9.4
1898	0	4.0	1901	0	..

The only explanation of April's peculiarity that is discernible is to be found in the combination of favorable weather, moderate volume of traffic, and a minimum of inexperienced trainmen. A lessening of the volume of traffic and the number of trains run both reduces the chance of accident and causes an improvement in the quality of the service by forcing the dismissal of some of the men, the newest and presumably least efficient men being, of course, the first to go.

An examination of the April records for the past few years serves to make prominent another fact; the fact that the number of collisions is falling off a good deal faster than the number of derailments. This appears also in the Interstate Commerce Commission bulletins. In the early days of the government accident records the quarterly statements of collisions and of derailments, when measured by the money loss, were generally somewhere near equal, but now they are usually very unequal.

In a matter involving so many uncertain factors, precise comparisons are hardly worth while; but the reasons for this change are quite clear in at least two respects, namely, the extension of the use of the block system (and of air-brakes) in preventing collisions, and the increase in the size and weight of freight cars and engines, and in speeds of freight trains, in enhancing the cost of derailments. The difference between the latest records and those of ten years ago may be seen in the double-column table. The most instructive comparisons are those between the items of cost—columns 4, 7 and 10. "Cost" does not include payments for freight damaged or for personal injuries, and therefore gives no adequate idea of the total losses due to train accidents; but for purposes of comparison, one year with another, these partial figures are even better than the totals would be, for, no doubt, the fluctuations are not so great. Train mileage cannot be compared, satisfactorily, as the figures for 1914 have not yet been published. The showing for improved safety of life and limb is even better than the figures indicate, for in the earlier years the number of casualties does not include trespassers, whereas in the later years it does. And the increase in the volume of traffic is greater than appears, as shown by the footnote. Column B, which is included in column A, is shown separately because, with slight exceptions, it is only the collisions in column B which are susceptible of prevention by the block system. This column, therefore, throws most light on the decrease in collisions as a result of the increase of the use of the block system.

In spite of the uncertainty due to the numerous indeterminate factors, the facts given in this ten-year comparison afford ground for marked satisfaction. For example, take 1904 and 1914. Though the cost item under the head of derailments in-

Collisions and Derailments in the United States; Data Concerning Cost, 1902-1905 and 1910-1914

Twelve months ending June 30	Freight ton mileage (Millions)	A All collisions			B Rear and butting collisions			C Derailments		
		Number	Cost	No. killed	Number	Cost	No. killed	Number	Cost	No. killed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1914	288,320*	5,241	$3,775,279	287	1,299	$1,805,906	180	8,565	$7,189,902	318
1913	301,399*	6,477	4,768,772	457	1,825	2,646,479	340	9,049	8,280,442	334
1912	264,081	5,483	4,330,206	378	1,846	2,607,017	274	8,215	7,197,252	394
1911	253,784	5,605	4,302,056	436	1,708	2,491,712	296	6,260	5,549,724	349
1910	255,017	5,861	4,629,279	433	2,006	2,913,144	313	5,918	5,194,679	340
1905	186,463	6,224	4,849,054	608	2,200	2,914,918	456	5,371	4,862,602	456
1904	174,522	6,436	5,190,918	630	2,664	3,379,445	475	4,855	4,192,159	388
1903	173,221	6,167	5,615,746	...	.....	.....	...	4,476	3,981,231	...
1902	157,289	5,042	4,285,683	...	.....	.....	...	3,633	3,359,723	...

*Small roads (Class 3) not included.

creased over 70 per cent, with an increase of traffic of 65 per cent, the number of persons killed decreased 18 per cent. The cause of the increase in cost of derailments has already been suggested. While from 1904 to 1914 the derailment costs were thus increased, collisions costs fell off 27 per cent, and the killed in collisions from 630 to 287, or no less than 54 per cent.

That the decrease in the number and seriousness of train accidents has been more rapid during the past twelve months than in earlier years, is a matter of common knowledge, a principal cause being the falling off in the volume of traffic. The smallness of the totals, with the small proportion of collisions, as compared with derailments, may be seen in the following table:

Number of Prominent Train Accidents Reported

	Collisions	Derailments		Collisions	Derailments
1915 March	2	9	1914 August	4	6
1915 February	5	9	1914 July	2	6
1915 January	2	14	1914 June	3	11
1914 December	3	8	1914 May	2	11
1914 November	5	8	1914 April	1	8
1914 October	3	8			
1914 September	0	7	Total, 12 months...	32	105

These, it is to be remembered, are only the prominent accidents, published in the newspapers. From a statistical standpoint the items may be only straws; but straws show which way the wind blows.

THE COMMISSION ON RELATIONS BETWEEN RAILWAYS AND WATERWAYS

THE Interstate Commerce Commission, in an opinion by Commissioner McChord, has given the most rigorous possible interpretation and application of the part of the Panama Canal act relating to the ownership of boat lines by railways. The law provides that it shall be unlawful for any railway to control or have any interest in any common carrier by water operating through the canal or elsewhere, with which the controlling railway does or may compete. This provision is qualified by another to the effect that if the Interstate Commerce Commission believes that any existing service by water other than through the canal is being operated in the interests of the public, and that an extension of the time during which it is under the control of a railway will not "exclude, prevent, or reduce competition on the route by water," the commission may extend indefinitely the period during which such service by water may continue to be operated. In the administration of these provisions, the commission has ordered all the eastern railways to dispose of their interests in boat lines on the Great Lakes.

Some of these railways, such as the Pennsylvania, the Erie, and the New York Central, own railway lines to Chicago paralleling the lakes on which the water carriers in which they are interested operate. The rails of others, such as the Lehigh Valley and the Delaware, Lackawanna & Western, terminate at Buffalo and therefore connect with, but do not parallel, the lakes and the routes of the lake carriers. Doubtless in requiring the former class of railways to give up their boat lines the commission is but giving effect to the spirit and intent of the law. But the commission holds that the railways which end at Buffalo as well as those whose rails extend to Chicago, must give up their interests in the water lines.

The terms of the law make it plain that Congress never intended that any railway should be required to dispose of its holdings in any water carrier with which it did not and could not compete. The language used makes it especially clear that Congress never intended this with respect to railways having interests in boat lines on the Great Lakes and other inland waterways. How, then, does the commission reach the conclusion that railways which end where the service on the Great Lakes begins may and should be required to dispose of their holdings in lake lines? These railways have through rates and through routing arrangements in connection with railway lines operating between Buffalo and Chicago. The commission finds that by means of these through traffic arrangements with connecting railways, the Lehigh Valley and the Lackawanna are competing with their own boat lines, and it is on this theory that it bases its conclusion that their ownership of interests in boat lines is contrary to the law and to the public welfare.

In spite of the commission's labored and metaphysical reasoning, it is hard for persons not gifted with its powers of ratiocination to see how a railway which begins at New York and ends at Buffalo can compete with a boat line which begins at Buffalo and ends at Chicago. Common sense suggests that the competing with the boat line between Buffalo and Chicago must be done by some other railway, and common sense sometimes, although not always, has weight with the courts. The courts may also consider the fact that under the act to regulate commerce, the railways from New York to Buffalo may be required to make reasonable through rates and routes in connection with railways from Buffalo to Chicago, and that the commission is the body which is empowered to enforce this regulation.

If all the eastern railways except those terminating at the eastern end of the lakes were required to dispose of their boat lines, there would be an increase of competition between the water carriers themselves and between them and the railways. A large majority of the lake lines would then be owned by industrial corporations and independent companies. The fact that some boat lines were owned by eastern railways terminating at Buffalo would not, it would seem, affect the competitive situation materially, if at all. If, at the most, it would affect it only to a slight extent, and nevertheless it can be held that the ownership of some boat lines by railways terminating at Buffalo, is against the public welfare, this can be only on the ground that the public welfare requires absolutely unrestricted competition of the water lines against the railways. As a matter of fact, this seems to be the very position the commission takes. It descants on the beauties of water transportation and the desirability of competition of waterways with railways in the rhetoric of an orator at a river and harbor congress. It says:

> On a water course, where the boats and boat lines are free from domination or control by the railroads, and *where they are left to survive as their merit and the ingenuity of their owners makes possible*, there will be, and always is, a healthy rivalry and striving between such boat lines themselves and with paralleling railroads for all suitable and available traffic. There is competition. This rivalry manifests itself in several ways... *The rates charged fluctuate according to economic principles*, and the shipper enjoys invariably, as a result, lower charges for the transportation routed over such waterways and thereby reaps a return from the "nation's highway."

These statements—the italics in which are ours—cannot be supported by evidence. Seldom or never are boat lines on inland waterways "left to survive as their merit and the ingenuity of their owners makes possible." They are usually subsidized by government appropriations for the development of the waterways they use. As to the statement regarding, "healthy rivalry and striving between such boat lines themselves, and with paralleling railroads," there almost always are agreements between rival boat lines to limit competition between themselves, and the restrictions which the Interstate Commerce act imposes on the railways prevents "healthy rivalry and striving" between water carriers and paralleling railways. Even with all the governmental aid and protection given water carriers it is not a fact that they are usually able to compete effectively with railways. The Mississippi is a deep waterway between Memphis and New Orleans. The carriers on that river are not dominated by railways; yet hardly a ton of freight moves by water between the terminals at Memphis and New Orleans. Less extreme examples could be cited all over the United States. The evidence all shows that the inland water carriers of the United States, excepting perhaps on the Great Lakes, cannot be made able to compete with the paralleling railroads even by government expenditures which cover a large part of the cost of handling the water traffic; and it is very questionable if independent water carriers on the lakes can hold as much of the traffic as has been held by the boat lines which have been controlled by the railways.

As to the statement that "the rates charged (by the water carriers) fluctuate according to economic principles," it would

be interesting to know whether the commission means by this to indorse the way in which rates by water commonly are made. The "economic principle" on which they usually are based is that of "charging what the traffic will bear." Sometimes they are high and sometimes they are low. They may be low for one shipper and high for another shipper of the same commodity, moving on the same boat. The one shipper may get a rebate and the other may not. If the "economic principles" observed in making rates by water are right, why should not the railways be allowed to make rates according to the same principles? Why should the railroads be prohibited from discriminating unfairly between different shippers, required to give notice of changes in their rates, and have advances in their rates made subject to suspension by the commission? If on economic principles the water lines should be encouraged to compete with the railways by making rates in this manner, why should severe restrictions be imposed on the way in which railways may make rates to meet water competition?

It is somewhat surprising to find the commission assuming in the opinion in this case, the same attitude of a mother to water transportation and a stepmother to rail transportation which is assumed by Congress and a large part of the public—and that not the most intelligent or least prejudiced and disinterested part of the public. Perhaps in doing this the commission is merely reflecting and carrying out what it understands to be the will of Congress and the public. But have we not a right to expect an expert body charged with the duty of regulating both rail and water transportation to reason and act on better information and sounder principles than the legislative body and the public which have delegated certain functions to it on the assumption that the exercise of those functions requires expert knowledge and judgment?

NEW BOOKS

Railroad Speed Tables and Time Cord Constructor. By Otto Holstein, P. O. Box 1216, San Antonio, Tex. A thin pocket book, 3¾ in. by 8¼ in. Bound in pasteboard. Published by the author. Price $1.

This is a hand book for use in correcting time tables. It is much like Fleming's, which was issued in 1885 and Beaver's, which was issued in 1913 and was noticed in these columns January 30, 1914. The tables give even miles from 1 to 100, and rates of speed from one mile to 60 miles an hour. A separate chapter gives the rate of speed in miles per hour of a train running one mile in any period of time (stated in even seconds) from 30 seconds to 10 minutes 59 seconds.

Who Built the Panama Canal? By W. Leon Pepperman, chief of office of administration of the Second Isthmian Commission. Size 5½ in. by 8 in., 419 pages, 27 illustrations. Bound in cloth. Published by E. P. Dutton & Co., 681 Fifth avenue, New York City. Price $2.

Any book on the Panama Canal is of particular interest at the present time. Four separate administrations have shared in the construction of this canal; the French, the Army and Navy, the Railway and the Goethals. Each had its particular function and contributed to the ultimate success of the undertaking. This book pays particular attention to the third or railway regime. In the earlier chapters it outlines the conditions existing when the railway men took charge in 1905 and the difficulties confronting the new administration. The major portion of the book is devoted to the accomplishments of the two succeeding years under the administration of T. P. Shonts, chairman, and John F. Stevens, chief engineer of the Isthmian Commission.

At the time of his appointment Mr. Shonts was president of the Toledo, St. Louis & Western Railroad, and Mr. Stevens had just resigned the vice-presidency of the Rock Island. W. G. Bierd, now president of the Chicago & Alton, resigned as assistant general manager of the Rock Island to become general superintendent of the Panama Railroad. J. G. Sullivan, now chief engineer of the Canadian Pacific, was first assistant to Mr. Stevens. David W. Ross resigned as superintendent of transportation of the Illinois Central to assume charge of the purchasing department of the canal. E. J. Williams, now treasurer of the McCord Company, resigned as paymaster of the Chicago & North Western to become disbursing officer on the isthmus. E. S. Benson, general auditor of the Oregon Railway & Navigation Company, and Walter G. Tubby, general storekeeper of the Great Northern, resigned to accept similar positions at Panama.

At the time the railway men took hold the problems of sanitation and organization were of at least equal importance with those of engineering, and the solution of the two former had to precede the latter. Mr. Pepperman describes the methods adopted to secure these desired results, paying particular attention to the problem of organization. By eliminating the customary governmental red tape and introducing railway methods, Mr. Pepperman relates how Mr. Williams saved the United States approximately $750,000. On another page he describes how Mr. Bierd saved $8,000,000 by improvements in the methods of handling excavation, etc. Considerable space is given to a discussion of the incidents concerning the resignation of John F. Wallace as chief engineer, as well as to the solution of the labor problem, the choosing of the lock type of canal and the function of the Panama Railroad. The book concludes with a description of Panama as it existed at the close of the railway regime in 1907, a short history of the Panama revolution and a discussion of the value of the canal itself.

There has been a great deal written and published within recent months regarding the building of the canal. The conclusion which would naturally be drawn from most of this literature is that practically the entire credit for its successful construction should be given to Colonel Goethals and his administration. In fact, this conclusion has been drawn and used as a basis for many arguments in favor of government ownership and management of railways and other similar governmental activities. However, Colonel Goethals himself has publicly acknowledged the debt which the nation owes to Mr. Shonts, and the other railway men with whom the latter surrounded himself when he was in charge of the work. The organization which the railway regime built up and the methods which it introduced, Colonel Goethals apparently concedes, were necessary for the subsequent prosecution of the undertaking. For example, it was during the railway regime that yellow fever was driven from Panama, and without this accomplished no organization could have carried the project to completion.

There can be no question about the vitally important part which the railway regime played in creating the conditions, developing the organization and adopting the methods necessary to the success of the task, and Mr. Pepperman has rendered a distinct public service in both telling the reasons why the army and navy regime, which preceded the railway regime, had made so little progress, and why the railway regime was able to make so much progress in so short a time. The army and navy regime tried to use the customary government methods, and it was not until the railway men came in and brushed those methods aside and substituted railway methods, that the dirt really began to fly.

But while Mr. Pepperman has rendered a public service in setting forth the importance of what the railway men did, many well informed persons are likely to think that he minimizes too much the importance of what was done by John F. Wallace when he was chief engineer, and by Colonel Goethals and his staff. There still remained after Mr. Shonts and his associates had left, a big task requiring administrative ability of a high order, and while the work which the railway men did was necessary in order to prepare the way for later achievements, still, those who are disposed to give due credit to all concerned will not withhold from Colonel Goethals the glory of having performed his part in a way commanding respect and admiration.

The point is that there is glory enough for all, and that that belonging to the railway men need not be minimized in order to give to Colonel Goethals all that belongs to him, or vice versa.

Mr. Pepperman's book is well illustrated with pen and ink drawings by J. Pennell.

Railway Storekeepers' Association Convention

Reports on Scrap and Scrap Classification, Recommended Practices, Reclamation Work, Accounting, Piece Work

The twelfth annual convention of the Railway Storekeepers' Association was held at the Hotel Sherman, Chicago, May 17-20. The association was welcomed to the city by Mayor Wm. H. Thompson and an address was made by E. D. Sewall, vice-president, Chicago, Milwaukee & St. Paul. Mr. Sewall referred to some remarks he had heard which included the statement, "I have no sympathy with the railroads in their present predicament; they brought it on themselves and should get out the best way they can." In his opinion the railways have never received the consideration to which they are entitled. He touched on the attitude of politicians and sensational publications regarding capitalization and defended the practices commonly employed in obtaining capital. Ninety per cent of the present complaints are based on conditions of many years ago.

G. G. Allen, general storekeeper of the Chicago, Milwaukee & St. Paul and president of the association, said in his address that the association had prospered during the past year, 105 new members having been added, 20 of whom were from roads not previously represented. Referring to storekeeping practices, he emphasized the value of well-equipped storehouses in promoting economy, and advocated the employment of supply cars on roads whose location and physical condition lent themselves to such a practice.

The secretary-treasurer reported a total membership of 823, and $546 cash on hand.

SCRAP AND SCRAP CLASSIFICATION

The real meaning of the word scrap is not fully understood by the average railroad employee. To most people scrap implies something useless, without value and to be disposed of only by being cast away. The fact that an article has been cast off does not imply in any way that it is without value for some other purpose. The economical handling of scrap in all of its phases is one of the most important items in railroad operation.

The cost of handling scrap should be considered carefully, as duplicate handling is very expensive. There are some kinds of scrap having such small market value that, if handled through one or two operations at scrap yards or on line of road, the actual cost of handling is greater than the amount realized from the sale of the scrap. On the other hand, with certain kinds of scrap one handling or operation, such as sorting out pieces of certain size or length, or cutting a few bolts and rivets, will result in a saving of several dollars per ton when the scrap is placed on the market.

Scrap should be picked up by section gangs daily and assembled at points designated, such as tool houses, etc. After it is assembled at these points it should be loaded at intervals suitable to conditions.

In loading scrap, rails and frogs should be loaded separately from track scrap, if possible. Mechanical scrap picked up off the right of way and in yards should be loaded separately; serviceable roadway material should be separated and transferred from time to time, instead of ordering new material.

Mechanical scrap should be forwarded to the nearest mechanical shops or supply yard for reclaiming. After reclaimed material has been removed, the car should be loaded to capacity with other scrap and forwarded to the place designated as a general scrap or supply yard, for making ready for the market.

In the handling of scrap, important features to consider are the equipment and back haul. The selection of equipment should be made from cars used for rough freight handling; consideration should also be given to the loading of scrap in open or closed cars to suit conditions at the general supply or scrap yard.

Another feature that should be followed up very closely is the loading of equipment to full tonnage. Oftentimes scrap is forwarded long distances with light load, whereas it could be started out with a light load and all scrap picked up until reaching general headquarters, by which time, if properly handled, the car would have its full tonnage.

Special care should be given to the switching of cars in and around scrap yards with a view of curtailing unnecessary switching. It is necessary that cars loaded ready for weighing be pulled out at certain intervals in order to save switching and as many cars as possible should be handled at this particular time, with the understanding, of course, that other cars will be set immediately for reloading. Scrap should not be loaded in foreign cars unless this is absolutely necessary, and in case it is loaded in foreign cars, the scrap yard foreman should give these preference in order to release the cars promptly.

[The committee suggested the special preparation of certain specified items of scrap not covered in the scrap specification, in order to obtain a better price, the understanding being that this will not change the present scrap classification.]

The report is signed by W. Davidson (chairman), Ill. Cent.; W. A. Linn, C. M. & St. P.; A. L. Tucker, C. & N. W.; H. E. Rouse, C. G. W.; J. F. Rothschild, C. B. & Q.; F. A. Bushnell, G. N., and H. Scatchard, N. & W.

Discussion.—Several members did not approve the addition of a classification for miscellaneous mixed scrap; others believed it necessary in order to provide for small roads without means of classifying and preparing scrap. Reference to the separation of high speed steel scrap brought out the fact that most roads do not have any to sell, a great many welding the small pieces on soft steel and thus using them up. Several members were of the opinion that scrap should be sold direct to the consumer and that the scrap dealer be eliminated. It was decided not to adopt the mixed and miscellanous scrap classification.

RECLAMATION OF MATERIAL

The committee finds that a great deal has been accomplished in the reclaiming of material and also that there is much more to do than has been done. The work needs much systematizing, intelligent supervision, more efficient methods and machinery, and more education of the users of material as well as the reclaimers. There is a vast amount of money tied up in material in store stock under the supervision of the storekeepers, as well as money spent for purchases, which we are responsible for. How much can we reduce purchases and the amount of money tied up in stock material by more efficient reclamation, is the problem which we, as storekeepers, must solve.

The committee believes both purchases and stocks can be reduced materially by reclamation work. The reclamation of material should be under the supervision of the store department for the following reasons:

(1) The store department supervisors are already trained for the work.

(2) The assembling of reclaimed material, its classification, disbursement and accounting is directly in line with good storekeeping.

(3) Centralization of all discarded, second hand, obsolete and scrap material at designated scrap yards under the store department has been found by actual experience to be the best method. The handling of reclaimed material is store department work, as it already has the organization to re-

claim that which is fit to use for the purpose originally intended and can easily supervise the work necessary to make reclaimed material into any shape desired. The store department knows what material cannot be reclaimed for any use and will quickly turn this into money to the best advantage.

(4) The store department has adequate records, showing amount of material used and knows how much of each kind of material to reclaim and will prevent big losses by reclaiming more material than is needed. The store department will also prevent working over material that is not needed.

(5) The store department is in constant touch with the markets and knows at all times the different costs of all articles.

(6) The store department is not only interested in the use of material, but is interested in its abuse. Reclaiming material often shows where there has been abuse, and the store department is in the best position to stop abuse, as it is vitally interested, being measured by the purchases which the abuse increases.

(7) The store department labor force and handy men can do the work cheaper than any other department, as it is necessary for the other departments to do reclamation work in connection with their regular work, which requires high paid mechanics and skilled labor.

There can be no set rules or regulations to cover reclamation work, as the conditions vary so much that each individual case will have to be decided upon its merits. The committee finds, after careful investigation, that the railroads should build and equip efficient reclamation plants (these to be worked up gradually as the needs demand) to handle a large part of the reclamation work, if the best results are to be obtained.

The geographical location of the road, location of shops, scrap market, traffic tide, etc., should govern the location of a reclamation plant and scrap dock. It should be such as to save back haul of scrap, and at the same time give a minimum haul for reclaimed material and be a good distributing point. Of course, the present location of the scrap dock, size of shops using reclaimed material, land, tracks and buildings obtainable for reclamation work will have to be large governing factors in the location, as well as the size of the appropriation obtainable for this work.

Care must be exercised to see that the plant is so located that there will be room for future growth.

The size of the plant, of course, will govern the organization. The committee recommends that the reclamation plant and scrap dock be under one general foreman, whose rate of pay should be from $100 to $150 per month, to whom should report the foreman of rolling mills; foreman of scrap dock (rate of pay $70 to $90 per month); leaders (about one for every six laborers), 17 cents to 35 cents per hour; clerks; piece work inspectors; handy men for operating machines and doing special work (15 cents to 30 cents per hour), and laborers (at labor rates).

The leaders or gang foremen should be carefully selected and trained in their duties. By having leaders it only makes it necessary for the foreman to educate them and hold them responsible for work under their supervision, and then they in turn can educate the men.

The number of clerks and the rate of pay will depend on the size of the plant and work necessary to be done.

Handy men or operators should be used in reclamation plant instead of mechanics and journeymen. Much of the work of the reclamation plant is a growth of that formerly done on the scrap dock. Practically all of the work requires but one operation.

All work in the reclamation plant and on the scrap dock should be done piece work and all day work eliminated.

The size of the plant will depend on the size of the road, the number of plants on that road and the location and space available. The plant should be large enough to prevent congestion and so it can be arranged to handle material at the minimum cost. It is a mistake to build a plant, or any part of one, without a complete, comprehensive plan. Many of our reclamation plants are poorly laid out.

The machinery, tools, etc., will have to be selected to meet individual needs as well as the appropriation available. Second hand machinery and tools can often be used to good advantage, but in most cases discarded machinery and tools have outlived their usefulness and are expensive at any price.

[A list of machinery, tools, etc., for a fully equipped reclamation plant was here included in the report. The costs given were for a guide only.]

The cost of reclaiming is the governing factor as to whether material should be reclaimed or not. In arriving at this cost all the factors should be taken into consideration; cost of handling, cost of actual work of reclaiming, interest, depreciation, etc., on the facilities which it is necessary to install to reclaim material and life of the material after it is reclaimed as compared with new articles. In many cases in reclaiming material we deceive ourselves by not taking all of the factors into consideration. What is possible to reclaim at a profit on one road is not on another, but there are a large number of items that it pays to reclaim on all railroads. In starting reclamation work, such articles should be reclaimed as valves, bolts, brakebeams, couplers, bolsters (welded with oxyacetylene), bar-iron, etc., and then work into the other items as fast as facilities can be installed to reclaim them at a profit.

Material should be classified in accordance with the Railway Storekeepers' Association classification of material, and should be carried in these classifications as recommended in the Book of Rules and distributed and handled similar to store stock. Material should be shipped direct from the reclamation plant wherever practicable; local conditions and shipping facilities, of course, will govern.

The cost of the plant will depend entirely on its size and the amount of work necessary to fit it for the work required. Wherever buildings are obtainable that are suitable for the work they should be used. However, railroads often lose sight of the savings that might be effected by having a plant built and arranged so that the cost of the work will be reduced to the lowest possible limit. The difference in cost of operation of a plant properly laid out and constructed and equipped with labor-saving devices, and one poorly laid out with inefficient equipment, will often pay for the improved plant in less than a year.

One of the strongest arguments against a reclamation plant is that there should be no need for one. It is claimed by many that material should not be allowed to get where it is necessary to reclaim it, and that by proper supervision and use of material there is no reason for a reclamation plant. However, the experience of railroads shows conclusively there is a need for one.

Prevention requires the education of the users of the material by the men in charge, and by the store department. The storekeeper must watch issues of material and call attention to all cases where the old material should have been repaired and used, return old material for new and have old material repaired locally where it pays to do so, and where it does not, send it to the reclamation plant.

Educate the users as to the value in dollars and cents of the material they are using. One of the principal causes of misuse and waste of material is ignorance of its value in dollars and cents. While there are many people in large corporations who do not care for the waste they cause, the larger percentage by far of the employees cause waste through habit and ignorance of values. Object lessons well presented are one of the best ways to educate the users of material. A good method to prevent its being necessary to reclaim material is to make it hard occasionally to obtain, thus forcing the user to help himself.

The change in patterns and designs on account of increases in size and other causes is a big factor in the waste of material, and great care should be exercised before any change.

It is necessary to reclaim a large amount of material and work it over into something else on account of not having had proper care to preserve it. A little paint on steel and finished surfaces is often the cheapest reclamation work that can be done. Material in store stock, as well as charged out material of this kind, should be given the necessary attention to preserve it. It is not good practice to store cut nuts or material with finished surfaces in places exposed to the weather.

It does not pay to reclaim material at the point of origin where it involves extra handling or expense. However, where material can be reclaimed at the point of origin at less cost than at a reclamation plant, and where it can be repaired and distributed at the same cost as at a reclamation plant, it should be done. But there is danger of duplicating work and hidden expense in reclaiming material at the point of origin.

As a rule scrap wharf facilities, as the term suggests, fall heir to what is left in the shop yard in the way of facilities. Wharves, buildings and storage bins for such purposes are usually the result of improvised and temporary structures. Many times the facilities are not only inadequate, but expensive to operate; still their general revision is delayed or prevented by the large outlay to change the plant as a whole, and for the reason that the very first preparations, which perhaps were necessary to meet an emergency, grew piecemeal until they precluded the re-arrangement for greater economy except at considerable cost. Often times unsuitable buildings have been gradually built up with which inadequate facilities the local foremen are badly hampered in their work of handling, inspecting and assorting materials for re-use, repairs or sale.

The scrap dock should be organized so it will have adequate supervision for reclaiming material, and the men sorting scrap thoroughly instructed as to what material should be saved for the reclamation plant. The supervision should constantly inspect the sorting to see that no material is being sold for scrap that can be reclaimed. The profit or loss in reclaiming material is often determined by the handling. One good way to educate is to have a sample or exhibition place where samples or the material to be reclaimed can be seen by the men doing the work, and when mistakes are made, their attention should be called to them and the exhibit also. It has also been found economical to have a schedule so arranged that shop foremen and heads of various departments are permitted to take their turn at the wharf in the supervision of the work generally.

The physical handling will depend on local conditions. This, however, is a very important item in the reclamation of material, for as a rule, excessive handling of reclaimed material will soon eat up the profit of reclamation. It should be an absolute rule that no scrap material of any kind be sold as such until it has been carefully inspected and all reclaimable material removed. Where material reclaimed can be used without any labor, it should be sent to the shipping room or proper storage room and thus eliminate all handling.

Records of car numbers and points from which material comes should be kept so that when material is put in the scrap that should not have been, the matter can be taken up with parties at fault. The scrap dock should be so designed that the reclamation plant will be located to reduce the handling of the material to a minimum. Where this is impossible under present conditions, a comprehensive plan should be drawn up, showing the ideal conditions desired, and then work the scrap dock over a little at a time until the desired arrangement is obtained.

All material reclaimed should be inspected by a competent person to see that it is in condition to meet the requirements of its use. The foreman on the scrap dock can pass on this for the material shipped direct from the dock to the work, and the foreman or sub-foreman of the reclamation plant should do so for the material from the reclamation plant. Suitable testing machines should be provided for testing certain materials and gaging them to see that they will meet the requirements. There is much to be said for and against the practice of painting and marking material reclaimed. The committee feels that, generally speaking, material reclaimed should be painted, dipped or rattled.

[Detailed instructions and forms for handling the accounting for scrap and reclaimed material at a reclamation plant were here included in the report.]

The committee finds it impossible to make up a general statement of the saving made by the reclamation of material that would be applicable to all roads, or even to two or more roads, as conditions are so different. The saving will have to be worked up to suit individual needs for each item reclaimed. [Lists were given as a guide and to show what is being done at the present time on some of roads.]

The committee finds that the moral effect caused by reclaiming material saves many thousands of dollars. The man interested in the welfare of the company, by seeing the vast amount of material reclaimed, exercises much more care in the use of material and finds ways of using it that are cheaper than sending it to the reclamation plant.

The user of material who is careless and indifferent is checked very closely by a reclamation plant, as each individual item can be definitely traced and places the responsibility on the one that caused the loss of the cost of reclamation, thus all users of material are kept keyed up, which prevents material being discarded unless it is justified.

The report is signed by D. C. Curtis (chairman), C. B. & Q.; D. D. Cain, S. A. L.; H. S. Burr, Erie; H. Scatchard, N. & W.; R. K. Graham, A. T. & S. F.; C. H. Rost, C. R. I. & P.; J. H. McMillan, N. Y. C., and H. G. Cook, S. P.

In presenting the report, the chairman of the committee regretted that the committee was unable to include details of the Great Northern rolling mill plant, but referred to the description in the *Railway Age Gazette*, May 7, 1915, page 967.

Lantern slides were used by the committee in presenting its report.

Discussion.—In the discussion which followed the figure of 45 cents per cord for making old ties into engine lighting wood was questioned. The chairman explained that this figure did not cover the cost of picking up the ties on the road. Considerable stress was laid on the possibilities of reclaiming track material, particularly frogs and switches. More critical attention must be given to the subject of reclamation, as many roads are now reclaiming material which should not be reclaimed and some that never should have been scrapped.

ACCOUNTING FOR SECOND HAND SERVICEABLE MATERIAL

By C. H. Samson

Assistant Auditor, Chicago, Burlington & Quincy, Chicago, Ill.

With full appreciation of the highly important part it takes in the purchase of material, there is yet reason to believe that in nothing does a store department render greater service to the company it serves than in judicious and persistent efforts to avoid purchases.

Storekeeping is many-sided and only by developing all sides in their just relation and proportions to each other will the store department as a whole take and maintain its proper place in the railroad organization. Its primary object is to secure the most economical care and use of material and in that work, accounting, in its usual acceptation, though secondary and complementary, has an important part in that it puts the results of the care and use into record form, which is of value in proportion, as it truly reflects the physical conditions and transactions.

Accounting for released material is somewhat different from other phases of material accounting in that it can be absolutely controlled in both the debit and credit, as the values are essentially arbitrary. The main consideration under such conditions is the use of values that will best harmonize with the values fixed by purchase and will be the most natural to apply. The commercial theory and practice in the handling of second hand material cannot be properly applied

to railroad accounting as the railroad is its own best customer and there is neither profit nor sense in "robbing Peter to pay Paul," which is practically the case when one account or department is allowed to take advantage of another.

Material returned to store stock is naturally divisible into three classes for which fixed bases of value can be established:

1. Usable in its present form; value, same as corresponding new material.

2. Needing repairs to make it usable; value, a fixed percentage of corresponding new material when released and full value when repaired.

3. Scrap, not fit for use or repairable; value, fixed prices according to kind.

Considering these classes in the order named, as the physical condition of released material, whether salvage or unused, fixes the class to which it should belong, it is entirely practicable for store department men to determine when an article is usable and to account for it at its proper value, without any supplementary description of its condition, as the fact that it is issued for use is evidence enough. On the other hand, if usable second hand material is handled on a percentage basis, more or less distortion of the material account will surely follow. When received, any desired percentage can be readily applied, as there is no question then as to the fact that it is second hand, but in the issue the distinction must be made on the appearance of the article, and often by the average man under working conditions. However appealing the method may be in theory, and it looks good, in practice it is both unsafe and unnecessary.

As material in stock is issued at its stock value, regardless of the current market price, so should uniformity in value of second hand material be maintained, regardless of its particular use, with only such self-descriptive exceptions as are expedient on account of values and accounts involved, and they are surprisingly few.

As material needing repairs becomes usable when repaired, it naturally follows that its value, when released, should be the usable, or new value, less a percentage allowed for repairs. Before it is repaired, it is not available for issue and therefore cannot be charged to the material class from which the repaired article will be issued. The two conditions can be satisfactorily met by charging the released value and cost of repairs to a material class designated as scrap and crediting that class at usable value, as scrap can readily absorb, in its adjustment, all differences caused by the varying cost of repairs. The greater part of scrap ordinarily is sold, so that the actual value is determined by the market, but so far as the accounting is concerned the values can and should be fixed, subject to adjustment when the sales are made.

In the three sub-divisions, released material touches many phases of storekeeping and for its efficient handling and accounting demands the closest co-operation in the physical and accounting work. An effective working plan, therefore, must not only meet the various complications with definite rules, but must have rules that fit the working conditions at the physical end.

RECOMMENDED PRACTICE

The committee, instead of presenting additional recommendations, feels that it is desirable at this time to call attention to the recommended practices already made by the association. Correspondence with about 50 railroads, relative to the recommended practice, shows that on the whole great improvement in the economical handling of material could be made, provided many recommended practices as outlined by the association were actually put in use by the different roads.

Due to the different methods of handling and accounting, it is impossible at the present time to make a proper comparison of the efficiency of the stores department on the various roads. The greatest fault is with the storekeepers themselves, in not forcefully bringing these practices to the attention of their own roads, and calling attention to concealed expenses in handling material.

To properly compare the work of the stores department, we must have a common basis of arriving at the store expense, and a system of accounting which will not conceal or wrongly distribute the cost of handling material. It would appear that under the present rules of the Interstate Commerce Commission the cost of handling at least could be compared, but such is not the case. Store expense on many roads covers only the storekeepers' pay roll, practically all other expenses being charged to operating accounts. Many storekeepers do not do their own accounting. Storekeepers who actually do all the work that they should do and handle their organization properly are put in a false light by other storekeepers who only do part of the work and are only charged with a portion of the cost of handling and accounting for material.

It should be the duty of the auditing department to see that all the expenses of handling and accounting for material, no matter by what department performed, is charged to the proper account.

Attention was called to the report presented at the convention of 1914 by the accounting committee, and a paper in connection therewith; and the report of the committee on the book of rules, presented at the same convention. These two reports are so complete that the committee recommends that the association urge each member to submit them to their respective roads for adoption. The following in particular appears to be absolutely necessary to the efficient and economical handling of store department work:

The general storekeeper should have entire charge of all material belonging to the company, which is not actually in use, regardless of location. All unapplied material, new, second-hand or scrap, should be carried in his accounts and under his jurisdiction.

The accounting for all material in stock, necessary charges and distributions, including the making of vouchers, should be handled by the storekeeper and charged to store expense.

In order to arrive at honest comparisons, all labor expenses by other departments in handling material should be charged to the proper account—Material Store Expense. This will do more than anything else in placing the store department on a proper foundation.

The handling of scrap material and the sorting and reclamation of it is not properly a material store expense item and each department should stand the labor cost of the initial delivery to the store department. All labor expended by the store department in unloading, sorting, preparing for sale and loading should be charged to the value of the scrap as carried in the scrap class or account. The cost of reclamation should be charged to the article reclaimed as far as possible by the use of reclamation orders.

A classified statement of material received, issued and on hand should be made so that proper attention could be given to the different classes of material.

Disbursements should include only material actually used or disposed of; transfers between stores are not disbursements; labor in maintenance or construction of equipment should be excluded from material disbursements; material in course of manufacture, including labor expended, should be included as material stocks; temporary tracks and material suspense in connection with them should be excluded.

The importance of store delivery is not understood or appreciated on many of our railroads; consequently, it is not in general use.

While a majority of railroads operate supply cars, the greatest efficiency as regards their usefulness has not been reached. On many roads this car or cars simply distribute oil and a few light supplies. The supply car or train is the connecting link between the storehouse and the user of the material on the road, and should be the one great factor in

properly handling and delivering on the ground all material, tools and stationery required for all departments and at the same time pick up all scrap and surplus material and bring it to the storehouse.

The report is signed by D. D. Cain (chairman), S. A. L.; A. M. Gage, L. E. & W.; Clarence Foster, N. Y. C.; L. O. Genest, C. P.; J. J. Opheim, G. N.; W. A. Miller, Southern; H. C. Cook, S. P.; J. R. Mulroy, Pullman Co., and H. S. Burr, Erie.

PIECE WORK

Previous papers and committee reports have fully outlined the advantages to be derived from the piece work system; have shown how to install and maintain the system; provided forms for records, and have also given a few concrete examples of economies which can be effected. There has seemed lacking, however, information as to the compilation and phraseology of the schedules, and this feature the committee has endeavored to cover in this report on a limited scale.

In making up a piece work schedule it should first be properly classified. The scrap dock employees would not be interested in schedules for handling lumber, nor does the ice house force care anything about schedules for handling rail and track material; hence it is recommended that the schedule be compiled in sections so that each shop or yard can be furnished that portion of the schedule which affects the work it has in hand.

It is not expected that the classification given will suit all cases, but should be modified to cover conditions as they exist in each individual case. The classification of the schedule is as follows:

Concrete products—manufacturing and handling; ice; lumber, switch ties, piling, poles and posts; miscellaneous storehouse material; rail and track material; scrap and reclamation material; signal material; tools and machinery; track ties and tie treating chemicals.

Schedules under the various classified headings should be arranged in numerical and alphabetical order. The heading "Miscellaneous Storehouse Material" may be sub-divided to suit conditions. One alphabetical index should cover the complete schedule.

[Examples were included in the report showing the method used in preparing the schedules.]

The following instructions should constitute a preface to each copy of the schedule.

All work unless otherwise specified is to be done by hand. Derrick prices and machine work includes all work, fixing tackle and machinery and doing the necessary switching, as well as transferring from previous jobs unless otherwise specified.

Loading includes getting material from the storage place, placing in the car, and properly blocking it for shipment unless otherwise specified.

Unloading includes taking from the car to the storage place, inspecting, taking out culls and properly piling or placing in racks or bins, unless otherwise specified.

Prices per "job" or per "trip" for derrick or hand work are to be paid only when it requires the extra switching or trips for the work. They are not to be paid when it does not require extra switching or trip and when the work can be done in connection with other work.

Rubble car prices include all handling of car to and from work, unless otherwise specified.

The report is signed by W. W. Eldridge (chairman), C. B. & Q.; B. W. Griffith, N. Y. C.; Geo. Holmes, M. C.; W. H. Thorn, C. St. P. M. & O.; F. J. McMahon, N. Y. C.; J. A. Stewart, N. Y., O. & W., and W. E. Brownell, Lack. Steel Company.

Discussion.—It developed that only a few roads are using piecework in the stores department, but that these few are well satisfied with the results which are being obtained. The Chicago & North Western finds a considerable increase in the work accomplished, and no neglect of inspection. More supervision is needed with piecework. Rates should not be cut when a man's earnings increase.

ACCOUNTING—MATERIAL STORE EXPENSES

In recommending rules governing the accounting for material store expenses, the committee sets forth the principal and general expenses which are concerned and connected with store department operations. In the purchasing department, material store expenses are chargeable with the pay of general and local purchasing officers and their assistants and employees of the purchasing department; also, their traveling, office and other expenses incurred in purchasing material and supplies. The two exceptions are amounts expended for purchasing stationery, which are chargeable to stationery store expenses; and pay and expenses of officers and employees engaged in purchasing a single class of material or supplies, such as ties or fuel, which are chargeable directly to the cost of that material or supply.

[Similar analyses of the charges against material store expenses are given for storekeeping, inspection, switching service, motive power and car departments, maintenance of way department, construction department, handling supplies for, and products from, company industries, handling rail and ties, handling ice, handling bridge material, signal material, structural steel, etc., shipped direct to jobs, handling scrap, and accounting.]

In the application and distribution of material store expenses, percentage rates, representing material store expenses, should be assessed according to the issues. The percentage should remain in effect until conditions may warrant a change, which may be made monthly or otherwise during the fiscal year.

Material store expenses are chargeable on the value of material issued for construction and additions and betterments, as well as for operating expenses; they are not chargeable in connection with transfers of material and supplies as between stores and stock accounts.

Material store expenses are chargeable on the value of the gross issues from stock, regardless of the value of scrap and second hand material released and received in exchange; they are chargeable on the value of the material issued to the shops for the manufacture of goods on store department orders and are also chargeable on the value of all shop manufactured goods issued from store stocks. Material store expenses should be assessed on the value of material and supplies sold from store department stocks.

A ledger account entitled Material Store Expenses should be established, for the specific and exclusive purpose of providing a suspense account through which to clear all debits and credits appertaining to the operation of the store department. This account should be credited with the amounts accruing from the application of the percentage for material store expenses to the value of goods issued. The balance in the account, if debit, would represent undistributed expenses due to the prescribed percentages being insufficient to clear the account; if credit, due to the prescribed percentage being greater than the percentages that would have cleared the account.

The account should be cleared in June account of each year by using for the prescribed percentages the rates of per cents that the actual expenses bear to the actual total material issues for the month.

Stationery store expenses should be handled separately from, but similarly to material store expenses.

The report is signed by P. J. Shaughnessy (chairman), Erie; E. L. Fries, U. P.; H. H. Laughton, Southern; E. E. McCracken, B. & L. E.; D. A. Williams, B. & O.; Chas. I. Davis, D., L. & W., and J. W. Camp, B. & M.

Discussion.—The discussion centered largely on the charging of expenses for the handling of scrap. In this respect the report

conflicted with the reports on Recommended Practices and Reclaiming Material, and was finally amended to agree with them.

STATIONERY

Stationery is material and supplies. The cash values of such supplies is about 4 per cent of all other supplies, with the exception of fuel, rails and ties. Owing to the nature of the material, and the comparatively small unit value, the percentage of cost in buying, handling and accounting is much higher than in the case of other material.

In the handling of stationery, there is the same lack of uniformity of methods prevailing as is the case in the handling of other material. On some roads these supplies are handled by a special department, under a stationery agent; on others, by the general stores. On some roads the stationery supplies are charged out in detail as issued, while on others no detail charge is made, but the total cost is apportioned to the various departments on a percentage basis. There are also many different methods of handling the requisitions on which the stationery is issued.

When stationery is handled by a separate organization, under a stationery agent, the head of the organization is usually the buyer, or purchasing agent for the material, as well as the storekeeper. The one strong point in favor of the separate organization is that it is complete in itself, and there would seem to be a good prospect of eliminating much of the correspondence and referring back and forth that would take place if the stock were maintained by one department, and the buying done by another.

On the other hand, the committee finds many weak spots. In the first place, the organization, to be efficient, must be complete in its ordering, receiving, storing, distributing and accounting for, and this means the maximum of cost. Then the head of the organization, being the buyer, or purchasing agent, is so taken up with the buying that the more important end, the distribution, is neglected by him, this work being largely delegated to members of his staff, who are rarely men of wide railway knowledge. One reason for this is that executives seem to have the idea that the handling of stationery, because it is largely paper, pens and pencils, is boys' work, and we should pay boys' wages. Boys can be used in this work to an extent, but supervision must then be better than ordinary, which has not been found to be the case in separate stationery organizations.

The weak spot in the handling of the stationery supplies by the stores department is that the buying may then be done by a purchasing agent removed from the stores, and much unnecessary correspondence and referring back and forth is entailed.

The strong points in favor of the handling of stationery by the stores department are: An organization for the handling of supplies and material, ordering, receiving, storing, distributing and accounting for. The receiving clerk or clerks of this organization can receive stationery at less additional cost than can a department created for that purpose alone; the porters who handle general supplies can handle stationery supplies at less additional cost than can porters who are maintained for that purpose alone; the distributing force which distributes general supplies can distribute stationery supplies in addition to general supplies at less cost than a force maintained for that purpose alone; the accountants who handle accounts for general supplies can handle the additional accounts for stationery at less cost than can accountants maintained for that purpose alone. All of these men having wider general training than would men handling stationery only, should do the work better.

The committee finds it impossible to make a fixed rule that an ordinary railway should carry so many dollars worth of stationery stock per mile of road operated, because of a lack of uniformity in practice. The figures that mean one thing on one road, mean an entirely different thing on another road. For instance, on one road the stationery stock figures cover the folders, tariffs, tickets, adding machines, typewriters, advertising matter and the postage stamps, while on another road they cover some of these, and on others, none of them.

However, leaving out the items mentioned above, any road having stationery stock that goes beyond ten dollars per mile of road, counting double track as single main line, and counting main line only, would do well to look into the matter.

The conclusions arrived at are:

(1) That the handling of the stationery should be done in connection with the general stores.

(2) That stationery should be charged out in detail, the same as other material and supplies.

(3) That while the receiving, accounting and shipping facilities of the stores be made use of in the handling of stationery supplies, the stationery should be a department by itself within the stores, to the extent that the stationer devote his whole time to stationery matters, and that he be the stationery buyer. In no case should the general storekeeper be called on to do the buying.

The stationery organization should be a part of the regular store organization under the general storekeeper, the staff to consist of the stationer, stenographer and stock room man, with the necessary help to handle the stock, according to the size of the road. Requisitions for purchase of stock supplies should be made up by the stock man, checked by the stationer and approved by the general storekeeper for purchase.

The stationery stock room should be of ample size and laid out in sections; a section to accommodate the forms belonging to each department, and a miscellaneous section to care for forms and supplies common to all departments. There should be a catalog of stationery made up in cheap form, so that it could be renewed at small expense, and a copy of this catalog placed in each office. The catalog should be made up to correspond to the stock room.

Each department should have its own series of numbers and symbols. Thus, the motive power department would be given 1 to 200, and its forms would bear its number and letter, thus—F. 160 M.P. Miscellaneous should have its own number and letter M. Each section should be marked with a small sign, as "Motive Power 1 to 200," and the pigeon holes, or shelves, numbered for the forms placed in them. In addition to the shelving for forms there should be, of course, a sufficient number of cupboards and drawers to hold the other material and supplies. The one thing absolutely necessary about a storeroom is that it be big enough.

In each department of the catalog there should be blank spaces for new forms. The stock man should have a copy of the catalog always on his desk. As a new form is gotten out, he should write it in its proper place, and as an old one is discarded, he should strike it out. This working copy should go to the printer, and from it the new issue should be struck. If this occurred too often, notice of a new form could be sent out, and each office could enter it in writing in its copy. If this was done on a fully organized road, a new issue of the catalog would be needed only once in five years.

The requisitions for supplies of stationery should be approved by the head of the office requiring them, and sent direct to the general storekeeper, and from him to the stationer to be filled. The real checking of the requisitions should be made by the man filling the requisitions. Requisitions from agents should go direct to the storekeeper without approval by superintendents or others.

A carefully prepared list of all stations and offices should be kept in the storekeepers' and stationers' offices. This list should show the number of employees in each office, and any other particulars that might be a guide to men filling requisitions. Stationery supplies should be delivered by supply cars as far as possible.

At stocktaking, the stationery supplies in all offices should be carefully checked, and all surplus or dead stock returned to the stores. It is at stocktaking time that the careless and extravagant man is located.

Requisitions for new forms should be special, accompanied

by a full description of the form and an explanation of why it is required. Multiplicity of forms is a great evil, and additions to the number should be most carefully watched. This should be part of the duty of the stationer. Under this plan he will be relieved of such duties as accounting and distributing, and he should devote his whole time, apart from buying, to the study of standardization and uniformity of blanks, as well as grades and weights of stock.

The report is signed by E. J. McVeigh (chairman), G. T.; C. H. Rost, C. R. I. & P.; R. C. Crosby, Wabash; O. T. Burleigh, B. R. & P.; N. C. Foss, Ann Arbor, and R. A. Weston, N. Y., N. H. & H.

Discussion.—There was considerable difference of opinion as to whether this department should come under the storekeeper or not. One member stated that he had found economy in sending the stationery out in small packages rather than by the supply car.

SUBSTITUTES FOR EXPENSIVE LUMBER

By W. H. Clifton

Lumber Agent, Baltimore & Ohio, Baltimore, Md.

As in other lines of industry, there are certain practices which are followed in the use of lumber in railroad shop and building work today, which have been unchanged for many years, regardless of the decrease in the supply and increase in the cost of the lumber used, or the fact that other kinds of lumber, equally well adapted to the purpose, are more easily and cheaply obtained. This condition seems to be due largely to a lack of knowledge of the characteristics of materials, other than the ones which have always been used for certain purposes.

There are many occasions when 1 in. by 12 in. by 16 ft. white pine of good grade is ordered when 1 in. by 8 in. by 12 ft. to 16 ft. yellow pine, cypress, spruce or even hemlock of a lower grade would answer equally well for the purpose, and would cost considerably less. White pine for pattern work is frequently ordered to be 12 in. and over in width, when, if ordered 8 in. and over with a limit on the percentage of widths under 12 in. acceptable, the lumber would cost less, and the widths under 12 in. will usually be found, piece for piece, to be of better quality than the wide stock.

Not very long ago, while passing through a cabinet shop in a railroad mill, I observed a large number of boxes or trays of a peculiar design in the course of manufacture. The boxes were being made from clear yellow poplar and were heavily ironed, and, I think, were mounted on small truck wheels. Upon inquiry, I was informed that they were to be used as tool boxes by machinists and car repair men for keeping together their wrenches and tools, and for moving them from one job to another. Now, when those trays were finished, they were beautiful to look upon, the bright yellow of the heart poplar standing out in contrast to the black iron branches, but the first time a car man threw his 18 in. wrench or his iron jack lever against the side or end of one of those boxes, an abrasion would appear in the soft surface of the wood in which one might lay a finger, and in a very short time the body and partitions of the box would be gone. Yellow pine or oak would have been a more durable material, and would have cost approximately 50 per cent less than the poplar, but the force in that shop knew little about yellow pine, except that it was more difficult to work, being harder in texture, and, I believe, they considered oak too heavy; but they did know poplar and white pine and no doubt figured that, if it was good enough for cab panels and coach siding, it was good enough for the tool boxes.

The storekeeper did not use those tool boxes, but he supplied the stock to make them, and, perhaps, accepted the boxes in his stock and issued them. He is interested to the extent that, when the practice of using such expensive material for ordinary purposes is discontinued, he will have to carry less of it in stock and his stock balance will drop proportionately.

Noting, about a year ago, that a certain shop was ordering very frequently 1 in. by 16 ft. No. 2 white pine barn boards, inquiry was made as to the purpose for which they were used. Among other things, it was learned that quite a large quantity of the boards were being ripped to 2 in. and 3 in. strips and shipped out on the line for staying explosives in shipments and for stripping powder cars. Hemlock and chestnut cut to the desired size is now being purchased for this use at a cost of $18 to $20 per thousand feet. The white pine cost $27 to $32 per thousand feet. Old car siding and other waste material is also being used.

On two occasions, at different shops, it has been found that track shims were being made from new white oak purchased for gondola flooring, and, while it must be admitted that the shims were excellent and the size of the flooring was well adapted to the method of manufacture, little progress was being made toward economy, which would have been possible by cutting up odds and ends and obsolete sizes of material, of which there was a considerable quantity available at both shops.

The cases mentioned are not exceptions, and are not peculiar to any one shop or railroad. Similar cases can, no doubt, be found to exist on many roads. The condition is the result of practices in effect when high grade lumber was cheap and plentiful.

A remedy is not hard to find or difficult to administer. Usually a little educating of the consuming forces in the possibilities of substituting, with a view of economy, brings the desired result, for the average mechanic on a railroad is not averse to saving money for the company if some one will show him how to do it and co-operate with him in accomplishing the desired result.

Some of the railroads have already gone quite extensively into the substitution of cheaper and more plentiful lumber. The Chicago, Milwaukee & St. Paul has found Douglas fir of suitable grades at a price ranging from $26 to $30 per thousand feet, and Washington cedar at $30 to $37 per thousand feet, to be excellent substitutes in many cases for soft yellow poplar at $65 to $90 per thousand feet. Both fir and cedar can be obtained in any width and thickness desired and can be satisfactorily kiln dried. While this company still uses yellow poplar for outside siding and interior finish on passenger cars, it has been able to cut the consumption of poplar to about 35 per cent of the quantity formerly used. It has also been found that clear red birch is an excellent substitute for mahogany for seat arms, etc., and at a considerable saving in cost.

The Baltimore & Ohio has very recently taken up the question of substituting red or gulf cypress for purposes for which soft yellow poplar has been used. For all purposes in which substitution has been made it answers equally as well as poplar, and, in some cases, it is superior to poplar for the purpose.

The following comparison of the approximate prices of first and second clear soft yellow poplar and the same grade of red or gulf cypress will give some idea of the saving which will be effected:

Approximate Prices, F. O. B. Cars, Cincinnati, Ohio

First and Second Clear Soft Yellow Poplar		First and Second Clear Red or Gulf Cypress	
Thickness	Price	Thickness	Price
1 in.	$50.00	1 in.	$43.00
1¼ in.	55.00	1¼ in.	43.50
1½ in.	52.50	1½ in.	43.00
2 in.	55.00	2 in.	46.00
2½ in.	60.00	2½ in.	56.50
3 in.	65.00	3 in.	57.50
4 in.	68.00	4 in.	62.50

The specifications of the Baltimore & Ohio call for poplar 7 in. and over in width and 8 ft. to 16 ft. long; shipments must average 12 in. or over in width and 50 per cent of the boards must be 16 ft. long; only 10 per cent of 8 ft. and 10 ft. boards are admitted. The cypress can be purchased the same way.

It was formerly the practice on this road to use poplar for blocking in between the framing of baggage, mail and express cars to provide a soft absorbent surface to which glue is applied in putting on the outside sheathing. After a trial,

it was found that a sound wormy grade of chestnut, kiln dried, could be used for this purpose with as good results as obtained from poplar. The chestnut cost approximately $20 per thousand feet; the poplar cost $55 per thousand feet.

Of course, steel is rapidly taking the place of lumber in car and locomotive work, and the possibilities of substitutions of cheaper woods in that class of work will grow constantly less, but there is on most railroads still a large amount of wooden equipment, which will be rebuilt and kept in service for years to come.

OTHER BUSINESS

J. H. Waterman, superintendent of timber preservation of the Chicago, Burlington & Quincy, presented a paper in which he suggested that the storekeeper should examine critically all requisitions and substitute cheaper material if it was just as satisfactory.

The above covers the proceedings for Monday and Tuesday of this week. The remaining sessions will be reported in next week's issue of the *Railway Age Gazette*.

A report on the Uniform Grading and Inspection of Lumber was presented on Tuesday, an abstract of which will also appear in next week's issue.

SOUTHERN PACIFIC EMPLOYEES GIVEN PRIZES FOR SOLICITATION OF TRAFFIC

The Southern Pacific has recently awarded cash prizes to 24 of its employees on the Pacific system in the contest for the personal solicitation of traffic between May 1, 1912, and December 31, 1914. The contest was open to every employee of the company except those traffic representatives and agents whose regular duty it is to solicit traffic.

Prizes of $25, $20 and $15 were awarded on each of seven divisions and in the general offices, and in addition special prizes of $25 each were given to R. W. Dodd, rate clerk in the general freight department, and H. E. Landerkin, rate clerk in the general passenger department, whose records were considered worthy of special consideration since their duties had not placed them in contact with the public. Each of the 10 divisions on the system was constituted a group and two groups were made up of the general offices at San Francisco, Portland and Los Angeles. Prizes were offered to each group to be based on a system of credit units, and it was necessary for contestants to obtain at least 50 credits to qualify. Failure to do so accounted for the fact that no award was made in four of the groups. In the plan of credit rating 40 credits were allowed for each carload shipment secured by unaided effort for transcontinental shipment and 20 credits for other shipments. Twenty credits were allowed for transcontinental carloads reported and secured with the assistance of a traffic department solicitor and 10 credits for other shipments. Five credits were allowed for each carload prospect reported but not secured. Half as many credits were allowed for l. c. l. shipments. Forty credits were allowed for transcontinental passengers secured by unaided efforts and 10 for each other passenger secured by unaided effort. For each passenger reported and secured with the assistance of a traffic department solicitor, 20 credits were awarded for transcontinental passengers and 5 for other passengers. For each transcontinental passenger reported but not secured 5 credits were allowed. Special credits were allowed for large party movements, such as conventions, etc.

A similar contest is now in effect to close on June 30, 1915. Personal solicitation cards are furnished to the employees on request and when a prospective shipper or traveler is obtained the employee forwards the card properly filled out to the nearest district freight and passenger agent. The latter then calls on the prospect and closes the canvass, returning the card to the general office with a notation on it as to what business resulted.

RAILWAYS MUST ABANDON CONTROL OF BOAT LINES ON THE GREAT LAKES

The following is an abstract of the Interstate Commerce Commission's decision, written by Chairman McChord, in the case entitled "Lake Line Applications Under Panama Canal Act" (33 I. C. C., 699), refusing the petition of the rail carriers to retain control of their boat lines on the Great Lakes.

The several lines concerned are as follows: The Anchor line, the Erie & Western Transportation Company, is owned by the Pennsylvania and operates 12 vessels serving Buffalo, Erie, Cleveland, Detroit, Mackinac Island, Milwaukee, Chicago, Sault Ste. Marie, Marquette, Hancock, Houghton, Superior and Duluth. The Mutual Transit Company, owned by the Mutual Terminal Company, which in turn is owned jointly by the Lehigh Valley, the Erie, the Lackawanna and the New York Central, operates 12 vessels serving Buffalo, Fairport, Cleveland, Gladstone, Green Bay, Duluth, Houghton, Hubble, Fort William, Port Arthur and Westport. The Lehigh Valley Transportation Company is owned by the Lehigh Valley and connects with it at Buffalo. The Western Transit Company, owned by the New York Central, operates from Buffalo to Chicago and other Lake Michigan and Lake Superior ports. The Rutland Transit Company, owned by the Rutland Railroad, which in turn is controlled by the New York Central, runs boats between Ogdensburg, N. Y., and Milwaukee and Chicago. The Canada Atlantic Transit Company, owned by the Grand Trunk, operates three steamers between Depot Harbor on Georgian Bay and Chicago and Milwaukee. The Erie Railroad lake line, operated by the Erie, operates between Buffalo and Fairport and Milwaukee, Chicago and Manitowoc.

The commission finds that there is or may be competition for traffic between the vessels and the railroads interested in them within the meaning of the Panama Canal amendment.

There are no cases where any two ports are served in common by the boats and by the paralleling rails of the particular owning railroad entity. In the case of the Pennsylvania, the New York Central, the Erie and the Grand Trunk, however, the railroad entity owning the boats or the interest therein also owns, or has an interest in, other railroad entities whose paralleling rails do serve ports in common with the boats. The interest existing between the several portions of each of these systems and the several boat lines in which it is a stockholder is the kind of interest which the act was intended to reach.

The Lehigh Valley and the Lackawanna are each parties to through all-rail routes and joint rates to all the ports served by their boats. They are members of various fast freight lines, and are also interested in the Lake Line Association organization, the records of which indicate that its function is to insure a "proper" management of the boat lines from the viewpoint of the railroads. While the two roads may not directly compete with their boat lines, their membership in this association or participation in any like understanding places them in a position inimical to the best interests of their boat lines. Placed in such an attitude these roads, through the agency of other roads, with which they are "partners," become the competitors of their own boat lines. What is here said with special reference to the Lehigh Valley and the Lackawanna also applies to the other roads.

That the existence of paralleling through all-rail routes, which the petitioning railroad forms a part of, brings an application under this amendment within its provisions, seems clear when the amendment is considered in its application to the railroad interest in boats using the Panama canal. Neither at the time the amendment became a law, nor now, is there any transcontinental rail line owned or operated by a single railroad or system of railroads in the United States.

The words of the law are as follows:

If the Interstate Commerce Commission shall be of the opinion that any such existing specified service by water other than through the Panama Canal is being operated in the interest of the public and is of advantage to the convenience and commerce of the people, and that such extension will neither exclude, prevent, nor reduce competition on the route by water

under consideration, the Interstate Commerce Commission may, by order, extend the time during which such service by water may continue to be operated beyond July 1, 1914.

The commission finds that it is not in the interest of the public that the rail carriers should continue their control over the lake lines.

It is the opinion of the commission that the purpose of the Panama Canal Act is to preserve to the common interest of the people free and unfettered the "water roadbed" via the Panama canal, and with respect to waters "elsewhere" to restore all the water routes of the country to the same condition of freedom from domination that would reduce their usefulness as a natural means of transportation. Congress has decreed that there shall be a restoration of conditions which prevailed when railroads had no interest in and exercised no control over the boat lines plying the country's water routes. That the legislation might not be arbitrary certain provisions were made so that in given instances which form exceptions to the usual experiences in cases of joint ownership such ownership may be continued. It is not found that the cases at issue constitute such exceptions.

The petitioners have contended that the control of the lake lines by the rail carriers results in responsibility and regularity of the service They allege that the joint ownership results in greater economies, particularly from the standpoint of terminals. They note that certain of the boat lines are being operated at a loss and that only the greater financial strength of the owning railroads enables them to operate.

The commission agrees that no doubt under joint operation certain economies can be effected, but that these economies have not manifested themselves in a reduced lake-and-rail transportation cost to the public. On the contrary there have been advances. These successive advances have had the effect not only of preventing an increase in lake line tonnage, but in diverting from the lake routes to the all-rail lines, part of the tonnage which formerly moved on the lakes. Furthermore there is much reason to believe that the very purpose of these advances in lake and rail rates was to divert tonnage to the all-rail lines. As a direct result, the boats have operated with small cargoes, although their operating expenses were almost as great as if they had been fully loaded. This has in turn resulted in a high operating cost per unit of freight. The commission believes that this policy fully explains the lake line deficit and that such facts make clear that whatever economies might be realized by joint ownership are offset by the waste resulting from the unfair use of vessel tonnage in the interest of the owning railroads. The railroad control of these boat lines cannot be said to be in the public interest when the policy of these railroads has been by an artificial rate structure to deprive the public of the natural benefits that would flow from a free use of this waterway.

There are no instances where the boat lines have actively competed for traffic with one another or with the paralleling railroads under the regime of joint operation. Under independent operation each of the lines, in order to survive, will become a competitor of every other boat line and of the paralleling railroads, and the result of such operation will be reflected in the character of service furnished and in the rates. There will be a considerable advantage, moreover, in that these various boat lines, when independently operated, will be able to make through routes and joint rates with the boats which will be operated on the Erie canal barge lines.

These boat lines under the control of the petitioning railroads have been first a sword and then a shield. When these roads succeeded in gaining control of the boat lines which had been in competition with paralleling rails in which they were interested, and later effected their combination through the Lake Line Association, by which they were able to and did drive all independent boats from the through lake-and-rail transportation, they thereby destroyed the possibility of competition with their railroads other than such competition as they were of a mind to permit. Having disposed of real competition via the lakes, these boats are now held as a shield against possible competition of new independents. Since the railroads are able to operate their boat lines at a loss where there is now no competition from independent lines, it is manifest that they could and would operate at a further loss in a rate war against independents. The large financial resources of the owning railroads make it impossible for an independent to engage in a rate war with a boat line so financed.

The commission from a consideration of the above facts denies the petition of the carriers to retain control of the boat lines, effective, December 1, 1915, and an order has been made to that effect.

FRANCE SAVED BY HER RAILROAD MEN

By Walter S. Hiatt*

One of the big achievements of the war in Europe has been the handling of the transportation situation by the railroads. One general has called it "a war of railroads" because of the vast role played by them in getting troops, provisions and munitions. to the front and on time, the victory being with the army that gets first to a critical point. The often quoted remark of Napoleon, "an army is as strong as its feet," has been adapted to read: "An army is as strong as its railroads."

Every railroad man today knows that Germany has been able to keep up a remarkable fight on her two frontiers by her government owned military railroad system which enables her to shunt the same troops back and forth from one frontier to the other. It is not known that the French railroads have rendered an equally great service in France and at the same time, with the exception of the first two weeks of the war, practically continued on their regular schedule for civil passengers and commercial freight. And all this wonderful work has been done without any noteworthy accident, and it has been done with a constant rerouting of large numbers of troops and war material to meet new battle conditions on a front 940 kilometres (584 miles) long, from the English channel to the Swiss frontier. It has been done with a decrease of rolling stock, in the face of an ever-decreasing coal supply, and always with the same or a smaller number of railroad men.

During the critical period from August 1 to 20 last, no less than 1,800,000 soldiers were gotten to the front, and each of these soldiers was handled three times, so that in reality 5,400,000 troops were delivered at the required points. While these troops were being moved, while possibly 5,000,000 of the civil population was also traveling, while two armies were being hurried into Alsace and Lorraine to begin a double campaign to turn the German army heading for Belgium, on August 3 a special train was provided to conduct the German ambassador, M. de Schoen. to Berlin. No, there was no panic among the railroad employees, there was no breakdown of the French railroad system.

When I got off a ship at Bordeaux lately, the service of which ship, as of all other ships and of all steamship companies, had been seriously interfered with because of the war on land, I expected all sorts of difficulties in riding to Paris, such as slow and dirty trains, frequent side-tracking to permit troop or hospital trains to pass. Right at the very dock, however, I found a railroad agent, as at any American port, ready to sell me a ticket, to assure me that the trains were making fast time, and to check my baggage, both my trunks and that part which I sent by the slow and cheaper method known as "la petite vitesse." At the station I noted a great many soldiers, a huge number of hospital automobiles for the wounded, and a large number of civilian travelers. The usual ticket-taker stood at the platform entrance, with a brassard on his arm to indicate that he was under military service. Beside him stood two red-trousered soldiers with their guns bayonetted to check the coming and going of all travelers, both civil and military. The man who carried my baggage wore the sleeve brassard. He, too, was in the military service.

I was surprised that I could take my choice during the day of no less than four fast trains to Paris, any one of which would

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make the run in the usual eight to nine hours. Yet when I entered my train, before it pulled out, I counted no less than three long hospital trains pulling in, within the space of a couple of minutes each, and each filled with wounded troops, the men sitting or lying, according to the nature of their wounds. Had I been a blind man, the only sign of the war would have been the wet cushion which I happened to sit on. It was stained red with blood from some wound that had broken. Doubtless the car in which I was to ride had but lately come in with some of the wounded and had been made up into the fast passenger train after a hasty cleaning.

I was surprised at what I saw because I had just finished reading a new book telling how the railroad system of France had broken down, and right from the beginning of the war. So well posted a man as C. W. Barron, of Boston, who wrote this book on the financial aspects of the war, stated that last August the railroad men of France were actually taken from their regular posts of duty and mobilized by regiments, and that but for the motor-busses of the Paris street passenger service carrying troops to meet the Germans, Paris would have been taken. While Mr. Barron's book is otherwise full of good information, in this respect it is incorrect. The statement is in line with many made by persons possessed with the bogy of German efficiency.

Already in France the extraordinary service rendered by the railroads is acknowledged, and in time, I am informed, certain of them—the privately owned—will be decorated with the Legion of Honor cross. In France there are six large railroad systems, two controlled by the state, and four by private companies, the latter comprising 30,000 of the 36,000 miles of single track; on these latter has fallen the brunt of war transportation, because of their geographical positions. It is true that these railroads were not fully prepared for war on such a scale—nobody on earth was fully prepared for that matter—and it is to their credit that they have met bravely and efficiently these unusual conditions, just as do our own railroad men in time of flood or wreck.

It is not denied that the motor car and the motor-bus have and still are rendering a large service. However, it borders on the ridiculous to imagine for a moment that the tremendous transportation work of a railroad has been or can be done by such means. When the truth is told about the way the French troops were launched against the Germans, that resulted in the battle of the Marne, it will be found that it was not so much the few thousands of men hauled in the motor-busses out of Paris but the men of the army of General Manoury that routed the Germans. This army was hastily concentrated at Reims, thanks to the railroads, and so rapidly collected that the German spy and information system did not know of its existence.

I am not judging railroad efficiency of the early part of the war by what I saw in my travels through France lately or of what I saw at the big Paris terminals, where the trains are now moving as quietly and smoothly as in peace times. Not only old railroad men but disinterested travelers during that mobilization period of early August tell me the work was inspiring. Consider the conditions. Every day, beginning with July 26, when the war cloud began to blacken, tourists began to rush to and fro, some to seaports, some inland to their homes, and each day their panic grew. During this first week the trains were doubled, then tripled. No less than 500,000 extra passengers came to or passed through Paris, the railway center of France, and no less than 200,000 of the foreign population left Paris. On July 31 the older soldiers of the reserve army, then as now assigned to the guarding of roads and railroads, began to arrive at railroad depots and add to the crowds. The next day at 5 o'clock all the railroads, which had so far done their work as civil instruments, came under military law.

Did the railroad men lose their heads when this mobilization was declared? When hundreds of thousands of troops began to move from every city and town and farm of France to their appointed place to join their regiments, when other hundreds of thousands of civilians began to fly hither and thither, the railroad men quietly put on their brassards and continued at work.

An old lady who was at that hour struggling on the crowded Paris platform of the Paris-Lyons-Mediterranean, waiting to get a train for Toulon in the far south, and there say goodbye to her son joining his regiment, lately told me she saw the railroad men moving huge trucks of rifles along the platform, going about their business through that excited crowd in the matter-of-fact way of railroad men in emergency the world over. Yet these men had perhaps been without sleep for several nights. It is true that it took this lady sixty hours to reach Toulon instead of the usual sixteen, but she got there. The wonder is that any civilian trains were permitted. As it was they were only sidetracked while the military trains passed, moving at an average rate of forty miles an hour.

One of the amazing feats of the railroad men was the changing, over-night, of the time tables on every one of the six systems. These time tables were changed to a new schedule accommodating from 140 to 160 trains a day. Every station master was notified by telegraph when trains were due at his station. No less than 200,000 messages of this import were sent in a single day.

During twenty long, hot, murderous days, ten thousand trains were kept in motion throughout France. Happily, not all of these trains moved towards the frontier at the same time. Yet, to the complexity of the general forward movement was added that of first carrying the men to their regimental depot. Neither a regiment nor a division is moved all in a piece, like an excursion party. A soldier living in Paris may have to go first to some relatively distant station in the country where he joins his regiment, is armed and equipped, and then moved with his regiment to the headquarters of its army corps in another place; and finally the army corps is moved to a point on a main line and thence to some place at the front, either in the north or the east. A man working in Reims may have to join his regiment at Toulouse in the south, thence to a military camp, and finally to Verdun in the east. What these 10,000 trains began to do in August they have been doing ever since, for the other millions of newly recruited men, or for the shifting of armies to new battle regions.

One must have seen the handling of an army corps to get an idea of what work these inoffensive-looking French trains have accomplished and still are accomplishing. Let railroad officers who have sweated over a 100-car circus movement consider that any heavy movement of troops is made by army corps, and that an army corps consists of no less than 39,000 men, all told; and that to boot there are cannon, horses, kitchen equipment, engineers' equipment, wagons, aeroplanes, ammunition boxes, provisions—enough things to make the moving of a train-load of wild animals seem tame in comparison.

It takes two trains of fifty cars each to transport the men of an infantry regiment. This regiment is subdivided into three battalions of 1,000 men each, and each battalion into four companies. The military end of the affair is easy. Get your cars there and the soldiers, company by company, hop in quickly, without any confusion. Your cars for the infantry regiments are easily gotten rid of. But you need an extra hundred cars to carry nothing but the immediate infantry equipment—mitrailleuse guns, regiment wagons and odds and ends of baggage,

Then you need another extra twenty trains for the artillery of this army corps. Only one cannon can be set on a flat-car, including its limber. About fifty cars are necessary for each regiment's cannon. Next there must be cars for the horses that drag the cannon, cars for the artillerymen, and for all the other equipment that goes with cannon.

If the cavalry regiments travel with the army corps, the job is still worse, as no less than 6 trains of cars are necessary for one cavalry regiment. Add to these trains the ones required by the commissary, the hospitals, the heavy artillery, the trench diggers, the bridge builders, and no less than 70 trains of fifty cars, or about fifty big circuses, are necessary to move an army corps. And the French railroads, if you please, had to move no less than 42 army corps in twenty days.

Commission's Findings Relative to the Cummins Law

That Full Liability is Demanded by the Statute Does Not Allow the Carriers to Increase Their Rates

Following is an abstract of the Interstate Commerce Commission's finding relative to the Cummins amendment, the language of the commission being preserved in so far as possible.

For many years, if not, indeed, from the origin of railroad transportation in this country, common carriers have sought in various ways to limit their common-law liability. One method was by a so called release, executed by shipper and carrier, and intended to be effective whether the loss or damage was due to negligence of the carrier or to other causes.

The Carmack amendment of June 29, 1906 made the initial carrier responsible for the safety of goods through to destination. Since that time, beginning in 1913 with *Adams Express Company v. Croninger*, 226 U. S., 491, the United States Supreme Court has decided in a number of cases, that where the shipper has his choice of two rates, the higher carrying unlimited carrier's liability, and in "a fair, just, and reasonable agreement," declares that the value of his shipment is a certain sum and thereby secures a reduced rate, he is bound by that declaration.

The Cummins amendment (an abstract of which was given in the *Railway Age Gazette* of March 12, page 482) was approved March 4.

The Official Classification provides different rates and forms of bills of lading to be used at the election of the shipper, so that the consignor may have the option of shipping subject to the terms of the uniform bill of lading, or under a receipt by which the carrier accepts unconditional liability. Under this rule property is carried at the normal tariff rates if shipped subject to all the conditions of the uniform bill of lading. Property carried not subject to all these conditions is taken at the carrier's liability, but at a rate 10 per cent higher. The Western classification also contains provisions substantially similar. The Southern classification contains a similar rule, and also provides that the rates on livestock will apply when the declared value does not exceed certain values therein stated and that for each increase of 100 per cent or fraction thereof in the declared value there will be an increase of 20 per cent in the rate.

It is plain that the purpose of this law is, except as otherwise provided, to invalidate all limitations of carrier's liability for loss, damage, or injury to property transported caused by the initial carrier or by another carrier which may participate in transporting it. The law does not specifically say that attempts so to limit the carrier's liability shall not be resorted to, but it declares them to be invalid and unlawful.

The official classification roads have announced the purpose of making certain changes in their bill of lading, but as to rates are still considering the question. They say that the law will impose upon them liabilities not heretofore borne and reserve the right to assert a claim for some increase in rates on account thereof.

The southern lines at first announced their intention of making changes in their rate schedules which would exempt from any immediate increases in rates, certain important heavy commodities said to constitute about 70 per cent of their traffic, and of increasing the rates on the remainder 5 per cent. The commission notes in this connection that it has no right to assume that the proper compensation for the additional risk would be 5 per cent of the rates upon 30 per cent of the carrier's traffic, or that it would be any given per cent upon all the traffic. With regard to shipments of livestock the southern carriers have announced their intention of making an increase of 5 per cent in the rate for each increase of 100 per cent or fraction thereof in the declared value. With reference to the other rates they have later proposed to continue their present rates in effect. Property carried, not subject to the terms and conditions of the carrier's bill of lading will be at carrier's liability, and property so carried will be subject to rates 10 per cent higher than those shown in the tariffs.

The western roads take a position substantially like that of the Official Classification roads. They admit that a 10 per cent increase can not be justified and have no desire to take advantage of a technical opportunity to mulct the shipping public.

It appears that prior to 1913 the limited liability provisions were very generally disregarded in the settlement of loss and damage claims, especially in western territory. To a very large extent at least, despite the limitations of liability, full value was quite generally recognized. After the Supreme Court decided the Croninger case, in 1913, the provisions of the contracts and rate schedules in this and other particulars were recognized as lawfully binding upon carriers and shippers alike, and the policy followed was correspondingly changed. In 1913 the policy was generally adopted, therefore, of endeavoring to enforce the limited liability provisions, but no change was made in the rates. It is now argued that inasmuch as no reduction in rates was made when the limited liability provisions were established, or when they were sustained as lawful by the Supreme Court, there is no justification for an increase in rates now that the liability conditions are restored to substantially what they were prior to 1906.

The uniform bill of lading contains a provision that claims for loss or damage must be presented to the carrier within four months, but until the Croninger case no effort was made to enforce that provision. After the decision the carriers took the position that this provision was in the bill of lading, the terms of the bill of lading were in the rate schedules, and that, therefore, it was unlawful to depart from that requirement. This created a general controversy which was considered by the commission in its report *In the Matter of Bills of Lading*, 29 I. C. C., 417.

The Cummins amendment makes it unlawful for the carrier to fix a period for giving notice of claims shorter than 90 days, for the filing of claims shorter than four months, and for the institution of suits shorter than two years. The law does not indicate the time or date from which these several periods of time shall be computed. . . . It will be necessary for the carriers to determine what periods of time they will fix for the giving notice of claims, the filing of claims, and the institution of suits. It is desirable that the rules be uniform for all the carriers of the country.

It is to be remembered that the Cummins amendment is not a separate statute, but is an amendment to the act. It must, therefore, be construed as a part of, and in connection with other portions of, the act, and in such a way as to give effect to the whole statute. . . .

The more important points which seem to be surrounded with the most doubt and upon which opinions so far expressed most sharply conflict, are:

If no changes are made in existing shipping contracts and rate schedules, will the higher rates provided therein automatically become lawfully applicable upon the date upon which the amendment takes effect? . . . It is contrary to all canons of construction to hold that an act of Congress produces a result not intended by Congress unless the express language of the act compels such a construction. There is nothing in the expressed terms of this act or in the history of this legislation that shows any intent to affect in any degree the existing rates. The legislation is aimed at specified contracts and declares them to be unlawful. The lawful rates on file at this time, therefore, are the rates providing for the limited liability. The Cummins amendment, by

making contracts limiting liability for loss caused by the carriers unlawful, does not destroy these rates, but they remain in effect and are lawfully applicable; for the 10 per cent increased rates are merely additional and can not stand in and of themselves.

Applying correct rules of interpretation, the Cummins amendment does not automatically bring into effect the increased rates named in the classifications. . . .

May the carriers lawfully provide in their tariffs and rate schedules that their liability shall be for the full value of the property at the time and place of shipment?

The loss or damage must, apparently, be either as of the time and place of shipment, time and place of loss or damage, or time and place of destination. Where rates are lawfully dependent upon declared values, the property and the rates are classified according to the character of the property, of which the value of the property may constitute an element, and such classification is necessarily as of the time and place of shipment. It is therefore believed that the liability of the carrier may be limited to the full value of the property so classified and established as of the time and place of shipment.

Does the amendment apply to export and import shipments to and from foreign countries not adjacent to the United States?

This must be answered in the negative. . . .

In the proviso, "that if the goods are hidden from view by wrapping, boxing, or other means, and the carrier is not notified as to the character of the goods," what is the proper interpretation to be placed upon the words "and the carrier is not notified as to the character of the goods"?

There is no inhibition as to the limitation of the liability of a carrier for losses not caused by it or a succeding carrier to which the property may be delivered. The amendment has expressly reapplied the limitation of the prior act with respect to loss or damage caused by the carriers chargeable therewith. It follows, therefore, that the interpretation applied to the act before it was amended is equally applicable to the amendment in so far as the latter affects the right of a carrier to establish rates conditional upon the shipper's assumption of the entire risk of loss attributable to causes beyond the carrier's control. From this it follows that under the amendment a contract or a tariff may lawfully limit to a reasonable maximum the liability of a carrier for losses which it does not cause. It follows further that the rates provided by such tariff may be proportionate to the risk assumed.

This provision of the statute as to goods concealed from view and of the character of which the carrier is not advised clearly prescribes the right of carriers under the direction or approval of the commission to provide for a graduation of rates in accordance with the declared value of the property transported. The liability provided by the rates so established by the commission is applicable no less to instances of loss or damage chargeable to the negligence of the carrier than to those occasioned by causes beyond the carrier's control. But the carriers may not contract to limit their liability for loss, damage, or injury caused by them to property the character of which is manifested by the shipment itself or otherwise disclosed.

In this connection it has been suggested that the carrier might provide that in the event the shipper refused to declare the value the higher rates would apply. This suggestion can not be approved. If the rate is lawfully conditioned upon the value as declared by the shipper, it is as much the shipper's duty to declare the true value of the shipment, as it is his duty to declare the name of a commodity tendered for shipment as to which there are no different rates.

It is important to keep in mind that the carriers are not prohibited from making different rates dependent upon the value of different grades of a given commodity; that, except as covered by the Cummins amendment, including approval of the rates by the commission, the carrier is subject to all of the liabilities imposed by that amendment; and that if, in any instance, the shipper declares the value to be less than the true value in order to get a lower rate than that to which he would otherwise be entitled, he violates, and is subject to the penalty prescribed in, section 10 of the act. The carrier would also be subject to the same penalty in such a case if, having knowledge that the value represented is not the true value, it nevertheless accepts the shipper's representation as to value for the purpose of applying the rate.

Do the terms of the Cummins amendment apply to the transportation of baggage?

This must apparently be answered in the affirmative. Transportation of baggage is a part of the contract for transportation of the passenger. The carriers have always limited their liability for loss of or damage to baggage. The baggage check is the carrier's receipt for the baggage. The conditions attached to the carrier's liability are stated in the fare schedules and on passage tickets of contract form. All ordinary personal or sample baggage is hidden from view by boxing, wrapping, or other means, and the amended law seems clearly to recognize the carrier's right to fix conditions and terms applicable to the transportation of baggage dependent upon the value as declared by the person offering the baggage for transportation.

The necessity for revision of the bills of lading, livestock contracts, and other similar contracts of carriage, as well as of certain parts of the carriers' classifications and rate schedules, is manifest. Bills of lading and shipping contracts can and ought to be at once amended by eliminating obviously unlawful and invalid provisions. Such action will obviate for the immediate future numerous controversies that otherwise would probably arise. Proper analysis should be made of the classifications and tariffs to bring them into harmony with the amended law.

Such changes in classifications and rate schedules can not be made upon statutory notice and become effective contemporaneously with the new law. Permission is therefore hereby given to carriers to make effective on June 2, 1915, upon not less than three days' notice, amendments to the classifications and rate schedules which eliminate provisions or rules that are in conflict with the terms of the new law, provided no such amendment has the effect of increasing any rate or charge for services.

If it shall be made to appear that, with regard to any commodity or commodities, the existing rates do not afford the carriers proper compensation, it could hardly be denied that the rates on such commodities might properly be increased in a sufficient amount to properly compensate the carriers for their added risk and liability. Where rates are lawfully based upon declared values the difference in rates should be no more than fairly and reasonably represents the added insurance. It does not appear that this amendment to the act affords justification for any increase in rates on commodities in general. As has been said, the carrier may not lawfully impose unreasonable rates upon one commodity in order to compensate it for risk or liabilities incurred in connection with the transportation of another commodity, and it is not to be forgotten that the liabilities here considered are only those for loss, damage, or injury to the property caused by a carrier or its agents or employees; in other words, the loss, damage, or injury resulting from the neglect or omissions of a carrier or its agents.

The commission has been conducting an investigation with regard to bills of lading. Further hearings in that proceeding may be necessary in the light of the Cummins amendment. In that connection matters that have been informally presented and urged in this informal proceeding may be presented in a formal way, supported by testimony, and a determination can there be reached on questions as to which the commission now has no information upon which it could base a lawful order. What is attempted here is simply to indicate the impressions gained from the experience had in the past and from the suggestions informally presented by those who are vitally interested in the effect of the Cummins amendment, and the course to be pursued for the immediate future in the light thereof. All of the questions herein discussed are, of course, subject to judicial inter-

pretation, and the views indicated herein might be somewhat changed in the light of more complete information supported by competent evidence.

The classification, tariffs, receipt and other forms used by the express companies have been prescribed by order of the commission. The new law, of course, applies to them as well as to other carriers. They have presented suggested changes in their rules and forms which will be disposed of by a supplemental order in the *Express case*.

INSTRUCTION IN STATION SERVICE ON THE CHICAGO & ALTON

The passenger department of the Chicago & Alton Railroad has recently inaugurated a plan for instructing its station agents in the care and handling of tariffs, the manner in which passenger fares are made from the different stations, particularly in connection with the sale of interline tickets and the routing of such tickets, the care and handling and the issuance of tickets, and more uniform methods of conducting station office matters, such as keeping and filing station records, care and handling of baggage, baggage records, checks, etc., and the advertising and solicitation of passenger traffic.

In order that all agencies on the line should be thoroughly schooled and instructed in these matters the passenger traffic manager, George J. Charlton, recently arranged to send the chief clerk in his office, the chief rate clerk, the assistant to the general baggage agent, the auditor of passenger accounts and the general claim agent, together with the general agent and the division passenger agent of each division, on a trip over the line to meet the agents and give them complete and thorough instructions in all matters pertaining to their station work.

These men were provided with one of the road's official cars, and also a cafe car with a large observation room. Meetings were held in the observation room, and the safe end of the car was used to furnish meals, not only to the instruction party but to the agents in attendance at the meetings. Meetings were held at Dwight, Bloomington, Springfield and Roodhouse, Ill., and Mexico and Higginsville, Mo., and the agents from all stations within 50 miles from those cities were required to be present and in the car on the side track by 10 o'clock in the morning of the day on which the meeting was held. This plan made it possible for the agents to get to the meeting and to leave again in time to return home the same night.

It took just one week to cover the entire line of the road in a thorough manner, and the results of the first trip appeared so satisfactory to the officers that the trip will probably be made an annual affair. The party from the general offices took with them the necessary material in the way of rate sheets, time cards, folders, tickets, checks, maps and everything necessary to completely illustrate the various matters, which were discussed in informal lectures followed by a general questioning on both sides The agents and the principal ticket sellers at each station were given a chance to meet those with whom they are in frequent correspondence on passenger matters and to gain a clear understanding as to the necessity for many little things which have been required of them and which, perhaps, have appeared unimportant in the eyes of the agents.

The agents were most enthusiastic regarding the plan. They asked numerous questions and the representatives of the general office were given an opportunity for a better appreciation of various small difficulties and inconveniences under which many of the agents were working, thus paving the way for a little more sympathy between the department and its agencies, and more good fellowship and team work all around, and it is believed that the better understanding between the department and its agencies alone will be a big benefit to all concerned. A complete record was kept of each meeting and Mr. Charlton has received a number of letters from the agents thanking him for the opportunity presented and speaking highly of the expected results from the meeting.

PRIVATE CAR LINES NOT COMMON CARRIERS

The decision of the Supreme Court of the United States in the appeal of F. W. Ellis, general manager of the Armour Car Lines, against giving testimony concerning the doings of his company before the Interstate Commerce Commission, was reported briefly in the *Railway Age Gazette*, May 14, page 1027. The opinion is by Mr. Justice Holmes, and the decree of the district court, requiring Ellis to answer certain questions, is "reversed without prejudice." Certain questions in a long list are not disapproved.

The investigation begun by the Interstate Commerce Commission had to do with allowances paid for the use of private cars and the practices governing the handling and icing of such cars; minimum carload weights, etc. The decision is substantially as follows:

The Armour Car Lines is a New Jersey corporation that owns, manufactures and maintains refrigerator, tank and box cars, and that lets these cars to the railroads or to shippers. It also owns and operates icing stations on various lines of railway, and from these ices and re-ices the cars, when set by the railroads at the icing plant, by filling the bunkers from the top, after which the railroads remove the cars. The railroads pay a certain rate per ton, and charge the shipper according to tariffs on file with the commission. Finally it furnishes cars for the shipment of perishable fruits, etc., and keeps them iced, the railroads paying for the same. It has no control over motive power or over the movement of the cars that it furnishes as above, and in short, notwithstanding some argument to the contrary, is not a common carrier subject to the act. It is true that the definition of transportation in section one of the act includes such instrumentalities as the Armour Car Lines lets to the railroads. But the definition is a preliminary to a requirement that the carriers shall furnish them upon reasonable request, not that the owners and builders shall be regarded as carriers, contrary to the truth. The control of the commission over private cars, etc., is to be effected by its control over the railroads that are subject to the act. The railroads may be made answerable for what they hire from the Armour Car Lines, if they would not be otherwise, but that does not affect the nature of the Armour Car Lines itself. The petition of the Interstate Commerce Commission to compel an answer to its questions hardly goes on any such ground.

The ground of the petition is that it became the duty of the commission to ascertain whether Armour & Company, a corporation, was controlling Armour Car Lines and using it as a device to obtain concessions from the published rates of transportation, and whether Armour Car Lines was receiving for its refrigerating services unreasonable compensation that enured to the benefit of Armour & Company, all in violation of sections 1, 2, 3 and 15 of the act.

If the price paid to the Armour Car Lines was made the cover for a rebate to Armour & Company, or if better cars were given to Armour & Company than to others, or if, in short, the act was violated, the railroads are responsible, on proof of the fact. But the only relation that is subject to the commission is that between the railroads and the shippers. It does not matter to the responsibility of the roads whether they own or simply control the facilities, or whether they pay a greater or less price to their lessor. It was argued that the commission might look into the profits and losses of the Armour Car Lines (one of the matters inquired about), in order to avoid fixing allowances to it at a confiscatory rate. But the commission fixes nothing as to the Armour Car Lines except under section 15 in the event of which we shall speak.

The appellant's refusal to answer the series of questions put was not based upon any objection to giving much of the information sought, but on the ground that the counsel who put them avowed that they were the beginning of an attempt to go into the whole business of the Armour Car Lines—a fishing expedition into the affairs of a stranger for the chance that

something discreditable might turn up. This was beyond the powers of the commission. The Armour Car Lines not being subject to regulation by the commission its position was simply that of a witness interested in but a stranger to the inquiry, and the commission could not enlarge its powers by making the company a party to the proceedings and serving it with notice. Therefore the matter to be considered here, subject to the qualification that we are about to state, is how far an ordinary witness could be required to answer the several questions that are before the court.

It is to be observed that not every advantage that may enure to a shipper as the result of the position of his plant, his ownership or his wealth is a preference. But the intervening corporation may be a means by which an owner of property transported indirectly renders the services in question, and in that event its charges are subject to the commission by section 15. The supposed unreasonable charge may be used as a device to attain the forbidden end and therefore reasonable latitude should be allowed to see if any such device is used. But still until the Armour Car Lines is shown to be merely the tool of Armour & Company it has the general immunities that we have stated. With the foregoing general principles in view we proceed to dispose of the questions asked.

The questions concerning interlocking officers and relations between Armour Car Lines, Armour & Company and Fowler Packing Company, questions 1, 2, 3 and 7, should be answered. The only objection was on account of the general intent avowed as we have stated. So also questions 4, 5, 6, concerning the acquirement of cars previously owned by Armour & Company and Armour Packing Company, making the second group. Also questions 8, 9, 12 and 13, as to contracts of Armour Car Lines with Armour & Company and Colorado Packing Company for furnishing cars and icing service. The next group, so far as the questions concern the ownership, manufacture and repair of cars, Nos. 10, 11, 14, 16, 17 and 19, need not be answered, except 11 "where are the cars of Armour Car Lines repaired when not repaired in shops of railroads?" The last two groups concern matters into which the commission was not authorized to inquire. The fifth, questions 15, 20, 21, 25, 26, 27 and 28, called for statements showing profit and loss, credits and debits to income, etc., so far as the same related to transportation as defined in the act; and the sixth, Nos. 22, 23 and 24, for statements showing the amount invested in each icing plant and the detailed results of the operation of each, amount invested in each, cost per ton of ice at the source of supply, etc., all matters belonging to the private business of the Armour Car Lines and not open, if our interpretation of the law is correct. Our decision, however, must be without prejudice to the possibility that the case may be brought within section 15 by evidence to the effect stated above.

The decree of the District Court is reversed without prejudice.

Mr. Justice Day, while not differing from the general views taken by the court, is of the opinion that the nature of the inquiry under section 15 made it proper that all the questions should be answered.

RAILWAY DEVELOPMENT ASSOCIATION

The annual meeting of the Railway Development Association was held on May 11, 12 and 13 at St. Paul, Minn. The program included the following papers, many of which were followed by a general discussion: "Intensive Farming in the Irrigated District," by Dr. H. H. Harrington, St. Louis, Brownsville & Mexico; "Intensive Farming in the Drainage Belt," by B. E. Rice, Norfolk Southern; "Corn Growing in the Northwest," by D. E. Willard, Northern Pacific; "Immigration," by S. A. Hughes, Frisco Lines; "Why the Department of Railroad Development Work?" by M. V. Richards, Southern; "Colonization vs. Speculation and Exploitation," by C. L. Seagraves, Atchison, Topeka & Santa Fe; "Science and the Soil," by Prof. Henry G. Bell; "Relation of Live-Stock to Agriculture," by Prof. Thomas Shaw, Great Northern; "The Railroad Industrial Agent," by George Bonnell, Chicago & North Western; "The County Demonstration Agent as a Factor in Railway Development Work," by D. C. Welty, St. Louis, Iron Mountain & Southern; "The Value of Immigration to the Railways," by H. W. Byerly, Northern Pacific; "Erection of Buildings, Platforms, Coal Bins or Other Facilities by Railroad Companies," by John C. Emig, Cleveland, Cincinnati, Chicago & St. Louis; "Co-operating With Farmers," by G. E. Cassel, Norfolk & Western; "The Railways in the Settlement and Development of the Northwest," by E. C. Leedy, Great Northern; "A Better Agriculture," by R. F. Murray, Northern Pacific; "Northwest Immigration," by Wm. H. Killen, Minneapolis, St. Paul & Sault Ste. Marie; "Wealth in an Aggregation of Small Things," by Austin Gallagher, Western Maryland; "What Are the Prerogatives of the Industrial Agent?" by D. E. A. Schubert, Norfolk & Western; "The Field of the Agricultural Commissioner," by T. A. Haverstad, Minneapolis, St. Paul & Sault Ste. Marie; "Industrial Development," by Geo. E. Bates, Delaware & Hudson; "Conservation of Agriculture for the Northwest," by F. R. Crane, Great Northern; "Conditions Affecting Industrial Efficiency," by Grant Williams, Chicago, Milwaukee & St. Paul; "Service of the Development Man," by Rutledge Smith, Tennessee Central.

An informal banquet was held on Tuesday evening at the Hotel St. Paul. Allen D. Albert presided as toastmaster, and the speakers included Governor W. S. Hammond of Minnesota, Ex-Governor A. O. Eberhardt, and Prof. A. F. Woods, who spoke on the subject of "Agricultural Education Work." Officers for the ensuing year were elected as follows: President, John C. Emig, industrial agent, Cleveland, Cincinnati, Chicago & St. Louis; vice-president, L. J. Bricker, general immigration agent, Northern Pacific; secretary, H. O. Hartzell, assistant general industrial agent, Baltimore & Ohio Railroad; treasurer, D. E. King of the Missouri Pacific. It was decided to hold the next meeting of the association in New York in November.

INSPECTION OF LOCOMOTIVES AND TENDERS

The Special Committee on Relations of Railway Operation to Legislation has issued Bulletin No. 66, which shows the attitude of the roads regarding the rules and regulations in connection with the new federal law affecting the government inspection of locomotives and tenders. An abstract of the bulletin follows:

Replies to Circular 69 received indicate a very clear preference on the part of the roads, as is evidenced by the replies to the following questions:

Question	Answer Roads replying	
	Yes	No
1. Should the rules and regulations for the inspection of locomotive and tender be filed by the roads individually?	9	135
2. Should they be filed, if possible, by agreement between the roads?	103	37
3. Should a conference be sought with the Government representatives for the purpose of formulating a standard code?	131	22
6. Should the rules and regulations be confined, so far as possible, to inspection solely?	148	1

Roads operating 171,705 miles have authorized this committee to represent them in these negotiations. Roads operating 22,966 miles, while not specifically delegating this committee to represent them, have promised co-operation and have named representatives. Replies have not been received from roads operating 26,297 miles.

The committee will, therefore, undertake these negotiations with the government on the understanding that should any radical differences of opinion develop as between the roads which it is authorized to represent and those which will deal with the subject individually, it will report the fact with a suggestion for further procedure.

The negotiations will be undertaken by the Conference Com-

mittee of Mechanical Officers, which consists of the following gentlemen:

C. E. Fuller.....S. M. P. & M.....Union Pacific (Chairman).
A. W. Gibbs.....Ch. Mech. Engr....Pennsylvania.
F. H. Clark.....G. S. M. P.....Baltimore & Ohio.
D. R. MacBain....S. M. P.....New York Central.
R. E. Smith.....G. S. M. P.....Atlantic Coast Line.

The following gentlemen will be asked to act with this Committee of Conference in order to provide for the widest representation:

H. T. Bentley.....S. M. P. & M.....C. & N. W.
F. F. Gaines.....S. M. P.....Central of Georgia.
John Purcell .....Asst. to V. P.....A. T. & S. F.
W. H. V. Rosing..Spec. Engr. .....St. L. & S. F.
C. B. Young.....Mech. Engr. .....C. B. & Q.

It is understood that the chief inspector of locomotive boilers desires co-operation in the formulation of the rules and instructions necessary under the act. In view of this fact it is strongly recommended that the railroads do *not* file with the chief inspector any rules or instructions of their own until further advised by circular.

STATISTICS OF EXPRESS COMPANIES FOR 1914

The Interstate Commerce Commission has issued a report on the statistics of express companies in the United States compiled from returns made by the companies for the year ended June 30, 1914. This is the sixth report in the series and covers statistics of the 11 important companies. The total mileage covered in the operations of the express companies as of June 30, 1914, was 305,690, as compared with 301,621 for 1913. This includes coastwise, river and lake mileage, but does not include ocean mileage or any mileage in foreign countries except Canada and Mexico. The steam road mileage was 256,183; electric line mileage 7,680; steamboat line mileage 40,929 and the stage line mileage 896. The total express mileage increased 4,069 miles in 1914, as compared with 1913. The mileage on steam roads increased 4,357 miles. The greatest total mileage shown is that for Wells, Fargo & Company, 99,017, of which 63,692 was steam road mileage. Of the companies listed, eight show increases during the year in mileage covered, two showed decreases and one, the Globe Express Company, shows the same number of miles for 1914 as for 1913. In the steam road mileage the largest increase was that of the Canadian Express Company, 2,551 miles, practically all of which represents the extension of service over the line of the Grand Trunk Pacific.

Tables are given in the report showing mileage by states and territories for 1914 and 1913, cost of real property and equipment, inventory value of equipment owned, income account and profit and loss account, analysis of operating revenues, analysis of operating expenses, general balance sheet statement and statement of financial paper issued during the years 1914 and 1913.

The total cost of real property and equipment for 1914 is given as $33,994,114, of which $16,446,268 represents real estate, buildings and fixtures, of which $6,708,172 represents vehicles, $3,849,554 horses, and $4,470,759, office equipment. The cost of cars is stated at $603,786. The total inventory value of equipment is given as $12,652,618, whereas in 1913 it was $13,555,714.

The income account and profit and loss account for the two years, showing a decrease of nearly $10,000,000 in gross receipts and of over $4,000,000 in net operating revenue, is as follows:

INCOME AND PROFIT AND LOSS ACCOUNT

Income Account	1914	1913
Operating income:		
Gross receipts from operation	$158,891,326.67	$168,880,923.13
Express privileges—Dr.	79,906,078.38	83,872,497.17
Operating revenues	$78,985,248.29	$85,008,425.96
Operating expenses	77,221,993.81	79,215,707.71
Net operating revenue	$1,763,254.48	$5,792,718.25
Outside operations:		
Revenues	$428,155.25	$310,201.37
Expenses	462,041.80	370,133.67
Net revenue from outside operations	*$33,886.55*	*$59,932.30*
Total net revenue	$1,729,367.93	$5,732,785.95
Taxes accrued	1,491,698.62	1,379,258.40
Operating income	$237,669.31	$4,353,527.55
Other income	4,531,740.46	5,563,792.18
Gross income	$4,769,409.77	$9,917,319.73
Deductions from gross income:		
Separately operated properties—Loss	$66,674.39	$14,009.79
Interest accrued on funded debt	784,371.97	801,578.75
Other interest	237,235.21	157,644.92
Other deductions	181,406.95	333,196.87
Total deductions	$1,269,688.52	$1,306,430.33
Net corporate income	$3,499,721.25	$8,610,889.40
Disposition of net corporate income:		
Dividends from current income	2,986,250.24	4,679,823.44
Appropriations for other reserves	.....	6,594.72
Balance to profit and loss	$513,471.01	$3,924,471.24
Profit and Loss Account		
Credit balance on June 30, previous year	$60,165,377.81	$61,955,552.88
Credit balance brought forward from income account	513,471.01	3,924,471.24
Additions for year	985,279.17	161,910.04
Deductions for year	31,453,815.91	3,704,500.29
Dividends declared out of surplus	2,577,683.46	3,172,056.06
Balance, credit, carried to balance sheet	$27,632,628.62	$60,165,377.81

It is stated in a footnote that the decrease of $32,532,749 in the credit balance carried from profit and loss account to the balance sheet, aside from the effect of the decrease of over $4,000,000 in net operating revenue, is substantially represented in special charges to the profit and loss account of the Adams and American companies. The Adams company during the year fixed its capital stock at the sum of $12,000,000, and the specific liability for capital stock was included for the first time in 1914 balance sheets of the company. The charges made by the American Express Company are adjustment of book value of securities owned by company, $3,077,930 and distribution to share holders of Wells, Fargo & Company stock held by company of $9,000,000.

TRAIN ACCIDENTS IN APRIL

The list of notable train accidents occurring in the United States in the month of April (made up by us, as usual, from reports found in the daily papers) is so short that a tabular statement is not necessary. One collision and one derailment, as noted below, are all that we have found which may properly be classed as "notable," and, so far as casualties are concerned, even these are relatively unimportant.

On the Atlantic Coast Line near Tarboro, North Carolina, on the twenty-fourth, northbound passenger No. 42 collided with a southbound freight. Both engines were slightly damaged and three passengers and the Pullman conductor were slightly injured. The freight had encroached on the road-right of the passenger train without proper flag protection.

On the Missouri, Kansas & Texas near Higbee, Mo., on the 29th a northbound passenger train was derailed and three cars were damaged. Three passengers were injured, but not seriously. The train was moving at about 35 miles an hour, and the derailment is believed to have been due to a soft spot in the track, on the inside of a curve, due to heavy rain.

Electric car accident.—At Detroit, Mich., on the 14th a street car was run into by a switching freight, at a crossing, and 15 persons were killed and 20 injured. This accident was reported in the *Railway Age Gazette* of April 16.

BUSINESS AT VLADIVOSTOK.—There has been a great increase recently in imports to Vladivostok for transmission to Siberia and Russia over the Trans-Siberian, says an Ashai despatch, especially in those from America. Four or five steamers of 4,000 to 5,000 tons are constantly in harbor awaiting their turn to discharge cargo. The cargo congesting the landing place is rapidly increasing, and the warehouses recently built to store wheat for export have been leased by the custom house. The Chinese Eastern has been doing all in its power to provide freight cars, but is unable to meet the increasing requirements. American cotton forms the bulk of the goods imported. Already 100,000 bales have arrived and 300,000 are on their way to Vladivostok.

International Railway Fuel Association Convention

Powdered Coal for Locomotives; Fuel Stations and Coal Storage Methods; and Smoke Prevention in Chicago

The seventh annual convention of the International Railway Fuel Association was held in the La Salle Hotel, Chicago, May 17 to 20, D. R. MacBain, superintendent motive power and rolling stock, presiding. The convention was opened with prayer by Rev. John W. Nicely.

PRESIDENT'S ADDRESS

Mr. MacBain said in part: "I am a great believer in the educational phase of the question of fuel. To render efficient service economically in any particular line, familiarity with its details is essential, and this is the more particularly true, perhaps, in the case of the man who actually handles the coal between the locomotive tender and the firebox. For fuel might be purchased with the utmost skill, receive the best attention as to grade and preparation by the railroad company's inspectors, be carefully passed from the coaling plant to the tender and then might be subjected to the grossest kind of misuse and extravagance. The firemen need practical instruction on the road, the more they get the better, and the more efficient and economical will be their services. With this practice in vogue, I am positive that the salaries of the instructors will appear as assets, doubled and trebled, on the auditors' books."

ADDRESS BY MR. SCHOYER

A. M. Schoyer, resident vice-president, Pennsylvania Lines West, made a most interesting address after commenting on the very creditable work of the fuel association. In his address, he said in part:

"It seems to me that one of the burning questions of the day, from a railroad standpoint, is what shall the railroads do either to offset the continuing demand for increased wages or to get the relation of employer and employee on a sounder basis, where right will be considered, instead of might or expediency.

"Three remedies have been suggested—first, government ownership of railroads. I hope that should this country ever adopt government ownership, that I may be out of the railroad business before it is done. The party and administration which are in power when the railroads are once taken over by the government will probably remain in power thereafter as long as they want to. With over two million men working for the railroads and with ten million women and children dependent upon them, any administration having the appointive power can have a force of practically five million railroad votes in hand at all times. Woe to the time and country when any one party or man can have such unlimited power. With ward politicians acting as general managers, state politicians handling the policy, national politicians handling the finances and labor leaders handling the labor questions, there would be no need of arbitration for the wages would be increased upon the asking. There would be no strikes for there would be nothing to strike about. It has always seemed to me that the reduction of interest argument is not at all sound. The government's ability to borrow at a cheap rate of interest is due to the confidence which people have in its ability to pay. With the railroads in the hands of the government, with rates probably continually being decreased, in order to favor special lines of voters, and with wages being increased to favor special lines of labor unions, with incompetent supervision of details the growing deficits would have to be raised by taxation, and it is quite certain to my mind that the result of such losing operations would be that the credit of the government would suffer and rates of interest go higher and higher. I shall, therefore, lay aside the thought of government ownership settling the relations of the men and the railroads.

"The second solution, which has been suggested, is that if the law should provide and the Interstate Commerce Commission should authorize that whenever railroads must through arbitration increase the wages of the employees in any branch of service they be also authorized to increase their freight rates automatically. If an arbitration should give the men an increase of wages of 6 per cent, then the railroads should be authorized to increase freight rates, say 3 per cent. How long the farmer would stand this I do not know; probably once. How long the public generally would stand it I do not know. They might stand it twice. But such a law would soon become so unpopular and would be so burdensome that we might readily expect it to be changed by unanimous consent in a very short time. Therefore, I do not believe that this would solve the question, except for a very short period of time.

"With very great diffidence I bring forward a third solution, compulsory arbitration. Not arbitration as under the Canadian law, which is not entirely compulsory; not arbitration as under the American law, which is entirely optional; not arbitration as exists in any country today; but a law which would compel employer and employee to submit their differences to a court of arbitration, after having done all they could together to solve them.

"I think the court should be constituted by the appointment of three, five or the required number of judges by the President, with the required approval of the United States Senate and of the chief justice of the Supreme Court; the judges to hold office for 10 years, to receive a large and adequate salary, to be removable only for malfeasance in office, and with the approval of the President, the Senate and the chief justice of the Supreme Court. The law should provide that the man should be of adequate ability in the minds of those who appoint him; that he should not have been a railroad officer nor a member of a labor union for five years prior to his appointment. The law should require that no lockout or strike should occur hereafter on railroads, but that when the employers and employees have exhausted their means of getting together they should unitedly refer the matter to the court of arbitration. The decision of the court should be binding; not to be appealed from, except as to errors of law appearing on the record.

"No doubt such a court would be crude at the start. The judges would not know the railroad business nor would they be acquainted with labor difficulties, but, being absolutely free from all politics, political influences, or financial embarrassment, they would, as all men do under similar circumstances, become more and more fair and enlightened and conservative as the time went by.

"Such a law, would, of course, meet with tremendous storms of protest from the employees. It would take from them their liberty to strike, but the law should provide that no requirement of the law should interfere with rights of the men as individuals to leave the employment of the railroads at their own volition. It would meet with indignant protest from the railroad companies, who would feel that it took away from them the right to settle their own questions, both of a financial and disciplinary nature, but the law should provide that nothing in the law should prevent the railroad companies from discharging individual men for cause.

"If these objections could be overcome, and if the law could be passed, it seems to me that its effect would be to stop the unreasonable demands from going to the limit of persecution. Neither the employers nor the employees would be willing to go to the limit of submitting matters to this court unless they were assured of the justice of their positions, and, in the course of time, labor and capital, as applied to the railroads, would find their own relations."

POWDERED COAL*

By W. L. Robinson
Supervisor of Fuel Consumption, Baltimore & Ohio

Coal in a finely divided or powdered state represents the most advanced method for producing perfect combustion, thereby making it possible to more nearly obtain the full heat value of the fuel than by any other known means. While a cubic inch of solid coal exposes only 6 sq. in. for absorption and liberation of heat, a cubic inch of powdered coal exposes from 20 to 25 sq. ft., which enables the more uniform gas production from the volatile matter in the coal and the more prompt and perfect intermingling of gas and air, thereby improving combustion and reducing smoke. Furthermore, there is no cooling of the fire by heavy intermittent charges of fresh coal, and consequent production of lost heat, as is the case with hand or stoker firing on grates.

The mechanical production of coal by machine undercutting and shearing and by powder mining has materially affected the grade of coal produced, by increasing the percentage of dust and slack, which in some instances is as high as from 45 to 55 per cent of the total mine output. The generally recognized waste, unsalable or otherwise low-value coal mine products, such as culm, slack, mine sweepings and dust, all of which are suitable for converting into the powdered form, represent practically the same acreage and mining cost per ton as the commercial grades. Moreover, by powder mining and mechanically exhausting coal in a fine state suitable for powdering, out of shallow, faulty, inferior quality and otherwise undesirable abandoned operations, much fuel that is now going to waste could be advantageously mined and utilized. Furthermore the annually increasing expense to produce the inferior qualities and grades of coal in the mining operations, now make it essential that the railways utilize as much as possible of the inferior grades and qualities of local fuel supply available, in order to conserve the better mine output for commercial revenue tonnage in the domestic and foreign trade.

In general, powdered coal, to give the best results as regards complete combustion and the least trouble as regards ash and slag, should contain not more than 1 per cent moisture, and be of a uniform fineness, so that not less than 95 per cent will pass through a 100-mesh, and not less than 85 per cent through a 200-mesh, and not less than 70 per cent through a 300-mesh screen. The cost for preparing powdered coal will vary with the cost for the raw coal and its moisture content. However, a general average from available data covering periods of the past five to ten years at cement and metallurgical plants will enable the following conservative estimate, assuming the cost of the raw coal at from $1 to $2 per short ton, and that it will require crushing and have a moisture content of from 5 to 10 per cent, when placed in the dryer.

Capacity of plant in short tons per hour	Average total cost for preparation per short ton
2	From 25 to 50 cents
3	From 20 to 45 cents
4	From 16 to 40 cents
5	From 14 to 35 cents
10	From 12 to 30 cents
25	From 10 to 20 cents

The fuel required for drying the coal will average from 1 to 2 per cent of the coal dried. The distribution of the total cost may be approximately stated as:

Fuel for drying	10 per cent
Power for operation	30 per cent
Labor	30 per cent
Maintenance and supplies	25 per cent
Interest, taxes, insurance and depreciation	5 per cent
Total	100 per cent

The cost for preparing powdered coal should be more than offset by the ability to utilize the cheaper grades of fuel.

Finely divided coal dust gives off gas at normal atmospheric temperature, but any pulverized coal coarser than that which will pass through a number 100-mesh screen is liable to explosion only when distilled by the heat or compression of a primary ignition. The finer than what will pass through a number 100-mesh screen carries no danger unless combined in a dry state, in floating suspension in nearly still air and mixed with the requisite amount of oxygen at the requisite temperature to produce "chemical tension" or primary ignition.

Powdered coal may be burned by either of two generally defined methods: The first, or long-flame method, constitutes a progressive burning of the coal. This combustion is accomplished by projecting the primary air which carries the fuel into the furnace with high velocity, the additional air (about 75 per cent) required for combustion being blown or induced into the furnace from other sources. The second, or short-flame method, has been the latest development. This process involves a flame of relatively short travel, and consists of admitting the entire air supply needed for combustion into the furnace with the fuel at low velocity. In the application of powdered coal to a New York Central locomotive, a combination of the long and short-flame methods has been used.

But very little descriptive data as regards the equipment that is essential for burning powdered coal in locomotives has been obtained. However, it may be stated that the principal requirements are: An enclosed fuel container; means for conveying the fuel to the feeders; means for commingling the fuel with air at the time of and after feeding; supplying the proper amount of air to produce a combustible mixture at the time the fuel and air finally enter the furnace; a suitable refractory-material furnace in the firebox; means for disposing of the slag; means for producing the proper draft through the furnace and the boiler; means for harmonizing the draft and the combustion; suitable power for operating the fuel and air feeding mechanism, and an automatic and hand control of the fuel and air regulation.

It is understood that the developed equipment for burning pulverized fuel can be readily applied to all existing modern types of steam locomotives without any changes in the bo except to install arch brick supporting tubes, where fireboxes are not now equipped, and to remove the grates, ashpan and smokebox draft appliances. There is no equipment in the cab except the automatic hand control, which is placed in a position convenient to the fireman. The enclosed fuel container is suitable for either powdered coal or fuel oil, and either kind of fuel can be used by merely changing the feeding equipment. The total weight of the equipment applied will about equal that of the equipment removed.

The information pertaining to the operation of powdered coal burning equipment is also vague. It is understood, however, that for firing up a locomotive, the necessary draft through the boiler is obtained by means of the usual stack steam blower, after which a piece of lighted waste is placed in the fuel and air conduit leading to the firebox, and one of the fuel feeders is started.

SOME BENEFITS TO BE DERIVED FROM ITS USE

With powdered coal the tendency toward the more uniform, intense and sustained firebox temperature, as well as the automatic, continuous stoking of the fuel and the burning in suspension; feeding of practically dry fuel to the furnace; reduction in the clogging and leakage of flues and the reduction in the various heat losses, should all tend to maintain the boiler capacity at its maximum effectiveness under varying operating conditions.

Through the burning of powdered coal in suspension, the necessity for over or under-feeding fuel to grates or retorts is eliminated, and as there are no grate fires to require cleaning, it enables the establishing of the most economical length of locomotive run for the train service to be performed, and the reduction of engine house terminals. As locomotives burning oil are being regularly and successfully operated on runs from 300 to 450 miles each way, the same should be entirely feasible when burning powdered coal.

The use of bituminous coal in a powdered form seems to be the logical solution of the smoke, cinder and spark questions

*See also article on "The Use of Pulverized Fuel for Locomotives," published in the *Railway Age Gazette* of April 30, page 941.—[Editor.]

at engine houses, terminals and on the road, and one that should greatly reduce the loss of heat and fuel cost resulting from imperfect combustion in existing and future steam locomotives.

The elimination of ash pans, grates, smokebox, diaphragm, baffles and nettings substantially reduces the retardation of the products of combustion through the boiler.

With powdered coal, the fuel is supplied to an enclosed, air-tight container on the tender (suitable for either powdered or liquid fuel), prepared to uniform fineness and thoroughly dried, so that when fed to the furnace it immediately produces effective heat. Furthermore, the coal is not touched by hand or shovel from mine car to furnace and there is no loss by pilfering, dropping from the tender container, gangways, through holes in deck, or by firemen shoveling undesirable fuel off the tender on right-of-way.

When powdered fuel is used, the refractory-material furnace retains its heat and prevents the chilling of the firebox and flues, even though the supply of fuel may be cut off and therefore reduces the liability of firebox leakage.

When being worked at from one-half to maximum boiler horse power capacity, a locomotive boiler equipped with a superheater will range from 65 to 55 per cent boiler efficiency, this being representative of the best grate fire practice. Taking into consideration the effect of burning powdered coal in suspension on the various heat losses enumerated, it is most conservative to place the saving to be effected at 25 per cent of the coal fired, actual performance to date having shown as high as from 30 to 40 per cent saving.

The time required for building, cleaning or dumping fires at terminals and cleaning flues and smokeboxes on steam locomotives represents a large percentage of the maximum non-productive delay to power, and is directly responsible for much road and yard crew and shop labor expense. With powdered coal there are no grate fires to clean; the extremely fine nature of the ash and absence of cinders causes practically no accumulation in the flues or smokebox.

As the sulphurous and other poisonous gases resulting from combustion tend to precipitate with the liquid ash into slag, the poisonous and suffocating effect of the products of combustion emitted from the stack is materially reduced.

The use of powdered coal (due to absence of cinders, sparks, ashes, etc.), would reduce cementing of ballast and lack of drainage of roadway, burned out ties and the cost for forking ballast.

As the larger locomotives now frequently require the feeding of from 4,000 to 10,000 lb. of coal per hour to produce their rated hauling capacity, the effectiveness of the boiler is dependent largely on the intelligence and physical qualifications of the fireman. However, with powdered coal and automatic mechanical mixing of the fuel and air and its combustion in suspension, no manual labor is required, and the human element is practically eliminated.

Discussion.—The members participated freely in the discussion, there being some skepticism as to the ultimate outcome of the use of powdered coal. E. H. Stroud, of E. H. Stroud & Company, stated that the coal must be powdered to the correct fineness and that it must be uniformly fine if the best results are to be obtained.

Complete combustion must be obtained to prevent the formation of cinder slag and if the furnace is correctly designed there should be no trouble with the accumulation of slag on the flues. The air and the fuel passed through the burner should be definitely measured, and to accomplish this he strongly recommended that the air necessary for the complete combustion of the powdered fuel be admitted only through the burner. Where air is used to separate the fine from the coarse particles in the process of pulverizing—a coal with 10 per cent. moisture will be reduced to 7 or 8 per cent .moisture. He also recommended a lazy flame, stating that in stationary plants this would give a temperature that could be regulated from 1,800 to 3,600 degs. F. In this same service savings as high as 50 per cent. in fuel of a low price have been made. He gave estimates of 15 cents per ton as the cost for pulverizing fuel at the rate of 5 tons per hour and 4 to 5 cents per ton for drying the coal. From his experience he found that a draft of only ⅜ in. (water column) was required. He recommended a coal with not less than 25 per cent. volatile.

Joseph Harrington, of the Powdered Coal Engineering & Equipment Company, called attention to the effect the use of powdered coal on locomotives would have in postponing the necessity of electrification at large terminals such as Chicago, and spoke to some extent on the large field this type of fuel offers to the railroads.

J. E. Muhlfeld, president of the Locomotive Pulverized Fuel Company, presented a written discussion, in which he confirmed the conclusions derived from Mr. Robinson's paper. He showed that if the powdered coal equipment was applied to all types of locomotives an annual saving of millions of dollars could be made in the cost of fuel to the railways.

Other speakers who have had experience in the use of powdered coal spoke strongly in its favor, and all called attention to the necessity of having the powdered fuel dry, the maximum moisture being placed at 2 per cent.

Mr. Robinson stated in his closure that tests have shown that only 15 lb. of dust was found in the locomotive frontend after a test of two weeks and that evaporation of 8½ to 12 lb., from and at 212 deg., had been obtained.

FUEL CONDITIONS IN SOUTH AMERICA

By James W. Hardy

Sales Agent, West Kentucky Coal Company, New Orleans, La.

Chile, under normal conditions, uses about 3,000,000 metric tons of coal annually; about one-half of this amount comes from foreign countries and the other half is produced at home. In addition during the year 1913 they used 230,845 tons of oil. The physical characteristics of the coal are about the same as Illinois or Oklahoma coal, but considerably lighter, and they use more of it to do the same work than they do of either Welsh or Australian coal. Local coal is sold for considerably less than foreign coal on account of its lightness and preparation. The prices paid for railway coal by the Chilean government for the past eleven years range from $4.44 to $7.28 (in our gold) per short ton, and the average was $5.62 per short ton for all coal. Their specifications were drawn up in such a way that they practically exclude North American coal. They place a limit of $2.11 (Chilean) per 1,000,000 calories (based on kilograms of fuel). This would mean a price of $4.86 per short ton for coal running 12,800 B. t. u. per pound. In addition to this 5 per cent moisture, 15 per cent ash and 2 per cent sulphur was the maximum and a further limitation of 15 per cent screenings through a ½-in. bar screen, set at an angle of 45 deg.

They have used briquettes to some extent in Chile until the European war started, and prefer them to coal and pay about 10 per cent more for them. They prefer to handle them, and so do the ship people prefer them as freight, as they can be loaded and unloaded more rapidly and with less waste.

Peru is not developing her fuel supply to the same extent or as rapidly as Chile and uses much less coal than Chile. The coal mined in Peru is of such inferior grade that its use was discontinued on locomotives; it clinkered badly and ran over 20 per cent ash, fusing at a very low temperature. The Peruvian steamship line uses oil altogether.

Freight rates to South American ports are cheaper from Australia than they are from the United States. Coal is placed on ships at $2.50 per metric ton and taken across in sailing vessels at from $4.30 to $5 per ton freight charges, English coals at $1 to $1.50 higher. The freight cost to get North American coal down there is considerably more than this. The toll through the Panama canal is $1.20 per 100 cu. ft. of carrying capacity, so it costs about 60 cents per ton to get coal through the canal. The best ocean freight rate to the west coast would be between $5

and $6 per ton. The rates have a wide range of fluctuation; they go largely on the theory of "charge all the traffic will stand" and this very feature is a grave danger in getting tied up in contracts for fuel deliveries to those countries.

I only wish the people in the United States, who are clamoring so vigorously, loudly and persistently for government ownership, could see and ride on the government railways of Chile. I am sure they would then be glad and contented to allow things on the railways of the United States to be handled and operated as at present and with, at least, their moral support. The railway between Valparaiso and Santiago is a 66-in. gage track, poorly kept up, coaches dirty and badly in need of paint and varnish, freight cars in a dilapidated condition, coupled with hooks and chains the same as the safety chains between our engines and tenders. No air brakes or safety appliances, not even grab irons. The engines are all much cleaner than they are in the United States. Engineers (drivers as they call them) receive $2.25 to $2.50, and firemen $1.40 to $1.90 per day on a basis of our money. The position of engineer or fireman is not thought much of and their responsibilities are not recognized as they are with us; their social position does not compare with ours in any way.

Their standard shovels were quite a curiosity. The blade is 18 in. long, 6 in. wide, 2 in. deep and has a handle 53 in. long with a little knob on the end. These shovels hold 7 to 9 lb. and are very inconvenient to handle. The fire doors are very small and are left open nearly all of the time. There is a deflector just above the door on the inside set at an angle of about 30 deg., which throws the currents of cold air down on top of the fire, so there is apparently no bad effect on the flues from leaving the door open. They never shake the grates because they are all stationary. They put the coal in about as it burns, and it is astonishing to see how little is in their fireboxes at the end of the run. The freight cars are 10 to 15 tons capacity, although there are some of 30 tons capacity; the smaller size being the favorite. The road is lined with scrap; thousands of dollars' worth being eaten up by the rust. They charge you as much for the baggage as they do for the passenger in some places. The passengers are divided into two classes and they pay according to class; their comforts are about in proportion to the classification.

The Peruvian Corporation Company of London, England, controls nearly all the railways of Peru; they are government owned and were operated by the government for years, but the operation was so faulty and expensive that it nearly bankrupted the country. The service was so poor and uncertain that they were finally taken over by the above corporation to operate for a period of eighty years, and under the able management of such men as J. H. Feehan, who is a native of the United States, they are being placed on a safe basis and are beginning to pay and improve.

The Oraya Railway or Peruvian Central runs out of Lima and crosses the Andes mountains at an elevation of 15,665 ft. above sea level. This is one of the most wonderful pieces of railway engineering and the highest railway in the world. In going 106 miles the main line rises steadily from sea level with an average grade of about 4 per cent, clinging to or boring through solid rock almost the entire distance, to its highest point at Ticlio. There are 65 tunnels, 67 bridges, many of them perfect marvels of construction. Sixteen switch backs are located at various points where the steepness of the mountain permits of no other means of ascent. They have 65 locomotives, both English and American oil burners.

We in the United States have no idea how the cataclysm in Europe has affected South American countries. Train service is reduced in many places to a passenger train per week; shops are working two days per week with reduced forces; thousands of people are out of employment and in destitution.

There have been numerous articles in the newspapers about the great possibilities of our walking away with *all* of the South American trade. We need educating in these matters more than do the people in South America. To do business extensively with South America we must establish banking facilities with them. We must extend long credits, six months to a year at least; we must teach them the American dollar instead of the English pound. We must find a home for their exports; their regular markets are now closed and, as their revenue is largely from exports, how can they buy or pay, unless they can borrow or sell? Representatives must go down there and live; learn the language, customs and habits of the people, their needs and requirements and cater to them. Make things the way they want them instead of trying to convert them to our standards, and then sell at reasonable profits. Of the total tonnage imported by Argentina, Brazil, Chile and Uruguay, only 5.17 per cent comes from the United States.

ANALYSIS OF DEPENDENT SEQUENCE AS A GUIDE TO FUEL ECONOMIES

By Harrington Emerson

The Emerson Company, Efficiency Engineers, New York

With a good steam engine, a good furnace and a good boiler, a horsepower can be produced from one pound to a pound and a half of coal. The steamers of the Inch Line have long records of one pound per 1 hp. The Lusitania, with all her auxiliaries, uses about 1.5 lb. The indicated horsepower generated by all the locomotives of the country when pulling trains, divided into the total fuel, amounts to between 4 and 6 lb. I intend to speak of those attainable ameliorations in our locomotive practice as might reduce the 6 to 4, the 4 possibly to 3.

To bring about attainable reductions, there are three essentials: Complete knowledge of what is taking place from mine to ash pit; an organization that is capable of taking hold of the subject; an organization that is competent to solve the problems.

The first step towards the solution of the problem is to set down what we do know of all the steps from mine to ash pit. It will be found that there are some sixty different, distinct steps and that they form what is technically called a dependent sequence. Unlike the links of a chain, which are in dependent sequence, the use of coal is one in which any loss that occurs in the first term is carried on into the second, the losses in the second link or term are carried on into the third link, and we find suddenly that we have frittered away all the strength there was.

Dependent Sequences in Coal Use in Locomotive Operation

Sequences					
1 to 23	23	A	Administrative inefficiencies	51	per cent
24 to 32	9	B	Shrinks in quantity between purchase and use	92	per cent
33 to 45	13	C	Wastes due to poor design	69	per cent
46 to 52	7	D	Wastes due to poor firing	71	per cent
53 to 58	6	E	Wastes due to poor running	88	per cent
	58			20	per cent

Probably in no case do all the possible losses occur cumulating on any single road, but probably on every road there are at least 30 different kinds of losses. As to each of the fifty-eight a separate analysis would be desirable, an analysis that each must make for himself. I shall content myself with a few indications and a very elementary estimate of the loss that may be occurring.

A.—Administrative Losses.—These far exceed all others, but it is the fireman and engineer who get the most blame.

1—Eff. 99.5 per cent. Buying too much coal. Coal costs money and money carries interest. For a road spending $6,000,000 for coal at $1 a ton the difference between a two months' supply and a two weeks' supply amounts annually to $45,000 a year, or the loss from this source might amount to 0.5 per cent.

2—Eff. 96 per cent. Paying too much. This is much more serious. Coal contains B. t. u's, and this is all that makes it valuable. Wise buying might secure 5 per cent more B. t. u's for the same money. This has proved feasible in industrial plants and on railroads as to other items than coal.

3—Eff. 95 per cent. Buying wrong kind of coal (clinkering, coking, etc.). Certain coals containing 60 per cent of B. t. u's of another coal or—The type of coal may make a very great difference. Wisdom as to this matter might make a difference of 5 per cent.

4—Eff. 94 per cent. Unnecessary transportation. Probably $0.60 a ton

is added to cost of coal on long roads by transportation charges, of which $0.06 might be saved by wise routing.

5—Eff. 98 per cent. Unnecessary handling expenses, loading and unloading, detention of cars, etc.

6—Eff. 90 per cent. Wrong sizing of coal. A. G. Kinyon, a recognized authority, estimates the difference between properly sized coal and usual run at 10 per cent.

7—Eff. 98 per cent. Loss in value of coal due to weathering. In some coals this is very great, as much as 10 per cent in a year. It might be conservatively estimated at 2 per cent.

8—Eff. 99.7 per cent. Moisture in coal. Even if the coal absorbs 5 per cent of moisure the loss is small, about one-third of one per cent.

9—Eff. 99 per cent. Bad water conditions, indirectly affecting coal consumption. Our experience has been that when water was very bad, coal consumption for similar trains and locomotives is higher.

10—Eff. 95 per cent. Scale on tubes and other fire surfaces. F. W. Foltz, fuel supervisor of the Missouri Pacific, stated that the fuel losses due to this cause were enormous. They undoubtedly might be far worse than the 5 per cent allowed.

11—Eff. 99.7 per cent. Leaks from boiler.

12—Eff. 99 per cent. Broken grates. Causing excess of air and waste of coal before being burned.

13—Eff. 97 per cent. Use of cold water and frequent changes. On a road using 6,000,000 tons, this loss probably amounts to $200,000 a year.

14-15-16-17—Eff. 85 per cent. Terminal and roundhouse losses. Mr. Foltz's estimate of terminal and roundhouse losses is 15 to 30 per cent of total fuel bill.

18—Eff. 98 per cent. Detentions on side tracks.

19—Eff. 99 per cent. Short sidings and other unnecessary see-sawing of trains.

20—Eff. 99 per cent. Uneconomical grades. It is very easy to lose money on a grade in order to try to save it on coal. There are, however, sags and fills that have altered original grade that if corrected would favorably affect all operation, including coal.

21—Eff. 98 per cent. Uneconomical loading.

22—Eff. 98 per cent. Wrong assignment of power.

23—Eff. 98 per cent. Unscientific time schedules. Based on distance rather than grades.

If all these inefficiencies should occur on the same road, only one as high as 10 per cent, many of them less than 1 per cent, the end result would be under 51 per cent.

B.—Shrinks in Quantity Between Purchase and Use.—The locomotive is generally charged with coal purchased, not with coal used. These losses are partly due to dishonesty and partly due to carelessness.

24—Eff. 99 per cent. Incorrect mine weights (dishonesty).

25—Eff. 99.5 per cent. Incorrect car weights (carelessness). A car, owing to mud, etc., is more apt to be more than stenciled weight. The extra weight is paid for as coal.

26—Eff. 98 per cent. Biased weigher.

27-28-29-30—Eff. 97.5 per cent. Loss in transit (coal that drops off or is thrown off, loss in loading tenders, loss from tenders). These losses, although small, are like a continuous leak. One railroad supervisor told me that the loss on commercial coal in transit was 2.5 per cent. It is not less for company coal.

31—Eff. 99 per cent. Diversion from coal in transit. I knew a flouring mill which operated for a year on stolen coal, whole car loads being diverted, after being weighed and charged to coal bunkers.

32—Eff. 99 per cent. There are other diversions, as when coal from bunkers is used for office and roundhouse fires, etc., coal used perhaps for company but not used on locomotives. These dishonesties and semi-dishonesties amount perhaps to as much as 2 per cent. The end result is about 92 per cent.

C.—Waste Due to Poor Design.—The best stationary steam engines use about one pound of coal per 1 hp. The ordinary commercial steam engines use from 3 lb. to 20 lb. The conditions under which a locomotive operates are extraordinarily difficult. The power installation is mounted on wheels, the machinery must be rugged rather than accurately finished. Every element of standard operation varies from minute to minute. The fuel, the water, the load varies. It is, therefore, inevitable that severe losses occur from poor design. In good stationary practice 80 per cent of the heat in the coal passes into the water. In locomotive practice very rarely as much as 50 per cent. There is, therefore, a shrink of about 30 per cent in coal efficiency to be charged to design and conditions of operation. Two-fifths of this might possibly be eliminated and if distributed might be apportioned as follows:

33—Eff. 99 per cent. Design of firebox.

34—Eff. 98 per cent. Size of firebox.

35—Eff. 95 per cent. Diameter and length of tubes.

36—Eff. 95 per cent. Front end design. In an English test 375 hp. out of 2,000 was used in creating draft. M. C. M. Hatch, superintendent fuel service, D. L. & W., states that only 19 per cent of front end vacuum pump is effective at fire.

37—Eff. 98 per cent. Poor ash pan design. Air openings should be 14 per cent of grate openings and about 100 per cent of tube opening area.

38—Eff. 98 per cent. Grate openings.

39—Eff. 95 per cent. Radiation.

40—Eff. 95 per cent. Economies due to compounding do not become manifest unless the pressure exceeds 180 lb. Can he estimated at 5 per cent.

41—Eff. 95 per cent. Economies due to superheat.

42—Eff. 98 per cent. Preventable friction in machinery, valves, pistons, rods, bearings.

43—Eff. 99 per cent. Wheels of different diameter, as either ahead or slightly shifted from middle line.

44—Eff. 99 per cent. The difference in economy between high and low steam pressure is discernible.

45—Eff. 99 per cent. Direction of draft through locomotive. End result is about 69 per cent.

D.—Wastes Due to Poor Firing.

46—Eff. 99.5 per cent. Building fires. The loss is relatively great, but on the aggregate, small.

47—Eff. 95 per cent. Smoke and sparks. Too little air. M. C. M. Hatch states that at 2,000 lb. coal fired per hour, the coal loss in sparks is 1.5 per cent; at 7,000 lb. it is 12 per cent. To put the loss in smoke and sparks at 5 per cent is conservative.

48—Eff. 80 per cent. Too much air. This is an invisible but serious loss. Assume 50 lb. excess of air for each pound of coal, the air heated 800 deg. Can lose 0.0686 B. t. u. per lb. per degree. For 800 deg. 54.88 B. t. u's. For 50 lb. excess air this gives 2,744 B. t. u's, or about 20 per cent of the heat units in very good coal. The loss might therefore be 20 per cent.

49—Eff. 98 per cent. Popping and plume—too high pressure.

50—Eff. 99 per cent. Too low pressure. The lower the pressure the less the efficiency of the steam engine.

51—Eff. 99 per cent. Cleaning fires wastefully.

52—Eff. 98 per cent. Dumping fires.

E.—Waste Due to Poor Running.—This paper is on a theory and on a method and does not assume to give any proof of the actual losses, which may be more or less than estimated. Undoubtedly losses exist due to poor running, for I have seen letters from firemen narrating the excessive work put on them, and the coal wasted by bad running.

53—Eff. 99.5 per cent. Slipping drivers (harder on the drivers and rails than on the coal pits).

54—Eff. 98 per cent. Full stroke. A train might very easily waste time at a station and the engineer try to make it up by extra steam on the road.

55—Eff. 99 per cent. Throttling in combination with full stroke results in greater steam consumption.

56—Eff. 95 per cent. Dynamometer car tests show variation in horsepower and constant speed when constant horsepower and variable speed is more economical.

57—Eff. 98 per cent. Unwise acceleration. A great consumption of power to gain a few seconds in time.

58—Eff. 98 per cent. Unnecessary braking. This is the opposite of unnecessary acceleration, but is worse, since it destroys not only stored energy but also brake shoes, driver and truck tires and abrades the rails. End result—88 per cent.

If we take the combined efficiency of the engineer and fireman, it appears to be 62.5 per cent or almost two-thirds. But a test made on a switch locomotive reported in Erie Employes' Magazine showed that current consumption of coal was reduced 65 per cent by care, not 33 per cent. Tests have been made both as to passenger and freight runs, which show actual consumptions under dynamometer-car records amounting to only one-third of usually charged consumption. On such runs, wastes due to poor design and to interest charges, to paying too much, to unnecessary transportation and to unnecessary handling expenses, are not eliminated, nor losses due to weathering.

Eliminating these we would have the following major sequences:

A	Administrative inefficiencies	60 per cent
B	Shrinks in quantity	92 per cent
D	Poor firing	71 per cent
E	Poor running	88 per cent
	End result	34.5 per cent

This sequence in its end result of 20 per cent to 35 per cent checks up well with the special tests made, checks up well with the difference between coal actually required for horsepower

generated and the coal charged to the locomotive fuel account.

To correct the cumulative result in dependent sequence of a number of small evils there should be reliable, immediate and adequate records available from mine to ash pit; an organization capable of handling the problems, and an organization competent to solve the problems.

Railroad locomotive practice is defective as to all these conditions. The records are unreliable, deferred and inadequate. Railroads are very slowly outgrowing the belief that a line officer also necessarily possesses staff competence. The fuel problem is a bigger one than records and a specialized organization. These are the tools wherewith results can be obtained, but before we use tools we must have an organization able to use them, an organization competent to expand and supplement the present cramped type.

Discussion.—The paper was well received, the members approving of the broad basis on which it was written. The subject of fuel economies is of so vital importance that all of the higher railroad officers should take an active interest in it. While the mechanical department is directly interested in the consumption of fuel, there are a great number of ways in which the other departments can assist substantially in saving fuel. For this reason it is believed that more decisive action should be taken by the officers in order that the necessary authority be given for a comprehensive and effective fuel economy campaign. Several members demonstrated as to how the transportation department could be of material assistance. On some roads transportation officers have been included on the fuel committees with excellent results, but there still seems to be a feeling that the general officers do not give the fuel problem the attention which it deserves. Tests have shown that large savings may be made in fuel consumption by providing more supervision on the locomotives. It was believed that if the division superintendents were kept accurately posted as to the actual units of fuel consumed more direct benefits would result.

SMOKE PREVENTION

By E. W. Pratt

Assistant Superintendent Motive Power and Machinery, Chicago & North Western

In 1912 and 1913 elaborate tests were made on the locomotive testing plant of the Pennsylvania Railroad at Altoona, Pa., and a complete report made in 1913 to the American Railway Master Mechanics' Association, with recommendations covering the application of steam-air jets, quick-action blower valves, etc. Since that time practically every locomotive operating in the city of Chicago has been equipped with such apparatus and it has been conclusively proven that soft coal burning locomotives may thereby be kept comparatively free from smoke if the engine crew be given and observe proper instructions at all times.

The smoke inspection bureau of the city of Chicago has accepted these devices as standards and recommends them to those inquiring. This bureau consists of the city smoke inspector, two assistants, ten mechanical engineers and nine deputy observers, covering not only the railroads but the entire city. The expense to the city is about $39,000 per year. The railroads in Chicago have a total of 54 smoke inspectors representing an annual expenditure of about $65,000. A railroad smoke inspectors' bureau, under the direction of a sub-committee of the General Managers' Association of Chicago, has been formed. This is composed of the chief smoke inspectors of all railroads in the city and holds its meetings bi-weekly, inviting thereto all railroad men interested in smoke prevention.

The railroad inspectors are required to report all engines they observe emitting dense smoke on a duplicate post card printed with the form shown herewith. One part of the card is mailed to the joint smoke inspection bureau through the U. S. mails, and the other is sent to the proper officer of the violating road through the railway mails. The bureau makes bi-weekly summaries of the reports for the different roads showing the number of reports filed, the number of locomotives operated in Chicago, the percentage of locomotives reported, the average density of the cases reported and the number of reports made by the inspectors of each railroad. These reports are for the private use of the railroads and are not furnished the city. However, the work of the railroad bureau is heartily approved by the city authorities and has been productive of greater co-operation between the various railroads, so much so that the smoke reading made by the city the year following its inception was over 50 per cent lower.

At the present time all city inspectors are instructed to each read locomotive smoke for a total of two hours each day. This to be done in one period or in several periods of 15 minutes or more. These inspectors being assigned to various districts in the city make it certain that the railroad observations will not be confined to any one locality. From these observations the city issues monthly and semi-annual reports. All readings are made in accordance with the Ringlemann method of determining smoke density and the *engine minute* is the unit employed. It should be understood that the city smoke bureau construes one minute of No. 3, 4 or 5 smoke as a violation of the law.

JOINT SMOKE INSPECTION BUREAU
OF RAILROADS OPERATING IN CHICAGO

Date _____ 191__

Inspector _____

of _____ R. R. noted following cases of dense smoke emission on above date:

ROAD	ENG. NO	TIME		DENSITY NO.	LOCATION	REMARKS
		FROM	TO			

Postal Card Form for Smoke Inspector's Report

An *engine minute* covers the observation of one locomotive during the entire minute. During this minute 14 seconds or less is not counted; 15 to 44 seconds is counted as one-half minute; 45 to 74 seconds is reported as a full engine minute. One-half minute of No. 3 density is 1.5. One-half minute of No. 1 density is 0.5, etc. The per cent smoke density is obtained by multiplying the smoke units by twenty (each Ringlemann unit being 20 per cent) and dividing the product by the total engine minutes.

In order that the city inspectors shall read the smoke density correctly, applicants for these positions pass through a probationary period during which time, under the direction of an experienced inspector, they make thousands of smoke readings with a full size Ringlemann chart set up 50 ft. from them in the direction of the stack under observation. These men are under civil service and their standing is based largely on their ability to correctly read smoke density. The members of the Railroad Smoke Inspectors' Association and the city inspectors frequently have joint classes in the reading of smoke density in order that uniformity may be obtained in the case of independent individual observations.

One of the encouraging features of this plan is that it has so fully met with the approval of the city smoke bureau that the latter has voluntarily opened all their record books to members of the railroad bureau, and the reduction in the per cent of density of railroad smoke during the past two years has been remarkable. It is as follows:

1912	10.74 per cent
1913	6.06 per cent
*1914	7.41 per cent

*The figure for 1914 was made up from the Summer reading of 1914 (by old method) and the reading for September, October and November, 1914 (by new method). This figure would be lower but for the change in method.

STANDARDIZATION OF COAL PREPARATION

By H. C. Adams
President, Jones & Adams Coal Company

The present method of screening has caused no end of trouble in marketing the coal, and various losses to the producer. There is never a time in the year when a market can be found to fit the various sizes that are now being made. This results in large quantities of coal being put on the market for any price the customer is willing to pay. It displaces the size the consumer would ordinarily use and which the operator wants him to use, and destroys any profit that might be secured.

No way has been found to store unmerchantable sizes of coal at the mines in large quantities, as this would mean storage for every size produced at times. During the summer months 6-in. lump is made in great quantities in excess of the demand, and frequently sells at mine run prices, or less. In the fall and winter other sizes are made in excess of demand, so to store coal at the mine it would mean to make room for half a dozen sizes, and the operators have not the room or capital to do this.

The railroads at times have their tracks crowded with deadloads of coal of various sizes, for which there is no market, when this same equipment could be used to advantage in other directions.

Approximately 100 tons of mine run coal, as it is prepared today in Central Illinois, will screen out about as follows:

6-in. lump and larger	30 per cent
6-in. by 1¼-in. egg	35 per cent
1¼-in. screenings	35 per cent

If an operator today has an order for 300 tons of 6-in. lump coal, it is necessary to dig about 1,000 tons of mine run to get it, which gives about 700 tons of coal that he may or may not have a market for.

If all coal preparation was standardized so that the lump coal would be made over an inch and a quarter screen, and the operator had an order for 300 tons of lump, he would only produce, on the same basis of figuring 450 tons. Of this amount of coal, only 150 tons would be 1¼-in. screenings, and in most cases would be easier to sell than the first mentioned separation.

The benefits of standardization are numerous: It would reduce the output to a point where the mine would get running time that would greatly reduce the cost. A great many cars that are now constantly tied up with unsalable sizes would be released and could be used for any other purpose. The operator would not be producing two or three tons of sizes that he has no market for in order to get a ton of the size coal he wants. The railroads for their fuel could use either inch-and-a-quarter lump or mine run, as they deem best, and either of these sizes could be produced in quantities required at all times, for the reason that no unsalable sizes would be produced in order to supply railroad coal. The railways are and should be interested in any move that will benefit the operator. A very large percentage of the freight of some of the roads is coal, and when coal cannot find a market, or perhaps finds an unprofitable market, the railway is sure to feel the effect in the lessened prosperity of the operator and his inability to seek broader markets.

Discussion.—The railways must co-operate with the mine operators if a standardization of fuel is to be obtained. It was shown that by doing this in one case the sizes produced by one operator were reduced from 22 to 6, the railways using coal which the operators found it difficult to market.

FUEL STATIONS

The committee deemed it advisable to consider three separate and distinct sub-divisions of the subject as follows: Plant storage for reloading through the medium of cars; plant storage for direct issue to plant, and central storage for distribution to miscellaneous plants. The committee suggests the use of a locomotive crane with a clamshell or similar device for unloading and reloading storage coal, where the amount to be stored is less than 5,000 tons and where the daily issues are small enough to permit of its use.

A cheap method of unloading cars is to use a trestle from which the coal can be automatically dumped. Such a plant could be located adjacent to the coaling station, if the space is not too restricted and the track arrangements permit. Another method is to erect a timber trestle adjacent to the track on which locomotives are coaled and grates cleaned, provided with a runway for a locomotive crane equipped with a clamshell or grab bucket. A plank wall or barrier should be placed along the side of the trestle contiguous to the storage pile, to prevent the coal from accumulating under the trestle. A strip of land about 60 feet wide, and varying in length in proportion to the capacity of the pile would be required for storage. The plan provides for a capacity of 28 tons per lineal foot of coal pile. The coal will be delivered to the coal-receiving track (on the outside of the engine track) in gondola cars of practically any type, from which it will be removed and transferred to the storage pile by the locomotive crane. If desired, this plant may be used for coaling engines either from cars on the receiving track or from the storage pile. It is not considered advisable to use this plant as a locomotive coaling station at terminals where a large number of engines are coaled.

From somewhat meager figures available it is estimated that with these plans coal can be stored from cars, or reloaded from storage at about 2½ cents per ton.

All new mechanical plants should be so designed as to provide a storage adjunct to permit of unloading coal into the receiving hopper, from which it may be distributed, either to the plant direct, or to a storage pile when business is dull and there is a surplus of road cars and of coal. The plant must be so designed as to permit of the recovery and issuing of the coal from the storage pile through the plant without the use of road cars.

The locomotive crane may be used to good advantage for taking care of ground storage in connection with a mechanical coaling station. This plan has been adopted by the Louisville & Nashville, at three places, where large mechanical coaling stations of reinforced concrete and steel construction are being erected. The receiving hopper is enlarged at the back to form a pit of sufficient size to accommodate the grab bucket of the crane. The crane is located on a circular track back of this hopper, this track centering on the hopper. Coal is dumped into the hopper from the receiving track, and handled to storage by the crane. In reclaiming from the storage pile, coal is picked up by the crane and discharged into the hopper, from which it is handled to the overhead coal pocket in the usual manner. For the most economical operation, such a crane should be electrically operated. Such a plant is estimated to cost $23,000 and has a capacity of 22,000 tons.

With the bridge type, the receiving hopper pit is constructed practically the same as for the locomotive crane. This type lends itself to a much larger storage pile and greater handling capacity than the locomotive crane, but it is, of course, more expensive. The inner trucks of the bridge run on a circular track and are held in position by an arm extending to a central swivel point. The outer trucks also travel on a circular track, the center of the circle being the swivel point above referred to. Coal dumped into the pit at the side of the receiving hopper of the coaling station, is picked up by the grab bucket on the bridge, and placed in storage. A swivel bridge of latest design can be contracted for complete above the rails, for from $25,000 for 100 ft. span, up to $50,000 for 250 ft. span, and handling from 100 to 300 tons of coal per hour.

The cable and drag scraper method has been adopted by the Southern Railway, the Canadian Northern, and others. The storage pile is located directly back of the receiving hopper of the coaling station on a large elliptical area. The coal is dumped into the hopper and conveyed to the top of the coal pocket by the usual mechanical means. Instead, however, of dumping into the coal pocket, the coal is deflected into a chute which carries it out into the storage area. The coal is then spread over this area by means of a drag scraper operated from a drum in a tower over the hopper. Located at intervals

around the storage area are pulling poles to which are attached snatch blocks for the endless cable. This method has the advantage of low first cost and low cost of operation, but causes a great degradation to the coal.

The cableway excavator method contemplates having the storage pile between the receiving hopper and the coal pocket, and is particularly well adapted to a storage of 2,000 or 3,000 tons. A mast is provided at the coal pocket of sufficient height to enable the drag bucket to dump into the bin. Directly behind the receiving hopper, anchorages are provided for the main cable. The hopper is so constructed that the drag bucket may scrape toward the coal bin over a sloping concrete floor. In reclaiming, the coal is picked up by the drag bucket, and deposited directly into the coal pocket, ready for locomotives. This is a very economical system, and has the advantage of not requiring additional machinery for the coaling station. It also lends itself very readily to "under-water" storage.

A central storage plant should provide for the storage of from 100,000 to 500,000 tons, and each plant should be as elastic as possible. It should be located at some convenient central distributing point. It should be as near permanent in its construction as possible, and be so designed and constructed that it could be protected at all times without much expense for maintenance, operation and care. It is believed that a modern plant, answering all practical purposes, can be installed for 100,000 tons of coal for an outlay of from $30,000 upward.

[The committee included in its report a description of the coal storage plants at the Panama Canal as representative of the latest practice, the matter being taken from the annual report of the Isthmian Canal Commission for the year ending June 30, 1914.—Editor.]

WEIGHING AND MEASURING DEVICES AT FUEL STATIONS

The committee recognizes the absolute necessity for having correct efficiency performance records of individual locomotives and enginemen, and believes that the railroads and their executives are prepared to spend certain moneys for proper auditing, but that they desire more reliable results and want to know the actual facts as to what their locomotives and enginemen are doing. Fuel accounting should be considered from two separate and distinct standpoints: That of value and that of quantity. The individual coal plant, locomotive and enginemen should be charged with that which it or he receives, and credited with that which it or he issues and uses. No adjustments of any character should be included in the published statements showing individual performances. It is deemed advisable to suggest the adoption of some reliable automatic means of weighing and measuring, and devices that might be cheaply installed, operated and maintained; not only on new plants being installed, but also that might be applied to plants that are in operation. The committee suggests that this subject be again referred to them, believing that additional methods of establishing an automatic and reliable record of the actual amount of coal issued by each plant to each locomotive and each engineman will be on the market during the coming year.

The report is signed by H. J. Slifer, chairman (Cons. Eng.); E. A. Averill (Standard Stoker Company); E. E. Barrett (Roberts & Schaefer Company); W. E. Dunham (C. & N. W.); H. B. Brown (I. C.); G. W. Freeland (Williams White & Co.); W. L. Krausch (C. B. & Q.); R. A. Ogle (Ogle Construction Company); D. J. Madden (Erie), and J. L. Rippey.

This covers the proceedings for the first two days of the convention—Monday and Tuesday of this week. A report of the remaining sessions will appear in next week's issue of the *Railway Age Gazette.*

Railway Extension in Argentina.—It is reported that a bill authorizing the construction of a branch line from Santa Fe to Puerto Reconquista will be introduced in the next session of the legislature of the Province of Santa Fe. Railway extension work at the present time is practically paralyzed and even if the line is authorized, some time must necessarily elapse before work on it can be started.

WESTERN RATE ADVANCE CASE

The hearing at Chicago in the Western rate advance case, presided over by Commissioner Daniels and Examiner Watkins of the Interstate Commerce Commission, was concluded on May 13, with the introduction of several rebuttal witnesses on behalf of the railways. The protestants had concluded their case the day before. First briefs are to be filed by June 10 and reply briefs by June 20, and oral arguments are to be held at Washington beginning on June 22. The hearing was begun in Chicago on March 4, and has been held daily. During the past month or so many night sessions have been held. The printed record in the case has run to nearly 15,000 pages, while the number of exhibits presented on both sides was 1,060. During the hearing 140 witnesses were heard, 55 appearing for the carriers and 85 for the protestants.

The rebuttal testimony of the railroads included statements by representatives of the Union Pacific, Great Northern and Northern Pacific to show that their companies would receive only very slight increases in revenue from the proposed advances, which are confined mainly to Western Trunk Lines and Southwestern Tariff Committee territory. These were introduced in reply to the contention which has been raised by the protestants throughout the hearing, that the statistical exhibits introduced by the railways were not representative because these roads had taken no part in the case. L. R. Capron, assistant general freight agent of the Northern Pacific, stated that the Northern Pacific's revenues would be increased about $3,000 a year by the advances on coal and about $2,000 by the advances on grain.

E. H. Hawley, of the freight traffic department of the Union Pacific, said that his company would receive approximately $8,000 increased revenue from the advances on hay from Kansas and Nebraska to points east of the Missouri river; that it is slightly interested in the livestock advances but the greater part of its traffic on livestock stops at the Missouri river and is not affected. A telegram was presented from the Great Northern saying the increase in revenue which that company would receive from the advances is only about $20,000 a year. The witnesses testified that while some of the rates would be advanced on some traffic originating on their lines, the advances usually do not apply to their portion of the haul.

Clifford Thorne, of the Iowa commission, contended that these roads should be included because they are interested in a general movement of western roads to advance rates, and are interested in the tariffs eliminating certain "free services" which were originally included in this case but have been transferred to separate dockets. Mr. Capron and Mr. Hawley said that the increases in revenue which their roads would receive from these tariffs were very small. At the request of Luther M. Walter, representing Morris & Co. and other packers, Commissioner Daniels finally made a ruling directing the Great Northern, Northern Pacific and Union Pacific to file division sheets covering the tariffs included in the commission's suspension order.

Just before adjournment Mr. Thorne made a request that the commission allow the introduction as evidence of a large number of exhibits compiled by W. J. Lauck to show the "prosperity" of the roads, and used by him in the recent arbitration proceeding on the engineers' and firemen's wage demands, in which he appeared as statistician for the brotherhoods. Mr. Thorne said that it had been intended to ask for permission to file the entire set of exhibits, comprising about 4,000 pages and representing a cost of $100,000, but as the commissioner had indicated during Mr. Lauck's testimony that he considered a large amount of this material irrelevant, he had decided to ask to file only a selected number of the exhibits. Commissioner Daniels ruled that they could not be introduced.

E. B. Boyd, chairman of the Western Trunk Line Committee, introduced some exhibits in reply to criticisms which had been made by witnesses for the protestants on his original exhibits and to correct some figures in the record on the amount of grain traffic involved in the case. He said that A. E. Helm, of the Kansas commission, in trying to show how many tons of grain

the railways transported from Kansas had included over 6,000,000 tons of corn cobs, by multiplying 30,000,000 bu. of corn by 70 lb., instead of using 56 lb. per bushel for shelled corn, which is the form in which corn is shipped. He said the protestants had used figures showing the total production of grain in various states, which includes a large amount of grain not shipped out of the state.

F. S. Hollands, assistant general freight agent of the Chicago Great Western, testified regarding rates on hogs in Minnesota and Iowa; Conrad Spens, assistant freight traffic manager of the Chicago, Burlington & Quincy, testified in reply to statements by protesting witnesses that the advance on livestock to Chicago would change the routing of the traffic, and F. P. Eyman, assistant freight traffic manager of the Chicago & North Western, explained that rates from Chicago to Wisconsin on livestock had not been advanced on account of the competition with Milwaukee, since the rate from Milwaukee to Wisconsin points is a state rate and cannot be advanced in the present case. N. D. Ballantine, assistant to second vice-president of the Chicago, Rock Island & Pacific, testified regarding the handling of livestock traffic, saying that the railroads' contention that the livestock traffic reduces the efficiency of train operation had been proved by exhibits of the shippers themselves.

J. Pease Norton, bond expert, was placed on the stand as a witness for the state commissions to testify to some additional exhibits showing the yields on various classes of bond issues for the purpose of showing that the credit of railway companies is improving in relation to that of governments and industrial and public utility companies. He presented a compilation for a large number of bonds showing the net proceeds. M. O. Lorenz, statistician for the Interstate Commerce Commission, contended on cross-examination that the list of railways selected by Mr. Norton was unrepresentative, since with only one exception, they have been consistent dividend payers, and their bond prices therefore would not correctly reflect a decline in credit since 1910. Dr. Lorenz also showed that the increase in the proportion of bonds to stock indicated that some factor was at work which affected the credit of the railroads adversely. Mr. Norton attributed the decline in the price of bonds partly to the increase in the production of gold, saying that the bondholder knows his principal when repaid will purchase fewer commodities and naturally wishes a higher rate of interest. Doctor Lorenz asked if this rise in prices would not have some relation to railway rates. Mr. Wright, on cross-examination, showed that improvements in the character and value of a road making the bonded indebtedness a small proportion of the value would have an influence on the price of the bonds, and also that many of the railroad bonds were seasoned securities, whereas the industrial issues were new. He said the comparison of a stable, seasoned security with newer and unsettled issues was worthless. "Ought not the rate of return of the railroad to go up if the itnerest and commodity prices have gone up following the increase in gold production?" asked Mr. Wright. The witness claimed that earlier railway rates were too high, so that no increase was necessary.

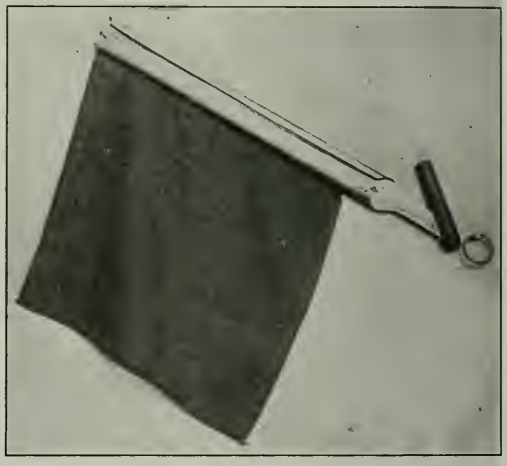
A. N. Bean, an examiner of accounts for the Interstate Commerce Commission, testified as a witness for the commission to present the results of inquiries which had been addressed to the railways, asking an explanation of the increase in operating ratio. He had made a compilation of the replies, showing that the principal causes named by the railroads were increased wages, increased cost of fuel, increased price of ties, larger expenditures for maintenance of road and equipment, increases in taxes, more numerous requirements of state and federal statutes, decreases in revenues with reductions in rates and the introduction of depreciation charges.

Railroad Construction in Portugal.—The government of Portugal has authorized by presidential decree the Administrative Council of the State Railways to spend about $300,000 for the immediate construction of branch lines from Condomil and Ermezinde to Leixoes.

A FLAG AND TORPEDO HOLDER

The illustration shows a flagstaff which has been designed as a convenient holder for torpedoes, doing away with the present methods of carrying them in a sack with a draw string, or of twisting the lead straps around the flag and stick. By this device they can be taken from the container without removing gloves in cold weather. There is also no chance of losing the torpedoes.

The staff is made of galvanized sheet iron, bent as shown, the handle being split into two parts and connected near the ring. The part of the handle on one side is fastened by two bolts, while the portion of the handle on the side shown in the illustration is pivoted by one of these bolts. The staff is corrugated



Combined Flag and Torpedo Holder

its full length to give stiffness. When it is desired to put torpedoes into the staff, the handle is moved on the pivot to the position shown and the torpedoes are inserted in the slot, which will hold 12. The handle is then turned down on the pivot until it occupies its normal position, at which point it acts as a lock and prevents the torpedoes from coming out. The handle is also locked by the corrugation. At the top of the flagstaff the two corners are bent over to prevent the torpedoes being removed at that end.

The flag is fastened by a rod run through the hem, the lower end of the rod passing under the stationary half of the handle and the top end being bent and passing through a hole in the body of the container. A cotter key fastens it in place. This torpedo holder was designed and patented by W. J. Strohm, Moline, Kan.

Higher Rates between Scotland and Ireland.—The cross-Channel shipping companies having recently intimated an increase in their rates for the sea portion of the journey between Scotland and Ireland, the five chief Scottish railways (Caledonian, Glasgow & South-Western, Great North of Scotland, Highland and North British), have given notice of an increase of 1s. 3d. (30 cents), a ton in their rates on merchandise between stations on their lines and ports and stations in Ireland. Live stock rates between certain Scottish stations and the ports of Belfast, Larne, Newry and Dundalk are also to be increased to the extent of the increase in sea transit charges, which is 1s. (24 cents), per head for horses, 6d. (12 cents), per head for cattle, and 3d. (6 cents), per head for sheep, lambs and pigs. Similar notices applying in the reverse direction have been issued by some of the Irish railway companies. The increases are effective June 1.

Maintenance of Way Section

In the April maintenance of way section we devoted considerable space to the renewal of ties. In this issue are found similar articles relative to the relaying of rail. We plan to continue these timely discussions in the June maintenance of way section, in which we will discuss particularly, the ballasting of tracks. We invite contributions on important phases of this subject, including the kinds of ballast best adapted for lines of different densities of traffic, the organization of forces, the relative merits of heavy and light raises, the classes of labor best suited for work in ballast gangs, etc.

Handling Ballasting Work

The Lehigh Valley has laid 160,000 tons of rail during the past five years without spacing ties. The statement by G. L. Moore, in an article on another page describing the methods of laying rail on this road, that "we have yet to find the first case of damaged rail by reason of not spacing joint ties, but have been able to greatly improve our track by diverting the labor so employed in former years to the more important work of improving the surface and line and renewing the ties," is therefore significant and of special interest. This practice is gaining ground on a number of other roads, including the Pittsburgh & Lake Erie, the St. Paul and the Illinois Central. While care must be used in the adoption of this method, the results secured on the roads which have given it extensive trial, commend it for serious consideration on main line tracks which are normally maintained to a high standard and on which, therefore, the track is not allowed at any time to get badly out of line and surface.

Laying Rail Without Spacing Ties

The president of one large railway was led to favor the adoption of ballasted floors on bridges on his lines largely because of the greater sense of security they give to the lay passenger. Another railway officer refuses to allow the high viaducts on his road to be referred to in advertising literature, even though they are excellent examples of engineering design, because of the sense of danger they may create in the mind of the prospective passenger. As outlined elsewhere in this issue, the Pennsylvania and the Lackawanna regularly call their landscape architects into consultation in the design of their passenger stations and the surrounding grounds, even at small outlying points, to harmonize the design with the particular location. Several eastern roads plant flowers systematically about the station grounds each spring, even to the extent of transferring flowers from the hothouses to these various points by special work trains. The Canadian Pacific organized several large extra gangs last fall to cut off all the brush to the right of way fences on the western mountain divisions. These examples illustrate the importance attached to appearances by many railway officers and the expenditures they are willing to make to secure these more or less intangible results. The lesson should not be lost on maintenance of way men, for it is of special significance to them as custodians of the company's property. While many roads have given close attention to the systematic policing of the entire right of way, others have largely neglected it. It costs little or nothing for a bridge crew to burn or otherwise remove the pile heads and odd pieces of timber lying about a job after they have completed their work, or for a concrete gang to level off the small amount of gravel which may be left after the completion of their work. Likewise, it requires little time for the section crew to pile and burn the ties removed from the track and to carefully collect and store the scrap at some obscure point about the section house. A certain amount of debris is necessary about a railway. It is not, however, necessary to display it as prominently as is frequently done. The difference between attention to and neglect of this subject is frequently the difference between a favorable and unfavorable impression on the part of the traveling public.

The Value of Appearances

Normally the relaying of rail should be actively under way at this season. This year, however, the work is being seriously delayed. In the first place, the ordering of rails has been seriously retarded, as occurred last year, when only one-half as much tonnage of new rails was laid as in 1913. While some roads, such as the Burlington, the Santa Fe and the North Western, ordered their usual tonnage early this spring, many are still delaying placing the orders for their requirements, one of the most prominent being the Pennsylvania, which is now reported to be in the market for over 125,000 tons. With the large number of rail orders still to be placed, it is evident that the work of relaying the rail in the track will be seriously delayed this year. This introduces a special problem and opportunity for maintenance of way officers. Because of the ample supply of labor available it will be possible to secure gangs of relatively higher efficiency than in previous years. With the reduced amount of work under way it will also be possible for the supervising officers to give more attention to the details of their work. This will permit the organization of more efficient forces and should result in handling the work more economically.

The Relaying of Rail

CHANGING EXPENSE INTO REVENUE

THE article entitled, "Income from the Maintenance of Way Department" in another column in which the writer describes the methods by which one supervisor has created an annual income of over $10,000 from the sale of materials, most of which were previously considered only a cause of expense, opens the way for study in a field to which comparatively little attention has been paid. As stated in this article the maintenance of way department is primarily a spending organization, and attention has been directed almost entirely towards making these expenditures as economically as possible. This is as it should be from the very nature of this department. But this does not necessarily mean the exclusion of other problems with which the maintenance of way department is in most intimate contact, the solution of which may result to the benefit of the company.

Up to a few years ago all materials unfit for further use in their present condition were sent to a central point and sold in bulk as scrap. Gradually it was found that the sorting of this scrap into various grades enabled higher prices to be realized. This soon led to the establishment of scrap reclaiming plants on a number of the roads at which much of the scrap material was reclaimed for further service by repairing it or converting it into other materials. This development, however, applies only to materials with a generally accepted scrap value. The disposition of other materials such as ties and cinders, released by the railroads in large quantities, has been regarded as a necessary cause of expense, notwithstanding the fact that in certain isolated localities there was a considerable demand for these materials. The supervisor referred to has developed the latent market for these materials by calling their advantages to the attention of possible purchasers and by letting it be known that they were

for sale. In this way he is only following out the practice of many successful manufacturing institutions whose profits come largely if not entirely from the sale of the by-products. The steel mills formerly were glad to give their slag to the railroads if they would haul it away. Finding that the railroads were glad to secure it, several mills are now able to sell it to the roads at a few dollars per car. The fact that a plan such as is outlined in the article referred to must be worked out carefully and with proper supervision to prevent abuses creeping in should not deter the proper officers from giving it careful consideration, for a sufficient number of savings such as this may mean the difference between unprofitable and profitable operation.

LABOR SAVING APPLIANCES

RAILWAYS have been slow in many cases to adopt labor saving devices. This has been particularly true in the maintenance of way department, which has lagged behind other departments, and especially behind the construction department, with which it is closely associated. On construction work the station man of a generation ago with his shovel and wheelbarrow has been replaced almost universally with the grading machine, the steam shovel and the dump car, while the track laying machine has largely replaced hand work on new lines. But one still finds maintenance of way work being done almost entirely by manual labor, aided by a few simple tools, as the tamping bar and the pick.

The reason for this is not apparent at first glance. Twenty-eight per cent of all railway employees are in the maintenance of way department, more than those engaged in the maintenance of equipment, the traffic department and the general offices combined, while nearly 60 per cent of all expenditures for maintenance of way and structures go for labor. This very high proportion of labor cost in the maintenance of way department would indicate that there is a great field for the adoption of mechanical appliances here. The relatively small amount of attention given to this subject, may therefore, probably be considered to be the result of neglect and of preconceived ideas regarding the narrowness of the opportunity rather than from an actual lack of a field.

The best indication of what may be done in this line is a statement of the results actually being secured in certain specific instances where special study has been given not only to the use of mechanical appliances in general, but to means whereby these appliances may be used to the best advantage. Such an instance is the description of the results secured in handling rail out on the line by the use of locomotive cranes, ditchers and derricks on the Lehigh Valley, described in another column. Not only is the picking up of nearly 11 track miles of rail in one day an unusual record, but the manner in which the equipment is regularly handled to secure this result at a cost of only 18 to 23 cents per ton is most unusual. This is only one of many details of maintenance of way work to which power equipment can be applied with corresponding savings. The motor car carrying a power unit provides an opportunity for the use of a wide variety of auxiliary equipment, such as rail drills, tie tampers, portable rail saws, etc. These experiments deserve the hearty support and sympathetic co-operation of maintenance of way men, not only for the results they may produce directly but because of the further improvements to which they may lead. It is the experience of railway supply manufacturers that many railway men are prone to give an adverse opinion regarding a labor saving device without giving it a trial. It is fully as much to the interest of the railroads as the manufacturers for labor saving devices to come into universal use as rapidly as possible, and the quickest way to develop such devices is to experiment with them. There is no more productive field for the reduction of maintenance of way expenditures today than in the replacement of manual labor with mechanical power. Human labor is almost invariably the more expensive.

While a shortage of labor is not to be expected this year, it is only a question of time until this condition will exist, as it does at regular intervals. At such times, when labor cannot be secured at any cost, the value of power equipment cannot be measured solely by its savings. During a season such as this when the indications are that only a moderate amount of work will be carried on, there is more opportunity to study, experiment with and develop new devices than in busy seasons when everyone is working under pressure. This subject should, therefore, receive careful attention this year.

NEW BOOKS

Plain and Reinforced Concrete Arches. By J. Melan, professor of bridge design at the German Technical School at Prague. Translated from the German by D. B. Steinman, professor of civil engineering at the University of Idaho. Size 6 in. by 9 in., 161 pages, 43 illustrations, bound in cloth. Published by John Wiley & Sons, Inc., New York City. Price $2.

The increasing use of concrete arches by railways makes any discussion of the design of such structures of interest to many engineers, and the prominent part which Professor Melan has taken in the development of arch design will serve to introduce his work to many. The book discusses briefly the fundamental arch principles and the stresses existing in an arch and then develops various analytic and graphic methods of analyzing and designing hingeless, one-hinged, two-hinged and three-hinged arches. Other chapters consider the effects of temperature, the displacement of abutments, non-vertical loads, etc. The last chapter covers a method of calculating the stresses in an arch by means of a chart, the use of which is illustrated by numerical examples. In making the translation from the German the notation has been modified and a preliminary index showing all symbols used is inserted for the guidance of the reader. In its diction and phraseology the book bears little evidence of its foreign origin.

Railroad Field Manual for Civil Engineers. By William G. Raymond, professor of civil engineering and dean of the College of Applied Science, State University of Iowa. Size 4¾ in. by 7 in., 405 pages, 31 figures, 83 tables. Bound in leather. Published by John Wiley & Sons, Inc., New York City. Price $3.

The most striking feature of Raymond's Field Manual, just issued, is the use of decimal divisions of degrees in the tables in preference to the more common system of minutes and seconds. The author's reasons for this departure from ordinary practice are stated quite fully in the preface and are based on the convenience in laying out curves with a vernier graduated to read hundredths of degrees and the elimination of the necessity for transposing minutes and seconds to decimals, or vice versa in the solution of curve problems. Instrument makers quote a price of about $20 for changing the verniers of an old instrument and make no difference in the cost of new instruments with such verniers. About 50 engineers, including chief engineers of railroads, independent practising engineers and railroad engineering professors were practically unanimous in their opinion as to the desirability of such a change. It is pointed out that the adoption of the decimal division of the degree does not change the unit, as was the case in the attempted change to the metric system, but is comparable rather with the adoption of the decimal division of the foot in surveying work which is now very general. An endeavor has been made, however, to make the book applicable in case any individual user does not desire to change the system of dividing the degree.

The book is intended primarily for field use and five-place tables have been adopted as representing the greatest degree of precision warranted. The book includes tables and explanatory statements covering curves, the ten-chord spiral, logarithms and trigonometric functions, location tables, construction tables, turnouts and crossovers, azimuth, latitude and time, tables for metric curves, the adjustment of instruments, and miscellaneous tables.

The Design and Construction of Small Stations

Resume of Current Practice on Several Roads in the Selection of Materials and the Arrangement of Facilities

It is estimated that the railways of the United States maintain 85,000 passenger or combination passenger and freight stations, and that fully 80,000 of these are buildings costing $25,000 or less. From these and similar estimates it can be shown that the total value of the small stations is at least equal to that of the large stations and that the annual cost of replacing buildings in the two groups also is roughly the same. Disclaiming any high degree of accuracy for these estimates, they are still sufficient to show the importance of a class of construction which is too often given slight consideration. A $1,000,000 terminal has in its design and construction far more to inspire the architect and engineer and to interest the executive officer than an equal expenditure in assorted sizes of small stations, but the opportunities for effecting economies through careful study of the requirements are at least as great in the latter case as in the former, since such an expenditure might cover 200 buildings located in as many communities of widely differing characteristics. There has been a marked tendency in recent years to provide better station buildings at all points and the number of roads that allow their property to remain the most unsightly spots in the communities they serve is fast decreasing. A number of factors are responsible in varying degrees for this movement. In some cases, competition, local demands, or the authority of a state commission have made necessary heavy expenditures for new stations, but the underlying reason in general is the growing spirit of cooperation between the public and the railroads which is resulting on one side in an increased desire to see the roads fairly treated and on the other side in more active efforts to give the people satisfactory service in every respect.

A Brick and Stucco Building on the Rock Island

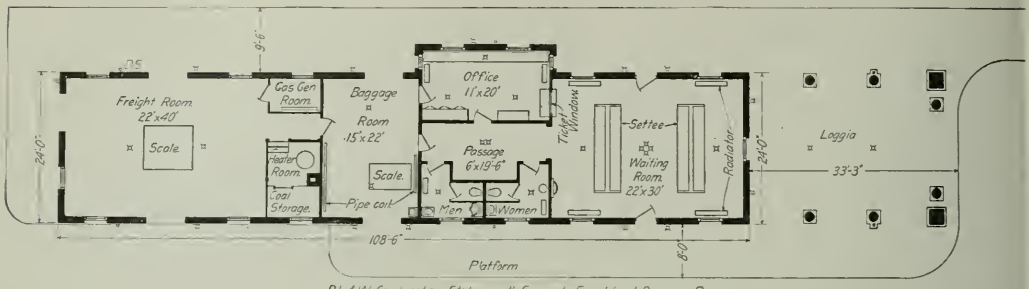
The scale by which to measure the suitability of a passenger station to the needs of a community is extremely hard to fix. The revenue from ticket sales is an index of the passenger business originating at a given point, but it might be misleading as a guide to the kind of a station needed, for some towns producing relatively little passenger traffic are good sources of freight revenue, and therefore a somewhat disproportionate expenditure for passenger facilities may be justified by the increased freight traffic resulting from the more cordial relations set up with the people. On the other hand, a rough mining or manufacturing town which would produce more passenger and freight business than a suburban or rural community of equal size might be adequately served by a less expensive building. The amount of transfer business must also be considered for at some stations at junctions or crossings the amount of either passenger or freight traffic originating may be insignificant, but the fact that such a station must be used by a large number of through passengers when changing trains, makes it essential for the repu-

A Small Station on the Santa Fe in the Southwest

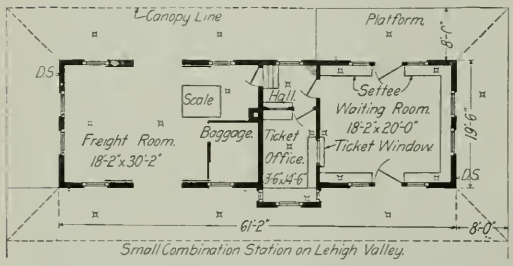
tation of the road that comfortable and commodious quarters be provided.

These facts emphasize the necessity for careful study of the nature of each problem to insure the wisest investment in stations, and such studies should preferably be made jointly by representatives of the operating, traffic and enginering departments. On some roads standard designs are used for the very small buildings, and if, on investigation of the community, the old facilities, and the probable requirements, one of the standards is found suitable, there is, of course, no necessity for drawing a new plan for that building. The evident advantages of standard structures are offset, however, in the minds of many railway men by the monotonous appearance of similar buildings recurring frequently along the line and the tendency if standards are followed

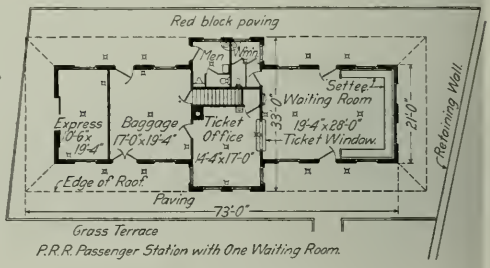
One of the Santa Fe's Brick and Stucco Stations, Showing a Suggestion of the Mission Style Used Extensively on That Road



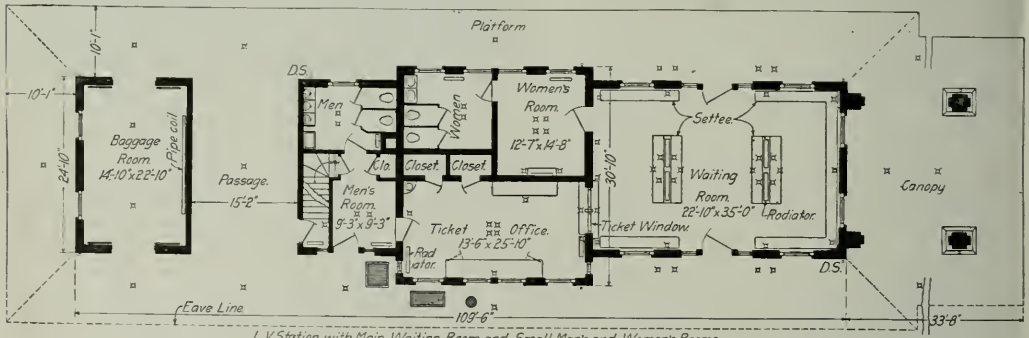
D.L.&W. Combination Station with Separate Freight and Baggage Rooms.



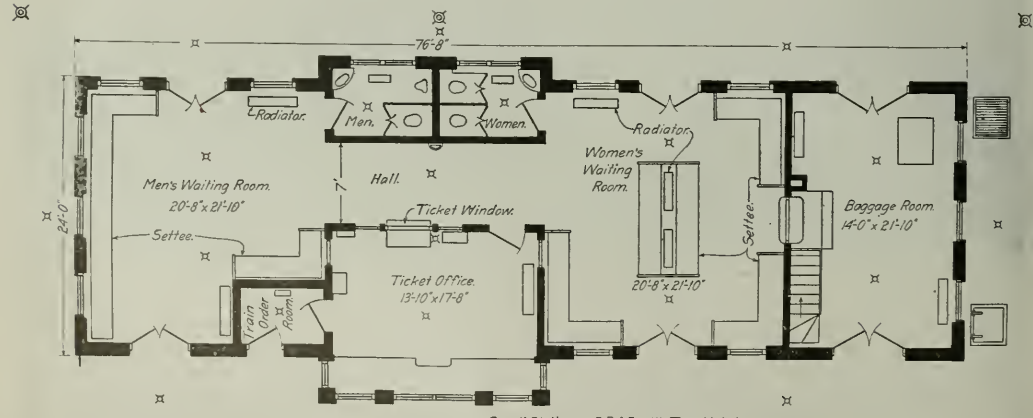
Small Combination Station on Lehigh Valley.



P.R.R. Passenger Station with One Waiting Room.



L.V. Station with Main Waiting Room and Small Men's and Women's Rooms.



Small Station on B.R.&P. with Two Main Waiting Rooms.

Five Small Station Plans, Showing a Variety of Arrangements of Passenger and Combination Freight and Passenger Facilities

to adopt one of these in preference to a special design much better adapted to the local requirements.

A station which fully meets the needs must provide adequate and convenient facilities for the sale of tickets, checking, handling and storing of baggage, receiving, delivering and storing of express and in combination stations, of freight; must contain public rooms of ample dimensions in which are installed all the commonly recognized provisions for the comfort and convenience of the road's patrons; and must have a pleasing appearance inside and out, the latter requirement covering also the surrounding grounds. Considered as an investment, all of these requirements must be met in a building that will have the lowest possible first cost consistent with long life and low maintenance charges. In an endeavor to co-ordinate the experience of various roads in the solution of such problems, a study has been made of the practice on eight typical roads where considerable attention

A Brick Station on the Burlington Showing a Limited Use of Stucco

has been given to the matter and the following discussion presents the variations in details of design and construction with the reasons for each arrangement or material where possible.

ARRANGEMENT

For the smallest villages and towns it is customary to provide a combination freight and passenger station. Such a building, as shown in one of the floor plans reproduced herewith, may have only a waiting room, a ticket office and a freight room, which also serves for baggage and express, or a separate baggage room and toilet rooms may be added. In somewhat larger towns separate freight and passenger facilities are warranted. In a station for passenger traffic only, a main waiting room, women's retiring room, men's smoking room, toilets, ticket office and baggage room are usually included, although some roads frequently use two separate main waiting rooms where the traffic warrants, or in communities with a large number of foreigners or a rough population, and this arrangement is of course necessary in many of the southern states where the law requires separate quarters for white and colored passengers. Two waiting rooms, however, cut up the plan more than a single main waiting room and they are less easily heated. A train order room must frequently be provided in small stations. Particularly for suburban towns, it is not uncommon to include in the plan a loggia or pavilion, adjacent to a drive, or at one end of the building where exceptionally large crowds can find shelter.

The size of the building and the arrangement of rooms must in general be decided on to meet the local requirements. The stations of the class referred to, are usually 20 to 25 ft. wide on the Lehigh Valley, the width being governed by the width of right of way and the necessity for providing a drive behind the building. On the Lackawanna 24 ft. is the maximum width of building and other roads have similar rules. Frame buildings are set back 21 ft. 6 in. from the center of track on the Chicago, Rock Island & Pacific, and brick buildings 30 ft. to 36 ft., while on the Lackawanna 16 ft. platforms have been built, but a greater width is preferred. Where possible, room is provided by this road for flower beds or shrubbery between the station and the tracks. The New York Central usually allows 27 ft. between the building and the center of track, using a canopy over the platform at important stations.

For small stations handling passenger traffic only, the American Railway Engineering Association Manual recommends the following ratios of floor area in the various rooms. General waiting room, 41 per cent; baggage and express room, 26 per cent; ticket office, 15 per cent; women's room, 10 per cent, and toilets, 8 per cent. Typical minimum waiting room sizes are 12 ft. by 20 ft. for the smallest type of station on the Lehigh Valley and 22 ft. by 32 ft. for a brick station on the Rock Island. The smallest ticket offices used vary from 10 ft. by 14 ft. on the Burlington and 8 ft. by 20 ft. on the Lehigh Valley, to 12 ft. by 16 ft. on the New York Central and the Pennsylvania. A preferred size on several roads is 18 ft. by 18 ft., or 18 ft. by 22 ft. The minimum sizes hardly provide room for the telegraph desk, ticket case, tariff file, letter press, etc., which an agent at such a station requires.

At combination stations, the Lackawanna usually has an elevated platform outside the building for handling freight to cars on the siding. The New York Central frequently provides separate baggage and express rooms, and when a single room serves for both, an end door is preferred to prevent the baggage and empty trucks from accumulating on the platform. A raised platform is provided within and without the building and a platform or beam scale may be installed. In many places a partition in the baggage room separates a small space for valuables or for checking parcels. On the Pennsylvania and the Lehigh Valley, the entrance to the men's toilet is from the outside of the building in order to keep some travel out of the waiting room. On the other hand, the New York Central, the Lackawanna, the Rock Island, the Santa Fe and the Burlington, arrange toilets so that both will open inside the buildings to prevent many loafers from using them so readily. The New York Central usually provides for a vestibule between each toilet room and the waiting room if no smoking or retiring rooms are included and on most roads an effort is made to locate the doors out of the line of vision.

WALLS AND ROOFS

The use of frame structures, formerly quite common, is being more and more restricted to new towns, temporary quarters, and permanent buildings only in the smallest villages and towns. The Lehigh Valley has not built a frame station since 1906, and the

A Brick Station on the Burlington with Long Canopies at Either End

Lackawanna does not use frame for any permanent construction in such buildings. The New York Central has recently built a frame combination freight and passenger station costing $16,000, but the more ordinary buildings of this type cost $5,000 to $6,000. This road occasionally uses broad clapboards on its stations, but it is expected to limit the use of frame construction in the future to the canopies between the buildings and the track. The Rock Island builds 80 standard types of frame stations, the maximum size being 24 ft. by 104 ft., costing about $3,500. The Santa Fe builds small frame stations 16 ft. by 40 ft., to 24 ft. by 65 ft. and 24 ft. by 80 ft., costing about $1,200, $2,200 and $3,000, respectively. These structures are located on new lines and they usually re-

main for their natural life, although if the town develops a better station is provided. Frame stations are very seldom built for replacing existing structures. The Burlington builds a number of standard frame combination stations from 18 ft. by 38 ft., up to 24 ft. by 82 ft., costing from $1,500 to $2,950, or $2.20 and $1.50 per sq. ft. of floor area respectively.

The most usual wall construction for permanent stations of medium sizes is of brick or stucco, although concrete, brick veneer, terra cotta and natural stone, are all used to a limited extent. Brick stations are built by most roads at a cost of $3 to $5 per sq. ft. in sizes from 1,000 to 3,000 sq. ft., and are almost universally satisfactory. An impervious vitrified brick is frequently preferred, although some of the rough textile product is coming into use. The dark colors are ordinarily selected with a trimming of natural stone, terra cotta or concrete. The Lackawanna has tried a construction of two 4-in. brick walls with a 2-in. air space between them. In this connection, however, the insulation of the walls is generally considered relatively unimportant for the heating must be proportioned for an excessive window and door area.

Stucco has been widely used and in most cases has given satisfaction, particularly for the upper portion of the buildings. The objection to stucco below the window sills is that it is easily damaged by trucks, wagons, etc. The Lehigh Valley also finds difficulty in the streaking and discoloring of the stucco. On this road a building with hollow tile walls stuccoed costs from $3.35 to $4 per sq. ft. in sizes from 1,000

A Brick and Stone Suburban Station on the Burlington Which Is Showing a Long Life and Low Maintenance Cost

to 2,000 sq. ft. The New York Central does not use stucco below the window course but finds it satisfactory above that level either on frame or hollow tile construction, particularly when the lower part is of brick. The former is of course cheaper. The Lackawanna has used stucco over tile walls but has eliminated this type of construction on the basis of maintenance and appearance. The Pennsylvania frequently uses brick with a stuccoed surface, finding it little more expensive than tile. The Rock Island has built a number of tile and stucco buildings with brick below the windows at about the same cost as an all-brick station. The Santa Fe uses a stuccoed wall down to the foundation, placing guards where necessary to prevent trucks from damaging the surface. These buildings cost about $3.50 per sq. ft. The Burlington builds a 24-ft. by 82-ft. station with frame walls, stuccoed, at a cost of about $3,000 not including heating, lighting or fixtures, and a similar building with tile walls is estimated to cost about $4,000. This road has successfully stuccoed one old frame station.

The Lackawanna uses some concrete buildings, and the New York Central has used concrete up to the window sill course, the cost usually being about the same as for brick. On the latter road the surface is pebbled, brushed or rubbed and the corners chamfered or rounded. In some cases a special face mixture may be poured and brushed out after the forms are removed. The Lackawanna prefers a bush-hammered or bull-pointed surface. In addition to the cost, the chief objections to concrete for station buildings are the difficulty of accurately lining thin, high walls and the extra care required to secure a pleasing appearance of the surface. Brick veneered walls have been used to a limited degree. The Lackawanna places the brick facing on a tile wall and the Burlington finds the average cost for a 24 ft. by 82 ft. combination building without fixtures to be about $4,000. A special type of building used by the Lackawanna in one case is the cream mat glazed terra cotta station shown in one of the accompanying illustrations. Natural stone is ordinarily used only where it can be secured economically near the site and the cost of course varies widely with local conditions.

The very large majority of small stations have a pitched

A New York Central Station with Concrete Base Course and Wooden Clapboards Above

roof with wide overhanging eaves. Plain roof lines are much to be preferred in reducing the maintenance on the building but for architectural effects gables and broken lines are frequently introduced. The most widely used and most satisfactory roofing materials for stations of medium size are tile and slate. The A. R. E. A. Manual recommends these materials for slopes of 6 in. per foot or over and ready or prepared roofing for very small or temporary buildings. The difference in quality between

A Concrete and Stucco Building on the New York Central

various grades of slate and tile makes it difficult to compare accurately either their costs or serviceability. The best grade of slate when properly specified is considered expensive by some roads but its service is not questioned. The principal objection to the average slate roof is that it breaks easily from jars and some roads, as the Lackawanna, limit its use to cheaper stations. A good grade of impervious tile is reported by several roads to cost little more than the average slate and when properly laid on a waterproof paper, gives very good satisfaction. In laying tar paper roofs the Lehigh Valley has

found it necessary to use half round or oval molding over the laps to prevent wrinkling. Gravel and composition roofs, tar paper and asbestos shingles, metal and tin are all used to a limited extent on various roads. Under certain local conditions, all of these materials have advantages.

Opinion is divided as to the best type of gutter, the Pennsylvania favoring a standing gutter while the Rock Island, Lehigh Valley, the New York Central and other roads prefer a hanging gutter. The hanging gutter is usually considered to be easier to repair, the Rock Island using a sheet lead flashing under the tiles to allow repairs to be made without damage to the roof. Gutters and flashings are usually of copper, galvanized iron or a pure ingot iron, while gutters of wood are also frequently used.

A Glazed Terra Cotta Station on the Lackawanna

INTERIOR WALLS AND FLOORS.

Partitions in small stations are usually built of brick, hollow tile or timber studs, the latter being the least desirable but also the least expensive. The lower portions of the walls in the public rooms are commonly wainscoted to a height varying from 5 to 9 ft. Wood is used for this purpose to some extent on the New York Central, the Lackawanna and the Buffalo, Rochester & Pittsburgh. The Lehigh Valley and the Lackawanna use tile extensively, and the Rock Island prefers an impervious brick. In dark rooms a light gray enameled brick is used and in light rooms a dark brick. This construction is found better and cheaper than a good paneled oak wainscot. The Burlington and the Lehigh Valley use some enameled brick. The Santa Fe in general prefers a chair rail to the wainscot.

The wall, or at least the portion above the wainscot, is almost universally plastered, metal lath being used exclusively or generally on most roads. The woodwork is ordinarily of pine, fir or oak, depending on the grade of the station. Plaster or wall board has been used to a limited extent on a number of roads and has been found very satisfactory by some. The Lehigh Valley has found that the board must be well seasoned, for if it is placed when green, it pulls away from the nails. The New York Central has used this wall finish in some temporary stations and in one or two small permanent buildings. This road prefers the imitation wood finish. On the Santa Fe some wall board has been used in localities where water is very scarce, rendering it difficult to make plaster. Pressed brick facing has been used in the public rooms in a few cases on the New York Central and the Lackawanna and a number of roads have faced the baggage and freight rooms with brick. Glazed tile are common in toilet rooms and the Buffalo, Rochester & Pittsburgh has used some sheet steel for lining train order rooms.

Wooden floors that have been almost universally used in the past are still being installed to a large extent on many roads. The comb-grained yellow pine which has been generally favored for this use is becoming increasingly difficult to secure and Oregon fir is being used in its place by some companies. The Buffalo, Rochester & Pittsburgh has built a number of stations with a double floor, consisting of 7/8 in. tongue and grooved hemlock, laid diagonally on the joists with a layer of building paper separating it from the surface layer of 7/8 in. tongue and grooved comb-grained Georgia pine. Maple flooring is used on a number of roads in the ticket office and a plank flooring is frequently laid in the baggage, express and freight rooms. Wooden floors have the disadvantages that they are not sanitary or fireproof and under severe wear do not have a long life. Tile floors are preferred to wood on the Lehigh Valley, the New York Central and the Rock Island, although their cost is, of course, greater. Concrete has been satisfactorily used in many of the stations built by the Santa Fe and on the Burlington a reinforced concrete floor with a cement tile surface is generally provided. Granulithic and terrazo floors have been used almost exclusively by the Lackawanna and cork has been used by the New York Central in some ticket offices. Baggage rooms on the Rock Island are laid with a brick floor practically the same as the platforms.

A Brick Station on the Lackawanna with Separate Waiting Rooms for Traffic on the Opposite Track

HEATING, LIGHTING AND PLUMBING

All stations built in the northern and central portions of the country require some provision for heating. For the very cheapest buildings on the Lackawanna, New York Cen-

tral and many other roads, stoves are still used, although the Pennsylvania puts very few stoves in new buildings. The Buffalo, Rochester & Pittsburgh provides a coke-burning stove for the very small buildings. The Lehigh Valley has tried car heaters for some of its stations and also has two vapor systems in service. For stations of medium size, however, steam and hot water heating plants are the most usual. The Lehigh Valley, the New York Central, the Lackawanna and the Pennsylvania prefer steam in most cases and the Burlington, Rock Island, and the Santa Fe prefer hot water. The Rock Island uses steam on its northern lines and hot water on the southern lines because of the possibility of maintaining an even temperature with a hot water plant when only a small amount of heat is required. In general the first cost of a steam plant is less than that for a hot water heater, but the latter is cheaper to maintain and uses less fuel. A factor considered by some roads is the danger of an explosion in a steam boiler while the worst that can happen to a hot water plant is for one section to burst and flood the fire.

The heating plants are usually located in a basement if possible, although in some localities the height of the ground water will not permit an excavation to be made under the building. On most roads the basements are made only large enough for the furnace and for coal storage, although the

A Brick Station on the Buffalo, Rochester & Pittsburgh in a Small Rural Community

Pennsylvania usually excavates under the full building in order to make all pipes accessible without the use of tunnels or conduits. Several roads endeavor to locate the basement under the toilets so that the plumbing is accessible from below. The Rock Island provides a reinforced concrete floor in all basements. The alternate location for a heating plant is usually in the baggage room or freight room, where it is common to set the furnace in a shallow pit a few feet below the floor level. The Lehigh Valley lays pipe runs in vitrified clay conduit under the floor, arranged to pull the pipe out if necessary. On the Lackawanna short pipe runs are laid in conduit and long ones in a covered box in the floor. The Rock Island usually provides a tunnel for the pipes and on the Santa Fe and the Burlington the feed pipes of the hot water system are run overhead in the attic with the returns outside the building in conduit or in a tunnel under the floor.

In general, radiators are located along the wall, under the windows or near the doors. The New York Central avoids exposed radiators wherever possible, ordinarily placing them against the outside walls back of the seats. The obvious objection to an exposed radiator is that it soon becomes a litter box and a cuspidor. The Burlington does not favor the location of radiators under seats, as this practice prevents the rearrangement of seating facilities. In some cases attention must be paid to the location of radiation with reference to the coldest extremity of the building.

The provision for lighting stations depends largely on the system in use in the community. If electricity is available, it is almost universally utilized, gas is piped to the station in many instances and in many of the smaller stations only oil lights are justified.

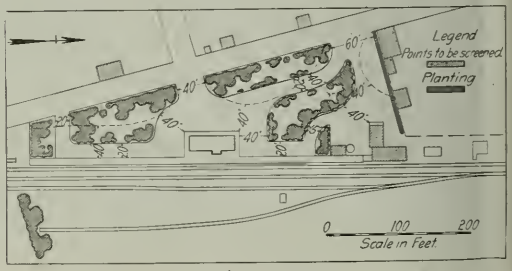
The provision of sanitary plumbing is also dependent to a certain degree on the ability of the roads to connect with water and sewer systems in the towns. It is almost a universal practice to provide such connections whenever possible and in many cases, particularly on eastern roads, cesspools and septic tanks are installed when the towns have no sewer systems. In the central and western states it is unusual to find a town in which a medium sized passenger station is justified which does not have a water and sewer system. The Lehigh Valley uses cesspools 6 to 8 ft. in diameter and 15 ft. deep or a rectangular box of brick, hollow tile or stone. On the Pennsylvania large double cesspools laid up dry are used. These are built of stone or brick and are usually 7 to 8 ft. in diameter and about 15 ft. deep.

Drinking fountains are frequently provided even in the small stations and there is an increasing tendency toward the use of sanitary or bubbling fountains. A number of roads, however do not consider the provision of drinking water important and if not convenient omit it. When ice is provided the better practice is to put the water through coils, around which the ice is packed.

PLATFORMS AND STATION GROUNDS

Station platforms on the Lehigh Valley and the Lackawanna are usually of concrete and on the Rock Island, the Buffalo, Rochester & Pittsburgh, the Santa Fe and the Burlington, of brick. The New York Central uses both concrete and brick, finding the latter better in northern climates where snow and ice collect. Brick platforms are usually laid either in the herringbone pattern or at right angles to the length of the platform. The former is considered to give a little better support for trucking, but requires cutting the bricks and using small pieces at the edges. Brick platforms are laid on sand or gravel fill or on a concrete base and are usually provided with a concrete curb. On the Burlington these curbs are built in a company plant and shipped to the site in the manufactured state. It has been found that in this way a curb fully as cheap as a creosoted timber can be provided. On the Santa Fe the concrete curbs have bricks on top.

One of the most marked advances in practice during recent years is indicated by the increased attention being paid to the appearance of station grounds. Many expensive and



A Typical Layout of Drives and Shrubbery at a Small Station on the Pennsylvania

well designed buildings have in past years been located among such squalid surroundings as to lose almost entirely their architectural value. This condition is fast being remedied, however, by the sodding of the station grounds, laying out walks and drives where the opportunity is presented and in many cases by planting trees or shrubs. The Pennsylvania has given special study to this work and has in its maintenance department an office which prepares landscape plans and supervises generally the use and care of all plants.

Trained men handle features not ordinarily given their due share of attention, such as the views to be had of railroad structures and the surrounding country from the approaches to the building, and from passing trains, and the use of every opportunity for artistic arrangements that do not conflict with the utilitarian objects of the station. General plans are drawn on a 40-ft. or 20-ft. scale to show all buildings and landscape features, trees, shrubs, etc., around the station and on this plan very careful location of each tree and shrub is possible. The accompanying drawing illustrates in dotted lines the way the drives at a small station would have been located had not the rearrangement shown in solid lines been suggested by those who appreciated the need to screen the very objectionable appearing buildings on adjoining property. A company nursery on this road furnishes most of the trees and shrubs and a gardener foreman with a small gang on each division tends to the planting, watering and other maintenance.

The Lackawanna also makes detailed plans of station grounds showing driveways, walks. shrubbery, etc., particularly for suburban stations. There is also an organization connected with the maintenance department to look after this class of work.

On the New York Central station grounds are always graded and vacant spaces sodded, any parking or decoration that may be desired being left to the superintendent and the station agent. On the Rock Island the division officers lay out drives and walks, shrubs, etc., and the local men maintain them, while on the Burlington the architect's office prepares the layout for station grounds and the division force takes care of the maintenance.

INCOME FROM THE MAINTENANCE OF WAY DEPARTMENT

By "Supervisor"

The maintenance of way department of any railroad organization is primarily a spending organization. Any income from this source is necessarily incidental, and in no way can it be regarded as a main function of the department to turn any considerable sums into the treasury. Admitting these premises, there still remains the fact that the maintenance organization can do something toward swelling the general income of the railroad. In times such as these, any addition, however small, to the net income, is extremely welcome to the management, and this article purposes to outline how one maintenance officer paid his annual salary back to his company several times over by devoting a little time and trouble to increasing the sales of scrap material to outside parties.

The territory in charge of this man is a single-track branch line running through a fertile farming country and serving two large and one small industrial towns, the seats of large iron and steel manufacturers. When the idea first presented itself the prospect seemed rather poor, for there was apparently little which the railroad man could offer for sale which would appeal to the public along his tracks. His main commodities were old rails, old ties and engine cinders, and his first duty was to go out and make a market for these goods. His first step was to call upon the purchasing agents of the various industries located along his tracks. He found that their purchases of scrap iron and steel were made in such lots and at such prices that they could best be handled by the purchasing agent of his own company. His offers of engine cinders for filling, etc., met with no response. His offers of old ties, however, were considered, and after consultations with furnace and mill superintendents he was able to place orders for several carloads of old ties at a price which netted his company a good profit over the cost of loading and hauling them to the point of delivery. These ties are used by the furnace people for kindling, and gave such satisfaction to their purchasers that he was able to turn in over $400 from this source for the year 1914, with the iron business at a low ebb.

When main or running-track rail renewals release rails in fairly good condition, but too light for further railroad use and not quite good enough for sale in the open market as relayers, the matter is taken up by personal calls upon superintendents, managers and owners of industrial tracks along the line, frequently with success. By quoting prices slightly lower than the current prices for relayers plus the freight on them, by being able to guarantee condition and by permitting inspection and rejection while the rail is being loaded, he has been able to sell several cars of light rail per year at prices from $5 to $8 per ton above their scrap sale value. Fittings are also sold at a large increase over their scrap prices. During 1914 about 95 tons of rail and $160 worth of fittings were sold at prices averaging $6 per ton above normal scrap values. Without personal effort to dispose of this stock it would have gone to the scrap pile.

By getting in touch with township road authorities another market was opened. Rails were sold for re-enforcing culverts and small bridges. After the free gift of enough engine cinders to surface several stretches of mud roads, a market developed for this class of material. Farmers and country merchants came to recognize that cinders were the best and cheapest material for private roads around their buildings and into their fields. Building contractors were next approached, generally with successful results. These men buy second-hand lumber, for which the railroad has no further need, rails for concrete work and large quantities of engine cinders for foundations, for paving construction and for filling. Between the road supervisors, the farmers and the contractors the sale of engine cinders now runs from 600 to over 1,000 cars per annum. This is a saving in two ways, as formerly a large amount of these cinders was unloaded on waste dumps at considerable expense for labor. The demand for these cinders now is frequently larger than the divisional supply.

From these various sales of materials at his disposal he was able to show an income averaging considerably over $10,000 per year during 1913 and 1914, including in this sum only the difference between the scrap value of rails, etc., and the sums actually received for them, and making no account of the labor saved from wasting cinders. The cost of hauling to the consignees has also been omitted (all material was sold f. o. b. destination), but most of it would have had to be handled by trains under any circumstances. No small part of the credit for this showing is due to the railroad's purchasing agent, who set the prices at which this material should be sold, and who used every means in his power to assist the man on the ground and gave him every facility for quick and fair selling.

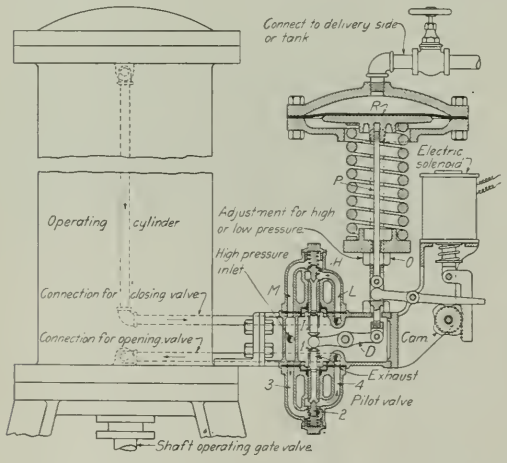
While the sum mentioned above as the annual turnover of profits is small in comparison with other sources of railroad income, yet it is new business. It has been developed from practically nothing, the selling expense is nil, and it shows that even the maintenance of way department can in its small way put something on the right side of the big ledger.

Nyasaland Railway Opened for Traffic.—The extension of the railway running between Port Herald, in Nyasaland (the southern terminus of the Shire Highlands Railway), and Chindio (a point on the northern bank of the Zambesi) was opened for traffic on April 1. This line forms complete railway communication between the Zambesi and Blantyre (the capital of British Nyasaland). It is 61 miles in length and crosses a tributary of the Zambesi by a steel bridge of 38 spans, over a third of a mile in length. The chief importance of the line is that it facilitates transport between Nyasaland and a navigable point on the Zambesi. At Port Herald the river is only navigable for a few months in the year, while at Chindio boats can run all the year round.

AUTOMATIC CONTROL FOR A GATE VALVE

An application of the Golden-Anderson automatic control device to a hydraulic gate valve for automatically maintaining the water level in tanks, standpipes or reservoirs, has recently been developed by the Golden-Anderson Valve Specialty Company, Pittsburgh, Pa. The latest form of this valve for controlling a globe valve was illustrated in the *Railway Age Gazette* of March 19, 1914. In the design illustrated herewith the gate valve is opened and closed by an operating cylinder, the piston of which is actuated by hydraulic pressure through pipe connections to the pilot valve of the control device.

When the valve is open and water is flowing freely to the tank or reservoir the parts of the control device are in the position shown in the sketch. This condition exists as long as the pressure in the tank or on the outlet side of the valve, which is transmitted to the upper side of the diaphragm "R" through a pipe connection, is less than that for which the heavy spiral spring has been adjusted by the nut "O," for under this condition the spindle "P" is forced upward by the spring and the arm "D" closes the exhaust valve 1 and opens the high-pressure valve 2, at the same time allowing the exhaust valve "I" to open and the high-pressure valve "H" to close. The full pressure in the pipe line on the inlet side of the valve is transmitted to the pilot valve through a pipe connection to the high-pressure inlet, and thence



Improved Arrangement of Control Valve for Use with a Gate Valve

through the ports 3 and 4, and the pipe leading to the lower side of the operating cylinder. The piston in the cylinder is allowed to move upward under this pressure as the water above it is exhausted through the pipe to the pilot valve and the port "L" to the atmosphere.

When the pressure in the tank or on the outlet side of the valve has exceeded the pressure maintained by the coil spring, the spindle "P" is forced downward by the diaphragm "R" operating the arm "D" which then closes the exhaust valve "I," opens the high-pressure valve "H" and permits the exhaust valve 1 to open and high-pressure valve 2 to close. The pressure from the inlet side of the valve is then transmitted through ports "M" and "L" and the pipe connection to the upper side of the piston in the operating cylinder. As the water underneath the piston is allowed to exhaust through port 4 to the atmosphere, the valve is closed smoothly and positively.

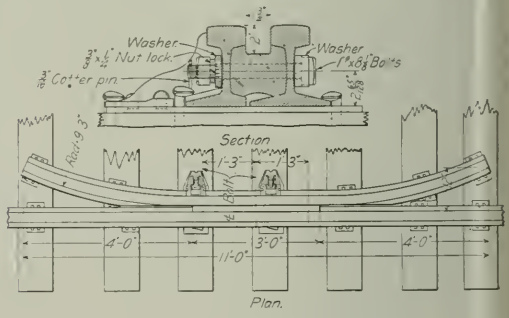
An electric solenoid attachment similar to that used on previous forms of this device can be attached to enable the valve to be opened or closed electrically from any number of distant points. As the electric current is only applied to the solenoid for a few seconds in the operation of the valve there is no waste of current. In a similar manner the addition of an extra diaphragm attachment in place of the electric solenoid allows the valve to be hydraulically closed at any time by putting increased pressure on the main. This diaphragm can be adjusted to a few pounds above the normal supply, this increased pressure operating the pilot valve as described above.

It is also possible by connecting the inlet pressure pipe both to the pilot valve and the top of the diaphragm to operate the control valve in both directions, allowing water to flow into the tank or reservoir and to return through the same pipe whenever the pressure is less on the inlet side than in the tank.

THE B. R. & P. STANDARD GUARD RAIL

One of the most difficult of the smaller details of maintenance of way work with which the track man has to contend is that of guard rail maintenance. In common with other roads, the Buffalo, Rochester & Pittsburgh has experimented with guard rails of different lengths supported by numerous types of guard rail braces, clamps and fasteners, as a result of which it has adopted as standard the design shown in the accompanying drawing.

The standard guard rail for both main and turnout tracks is 11 ft. long with a 3-ft. cast filler block bolted through both the guard and main rails with three 1-in. bolts spaced 15 in. apart. Both the guard and main rails are full tie plated with standard plates. The guard rail is straight for a distance of 3 ft. in the



B. R. & P. Standard Guard Rail

center, beyond which it is curved to a radius of 9 ft. 3 in. at each end, giving a clear distance of 12 in. between gage lines at the ends. The center of the guard rail is placed 6 in. ahead of the point of the frog, leaving 12 in. of straight flangeway back of this point. Two dimensions of cast filler blocks are used, that for the main tracks providing a 1¾ in. flangeway, while that on the turnout side of the frog provides for a 2-in. flangeway to correspond with the standard practice of widening the gage ¼ in. through the turnout. The 1-in. bolts are provided with a washer on the head end and a washer, a ⅜-in. nut lock and a 3/16-in. cotter pin on the opposite end. The fillers are made of ordinary cast iron and can be cast in any foundry while the guard rails are sheared and drilled complete in the company's shops.

Approximately 4,500 of these guard rails are now in use on this line. Loose guard rails are practically unknown, and the wear on switch ties and frog points as well as the element of danger have been very largely eliminated. In addition to the guard rail remaining in its proper position, the labor of keeping the flangeway free from ice in winter is eliminated since it is only necessary to drop a little salt in the flangeway. When a section foreman orders a guard rail it is furnished to him complete with all accessories, including the rail, bolts, washers, filler and guard rail fasteners complete.

Renewal of Ties—Inspection, Marking and Records

Methods Being Used to Insure Best Results in Removal of Old and Distribution and Use of New Ties

The latest official statistics show that the railroads spend annually about $55,000,000 for the ties used to replace those removed from the track on account of wear, decay, accidents, etc. This figure, which does not include the cost of labor for distributing the new ties, placing them in the track and disposing of the old ones, together requiring so large a part of the trackmen's time during the spring and summer, is about 15 per cent of the total cost of maintenance of way and structures and 3 per cent of all operating expenses. It is obvious then that particular care is justified to insure the lowest percentage of renewals consistent with proper maintenance standards and important as this subject is at present, it is becoming increasingly so on account of the rapidly increasing cost of ties.

Theoretically, to attain the maximum economy every tie should remain in the track until it reaches the point in its deterioration when it will no longer support the rails with the proper factor of safety and should then be removed immediately. Practically, since ties are renewed once a year it is the general rule to remove all that will not safely carry the loads for another year, and on account of the disadvantages resulting from tearing up the roadbed as is necessary to a certain extent in tie renewal, it is practical economy to remove ties with even a greater life than this during general surfacing, reballasting or rail renewal.

Some roads have tried to assign a reasonable number of ties to each section and leave it to the foremen to use them to best advantage, but the imperfections of this scheme are obvious. It is almost universal therefore to base the requisition for ties on an inspection of the track prior to the season of renewal, although the methods of making this inspection, of checking the reports and of supervising the work of placing the new ties in the track vary widely. These differences as they exist on 16 typical important roads are discussed in the following paragraphs.

INSPECTION AND MARKING

The inspection upon which the requisition and allotment of new ties is made is left to the section foremen on the Central Railroad of New Jersey with very satisfactory results. The supervisors are constantly in touch with the foremen, walking each section during the year and familiarizing themselves with the details. Each foreman is allowed to ask for as many ties as he thinks he will require. This data is then checked up by the supervisors, who have acquired during the course of the year an approximate idea of what the needs of each section will be. The requirements are then forwarded to the engineers maintenance of way, who tabulate the data and make requisition for the necessary ties. After renewals have started, the supervisors and assistant supervisors examine all ties removed very carefully, and if a foreman is found to be removing too many ties, or leaving poor ties in the track, his attention is drawn forcibly to the fact. The engineers maintenance of way as well as the superintendents also inspect ties that are removed at frequent and unexpected intervals in their trips over the line. Any ties removed from the track that are found to have any additional life are sorted and picked up by the work train and used in siding repairs or construction, being spotted in with good or new ties. Under this system the situation has gradually improved until it is scarcely ever necessary to draw a foreman's attention to any misjudgment, and much better results are being secured than by methods previously employed. The objection to leaving the selection of ties to be removed from the track entirely to the section foreman, which is advanced by some maintenance men, is that there is too great a tendency under this method to praise the man who puts in the most ties per day per man, resulting in the removal of some ties from which additional life could be secured.

Several roads have found it advantageous to combine the detailed inspection of the foremen with check inspections by supervisors, roadmasters, engineers or superintendents. On the Boston & Albany the foreman's statement is checked by the supervisor or his assistant and is then sent to the division engineer for approval. On the Pennsylvania the practice is similar except that the division engineer, usually accompanied by the supervisor, also makes frequent independent inspections to see that the proposed renewals are proper and economical. In addition, there are men assigned to special duty both on the division and in the office of the engineer maintenance of way, who regularly follow up tie renewals, making an inspection both of the ties removed from the track and those left in. These men submit reports on what they find and any cases of bad judgment are taken up through the regular channels. During the time that this practice has been followed, covering the last six or seven years, there has rarely been any cause for criticism.

The reports of the Northern Pacific section foremen are checked by the roadmasters walking over a part of each section, and in addition the division superintendent goes over at least three sections on each roadmaster's district accompanied by the roadmaster on a hand car or on foot to verify the tie requirements. The Illinois Central requires the supervisors, after receiving the foremen's reports, to make an independent inspection and then forward the foremen's reports with their recommendations. The roadmasters, on receipt of the supervisors reports, walk over selected miles with the division superintendents to check the judgment of their men.

Some roads place the responsibility for the tie inspection entirely on the supervisors or roadmasters. Such roads include the Atchison, Topeka & Santa Fe, the Norfolk & Western and the New York Central. On the Baltimore & Ohio all tie inspections are now being made by the supervisors and a general tie inspector for the system checks up these reports. This method has been found better than a previous one in which tie inspectors alone handled this work. Other roads, including the Chicago & North Western, the New York, New Haven & Hartford, the Philadelphia & Reading, the St. Louis & San Francisco, and the Union Pacific, require the roadmaster or supervisor and the section foremen to go over the line together for the inspection of ties to be renewed, thus combining the broader experience and better judgment of the superior officer with the detailed knowledge of local conditions possessed by the foreman.

On two of the roads considered, the tie inspector is used with satisfaction. The Queen & Crescent inspectors are selected by the roadmasters and report to them. They are accompanied in making their trip over the line by each supervisor while working on his district. The Buffalo, Rochester & Pittsburgh selects the most intelligent extra gang foremen for tie inspectors, making them report to the division engineers. They are accompanied by the section foremen in going over the line. The roadmasters and foremen are not relieved of responsibility for the safety of their track on this road and are given a proper voice in the matter of tie renewal. Objections are advanced to the use of tie inspectors by some roads, one of these having found that the best section foremen on the road when made tie inspectors could not spot all of the bad ties and would spot some good ones so that the net results were less satisfactory than when the work was handled by men familiar with the local conditions.

The time of making tie inspections is also extremely variable, so that considering April 1 as the beginning of the tie renewal season, the inspection is begun on some roads as much as nine months before that date and is not finished on others until three months after it. The Boston & Albany and the New York Central are among those that begin early, the former making its

inspection during July and August, and the latter usually finishing it before October 1. The Union Pacific, the Chicago & North Western, the Pennsylvania, the Central Railroad of New Jersey, the St. Louis & San Francisco, and the New Haven, require the inspection to be made during the fall, and the Queen & Crescent specifies December. On the Baltimore & Ohio the work is begun as soon as possible after January 1 and is completed before July 1. The months of April and May are designated for tie inspection on the Illinois Central, and on the New Haven and the Buffalo, Rochester & Pittsburgh, the work is handled during the spring, beginning on the latter road as soon as the frost is out of the ground.

The points to be considered in an inspection of ties in the track may be left entirely to the judgment of the inspector or be covered more or less completely by written instructions, depending on the practice of the individual roads. When such instructions are brief they ordinarily mention a close examination including the ties on each side of the one under consideration, the local roadbed conditions, the location, whether in curve or tangent, the amount and character of the traffic, the visible rot or crack, and a test with an adze or other suitable tool to determine interior soundness. A very complete set of instructions is issued to the tie inspectors on the Buffalo, Rochester & Pittsburgh, from which the following abstract is taken:

There are two standards for making renewals in main track; first, where the track is not to be disturbed and the ties will therefore be dug in and, second, where the track is to be raised off of the old bed allowing the ties to be placed during the raise. Under the first condition ties must be inspected by driving a pick in each side adjacent to the rail seat near both the bottom and the top faces below the sap line. The pick must be driven into the ties toward the center and be drawn with as little prying as possible. The ties must not be tested on the top except in an endeavor to find decay around the tie plate and spike, and in such tests the ties must not be mutilated more than absolutely necessary. To test the tie for strength, one end of a pick should be inserted under the end of the tie and the pick used as a lever. It the tie is broken under the rail seat this will usually determine it. If two ties with only one year's safe service are adjacent, one must be removed. In a group of ties, all of which have only one year's safe service, enough must be renewed to leave each doubtful tie with one good neighbor. Sap rot alone is not sufficient to condemn a tie. A tie cut down by rail wear should not be renewed unless the rail has cut into the face more than ¾ in. This applies to ties on tangent, as all curves are tie plated. On curves when by being adzed repeatedly for rail renewal, a tie is cut down sufficiently to weaken it, it should be removed and used for side track renewals if the timber is sound. On tangents where a good tie is cut down ¾ in. by rail wear or adzing it should be protected with tie plates against further cutting. Careful attention must be given to the inspection of red oak and pin oak ties, as this timber usually rots from the center, leaving a hard shell which can be detected only by careful inspection. In track that is subject to heaving and where shimming is necessary, care must be taken to insure enough good ties

Form 1596 — 2 M 4-11

BUFFALO, ROCHESTER & PITTSBURGH RY.

ENGINEERING DEPARTMENT

FOREMAN'S DAILY REPORT OF TIES PUT IN TRACK

Date _____ 191__ Division _____ Section _____ Mile Post _____ to Mile Post _____

LOCATION	T	E	RO	BO	PO	M	B	Br	Cy	G	C	H	P	Bridge	REMARKS
North Bound Track															
South Bound Track															
Single Main Track															
Side Track No.															
Side Track No															
Side Track No															
No. 7 Switch Set															
No. 7 Switch Set															
No. 6 Switch Set															
No. 6 Switch Set															
No. 9 Switch Set															
No. 9 Switch Set															
No. 12 Switch Set															
No. 12 Switch Set															
No. 7 Xover Set															
No. 9 Xover Set															
No. 12 Xover Set															

Correct _____ Roadmaster

Signature _____ Sec. Foreman

INSTRUCTIONS—Section Foreman must fill out one of these reports covering ties put in main tracks and sidings for each mile, and mail to Roadmaster at close of each day. Note opposite each switch and crossover set, under proper heading, the number of pieces of each kind of timber, and show station and side track number where located. Show station where each side track is located in remarks column opposite.

The B. R. & P. Foreman's Report of Ties Put in Track

for spiking and bracing and special attention must be given to the inspection of ties through road crossings, station platforms and other places where they are covered and likely to be overlooked by the section men.

The second condition governing the marking of ties for renewal arises from the policy of the company to resurface out of face a part of the main line on each section each year in addition to the reballasting of track when new rail is laid. In such cases it is the intention to make sufficient renewals to last two or three years without having to disturb the track during that time. Under this condition the inspectors test the ties as previously described, removing all that will not last more than two years. Where new steel is laid, no bad ties must be left under the joints. In making renewals in this case, some fairly good ties may be

Form 1596 — 2 M 4-11

BUFFALO, ROCHESTER & PITTSBURGH RAILWAY

ENGINEERING DEPARTMENT

FOREMAN'S DAILY REPORT OF TREATED TIES TAKEN OUT OF TRACK

Date _____ 191__ Division _____ Section _____ Between Mile Post _____ and Mile Post _____

LOCATION	T Date Nail	E Date Nail	RO Date Nail	BO Date Nail	PO Date Nail	M Date Nail	B Date Nail	Br Date Nail	Cy Date Nail	G Date Nail	C Date Nail	H Date Nail	P Date Nail	REMARKS
North Bound Track														
" " "														
" " "														
South Bound Track														
" " "														
No. 12 Xover Set														
" " "														

Correct _____ Roadmaster

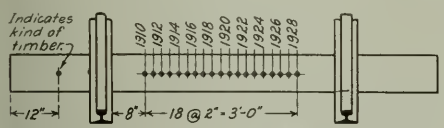
Signature _____ Section Foreman

INSTRUCTIONS—Section Foreman must fill out one of these reports covering treated ties taken out of main tracks and sidings for each mile, and mail to Roadmaster at close of each day. Show under proper heading all ties having corresponding letter on nail, and show those having same date on dating nail on the same line and give date. In case number on dating nail cannct be read, give date as shown by position of nail in tie in accordance with standard instructions. Note opposite each switch and crossover set, under proper heading, the number of pieces of each kind of timber, and show station and side track number where located. Show station where side track is located in remarks column opposite.

A Report Covering Treated Ties Taken Out of Track

taken out, in which case they should be carefully sorted and piled, to be picked up and distributed for side track renewals. A lower standard of inspection is used for mine tracks and side tracks, and especially for standing tracks in yards where no ties are taken out until their safe service is passed. In passing tracks care should be used to see that all ties around turnout curves are in good condition.

Although a large majority of the roads considered require the officer making the first inspection to mark each tie in some distinctive manner for future identification, several roads, including the Pennsylvania, the Union Pacific and the Central Railroad of New Jersey use no system of marking. The two commonly recognized methods of designating ties for renewal are by cutting with an adze or axe, and by painting a line on the web or base of the rail directly over the tie. Various forms of cutting are in use, such as chipping off one corner, and notching the side or top of the tie, while on the Northern Pacific two gashes about 3 in. apart are cut on the side near the end. The Buffalo,



Method Used on the B. R. & P. for Marking the Kind of Timber and the Year Ties Are Put in Track

Rochester & Pittsburgh, the Queen & Crescent, the Baltimore & Ohio, and the Atchison, Topeka & Santa Fe use paint.

RENEWALS AND RECORDS

On the Union Pacific it is the practice to distribute enough ties before March 1 to care for the renewals on each section up to June 30, the remainder being piled in yards and distributed after July 1, so as not to interfere with the mowing of the right of way. The roadmaster selects the locations at which the renewals are to be made each month and inspects the ties after renewals. On the Pennsylvania the foreman "blazes" or marks with kiel the ties that are to come out just previous to their renewal. The ties removed are held for inspection and the good ones returned to side tracks, the rest being burned or destroyed. On the New York Central the foremen are instructed to avoid as far as possible the renewal of ties to face and they are cautioned particularly against damaging the ties by picks or by hammering them in spacing. Tie tongs are furnished on all sections where treated ties are used and tie plugs are required to be driven in the holes whenever a spike is drawn. To reduce the tendency to decay around the holes these plugs are treated.

On the Queen & Crescent the foreman, during the renewal of ties, examines carefully each tie spotted for renewal by the inspector and leaves in the track any that he thinks will last another year. He also reports any ties not spotted that he thinks should be removed, giving their location, but waiting for authority from the roadmaster before taking them out of the track. On the Buffalo, Rochester & Pittsburgh the foremen renew only the ties spotted by the inspectors on track that is not to be raised. In case they think additional ties should be removed they report to the roadmaster, who has the ties reinspected. In track that is being raised the foremen are allowed to remove unmarked ties which should come out, placing a cross on them for special inspection later. Such ties are used again if possible. The inspectors on this road are instructed to watch carefully the practice of section forces in renewing ties and to report any improper practice. It is customary on most roads to pile and burn the ties removed after proper inspection to secure ties that may have additional life in side tracks or yards. Special precautions are necessary in burning ties to prevent fire damage to the telegraph line, right of way fence and adjacent property.

The number and kind of records of tie renewals kept for future reference differ considerably on the roads considered. These permanent records are kept by various officers ranging from the division engineer to the general manager and the records may be intended simply for a check of the actual renewals with the requisition or for comparisons of the renewals on each mile for a period of years to make possible close supervision. On the Union Pacific each roadmaster is given an allowance showing the number of ties that can be used each month to avoid getting the expense for all renewals in one month. To supplement the record turned in by the tie inspector, the foremen on the Queen & Crescent are required to make a monthly report to the roadmaster showing the number of ties on each mile spotted for renewal, but found good for another year, and also the number not spotted but removed, with the cause of their removal. The Boston & Albany keeps a record by weeks of all ties taken out of track on the forms reproduced herewith.

The Buffalo, Rochester & Pittsburgh requires a daily report

M. W. 13

NEW YORK CENTRAL LINES

BOSTON & ALBANY RAILROAD

(N. Y. C. & H. R. R. R. Co., Lessee)

3m-12-11. H.

Section No. _____

SECTION FOREMAN'S REPORT.

Sub-Division No. _____

CROSS TIES TAKEN OUT OF TRACK

Week during Month ending _____ 191__

Section Foremen shall report all Cross Ties taken out of Track, not including Bridge or Switch Ties, as per Blank Form below. Great care should be taken to give all information called for. In column "Kind of Treatment" the following letters should be used instead of writing words in full:—Untreated, U; Treated, Zinc Chloride Process, Z Cl; Creosote, C; Ruepping, RP.

MAIN TRACKS									SIDE TRACKS							
Number Removed	Year Put in as Marked	Tie Plated or Not	KIND OF		CAUSE OF REMOVAL				Number Removed	Year Put in as Marked	KIND OF		CAUSE OF REMOVAL			
			Timber	Treatment	Decayed	Rail Cut	Spike Killed	Other Causes			Timber	Treatment	Decayed	Rail Cut	Spike Killed	Other Causes

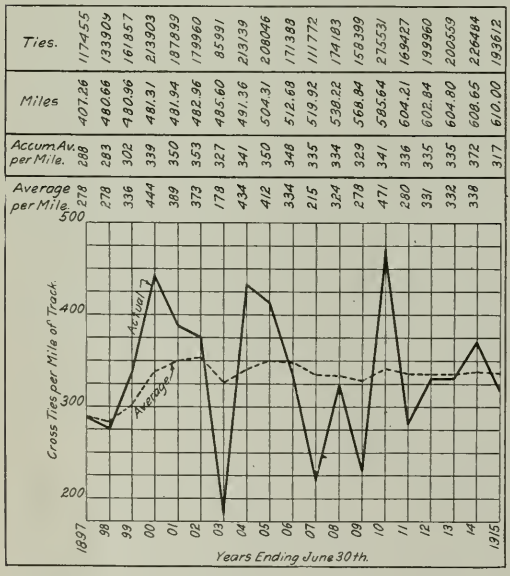
Approved. _____ Supervisor.

Signed. _____ Section Foreman

The Boston & Albany Form for Reporting Cross Ties Taken Out of Track

similar nail bearing the date is placed in the upper face of the tie between the rails, the position along the tie also being varied by an increment of 2 in. for each year. On the Baltimore & Ohio the record of ties marked for renewal is transferred in the office of the division engineer to forms covering main and side track, tie inspection and renewals, blue prints of which are sent to the engineer maintenance of way through the office of the district engineer maintenance of way immediately upon the completion of the inspection for the division. During the season of renewals the foremen report monthly on the ties removed from track, this report accompanying and checking the material report. This information is also entered on the forms mentioned above, furnishing a complete record of the renewals of the year by miles.

On the Illinois Central a record is kept in the office of the chief engineer of all ties used each year for construction and maintenance and also a special graphical record of the renewals in main track. Each district has a separate chart, and these are bound in book form. A book covering the entire system is kept in the office of the chief engineer and one covering each division



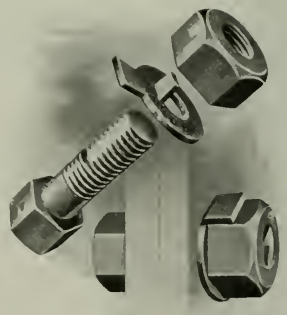
A Chart Kept by the Illinois Central, Showing the Actual Annual Consumption and the Accumulative Average Annual Consumption of Ties per Mile of Main Track on One Division

is furnished to the division superintendent. As soon as the recommendations for tie renewals are made they are plotted on the chart and when any important difference from the accumulative average is shown an investigation is immediately made by an assistant engineer from the office of the engineer maintenance of way or by an old roadmaster selected by the engineer maintenance of way on account of his previous good record in tie renewals. The curves shown herewith illustrate the manner of keeping this record for a typical division.

In determining the average number of ties per mile used in renewals each year, a correction is applied in cases where new lines have been constructed, so that the average derived furnishes a comparison of the renewals on all districts regardless of the date the line was constructed. The mileage of new track is therefore added not in its entirety the year the line is built but in sections during a period of nine years. The amount added each year is proportionate to the estimated tie renewals required for that year. The first addition is made during the third year, amounting to 2 per cent, the remainder being added as follows: fourth year 3 per cent, fifth year 5 per cent, sixth year 5 per cent, seventh year 25 per cent, eighth year 50 per cent, and ninth, 10 per cent. On account of the increased average life of ties resulting from the use of tie plates and preservative treatment these percentages will be revised in the near future. Two averages are shown on the chart, the solid line representing the average ties per mile used in renewals in the years shown, and the dotted line the accumulative average per mile used in renewals since 1897, the year in which the chart begins. The actual number of ties used each year is shown at the top of the chart and the scale of miles is corrected, not actual.

A COMBINED NUT LOCK AND WASHER

The nut lock manufactured by the Positive Nut Lock & Tie Company, Grand Rapids, Mich., has been in satisfactory service on 150 track bolts in the crossing of the Pere Marquette and the Michigan Central in Grand Rapids, Mich., since May, 1913. Other tests have also been made to demonstrate its adaptability to cars, locomotives, and various other machines. The device consists of a soft steel washer with a lug extending on one side and a wedge shaped tongue projecting at right angles from the edge of the hole through which the bolt passes. One side of



The Goble Nut Lock

the bolt is cut off at the end for the distance it is desired to screw down the nut. The tongue on the washer rests against this flat side of the bolt so that when the nut is turned on it will cut a thread on the surface of the tongue, thus forming a threaded wedge. When the nut is turned into the desired position, a lug on the outer edge of the washer is bent down to engage the side of the nut so that the bolt, nut and washer are all bound firmly together.

The advantages claimed for this device are that it does not injure the threads of the nut, it is adjustable and can be locked in any position lengthwise on the bolt and can be unlocked, removed and relocked as often as desired without injury. Old bolts in good condition can be slabbed and equipped with these nut locks, although the company is prepared to furnish new bolts already slabbed. With the use of such a device a better grade of steel than is commonly employed is recommended for bolts subject to particularly severe strain since the nut lock prevents the nut from giving, resulting in a lengthening of the bolts unless the material is designed to withstand this strain.

SIGNALS IN THE UNITED KINGDOM.—An English signaling authority has recently estimated that there are approximately 310,000 switch and signal levers on the railroads of the United Kingdom, and the approximate number of signals is 171,000.

Practical Bridge Erection and Maintenance Methods

First Series of Contest Papers Describing Solutions of Various Common and Special Problems by Bridge Men

As outlined in the *Railway Age Gazette* of April 16, 13 men, representing 11 roads and one contracting company, submitted 16 papers in the contest on Bridge Construction Methods which closed March 10. The judges in this contest awarded the first prize to S. T. Corey, chief draftsman, bridge department, Chicago, Rock Island & Pacific, Chicago and the second prize to James H. Stack, secretary, the Thomson Bridge Company, San Francisco, Cal. These and other papers are published below and the remaining contributions will appear in early issues of the maintenance section.

FIRST PRIZE—AN ECONOMICAL METHOD OF REPLACING TRUSSES WITH GIRDERS

By S. T. Corey

Chief Draftsman, Bridge Department, Chicago, Rock Island & Pacific, Chicago, Ill.

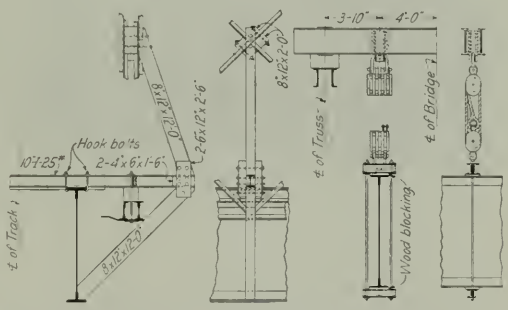
The main line of the Missouri division of the Chicago, Rock Island and Pacific crosses the Iowa river about one mile east of Columbus Junction, Iowa. The early history of this crossing is not available, but the first channel spans of the Warren or Thatcher combination type, resting on stone piers, were probably erected about 1868. In the early 90's these spans were replaced by six through lattice spans, each approximately 150 ft. long, on the original substructure. In 1903 it was noted that these stone piers

The Old Rock Island Latticed Truss Bridge Over the Iowa River Near Columbus Junction, Iowa

were deteriorating rapidly, and the latticed spans were therefore placed on falsework and four new concrete piers constructed. The present bridge consists entirely of deck plate girder spans on concrete piers and is approximately 1,550 ft. long.

This article covers the replacement of the six through latticed spans by 11 girder spans, which was mentioned briefly in the *Railway Age Gazette* of January 19, 1912. The old bridge was designed for two 95½-ton engines followed by a uniform load of 3,300 lb. per lineal foot, without impact and with a unit stress of about 8,000 lb. With a unit stress of 22,000 lb. per sq. in. (including impact determined from the formula $\frac{300}{L+300}$) it was found that the limiting classification of the spans was equivalent to Cooper's E-45. The weight of the motive power had already reached the E-45 classification, and in a few cases exceeded it, and the introduction of still heavier power was imminent. The elastic limit of the steel was probably not much in excess of 30,000 lb. per sq. in., and great eccentricities existed at nearly all the chord joints. Furthermore, it was thought necessary to renew several combination spans on various branches of the system.

The accompanying elevation indicates the extent of the change made. Piers 2, 3, 4, and 6 had been constructed in 1903, replacing the original stone piers. Their tops were remodeled for the reception of the new girder spans. Piers 1, 1a, 2a, 3a, 4a, 5a, 6a, and 7 were built new, pier 1 replacing one of the original stone piers which had been patched up in 1903 to yield a few more years' service. Pier 5, which was also part of the original substructure,

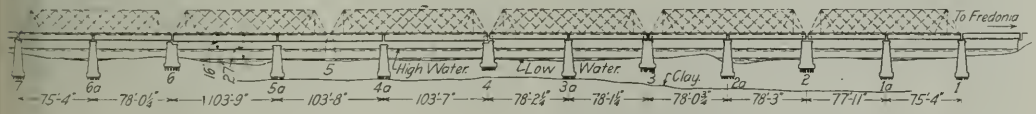


Method of Supporting Old Trusses to Defer Dismantling, and Tackle Used to Support New Girders from Old Trusses

was abandoned. The opening between piers 4 and 6 was divided into three equal parts rather than four, it being figured that the cost of a third pier would be somewhat greater than the cost of the additional weight of the longer spans.

The aggregate length of the truss spans was 928 ft. 9½ in., and to drive falsework under them was estimated to cost at least $7,500 besides greatly hampering traffic during the driving. There was also the probability that the falsework would go out with the first spring freshet with attendant interruption of traffic and loss of the old spans. As an alternative, it was decided to utilize the lattice trusses in the erection of the new girder spans.

Briefly, the method determined upon to erect the two 75-ft., and the six 77-ft. 9 in. spans, comprised the following operations: A girder span, completely riveted up and with deck on, was brought in on flat cars, being spotted immediately above its final location,



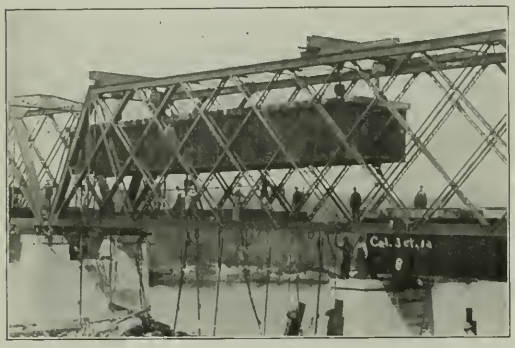
General Elevation of the Chicago, Rock Island & Pacific Bridge Over the Iowa River Near Columbus Junction, Iowa

and then raised by block and tackle fastened to loading beams placed across the top chords of the trusses. The old floor was removed while the span was suspended and the latter then lowered to its seats. The loading beams were made from second-hand material.

The steel for the new superstructure was stored in the yard at Fredonia, about one-half mile east of the bridge site. Here the spans were assembled on flat cars, riveted up, and the new decks put on. This arrangement was very effective, as the work of assembly was carried forward without interruption from passing trains. The traffic at this point was heavy, the maximum

interval during the day being about 2½ hours. The work was arranged to allow the setting of one girder span within this period. No attempt was made to set a record, and no chances were taken other than those inherent in the method used.

Previous to the beginning of the two and one-half hour period, the loading beams were placed in position on the top chords, blocked and lashed. Snatch blocks, rigged in pairs, with lines to be utilized in removing the old floor, were fastened to the truss diagonals. The lines, of which there were two, were operated by



Removing the Old Bridge Floor Under One of the Short Girder Spans Suspended from the Upper Chord of the Old Trusses

the derrick engine; first in one pair of blocks and then in the other, as the removal of the floor progressed.

In the yard at Fredonia, meanwhile, the suspenders, block and tackle, were fastened in correct positions on the new span, which, when loaded upon the two flat cars, was placed between the derrick car and a work engine. After the departure of the passenger train, the two cars were moved to the bridge site and spotted, after which the suspension tackle was fastened to the loading beams and the lines carried back to the engine. The engine was cut off from the cars and backed slowly, lifting the span from the cars and raising it as far as the truss clearance would permit. The two cars were then cut off from the derrick

Removing the Old Truss Members Showing Bracing Used for Their Support

and moved clear of the suspended span in the direction of the engine, the lines to the latter being long enough to permit the cars to intervene between the end of the span and the engine when the former was lowered on to the masonry.

The rivets in the stringer and floor beam connections had been previously cut out and bolts substituted, so that by means of the lines through the snatch blocks, these members could be removed and lowered into the river in 15 ft. of water. To facilitate recovery of the pieces, a rope long enough to reach to the surface of the water was fastened to each and attached at the other end to a float or to the bottom chord of the old truss. After completing this operation the engine slowly moved forward, and the span was lowered to its seats. While the rails were being laid on the new span, the bracing shown in one of the drawings was placed. The track was then made ready for traffic, the entire operation consuming about 2¼ hours.

On account of the great weight and length, it was deemed inadvisable to erect the 103 ft. 4 in. spans in the manner described. An investigation of the stresses resulting in the web systems

The Completed Deck Plate Girder Structure About 1,550 ft. Long

of the truss spans, from the local concentrations of the loading beams carrying these longer spans, showed an ample theoretical margin of safety, but the age of the old spans, the heavy load, and the possibility of unforeseen contingencies developing, made it desirable, if not necessary, to employ other means to erect these spans.

Like the short spans, the 103 ft. 4 in. spans were riveted up complete in the yard, but the deck was not put on for the reasons that greater space under the girders would facilitate subsequent operations, and that the omission of the deck reduced the load to be handled by about 25 tons. Two wrecking cranes, of 100 tons capacity each, were borrowed from the operating department, and, when everything was in readiness a span was picked up by them, one at either end, lifted a few inches above the top of rail, and moved to a point over its final location in the bridge.

Span 5a-6 was the first long span to be erected, and just previous to the arrival of the wreckers with the steel the top lateral bracing was removed from the truss span 6-5 to allow the boom to pass. Girder spans 6a-7 and 6-6a were already in

Placing One of the Long Girder Spans with Two Wrecking Cranes

place, and truss span 6-7 had been removed. The old stone pier No. 5 was in such bad condition that it was thought advisable to place three frame falsework bents in each aperture 5-5a and 4a-5 to relieve the pier and also to allow the concentrations of the wrecker to pass directly to the ground. The bents were designed of the two-story type, so the tops could be quickly pushed off when span 4a-5a was placed.

When the two wreckers with the span between them had been spotted, they were clamped securely to the track, and the span was then raised as high as the temporary top lateral bracing, which had been put in after the passage of the first wrecker,

would allow. The old floor was removed in the same manner as previously outlined for the short spans, the span lowered to its seats, and the deck and rails put on. The old trusses were braced in the same manner as previously described.

Piers 2, 3, 4, and 6 had to be prepared for the reception of the new superstructure, since the distance from base of rail to masonry of the truss spans was about 3 ft., while for the girder spans it varied from 9 ft. 8 in. to 12 ft. 11 9/16 in. Fortunately, by cutting the piers in two vertical planes parallel to the axis of the bridge and passing close to the inner edges of the truss shoes, it was possible to provide room for the girders and still leave the truss seats intact. The concrete was cut down low enough to allow about two feet of new concrete to be placed for the girder seats. These were reinforced to prevent cracking and copings were put on. While this work was going on, the end stringers of the old trusses were supported by 8 in. by 16 in. timbers, spanning the notch and resting on the masonry left to carry the trusses. After the old spans were removed, these portions were removed and capped to match the coping already constructed under the new spans.

The following cost data compiled from the erection foreman's reports does not include rent of erection apparatus and tools nor depreciation on the same. The total cost for engineering, including the preliminary investigations, detailing, checking and tracing the plans for the entire job amounted to $700, and the salary of the field inspector amounted to $960, making a total of $1,660. Classifying inspection as engineering, this gives a percentage of approximately 2½ on $70,000, the total cost of the work.

WEIGHTS

Span length	No. of spans	Weight each	Weight with deck
75 ft.	2	39 tons	58 tons
77 ft. 9 in.	6	42 tons	62 tons
103 ft. 4 in.	3	80 tons	106 tons

Total weight of new steel..... 570 tons
Total length of new steel..... 926.5 lin. ft.
Total weight of old steel..... 600 tons
Total length of steel removed..... 928.8 lin. ft.

DISTRIBUTION OF ERECTION COSTS

Class of work	Total	Cost per ton of new steel	Cost per lin. ft. of new steel	Remarks
Enroute to site.....	$281.35	$0.49	$0.30	
Changes in masonry.....	1,971.91	3.46	2.13	Cutting down piers 2, 3, 4 and 6.
Falsework	891.95	1.56	.96	Includes falsework for rebuilding Pier 1.
Unloading ties and piling.	45.68	.08	.05	
Assembling and riveting spans	300.37	.54	.32	
Framing ties	321.98	.56	.35	
Erecting new steel.....	1,707.69	2.99	1.84	
Removing old spans.....	3,193.23	5.60	3.45	$5.32 per ton of old steel.
Removing falsework	201.81	.36	.22	
	$8,915.97	$15.64	$9.62	
Add 2½ per cent.....	222.90	.39	.24	
	$9,138.87	$16.03	$9.86	

The work was carried out under the direction of J. B. Berry, formerly chief engineer, while I L. Simmons, bridge engineer, prepared the plans and supervised the erection.

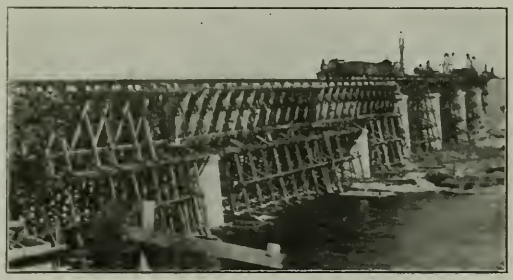
SECOND PRIZE—DROPPING OLD TIMBER TRESTLES WITH DYNAMITE

By James H. Stack

Secretary, The Thomson Bridge Company, San Francisco, Cal.

In replacing a number of wooden bridges and trestles on the coast division of the Atchison, Topeka & Santa Fe between Los Angeles, Cal., and San Francisco, a unique method of placing steel girder spans without delay to traffic was worked out by O. J. Crossfield, general manager of the Thomson Bridge Company, San Francisco, Cal, which had the contract for the erection of the new structures. The piers and abutments for these bridges had been built under a separate contract and the steel was delivered at the nearest convenient unloading point to the various sites.

One of the bridges to be replaced was that across the San Joaquin river at Herndon, Cal., which consisted of three 150-ft. Howe truss spans on pile piers and 450 ft. of framed trestle bents 16 ft. center to center, resting on pile bents, capped just above the ground line. The highest point of the trestle was about 70 ft. above the river bottom. The new bridge consisted of two pin-connected spans 200 ft. long, three 100-ft., one 80-ft. and one 48-ft. deck girder spans, all of which carried an 8-in. creosoted floor with ballasted deck. The alinement of the new bridge was the same as that of the old and the specifications required that "all operations must be so conducted that traffic may not be interrupted." The intervals elapsing between trains varied



General View of Santa Fe Bridge at Herndon, Cal., Replaced by Dynamiting Trestle Spans

from 45 min. to 3½ hr. The steel for this bridge was unloaded at a siding about 3½ miles from the site.

The erection of the pin connected spans could be carried on without difficulty, but the girder spans presented a serious problem. They had to be transported 3½ miles, the rails, ties, stringers and trestles of the old bridge removed, the girders riveted, the creosoted floor laid and fastened, and the ties and rails placed, all within the interval between two trains. The construction of falsework was out of the question on account of the height.

The method adopted was to support a complete girder span between two special derrick cars and to remove the old trestle by dynamiting the posts. Each derrick car consisted of two 40-ft.

New Girder Spans in Place, Showing Section of Trestle Dropped by Dynamiting

steel flat cars of 50 tons capacity, which were coupled and bolted together so as to be able to travel without changing the distance from end to end. Cross timbers were placed on these cars at intervals of about 10 ft., on which were laid long sills the full length of the two cars to support the towers, boom and engine. The sills were sway-braced to stiffen them laterally and fastened only at the ends so that the cars could pass around curves without bending the sills. The tops of the cross-timbers were also thoroughly greased. A tower 20 ft. high was erected at one end of this outfit, being built up of 12 in. by 12 in. timbers, with a

rigid A-frame boom 35 ft. long projecting at an angle of 45 deg. from the foot of the tower. The back guys were passed over the towers and carried to the farther end of the sills. The derrick and towers were designed to carry safely a load of 100 tons and the cars were ballasted with old rails. Six-sheave steel blocks designed and built especially for this work were provided.

A complete girder span was assembled and riveted on rail skids in the material yard, the creosoted floor being placed and fastened so that as soon as a train had passed the bridge, the span could be picked up by the two derrick cars and the entire train with the girder span between the derricks could be run out to the bridge site. Meantime, a force of men at the bridge bored two holes in each post of the trestle within two feet of the bottom of the posts, and two holes about 12 ft. above these at right angles to them. A stick of dynamite with an electric detonator was inserted in each hole and the entire series wired so that they could be exploded simultaneously.

The train was spotted on the trestle so that the span was in correct position over the pier, the old rails and ties were removed and the stringers cut over the center of the pier. The dynamite was then discharged, cutting off the posts 15 ft. from the bottom and causing the entire trestle between the piers to drop far enough to allow the girders to be lowered into position. The ties and rails were then replaced and the derricks removed. The longest time required for placing one span from the time the regular train crossed the bridge until the rails were placed on the new span was 2 hr. 40 min., and the shortest time 1 hr. 45 min. The trestle bents in many cases dropped so true after the explosion of the dynamite that the posts landed on the sills and remained standing as though originally built there.

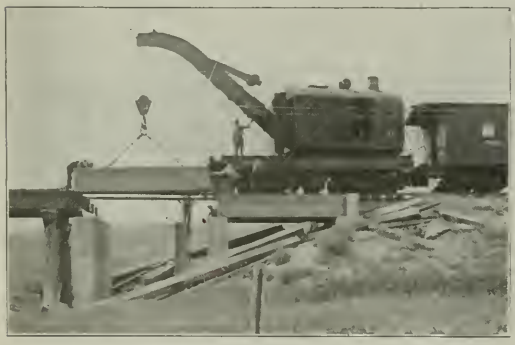
ERECTING REINFORCED CONCRETE TRESTLES

By E. M. Grime

Supervisor Bridges and Buildings, Northern Pacific, Dilworth, Minn.

A number of reinforced concrete trestles have been built on the Northern Pacific, particularly where the main line crosses the bad lands of North Dakota. The alluvial soil of this locality is easily eroded and dry runs become raging torrents during the early spring and summer storms, making it necessary to maintain comparatively large bridge openings.

These concrete trestles consist of reinforced concrete piers,



Placing Concrete Slab on Typical Reinforced Concrete Trestle on the Northern Pacific

spaced 16 ft. center to center, resting on reinforced concrete piles and spanned by reinforced concrete slabs. Erection of bridges of this type is a little more difficult than the ordinary pile bridge, but it was found that the men soon became familiar with the work and it was not long before they would rather drive the heavy concrete piles than ordinary timber piles. The spans being made practically the same length as those in the old bridges which were replaced, the piers were easily located to clear the old structure and a minimum of additional falsework thus required. These piers enclose the piles for a height of not less than three feet and frequently six or eight feet where the piles have not penetrated to the previously estimated depth. The piers are 30 in. wide and are reinforced both horizontally and vertically, this reinforcing being tied to the piles by ¾-in. steel rods wound around them. On this account it is necessary to drive the piles practically true to line and with a variation not exceeding 3 in. from the vertical.

The driving of the piles thus becomes one of the most difficult features of the erection of this type of structure and it was found that this part of the work could be greatly facilitated by the addition of a water jet to the regular division pile driving equipment. This consisted of a Fairbanks-Morse duplex general service pump with a working pressure of 150 lb., which at times could be increased to 200 lb. The pump was mounted on the tender of the driver and had a 5-in. suction connected with the water car and a 4-in. discharge reduced to a 3½-in. pipe leading up to the driver leads. To this was attached a 2½-in. six-ply armored hose ending in the goose neck, which was reduced to a 2-in. jet pipe about 40 ft. long, having a 1-in. nozzle.

As the driver was spotted in position for driving a bent, the jet pipe was drawn up along the leads and five vertical holes were jetted down to the exact position for the piles and to about the depth the piles were expected to penetrate. The jet left a neat hole about 5 in. in diameter which the piles readily followed as driven, and this proved to be a great help in keeping the piles in correct alinement. It was thought the piles might not stand the battering of the 4,500-lb. hammer, but by using a short piece of oak block and a layer of hemp rope to act as a cushion on top of the piles, and with the hammer dropping from 6 to 15 ft., no serious damage was done. They were driven until the penetration was ¼-in. or less with a 15 ft. drop of the hammer. The piles were selected in from 16 to 30 ft. lengths as best suited the location according to data from the pile driving record of the old bridge.

As soon as the driving of a bridge was completed the concrete crew proceeded with the building of the piers and when these were 30 days old or more, they were ready for the placing of the slabs which had previously been made at the concrete plant and shipped to the site of the work, being unloaded along each side of the track at one end of the bridge. The placing of the slabs, two of which are required for each span, is shown in the illustration which also shows the method of removing the deck of the old bridge one span at a time and blocking up the ends of the stringers on the edge of the new pier, so the bridge can be opened to traffic quickly after the slabs are placed and the track laid. Each slab is 7 ft. wide and 15 ft. 11 in. long and weighs about 15 tons, so it was found advisable to handle them with the locomotive crane working forward from the end of the bridge and building track as the slabs of each span were placed in position. Most of these bridges being located on a rather busy section of the main line, the placing of slabs was not attempted except at times when the despatcher could allow several hours between trains. In this way the work was accomplished without any serious delay to important trains.

The slabs and piles for this work were manufactured at the Glendive, Mont., concrete plant under the direction of M. F. Clements, assistant engineer, and the writer had charge of construction in the field.

REPLACING CAPS ON HIGH TRESTLES

By W. L. Ratliff

Supervisor Bridges and Buildings, Illinois Central, McComb, Miss.

In replacing caps on high ballasted deck trestle bridges the cost of building cribs to support jacks is often very expensive, especially when only one or two caps are to be replaced and large quantities of old timber are not available. This situation can be met by lashing a 10 in. by 12 in. timber 14 or 16 ft. long across the piles in the bent on which the cap is to be renewed using chains of sufficient length to go around the pile and the stick of timber twice. This timber should be placed at the

proper distance from the lower side of the deck for the operation of a 4 or 5-ton jack which can be used to raise the deck a sufficient distance to allow the caps to be changed. In cases where there are stringer joints on the caps another stick of timber can be bolted to the lower side of the stringers on the opposite side of the caps from the jacks, being sure to place it far enough away to allow swinging the caps, the guard rails in this case being depended on to carry the load of the deck or the short stringers under which jacks cannot be placed. It has been found that a cap can be renewed in this manner in a very short time and at much less cost than by cribbing.

REPLACING A SMALL BRIDGE OVER A HIGHWAY

By C. V. Chamberlin

Assistant Supervisor of Bridges, New York Central, Utica, N. Y.

The timber trestle over State street in Dolgeville, N. Y., on the Little Falls & Dolgeville division of the New York Central, was recently replaced with a steel bridge on concrete abutments and intermediate steel bents on concrete piers. The old trestle was about 124 ft. long, composed of framed bents and 8-in. by 16-in. stringers, the spans varying from 9 to 16 ft. The new structure consists of three spans of second-hand girders remodeled by the addition of new lateral bracing and floor system. The center span of the through girders is 38 ft. long and the two deck girder approach spans are 26 ft. 9 in. and 28 ft. 9 in. long, respectively. The base of rail was raised to preserve the necessary under-

Progress in Erection of Steel Bridge Replacing Timber Trestle

clearance and the alinement was thrown to a uniform 8-deg. curve as it was previously quite irregular.

The falsework and masonry were put in during December and January. Pile bents were driven at the two abutments and the temporary stringers set for the new base of rail. At the same time the base of rail on the old trestle was raised by laying stringers on the old deck and placing on these stringers a new temporary deck. This has the advantage of stiffening the old structure. Where the excavation for the piers endangered the old timber bent, two piles were driven and capped to support the caps of these bents and be outside the lines of the excavation. This allowed placing the new masonry with the smallest amount of alteration to the old trestle and as the excavation in some cases had to be carried 8 ft. in rather wet material the piles were quite necessary to the safety of the structure. The steel was laid out on blocking at a convenient level spot where the necessary changes were effected. The floor system for the long span was set in place so the drilling and reaming of the girders would be accurate. The approach spans were cut apart, placed on the necessary skew and the new cross bracing riveted in. The new deck of 8-in. by 10-in. by 12-ft. ties was framed with elevation blocks for 4 in. of superelevation in the track.

The bridge was erected on February 19 with a 12-ton long boom derrick car. The accompanying illustration shows the old trestle just previous to its removal, the derrick car erecting one of the approach spans and the new structure after the erection of the center span. The work was finished between 11:30 a. m. and 5:20 p. m., 5 hr. and 50 min. As the passenger traffic is light and most of the passengers use the Main street station which is south of the bridge, it was possible to cut out traffic completely over the structure during its erection. This work was handled under the direction of E. L. Jenkins, supervisor of bridges.

RENEWING HOWE TRUSSES WITHOUT DELAY TO TRAFFIC

By J. J. Wishart

Supervisor Bridges and Buildings, New York, New Haven & Hartford, Hartford, Conn.

The two-span wooden Howe truss bridge of the New York, New Haven & Hartford over Water Shops Pond, Springfield, Mass., which had been in service 39 years, was recently replaced by a four-span deck plate girder bridge without interference to traffic. Each of the old spans was 153 ft. 3 in. long, supported by a brown stone pier and abutments. The new spans are each 76

Replacing Howe Trusses with Deck Girder Spans on the New Haven

ft. 8 in. long, requiring a new concrete pier at the center of each old span.

The old center pier had to be renewed down to the water's edge, a distance of about 8 ft. The brown stone was cut away between the two lower chords, leaving the bridge supported on two small pedestals above the water. The cutting was done by contractors and a company mason followed, pointing all seams and old cracks. On the surface of the two small pedestals 25 bbl. of cement were poured, making them solid and saving the cost of carrying the bridge on falsework, which would have amounted to several hundred dollars.

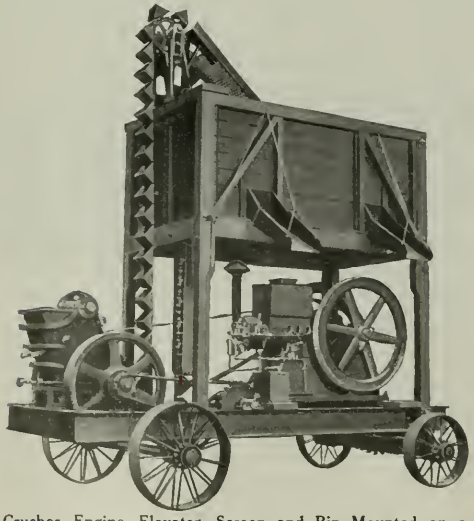
In the construction of the first new pier a cofferdam was driven and the water had been lowered about 21 ft. when the bed of the pond inside the dam broke, allowing water and mud to rush in. An attempt was made to place sand bags to seal the dam, but this proved unsuccessful. Permission was therefore secured to drive piles on which to carry the pier, a self-propelling pile driver working on the old bridge with a 20-ft. follower and a set of gins on the lower chord, being used for placing these piles. The surface of the water was 30 ft. below the top of the bridge. The water was 22 ft. deep and 23 ft. of sand and mud overlaid

the solid bottom. After the piles were driven, the bottom was sealed by placing concrete through a 10-in. galvanized tube to a depth of 4 ft. The cofferdam was then pumped out, the piles cut off and the pier finished. The foundation for the second pier was handled without trouble in the same manner.

During the erection of the new steel the old trusses were blocked on the new piers, as the derrick car when setting the girders was 60 tons heavier than the capacity of the bridge. The derrick boom was only 35 ft. long. The first span was replaced on a Friday morning, the ties and floor stringers over the first pier being cut and the tower set between trains. After a passenger train crossed the bridge at 10:20 a. m., the rails, ties, stringers, top rods, top lateral braces and sway braces were removed with the derrick car, and the new girders erected in the space between the old trusses. While the girders were being set the bridge and section gangs brought new ties on push cars from the west shore and while the braces and laterals were being bolted up the bridgemen placed the ties and the section men the rails. A freight train passed over the bridge at 1:05 p. m., 2 hr. 45 min. after breaking the track. On Sunday two towers and two spans were placed, there being no trains to interfere with the work, and on Tuesday the last span was set between trains.

A SMALL PORTABLE STONE CRUSHING OUTFIT

A considerable number of railway structures are built of concrete every year in locations considerably removed from a source of crushed stone, making this material unusually expensive, although field boulders or stone from excavations may be available near the work. In order to make it possible to utilize such material as aggregate in concrete a small portable crushing outfit has been developed by the Smith Engineering Works, Milwaukee, Wis. As the first requisite for such an equipment had to be small size and portability, and, as it is intended solely for use on



Crusher, Engine, Elevator, Screen and Bin Mounted on a Steel Truck

small work where the volume of stone needed does not warrant the expense of moving and setting up a big crushing plant, the output and cost of production can scarcely be compared with ordinary figures of this kind. It is estimated, however, that the cost of crushing stone with this equipment is from $0.70 to $0.80 a cubic yard, based on the use of field boulders and including the cost of gathering and hauling the stone. This also includes an allowance for depreciation, fuel, interest on the investment, etc. The capacity of the plant in producing ½-in. stone is 2 to 2½ tons per hour, and in producing 1½-in. sizes and under the output is about 4 tons per hour.

The outfit, which is known as the No. 7 contractor's portable crushing rig, consists of a No. 7 Telsmith jaw breaker, a 12-hp. double opposed cylinder engine, elevator screen and bin, all mounted on a single steel truck. The crusher has a 7-in. by 10-in. opening, manganese steel die plate, cast steel frame, direct crushing stroke and enclosed eccentric. The double opposed cylinder engine is particularly adapted to this work because of its reduced weight and continuous power. A reciprocating feeder conveys the stone from the crusher to the elevator, the feeder being operated by the swinging jaw of the crusher. The stone is raised to the bin by a vertical single-chain elevator, with 7-in. by 4½-in. by 5½-in. bucket, the chain being of malleable iron and the boot of steel. The elevator has a folding section at the top to reduce the required head room. The equipment can be furnished with a chute screen with perforations made to suit, or a rotary screen of the central shaft type 16 in. in diameter and 4 ft. long. The bin is of the flat bottom, portable type, with four bin gates. It has a total capacity of five tons, of which about three tons will run out by gravity.

The equipment is mounted on an all-steel truck with 8-in. channel sills strongly braced. The front axle is a steel channel with cast steel skeins, and the rear axle is of cold rolled shafting 2 15/16 in. in diameter. The front wheels are 24 in. by 6 in., and the rear wheels 30 in. by 6 in. The entire outfit weighs about 9,000 lb. without a rotary screen, which adds about 400 lb. to this. It can be pulled by two horses on a paved street, and four horses will take it anywhere that an automobile can be driven.

AN ORNAMENTAL TYPE OF METAL SHINGLE

A new type of metal shingle which is adapted to use on the roofs of railway buildings where the pitch allows, has recently been placed on the market by The Berger Manufacturing Company, Canton, Ohio. The principal change in design as compared with the "Chieftain" and "Swanee" metal shingles made by this company, is that the design is more ornamental than the previous patterns. In common with the other Berger shingles the new

The "Berco" Metal Shingle

design is made with a three-point contact lock construction and an end lap providing high corrugations at the top. This serves a two-fold purpose, facilitating the application and at the same time making the shingles automatically interlocking and self-alining, while the knife edge at the top insures a tight joint and prevents capillary attraction. These shingles are 10 in. by 14 in., and are made either from galvanized rust-resisting Toncan metal, galvanized open hearth steel or painted terne plates.

The Organization for and Methods of Relaying Rail

Three Discussions of Practical Organizations for This Work, on Lines Having Heavy and Light Traffic

One of the most important classes of work in which the maintenance of way department on most roads is now engaged is that of relaying rails. Because of its direct interest at this time we publish below three articles discussing various phases of this problem as they have been worked out on different roads.

LAYING RAIL ON A BUSY LINE

By W. F. Rench

Supervisor, Pennsylvania R. R., Perryville, Md.

On lines of intensive operation where the available intervals between trains are never more than 25 min. and where intervals as low as 12 min. must frequently be utilized it is of the utmost consequence that the preliminary work be done to the last item. No single operation that can be completed before the track is broken must be omitted. The cutting of a closing rail is entirely out of the question and this must be provided for beforehand by careful determination with the steel tape. The number of rails that can be laid in a given interval must be known and though this is somewhat variable it will be found close to a rail a minute for intervals between 10 and 25 min.

The rails must be as near the place where they are to be applied as possible and all needed material must be close at hand. The distant flagman must be trained to receive instantly the flag signal to begin protecting and must respond just as promptly when the signal is given to withdraw. The need for immediate action by each member of the rail laying force is no less insistent.

There is no item of work wherein the matter of detail is of such importance as rail renewal, which of necessity causes a break in the track. A specific duty is laid upon each member of the gang and remains for every operation, so that no further line-up is required. Maintenance rules generally require that the rails shall be laid one at a time and similarly forbid the withdrawal of spikes or the removal of bolts in advance of the renewal. This severe but necessary restriction can be met by perfect organization.

The bolts at the joints to be broken have washers added until the nut has just a safe hold. Two of the best workmen are assigned to each end of the run to be relaid. Ten men with claw bars are delegated to remove from the chosen side of the rail the spikes which have previously been started to assure their coming out readily. Eight men with lining bars push the old rail aside, two dislodging it, one guiding it across the new rail and five lining it away. Four men follow closely, two with spike mauls and punches to drive down the butts of broken spikes, one with an adz and one with a stiff broom to sweep aside chips of wood, pieces of ballast and spikes. Twelve men with tongs put the new rails in place as fast as the old are removed and 10 men working in pairs apply the splices with half their complement of bolts. Two men push the rail under the spike heads and spike the joints and centers while the 10 men who were pulling spikes but who are now free spike the rail upon every other tie. Four utility men put the cut rail in place and look after the compromise joint in case a different section is being laid. The gang which threw out the old rail completes the full spiking and the men with the tongs assist in applying the remaining bolts, giving them all as full tension as possible. This force of men generally consists of two gangs and, in addition to foreman and assistants, numbers about 50 men.

The preliminary work in renewals of this character largely determines the efficiency of the gang. In the event a different section of rail is used in renewal, the first work upon the arrival of the relaying gang is to remove the tie plates, the ties that were without tie plates being adzed down when these are in the minority and those surfaced up that carried the tie plates when they are in the minority. After this is done the detailed surface of the track is given attention so that the new rail may lie upon as smooth a bed as possible. The ties must then be adzed to a level seat alongside the rail. The point of beginning must next be established and where possible this should have especial regard for the existing locations of block joints when these cannot be changed so that the introduction of unusual lengths of rail in the main track at isolated points may be avoided. In the event that this necessitates laying the rail against the current of traffic, temporary rails of the new section are used so that the approach ends of the permanent rails will not be injured. The rails are then strung out just outside the ends of the ties to be as near their final positions as possible and incidentally to indicate the new positions of the joints for use in the preliminary tie spacing. This method is not accurate on sharp curves and the position of the joints must be determined in such cases by careful measurement with a steel tape after the average length of the new rails has been carefully ascertained. When the rails are set up for the purposes named it would be an unnecessary refinement to use shims and many of the shims would surely become lost. It is quite sufficient to place a number of the rails, five in summer weather, with their ends in contact and separate each five with a spike, which represents the aggregate of the several spaces.

When the preliminary spacing is completed so as to assure the flanges of the splices entering without exception the word is given and the men line up to await the foreman's signal that use of track has been given, communicated from the telephone box or from his field telephone connected with the despatcher's telephone line. The principal protection is the distant flagmen, who not only display a red banner but place torpedoes on the rail. The signalmen, whose duty it is to bond the track, further by means of a wire shunt the track circuit so as to display the danger signal at the nearest signal; but at the immediate location the foreman's red flag is always in evidence until replaced by a white one to indicate that all protection may be withdrawn and traffic be allowed to run as usual. This assumes that all ties are fully spiked, all bolts inserted and made tight and at least two bond wires are in place at each joint.

RAIL LAYING ON LINES OF MODERATE TRAFFIC

By E. R. Lewis

Assistant to General Manager, Duluth, South Shore & Atlantic

It must be borne in mind by all concerned that rail laying is, in its sphere, of equal importance with train operation; that it is a necessary menace to safety; and that extraordinary vigilance is required to prevent accidents to persons and to property, from the time of distributing the first car of rail until the cancellation of the last slow order. No more important duties are delegated by the track foreman to any employee than those of the flagman. Flagmen should be most carefully selected, drilled and instructed. Preferably they should be experienced trainmen. The track foreman's orders to flagmen and to material trainmen, insofar as is possible, should be given in writing from carbon copy note books. Too much care cannot be exercised to prevent misunderstanding of orders affecting traffic.

The efficiency of a track-laying gang depends on the program laid down, on the continuity of the work, on the delivery of materials, on the class of labor available, on the personality of the foreman, and most of all on the completeness of understanding and the helpful co-operation existing among officers and employees of all departments. On lines of moderate traffic, depending in part on the weight of materials to be handled, and in part

on the mechanical contrivances in use, a track laying gang may be organized about as follows:

1 foreman,
1 or 2 assistant foremen,
1 time keeper and material clerk,
2 flagmen,
4 splice men,
8 tong men,
2 tie plug drivers,
5 adz men,
5 spike pullers,
6 spikers,
2 tie plate handlers,
5 men of all work,
1 tool car man,
1 water boy.

If, as is usual on lines of moderate traffic, a boarding train is necessary, one cook, one assistant cook and one or two chore boys will probably also be needed. Since the boarding train must be set out on temporary spur tracks between stations, a field telegraph office and a telegrapher will be of decided advantage, especially to the material train operating in conjunction with the track laying gang.

The boarding train may consist of:

1 foreman's car with office and sleeping quarters for 6 men.
Sleeping cars for 45 men, so partitioned that not more than 4 men sleep in one well ventilated compartment, in single bunks preferably of metal frames requiring no mattresses.
1 cook's car, to accommodate 4 men.
1 kitchen car.
1 stores car.
1 dining car—Foreman and men should eat together—Special diners and special dishes breed trouble.
1 fuel car.
1 tool and blacksmith's car.
1 laborers' day coach for use of laborers with material train.
1 locomotive tank—for water supply.

The most important man of the organization is the foreman. To be successful he must be an organizer of executive ability. Preferably he should be permanently employed and well acquainted with the road, its rules and its labor supply. If so, he will be able to attend in part to the outfitting of the boarding train and the gathering of a small gang at least, of track laborers who are well acquainted with the territory, expert in their duties, and of service in teaching new men. The foreman will be able to help select his tools and equipment, and to profitably employ the gang while recruiting is in progress. The more efficient the foreman, the better will be the assistants he hires, and the gang he keeps. Understanding between the foreman and men minimizes the difficulties of nationality. There are rail laying gangs composed of natives of various countries other than America equal to the best American labor.

The idea that foreign labor is inferior to our own is largely the result of American ignorance of, and carelessness about, learning foreign ways. Proper treatment and determination to establish an understanding with laborers of any nationality, will usually overcome most obstacles to efficiency. It is largely a case of placing oneself mentally in the foreigner's position, of getting his view point and of treating him accordingly.

A good track foreman will devise ways and means of retaining the services of a gang almost intact during a season's work. This requires tact, system, ability to teach, to understand, to deal justly and wisely, to organize, to grade and reward and punish, and through all to retain respect. Yet such foremen are available and ready on every railway. Much of the present scarcity of good foremen is due probably to a certain dearth of judgment of human nature in those who must select and train them. The assistant foremen should be experienced trackmen, preferably extra section foremen, or sub-foremen. They should be carefully selected, trained and given direct charge over not more than 20 men. Their ambition for advancement should be carefully nurtured.

A good blacksmith should be selected, if possible, as tool car man. Besides caring for and accounting for the tools he can, if provided with a blacksmith's kit, a small anvil and a portable forge, save the company time and money by repairing rail laying tools promptly and by saving the shipping of them to and from division points for repairs.

The selection, transportation, refrigeration and serving of clean, plain, wholesome food; the sanitation of the camp; the disciplinary arrangements for the "off days," Sundays, pay days, holidays and rainy days; the weeding out of undesirables; the grading of wages; the excellence of the work report system; and forethought in ordering supplies of all kinds, are matters of moment in rail laying economics.

This procedure depends in fact on the same team work, on the same individual efficiency, on the same intelligence, integrity, diligence and wisdom as form the basis of all worthy human endeavor. The best results are only obtainable through the best efforts of mind and body of the men of all ranks employed on the work.

LAYING RAIL ON THE LEHIGH VALLEY

By G. L. Moore

Engineer Maintenance of Way, Lehigh Valley, South Bethlehem, Pa.

All rail is handled by machines—locomotive cranes, steam ditchers, steam derricks and air loaders being used. Several machines are used in one work train in distributing new rail. The length of track per car load is blocked out, and the work train is split up into sections so that the locomotive handles the air loaders and each locomotive crane handles a section consisting of itself, two cars of rail and a steam unloader, the locomotive crane propelling the section and unloading one car of rail on one side of the track and the steam derrick or ditcher unloading the other car of rail on the opposite side of the track. Short rails are unloaded at each signal or cut section to permit squaring the insulated joints within 10 ft. without cutting rails. Joints, bolts and new anti-creepers, where required, are unloaded the same day.

In loading up relayer rails, the work trains are operated in the same manner as in unloading. Each rail is numbered in the order in which it came out of the track and is loaded consecutively in the same order so that when relaid in side lines or freight main tracks they are in the same order, thus avoiding any possibility of mis-matched joints. The rails are loaded in the cars in single tiers, heads up, with strips between each tier.

The high record so far for loading relayers with one work train in one day is 115,817 ft. of 90 lb. rail, including joints and bolts, in 37 cars. Nine machines were used in this train. Figuring in miles of track 10.96 miles of track was cleaned up of rail, joints and bolts with one work train in one day. This was all of the rail in this particular stretch and from our experience in this and other cases, we know that we have not reached the limit of efficiency in this work and believe that it is possible to load or unload the rail for 15 miles of track with one work train in one day.

The high record amount of new rail unloaded by one train in one day has not as yet quite equalled the figures for loading rail quoted above, but there is nothing, in our opinion, to prevent doing so and when we next receive new rail, which will be next fall, we fully expect that we shall find it possible to unload the rail, joints and bolts for 15 miles of track in one day with one work train.

The cost of loading or unloading rail, using several machines in a work train, runs from 18 to 23 cents a ton. The rails are placed on the ground in exactly the same location or order for convenient laying as though the work were done by one machine or by manual labor, and the rails are loaded in exactly the same manner and placed in the cars in order for convenient unloading again, the same as though done with a work train using only one machine and much better than when done by a loading gang of men.

It may be well to call attention to the fact that in using machines, whether one or several, in a work train, the rail is not injured and neither in our experience have men been injured; while in handling rails by hand the rail may be damaged and it is known from past experience that the men are frequently hurt and in many cases very severely.

Expansion is allowed in laying rail as follows:

100 deg. F., lay rails tight.
80 deg. F., lay rails 1/16 in. apart.
60 deg. F., lay rails ⅛ in. apart.
40 deg. F., lay rails 3/16 in. apart.
20 deg. F., lay rails ¼ in. apart.
At zero F., lay rails 5/16 in. apart.

Steel shims are used and thermometers are frequently consulted. The temperatures shown in the table are those shown by a thermometer in the shade. Anti-creepers are applied the

same day the rail is laid and their application is considered a part of the work of laying rail.

We lay practically all of our rail in the winter. Wherever there are any low ties, thin shims are used. We find it necessary to use very few such shims and our experience shows that our rail is not damaged either by the methods of laying it or by our plan of maintaining track.

During the past winter we laid 34,464 tons of new 100 and 110-lb. rail. We shall lay no more new rail until next winter; this conformance with the policy which we adopted five years ago of laying our new rail in the winter, reserving the summer season for the work of surfacing track and renewing ties. During this time we have not disturbed our track for the express purpose of spacing the ties to fit the joints and we now have in our main passenger and freight running tracks about 160,000 tons of rail so handled. We have yet to find the first case of damaged rail by reason of not spacing joint ties, but have been able to greatly improve our track by diverting the labor, in former years so employed, to the most important work of improving the surface and line and renewing of ties. We feel that there is absolutely no good reason for spending large amounts of money simply to space ties to fit the joints, which money applied otherwise would count for so much more.

In common with many other heavy traffic lines which had not done so before, we have for the last four seasons been increasing the number of ties in our heavy traffic track. Where formerly we used 18 ties under a 33 ft. rail, we are now putting in 20 ties. This work will near completion this season. In surfacing our track, renewing bad ties and increasing the number of ties to 20 to the rail, in many instances where the renewals are heavy and where it may be done without increased cost, we do space the ties to fit the joints. We have still in our main passenger tracks stretches where there are 18 ties per rail length where the ties were never spaced to fit the joints and we have many stretches of track where the track was surfaced and 20 ties per rail used before the new rail was laid and where nothing was or will be done in the way of respacing the ties. One of the great advantages of our method is that it is not necessary to wait until any specified time to surface bad track because we are going to lay new rail, but at all times we rebuild our worst track first regardless of rail renewals, and after new rail is laid and the track surfaced, it is impossible to tell, except by inspection on the ground, which was done first or, in other words, whether the ties are spaced to fit the joints or not.

Most of the rail is laid with large forces, frequently trains being detoured over other tracks. The organization for rail laying under such conditions is as follows:

	Foremen	Men	Wages
Removing anti-creepers	1	3	$6.95
Pulling spikes	1	18	29.45
Throwing out rail	1	10	17.45
Setting in rail	1	24	38.45
Spiking	2	14	25.90
Drilling for bonding	..	10	15.00
Bonding	..	4	10.20
Jointing and bolting	2	24	40.90
Reapplying anti-creepers	1	10	17.45
Motor car distributing water and material and signal work	t	3	6.95
Total	10	120	$208.70

Very frequently forces from adjoining supervisors' territories are used, each force laying the rail on one side of the track. In some instances we have had three such forces together and the greatest amount of rail laid in one day was 7.85 miles of track. Doing the work in this way, great rivalry is set up between the different forces and the rail is laid very rapidly and very cheaply. Another argument in favor of this plan is that the delay to traffic is small and covers one day only for such a stretch of track, whereas using small forces the traffic would suffer delays many days.

Our rail gangs are all supplied with portable telephones, so that the foremen are in frequent communication with the despatcher and in locations where it is impossible to divert trains over adjoining tracks the delays both to trains and to the gang laying rail are reduced to the minimum.

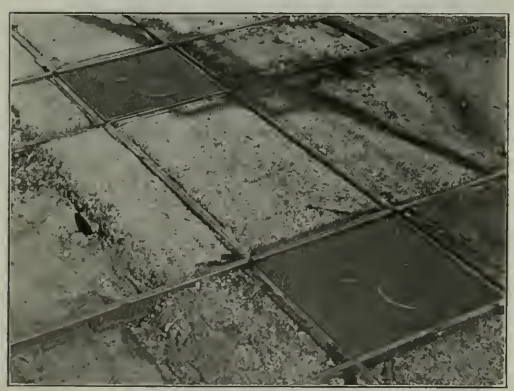
On a single track main line loop over which our important passenger trains are run, besides considerable other traffic, 4.5 track miles of new rail was laid in one day during the past winter, two forces as per the statement above being employed. In this case, of course, it was necessary to close up for the passage of all trains. On our light branches, it is impracticable to get such large forces together and the work is usually done with a small extra gang combined with nearby section gangs. On these branches there is no signal work to be done.

In all our work we endeavor to foster a spirit of friendly rivalry between divisions and between sub-divisions. Records worthy of note of all work accomplished in one day by any division is published on all divisions. The high records so far are as follows:

Laying new rail on track from which traffic has been diverted for the purpose of the day	7.85 miles
Laying new rail on track from which traffic could not be diverted	4.56 miles
Track miles of rail handled with one work train in one day	10.96 miles
Coal cars of ashes unloaded for shoulder on main line with one work train in one day	125 cars
Cross ties unloaded and distributed along main line track for renewals with one work train in one day	128 cars containing 28,094 ties

THE COBB SHOCKLESS RAILROAD CROSSING

At the intersection of the four-track line of the Pacific Electric and the single track line of the Atchison, Topeka & Santa Fe at Slauson Junction, near Los Angeles, Cal., two crossings of a new type with movable rails are in service. The first of these has been subjected to a very heavy traffic at this point for more than six months. The electric road handles a daily traffic of over 15,000 tons, consisting of 360 high speed electric cars made up in 240 trains and the steam road handles about 5,000 tons of traffic per day, a large part of which is in heavily loaded oil trains hauled by Consolidation locomotives. During the time these crossings have been in operation they have never caused a delay to trains and they have cost nothing for repairs and maintenance with the exception of the general inspection and lubrication, which is given to all of the mechanism in the interlocking plant.



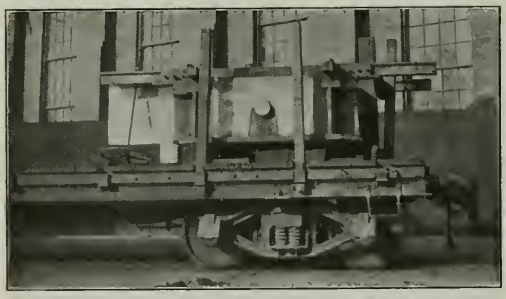
Two Cobb Shockless Crossings in the Tracks of the Pacific Electric and the Atchison, Topeka & Santa Fe

This design consists of four or more rails forming the closing members of the intersection, which are moved vertically between solid fixed guides to bring them up level with the rails on either side or to drop them out of the way of wheel flanges on the cross track as may be desired. The ends of the movable rails are mitered to form an interlocking joint, providing for continuous support of the wheels passing over the crossing on either track. The vertical motion amounting to 1¼ in., is imparted by two wedges under each rail at its extremities, as at the ends of a draw bridge, these wedges moving longitudinally with

respect to the rail and being designed to draw the rails downward when they are withdrawn. The wedges under the several rails are so connected that when one pair of rails is raised to the operating position the other pair is drawn downward to its lower position. The rail is under absolute control in all its positions and is locked solid when in position for use, so that no rolling load comes upon the wedges except in the fixed position.

The operating mechanism is located below the surface of the ground and enclosed in the main foundation frame of the crossing. This mechanism consists of gears, links and wedges, all having slow motion and ample wearing surface. In the two installations referred to the crossings are operated by motors enclosed in small water tight boxes within the foundations, but it is possible to arrange the mechanism for operation by hand, switchstand, compressed air or any other method deemed advisable or necessary, the only requirement being that the main driving shaft running under the crossing shall be revolved 180 deg. to bring one pair of rails into the effective position, and then 180 deg. in the opposite direction to bring the other pair up. There are no moving parts above the surface of the ground, the entire space within the crossing rails being covered as shown in one of the illustrations.

When the first crossing was placed in service it was equipped with a ½-hp. second-hand slip switch derail motor and a pole changer, borrowed from the signal department of the Pacific Electric, the entire arrangement being considered temporary in order to test the device and allow any mistakes that had been made in its construction to be corrected. As this crossing worked



A Cobb Shockless Crossing Ready to Install

with absolute satisfaction, with the exception of the improvised actuating mechanism for more than three months under adverse weather conditions and heavy freight and passenger traffic, it was taken out for the purpose of installing suitable actuating and control apparatus for the permanent installation. The new motors, quick acting device and proper pole changers which were installed have given such good satisfaction that a second installation with the same details has been made. The present motors consume about 6 amperes of current at 110 volts in operating the crossing, requiring about 3½ seconds for the change of position. The crossings are also equipped with an emergency provision for operating by hand, and it has been found that a man can readily operate the rails with a hand wheel similar to those used on ordinary hand brakes, indicating that the power required for operating the device is small.

These crossings are controlled by a lever in the all-electric machine in the interlocking tower and are properly interlocked with the signals, derails and switches. It is so arranged that the crossings cannot be thrown when a train is standing on them or is approaching them. The cost of installing these crossings is said to be no greater than that of an ordinary intersection, and the cost of manufacture is only slightly greater than that of a built-up rail crossing. The only additional expense for most installations would be that represented by the cost of electric motors or hand operating mechanisms for moving the rails.

The claims made for this crossing include the following: It prevents shock, which with ordinary crossings results in noise and in wear on equipment and track work entailing additional maintenance costs. The main frame or body when once placed on a good earth or concrete foundation, will last indefinitely and all parts subject to wear can be replaced without disturbing the foundation. The rails used may be of any cross section used in the adjacent track, and they do not wear any faster than the rails in the adjacent main line, as they are subjected only to rolling wear without shock. The crossing can be operated from a tower, from a moving train by electrical contact, or by hand, air pressure, or otherwise. It can be applied to any angle of intersection or to combined intersections of broad and narrow gage track, or to a three-rail intersection when both broad and narrow gage tracks use one of the three rails in common. The rails cannot be moved sideways by a force less than that which would cause the flange to climb the rail; the rails cannot be clogged by snow or ice or by any material dropped or placed on any part of the crossing; there are no parts of the operating mechanism exposed to view or to the weather preventing their being tampered with.

This crossing is made by the Cobb Shockless Railroad Crossing Company, 1121 Central building, Los Angeles, Cal.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since April 16, 1915:

Substructure of the New "Harahan" Bridge at Memphis.—The Rock Island, the Iron Mountain and the Cotton Belt, are building a joint bridge across the Mississippi river at Memphis. The substructure, completed last January, involved a number of interesting problems which were described and illustrated in the issue of April 23, page 877.

Frisco Seawall at Cape Girardeau, Mo.—The St. Louis & San Francisco is constructing a concrete and riprap retaining wall 1,800 ft. long at Cape Girardeau, Mo., to reclaim a considerable area from the Mississippi river and permit the straightening of the main line. This wall was described in a short illustrated article in the issue of April 23, page 889.

The Alaskan Government Railways.—The adopted location for the Alaskan government railways was described briefly in an article accompanied by a map in the issue of April 23, page 896.

The Success of Main Line Electrification.—The results secured from the electric operation of the main line of the New Haven from New York to New Haven, including the Westchester, Oak Point and Harlem River yards were described by W. S. Murray in an illustrated article in the issue of April 30, page 923. This article was accompanied by several tables giving detailed data.

Reasons for Building the B. & O. Magnolia Cut-Off.—The Baltimore & Ohio has recently completed the Magnolia cut-off described in the issue of July 17, 1914. The reasons justifying this $6,000,000 expenditure were outlined by A. W. Thompson, third vice-president, Baltimore & Ohio, in the issue of April 30, page 934.

New Clearance Regulations in Illinois.—The State Public Utilities Commission of Illinois has recently issued new horizontal and vertical clearance regulations which were published in our issue of April 30, page 940.

Construction of New Line to Reach Utah Coal Fields.—The Utah Railway Company has recently completed a line 27 miles long to reach coal fields at Mohrland, Utah. The construction of this line involved a number of interesting problems in connection with the disintegration of shale in embankments. This line was described in an illustrated article in our issue of May 7, page 971.

Lining Tunnels on the New Lewistown-Great Falls Line of the St. Paul.—On the Great Falls extension of the St. Paul, described in the *Railway Age Gazette* of April 2, 1915, there were six tunnels aggregating one mile in length, all but one of which were lined with reinforced concrete. The methods by which this lining was placed were described in the issue of May 7, page 978.

The Pennsylvania Improvements Through Piqua, Ohio.—The Pennsylvania has recently completed extensive improvements through Piqua, Ohio, involving interesting work which was described in our issue of May 14, page 1003.

The Federal Valuation Program.—The Interstate Commerce Commission has outlined the program for the valuation work for the next two years. This program was published in our issue of May 14, page 1014.

New Line of the Chesapeake & Ohio Northern.—The Chesapeake & Ohio recently let contracts for the construction of a new line from Edgington, Ky., to a point near Waverly, Ohio. This new line was described briefly in the issue of May 14, page 1017.

DETERMINATION OF ANNUAL CHARGE FOR TIES, POLES AND FENCE POSTS

By W. F. Goltra

President, W. F. Goltra Tie Company, Cleveland, Ohio

At the last annual meeting of the American Railway Engineering Association the Committee on Ties presented a report on the economic comparison of railroad ties of different kinds for adoption and publication in the Manual, which included the following formula to determine the annual charge:

$$r = C \times \frac{(1+p)^n \times p}{(1+p)^n - 1}$$

In which

r = annual maintenance charge or return.

C = initial expenditure or cost of material in place or investment.

n = average useful life of material or years of recurring period.

p = rate of interest including taxes.

In order to determine the relative economy of different materials such as ties, poles and fence posts, it is first necessary to ascertain the annual maintenance cost of each of the materials compared. The annual cost or annual charge is dependent upon three elements; first, cost of the material in place, second, useful life of the material, and third, rate of interest on the investment, including taxes.

TIES

By the above formula the annual sum (r) required to liquidate within the course of (n) years a debt now incurred is ascertained by dividing the cost of the material in place (C) by the present value as shown in the accompanying table, prepared by the author to facilitate the computations. To calculate each case separately according to the formula would be very tedious and laborious. For example, suppose C = $1.00, n = 10 years and p = 7 per cent. Substituting these numerical values in the equation, we have,

$$r = \$1.00 \times \frac{(1+0.07)^{10} \times 0.07}{(1+0.07)^{10} - 1}$$

The quantities in brackets should be multiplied so as to raise the product to the tenth power. When it is necessary to raise the power to 20, 30 or more, one can realize the amount of figuring required. The final result of the above equation is r = 14.24 cents a year. The same result may be obtained at once by dividing $1.00 by the factor given in the table, namely, 7.02.

If an untreated tie costs 50 cents delivered at the treating plant, 25 cents is spent for treating it and 20 cents for distributing and placing it in track, or a total cost of 95 cents (C), and if it lasts 15 years, the annual charge at 7 per cent. interest would be ascertained by dividing 95 cents by 9.10 (from the table) and the quotient (r) would be 10.44 cents a year.

After determining the annual maintenance cost of the two items that are to be compared, their difference should be multiplied by the mean number of years. For example, taking the two cases above mentioned we get the following result:

Annual charge for untreated tie	$ .1424
Annual charge for treated tie	.1044
Difference per year	$ .0380

Multiplying .0380 by the mean number of years, which in this case is 12.5, the product is 47.5 cents in favor of the treated tie.

TELEGRAPH AND TELEPHONE POLES

The relative economy between treated and untreated telegraph poles can be ascertained in the same manner. For example, if a 35-ft., 7-in. top, cedar pole costs $6, setting up costs $5, and it lasts 12 years, while a pine, chestnut or oak pole of the same size costs $4.50, treating the butt with creosote costs $2, and setting up, $5, and it lasts 20 years, with interest at 6 per cent in both cases, the comparison would be as follows:

Cedar pole.—$11.00 divided by 8.38 = $1.31 a year.

Treated pine, chestnut or oak pole.—$11.50 divided by 11.47 = $1.00 a year.

The difference in favor of the treated pole is 31 cents a year. Multiplying this by the mean life, which in this case is 16 years, gives $4.96 in favor of each treated pole. The larger the poles the greater is the percentage of economy. Some people treat the whole pole, but most people treat only eight feet of the butt in open tanks and that is generally considered sufficient for cedar and chestnut poles.

FENCE POSTS

In like manner the relative economy between wooden, concrete and steel posts may be ascertained. For example, assume that a 5-in. top, 8-ft., cedar post costs 18 cents delivered, the setting costs 4 cents, and it lasts 16 years, also that a concrete post 4 in. by 5 in. by 8 ft., costs 35 cents delivered, the setting costs 6 cents and it lasts 25 years, with interest in both cases at 6 per cent., the following comparison is obtained:

Cedar post.—$0.22 divided by 10.11 = $.0217 a year.

Concrete post.—$0.41 divided by 12.78 = $.0321 a year.

The difference in favor of the wooden post equals $.014 a year. Multiplying this by the mean number of years, which in this case is 20½ years, gives $.213 in favor of the wooden posts.

Now, supposing the above wooden cedar posts were given a preservative treatment at a cost of 6 cents each and the life was thereby increased 10 years, the relative economy would be found by dividing $0.28 by 13.00 which equals $.0214 a year, practically the same as for the untreated post. The economy in treating fence posts is not so pronounced as with ties and poles, for the reason that fence posts are a cheaper class of material than ties and poles, besides the cost of setting or placing is much less and owing to the conditions of service they have comparatively much longer life. Treated fence posts, however, show an economy over steel or concrete posts.

DISCOUNTED PRESENT VALUE OF AN ANNUAL RETURN OF 1, OBTAINABLE FOR n YEARS AT VARIOUS RATES OF INTEREST

Years n	Rate of interest (p) per cent 4	5	6	7
1	0.96	0.95	0.94	0.93
2	1.89	1.86	1.83	1.81
3	2.78	2.72	2.67	2.63
4	3.63	3.54	3.46	3.39
5	4.45	4.33	4.21	4.09
6	5.24	5.08	4.91	4.76
7	6.00	5.79	5.57	5.39
8	6.73	6.46	6.20	5.96
9	7.43	7.11	6.80	6.51
10	8.11	7.72	7.36	7.02
11	8.76	8.31	7.88	7.49
12	9.38	8.86	8.38	7.94
13	9.98	9.39	8.85	8.35
14	10.56	9.90	9.29	8.74
15	11.12	10.38	9.71	9.10
16	11.65	10.84	10.11	9.44
17	12.16	11.27	10.48	9.76
18	12.66	11.69	10.83	10.05
19	13.13	12.08	11.16	10.33
20	13.59	12.46	11.47	10.59
21	14.03	12.82	11.76	10.83
22	14.45	13.16	12.04	11.06
23	14.86	13.49	12.30	11.27
24	15.25	13.80	12.55	11.47
25	15.62	14.09	12.78	11.65
26	15.98	14.37	13.00	11.82
27	16.33	14.64	13.21	11.98
28	16.66	14.90	13.41	12.13
29	16.98	15.14	13.59	12.27
30	17.29	15.37	13.76	12.40
35	18.66	16.37	14.47	12.93
40	19.79	17.16	15.04	13.33
45	20.72	17.77	15.45	13.60
50	21.48	18.26	15.76	13.80
55	22.11	18.63	15.99	13.94

RAILWAY LINES NEAR THE TRENCHES.—Many of the railway lines between France and Belgium intersect the trenches, and regular trains cannot be run in those localities; but the Germans have utilized these lines by bringing in cars operated by storage batteries and operating them singly to remove the wounded from the battle front, and to bring back supplies.

General News Department

The roundhouse, machine shops, car shops and a large part of the rolling stock of the Alaska Northern Railway (the government-owned road) at Seward, Alaska, were destroyed by fire on May 10.

For the purpose of interesting school boys along its line in railroad work, the St. Louis & San Francisco has arranged a plan to have its division superintendents and other officers give short talks on the different branches of railroad service at schools at points on their divisions or other places when opportunity is offered.

Prominent railroad officers in California are proposing to test the constitutionality of the law of that state which requires railroads, street railways and steamship companies to carry without charge the members of the State Public Utilities Commission and its employees. In the recent decision of the United States Supreme Court in the case of the Northern Pacific against the state of North Dakota it was said that a carrier cannot be required to carry persons or goods gratuitously; and that this principle holds even if it be claimed that the public interests demands such free transportation. In California these officers of the state ride free on the railroads many hundred miles when they are engaged in business not connected with transportation, such as the inspection of light, power and water plants. The street railways of San Francisco carry large numbers of state employees free, and the free tickets are said often to find their way into the hands of persons not entitled to use them.

American Railway Association

The spring session of The American Railway Association was held at The Biltmore, New York City, on Wednesday of this week, President H. U. Mudge in the chair and 250 members being represented by 180 delegates.

The executive committee reported that a special committee (Julius Kruttschnitt, chairman), appointed to confer with the statistician of the Interstate Commerce Commission on a proposed revision of the rules governing the monthly reports of railway accidents, had arranged to have the effective date of the revision postponed until the railways have had a further opportunity to consider it. The special committee has also submitted one accident blank in place of six as proposed, which blank can be used by the railways in making reports to the several state and Public Service Commissions, as well as to the federal body, and also proposed a revised draft of the instructions.

The Committee on Maintenance, which has been examining the clearances for switch-stands, signal-stands, platforms, platform-shelters, mail-cranes, water-columns, coal-chutes and water tanks, has collected from the members of the association much data, and has reported that the subject is receiving attention by the American Railway Engineering Association. The committee included in its report a summary of replies to circular No. 1511, respecting the number of freight cars, passenger cars and locomotives equipped with safety appliances as required by the United States Safety Appliance Standards, as of January 1, 1915. On that date the number of freight cars in service (413 roads reporting) was 2,556,443; number fully equipped, 1,469,111; an increase of 398,358 over January 1, 1914. All cars in service, both freight and passenger, are fully equipped with grabirons as required by the laws of 1893, 1896 and 1903.

The Committee on Transportation reported that the revision of the train rules is substantially completed, but it will not present the revised code to the association for adoption until the fall session, by which time a revision of the block signal and interlocking rules will probably be ready.

The Committee on Transportation of Explosives presented the eighth annual report of the chief inspector of the bureau of explosives. (Noticed in the *Railway Age Gazette* of April 9.) On the recommendation of the committee, the association's rule, No. 1302, concerning the shipment of dangerous articles in baggage cars, was amended so as to provide that such shipments must be packed, marked and labeled as prescribed for express shipments and must not be transported in that part of any car used for the transportation of passengers.

The committee also called attention to the need of securing a revision of Section 233 of the United States Penal Code, so as to cover the transportation of "Other Dangerous Articles." A resolution was adopted by the association favoring the passage of such a revision.

The Committee on Legal and Traffic Relations reported that under instructions of the association it had undertaken the representation of the American Railway Association and individually of 158 railways, representing 190,871 miles, in the Interstate Commerce Commission's investigation of embargoes.

The Committee on Relations Between Railroads reported that Messrs. G. E. Evans (L. & N.) and J. J. Bernet (N. Y. C.) have been elected members of the committee, to fill vacancies

On recommendation of the committee, the association adopted resolutions urging the more general use of interline billing of freight, the better enforcement of rules for packing and marking of merchandise, that all roads enforce more careful handling of freight and that the several subordinate associations cooperate in these activities to the end of reducing claims for loss of and damage to freight, payments on this account having amounted in the last fiscal year to over thirty-six millions of dollars.

This committee reported, and the association adopted, some revisions of the rules for weighing empty cars and amendments to per diem rule 1 and car service rules 3, 14 and 15.

The meeting approved new car service rules 18, 19 and 20, covering (a) the continuous home route card; (b) cars containing refuse, which must not be offered in interchange, and (c) allowing a receiving road to collect $2 for weighing carloads of freight received from connections not weighed. Revisions of demurrage rules were also adopted.

The election resulted in the choice of A. W. Thompson (B. & O.) as second vice-president, and T. E. Clarke (D. L. & W.) and A. H. Smith (N. Y. C.) as members of the Executive Committee.

The following were elected members of the Committee on Transportation: Boston & Maine; Hocking Valley; Pennsylvania lines west of Pittsburgh.

The following were elected members of the Committee on Maintenance: Atchison, Topeka & Santa Fe; Norfolk & Western; Pennsylvania lines west of Pittsburgh.

The following were elected members of the Committee on Relations Between Railroads: Louisville & Nashville; New York Central; Southern. Chicago was selected as the place for the next regular session, which will be held on November 17.

Report of Special Committee

The Special Committee on Relations of Railway Operation to Legislation has issued its report, No. 14, outlining the progress of its work since the last report submitted on November 3, 1914. The report states that the only bill relating to railway operation which was passed during the Congress which adjourned on March 4, was that extending the provisions of the locomotive boiler inspection act to all parts of the locomotive and tender. Since the first of January legislatures in 43 states have been in session. Of these 31 have adjourned. Up to May 1, there had been introduced 1,005 bills relating to railway operation, of which 51 related to the number of men to be employed in train or switch crews, none of which have been passed. A total of 94 bills have become laws, most of which deal with relatively unimportant features of railway operation.

The report says that it is not impossible that when the next Congress meets an effort will be made to secure legislation specifying standard horizontal and vertical clearances. In view of the fact that there is not a standard clearance for new construction recommended either by the American Railway Engineering

Association or the American Railway Association, a sub-committee of engineering officers will take this matter vigorously in hand with the proper committee of the American Railway Engineering Association, and it is hoped that the latter committee will be able to submit a report by the first of December. The report also mentions the bulletin on the progress of the construction of steel and steel underframe passenger cars, and says that inasmuch as the construction of wooden cars for passenger service has practically been discontinued, it appears that no necessity exists for legislation on this subject from any point of view.

Revenues and Expenses of Express Companies for January

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the principal express companies for January, 1915. (The express companies have three months in which to make reports.)

A.—FOR THE MONTH OF JANUARY

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles)	44,883.11	38,665.94	72,192.66	59,792.88	9,676.50	7,080.31	2,839.78	2,839.78	9,557.73	9,336.44
Charges for transportation	$2,347,856	$2,361,889	$3,111,765	$2,828,022	$187,176	$186,730	$39,720	$35,110	$191,371	$205,103
Express privileges—Dr.	1,196,717	1,261,317	1,518,718	1,510,649	92,816	94,593	20,667	18,079	120,531	124,560
Operations other than transportation	33,448	25,403	153,893	166,932	4,429	7,973	679	600	3,316	3,373
Total operating revenues	1,184,587	1,125,975	1,746,941	1,484,305	98,788	100,110	19,732	17,632	74,156	83,915
Operating expenses	1,415,147	1,296,532	1,854,299	1,859,540	115,638	128,095	28,066	28,175	101,861	86,846
Net operating revenue	—230,560	—170,556	—107,358	—375,235	—16,849	—27,985	—8,333	—10,543	—27,704	—2,930
Uncollectible revenue from transp'n.	528	.....	247	90	.....	.....	.....	.....	6	.....
Express taxes	17,210	18,132	33,240	32,250	4,000	2,850	800	1,000	3,855	3,772
Operating income	—248,299	—188,688	—140,846	—407,576	—20,849	—30,835	—9,133	—11,543	—31,566	—6,703

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Mileage of all lines covered (miles)	8,118.34	8,080.40	34,552.60	33,615.60	113,461.05	99,680.19	5,174.26	5,008.97	300,456.03	296,385.34
Charges for transportation	$165,487	$176,089	$1,037,130	$1,312,786	$2,596,555	$2,182,234	$77,578	$78,133	$9,754,641	$10,788,573
Express privileges—Dr.	95,376	98,389	554,384	690,555	1,351,618	1,125,676	40,485	44,029	4,991,315	5,573,887
Operations other than transportation	2,460	2,601	21,213	24,803	48,222	44,477	2,756	2,035	270,420	302,117
Total operating revenues	72,571	80,301	503,959	647,034	1,293,159	1,101,035	39,849	36,140	5,033,746	5,516,803
Operating expenses	80,134	84,541	498,489	565,927	1,362,882	1,140,424	47,109	47,229	5,503,629	6,058,571
Net operating revenue	—7,562	—4,239	5,469	81,106	—69,722	—39,389	—7,259	—11,088	—469,883	—541,768
Uncollectible revenue from transp'n.	25	6	34	.....	775	.....	1	.....	1,620	97
Express taxes	5,000	4,500	14,667	14,565	32,891	33,000	953	722	112,618	124,543
Operating income	—12,588	—8,746	—9,232	66,540	—103,389	—72,389	—8,214	—11,811	—584,121	—666,408

B.—FOR THE SEVEN MONTHS ENDING WITH JANUARY

Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation	$20,081,460	$20,634,267	$27,089,551	$25,397,427	$1,897,338	$1,976,553	$438,599	$428,799	$1,923,689	$2,050,962
Express privileges—Dr.	10,326,949	10,927,894	13,557,123	12,716,614	962,871	941,963	220,594	215,602	1,171,786	1,245,700
Operations other than transportation	292,151	221,670	1,233,005	1,304,638	35,857	65,853	5,792	6,018	31,657	30,876
Total operating revenues	10,046,661	9,928,043	14,765,433	13,985,451	970,324	1,100,443	223,798	219,215	783,560	836,139
Operating expenses	10,810,648	10,004,468	14,723,782	13,811,360	928,272	1,021,195	206,920	215,621	642,039	641,562
Net operating revenue	—763,986	—76,425	41,650	174,090	42,051	79,247	16,878	3,594	141,521	194,576
Uncollectible revenue from transp'n.	3,267	.....	1,191	158	.....	.....	.....	.....	11	.....
Express taxes	119,454	116,743	246,351	213,335	28,000	19,850	7,400	8,200	28,472	28,606
Operating income	—886,708	—193,168	—205,892	—39,403	14,051	59,397	9,478	—4,605	113,037	165,970

Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named*	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Charges for transportation	$1,687,350	$1,892,603	$8,018,982	$9,367,507	$22,177,418	$19,076,828	$693,863	$747,212	$84,008,254	$93,794,196
Express privileges—Dr.	917,813	1,023,825	4,110,405	4,786,018	11,357,041	9,554,600	371,647	418,508	42,996,233	47,837,520
Operations other than transportation	23,497	23,880	179,620	198,522	421,633	388,681	21,824	17,187	2,245,040	2,441,413
Total operating revenues	793,034	892,557	4,088,197	4,780,011	11,242,010	9,910,910	344,040	345,891	43,257,061	48,398,089
Operating expenses	634,628	658,209	3,708,906	4,094,568	10,571,523	8,806,818	372,325	356,626	42,599,047	45,861,937
Net operating revenue	158,406	234,348	379,290	685,443	670,487	1,104,091	—28,284	—10,734	658,014	2,536,152
Uncollectible revenue from transp'n.	100	25	264	84	6,084	.....	54	.....	10,975	268
Express taxes	35,000	31,500	102,922	104,848	254,033	228,000	7,137	5,351	825,771	832,428
Operating income	123,306	202,822	276,103	580,510	410,369	876,091	—35,476	—16,026	—181,732	1,703,456

*Includes previous year's returns of United States Express Co.

Fuel Association Exhibitors

The following railway supply concerns had exhibits at the International Railway Fuel Association convention, which was held at Chicago this week. An abstract of the proceedings of the professional sessions of this association will be found elsewhere in this issue.

American Arch Company, New York.—Security arch. Represented by Guy Bean, W. L. Allison, F. G. Boomer, G. C. Denney, J. T. Anthony, J. P. Neff, H. D. Savage, LeGrand Parish and John L. Nicholson.

Barco Brass & Joint Co., Chicago.—Barco metallic engine and tender air and steam heat connections. Represented by F. N. Bard and C. L. Mellor.

Casey-Hedges Company, Chattanooga, Tenn.—Hawkes boiler and Casey-Hedges horizontal water tube. Represented by C. W. Hawkes and Henry Vick.

Economy Devices Company, New York.—Woodward truck, radial buffer and Economy exhaust nozzle. Represented by J. L. Randolph.

Fairbanks, Morse & Co., Chicago.—Photographs of coaling stations, mine tipples and ground storage. Represented by J. C. Flannigan.

Franklin Railway Supply Company, New York.—Franklin fire door. Represented by C. W. F. Coffin, Jos. Sinkler, Ralph Coburn and Sam Rosenfelt.

Goodman Manufacturing Company, Chicago.—Photographs of coal mining machinery and electric mine locomotives. Represented by H. H. Small and A. F. Fors.

Heat Saver Company, Chicago.—Blaske fuel saving devices. Represented by G. A. Smith and R. L. Holmes.

Hulson Grate Company, Keokuk, Iowa.—Hulson locomotive grate. Represented by A. W. Hulson.

Industrial Instrument Company, Foxboro, Mass.—Pyrometers, gages, thermometers, tachometers, temperature controllers and steam flow meters. Represented by F. W. Carret.

Jeffrey Manufacturing Company, Columbus, Ohio.—Photographs of single roll coal pressure, Arcwall mining machine and electric mine locomotives. Represented by W. J. Armstrong, P. C. Dierdorff, S. S. Shive and C. C. Ford.

Link Belt Company, Chicago.—Photographs of coaling stations and stations for storage of coal. Represented by J. C. Nellegan.

Locomotive Stoker Company, New York.

Locomotive Superheater Company, New York.—Photographs of superheater and pyrometer. Represented by Geo. Fogg, Wm. Boughton, J. Mourne, R. R. Porterfield, Gilbert Ryder and G. Spangler.

Manistee Iron Works Company, Manistee, Mich.—Centrifugal pumps and traveling grate stokers. Represented by Henry Vick.

Manning, Maxwell & Moore, Inc., New York.—Hancock inspirators, Ashcroft gages and boiler fittings. Represented by C. L. Brown and F. J. Wilson.

National Graphite Lubricator Company, Chicago.—Lubricators. Represented by E. L. Pollock.

National Railway Devices Company, Chicago.—Shoemaker fire door. Represented by J. G. Robinson, E. J. Gunnison and V. W. Goodman.

Ogle Construction Company, Chicago.—Working model of coal handling plant. Represented by C. F. Bledsoe, M. W. Powell and R. A. Ogle.

Parsons Engineering Company, Wilmington, Del.—Photographs of smoke prevention equipment. Represented by Wm. H. Savery.

Pyle-National Electric Headlight Company, Chicago.—Pyle-National headlights. Represented by L. H. Steger, Wm. Miller and R. L. Eddy.

Q. & C. Company, New York.—Ross-Schofield boiler circulator. Represented by C. F. Pierce, C. M. Jewell, J. J. Daly and E. R. Pecker.

Roberts & Schaefer Company, Chicago.—Photographs of coal and sand handling devices. Represented by C. P. Ross.

Simonds & Co., G. L., Chicago.—Dean ash tube cleaner, Vulcan soot cleaner, Hays gas analyzers and draft gages. Represented by F. A. Moreland, G. L. Simonds and A. B. Nelson.

Snow Construction Company, T. W., Chicago.—Photographs of coal and water stations. Represented by T. W. Snow and R. E. Robinson.

Stroud & Co., E. H., Chicago.—Stroud powdered coal burner and Stroud air separation coal pulverizer. Represented by E. H. Stroud.

United States Graphite Company, Saginaw, Mich.—Mexican boiler graphite, Mexicao lubricating graphite and locomotive graphite feeder. Represented by J. G. Draught and J. W. Eviston.

Whiting-Evans Manufacturing Company, Chicago.—Kerosene carburetor and stationary engines. Represented by H. Q. Turner.

Summary of Revenues and Expenses of Large Steam Roads

The following figures were compiled by the Interstate Commerce Commission from monthly reports of operating revenues and expenses of large steam roads for the month of March, 1915. No reports are included for roads whose operating revenues for the year ended June 30, 1914, did not reach $1,000,000. The figures are compiled as rendered and should not be considered final, inasmuch as scrutiny of the reports may lead to their modification before acceptance.

American Electric Railway Association

The annual convention of the American Electric Railway Association and the American Electric Railway Manufacturers' Association will be held in San Francisco, October 4 to 8.

The transportation committee has made tentative arrangements for special transportation facilities for the association members as follows:

The Red Special on Tour "A" will leave New York about September 23, and stop for passengers at Albany, Utica, Syracuse, Rochester, Buffalo and Cleveland. From Chicago it will go to St. Paul and Minneapolis, and thence over the Great Northern to Glacier Park, whence after a stopover of a day and a night it will proceed through Spokane, Seattle, Tacoma and Portland. After a day in Portland the train will leave over the Shasta Route and arrive at San Francisco on October 2.

Returning after a week's stay in San Francisco the train will proceed to Yosemite National Park, where a stop of two days will be made and thence to Los Angeles and Pasadena, where another two days' stop will be made. A two days' stop will also be made at the San Diego Exposition and the Coronado

For the Month of March

Item	United States			Eastern District			Southern District			Western District		
	Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated		Amount	Per mile of road operated	
	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*
Average number of miles operated	228,660.64	...	...	58,820.77	...	...	42,348.25	...	...	127,491.62	...	...
Revenues:												
Freight	$163,597,589	$715	$777	$72,703,100	$1,236	$1,326	$27,190,042	$642	$723	$63,704,447	$500	$539
Passenger	46,436,626	203	218	19,652,775	334	348	6,678,513	158	187	20,105,338	158	168
Mail	4,746,255	21		1,725,993	29		626,111	15	15	2,394,151	19	17
Express	5,266,225	23	75	2,252,126	38	132	790,274	19	23	2,223,825	17	16
All other transportation	6,652,213	29		3,713,869	63		603,804	14	15	2,334,540	18	22
Incidental	4,636,449	20	21	2,278,831	39	41	662,815	15	17	1,694,803	13	13
Joint Facility—Cr.	261,020	1	1	119,416	2	2	56,582	1	1	85,022	1	1
Joint Facility—Dr.	—97,251	...	...	—61,941	...	...	—12,846	...	...	—22,464	...	...
Railway operating revenues	$231,499,126	$1,012	$1,092	$102,384,169	$1,741	$1,849	$36,595,295	$864	$981	$92,519,662	$726	$776
Expenses:												
Maint. of way and structures	$26,098,580	$114	$126	$11,048,634	$188	$314	$4,786,332	$113	$117	$10,263,614	$81	$88
Maintenance of equipment	41,747,323	182	196	20,139,338	342	362	6,626,032	156	182	14,981,953	118	123
Traffic	4,932,870	22	22	1,848,203	32	31	888,432	21	22	2,196,235	17	17
Transportation	84,294,244	369	419	39,290,673	668	770	12,343,213	292	342	32,660,358	256	282
Miscellaneous operations	1,825,297	8	11	821,376	14	22	196,812	5	5	807,109	6	7
General	6,278,579	27	29	2,719,432	46	49	983,666	23	25	2,575,481	20	21
Transportat'n for Investm't—Cr.	—444,991	—2	—1	—65,411	—1	...	—94,511	—2	...	—285,069	—2	—1
Railway operating expenses	$164,731,902	$720	$802	$75,802,245	$1,289	$1,448	$25,729,976	$608	$693	$63,199,681	$496	$537
Net revenue from railway operations	$66,767,224	$292	$290	$26,581,924	$452	$401	$10,865,319	$256	$288	$29,319,981	$230	$239
Railway tax accruals	$11,133,218	$49	$50	$4,714,075	$80	$80	$1,565,001	$37	$39	$4,854,142	$38	$40
Uncollectible railway revenues	52,884	...	...	13,333	...	...	10,086	...	...	29,465	...	...
Railway operating income	$55,581,122	$243	$240	$21,854,516	$372	$321	$9,290,232	$219	$249	$24,436,374	$192	$199

*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only.

For the Nine Months Ending with March

	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*	1915	1915	1914*
Average number of miles operated	228,363.67	...	...	58,758.72	...	...	42,302.34	...	...	127,302.61	...	...
Revenues:												
Freight	$1,492,172,408	$6,534	$7,054	$645,524,309	$10,986	$11,894	$228,311,491	$5,397	$6,083	$618,336,608	$4,857	$5,114
Passenger	477,090,639	2,089	2,318	209,049,800	3,557	3,816	65,912,401	1,558	1,816	202,128,438	1,588	1,785
Mail	42,826,776	188		15,579,918	265		5,642,947	133	133	21,603,911	170	155
Express	51,029,417	223	727	22,787,929	388	1,336	7,671,029	182	208	20,570,159	162	175
All other transportation	61,984,945	271		34,325,907	584		5,010,698	119	135	22,648,340	178	196
Incidental	43,710,756	192	205	22,670,349	386	399	5,458,511	129	144	15,581,896	122	134
Joint Facility—Cr.	2,633,455	12	12	1,183,333	20	19	519,347	12	12	930,775	7	8
Joint Facility—Dr.	—930,133	—4	—4	—585,750	—10	—8	—115,852	—3	—2	—228,531	—2	—2
Railway operating revenues	$2,170,518,263	$9,505	$10,312	$950,535,795	$16,176	$17,456	$318,410,572	$7,527	$8,529	$901,571,896	$7,082	$7,565
Expenses:												
Maint. of way and structures	$266,153,708	$1,165	$1,337	$112,717,911	$1,918	$2,274	$43,391,639	$1,026	$1,119	$110,044,158	$864	$972
Maintenance of equipment	377,738,545	1,654	1,794	177,873,006	3,027	3,323	61,455,810	1,453	1,601	138,409,729	1,087	1,143
Traffic	44,463,837	195	209	16,940,642	288	317	8,331,414	197	201	19,191,781	151	162
Transportation	776,709,984	3,401	3,761	360,525,041	6,136	6,859	111,650,189	2,639	2,955	304,534,754	2,392	2,580
Miscellaneous operations	17,245,512	76	97	8,122,155	138	189	1,660,717	39	44	7,462,640	59	72
General	55,432,432	243	251	23,564,313	401	406	8,911,253	210	220	22,956,866	180	189
Transportat'n for Investm't—Cr.	—4,933,955	—22	—10	—550,324	—9	...	—1,030,297	—24	—3	—3,353,334	—26	—18
Railway operating expenses	$1,532,810,063	$6,712	$7,439	$699,192,744	$11,899	$13,368	$234,370,725	$5,540	$6,137	$599,246,594	$4,707	$5,100
Net revenue from railway operations	$637,708,200	$2,793	$2,873	$251,343,051	$4,277	$4,088	$84,039,847	$1,987	$2,392	$302,325,302	$2,375	$2,465
Railway tax accruals	$100,198,118	$439	$449	$41,296,373	$703	$719	$13,985,376	$331	$337	$44,916,369	$353	$360
Uncollectible railway revenues	398,339	2	...	138,828	2	...	69,343	2	...	190,168	1	...
Railway operating income	$537,111,743	$2,352	$2,424	$209,907,850	$3,572	$3,369	$69,985,128	$1,654	$2,055	$257,218,765	$2,021	$2,105

*Because of changes in accounting classifications, consolidations of companies, etc., comparative averages are approximate only

Beach Hotel. The train will also make a stop of a few hours at Riverside, a day's stop at the Grand Canyon, and after a short stop at Albuquerque will proceed via Kansas City and Chicago to New York.

The Blue Special on Tour "B" will leave New York over the Pennsylvania about September 26, and will stop to receive passengers at Newark, Philadelphia, Harrisburg, Pittsburgh, Columbus, Indianapolis, St. Louis and Kansas City, thence proceeding to Denver, Colorado Springs and through the Royal Gorge. It will stop at Glenwood Springs, and then go on to Salt Lake and Ogden and Lake Tahoe, arriving at San Francisco October 3. Returning it will follow the same route as the Red Special.

The White Special on Tour "C" will be a faster train. It will leave Chicago in time to arrive at San Francisco October 4, and will be for the going trip only.

Association of Railway Claim Agents

The twenty-sixth annual convention of the Association of Railway Claim Agents was held at Galveston, Tex., on April 13, 14 and 15. The following officers were elected for the ensuing year: President, H. B. Hull, chief claim agent, Illinois Central, Chicago; vice-presidents, W. F. Every, general claim agent, Northern Pacific, St. Paul, and A. H. Mansfield, claims attorney, Missouri Pacific, St. Louis; secretary and treasurer, Willis H. Failing, of New York City. It was decided to hold the next convention at Atlantic City.

American Society of Mechanical Engineers

The Chicago section of the American Society of Mechanical Engineers, held its last 1914-15 seasonal meeting May 14, 1915, at the La Salle Hotel, Chicago. An interesting paper on Electric Locomotives was presented by A. F. Batchelder and A. H. Armstrong of the General Electric Company, Schenectady, N. Y. The following officers were nominated for the following year: H. M. Montgomery, chairman; Joseph Harrington, vice-chairman; Robert E. Thayer, secretary, and H. T. Bentley and C. E. Wilson as other members of the executive committee.

Western Railway Club

The annual meeting and election of officers of the Western Railway Club will be held at the Hotel La Salle, Chicago, on Tuesday evening, May 25, at 8 p. m. The program for the evening is as follows: Address of Dean W. F. M. Goss, of the College of Engineering and Engineering Experiment Station of the University of Illinois; Reports of officers; Election of officers; Address of retiring president; Entertainment.

Special Agents and Police

The International Association of Railway Special Agents and Police will hold its nineteenth annual convention at the Grand Hotel, Cincinnati, Ohio, May 25, 26, 27 and 28. The secretary of the association is W. C. Pannell, who is also editor of the association's quarterly magazine, Baltimore, Md.

MEETINGS AND CONVENTIONS

The following list gives the names of secretories, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. R. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November, Noonday meetings, October to May.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meetings, 2d Monday in June.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday afternoon in month, except June, July and August, La Salle Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meetings, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

Month of March, 1915

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Baltimore & Ohio Chicago Terminal	80	.....	$473	$124,141	$2,081	$17,073	$989	$56,466	$1,260	$4,085	$80,873	$43,267	$17,654	$25,614	$25,890
Oahu Railway & Land Co.	109	$69,781	18,944	96,406	8,949	7,585	755	22,143	.....	3,968	43,400	53,006	7,152	45,854	—1,297
Ulster & Delaware	129	35,406	12,876	62,149	9,039	24,182	1,358	34,379	66	2,769	71,793	—9,643	3,300	—12,958	4,745
Nine Months of Fiscal Year Ending June 30, 1915.															
Atlantic City	170	$587,013	$1,096,361	$1,775,631	$320,334	$216,969	$22,142	$909,368	$870	$12,561	$1,481,428	$294,203	$121,500	$172,571	$19,253
Baltimore & Ohio Chicago Terminal	80	.....	5,192	1,179,346	102,265	166,764	7,977	507,040	18,192	40,638	836,667	342,679	169,823	172,747	87,284
Bangor & Aroostook	631	2,188,291	483,890	2,822,815	414,323	441,490	23,352	841,170	11,014	86,187	1,817,003	1,005,812	90,847	914,915	56,558
Belt Ry. Co. of Chicago	24	.....	.....	2,462,905	130,061	228,503	7,705	883,582	.....	54,760	1,304,611	1,158,294	99,135	1,059,159	297,706
Bessemer & Lake Erie	204	5,570,160	296,127	5,978,213	509,139	1,404,278	91,874	1,432,692	10,106	105,230	3,508,485	2,469,727	165,019	2,304,648	707,335
Bingham & Garfield	27	844,767	31,368	881,053	75,849	117,217	8,448	162,583	701	16,527	381,326	499,727	18,627	481,100	—322,447
Birmingham Southern	44	356,675	8,018	629,169	128,213	110,017	4,634	237,385	.....	31,749	511,998	117,171	22,946	94,225	—146,442
Boston & Maine	2,302	19,975,843	11,750,404	34,946,536	5,209,869	5,293,538	323,706	15,394,218	150,850	893,755	27,265,935	7,680,601	1,454,456	6,226,145	984,232
Buffalo & Susquehanna Railway	91	118,658	59,147	199,325	40,401	69,888	5,003	106,589	257	21,617	243,753	—44,428	14,400	—58,829	27,664
Buffalo & Susquehanna R. R. Corporation	253	1,018,446	61,181	1,107,040	203,934	345,722	11,663	335,114	.....	48,957	945,389	161,651	23,400	138,251	—120,471
Buffalo, Rochester & Pittsburgh	586	6,005,750	849,429	7,110,104	918,635	1,658,197	109,156	2,383,201	11,455	165,197	5,245,840	1,864,264	180,000	1,683,985	—586,708
Canadian Pacific Lines in Maine	233	754,703	180,421	1,001,423	172,407	161,207	51,378	441,422	.....	32,370	858,784	142,640	108,000	34,640	148,063
Carolina, Clinchfield & Ohio	248	1,433,912	132,188	1,603,397	168,880	208,106	57,793	318,194	.....	83,582	826,691	776,706	128,250	648,237	—333,027
Carolina, Clinchfield & Ohio of S. C.	18	84,298	12,633	99,547	10,131	762	15,131	18,787	.....	5,968	50,878	48,669	6,750	41,904	—27,625
Central of Georgia	1,924	6,152,632	2,310,327	9,410,874	1,265,450	1,739,926	303,839	3,286,414	12,762	309,619	6,893,279	2,517,595	423,232	2,090,031	—590,582
Central of New Jersey	678	15,476,788	4,429,228	21,087,009	1,801,350	3,947,628	271,513	7,469,601	115,316	447,273	14,050,245	7,036,764	1,078,406	5,958,319	—343,940
Central New England	304	2,373,188	351,707	2,859,996	567,217	308,391	11,018	958,543	.....	34,148	1,878,766	981,230	111,000	870,194	—41,688
Central Vermont	411	1,969,546	673,046	2,859,352	368,592	485,337	74,594	1,348,186	21,903	61,116	2,359,727	499,625	141,840	357,059	281,761
Charleston & Western Carolina	341	1,029,413	244,125	1,341,050	263,222	245,162	33,297	490,662	5	39,521	1,071,728	269,322	45,000	224,314	—118,616
Chesapeake & Ohio Lines	2,372	22,704,335	4,303,563	28,779,468	3,260,266	6,097,228	489,968	9,670,693	176,948	646,559	20,324,347	8,455,121	1,004,559	7,443,127	101,248
Chicago & Alton	1,033	6,991,114	2,934,548	10,831,134	1,229,777	2,488,624	332,317	4,010,700	88,286	271,571	8,421,274	2,409,860	403,393	2,004,217	755,517
Chicago & Eastern Illinois	1,282	8,077,365	2,119,641	11,065,189	1,315,867	2,304,621	214,824	4,171,198	73,609	329,203	8,405,415	2,659,774	475,200	2,183,572	545,602
Chicago & Erie	270	3,655,373	434,896	4,505,600	674,388	292,675	170,599	2,085,795	20,024	115,778	3,309,238	1,196,363	141,493	1,054,828	1,471,096
Chicago & North Western	8,108	39,911,787	15,642,152	61,789,890	7,904,738	9,830,094	1,003,128	22,764,046	449,401	1,318,882	43,147,949	18,641,941	3,375,000	15,262,623	—1,183,490
Chicago, Burlington & Quincy	9,367	48,537,998	15,446,985	70,218,084	6,913,146	11,935,854	1,217,362	22,511,155	607,799	1,570,203	44,755,519	25,462,564	2,957,186	22,505,379	—796,340
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	489,494	130,930	720,600	89,664	109,383	14,911	388,342	.....	12,931	615,230	105,371	25,830	79,523	—4,911
Chicago Great Western	1,429	7,386,556	2,346,948	10,629,978	1,325,670	1,829,868	419,906	3,951,461	62,390	308,771	7,889,294	2,740,684	436,498	2,300,455	—84,774
Chicago, Indianapolis & Louisville	618	3,178,079	1,277,834	4,874,333	516,818	860,726	182,089	1,816,050	1,571	154,037	3,529,252	1,345,081	238,920	1,105,741	—13,094
Chicago, Milwaukee & St. Paul	10,071	48,653,378	13,675,320	69,503,270	7,713,391	10,113,221	1,326,539	27,638,337	545,375	1,362,458	47,255,929	22,247,332	3,603,620	18,619,343	—2,125,868
Chicago, Peoria & St. Louis	255	845,321	186,541	1,095,526	179,988	204,646	47,645	467,180	.....	41,872	941,332	154,194	45,600	108,594	187,162
Chicago, Rock Island & Gulf	477	1,685,612	453,164	2,311,738	261,385	322,750	82,651	899,298	16,310	71,602	1,658,995	652,743	69,310	582,911	79,259
Chicago, Rock Island & Pacific	7,852	35,407,085	13,434,537	52,513,860	6,926,996	8,503,763	1,322,397	21,022,772	362,685	1,250,325	39,355,220	13,158,640	2,414,847	10,740,471	263,207
Chicago, St. Paul, Minneapolis & Omaha	1,753	9,037,681	3,820,151	13,855,336	1,489,219	1,870,416	257,779	5,265,308	131,256	324,394	9,322,127	4,533,209	780,800	3,749,028	8,140
Chicago, Terre Haute & Southeastern	372	1,519,468	147,149	1,712,816	224,712	398,211	31,992	525,976	8,046	89,164	1,278,101	434,714	107,500	327,214	85,434
Cincinnati, Hamilton & Dayton	1,003	5,295,872	1,136,853	7,195,880	1,080,711	1,528,942	177,058	3,264,981	26,844	176,278	6,251,742	944,138	326,533	615,540	186,292
Cincinnati, New Orleans & Tex. Pac.	337	5,307,086	1,334,732	7,048,360	697,411	1,814,155	228,947	2,245,458	56,479	183,016	5,223,573	1,824,787	279,000	1,545,265	—646,462
Cincinnati Northern	246	954,995	164,562	1,167,689	174,340	234,749	24,487	390,921	.....	32,131	856,628	311,061	47,963	262,802	328,378
Cleveland, Cincinnati, Chic. & St. Louis	2,381	18,349,093	6,358,570	27,098,476	2,889,240	5,469,570	704,573	10,537,101	210,887	558,935	20,319,427	6,779,049	1,165,027	5,603,313	3,592,936
Colorado Midland	338	1,073,563	170,784	1,382,016	212,671	307,937	67,924	549,862	10,091	50,744	1,199,229	182,787	79,709	103,078	134,275
Colorado & Southern	1,089	4,438,654	1,065,007	5,936,390	687,405	1,330,110	94,242	1,860,730	35,984	177,257	4,185,730	1,750,661	317,445	1,432,867	175,640
Cumberland Valley	164	1,551,154	498,021	2,174,472	360,492	298,675	42,869	757,904	7,775	74,728	1,542,442	632,031	51,453	580,578	—83,054
Delaware & Hudson Co.—R. R. Dept.	881	13,754,123	2,131,906	16,851,704	1,223,980	2,835,086	241,429	6,190,931	109,292	567,876	11,154,945	5,696,759	509,119	5,187,152	.....
Delaware, Lackawanna & Western	959	22,287,958	6,268,121	31,735,273	3,344,136	9,249,055	656,747	10,359,276	269,464	679,988	20,334,484	11,400,789	1,510,632	9,888,660	370,543
Denver & Rio Grande	2,569	12,289,907	3,260,598	16,599,627	1,993,700	3,099,575	342,565	4,897,294	235,999	496,200	11,056,031	5,543,597	785,100	4,757,442	—11,678
Denver & Salt Lake	255	954,281	246,677	1,269,975	152,650	220,515	20,614	428,302	.....	47,912	866,981	402,994	52,500	350,494	161,610
Detroit & Mackinac	400	515,708	235,534	813,861	100,033	142,347	19,006	304,560	1,021	24,989	591,957	221,904	59,835	162,069	—35,644
Detroit & Toledo Shore Line	79	1,122,826	.....	1,126,122	110,956	91,332	16,994	325,036	.....	25,315	569,633	556,489	53,450	503,039	—88,231
Detroit, Grand Haven & Milwaukee	191	1,203,289	468,749	1,939,964	278,396	205,815	60,939	1,015,390	7,982	43,052	1,711,573	228,391	30,240	197,075	—41,373
Detroit, Toledo & Ironton	441	1,181,942	131,550	1,396,658	182,659	231,182	35,184	835,911	.....	51,968	1,336,905	59,753	53,000	6,752	522,260
Duluth & Iron Range	273	2,740,487	166,981	3,029,245	569,510	540,944	9,345	778,493	22,169	79,007	1,999,468	1,029,777	155,662	874,114	—1,289,093
Duluth, Missabe & Northern	369	3,088,008	241,547	3,417,769	439,779	611,318	17,866	772,039	22,974	120,254	1,984,229	1,433,540	178,220	1,255,319	—1,251,139
Duluth, South Shore & Atlantic	628	1,317,748	658,269	2,174,160	385,429	316,086	72,940	868,705	33,749	94,339	1,771,248	402,912	143,970	258,862	—129,061
Duluth, Winnipeg & Pacific	185	823,975	160,335	1,015,965	149,206	168,659	20,104	377,693	9,419	55,179	780,261	235,704	50,687	185,017	—70,901
El Paso & Southwestern Co.	1,027	4,269,056	980,892	5,681,799	722,436	802,548	168,456	1,537,877	51,454	210,866	3,481,208	2,200,590	296,075	1,889,289	—147,730
Elgin, Joliet & Eastern	776	5,782,946	47	6,148,739	632,289	1,175,031	51,148	1,882,852	.....	168,083	3,909,062	2,239,677	320,020	1,919,624	—527,380
Erie	1,988	30,064,613	6,790,513	40,693,596	4,368,670	9,762,504	846,752	14,985,677	280,715	915,628	31,071,507	9,622,088	1,087,750	8,510,680	—492,772
Florence & Cripple Creek	87	745,473	142,565	904,798	102,102	90,828	18,871	263,373	.....	35,014	510,188	394,610	50,395	343,675	3,675
Florida East Coast	745	1,851,526	1,505,088	2,895,197	544,607	511,373	81,539	1,254,489	28,267	148,749	2,541,468	1,353,729	174,959	1,177,931	212,462
Fort Worth & Denver City	454	2,869,139	1,146,419	4,235,264	422,139	636,824	65,965	1,715,565	28,006	130,015	2,998,504	1,236,759	107,046	1,129,713	283,548
Galveston, Harrisburg & San Antonio	1,345	5,730,385	2,277,554	8,653,884	1,180,777	1,473,500	262,735	3,767,010	81,977	318,766	7,077,014	1,576,870	345,372	1,230,031	—82,231
Georgia	307	1,454,538	560,903	2,182,562	239,321	448,135	106,999	942,374	2,918	68,019	1,807,766	374,796	35,440	338,532	—226,678
Georgia, Southern & Florida	395	996,191	509,852	1,716,284	230,335	353,106	64,555	701,627	1,933	93,536	1,445,092	271,192	85,786	183,708	—87,142
Grand Rapids & Indiana	575	2,328,709	1,402,500	4,055,317	443,890	667,792	98,557	1,739,477	13,227	126,401	3,079,344	975,973	210,085	763,400	131,523
Grand Trunk Western	347	3,660,512	1,324,278	5,352,444	821,464	1,088,051	174,927	2,355,726	13,784	134,875	4,638,828	713,616	323,280	389,558	—188,480
Great Northern	8,051	37,390,349	10,161,519	52,688,891	5,025,342	5,460,140	871,813	14,146,097	623,460	930,560	27,006,113	25,682,778	3,342,782	22,337,682	1,003,581
Gulf & Ship Island	308	915,698	230,970	1,221,465	153,257	271,541	22,112	331,442	2,233	62,930	843,514	377,951	69,490	308,236	—142,265
Gulf, Colorado & Santa Fe	1,937	9,947,604	2,287,998	12,853,723	1,734,237	1,867,713	250,850	4,491,378	.....	304,351	8,636,617	4,217,107	432,968	3,780,830	1,809,806
Hocking Valley	352	3,740,985	644,687	4,706,998	548,147	907,879	84,758	1,556,203	.....	131,757	3,228,744	1,478,254	334,950	1,143,304	—300,840

REVENUES AND EXPENSES OF RAILWAYS

NINE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
Houston, East & West Texas	191	$721,057	$231,705	$1,011,271	$180,454	$158,997	$17,091	$420,280	$821	$28,667	$806,053	$205,218	$37,101	$167,792	—$79,780
Houston & Texas Central	860	3,647,327	1,136,013	5,140,380	881,842	719,299	138,454	2,038,861	18,478	159,160	3,952,918	1,187,462	226,123	960,084	210,971
Illinois Central	4,767	34,240,312	9,844,633	47,736,099	6,342,729	10,372,624	933,320	17,259,056	269,876	1,148,299	36,092,953	11,643,146	2,445,800	9,181,914	—401,511
Indiana Harbor Belt	110	.....	.....	2,484,198	309,771	238,981	25,206	1,098,630	.....	68,600	1,741,187	743,011	68,387	673,950	172,671
Interoational & Great Northern	1,159	5,195,418	1,388,114	7,107,819	1,167,215	1,237,819	209,103	3,159,707	25,959	271,290	6,071,093	1,036,727	300,000	731,845	—742,818
Kanawha & Michigan	177	1,864,604	262,082	2,187,534	302,210	563,287	24,331	659,858	31	59,062	1,608,780	578,754	103,061	475,660	—136,086
†Kansas City, Mexico & Orient	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas City Southern	827	5,846,686	1,090,409	7,625,730	811,969	874,334	256,186	2,599,815	.....	171,140	4,880,370	2,745,360	429,807	2,312,512	337,135
Lake Erie & Western	900	3,474,806	579,539	4,270,719	587,499	733,860	123,340	1,735,379	.....	110,368	3,290,446	980,273	208,541	770,714	225,490
Lehigh & Hudson River	97	1,206,461	87,297	1,309,180	175,450	179,181	12,708	482,608	.....	38,930	888,877	420,303	37,350	382,953	110,240
Lehigh & New England	294	1,741,725	11,369	1,844,008	244,547	274,569	17,273	451,529	.....	53,052	1,060,969	783,040	49,331	733,708	142,210
Lehigh Valley	1,443	26,327,017	3,069,775	31,263,574	3,355,486	6,206,283	695,346	11,534,062	106,859	661,434	22,955,955	8,707,619	1,270,000	7,428,892	361,826
Long Island	398	2,759,750	5,746,167	9,782,049	1,071,692	1,081,036	101,264	4,202,883	64,253	253,913	6,775,041	3,007,008	631,227	2,373,646	592,105
Louisiana & Arkansas	279	1,056,600	165,691	1,258,407	222,217	210,603	24,772	346,219	.....	37,580	840,949	417,458	59,900	357,314	—45,593
Louisiana Ry. & Navigation Co	351	1,219,749	198,136	1,510,759	279,683	160,263	50,894	615,145	.....	48,173	1,154,158	356,601	75,500	281,101	36,116
Louisiana Western	208	1,050,945	510,607	1,674,506	182,954	304,231	60,700	518,682	24,964	57,545	1,148,936	525,570	93,093	432,271	24,053
Louisville & Nashville	5,034	28,062,338	8,312,524	39,130,396	6,472,086	8,021,156	1,006,869	13,417,605	149,751	926,184	29,920,895	9,209,501	1,596,201	7,608,332	—2,487,909
Louisville, Henderson & St. Louis	200	696,904	295,163	1,060,128	218,332	144,762	48,035	361,815	.....	28,953	801,897	258,231	34,200	223,920	—6,365
Maine Central	1,219	5,392,204	2,581,818	8,576,633	1,214,321	1,314,091	98,078	3,250,587	49,378	244,963	6,170,543	2,406,090	465,763	1,940,171	50,911
Michigan Central	1,800	15,395,840	6,673,688	24,964,220	2,833,894	4,061,419	564,697	10,352,379	443,310	511,929	18,767,627	6,196,593	1,166,350	5,025,911	1,003,048
Midland Valley	380	704,982	314,499	1,085,681	210,762	188,195	18,756	361,604	.....	49,521	821,838	256,843	55,575	200,851	42,479
Minneapolis & St. Louis	1,646	5,918,013	1,479,061	7,825,868	877,439	1,114,677	161,839	3,036,723	470	186,444	5,377,592	2,448,276	340,144	2,108,132	187,494
Minn., St. Paul & Sault Ste. Marie	4,104	15,519,462	4,513,998	21,641,394	2,347,114	3,116,007	436,284	7,046,292	128,669	443,247	13,462,559	8,180,835	880,546	7,300,289	110,727
Missouri & North Arkansas	365	578,846	272,019	915,999	264,623	200,520	29,982	464,832	.....	51,576	1,011,532	—95,534	54,000	—149,989	—174,998
Missouri, Kansas & Texas System	3,865	17,565,465	6,274,382	25,633,076	3,378,964	3,375,304	498,762	9,301,545	775,067	103,287	17,456,385	8,176,691	990,484	7,181,367	1,577,702
Missouri, Oklahoma & Gulf	334	722,123	170,560	934,683	206,263	162,318	37,442	432,766	967	59,915	899,672	35,011	55,707	—21,229	—3,844
Missouri, Oklahoma & Gulf Ry. of Texas	19	96,604	2,600	101,488	14,127	21,074	1,964	41,431	.....	4,864	83,460	18,028	1,599	16,429	7,434
Missouri Pacific	3,920	16,273,865	3,571,982	21,633,861	2,750,835	4,129,592	529,356	8,506,646	67,749	528,658	16,512,836	5,121,026	887,310	4,221,323	1,475,493
Mobile & Ohio	1,122	6,786,979	951,966	8,217,523	823,775	1,420,307	361,088	3,162,195	23,616	259,546	6,050,526	2,166,996	283,732	1,882,079	—17,813
Monongahela	75	765,035	18,447	798,452	145,148	66,690	5,630	207,292	.....	18,342	443,102	355,440	14,838	340,602	—295,838
Morgan's La. & Tex. R. R. & S. S. Co	405	2,348,230	796,749	3,441,836	417,797	610,919	101,486	1,346,742	22,305	106,510	2,604,971	836,864	178,895	654,295	—45,836
Nashville, Chattanooga & St. Louis	1,231	5,642,140	1,929,924	8,284,652	1,131,870	1,672,109	408,285	3,367,083	83,057	268,001	6,930,191	1,354,461	242,491	1,110,847	—634,526
Nevada Northern	165	686,571	68,533	785,164	143,041	118,153	4,546	198,875	549	34,433	499,598	285,566	45,251	240,315	—341,874
New Orleans & North Eastern	204	1,973,921	406,793	2,626,600	274,951	552,009	87,247	943,688	52,176	105,253	2,015,324	611,276	131,990	479,286	—76,060
New Orleans Great Northern	283	865,749	213,940	1,188,948	154,825	185,706	23,995	364,851	1,635	57,323	788,335	400,613	26,444	374,038	—172,450
New Orleans, Mobile & Chicago	403	1,056,345	220,228	1,347,371	260,790	182,245	34,271	474,239	Cr.—39	61,668	1,013,174	334,197	56,667	277,328	—272,526
New Orleans, Texas & Mexico	286	921,796	177,688	1,157,655	238,953	148,576	35,354	469,490	.....	84,695	977,068	180,586	14,587	165,884	14,218
‡New York Central & Hudson River	5,982	23,836,615	9,633,550	39,012,342	4,055,350	8,761,573	719,019	14,597,341	613,519	1,047,623	29,794,426	9,217,916	2,428,335	6,786,889	.....
New York, Chicago & St. Louis	568	7,113,762	998,855	8,481,602	999,537	1,174,784	379,072	3,981,248	44,791	180,847	6,760,280	1,721,322	361,267	1,359,289	22,149
New York, New Haven & Hartford	2,003	22,410,331	20,079,481	47,755,574	5,647,248	7,227,859	317,920	18,310,267	437,214	1,195,875	33,122,658	14,636,915	1,969,000	12,662,084	1,714,597
New York, Ontario & Western	568	4,564,996	1,226,012	6,748,898	843,711	1,249,313	74,735	2,677,907	.....	140,392	4,986,058	1,762,840	178,824	1,583,983	101,419
New York, Philadelphia & Norfolk	112	2,143,365	368,756	2,743,183	265,028	558,262	39,329	1,216,617	41,429	90,239	2,211,004	532,179	87,300	444,648	36,049
New York, Susquehanna & Western	140	1,663,958	390,559	2,302,988	227,046	266,056	21,850	1,040,739	.....	48,475	1,603,062	699,926	44,479	643,832	149,592
Norfolk & Western	2,044	26,067,564	3,511,770	30,838,954	4,062,507	6,128,902	525,097	9,346,286	83,317	618,422	20,389,730	10,449,223	1,374,000	9,074,734	—80,952
Norfolk Southern	900	1,909,776	783,627	2,910,030	397,196	460,068	65,381	1,107,204	774	177,987	2,208,608	701,421	97,466	602,578	—213,833
Northern Pacific	6,497	33,896,504	10,311,666	48,502,928	5,983,809	6,122,386	839,861	14,674,305	711,933	825,408	28,270,364	20,232,564	3,554,041	16,676,015	—599,669
Northwestern Pacific	401	1,037,695	1,319,250	2,660,842	475,568	366,776	43,465	1,044,142	.....	73,609	1,969,525	691,317	144,197	546,998	118,651
Oahu Railway & Land Co	109	684,231	194,907	941,037	91,896	79,275	5,973	194,524	.....	38,523	410,191	530,846	64,674	466,172	27,172
Oregon Short Line	2,162	10,766,013	3,307,268	15,386,645	2,063,306	2,149,091	277,853	3,846,011	233,878	490,863	8,990,859	6,395,787	935,791	5,458,019	—948,205
Oregon-Washington R. R. & Nav. Co	1,995	7,524,743	3,248,991	11,807,990	1,316,212	1,444,923	348,014	3,938,993	109,432	511,905	7,605,404	4,202,586	857,663	3,343,573	144,078
Panhandle & Santa Fe	669	2,335,878	507,420	2,987,210	550,479	579,308	35,049	942,490	.....	77,381	2,184,707	802,502	80,866	720,516	436,754
Pennsylvania *Company*	1,757	28,068,507	7,284,476	39,386,180	5,719,252	7,521,077	685,832	14,874,431	319,106	1,006,176	30,125,873	9,260,307	2,358,806	6,899,184	—1,997,478
Pennsylvania *Railroad*	4,512	95,293,242	28,674,725	136,442,613	18,394,359	27,923,030	1,861,074	51,990,185	2,028,616	3,688,782	105,886,046	30,556,567	5,796,664	24,742,962	—1,128,377
Pere Marquette	2,317	9,390,925	3,048,213	13,575,453	1,200,694	2,654,595	288,704	5,370,120	41,550	383,983	9,936,432	3,639,021	376,861	3,260,446	—340,475
Philadelphia & Reading	1,119	27,872,824	4,882,553	34,456,078	3,165,073	6,362,601	410,917	12,480,846	146,234	633,589	23,189,171	11,266,907	900,499	10,361,974	—1,184,164
Philadelphia, Baltimore & Washington	717	7,261,730	6,145,329	14,945,823	2,296,493	2,880,268	247,445	6,480,437	156	411,326	12,316,125	2,629,699	511,430	2,117,308	252,007
Pittsburgh & Lake Erie	223	8,861,706	1,217,000	10,533,797	1,353,774	2,383,466	127,674	2,940,602	29,999	250,364	7,085,880	3,447,917	459,096	2,988,695	—1,834,674
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	19,218,085	6,009,924	28,738,819	3,649,549	5,693,375	589,990	10,886,711	218,311	712,960	21,751,096	6,987,722	1,457,744	5,528,039	151,137
Pittsburgh, Shawmut & Northern	294	1,298,359	94,550	1,411,342	249,270	382,413	14,832	470,121	.....	36,781	1,153,418	257,925	14,624	243,300	—4,949
Port Reading	21	944,954	.....	1,147,232	99,634	72,653	348	391,679	.....	3,162	567,474	579,759	108,000	471,759	40,088
Richmond, Fredericksburg & Potomac	88	1,048,456	733,714	2,065,366	188,189	273,228	30,883	778,952	40,306	64,602	1,376,160	689,206	62,926	626,121	22,957
Rutland	468	1,411,344	854,061	2,578,478	314,899	445,645	74,727	1,028,533	10,483	52,318	1,926,605	651,873	153,858	498,015	—18,862
St. Joseph & Grand Island	258	842,204	225,131	1,151,125	193,254	177,516	42,665	431,168	.....	47,000	891,504	259,622	72,403	187,121	55,877
St. Louis & San Francisco	4,749	21,381,017	7,705,889	31,121,610	4,154,845	4,899,653	592,073	10,469,998	.....	819,250	20,915,859	10,205,751	930,121	9,260,918	655,373
St. Louis, Brownsville & Mexico	548	1,001,606	546,592	1,698,996	308,875	188,850	48,482	633,241	.....	97,116	1,267,544	431,453	56,923	374,133	22,087
St. Louis, Iron Mountain & Southern	3,364	17,269,933	3,984,484	23,018,789	3,282,873	4,152,611	531,467	7,304,993	73,721	572,771	15,918,436	7,100,353	1,011,288	6,075,860	—2,291,984
St. Louis Merchants' Bridge Terminal	9	.....	1,604	1,398,170	172,937	67,887	6,986	707,274	.....	57,849	1,012,933	385,236	63,569	321,657	130,428
St. Louis, San Francisco & Texas	235	617,316	231,837	908,610	218,231	156,621	20,542	429,140	.....	40,900	865,434	43,177	11,261	31,886	—166,604
St. Louis Southwestern	943	4,144,850	900,450	5,350,712	642,621	929,583	231,560	1,529,458	29,241	237,875	3,596,948	1,753,765	291,401	1,461,463	803,465
St. Louis Southwestern of Texas	811	1,975,237	703,309	2,904,791	687,042	719,501	108,961	1,396,267	7,120	160,921	3,021,762	—116,971	132,153	—250,032	—167,431
San Antonio & Aransas Pass	724	1,995,299	802,712	2,991,295	615,639	562,012	59,200	1,431,485	.....	105,267	2,773,303	217,992	114,232	102,949	—451,528

†Road reorganized July 8, 1914. No cumulative figures shown.

‡Road reorganized January 1, 1915. Figures shown here are for three months ending March 31, 1915.

REVENUES AND EXPENSES OF RAILWAYS

Nine Months of Fiscal Year Ending June 30, 1915—Continued

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Operating revenues: Passenger.	Operating revenues: Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Operating expenses: Maintenance: Of equipment.	Operating expenses: Traffic.	Operating expenses: Trans-portation.	Operating expenses: Miscel-laneous.	Operating expenses: General.	Operating expenses: Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
San Pedro, Los Angeles & Salt Lake	1,132	$4,392,678	$1,829,937	$6,858,518	$679,758	$1,063,654	$293,614	$2,278,663	$132,083	$164,032	$4,610,805	$2,247,713	$380,583	$1,866,613	—$139,577
Seaboard	3,101	10,695,227	3,472,663	15,918,218	1,860,241	2,399,754	578,127	5,889,773	87,694	496,480	11,309,811	4,608,407	804,165	3,796,976	—1,391,311
Southern	7,035	30,626,658	12,536,612	47,326,234	6,550,820	8,487,207	1,625,554	17,439,710	298,979	1,521,091	35,751,114	11,575,120	1,938,616	9,622,941	—3,762,929
Southern in Mississippi	281	475,691	245,775	790,655	200,650	79,932	22,256	361,546	....	33,370	697,753	92,902	76,032	16,756	—135,997
Southern Pacific	6,517	44,042,367	20,613,982	71,986,873	7,207,206	10,477,905	1,458,647	23,180,988	1,215,890	2,063.837	45,387,748	26,599,124	3,598,849	22,975,409	—2,032,168
Spokane International	163	423,469	135,494	577,909	98,020	42,602	20,233	191,723	33	32,002	384,613	193,296	39,289	153,880	—140,992
Spokane, Portland & Seattle	556	2,032,596	1,078,364	3,423,056	475,634	319,975	68,482	796,008	30,335	120,924	1,811,167	1,611,889	480,600	1,129,597	—100,263
Tennessee Central	294	751,901	288,870	1,111,431	265,847	150,031	49,272	445,351	....	60,625	970,988	140,444	40,272	100,047	—189,056
Terminal R. R Ass'n of St. Louis	35	....	1,650	2,049,261	166,410	114,531	8,293	715,685	....	48,314	1,053,233	996,028	257,836	738,192	234,971
Texas & New Orleans	469	1,867,150	794,365	2,958,279	480,970	735,446	71,018	1,222,602	80,544	95,606	2,685,323	272,956	143,129	128,188	—81,034
Texas & Pacific	1,887	9,704,523	3,179,408	13,982,860	1,422,290	2,149,449	330,761	5,920,207	128,683	348,492	10,289,788	3,693,072	627,436	3,061,914	—157,744
Toledo & Ohio Central	446	3,160,517	460,543	3,849,305	577,897	753,897	71,851	1,476,455	15,756	89,383	2,985,240	864,065	200,355	661,934	7,964
Toledo, Peoria & Western	248	524,736	338,663	918,942	144,607	244,104	22,066	401,427	....	32,540	844,743	74,199	54,900	19,291	25,239
Toledo, St. Louis & Western	451	2,991,689	247,498	3,480,272	412,201	524,104	149,238	1,365,058	....	75,254	2,525,855	954,417	208,980	745,437	—201,291
Trinity & Brazos Valley	332	620,627	148,321	828,579	183,071	98,436	27,325	395,209	....	72,859	776,899	51,680	39,305	12,062	41,158
Ulster & Delaware	129	370,242	259,751	759,127	118,372	153,785	13,139	363,121	536	32,553	681,506	77,621	29,700	47,217	—71,151
Union Pacific	3,616	27,901,027	7,415,340	39,558,190	4,488,505	5,619,092	862,184	10,080,031	631,702	1,100,926	22,766,861	16,791,329	1,778,831	15,008,295	—377,576
Union R. R. of Baltimore	9	1,005,883	190,490	1,212,436	121,713	....	....	41,538	....	22,173	185,424	1,027,012	51,648	975,364	5,610
Union R. R. of Pennsylvania	31	....	....	2,461,079	364,114	846,159	1,013	1,128,213	....	30,374	2,369,873	91,206	30,073	61,133	—232,112
Vandalia	910	5,671,785	1,794,803	8,394,303	1,108,992	1,680,454	212,533	3,310,272	86,052	195,995	6,594,298	1,800,005	291,729	1,508,117	—283,460
Vicksburg, Shreveport & Pacific	171	580.020	339,634	1,036,594	189,036	245,020	32,012	410,425	20,458	45,392	942,343	94,251	64,307	29,943	—242,083
Virginia & Southwestern	240	1,224,288	122,010	1,385,986	238,197	326,442	21,493	408,251	....	34,391	1,028,774	357,211	59,566	297,646	—80,470
Virginian	503	3,757,658	293,242	4,324,470	549,814	767,080	48,295	1,006,032	88,737	100,137	2,538,303	1,786,166	192,500	1,593,425	—398,763
Wabash	2,518	15,388,379	4,686,518	22,055,032	2,470,848	4,037,959	773,220	9,115,220	127,935	550.023	17,056,673	4,998,360	729,118	4,266,942	192,892
Washington Southern	36	309,290	359,991	911,618	110,834	135,269	11,972	374,459	17,221	27,140	676,896	234,722	29,462	205,099	—19,559
West Jersey & Seashore	356	1,380,130	3.092,838	4,919,599	824,711	770,791	115,884	2,142,365	24,460	121,891	4,000,102	919,497	257,365	661,851	103,194
Western Maryland	661	5,185,136	726,832	6,207,467	888,725	1,058,135	197,838	2,294,174	19,306	172,369	4,624,697	1,582,770	225,500	1,357,270	1,054,168
Western Pacific	943	3,034,201	865,767	4,149,904	867,673	547,542	219,934	1,401,314	97,178	186,749	3,320,390	829,514	256,664	571,545	29,766
Western Ry. of Alabama	133	528,535	327,406	948,468	172,119	225,795	52,562	290,297	13,906	41,144	795,524	152,945	48,843	103,542	—160,728
Wheeling & Lake Erie	459	3,134,334	427,298	3,929,065	427,379	771,234	83,490	1,559,576	11,443	132,441	2,985,573	943,492	282,407	661,084	—1,041,728
Yazoo & Mississippi Valley	1,382	6,811,216	1,723,017	9,022,097	1,335,114	1,260,081	153,410	3,363,004	15,673	217,984	6,337,233	2,684,864	456,000	2,227,129	—660,374

Traffic News

The House public utility committee of the Illinois legislature has recommended for passage a bill permitting newspapers to exchange advertising for railroad transportation. The bill has already been passed by the senate.

The Boston & Maine announces a new local passenger tariff, between stations in Massachusetts, to go into effect June 1. The changes made include both increases and decreases. The increases are between points where the traffic is heavy and the decreases in thinly settled territory.

It is announced that the steamer James S. Whitney, of the Eastern Steamship Corporation, will this week make a trip through the Cape Cod Canal, with a view to "demonstrating" that by this route it is possible to shorten the journey between New York and Boston about four hours, as compared with sailing around the Cape.

A Suggestion to the Interstate Commerce Commission

W. H. Forsyth, second vice-president of the Curtain Supply Company, Chicago, has written a letter to Commissioner W. M. Daniels, of the Interstate Commerce Commission, who presided over the hearings in the western freight rate advance case in Chicago, suggesting that the commission "broadly authorize a universal increase in railroad rates of this country on existing tariffs, with a distinct proviso that the money derived by the railroads from this increase should be promptly and only expended for necessary renewals, replacements and improvements." Mr. Forsyth says that generally speaking the public wants service, and no one who has the welfare of the country at heart can find serious objection to a reasonable increase in rates provided such increase is spent for the upbuilding of railroad property, and that no industry could legitimately complain, providing the same proportional increase is made on the products of all its competitors. During the continuance of this increased rate, he says, "no additional rate of dividends should be paid from any moneys derived under this authority, but all should go to the actual benefit of the property," although "certain railroads whose working capital might be depleted, could perhaps be permitted to retain a reasonable amount for this purpose."

Educating the Public to Buy Tickets

T. J. Foley, general manager of the Illinois Central, has issued a pamphlet addressed to the people of Mississippi for the purpose of explaining the aims and desires of the management of the road in the matter of educating the traveling public to purchase tickets instead of paying cash fares on trains, and presenting arguments in favor of the plan of imposing a small penalty upon those who carelessly or negligently fail to buy tickets. It is stated that on the Yazoo & Mississippi Valley, particularly where stations are close together, it is often necessary to check the speed of a train and disarrange the schedule in order that the conductor may be enabled to collect the cash fares from passengers between stations.

"Please let it be thoroughly understood," Mr. Foley says, "that we do not want the extra ten cents and should be greatly pleased if it never became necessary to collect it, that is, if passengers in every instance would purchase tickets and thus relieve the company of the unpleasant duty of reminding them of their failure to do so." The practice of imposing a penalty, he says, has been fully justified and approved by the courts as well as by the Interstate Commerce Commission. In spite of this fact, the Railroad Commission of Mississippi on March 2, 1915, fined the Illinois Central $500 on the theory that it had violated an order of the commission limiting the charge for carrying passengers to three cents a mile. It is pointed out that in other states in which the company's lines are located the rule for collecting a 10-cent penalty is in full effect and working without any friction whatever. In conclusion Mr. Foley says, "We submit our case to you confident that we shall feel the force and effect of your decision, whatever it may be."

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has suspended until September 12 tariffs of the Erie and other roads, containing proposed advances in rates on sugar beets from points between Buffalo and Chicago to Decatur, Ind.

Rates on Scrap Iron from Gulf Ports

Opinion by Commissioner Clark:

The commission finds that the carriers have justified proposed increased rates and minimum carload weights on scrap steel and iron, from a broad territory east of the Mississippi and south of the Ohio rivers, which may be described generally as the Mississippi valley, and from certain gulf ports, including Mobile, Ala., and New Orleans, La., to St. Louis, Mo., Ohio river crossings, and points beyond. (33 I. C. C., 668.)

Ore Rates in Northern Michigan

Newport Mining Company v. Chicago & North Western. Opinion by Commissioner McChord:

Prior to January, 1913, the carriers serving mines in the northern peninsula of Michigan maintained a rate on iron ore of 40 cents per gross ton from all mines in the peninsula to the hold of vessel at nearest port, either Ashland or Escanaba except that from the mines between Ishpeming and Marquette the rate was 25 cents, and west thereof the rate was 30 cents to Marquette. In January, 1913, they filed tariffs continuing the former rate, but limited the service to originating the ore and hauling it to the dockyard only. For the dock service formerly included in the rate they made an additional charge of 5 cents a ton.

The commission finds that the effect of this charge is to increase the rate and that the carriers must justify the increased total charges.

After due consideration of the comparative ton-mile earnings and a study of the figures submitted by the carriers as to the costs of the dock, assembling and line-haul services it finds that the increased rates are justified. The rate is a blanket rate applicable via the lines of carriers of different financial condition. While the position of the North Western appears to be favorable, and while it appears from the record that its revenues meet all its operating needs and more, yet the situation with respect to the St. Paul, the Soo and the South Shore, is far less satisfactory. The reasonableness of a rate in a locality served by several carriers will not be determined alone by consideration of that line most favorably situated with respect to operations, traffic, and earnings, and conversely this is equally true, namely, that consideration of the line of poorest traffic, earnings, etc., will not control. (33 I. C. C., 645.)

Rates to Intermountain Territory

The commission has disapproved plans submitted by the transcontinental railroads for constructing rates to points east of Pacific coast terminals and in the inter-mountain country—the so-called back-haul rates.

The commission, however, has authorized the railroads to construct rates to the back-haul points by adding to the terminal rates not more than 75 per cent of the local rates from the nearest terminal to destination, or by adding arbitraries to the terminal rates, varying with the distance from the ports. The arbitraries are to be not more than 75 per cent of the local rates.

The carriers have also been authorized to extend terminal rates to these Pacific coast points: San Diego, San Pedro, East San Pedro, Wilmington, East Wilmington, San Francisco and Oakland, Cal.; Astoria and Portland, Ore.; Vancouver, Bellingham, South Bellingham, Everett, Tacoma, Seattle, Aberdeen, Hoquiam and Cosmopolis, Wash.

The commission has modified existing orders so as to permit maximum less than carload rates from the Missouri river to intermediate points on first and second-class of $1.72 per 100 lb., when lower rates are applicable to coast terminals.

Announcing that it has considered the influence of the Panama canal, the commission says: "We should authorize a certain degree of relief from the requirements of the long and short haul clause on this traffic to enable these carriers to more effectively compete with the water lines, but the rail carriers cannot expect, and the commisison should not authorize, such a degree of relief as will secure to the rail lines the same percentage of the traffic to the terminals as they enjoyed prior to the opening of the canal. They can secure a portion of the traffic to the terminals on the commodities by the establishment of the rates proposed, and such rates will afford some revenue in excess of the out-of-pocket cost involved.

"The carriers should, within reasonable limits, be authorized to make such rates to intermediate points in the so-called back-haul territory as will induce the direct movement of freight to such points from the territories served by these lines. The proportion of the freight hauled directly by the rail lines to the various destinations in the back-haul territory should be greater than the proportion hauled to the terminals and should increase as distance from the coast of terminals increases. The rates to all coast terminal points being practically the same, and the situations at intermediate points being substantially similar via all lines, the same method of constructing rates to intermediate points should be followed by all lines."

STATE COMMISSIONS

The New York State Public Service Commission, Second district, announces that it has awarded reparation in the case of A. R. Piper vs. New York Central on a shipment from Katonah consigned to Brooklyn, Bush docks. It was misrouted to Wallabout basin, involving extra cartage expense, admitted by the carrier. Amount of reparation 50 cents.

W. M. Busby, general counsel for the Public Service Commission of Missouri, has filed a brief with the state supreme court in which he takes the ground that the commission has no authority to increase maximum railroad rates fixed by statute. The brief was filed in a case in which the Kansas City Southern appealed from a decision of the commission denying authority to increase demurrage rates. The application of the road for authority to increase the rates fixed by statute was based on a decision rendered last year by the court in the case of the Missouri Southern, that the act creating the new public service commission gave the commission authority to fix rates independent of the statutory rates.

PERSONNEL OF COMMISSIONS

Daniel S. Hooker, formerly locating and construction engineer for the Colorado & Southern, has been appointed civil engineer of the Public Utilities Commission of Colorado.

H. H. Sanborn and A. B. Roehl have resigned as rate expert and assistant rate expert, respectively, of the Railroad Commission of California to engage in the practice of law.

A. L. Moler has been appointed senior inspector of motive power for the eastern district, in the division of valuation, Interstate Commerce Commission, with headquarters at Washington, D. C.

The governor of Pennsylvania has nominated for membership on the Public Service Commission the following: Samuel W. Pennypacker, chairman, and Milton J. Brecht, to succeed themselves; W. A. Magee of Pittsburgh; Congressman E. R. Kiess of Hughesville; W. D. B. Ainey of Montrose; John Monaghan of Philadelphia; John S. Rilling of Erie.

COURT NEWS

Bondholders of the Pere Marquette filed suit in the United States district court at Detroit, Mich., last week to have the Michigan two-cents-a-mile passenger fare law declared unconstitutional, on the ground that it is confiscatory of the railroad property.

Thirty Texas roads have filed suit in the district court at Austin, Tex., to set aside an order of the Texas Railroad Commission made on February 13, prohibiting the railroads from inserting in their bills of lading stipulations requiring notice of claims for damages or loss of freight to be filed within six

months. The petition says in part: "Correct business principles require a prompt presentation of freight claims. Under the application of such principles as generally observed in practice by the business world in this state, legitimate claims of all kinds are presented without unreasonable delay. A delay in the presentation of claims works to the advantage of dishonest claimants, facilitates the collection of fraudulent claims, and mulcts the railroads in damages for which they are not legally liable and which in reason they ought not to have to pay."

Liability for Servants' Acts

A passenger who had been ejected from a train by two special policemen employed by the railroad, brought an action against the company and the two policemen. The jury returned a verdict in favor of the policemen and against the company. It was held by the Iowa Supreme Court error to enter a judgment against the company, since it was liable only under the rule of *respondeat superior* for the wrongful acts of its servants, and, if they were not guilty of wrong, the company could not be.—Hobbs *v.* Illinois Central (Iowa) 152 N. W., 40.

Train Despatchers Working Twelve Hours a Day

A railroad company is held not to be relieved from liability for violation of section 2 of the hours of service act by requiring a train despatcher in a night and day office to remain on duty for more than 9 hours in each 24-hour period, by the fact that during a part of such time he is employed otherwise than as train despatcher.—Delano *v.* United States, C. C. A., 220 Fed., 635. A railroad company had on duty at a day and night office three operators, each of whom worked 8 hours a day. One was suddenly taken ill, and no other operator could be obtained. As soon as possible, which was next day, the chief despatcher sent a relief man, but the train on which he was traveling was wrecked, and he was ordered to establish an office at the wreck. This caused further delay, in consequence of which the two remaining operators each worked 12 hours a day for 4 or 5 consecutive days. It is held that the extended time during the first three days was permissible under section 2, and the further delay was due to a casualty which, under section 3, rendered the act inapplicable, and the company was not chargeable with its violation.—San Pedro, L. A. & S. L. *v.* United States, C. C. A. 220 Fed., 737.

Empty Car, Standing, is An Instrument of Interstate Commerce

The Pennsylvania Supreme Court holds that where a freight car consigned with merchandise from a point without the state to a destination within the state, after being unloaded at a freight yard is shifted to another yard to await reloading, and is stored there for a few days, and then loaded and shipped to another point without the state, it does not cease to be used in interstate traffic during the brief period of its unemployment; and the railroad company is liable for injuries to an employee in the shifting of the car from yard to yard, due to the company's failure to equip the car with an automatic coupler as required by law. Moyer *v.* Pennsylvania (Pa.) 93 Atl. 574. In an action for injuries to a brakeman the Indiana Supreme Court holds that a railroad laborer, working on a track which was to be used for both interstate and intrastate traffic, but over which interstate trains had never been run, is not engaged in interstate commerce within the federal employers' liability act.—Chicago & E. *v.* Steele (Ind.) 108 N. E. 4. In an action under the federal employers' liability act for the death of an engineman by falling into a roundhouse pit, it was held by the South Carolina Supreme Court that the plaintiff could not recover if the engineer went into the roundhouse for purposes of his own, or if there was a failure of evidence from which it could be inferred that he went there for the purposes of his employment; since the plaintiff must show that the deceased was engaged in interstate commerce at the time of his death. The court held that the jury was warranted in finding that the deceased went into the roundhouse to inspect his engine some time before taking it out on his run (although there was no rule of the company requiring him to do so), and that he was engaged in interstate commerce. Justices Hydrick and Gage dissented, being of opinion that the engineer went into the roundhouse on his own business, out of the hours, against the rules and practice of the railroad, and to unwarrantably sleep in his engine.—Padgett *v.* Seaboard Air Line (S. Car.) 83 S. E. 633.

Railway Officers

Executive, Financial, Legal and Accounting

D. F. Mustard, cashier of the Central Indiana, has been elected treasurer, with office at Anderson, Ind., and the office of cashier is abolished.

S. S. Russell, superintendent of the Central Vermont, at St. Albans, Vt., has been appointed special agent of the auditing department, with office at St. Albans.

E. M. Devereux, assistant treasurer of the Baltimore & Ohio at New York, has been appointed senior assistant treasurer, with headquarters at New York, succeeding Charles W. Rhodes, deceased, and T. H. Schultz, cashier in the general offices at Baltimore, Md., has been promoted to junior assistant treasurer, with office at Baltimore.

F. P. Gutelius, general manager of the Canadian government railways, announces that the jurisdiction of the heads of departments has been extended over the National Transcontinental from Moncton, N. B., to Winnipeg, Man., and the Lake Superior branch of the Grand Trunk Pacific from Fort William, Ont., to Superior Junction, Ont. The operation of these lines was taken over by the government May 1.

Operating

W. S. Hanley, chief engineer of the New Orleans Great Northern, has been appointed superintendent, with headquarters at Bogalusa, La.

C. M. Staples has been appointed assistant superintendent of the Houston & Texas Central, at Ennis, Tex., succeding C. M. Moursund, resigned.

J. D. Booth has been appointed acting superintendent of the Missouri, Oklahoma & Gulf, with headquarters at Muskogee, Okla., succeeding E. B. Fisher, resigned.

A. C. Showalter has been appointed assistant superintendent of the Buffalo division of the New York, Chicago & St. Louis, with headquarters at Conneaut, Ohio, succeeding C. L. Titus, resigned.

E. A. Dewey has been appointed trainmaster of the Missouri, Oklahoma & Gulf, with office at Muskogee, Okla., succeeding Harry Coughlin, resigned. Mr. Dewey was formerly with the Texas & Pacific.

J. E. Spaulding, trainmaster of the Central Indiana at Anderson, Ind., has been appointed superintendent. The office of trainmaster is discontinued and the superintendent will assume the duties of that office.

J. A. Blair has been appointed superintendent of dining cars of the Spokane, Portland & Seattle, the Oregon Trunk, the Oregon Electric, the United Railways and the Spokane & Inland Empire, with headquarters at Portland, Ore.

The jurisdiction of W. C. C. Mehan, general superintendent of the Grand Trunk Pacific lines west of Prince George, with headquarters at Prince Rupert, B. C., has been extended to include the territory between Prince George and Edmonton, Alta.

A. B. White, assistant superintendent of the Buffalo, Rochester & Pittsburgh at Punxsutawney, Pa., has been promoted to superintendent of the Middle and Pittsburgh divisions, with headquarters at Du Bois, vice P. Fraser, deceased, and R. L. Moore succeeds Mr. White.

J. E. Maun, acting assistant superintendent of the Central Vermont at Montpelier, Vt., has been appointed superintendent of the northern division, with office at St. Albans, Vt., vice S. S. Russell, assigned to other duties, and G. W. Groom, chief despatcher, at St. Albans, has been appointed assistant to superintendent and chief despatcher, with office at St. Albans.

J. Flynn, assistant superintendent of the Third division of the Denver & Rio Grande, has been appointed assistant superintendent of the Second division, with headquarters at Salida, Colo., vice D. E. Wilcox, transferred, and the office of assistant superintend-

ent of the Third division has been abolished. E. E. Eichar has been appointed trainmaster of the Third division, with headquarters at Gunnison, Colo.

A. Kilpatrick, superintendent of the Grand Trunk Pacific at Edson, Alta., has been transferred to the Lake Superior division, with headquarters at Fort William, Ont., succeeding A. A. Tisdale, who has been granted a temporary leave of absence. J. P. Kirkpatrick has been appointed acting superintendent, with jurisdiction between Edmonton and Prince George and all intersecting branch lines, with office at Edson, Alta. The jurisdiction of H. McCall, superintendent at Melville, Sask., has been extended to include the Regina division, on account of Mr. Kirkpatrick's transfer to Edson.

F. P. Brady, general superintendent of the Intercolonial Railway and the Prince Edward Island Railway, at Moncton, N. B., has been appointed general superintendent of the National Transcontinental between Quebec and Winnipeg, and the Lake Superior branch of the Grand Trunk Pacific between Fort William and Superior Junction, with headquarters at Cochrane, Ont. J. K. McNeillie, superintendent of the Canadian Pacific at Montreal, Que., has been appointed general superintendent of the Intercolonial, the Prince Edward Island and the National Transcontinental east of Quebec, with headquarters at Moncton, N. B. A. J. Gorrie has been appointed superintendent, and J. J. McManus has been appointed assistant superintendent of the National Transcontinental, district No. 1, Quebec to O'Brien, with headquarters at Quebec. W. B. Way has been appointed superintendent, and H. A. Ryan has been appointed assistant superintendent of district No. 2, O'Brien to Armstrong, excluding O'Brien, with headquarters at Cochrane, Ont., and R. S. Richardson, assistant superintendent at Moncton, N. B., has been appointed superintendent of district No. 3, Armstrong to Winnipeg, excluding Armstrong, and Superior Junction to Fort William, with headquarters at Winnipeg, Man.

Traffic

George F. DeMurray has been appointed general agent of the Chicago, Burlington & Quincy, with office at Sterling, Ill., succeeding L. C. Thorne, resigned.

Engineering and Rolling Stock

The jurisdiction of S. J. Hungerford, superintendent of rolling stock, western lines of the Canadian Northern, at Winnipeg, Man., has been extended over the eastern lines.

John J. Desmond has been appointed roadmaster of the Mississippi division of the Illinois Central, with headquarters at Water Valley, Miss., succeeding R. L. Hazlegrove, transferred.

C. E. Brooks, general foreman at the Transcona, Man., shops of the Grand Trunk Pacific, has been appointed acting superintendent of motive power, with headquarters at Transcona, succeeding Joseph Billingham, resigned.

Purchasing

Walter R. Owen, assistant purchasing agent of the Chicago, Rock Island & Pacific at Chicago, has been appointed assistant general purchasing agent, with headquarters at Chicago.

OBITUARY

Edward Harding Barnes, chief engineer of the Grand Rapids & Indiana, at Grand Rapids, Mich., died on May 15, at his home in that city.

General Thomas H. Hubbard, chairman of the executive committee of the Toledo, St. Louis & Western and a director of the Wabash, the Western Union Telegraph Company and the Southern Pacific, died at his home in New York on Wednesday, May 19. Thomas Hamlin Hubbard was born at Hallowell, Me., on December 20, 1838. He graduated from Bowdoin College and served with distinction in the civil war. He was a vice-president and director of the Southern Pacific from 1896 to 1900.

RAILWAY BRIDGE DESTROYED BY CRUISER.—The French Ministry of Marine has reported that on April 15 a French cruiser destroyed a railway bridge connecting the town of Acre with the interior railway system of Syria.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CHICAGO GREAT WESTERN is asking bids on 5 Mikado type locomotives, in addition to the 5 switching engines reported in the *Railway Age Gazette* of May 7.

THE PENNSYLVANIA LINES WEST have ordered 25 Consolidation type locomotives from the Lima Locomotive Corporation, and 25 Mikado type locomotives from the Baldwin Locomotive Works.

THE GLEN ROSE & WALNUT SPRINGS, Walnut Springs, Tex., is inquiring through the Railroad Construction Company, 80 Fifth avenue, New York, for prices on 4 65-ton Mogul type locomotives.

CAR BUILDING

THE COAL & COKE is building 100 coal cars in its shops at Gassaway, W. Va.

THE NEVADA NORTHERN is reported to be in the market for 100 dump cars. This item has not been confirmed.

THE GLEN ROSE & WALNUT SPRINGS is inquiring for prices on 10 passenger and 100 freight cars. See also item under Locomotive Building.

THE LEHIGH VALLEY has ordered 1,000 center constructions from the Standard Steel Car Company, and is said to have an option on another 1,000.

THE CHICAGO, ROCK ISLAND & PACIFIC, reported in the *Railway Age Gazette* of last week as inquiring for 5,000 40-ton all-steel box cars, is not inquiring for all-steel box cars, but rather for box cars with steel frames and single wooden sheathing.

THE PENNSYLVANIA LINES have placed orders for 16,145 freight cars as follows: American Car & Foundry Co., 3,443, including 100 refrigerator cars for the Lines West and 224 refrigerator, 1,719 hopper, 1,000 gondola and 400 box cars for the Lines East; Pressed Steel Car Company, 2,800, including 1,500 gondola and 500 hopper cars for Lines West and 500 gondola and 300 box cars for the Lines East; Standard Steel Car Company, 1,000 hopper cars, including 800 for the Lines West and 200 for the Lines East; Ralston Steel Car Company, 1,000 hopper cars for the Lines West; Cambria Steel Company, 3,300, including 3,000 hopper cars and 300 box cars for the Lines East; Haskell & Barker Car Company, 2,500 box cars for the Lines West, and the Altoona shops, 1,000 box, 1,000 gondola and 102 flat cars for the Lines East. The order is thus divided, 6,400 for the Lines West and 9,745 for the Lines East.

THE RUSSIAN GOVERNMENT, reported in the *Railway Age Gazette* of last week as having ordered 2,000 steel underframe box cars from the Eastern Car Company, and 2,000 cars from the Canadian Car & Foundry Company, has now placed orders, including the Pressed Steel Car Company's order which, however, may be still under negotiation, for a total of 22,000 cars, as follows: Pressed Steel Car Company, 7,000; Seattle Car & Foundry Company, 7,000; Eastern Car Company, New Glasgow, N. S., 2,000; Nova Scotia Car Company, Halifax, N. S., 2,000; American Car & Foundry Company, 2,000, and Canadian Car & Foundry Company, 2,000. The unconfirmed report in last week's issue to the effect that the Pullman Company had received an order for 8,000 cars is thus shown to be incorrect. All of the cars except those ordered from the Seattle Car & Foundry Company will have two trucks; those ordered from the Seattle company will be four-wheel cars.

IRON AND STEEL

THE NORFOLK & WESTERN has ordered 1,000 tons of rails from the Cambria Steel Company, and 1,000 tons from another company.

THE MISSOURI, KANSAS & TEXAS has ordered 2,368 tons of steel for through truss spans and deck plate girder spans from the Wisconsin Bridge & Iron Company.

Supply Trade News

The American Locomotive Company will soon reopen its Providence plant for the manufacture of shrapnel parts.

D. S. Woods, formerly Philadelphia salesman for Niles-Bement-Pond Company, Inc., has been transferred to New York.

The Corliss Carbon Company, Bradford, Pa., manufacturing motor and generator brushes, has moved its New York office and stock room to the Engineering building, 114 Liberty street.

The U. S. Metal & Manufacturing Company, New York, has been appointed eastern sales agent for the Union Fibre Company, Winona, Minn., makers of Linofelt for refrigerator and Feltlino for steel cars.

F. K. Irvin, formerly with the New York, New Haven & Hartford, has become connected with the Chicago office of the Niles-Bement-Pond Company. He will look after the railroad machine tool business in that territory.

The Standard Brake Shoe & Foundry Company, Pine Bluff, Ark., a new firm has taken over the Dilley Foundry Company, and will start work at once on the construction of a new $40,000 plant, including an open-hearth steel foundry.

The Ballman-Witten Manufacturing Company, 5407 Easton avenue, St. Louis, Mo., has been incorporated with $100,000 capital stock to manufacture piston rings. Lathes and boring machines will be installed. E. C. Ballman is president.

Charles William Sherburne, whose death was announced in these columns last week, was the founder of the railway supply firm of Sherburne & Co., Boston, Mass., and had been at its head for about 50 years. Mr. Sherburne was born in Boston on October 13, 1839. He was for a time employed on the Vermont & Canada, now a part of the Central Vermont, but soon returned to Boston to engage in the railway supply business, under the name of Sherburne & Co. Mr. Sherburne was a very active man, and until within a few years, he was president of the Armstrong Transfer Express Company, president of the Star Brass Manufacturing Company, a director of the Armstrong Dining & News Company, and treasurer of the New England Railroad Club. His death, in Boston, Mass., on May 6, followed an illness of three years.

C. W. Sherburne

H. E. Preston, formerly with the American Can Company, and prior to that with the Felt & Tarrant Manufacturing Company, Chicago, has joined the periodograph sales force of the Gisholt Machine Company, Madison, Wis., and will have headquarters at the company's Chicago office.

The Pittsburgh plant of the American Locomotive Company, which has been virtually idle for two years, is being overhauled and plans are being made for a complete resumption of work. It is understood that the plant has an order to repair 50 locomotives for the Seaboard Air Line.

Laurence Hamill, for some time district agent for the Buda Company, Chicago, and W. B. Hickox, formerly in charge of sales of the Adams Bagnall Electric Company, Cleveland, Ohio, have formed the Hamill-Hickox Company, with offices in the Hickox building, Cleveland. The new company will act as direct representatives in Ohio and surrounding territory for railway supplies, and will continue to handle the Buda Company account and several others.

E. L. Myers, until recently with the Chicago Great Western, has been appointed by the Willard Storage Battery Company, Cleveland, Ohio, to take charge of the company's railway sales in the southwest. Mr. Myers began in 1888 as division lineman and construction foreman for the Western Union and the Santa Fe in California. From 1901 to 1909 he was construction foreman and general foreman on the Mexican Central, and from 1909 to 1913 he was chief electrician in charge of all electrical work on the National Railways of Mexico.

W. L. Clark, formerly vice-president of Niles-Bement-Pond Company, Inc., and for the past few months connected with the purchasing department of J. P. Morgan & Co., has recently left the latter to become connected with the Westinghouse Electric & Manufacturing Company. Mr. Clark is to be manager in charge of operations at the plants of the J. Stevens Arms & Tool Company, Chicopee Falls, Mass., and the Stevens-Duryea Company, Chicopee Falls and East Springfield, which the Westinghouse company has acquired to enable it to fill the large order for rifles which it has recently secured.

William Sterling Hodges, of the Baldwin Locomotive Works, with his wife and two sons, was lost in the sinking of the Lusitania. Mr. Hodges was born in Philadelphia on March 1, 1882, and was a graduate of the Central Manual Training School. He entered the drafting department of the Baldwin Locomotive Works on December 18, 1899. In July, 1912, he went to China as technical representative. He remained there about two years, returning in the summer of 1914. In September, 1914, he went to Russia and remained there until the middle of December. Early in January, 1915, he was assigned to duty as technical representative or agent in Paris. He went there with the intention of returning in April to take his family back with him to France. He returned to this country on the Lusitania when that vessel made her last trip westbound, and a week later, with his family, sailed on the same ship. Mr. Hodges showed great capability as a designer in locomotive construction. He patented a number of devices, the best known of which is the trailing truck bearing his name.

W. S. Hodges

TRADE PUBLICATIONS

Paint.—The Paint Products Company, Chicago, has issued a booklet describing the "Cobar" process of manufacturing paints and paint oils.

Tank Calibration Curves.—The Universal Iron & Supply Company, St. Louis, Mo., manufacturers of tanks, has issued a leaflet containing a calibration curve for horizontal, cylindrical tanks of any dimension. A copy of this curve will be sent to anyone on application.

Arch Tube Cleaners.—The Lagonda Manufacturing Company, Springfield, Ohio, has just issued a 12-page catalog entitled Lagonda Locomotive Arch Tube Cleaners. This catalog deals with the subject of scale removal from arch tubes in locomotive fireboxes and describes cleaners specially designed for this purpose. Copy will be sent on request.

Hydraulic Pumps and Valves.—This is the subject of a mailing folder issued by the Hydraulic Press Manufacturing Company, Mount Gilead, Ohio. This folder contains illustrations and detail dimensions of the various hydraulic equipment manufac-

tured by this company. The folder is designated as bulletin No. 5000, and will be sent free on request.

VACUUM CAR CLEANER.—A four-page leaflet entitled bulletin No. 221A has been issued by the Thurman Vacuum Cleaner Company, St. Louis, Mo., describing the Thurman No. 2 portable electric car cleaning device. This vacuum cleaner is placed at the side of the coach seat to be cleaned and driven through an electric lamp cord from the lighting circuit in the coach or the terminal yard. The system is now in use on over 25 American railways.

LEATHER GOODS.—The Du Pont Fabrikoid Company, Wilmington, Del., has just issued an attractive bulletin on Fabrikoid, which is made with a face of cotton cloth coated with a tough flexible material and embossed by steel plates or rolls to produce the appearance and feeling of any desired natural leather grain. The cover of this booklet is printed in colors and shows five different colors and grains of Fabrikoid. The booklet is well printed and illustrated.

COOLING CONDENSING WATER.—The Spray Enginering Company, Boston, Mass., has issued bulletin No. 101, dated March 1, 1915, illustrating and describing the Spray cooling pond system of cooling condensing water. A number of good illustrations are included, showing various plants equipped with this system, and data is given concerning them. Bulletin No. 151 of the same company is entitled Washing and Cooling Air for Steam Turbine Generators, and contains eight pages dealing with this subject.

HYDRAULIC FORCING PRESSES.—This is the subject of catalog No. 92, issued by the Watson-Stillman Company, New York. This book contains 128 pages, thoroughly illustrated and deals with a large number of force and miscellaneous presses which this company manufactures. The catalog supersedes catalog No. 70 and part of No. 82. It is found convenient to divide the various tools into classes, making each class the subject of a catalog. At the back of this book a list is given of these classified catalogs.

CONCRETE CONVEYOR.—Four pamphlets have recently been issued by the Pneumatic Placing Company, Inc., 45 Broadway, New York City, describing the application of the pneumatic concrete conveyor to the lining of tunnels of small bore, the lining of double track railroad tunnels and the construction of viaduct pipes, retaining walls and abutments. These pamphlets describe the equipment neecssary for each use and contain an estimate of the cost of concrete from the material bins into the forms, which in each case is 30 cents per cubic yard.

IRON AND STEEL.—E. F. Jackman & Company, agents for the Firth-Sterling Steel Company, have issued a folder containing a tribute to the railroads, which reads in part: "A railroad has been likened to an octopus by those who do not know the flesh and blood and personality of railroads. A railroad is a disciplined power; owning rails and cars and locomotives, engaging the highest quality of mechanical skill and expert knowledge, but the glory of a railroad is the united adjustment of its living nerves to patience, courtesy, speed and safety."

WINDOW DEVICES.—The McCord Manufacturing Company, Detroit, Mich., has issued a 56-page catalog dealing with the Universal window devices which this company manufactures. The book is handsomely gotten up and illustrated in color engravings as well as line drawings, the latter giving in detail the arrangement of the different window fixtures. These include weather stripping, locks and racks, sash lifts, anti-rattle bearings, stop casings and parting strips, sash balance brackets, sash balance chain connections, metallic sash, deck sash rachets, etc.

WROUGHT IRON.—The Interstate Iron & Steel Company, Chicago, has prepared for distribution a pamphlet entitled "The Business Message of the Wrought Iron Bar." The first part of this pamphlet contains a copy of the series of advertisements recently published in technical journals on this subject, in which are shown the advantages to be obtained by the use of wrought iron. This is followed by a description of the plant of this company in which various operations in making wrought iron are quite clearly described. Extracts of specifications of the material made are given, and the results of tests of various kinds of wrought iron are also included. The pamphlet is neatly illustrated and it is also written in an interesting manner.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—This company is constructing about four miles of track, consisting of one main branch and several spurs, to serve the orange and lemon shippers at Corona, Cal. It will require very light work and very little bridging. The grading contract has been awarded to the Sharp & Fellows Contracting Company, Los Angeles, Cal. The track work will be done by the company forces. R. B. Ball, Los Angeles, Cal., is engineer of the Grand division.

CANADIAN NORTHERN, ONTARIO.—An extension of time in which to build the following lines in the province of Ontario has been granted by the Canadian parliament: From Washago to Kincardine; from Arnprior to Gananoque; from Pembroke to Cobourg or Port Hope; from Frenchman's bay to Owen sound; from Niagara river to Goderich; from Hawkesbury to or near Lanark; from Berlin through Guelph, Acton and Brampton to Toronto; from Berlin to St. Marys and Woodstock; from Sarnia to Chatham and from Orillia to Goderich, with a branch to Owen sound.

CANADIAN NORTHERN, QUEBEC.—The Canadian parliament has extended the time in which to build the projected line from Rawdon, Que., northerly to the National Transcontinental, also to build a branch from Jerome to St. Eustache, Que. (February 12, p. 289.)

An extension of time has been granted by the Canadian parliament in which to build the James Bay & Eastern from Lake Abitibi, easterly across the province of Quebec, and along the south end of Lake St. John to the mouth of the Saguenay river. (February 12, p. 289.)

FULTON & EAST RICHMOND (Electric).—Incorporated in Virginia, with $50,000 capital, to build an electric line from Fulton, Va., to Montrose Heights, about 5 miles. E. F. Atwood, president; R. B. Allport, treasurer, Richmond.

GLEN ROSE & WALNUT SPRINGS.—This company has given a contract to the Rail Road Construction Company, New York, for work on a section of the line. Work was started in 1909 from Walnut Springs, Tex., north to Glen Rose, about 14 miles, and extensions are to be built from Glen Rose northeast to Ft. Worth, and from Walnut Springs southwest. About 20 miles has already been graded. J. H. Farr, president, Glen Rose, and D. Morris, chief engineer, Walnut Springs. (December 11, p. 1107.)

INGLESIDE & EAST ARKANSAS.—Plans are being made to build a line, it is said, from Ingleside, in Jackson county, Ark., east via Fisher, to a point in Pointsett county, about 25 miles. C. B. Richmond, St. Louis, Mo., is interested.

JAMES BAY & EASTERN.—See Canadian Northern, Quebec.

LEHIGH VALLEY.—Work is now under way by company forces constructing a new car repair yard at Coxton, Pa.

MCCONNELLSBURG & FT. LOUDON (Electric).—A contract is reported let by this company to Reed & Company, Hazelton, Pa., to build from McConnellsburg east to Ft. Loudon, about 10 miles. E. J. Post, president, Washington, D. C. (March 5, p. 427.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, will open bids on May 28, for the completion of certain finish work in the Fourth avenue subway, in the borough of Brooklyn. The line is expected to be open for business in June.

OZARKS RAILWAY.—A contract has been given to the Rail Road Construction Company, New York, to build a section of this line. The plans call for building from Springfield, Mo., through Mountain Home, Ark., thence along Buffalo river, and then south to Little Rock, about 215 miles. T. J. Murray, Mountain Home, Ark., may be addressed. (January 29, p. 211.)

PALM BEACH & EVERGLADES.—The Everglades Construction Company, which has the general contract to build this line from West Palm Beach, Fla., west to Lake Hicpochee, has sublet to E. P. Maule, the work on the first section of 23 miles from West

Palm Beach, along the north bank of the West Palm Beach canal. Charles H. Baker, president, New York. (April 2, p. 767.)

South Dakota Roads.—Financial arrangements have been made, and work may be started soon, it is said, on a line from Waubay, S. Dak., north via Grenville, thence northeast via Effington to Hankinson, N. Dak., about 60 miles. O. M. Henderson is the promoter.

Southern Railway.—In connection with the export coal terminals now being completed at Charleston, S. C., by the Southern Railway, this company will construct a storage yard with a capacity of 400 cars.

Tennessee Roads.—The Whiting Lumber Company, Butler, Tenn., will build a railway, it is said, from Butler to the summit of the Blue Ridge mountains. J. M. Lacy, superintendent of construction, Elizabethtown, Tenn.

RAILWAY STRUCTURES

Ardmore, Okla.—The Oklahoma, New Mexico & Pacific will build a modern brick and concrete passenger and freight station at this place.

Biddle, Ark.—The Chicago, Rock Island & Pacific will build a small repair shop for light repairing at this place.

Chicago, Ill.—The W. C. Newman Company, 19 North Curtis street, Chicago, has been awarded a contract by the Union Station Company, for the construction of trunk sewers in Canal, Monroe and Clinton streets, and also concrete retaining walls. The work is in connection with the new terminal at Chicago.

The Union Station Company is asking for bids for the construction of the substructure and the superstructure of a trunnion bascule bridge to be built over the Chicago river at Monroe street. Thomas Rodd is chief engineer.

Easton, Pa.—The Central of New Jersey has work under way renewing the steel viaduct approach to the bridge over the Lehigh river at Easton. The design consists of eight double track deck plate girder spans varying in length from 53 ft. 5⅜ in. to 62 ft. 4⅞ in., supported on six reinforced concrete piers. The greatest height of the structure from the surface of the ground to the top of the rail is 36 ft. The contract for the steel work, about 550 tons, has been let to the Phoenix Bridge Company. The floor of the bridge will consist of reinforced concrete slabs which are to be molded at a place convenient for handling, to be later put in place by locomotive derricks. No waterproofing is to be used. The contract for the reinforced concrete piers, of which four are required, as two were constructed several years ago, has not yet been let.

Eufaula, Okla.—It is reported that the Missouri, Kansas & Texas will build a 1,000-ft. bridge over the South Canadian river at this point. The new bridge will have 10 steel girders each 100 ft. long and concrete piers set in 10 ft. of solid rock.

Kansas City, Mo.—The Atchison, Topeka & Santa Fe will enlarge its grain elevator at this place. The addition will be of reinforced concrete and will consist of 28 cylindrical bins. Each bin will be 36 ft. in diameter and 90 ft. in height, increasing the capacity of the elevator by 2,062,000 bu. The present elevator contains 72 similar bins. Wells Brothers, 53 West Jackson boulevard, Chicago, have been awarded the contract for the superstructure work.

Lewisburg, Tenn.—A contract is reported let to the E. G. Holladay Co., Nashville, Tenn., to build a new passenger station at Lewisburg, to be used jointly by the Lewisburg & Northern and the Nashville, Chattanooga & St. Louis.

Port Townsend, Wash.—A terminal car barge landing is contemplated at this place by the Milwaukee Terminal Railway in connection with the Seattle, Port Angeles & Western. The work will be done by company forces.

St. Paul, Minn.—The St. Paul Union Depot Company is asking for bids on channel changes, levee walls, sewer extensions and riprapping in connection with the new union station at St. Paul. It was erroneously stated in last week's issue that the Chicago & North Western was asking for these bids.

Railway Financial News

Chicago & Eastern Illinois.—The bondholders' protective committee has added the following to its membership: E. K. Boisot, vice-president, First Trust & Savings Bank, Chicago; Charles R. Butts, assistant treasurer, Norwich Savings Society, Norwich, Conn., and John J. Pulleyn, comptroller, Emigrant Industrial Savings Bank, New York. The committee is requesting the deposit of the general consolidated and first mortgage 5 per cent bonds and underlying bonds with the United States Mortgage & Trust Company, New York, or the First Trust and Savings Bank, Chicago.

Chicago, Rock Island & Pacific.—A petition has been filed in the United States district court at Chicago asking that N. L. Amster, F. W. Bauder, W. C. Crane, E. S. Dickerson, N. French, A. J. Keppelmann, C. Linkroum, G. G. Prentice and G. P. Ten Eyck be allowed to intervene in the suit of the American Steel Foundries against the Chicago, Rock Island & Pacific, which suit was the cause of the appointment of receivers. Among other things the petition says: "The railway company is not insolvent. Your orators, both personally and through their associates, believe it would have been feasible to meet or extend the maturing obligations of the railway company."

New York, New Haven & Hartford.—George B. Holbrook, of Springfield, Mass., has been elected president, succeeding John H. Alvin, of Concord, N. H., of the Connecticut River Railroad, a leased line of the New York, New Haven & Hartford.

Southern Pacific.—General Thomas H. Hubbard has been elected a director of the Southern Pacific, succeeding Hugh Neill, secretary, resigned. [General Hubbard died on Wednesday, as mentioned elsewhere in this issue.]

Third Class Pullmans on the Brighton Railway of England.—The London, Brighton & South Coast has recently entered into a contract with the Pullman Company, Ltd., for supplying a service of third-class Pullman cars on the Brighton main line. The service will be inaugurated soon, beginning with the chief trains from London to Brighton and back, and will be gradually extended. The railway fares will be the same as the present third-class with 18 cents additional. Each Pullman car will have accommodation for 50 passengers, and the seats will be similar to the orchestra stalls of a theatre. Tables will be provided and the third-class passengers will be able to order tea or any other refreshments they require during the journey. The Pullman cars will be well lighted and suitably decorated. They will not be so luxurious as cars on the "Southern Belle," but will be equal in comfort to the usual corridor train, with all the advantages of the Pullman. The cars are now being built by the Pullman Company.

Women as Railway Porters in England.—The announcement that the Great Central Railway is experimentally employing women as platform porters at certain stations shows another development in the policy of setting free more railway men of military age for service with the colors. Women have been successfully employed for some time as carriage cleaners by the Great Central, and it is from these women mainly that the porters have been selected. The experiment is at present being tried at Marylebone, Kilnhurst and Gainsborough, and so far the women porters have not been put into distinctive uniforms, though that matter is under consideration. Their work is confined to platform duties, as obviously women could not be expected to perform the more hazardous duties associated with a railway porter's occupation. Some of the railway companies have already engaged a number of women in the clerical and accountancy departments, and this movement is growing. Women booking clerks have been introduced at Willesden Junction, and there seems no reason why this practice should not be largely extended. At many French stations women were employed to a considerable extent as booking clerks before the war, and at stations on light railways in the south of France we have come across women who were in sole control.—*Railway Gazette.*

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WE GUARANTEE, that of this issue 8,600 copies were printed; that of these 8,600 copies, 7,305 were mailed to regular paid subscribers to the weekly edition, 151 were provided for counter and news companies' sales, 1,041 were mailed to advertisers, exchanges and correspondents, and 303 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 203,650, an average of 9,257 copies a week.

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VOLUME 58 MAY 28, 1915 NUMBER 22

Contents

*Illustrated.

The decision of Judge Maxey, holding that a conductor receiving train orders by telephone is not subject to the 13-hour work-day limit prescribed for telephone operators, which was reported May 14, page 1028, will, of course, be appealed to the Supreme Court; and it will afford that body an interesting opportunity to discuss some fine points of strict construction and "human interest." The 13-hour limit applies to "other employees," which term can easily be construed to include conductors. Judges Maxey and Pardee hold that the term only means other employees having primarily the same duties as station operators. It looks as though they would allow a station agent, for example, on duty 14 hours a day, to occasionally or incidentally transmit a train order; but they emphasize the phrase of the law "in towers and offices," etc. What is the rational basis of the 13-hour limit? Partly, perhaps wholly, the need of providing against the ill-effects on the person's bodily or mental health of long confinement in one room. It may reasonably be said that an operator working outdoors, or one so situated that he could take active exercise in fresh air every few hours, could safely be allowed to work longer than one confined continuously to a desk in an office. As every one knows, a freight conductor can often sleep in his caboose. This is one reason why, for him, 16 hours is not an utterly intolerable work day. However, this hairsplitting may as well be left to the august judges of the higher court—or to the brotherhood leaders who will go before the Congressional committees to get the law amended with a view to softening the conductor's hard lot!

Conductors Who Telephone Train Orders

H. U. Mudge, receiver of the Chicago, Rock Island & Pacific, recently gave an interview to the press in which he discussed the reasons for the road's failure financially. Part of what he said was published by the newspapers. The rest was ignored. The result was one of those too numerous cases where a man who is frank with the press and public, was, by a partial quotation, represented as saying practically the opposite of what he did say. Mr. Mudge was credited with giving federal regulation a large share of the blame for the Rock Island's present difficulties. As a matter of fact, few railroad presidents in the country have taken as hopeful a view of the value of federal regulation as has Mr. Mudge. In his remarks after the appointment of receivers for the Rock Island he referred to the 12-year summary given in his last annual report and mentioned government regulation among other contributory causes that had acted to prevent the Rock Island from fulfilling the hopes of its owners in 1912. The Rock Island operates in 14 different states which makes it subject simultaneously to 15 varieties of regulation. Of these 15 varieties Mr. Mudge has often expressed the belief that one—federal regulation—worked in the long run for good rather than evil, and that the other 14 could far better be dispensed with. State reduction of passenger rates and freight rates undoubtedly was a factor in the Rock Island's decrease in earning power in the years 1902-15. Federal regulation pretty surely also nibbled at rates, but to offset this there was positive good aimed at, even if not always achieved. It seems unfair that a misleading emphasis should have been placed on Mr. Mudge's reference to regulation, when he has accepted federal regulation not only without active opposition but actually in a spirit of cheerfulness and co-operation.

The Rock Island and Federal Regulation

Contrary to the practice which has prevailed for some years, a number of state legislatures have met and adjourned without passing any legislation for the regulation of railways and other public utilities. The legislature of Utah did this, and in addition, took a step which is unique. It adopted a set of resolutions for the express purpose of inviting both labor and capital to seek occupation and investment within the state's boundaries and to assure them that they would receive fair treatment if they did so. The resolutions set forth that in all its history, the people of the state have uniformly protected the interests of all classes. The natural resources of the state have been only prospected on the surface and present a most inviting field for investment, profit and return. Therefore, it is resolved, "that the state of Utah by and through its lawmaking body, does hereby invite to its midst the humble and honest laborer from whatsoever clime, who would better his condition, the homeseeker who would set up his household gods in a new country to his better

Utah Invites Both Labor and Capital

advantage, the investor of capital who would seek sound and profitable investment; all under the certain assurance that their rights, liberties and properties will be jealously safeguarded and held in sacred trust by the government of the state." These resolutions are significant not only as indicating the policy of Utah, but also as implying that it is in contrast with the policies being followed by some other states. It certainly is a remarkable commentary on the recent course of legislation that any state should feel called upon formally to announce, and should expect to gain by announcing, that both labor and capital can enter its borders with the "assurance that their rights, liberties and properties will be jealously safeguarded." This was formerly regarded as the chief function of all governments. We commend Utah's resolutions to those numerous states, such as Iowa, Indiana, Oklahoma and Texas, which think that the chief function of government is to pursue and harass capital invested in railways and other public utilities as if it were an enemy of the public welfare.

RAILWAY FUEL ASSOCIATION CONVENTION

THE seventh annual convention of the International Railway Fuel Association was one of the best attended in the history of the association. The Baltimore & Ohio (one of the roads that has eliminated convention expenses this year because of decreased revenue) was represented by 19 men. This certainly is a great tribute to the work of the association and clearly indicates the loyalty of its members and the faith they have in its work.

By far the most important subject presented for discussion was that of Pulverized Fuel. The adaptability of this fuel to locomotive use has been talked of, and more or less experimented with for several years, but during the past year it has received much attention, the experiments made on the New York Central locomotive being especially noteworthy. These were referred to in Mr. Robinson's paper and were also dealt with in an article published in the *Railway Age Gazette*, April 30, 1915, page 941. The Fuel Association has the distinction of being the first association to recognize officially the possibilities of this fuel on locomotives.

This association also went on record as to the permanency of the locomotive stoker. The committee report on this subject is perhaps the best symposium on the value and use of the mechanical stoker yet published. It covers briefly the reasons for the existence of the stoker, its operation and the operating advantages obtained by its use. Both these subjects were actively discussed and a large amount of interesting information was presented. While the more enthusiastic members looked upon the use of pulverized fuel as a panacea for all the locomotive fuel problems, such as smoke, fuel economy, locomotive terminal detention, and, in fact, most of the difficulties now experienced in locomotive operation from a fuel standpoint, it was conceded that there are difficulties yet to be overcome. The advocates of the stoker did not seem to view with very much apprehension the possibility of pulverized fuel cutting into their field.

The committee reports on fuel stations and coal storage also contained much valuable information. It is evident that economies, which are broad in their extent, are made possible by the logical storage of coal. By storing coal, less equipment is required, more equipment is available for revenue tonnage in the busy season, the coal can be purchased at a lower price, the railways are better protected from a shortage of fuel, the mines can be operated to much better advantage from both the operator's and miner's point of view—in fact, the storage of coal by the railways would be of direct economic advantage to the country at large. Several roads have made a careful study and have become convinced of the practicability of thus handling their fuel supply.

Another subject concerning which there is little concrete information, but which presents a lucrative field for improvement, is that of the railway stationary boiler plant. That this subject has received but little or no consideration was evident from the statements of various speakers. It is, however, a subject that requires careful study. A dollar saved from that source is as valuable as a dollar saved from any other. With but little additional work the fuel and mechanical experts on each road should be able to properly supervise these plants, and they would undoubtedly find their time well spent.

Fuel now represents about 25 per cent of the transportation expenses of a railroad. It is, therefore, worthy of the attention of the highest railway officers. Frequently the desired results are not fully realized on account of the lack of proper authoritative support. The opportunities for the economical use of fuel are not restricted to the direct users of the fuel. Much can be done by the transportation men, but without the proper backing, the men held responsible for this item will be severely handicapped.

UNINTELLIGENT AND UNFAIR CRITICISM

IN a statement appearing in the newspapers on May 19, N. L. Amster, chairman of one of the Rock Island protective committees, criticised severely the recent action of the receivers of that road in placing an order for 67 track miles, or approximately 10,000 tons, of new 100-lb. rails to replace the same mileage of "85-lb. rails, most of which have been in place only since 1907-9." Mr. Amster added that "the Great Northern, not in the receivers' hands, which hauls an average train load twice the weight of the Rock Island, has few if any 100-lb. rails on its lines." These statements of Mr. Amster show a lack of knowledge of railway operating conditions, and, coming from the source they do, they may do harm to the railways in general. Such statements as these, coming from persons supposedly familiar with railway operation, complicate the already serious problems confronting the Rock Island and other roads.

The Chicago, Rock Island & Pacific operates over 7,800 miles of line in addition to 475 miles of multiple main tracks. Assuming that 67 track miles of new rails were ordered annually, it would be necessary for the rails to give an average service in main tracks of 124 years before being transferred to the 2,200 miles of side and yard tracks. It is thus evident that even the 67 track miles of rails, the purchase of which is characterized as extravagant, is entirely inadequate for the proper mintenance of the property. This view is supported by a comparison with the rail orders placed this year by several other roads, the Burlington having ordered 36,000 tons, the Santa Fe 66,000 tons and the Illinois Central 35,000 tons, while the Pennsylvania is now inquiring for 138,000 tons.

Regarding the criticism of the 100-lb. rail to replace "85-lb. rail which has been in place only since 1907-9," this latter rail has had from 6 to 8 years' service in the main line. Every railway man knows that as new rail is bought it is advisable to place it in the most important main lines, and the rail released here is not scrapped, as Mr. Amster's criticism would indicate, but is laid again in secondary main and important branch lines where it continues to give further service. It may even again be relaid on less important branch lines or in side or yard tracks, when its condition has become such as to unfit it for further use under heavy traffic. As to the weight of the rail, the use of 100-lb. rail is in accordance with general practice for main lines. The American Railway Engineering Association at its last convention adopted standard sections for rails up to 140-lb., while the Pennsylvania Railroad has been working for two years on a new 125-lb. standard section.

The introduction of a comparison of the train load of the Great Northern with that of the Rock Island is equally out of place and misleading. The primary factors governing the train load are the ruling grades and the size of locomotives, while the weight of rail play a very insignificant part. The relatively

low train load on the Rock Island in comparison with that of the Great Northern is due primarily to the large expenditures made on the latter road to secure low grades, while the Rock Island has been unable to secure the funds to make such expenditures.

THE STATUS OF TRAIN LIMIT LEGISLATION

THE railway labor brotherhoods have succeeded in getting bills to limit the length of freight trains introduced in a large number of legislatures. But they are not having remarkable success in getting them passed. The only state in which such a law has been enacted is Arizona. Such bills were introduced this year in the legislatures of the following states, which have adjourned without passing them:

California	New Jersey
Colorado	New York
Indiana	North Carolina
Iowa	North Dakota
Kansas	South Carolina
Minnesota	South Dakota
Nevada	Utah

Such bills are pending in the legislatures of the following states, which are still in session:

Illinois	Pennsylvania
Michigan	Wisconsin
Ohio	

In other words, the legislation has been defeated in 14 states and is still pending in 5.

The arguments used against these measures in the states where they have been defeated are the same as those being used where they are pending. It has been pointed out that their passage would increase rather than reduce accidents; would cause an entirely unnecessary and very large increase in railway fixed charges and expenses which would have to be borne by the traveling and shipping public, and would tend to cause serious traffic congestions and delays. The fact that only one state has passed a train limit law, and that the lawmakers of 14 states have considered the merits of the proposed legislation and rejected it, ought to carry great weight with the legislatures which are still in session.

There is not a single valid argument in favor of train limit legislation, and there are innumerable overwhelming arguments against it. Nevertheless, it is being vigorously supported not only by the railway labor brotherhoods, but in some states by other labor organizations. In Illinois the railway labor brotherhoods and the state federation of labor are closely and vigorously co-operating in support of it. The Public Utilities Committee of the Illinois house reported unfavorably on it, but the political influence of organized labor was so great as to get it taken up for consideration by the House.

Many lawmakers seem entirely unable to hear the voices of reason and expediency when the paid lobbyists of organized labor are about. It is hardly conceivable, however, that the legislature of any one of the five important states in which train limit legislation is now pending can be induced to pass it.

NEW BOOKS

Engineering Office Systems and Methods. By John P. Davies. Size 6 in. by 9 in., 544 pages, 243 illustrations, bound in cloth. Published by the McGraw-Hill Book Company, Inc., New York City. Price $5.

This book covers a wide range of subjects of more or less direct interest to all office and consulting engineers, a large part of the information being compiled from other sources and put in convenient form for use. The 13 chapter headings include the following: Collection of Preliminary Data for Engineering Projects; Designing and Drafting Systems; Specifications for Engineering Material; Purchasing-Office Methods and Forms; Cost Keeping and Estimating; Sampling, Inspecting and Testing Engineering Material; Domestic and Export Shipping; Progress Charts, Scheduling Systems, etc., and Indexing and Filing Systems for the Engineering Office. The book contains a large number of forms, specifications, rules, reminders, etc., which, if not in themselves applicable, would frequently suggest similar solutions for engineering office problems.

Railway Rate Regulation. By Joseph Henry Beale, professor of law at Harvard University, and Bruce Wyman, of the Massachusetts bar, recently professor of law at Harvard University. Second edition, rewritten by Bruce Wyman. 1,306 pages, 6 in. by 9 in. Bound in law buckram. Published by Baker, Voorhis & Co., 45-47 John street, New York City. Price, $7.50.

This second edition of Beale & Wyman's well known and authoritative work covers the entire law affecting railroad rate regulation, with special reference to the powers of the Interstate Commerce Commission, and on account of the remarkable growth in the law covering the subject treated since the first edition was written in 1906, contains a very large amount of entirely new matter. In this treatise Professor Wyman has cited every opinion of the Interstate Commerce Commission discussing the principles of rate regulation. The work contains also a discussion of every opinion of the federal courts, wherein the powers of the commission under the act to regulate commerce are involved, and many rulings of state commissions on points not fully covered by the Interstate Commerce Commission.

Although the first edition covered nearly 20 years of activity of the Interstate Commerce Commission the commission at that time had just been given power to fix rates for the future; the power to suspend advances in rates was not granted until 1910; likewise its power to order joint rates, granted in 1906, was not perfected until 1910. All of the treatment of the functions of the commission in establishing rates, and the jurisdiction of the commission over joint rates, therefore, which extends over several chapters in the second edition, is new matter written upon the basis of important decisions decided since the first edition. The author remarks that "in writing the first edition we had only the rulings of the original commission to guide us, and the few decisions of the courts, mostly to the effect that the act did not justify what was ordered. In this edition we have the many volumes of the commission making orders as to future conduct, which are supported in most instances by the decisions of the courts." The second edition, therefore, covering the past eight years of the activities of the commission, has several hundred per cent more opinions as the basis for its text than were available for the first 20 years of the commission's existence. The historical development of the general principles of rate regulation receive much attention throughout the work.

The treatise is divided into four books, devoted to "Jurisdiction of the Commission," "Limitation of Charges," "Prevention of Discrimination" and "Powers of the Commission." Fifty pages are devoted to a table of cases cited and 55 to a very comprehensive index. In the appendices are given the complete text of the various statutes, together with the rules of practice and forms of pleading before the commission and the courts.

A most valuable part of the book is made up of long chapters on procedure in which practically every case involving a point of practice of importance has been treated.

The author calls attention in the preface to the way in which the contrast is brought out between opposing theories of rate regulation where the conflict in the law is as yet not determined. The policies of basing schedules as a whole upon the original cost of the plant or upon its present value are elaborately discussed, together with an indication of the collateral effects of a decision one way or the other. Likewise in dealing with particular rates, whether the cost of the service or its value is to be taken as the test, receives treatment to the extent of a chapter on each. The author does not hesitate to let his own preference for cost as the basis of regulation appear, although he appreciates the modifications to

which this theory must be subjected when put into actual practice.

It would seem that this book must be indispensable to all lawyers engaged in practice before the Interstate Commerce Commission or the courts on matters involving rate regulation, and of very great value to all students of the law upon this subject. The headings throughout are made so specific that the reader can easily locate the subject which is of interest to him.

Railroads. Finance and Organization. By William Z. Ripley, Nathaniel Ropes Professor of Economics, Harvard University. Longmans, Green & Co., New York. 638 pages. Price $3.

The first of Professor Ripley's two volumes dealing with railroads was published in 1912, and consisted of a comprehensive study of rates and regulation. The present volume treats of finance and organization. A knowledge of the problems of the financing and organization of American railroads is prerequisite to an intelligent discussion of railroad regulation. Never before, however, has there been made a comprehensive and just study of these problems. The material for such an investigation is scattered through a vast number of documents, and is often in such shape as to require literally months of work to digest it. Professor Ripley has painstakingly and scientifically sifted this great mass of material and made the results of this study available for railroad men and students of the American railroad problem. He has done an immense work and one deserving of the gratitude of any one who aspires to have any real knowledge of the all-important economic questions which are now in process of discussion by the Interstate Commerce Commission, state legislatures and the public press. Public hearings and investigations of railroad questions and of the history of particular railroads have been frequent in the past few years and the amount of testimony elicited has been voluminous. It is in large measure on this material that Professor Ripley has drawn for his facts.

Like the history of a happy country, the history of a successful, well managed railroad company affords little material for interesting and exciting reading. On the other hand, a description of the way spectacular fortunes have been made out of American railroads may be rendered interesting and often quite dramatic. For this reason it sometimes appears that Professor Ripley lays more stress on the destructive criticism of American railroad history than on the record of achievement of which this history is full. Present day problems of regulation, however, are so intimately bound up with past practices in railroad organization and financing that even where these past practices are now considered unfashionable or even unethical a discussion of them is necessary to a thorough understanding of the subject.

Professor Ripley has a New England bluntness in his comments on methods which are now illegal or considered bad practice that makes him a severe but not an unfair critic. He voices in a great number of instances the feelings in regard to certain railroad matters and railroad financing which are harbored by a great majority of straight-thinking, intelligent Americans who are not connected with railroads or with railroad securities. He denounces in an unmistakably forceful way such methods as led to the New Haven and the Rock Island failures and to the predicament in which the Erie found itself in 1907. Since this criticism voices the honest sentiment of so many outsiders, it should be read by railroad men, and especially railroad executives, with interest and with respect. It may be true that the practical railroad man can find inaccuracies in many of the descriptions of misdeeds which Professor Ripley denounces. With some of his conclusions, especially in regard to the benefit to be derived from a physical valuation of railroads, a great many railroad men will entirely disagree. But this detracts in no way from the interest of the book.

Professor Ripley is an ardent advocate of the federal regulation of railroads and sees clearly the needless burdens which state regulation is placing on railroad operation. While recognizing the importance of the "initiative and efficiency which spring from private ownership," he feels strongly that a guarantee for the common weal of a firm, just and steady supervision is necessary. To the railroad man it probably will appear that he underestimates the difficulties of obtaining such a supervision. The genius of a Harriman, with the financial backing of Kuhn, Loeb & Company, made supervision over 30,000 miles of line something more than a name; but there are 250,000 miles of line in the United States subject to the jurisdiction of seven commissioners, none of whom has had experience in the management of railroads.

Professor Ripley's answer to all this is that the best results of regulation can be obtained by co-operation between the federal regulative body and the railroad companies. This view is the one which is being pretty generally adopted by railroad men themselves.

The scope of the book is best indicated by the list of subjects with which it deals. These are Railroad Construction Finance, Capital and Capitalization, Railroad Securities, The Course of Market Prices, Speculation, Stock Watering, State Regulation of Security Issues, The Determination of Reasonable Rates, Physical Valuation, Receivership and Reorganization, Inter-corporate Relations, Combinations, Dissolution Under the Anti-Trust Law, and Pooling and Inter-railway Agreements. Space will permit of only a very brief comment on the book's treatment of most of these subjects.

Construction finance, of course, provides the author with numerous opportunities for denunciation of bad methods. One is inclined to think that if he had ever had any experience in financing a new piece of railroad construction he would be somewhat less ready to severely condemn all promoters' methods. As Frank Trumbull, chairman of the board of the Chesapeake & Ohio, pointed out in his statement before the Hadley Securities Commission, the changing of a $100 bill into 100 one dollar bills is a transaction of unimpeachable honesty, but not particularly profitable. Whether there is or is not going to be an actual profit in a new piece of railroad construction, somebody must be made to believe there is or no capital will be provided for the construction.

In the chapter on capital and capitalization the various definitions of these words are contrasted in such a way as to bring out a point that is very often much obscured by general discussions of "overcapitalization." Professor Ripley's own distinction is that capital is the assets and capitalization the liabilities. It should be borne in mind in any discussion of this kind that the face value of a bond bears a very different relationship to the liability of the company from that borne by the par value of shares of stock. Whatever par value may be given to the shares of stock legally they can represent nothing more than a pro rata equity in the ownership of the property. Bonds, however, are secured by a promise to pay a definite sum which constitutes the face value of the bond. The capital actually invested in a railroad company is the value of its assets. This cannot be shown on its books, but what is shown is the cost of the assets; at least that is what should be shown by the books.

Professor Ripley in discussing state regulation of security issues comes to the conclusion that mere publicity is inadequate. We cannot agree with him if the publicity is immediate and intelligible. Mere publicity has worked remarkably well in regulating security issues by joint stock companies in England. No law that has ever been invented can take the place of intelligence and business acumen in protecting a man against bad investment.

In discussing pooling agreements Professor Ripley is strongly in favor of co-operation between railroads for the elimination of wasteful competition.

The book as a piece of literature is readable. It can be strongly recommended to railroad men and to all other persons who are interested in the matters of which it treats.

Letters to the Editor

WASTE IN PRESENT METHODS OF CAR HANDLING

Chicago, Ill.

To the Editor of the Railway Age Gazette:

For many years car service officers have discussed in their meetings the terrific waste inherent in present methods of car handling. All sorts of remedies have been suggested by practical operating men, both for improved methods under the present ownership basis, and for various degrees of car pooling. Suggestions have been made that the executive and financial officers be informed of the tremendous saving that undoubtedly would accrue from effective co-operation in car distribution, repairs and storage. It is inconceivable that this situation is not fully understood by those responsible for railway operation. It also cannot be admitted that American railroad men are not equal to evolving the details of practicable plans for a drastic readjustment of existing conditions.

Why then, at a time when economy is the supreme desire of every railroad manager, is this problem not given adequate and comprehensive treatment?

Possibly the significance of the issues involved after all are not generally understood, and if so the *Railway Age Gazette* could perform a service of vast importance by analyzing and exposing the wasteful and extravagant features of our present methods.

L. M. Betts,
Car Accountant, Belt Railway of Chicago.

THE GOVERNMENT ACCIDENT RECORDS

New York City.

To the Editor of the Railway Age Gazette:

The Interstate Commerce Commission has issued a second and revised draft of the proposed new blanks for making monthly reports of railway accidents, continuing further the suggestions which were first issued last January. There is no evidence in the pamphlet, or in the accompanying letter, that the commissions of the 45 individual states (which have commissions) have had any voice in the formulation of the proposed rules or in the discussion as to what should or should not be included in them.

As most of the principal railroads have to report both to the federal and to the state authorities, it is much to be desired that the active interest of members of state commissions shall be enlisted in this matter.

This movement for improved records seems liable to failure, or partial failure, by reason of its comparative unimportance. State commissioners will not give it their attention unless they are specially appealed to; and this special appeal ought to be made. In one way of looking at it, the whole thing is only a mass of clerical detail; but it is an important thing for the railroads, nevertheless. A road having to report to six or a dozen states writes, in a year, an innumerable number of pages, in the aggregate, to be included in these records, and the unending diversity which now prevails is entirely unnecessary, if only there could be an agreement. The present lack of agreement exists, not because anybody desires diversity, but simply because there is no one to take the initiative.

No one state will lead off, because there is the feeling that such leadership is not warranted. Committees of the National Association of Railway Commissions accomplish things but slowly.

The railroads, presumably, are using their influence with the Washington authorities, through the committee of which Mr. Kruttschnitt is chairman. Why should not they also use their influence with state commissions? Why should not prominent roads in every state communicate with their commissions and try to get them to put their statistical officers in touch with the commission at Washington, in connection with this matter and thus start some real co-operation?

R. R. N. Y.

MORSE AND CONTINENTAL ALPHABETS

Haileyville, Okla.

To the Editor of the Railway Age Gazette:

Your editorial of May 7, advocating the use of the Continental alphabet on the railroads, in place of the Morse, is too late. So far as "safety first" is concerned there is not much of an argument. There is nothing any plainer than the Morse alphabet when handled correctly. Of course, with the class of operators now being produced the Morse is unmercifully butchered; and there would be little, if any hope for an improvement where any other alphabet is used. As for the wear and tear on the nerves there is no perceptible difference. Inasmuch as the greater percent of telegraph operators coming to the surface now are not capable of handling Morse what would they do with the Continental? The sending machine has, to some extent, in the hands of those who have practiced extensively with it, made their sending better; but in the hands of the beginner the condition is worse than when they use the primitive key.

Would it pay anyone to begin to familiarize himself with a new alphabet? It will be only a short time until the telephone will entirely supplant both the Morse and the Continental, both in despatching and for message work. A large per cent of railroad telegraph operators are using the telegraph now only because the hard times among the railroads prevents them from installing the telephone more extensively. Just as soon as they can see their way clear to appropriate funds for improvements there will be a noticeable extension of the telephone system. The commercial companies as well will fall in line, along with the railroads, by using the telephone to handle their messages. A good typewriter operator at one end of a first class telephone line with a good plain talker at the other will handle an enormous amount of business.

J. L. Coss.

TIPPING ON PULLMAN CARS

New York.

To the Editor of the Railway Age Gazette:

I hold no brief for the Pullman Company, and if its dividend rate were reduced I should survive; but in view of numerous utterances which have recently appeared, it seems to me, and, I believe, to the average railroad man, that attention should be called to the fact that sleeping-car porters are not the only men who live on tips and their employer not the only rich concern to profit by the tipping habit. Hotels and restaurants are far worse. Those extremely philanthropic newspapers which are now denouncing Robert T. Lincoln, seem to forget that he is but one of eleven directors, all of whom might be willing to pay porters $150 a month and who yet would not be likely to be able to improve the service or reduce its cost to the passenger, to any appreciable extent. The critics, however, do not forget that the Pullman Company is a corporation, such as legislators like to "jump on," while hotels may make 50 per cent profits and yet are immune to this sweeping journalistic criticism. And what do these newspapers think of the growing practice of giving tips equal to a third or two-thirds of the legitimate bill, such as prevails in barber shops?

The tipping habit is deeply seated in human nature—or at least in the nature of a good many humans who travel. Protests against it seem to be effective only where there is enough poverty to compel remonstrance, as in Europe. Is not poverty the real reason why a 10 per cent tip goes, over there, when many Americans freely give bonuses of 20 to 50 per cent? Again, is not the objection to tips based largely on dissatisfaction with details rather than on principle? Waiters often fall far short of their duty, notwithstanding the tip, and we blame the "system," when we ought to kick the waiter. Young women who serve

as table waiters at summer hotels and use their tips to get an education are not condemned; they are praised; but where is the difference in principle? There is a large degree of truth in Mr. Lincoln's declaration that the sleeping-car service with its high standards and strict discipline has helped to raise the social and economic position of the American negro. I do not write to defend tips, but merely to call the attention of our impartial press to its careless dissemination of a half truth. E. F. L.

MAKING RATES TO DEVELOP TRAFFIC

Jamestown, Cal.

To the Editor of the Railway Age Gazette:

In one of the papers a few days since I noted an article by Peter Radford, lecturer for the National Farmers' Union, referring to the recent action of the Interstate Commerce Commission granting an increase in freight rates in eastern territory. He writes as follows:

> The freight rates of the nation have been built up along lines of least resistance. The merchant, the manufacturer, the miner, the miller, the lumberman and the cattleman have had their freight bureaus thoroughly organized and in many instances they have pursued the railroad without mercy. . . . The farmer is seldom represented at rate hearings as his organizations have never had the finances to employ counsel and as a result the products of the plow bear an unequal burden of the expense.

It is just this point of view that the railroads are up against at nearly every hearing—this look-out-for-yourself-and-let-every-one-else-fight-his-own-battle idea that every class of shippers takes and which the average commissioner also holds, although he does not permit the railroads to take the same stand.

Now, it is exactly that point of view that the railroad manager must take if he is to work for the best interests of his road—the best interests in the long run. The traffic manager must look at the question from all angles. "Can I afford to grant Mr. Jones' request for a reduced rate on his salt shipments? Can he continue to operate his plant if I do not? If his plant is closed down what effect will it have on the other revenue from his town. Possibly my road may be supplying groceries, etc., to his employees, which he shall lose. Possibly that is the only revenue we obtain from that shipping point and the salt will be shipped in over the road from other places, and if so what motive have we to keep his plant going at our expense?"

Again, reports from agents and others show that if a reduced rate is named on iron ore a large plant will be erected, many thousands of men employed, large quantities of other freight will be handled, etc. Another officer sees vast acres lying idle and finds that very low rates must be made on grain to induce the owners to cultivate the land. He can handle the grain if offered to him at various points along the line at little or no increase in his operating expenses. Now, what shall he do? Self interest answers the question every time—whatever is better for the road.

Therefore, it does not follow that the farmer is discriminated against by one road because grain rates are not relatively as low as on lumber, nor that the manufacturer is discriminated against by another road because his output does not receive the same rate per ton mile as it does in some other localities.

If the railroad commissions would take some such views as these and permit the roads to advance rates with the same willingness that they grant reductions, I feel certain that there would not be one-half the friction that there is today. Restrictions should be maintained, of course. For instance, if a rate is reduced no increase should be permitted for, say, two years. That would prevent any undue preference to shippers or consignees who might be furnished with advance information of an advance. With the publicity given to all rates today, and the manifest intention of all railroads to refrain from rebating and similar actions, the public would get better service, the roads would employ more men, and purchase more supplies. Particular rates, which might need modification, could be investigated much more quickly than at present. Both carriers and shippers would know how to gage affairs ahead, and I believe it would make prosperity in all lines.

S. H. Smith.
Traffic Manager, Sierra Railway of California.

A DISCIPLINE AND WAGES BUREAU

New York City.

To the Editor of the Railway Age Gazette:

The letter of Mr. White in your issue of May 14 proposing that all labor matters should be put into the hands of a single vice-president, he to have no other duties, and comparing the management of labor with the work of the purchasing agent in connection with material, embodies interesting possibilities, but has he not forgotten the vast difference between a man and a piece of timber or a bar of steel? The idea of a central organization surely is good. Several roads already maintain a bureau of this nature, the New York Central, the Delaware & Hudson, the Erie and the Baltimore & Ohio, for instance. These bureaus collect and keep data in connection with wages, discipline and working conditions. The experience of these roads shows that the department is very useful. Each large railroad should have such a central bureau, with records for all classes of employees in each department. This is necessary if for no other reason than to bring about uniformity of wages on the entire system for the same classes of occupation (except when controlled by outside conditions, such as wages paid in other industries). The man in charge of the bureau can be useful in making uniform the interpretation of rules. By thus maintaining uniformity throughout the different parts of a system grievances are minimized.

But you cannot safely relieve heads of departments—the transportation department, the maintenance of way department, the motive power department, etc.—of the responsibility for their expenses; and if responsible for expenses they must have a voice in fixing the agreements with the employees. And probably the head of each department should have not only a voice, but the deciding voice. Moreover, the men desire to deal with their actual boss. It is true that labor leaders like to appeal to the highest boss, but that does not weaken my point. The appeal from general manager to president is normal and natural; but to have to appeal sidewise, instead of upward, would be unnatural. Imagine a road entrusting negotiations with the trainmen to the vice-president in charge of traffic or of the treasury department. How quickly the employees would make a fuss. Mr. White's proposal is hardly less objectionable. He would appoint a vice-president who had had experience with trainmen, very likely; but a very short time would so affect the mental attitude of this vice-president that he would come to be looked on as a non-technical man; as a mere negotiator, like a lawyer. That is what the purchasing agent is—a mere negotiator.

The head of the bureau having charge of these labor matters should be on the staff of the chief operating officer. He should be subordinate to and have the confidence of the heads of each of the departments for which he keeps data. He is the man to make the requisite investigation of all conditions that arise from day to day and always be prepared to advise, through the head of each department, and furnish for that department all necessary information. The superintendent of a division, for example, should be able to go to this bureau and inform himself fully, so as to be able to deal efficiently with each proposition that may come up within his territory, in relation to the pay of the employees or anything affecting the employees which is likely to disturb their feeling or attitude toward the employer.

Labor cannot be bought on the same principle that a railroad buys material. Unless the officers realize the fundamental difference as to this point, they will be very unlikely to make satisfactory progress in their dealings with the labor situation.

A. V. P.

Railway Extension in Manchuria.—The governor of Tsitsihar is said to be interested in a project to construct a railway from Hailunho to Harbin. The governor's office is collecting information regarding the commercial activity of the Hulan district and the industrial contributions of the district to Harbin. It is proposed to run the railway through Tuichingshan to avoid constructing a bridge across the Sungari river.

Preparing for the Federal Valuation of the Railways

Measures Adopted by the Different Roads Now Being or Soon to Be Inventoried by the Government Forces

No problem with which the railways are confronted today is attracting more attention than the federal valuation of their properties. While concerning primarily the engineering, mechanical, legal, real estate and accounting departments, this work is of live interest to all other departments and its progress is being watched closely. The law providing for the physical valuation of the railways has now been in effect over two years, while government parties have been in the field for over a year. The number of important roads on which this work so far has been undertaken is relatively small, and as the valuation work will ultimately extend over all roads, the methods adopted by the lines first selected for examination by the government are of general interest and value to the others, indicating as they do the preparations which all roads must eventually make. For this reason we outline briefly below the manner in which several of the leading roads now being valued are collecting information for the use of the government and themselves.

The extent to which the roads now, or soon to be, under valuation, are preparing for it varies widely. The government requires all roads to provide right of way and station maps, profiles and certain other data for its use. For their own interests all of the roads are also collecting and presenting to the government forces, all the information they can collect concerning hidden quantities and other elements of value not evident from a surface inspection. Beyond this the methods vary, depending on the amount of money the individual roads feel justified in spending to detect errors and omissions in the government inventory. Some roads only furnish a pilot to accompany each government party to give any further information desired and to endeavor to see that no important items are omitted. Other roads are making complete re-surveys independent of and in advance of the government parties with almost as much detail as the federal forces and are comparing their figures with those furnished them by the government to be sure that all property is included. On other roads are to be found all the various degrees between these two methods.

These variations also result largely from the condition of the records of the individual roads. Some of the older lines possess records of little value as indicating the present condition and value of the property. Other lines have been improved and rebuilt without corresponding revision of the records until this data has become obsolete. In such cases the incentive to revise and correct the records or to make new surveys to secure correct information for the use of the road itself as well as for the government is much greater than on lines recently built and possessing fairly accurate original records of construction. Also, a number of the states, particularly in the middle west, have required the roads to make valuations, and where this has been the case the data was in fairly good shape before the government entered the field. Under such conditions the roads naturally have not gone to the expense of making a complete re-valuation. The methods adopted by the roads under inventory so far have also been influenced largely by the time intervening between the receipt of the government notification and the arrival of the parties. In many cases this has been less than three months, and the amount of preparation possible has therefore been very limited.

CHICAGO & EASTERN ILLINOIS

One of the first roads on which the government began work last year was the Chicago & Eastern Illinois. For this reason the road had only a limited time in which to prepare for the federal parties. However, the methods adopted at that time are in general still being followed on this road, on those divisions on which more time was available for preparation.

Some time previous to the arrival of the federal parties on a given section of the line, the chief engineer goes over that portion of the line with his valuation engineer, pilots and those employees and others familiar with the portion of the line under consideration in earlier years. Last summer these trips were made with a motor car, and during the more inclement weather last winter by special train. The line is covered at the rate of about 10 miles per hour and an endeavor is made to gather all the information possible regarding conditions encountered in earlier years and not now so plainly evident. A stenographer accompanies the party, taking elaborate notes which are written up on the return to the office. Each item is entered on a separate loose-leaf sheet. One complete set of these sheets is then turned over to the pilot who goes back over this line, checking each item on the ground. He is given two copies of all notes relative to hidden quantities, one copy of which he gives to the government engineer in charge of the party, each engineer attaching his signature to the sheet retained by the other for identification. The pilots were selected from assistant division engineers and have all had from four to eight years' service on the road. Wherever possible the pilots are retained on those divisions on which they have previously been located in maintenance work.

About 12 men were required in the office last summer searching office records and securing statements of men familiar with the lines regarding hidden quantities, etc. As this road signed the agreement with the government whereby it receives copies of the field notes taken by the federal parties, these men are computing the quantities on the older lines in the office from these notes and checking the figures secured by the government on the newer lines with the construction records. During the winter the office force was considerably increased, as new maps were being made for the entire line in accordance with the requirements of the government.

Four federal parties covered about 560 miles of main line last year, comprising practically all the road in Illinois. One bridge and one signal party were also on the same line. Three roadway parties were returned to these lines on March 20. The government is also now starting to inventory the equipment, the present arrangement being for the government and the road each to assign a man to this who will co-operate, and where possible make a joint report. It is understood that the government will endeavor to examine from 10 to 30 per cent of each type of equipment.

The government has had two real estate men at work on these lines during the past winter, while the railway has also employed two real estate men to do the same work for it, following a short distance behind the government men. As it is the policy of the commission to ascertain information concerning real estate entirely independently of the railways, these two parties are working separately.

ROCK ISLAND

The Chicago, Rock Island & Pacific organization is similar in many ways to that of the Chicago & Eastern Illinois.

Previous to the inauguration of this work, the superintendent of each division soon to be under valuation, called a staff meeting at which were present the division engineer, roadmasters, master carpenters, foremen of water service and section foremen. Using the right of way maps and track profiles each section foreman's territory was gone over in turn and each one present was called on to give any information he could remember regarding work done on that particular section in the past, evidence of which could not now be seen on the ground. Stenographic notes were taken of this meeting, which were written up and furnished to the pilot who was to accompany the valuation party over this territory. About a month before the federal party

arrived, the pilot was given these notes together with maps and profiles. He then spent the intervening time searching through the files and records to substantiate the information brought out at this meeting and to supplement it with any further data. He also made one or two trips over his section to become familiar with it before the arrival of the federal party.

No surveys are being made on those lines on which previous valuations have not been made. This road has agreed with the federal engineering board that the railroad pilot and the man in charge of the government party shall proceed over the line and make the inventory. Having signed the agreement in circular No. 1, this road is receiving copies of all field notes taken and also the areas, quantities and overhaul computed in the calculation of grading quantities. In the states in which valuations have previously been made, comparisons are made between the figures secured by the government and those of the earlier valuation. All data concerning hidden quantities is of course furnished the pilot that he may transmit it to the chief of the government party.

The pilots are selected from the older engineering employees on the system who are familiar with the property and who have more or less recollection of work which has been done, of which no records are available. Men are also selected whose experience and ability are such that when the valuation goes into court, if such should be the outcome, they will be acknowledged the equal or the superiors of the men in charge of the government parties. Eight federal roadway parties started on these lines during the past winter and will continue during the coming summer, moving northward. The first parties began work on the lines in Kansas and Oklahoma, where valuations had previously been made for the state. On April 1, 2,000 miles of line had been covered. In addition 3 signal parties have completed 1,000 miles of line.

CENTRAL OF GEORGIA

The Central of Georgia was another of the roads on which the government placed parties early in its work. Because of the short notice given, the road was unable to collect as much information as desired in advance of the work. Pilots were chosen from the corps of assistant engineers in the office of the chief engineer, and were men who had been with this company for several years, who were familiar with conditions along its line and who had from 6 to 10 years' experience in railway construction and maintenance. Before the arrival of the federal parties the pilots walked over their respective lines accompanied by the supervisors and roadmasters to familiarize themselves with conditions in detail and secure any further information they could from old employees regarding any unusual conditions or construction affecting the cost. At the same time the office records and construction notes were carefully examined for the same purpose. As trains have been running between Savannah, Ga., and Macon since 1843, it was impossible to secure any of the original construction records for this or other old lines. There are very good records of those lines built in recent years.

This road signed the agreement with the government by which the road is furnished copies of all field notes which are checked against any information in the possession of the road. Government calculations of quantities are not being refigured, but are being checked against any original construction records available. A valuation of lines in Alabama was made in 1909 for use in a rate case, and the government quantities on these lines are being checked against the data secured at that time.

For a number of years this company has been perfecting its maps and profiles, and the entire line is mapped on a scale of 100 ft. to the inch, showing topography, right of way and section lines and a complete list of deeds, contracts and leases. These maps practically comply with the requirements of the government.

The first government party started to work on this road on July 9, 1914. Since that time other parties have been added until there are now four roadway field parties and one terminal party. They have completed about 1,700 miles of line. The signal department has completed its inventory of interlocking plants, crossing bells, etc. Three telegraph and telephone parties have completed work on this road. A structural party started work on November 3, and has completed the inventory of bridges and trestles on 1,100 miles. A force of 15 men is at work in the accounting department. An assistant land attorney spent six months of last year identifying all deeds to right of way, securing practically the same information as now called for in order No. 7. The government has started inventory of motive power and equipment, shop machinery, piping, etc. The government has 6 land men at work appraising the land of this company.

THE "SOO"

The lines of the Minneapolis, St. Paul and Sault Ste. Marie may be divided into two classes: First, those built in recent years for which complete records of construction are available and old lines and branches of which the road still has the original records and on which little change has been made since the lines were built; and, second, old lines which have undergone many changes since the original construction and of which there are not complete records. The first class includes about 65 to 70 per cent of the entire mileage.

On those lines on which records are available a pilot engineer is given a complete inventory by I. C. C. accounts of all items to be inventoried, which inventory he checks with records obtained by the government party. This road has signed an agreement with the government whereby it secures copies of all field notes. It is understood that the pilot engineer and the government field engineer will check and agree on all items inventoried from day to day as far as possible. If for any reason differences in quantities cannot be agreed upon, proper record of the differences are made and same are referred to their superiors for adjustment.

On the second class of lines where no accurate construction records are available, the road has placed parties in the field to make complete surveys and to bring the records of inventory up to date. After this data has been collected and compiled the method of procedure will be the same as with the other lines. An office force is also employed in investigating records, completing inventories and in determining in advance as far as possible to what extent field work is necessary to secure the desired information or to check the quantities which the government computes. This force is also employed in gathering and compiling the data and revising the maps and profiles required by the government.

The government placed one party on this line in Dakota on May 1, 1914. Two additional parties were started on this line on October 1. On November 5 these parties were sent south, at which time 400 miles of line had been covered.

GREAT NORTHERN

The Great Northern has organized in somewhat greater detail than the roads referred to previously to secure a complete inventory of its lines. Field parties consisting of an assistant engineer and three men are being sent over the lines in advance of the government parties to obtain the necessary information to correct and bring up to date the existing maps and profiles, and to prepare inventories covering all classes of property. These parties are provided with gasolene motor cars to facilitate their work. Especially designed loose-leaf field books are used and the notes are sent by the assistant engineers to the general valuation division office separately for each consecutive 6 to 10 miles of track covered. A division engineer, selected because of his long and varied experience in railroad construction, is placed in charge of 3 or 4 of these small parties. No recross-sectioning of the roadbed is done by these parties as the grading quantities are being compiled in the office from the records of original construction and of subsequent work. Fairly complete records of this nature are available for about 90 per cent of the mileage of the system. After these grading quantities are tabulated in the general office they are sent to the division engineer to check and compare on the ground to see that all items have been included as far as can be determined from a field inspection.

Seventeen such parties have been employed in this work and

they have covered approximately 4,800 miles of line in Minnesota, North Dakota, South Dakota, Montana, Idaho and Washington, on which the government has expressed a desire to undertake work first. An office force of 40 engineers, draftsmen and clerks is employed in compiling grading quantities from final estimates and other office records, correcting maps and profiles and compiling inventories from the information sent in by the field parties.

Two assistant engineers accompany each government field party as pilots, these men being selected because of their general competency and their general knowledge and experience in connection with the original construction and subsequent improvements on the line being inventoried. Seven government roadway and track field parties were employed on the lines of this company last summer, all being transferred to southern roads late in the fall, after 1,168 miles of line had been covered. Three of these parties were placed in the field by the western district and four by the Pacific district, although a readjustment has now been made whereby all further work on the Great Northern will be handled by the Pacific district alone. All buildings on the 592 miles of line in North Dakota covered by the roadway and track parties last year were inspected by a government structural engineer and an assistant accompanied by a representative of the company. Sketches and general descriptions of all buildings, including furniture and fixtures were prepared by these men.

In the accounting department six clerks were employed in the valuation work by the railroad company last spring. The government placed eight accountants in the offices of the railroad on July 15 The right-of-way department is preparing schedules of right-of-way deeds for the use of the government land men in the field. In addition, the railroad has sent men from the right-of-way department into the field to collect information from the county offices covering all transfers of land from January 1, 1911, to date in each county through which the railway runs. Property owners adjoining the line are being interviewed and their opinions regarding the value of farm lands and town lots obtained, while the latest assessment of these lands is also being obtained and listed. On August 10 two government land attorneys began work on the lines of the Great Northern. After checking over the schedules of deeds in the offices, they secured the same information in the field as secured by the railroad representatives.

KANSAS CITY SOUTHERN

One of the roads which has made a complete survey of its property in advance of the government valuation is the Kansas City Southern. This road decided that the best means of securing to the company a correct valuation of its property was to make independent surveys with its own forces, and to furnish the government with copies of the field notes taken while making these surveys.

These surveys were commenced in November, 1913, and completed in December, 1914. They preceded those of the government, and it was arranged that the pilot who accompanied the government party over any particular portion of road was the same man who had charge of the company's surveys over that particular section. Two pilots were, therefore, alternately in charge of the railroad party and acting as a pilot for the government party.

Individual inspection was made of all company equipment on the line with a view to verifying the existence and determining the condition of the units of equipment. Record was also made at that time of the additions and betterments that have been made on the same. The company representatives have co-operated with the government in making an inventory of the shop machinery and tools. This work has been completed. The inventory of bridges and buildings made by the structural party of the Interstate Commerce Commission, accompanied by representatives of the company, has been completed.

New maps and profiles were made of the entire line and filed with the commission in compliance with the map order. These maps and profiles were made from existing records and notes taken by the company forces in the field. A report has been made on property abandoned by the company during its development and filed with the commission in compliance with valuation order No. 2.

An organization is maintained for the purpose of compiling data in order to comply with the valuation orders issued by the commission at various times, and for developing expenditures which have been made for various items going to make up the cost of the property, such as assessments for public improvements, expenditures account, acquisition of right of way, damages, extraordinary construction, expense, etc.

The government has had five land appraisers in the field determining the market value of lands adjacent and adjoining the right of way, and have completed their work for the entire line with the exception of certain terminals.

BOSTON & MAINE

The Boston & Maine is also making complete surveys of large portions of its lines. After being notified in February, 1914, that the government expected to place parties on its line on May 1, a careful inspection of the maps in the files was made, showing that maps could be completed in accordance with the requirements of the government for about 1,000 miles of line with a small amount of work. Draftsmen at once began making new tracings to the required standards, and four survey parties consisting of two men each went out over these lines collecting missing information and adding further data required by the commission.

For the remaining 1,500 miles it was necessary to make complete surveys. For this purpose nine parties of five men each, one of whom is a draftsman, were placed in the field. These parties prepare maps on a 100-ft. scale showing all buildings and other property on the right-of-way and send them into the general office in approximately 5-mile lengths as fast as they are finished and inked. These maps are then completed in the general office in accordance with the government specifications after the land lines and data regarding deeds and other records have been added. Prints of these plans are then given to the government forces as they start on the various sections.

A pilot and a computer are assigned to accompany each of the government track and roadway parties in the field, the pilot representing the railroad and seeing that all property is included in the inventory while the computer works in the field office with the government employees checking computations. For the assistance of the pilots a "hidden quantity" squad has been organized to investigate all records, books, plans, etc. All the available information regarding the conditions of bridges, buildings and other physical property, such as ties, etc., is also being compiled. The tie records, for instance, show the annual replacement by individual years for the last nine years with the percentage of renewals for each year and the segregated renewals for the entire period. The government forces are accepting these records and prepare their final segregation of ties from them.

The government also has a bridge and building party on these lines with which the railroad has assigned a bridge and building man and a computer. There are also a signal and a telegraph and telephone party on this line. Five roadway and track parties on these lines covered about 650 miles of line to January 1, 1915, in addition to the other parties just enumerated.

The government right-of-way appraisers started work on the Boston & Maine last May. An assistant attorney is engaged in checking the records in the office, while five appraisers are at work in the field securing data regarding the value of adjacent lands, etc. The land department of the railroad is also securing the same information and has examiners going through all the registries securing abstracts of all deeds in the name of the railroad. This has been necessary as in many cases the files of the company were incomplete in this respect. The government land appraisers have completed about 400 miles of line.

STEEL PASSENGER TRAIN EQUIPMENT

To ascertain the progress of the building of steel and steel underframe passenger equipment and to develop the cost of reconstruction in steel of the present wooden passenger equipment in the country, the Special Committee on Relations of Railway Operation to Legislation issued a circular letter to the railways on January 2, 1915. Replies have been received from 284 companies operating 245,721 miles in the United States, and 62,112 passenger equipment vehicles, with 956 under construction on January 1, 1915. The tabulations based on these replies have been published in Bulletin No. 67, showing that of the cars under construction on January 1, 725 were all-steel, 228 steel underframe and 3 wood, and of the 4,495 cars acquired in the calendar year 1914, 3,355 were all-steel, 940 steel underframe and 200 wood, including 56 cars purchased second hand. Of the total number of passenger train cars in service on December 31, 1914, 12,900 were all-steel, 5,700 steel underframe and 43,512 were wood. The character of the various classes of equipment in service on December 31, 1914, is shown in the following table:

	Steel	Steel underframe	Wood
Postal	888	217	461
Mail and baggage	668	404	2,562
Mail, baggage and passenger	31	56	579
Baggage and passenger	528	227	3,519
Baggage or express	1,478	1,315	7,507
Passenger	5,105	1,704	22,266
Parlor, sleeping and dining	3,200	1,526	5,353
Business	32	109	730
Motor	970	142	535
Total United States	12,900	5,700	43,512

A table is also given in the bulletin showing that for the cars acquired during the past six years the percentage of all-steel cars has increased from 26 to 74.6, while the percentage of steel underframe cars has ranged from 14.8 per cent to 30.4 per cent, and was 20.9 per cent in 1914. The percentage of new wooden cars built has decreased steadily from 51.4 per cent in 1909 to 4.5 per cent in 1914.

Another table shows that the number of all steel cars in service has grown from 629 in 1909, an increase of 1,951 per cent, while the number of steel underframe cars has grown from 673, an increase of 747 per cent. A total of 4,614 wooden cars has been retired in three years. Of this number 1,048 were retired during the calendar year 1914. The bulletin also gives the following table showing the approximate cost of replacement of wooden cars:

Approximate Cost of Replacement of Wooden Cars

	Number	Average cost	Amount
Postal	461	$11,000	$5,071,000
Mail and baggage	2,562	10,000	25,620,000
Mail, baggage and passenger	579	10,000	5,790,000
Baggage and passenger	3,519	10,000	35,190,000
Baggage or express	7,507	8,500	63,809,500
Passenger	22,266	12,800	285,004,800
Parlor, sleeping, dining	5,353	22,000	117,766,000
Business	730	15,000	10,950,000
Motor	535	20,000	10,700,000
Total	43,512		$559,901,900
Annual interest charge at 5 per cent			$ 27,995,095

The charge to operating expenses under the classification accounts of the Interstate Commerce Commission, assuming a value of $4,000 per vehicle replaced, would be $174,048,000.

Replies were also received from 10 companies operating 27,628 miles in Canada, showing that of a total of 5,366 passenger train cars in service on December 31, 1914, 79 were all-steel, 187 steel underframe and 5,100 were wood. Of 57 cars under construction on December 31, 38 were all-steel, 16 steel underframe and 3 wood.

Port of London Authority Men and the Colors.—The total number of employees of the Port of London Authority who have been called up or have volunteered for active service is 2,009, including 238 men specially recruited for the army service corps. Up to April 29 the number who had lost their lives while serving with the forces was 53. Of these 24 were in the navy and 29 in the army.

A MODERN CONCRETE AND BRICK ROUNDHOUSE AT DU BOIS, PA.

The Buffalo, Rochester & Pittsburgh has completed a 16-stall roundhouse of reinforced concrete at Du Bois, Pa., directly opposite the old 16-stall brick roundhouse, which is too short for the large locomotives and which will be used for the smaller engines only. Both houses are served by the one turntable. The new house is 105 ft. deep with the inner circle 91 ft. from the center of the turntable.

The foundations for all walls and columns are of concrete carried on piles driven to refusal and cut off 8 ft. below the top of rail in the house, the latter elevation being 2 in. above the top of rail in the adjacent yard. The piles extend 12 in. into the wall foundations, which are reinforced with two rows of 80-lb. rail. The outside walls are of brick 13 in. thick with pilasters 17 in. deep, built separately from the wall. The window panels in the rear wall are built in units so that if struck by a locomotive only the single panel will be damaged and the beams and roof girders will not be injured.

The columns, girders, beams and roof slabs are of concrete reinforced with Kahn shear bars and twisted steel rods. The unit stresses adopted were 16,000 lb. per sq. in. for steel in tension and 500 lb. per sq. in. for concrete in compression.

Interior of B. R. & P. Roundhouse

The roof consists of 5-in. concrete slabs supported on concrete beams 34 in. deep and 14 in. wide over the outer bay, 6-in. concrete slabs on concrete beams 57 in. deep and 18 in wide over the center bay and 5-in. concrete slabs on concrete beams 38 in. deep and 16 in. wide over the inner bay. These slabs are covered with Johns-Manville asphalt roofing, which company also furnished the Transite asbestos smoke jacks.

Each stall is provided with an engine pit 76 ft. long, 4 ft. wide and 2 ft. 6 in. deep, built of concrete with the running rail carried on 8-in. by 12-in. creosoted yellow pine timbers supported on the side walls. The pit slopes 6 in. towards sumps at each end, where the water escapes through 8-in. sewer pipes. The floor of the pit is of concrete 15 in. thick, reinforced transversely by 80-lb. rails 8 ft. long at intervals of 4 ft.

Three stalls are provided with double drop pits 7 ft. 6 in. wide and 6 ft. deep, which are lighted with 60-watt Tungsten lamps recessed in the walls in each side of the pit. Outside of the pits the floor is of concrete 6 in. deep, reinforced in the center with triangular wire mesh and carried on 8 in. of cinders. The windows and doors are of wood construction. The upper and lower sash of the windows are balanced and the center sash fixed. The transom sash in the upper portion of the middle bays are provided with opening devices operated from the crane track.

A 38-ft. 15-ton Shaw electric crane runs through the center

bay of the house on a circular track 27 ft. 5 in. above the main track. This crane is installed for the handling of engine cabs, front ends and other heavy parts.

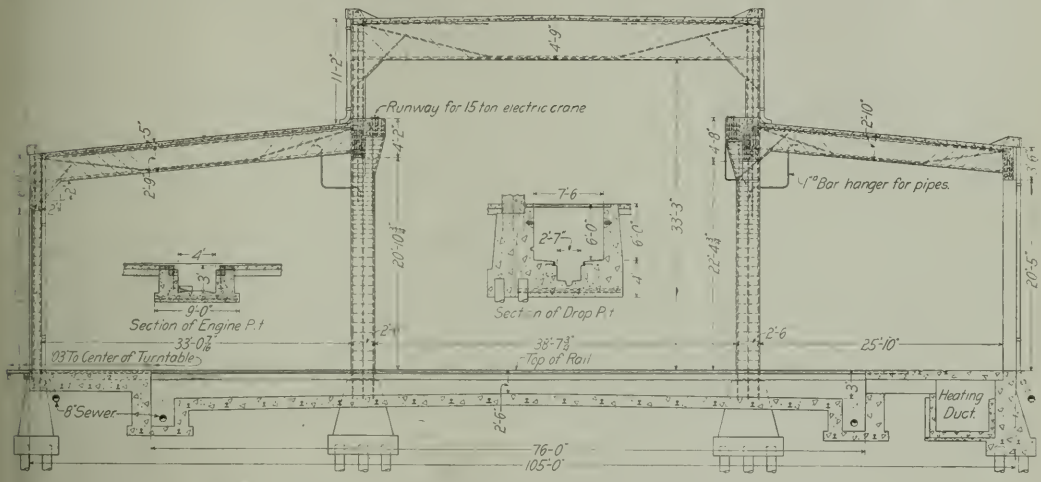
At the outer end of stalls 13 and 14 there is an addition 29 ft. long divided into two portions, one of which is given up to the heating plant and the other to the boiler washing plant. The house is heated with a fan system built and installed by the Buffalo Forge Company, Buffalo, N. Y., the warm air being forced through underground ducts with outlets in the sides of each of the engine pits. A Cowles-MacDowell boiler washout system is also installed with a capacity of 6 engines per 24 hours.

The house is lighted by means of bull's-eye reflectors placed at the ends of each stall, one on each door post and two on each brick pilaster at the back of each stall in such a manner as to avoid shadows. General illumination is provided by clusters in the upper roof. Plugs are also inserted in each column for the use of portable extension lamps. All conduits and boxes are built in the concrete.

Because of unfavorable local drainage conditions a concrete sump was installed with an automatic electric centrifugal deck turntable of the standard American Bridge Company's sump pump to receive and dispose of the roof and pit drainage.

In connection with the construction of this house a 90 ft. design for Cooper's E-60 loading was installed with a concrete pit replacing a 70 ft. deck turnable designed for Cooper's E-40 loading.

This structure was designed under the direction of E. F. Robinson, chief engineer, and W. F. Pond, office engineer, in co-operation with F. J. Harrison, superintendent of motive power, and W. J. Knox, mechanical engineer. It was built by railway company forces under the supervision of G. H. Stewart, master mason.



Cross Section of Reinforced Concrete Roundhouse at Du Bois, Pa.

CORRECTION

In the description of the new line of the Chesapeake & Ohio Northern from Waverly, Ohio, to Edgington, Ky., in the issue of May 14, page 1018, the statement that 40,000,000 lin. ft. of timber piling was required, should have read 40,000 lin. ft. While this error was undoubtedly evident to our readers we make this correction.

New B. R. & P. Reinforced Concrete Roundhouse at Du Bois, Pa.

Cooling Apparatus on Egyptian Railway Cars.—Tanks to hold half a ton of ice and electric fans to circulate the air from them are used to cool the interior of passenger cars of the Egyptian state railways.

THE RAILROAD ACCOUNTING OFFICER

By H. W. Davies
Auditor of the Pacific & Idaho Northern

If the railroad accounting officer is not exercising his full usefulness in the interest of the company he serves it may either be his fault, or it may be due to a condition, or conditions, over which he has no control, and which conditions create his limitations.

It is not an infrequent case, that an accounting officer, unconsciously or otherwise, creates his own limitations; the one cause more common than any other is probably his satisfaction in acceptably fulfilling the rules and requirements prescribed by the Interstate Commerce Commission on the one hand, and the railroad accounting rules and requirements on the other hand; and finally, submitting on time the monthly balance sheet, income statements and other subsidiary reports; which, when accomplished without bringing forth criticisms, is logically accepted as commendation of services well performed. The natural assumption is, and rightly so, that the successful fulfilment of the requirements named carries with it a successfully organized accounting department, which of necessity must exist to meet properly such difficult and varied requirements.

An officer in charge of an accounting department so thoroughly and successfully organized as to fulfil satisfactorily the requirements mentioned, and at the same time to take care of, and keep up to date, his collections, and the many subordinate, though important, branches of his department which contribute to the results as a whole, is indeed to be complimented. He is from a purely accounting standpoint, to be considered an expert and successful accounting officer. And yet, on the face of it, it will be apparent that though the results may embody correctness, completeness and promptness, requiring skill, energy and force of the highest order, it is but fulfilling certain prescribed rules and requirements, which in themselves are but a small part of the economical management of a railroad. Is such a successful and expert accounting officer, in accomplishing such excellent individual results, giving his company the full benefit of his ability? As an accounting officer, very probably, yes; as an officer of the company interested in all its departments and ramifications, no.

Certain department jealousies always have and probably always will exist in all large organizations, whether manufacturing or otherwise, and especially with railroads. The traffic and transportation departments differ over light tonnage cars, the roadway and mechanical departments over derailments, the mechanical and supply departments over supplies. Other natural conditions which affect two departments, whether as to cause or effect, create these little jealousies, and the accounting department gets its share from all other departments. This question of department jealousy may, or may not, properly have any place in connection with the question under discussion. However, if not a direct, it is possibly a contributory cause for the lack of recognition on the part of the management, in many cases, as to the possible usefulness of the accounting officer in the handling of matters not strictly accounting.

The accounting officer is essentially a man of intelligence, at least equal to if not above the average; this coupled with his position as custodian of reports and records from all departments, easily accessible for his examination and comparison, equips him with valuable material not in possession of others, and thus peculiarly fits him for dealing with matters other than those strictly accounting, which could be developed to the interest of the company, and which would otherwise probable be lost sight of. The accounting officer while not necessarily an expert statistician or economist, is by virtue of his constant dealing with figures, earnings and expenses, tonnage and mileage, etc., unconsciously if not consciously, trained to see conditions, conspicuous in detail but not always apparent by mere perusal or study of the condensed reports. Especially is this true with the smaller and middle size railroads which do not employ efficiency men or statisticians, or have in use forms for detailed daily reports to the heads of the different branches of the operating department, by which they can secure the same detailed information which goes to the accounting department.

The monthly report may show engine fuel consumption comparing very favorably for one month as against the previous month, or with the same month in the previous year; and yet, in detail it will very probably be found that two engines of the same class, under similar running conditions, will show a very marked difference, indicating the lack of efficiency in the running of one engine as against another. The monthly report may show the cost of crosstie renewals comparing very favorably with the previous month or with the previous year; yet, an analysis will possibly show a considerably less number of ties laid with a large increase of labor expense not justifiable by conditions.

The matter of station labor, clerical and manual, usually under the jurisdiction and full control of the division superintendent, and frequently left to his sole judgment, is, in many cases, capable of a more equitable and profitable adjustment by the accounting officer, and especially is this true at larger stations.

The president or general manager is invariably forced to delegate the signing of vouchers to some one else, who, while in a position to recognize the validity or lack of authority for the transaction itself, is not in a position to determine of his own knowledge, the reasonableness or excess of the voucher; the auditor, by virtue of his peculiar position of vantage, could be of valuable assistance by bringing to the attention of the proper officer, cases seemingly worthy of investigation, of which there are many.

There is an old saying, "the treasurer is the watchdog of the treasury." This is no doubt still true in a measure; but broadly applied in these days of forced economy, it can be properly said of all other departments, since values are measured not merely by dollars and cents in the treasury, but by material and labor also. Therefore, the accounting officer is as much a watchdog of the treasury as any one, and in many cases similar to those just cited could extend his usefulness to the success of the company beyond that of a "mere" accountant. Opinions will differ very materially as to the proper limitations of the application of mind, force and energy of any one department, especially when that department encroaches upon another. Yet, the general manager, privileged to question acts and to correct irregularities in all departments with his many important duties, finds it a physical impossibility to analyze the results of all departments to the extent of details. However, details are also important in contributing to the success of the road's operation, and the general manager is, therefore, dependent upon voluntary information to a large degree, before he can know of certain irregularities or be able to correct them. These same limitations exist in all departments to a greater or less degree. The very fact that the departments themselves exist, has established certain unwritten laws, recognized by nearly all railroad officers who are invariably governed thereby.

Divisions or departments are essential in all large enterprises, as segregating the several distinct factors or classes of work. Each class of work is distinct and separate as to skill and individual purpose, and carries respective responsibilities, and serves various other purposes not possible but by segregation. And yet, while each department represents separate skill, and turns out distinctly different products, they are but units or parts of the whole, and are each interested in the successful production of the finished article to which they contribute; and to whatever extent one department slights its workmanship, or unreasonably increases its cost, it reflects itself in the finished product, and in turn reflects itself on all departments. Criticisms, therefore, should be unhampered, solicited and freely given, but given and accepted in the fairest of spirit, as assistance rendered by one department to another for its benefit and in the interest of the company and not especially to the individual. The accounting officer can serve as an important factor in accomplishing these results.

International Railway Fuel Association Convention

Mechanical Stokers; Fuel Oil; Storage of Coal; Front Ends, Grates and Ash Pans and the Closing Exercises

A report of the first two days of this convention was published in last week's issue of the *Railway Age Gazette*, page 1054. The following is a report of the remaining sessions of the convention:

MECHANICAL STOKERS

The mechanical stoker today is practical, operating at a mechanical firing efficiency of 90 per cent or more, and effects operating economies that cannot be otherwise obtained—it is no longer in the experimental stage. Improvements in the design and construction of stokers will no doubt be made for many years to come. Locomotive design will undoubtedly be modified until the stoker becomes a part of the original design instead of being merely an attachment to the locomotive, as at present. Notwithstanding the necessity for further improvements, the fact can no longer be questioned that the mechanical stoker today is an important factor in railroad operation and must be recognized as such by all thoughtful railroad officers.

The real economy of the stoker is in the increased tonnage that can be handled by stoker-fired locomotives—not in the saving of fuel, as seems to be the general impression. The large, mechanically-fired locomotives of today are able to handle more tonnage than the same locomotives would be given if hand-fired, and handle this tonnage at a higher speed and with greater certainty than under hand-firing conditions. The development of the stoker has made possible the development of locomotives designed to burn coal continuously at a rate in excess of the capacity of the ordinary fireman to supply it. The real reason, therefore, for the improvement and adoption of the mechanical stoker is found in the economic necessity of reduced operating costs. The capacity of locomotives already in service may be increased and cheaper grades of fuel may be used on such locomotives, with the locomotive stoker.

According to the most reliable figures obtainable at the present time (April 1, 1915) and not including the experimental stokers, there are at the present time approximately 935 locomotives equipped with stokers on about twenty different lines of railroad.

There seems to be no fixed factor which can be used as a sure guide as to what constitutes a stoker job. One report indicates that any locomotive of 200,000 lb. total engine weight, with cylinders of 22 in. or over should be operated with stoker-firing. A second report states that engines having a tractive effort of 50,000 lb. or over should be stoker-fired. It seems to be the consensus of opinion that locomotives should be hand-fired when the coal consumption for extended periods does not exceed 4,000 lb. per hour.

The consensus of opinion is that the stoker will give about 10 per cent increased tonnage capacity, as compared with hand-firing, under the same conditions as to grade and time. Some believe that the tonnage increase will be more than 10 per cent. It should not be expected that stoker-firing will show any advantage in this respect where the job is within the capacity of a competent fireman. Stoker engines will make better time than hand-fired engines and while doing so will haul more tonnage than can be hauled with engines that are hand-fired.

It has not been the intention in the design of the Crawford stoker to use any cheaper grade of fuel than is used on similar engines that are hand-fired, nor does the Crawford stoker require the use of prepared coal. Both the Hanna Locomotive Stoker Company and the Locomotive Stoker Company state that their stoker will handle cheaper grades of fuel than can be successfully hand-fired, and that their stokers will enable locomotives to use some grades of coal that would be impossible with hand-firing. The Erie's experience does not indicate that a cheaper grade of fuel should be used.

The consensus of opinion seems to be that stoker-firing will not show a saving in the gross amount of fuel used, although there is a slight diversity of opinion on this subject. It is believed that there will be a saving on the basis of the amount of coal burned per thousand ton miles. This is due to the fact that additional tonnage is handled by stoker-fired engines with about the same gross amount of coal as with hand-fired engines. A marked saving is also made by the use of less expensive fuel.

While the stoker is a factor in increasing locomotive efficiency—that is, while it increases locomotive tonnage capacity to such an extent as to overbalance considerations as to first cost and maintenance costs—it is not a device for saving fuel. The real economy of the stoker is in the increased tonnage that can be handled. This is the meat of the whole stoker proposi. If increased capacity of locomotives is desired, then stokers are economical. If economical evaporation is what is required on large engines, its attainment may result in a sacrifice of maximum tonnage capacity.

Black smoke can be made with both hand and stoker-firing, or it can be eliminated by careful stoker or hand-firing. Average stoker-firing will probably show less black smoke than average hand-firing, because the coal is delivered to the fire in smaller quantities at a time.

There is less liability of engine failures with stoker-fired engines, owing to the fact that the stoker practically eliminates the necessity of opening the fire-door. Thus a more even temperature is maintained in the firebox, with less liability of leaky flues. In addition to this, if the engine should have leaky flues and bad grates or a bad fire, steam pressure can often be maintained with a stoker, when under hand-firing it would be impossible to keep up steam. Records to date indicate that firebox troubles are less on stoker-fired engines than on hand-fired engines.

The most important phase of the stoker proposition is that the engineer does not have to figure on the stoker tiring out, and is willing to work his engine to its full capacity under all conditions; whereas, under certain conditions with hand-firing, it would not be expected that the fireman could stand up against the largest engines when they were worked to full capacity. It is for this reason that increased tonnage can be handled with a stoker-fired engine, closer meets can be figured on and made, and better general results obtained.

The first cost of stoker installation, giving approximate figures only, is somewhere between $1,500 and $1,700. Maintenance costs, including interest on the original investment, are anywhere from ½ cent to 1 cent per mile. Maintenance cost figures at the present time, however, are not particularly reliable on account of the fact that more or less experimental work is being done with these stokers. It is generally stated that stoker maintenance costs do not nullify the saving in fuel cost possible where the stoker uses a cheaper grade of fuel. The only figures that have been presented on the cost of lubricating the stoker show the cost to be about $1 per 1,000 locomotive miles.

There is no added probability of engine failures which are not stoker failures on stoker-fired engines; and the reverse seems to be the case, on account of reduced liability of boiler failures. The consensus of opinion seems to be that a stoker failure should not imply even a partial engine failure, although the instructions on some roads are that in case of a complete stoker failure, tonnage will be reduced to hand-firing rating. One road reports that a stoker failure means a complete engine failure on account of the fact that such a low grade of fuel is used on

stoker-fired engines that hand-firing cannot be successfully performed with this fuel.

A skilled fireman must be employed on stoker engines, owing to the fact that it is occasionally necessary to resort to hand-firing for short distances, and to the fact that in the case of a partial, or complete stoker failure, hand-firing is necessary. The stoker makes the fireman's job a better one. He makes more money, on account of being able to follow his engine more closely, and a large percentage of the manual labor necessary with hand-firing is eliminated. Any good fireman can easily learn to operate a stoker. A fire which is properly prepared for hand-firing is all right for stoker-firing.

There should be no reason for a failure of the stoker equipment holding an engine beyond the ordinary time required for turning. In fact there are no repair jobs on a stoker that would necessitate delay, providing a proper stock of repair parts is kept on hand and the work handled promptly.

The Pennsylvania record with the Crawford stoker, covering a total of 204,922 trips, including all of the experimental trips during the time the stoker was being developed, shows an efficiency of 83.8 per cent. It can be readily understood that present efficiency is considerably higher than this figure. A six months' record of the use of stokers on the Norfolk & Western shows 97½ per cent efficiency, which makes the statement that the stoker is over 90 per cent efficient at the present time seem conservative. Roads having a considerable number of stokers in service show a performance of over 50,000 miles per engine failure on stoker-fired locomotives.

It seems conservative to state that the stoker will show a very satisfactory fuel economy based on ton-mile performance. That is, while it may not show a reduction in the gross amount of coal consumed per trip, it will show that it can haul more tonnage than a hand-fired engine using about the same gross quantity of the same or a cheaper grade of fuel.

From the coal producers' standpoint, the increased demand for slack coal and screenings for stoker-fired engines will no doubt be of benefit.

The stoker permits general operating efficiencies that would be otherwise impossible. Trainloads can be increased by the application of stokers to locomotives where the cost of grade reduction would be prohibitive or where bridge weights or terminal facilities, or both, might prohibit the introduction of heavier and larger power. On districts where train movement is so frequent as to approach the limit of single or double track capacity the increased speed of trains hauled by stoker-fired locomotives, together with the increased tonnage of such trains, will assist in relieving the congested conditions.

The stoker entirely obviates any question of the necessity for two firemen on large engines.

The stoker lives up to its worth, maintaining maximum steam pressure uniformly when the engine is worked at 100 per cent cut-off or at shorter cut-offs and higher speeds. To sum it all up, the stoker, even in its present state of development, pays and pays well in every case where a real stoker job is indicated.

The development of the stoker makes the design of larger locomotives possible and practicable. In fact, locomotives have been purchased within the last two years and are being built today which would neither have been purchased nor built had it been necessary to have them hand-fired. This refers particularly to the very large Santa Fe type Mallet and Triplex engines.

In closing this report the committee begs leave to call the attention of this association to the fact that the stoker has arrived. It is a success, and, furthermore, it is an absolute necessity from an economical operating standpoint for a great number of the large engines of the present day.

The report is signed by: D. C. Buell (U. P.); W. C. Hayes (Erie); A. N. Willsie (C. B. & Q.); T. R. Cook (Penn.); R. Emerson (S. L. & S. F.); O. L. Lindrew (Ill. Cent.); L. R. Pyle (M. St. P. & S. S. M.); Edw. C. Schmidt (Uni. of Ill.), and C. A. Spaulding (C. & N. W.).

DISCUSSION

It was the general opinion that fuel economy should be considered secondary to the operating advantages the mechanical stoker presents; that is to say, its ability to increase the boiler capacity and thereby permit greater tonnage to be handled at higher speeds warrants a sacrifice in the economical use of fuel. However, tests comparing the stoker with hand firing have in some instances shown an increase of evaporation.

E. A. Averill, of the Standard Stoker Company, called attention to comparative tests made on the Pennsylvania division of the New York Central. Four stoker fired and five hand fired tests were made under as near similar conditions as possible with the same engine, crew, tonnage, etc. However, a poorer grade of fuel was used on the stoker fired engines, this fuel averaging 13,711 B. t. u., as against 14,494 B. t. u. for the hand fired engines. Mr. Averill said: "These tests indicate clearly the following: First, the locomotive when stoker fired evaporated 7.4 per cent more water per unit of heat supplied; second, 18.6 per cent more coal of 5.4 per cent lower heat value was burned per square foot of grate area per hour by the stoker, resulting in the generation of 18.8 per cent more steam; third, while the power in the cylinder was increased 20.2 per cent, if gaged by the amount of steam consumed the amount of dry coal used for the stoker increased but 15.9 per cent and was a 5.4 per cent lower heat value."

Additional tests were made with an increase in tonnage for the stoker, which showed: "First, the locomotive when stoker fired pulled 12.1 per cent greater tonnage at 10.4 per cent greater speed with an increase of but 12.2 per cent in dry coal, which was of 5.3 per cent lower heat value; second, when stoker fired the boiler evaporated 11 per cent more water per unit of heat supplied; third, the power, as judged by the amount of steam consumed by the cylinders per hour, increased 35.5 per cent, while the dry coal per hour increased but 24.2 per cent and was of 5.3 per cent lower in heat value on the stoker fired run; fourth, the cost of coal per million heat units in available steam was decreased 8.5 per cent by the stoker."

A. N. Willsie, Chicago, Burlington & Quincy, stated that from road tests made with stoker and hand-fired Mikado engines of the same class it had been found that 435 tons more could be handled with the stoker than with the hand-fired engine and that 31 minutes were saved on a 156-mile division. The cost of fuel for 10,000 ton miles for the hand-fired locomotive was 45 cents, while that for the stoker fired was 41 cents. On the 2-10-2 type engine, stoker fired, it was found that 1,483 more tons could be handled than with the hand-fired Mikado, at a cost of 34 cents per 10,000 ton miles. F. Kirby, of the Baltimore & Ohio, stated that by use of the stokers the fuel consumption per 10,000 gross ton miles had been reduced 3 lb. and that the tonnage had been increased from 5,450 tons to 6,000 tons.

W. S. Bartholomew, president of the Locomotive Stoker Company, sketched the development of the stoker briefly and stated that this device did not generally find a market until the engines got so large that it was necessary to mechanically fire them in order to obtain their full boiler capacity. The problem for the stoker manufacturers now is to work out a development of the stoker that will provide for the economical use of fuel. Most any kind of coal can be used and from the mechanical standpoint the stoker is a success. Regarding the use of pulverized fuel he believed that there was a distinct field for that as well as the stoker, as the stoker eliminated the necessity of pulverizing the fuel, which must be done at more or less expense, and that many of the advantages to be derived from the use of pulverized fuel will also be obtained in stoker-fired engines. He also strongly favored the use of the brick arch on locomotives with automatic stokers.

FUEL OIL FOR LOCOMOTIVE USE

By G. M. Bean

Pacific Coast Representative, American Arch Company, Los Angeles, Cal.

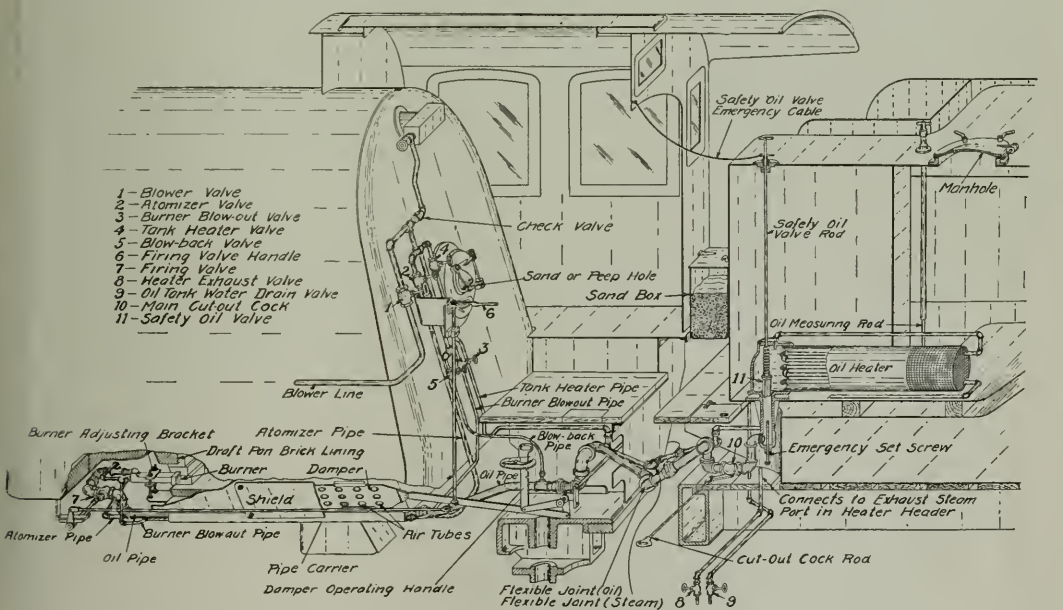
From 1907 to 1914 the use of fuel oil by railroads increased 112 per cent when a total of 31,000 miles, distributed over 50 railways, were operated with this fuel. A study of the use of fuel oil in the locomotive furnace is extremely interesting, because it offers problems that are not met with in other fuels.

With liquid fuel the diffusion must be simultaneous with ignition, with the resultant long flame, and a large furnace volume is essential. While the relative dimensions are of minor import to the volume, it is evident that a flame passage of sufficient length must be provided to prevent unconsumed particles passing to the flues. While it is generally conceded that lack of oxygen is responsible for smoke, the writer believes that restricted furnace volume and the attending lack of time for the proper mixture of the gases in the more highly heated portion of the furnace is the most common cause for black smoke from an oil-burning locomotive. Special attention is directed to this point in connection with locomotive oil-burner furnace design

The proper maintenance of brick work is essential to good results, and the possibility of the brick work falling down in the path of the flame must be avoided, as it usually results in an engine failure.

The oil supply is carried in tanks built to fill the coal space of the tender, and piped from there through suitable connections to the burner. It is generally necessary to provide means for heating the oil so as to insure a proper flow, as gravity is depended on for the necessary pressure. It is probable that the box heater is the most desirable arrangement. It is indirect in its action, only heating a sufficient volume to insure a supply at the burner, and is not liable to cause trouble by allowing water to get into the oil storage.

The illustration shows in detail the general arrangement of oil burner equipment which represents the latest standard practice as applied to locomotives of the Atchison, Topeka & Santa Fe, and is probably as complete and efficient as any so far devised. The indirect heater, together with the large direct oil supply line from oil tank to burner, insures ability to handle the heaviest of oils. The special attention of those interested in the subject of efficiency of oil burner handling and equipment, is



Standard Oil Burner Arrangement; Atchison, Topeka & Santa Fe

because of the general tendency to restrict the furnace volume by carrying the draft pan and brick work too high in the firebox covering up valuable heating surface and bringing about the continual necessity for forcing the fire at the expense of the remaining exposed surfaces.

At the first inception of the idea of using oil in this country the burner was placed under the rear of the firebox and directed forward with an upward incline so that the flame shot under a low, short brick arch, with the result that combustion became so intense in this limited space as to cause the flame to pass from under the arch with such velocity as to impinge on the door sheet, side sheets, and crown sheet, with very detrimental results. The burner is now placed in the front end of the draft pan and directed toward the rear in such a manner that the draft is forced to reverse the direction of the flame before it passes to the flues. The furnace is open, the brick work kept low and the maximum of heating surface is exposed.

called to the necessity for careful supervision of all locomotive equipment and care not to abuse the privilege of having oil burner power to handle your trains by overloading at the ultimate expense of fireboxes and flues. Emphasis should be placed on the fact that the oil fireman is a large factor in the success of the operation of oil burning locomotives. He must intelligently follow every movement of the engineer that demands regulation of the fire.

DISCUSSION

Several members spoke in favor of the use of the brick arch for oil-burning locomotives, as with this device the flame is more equally distributed throughout the firebox and the boiler maintenance is reduced. There is a tendency on account of the ease of operation of the oil-burning engines to neglect their maintenance. This should be carefully watched, as it will not only give a poor performance in oil consumption, but cost more for repairs than if the engines were

properly maintained between the general shoppings. H. T. Bentley, of the Chicago & North Western, stated that the cost of repairs to their oil-burning engines was not more than that to the coal burners. When the oil burners get in bad condition it has been found possible to get more life out of the boiler and out of the engine between shoppings by changing them over to coal burners. The success of the oil burner depends on the fireman and he should be properly educated and supervised.

STORAGE OF COAL

In order that the question might be thoroughly covered and local conditions taken into consideration, the mining districts of the country have been grouped in various sub-divisions, and sub-committees of representatives of railroads and coal operators were appointed for each group.

It has become apparent to all parties interested that there are approximately 50 per cent more coal mining operations in this country than are needed to produce the amount of coal consumed. This surplus of mines represents an investment of approximately $450,000,000. If 25 per cent of this had been invested in storage facilities instead of mines the needs of the country could have been fully and promptly supplied, and the bituminous coal industry of today would be on a solid basis financially instead of the jeopardized state, which, we are told by the operators, actually exists, due to ruinous competition and high cost of production brought about by short running time.

In order to meet the spasmodic strong demands for coal in the fall and winter (further intensified by the biennial mine suspensions) the railroads have been gradually creating a large surplus of coal cars. The average surplus for the period of May 15 to July 15, 1914, was 95,564 cars. This represents an investment of approximately $105,120,400. Fifty per cent of this amount judiciously expended in storage facilities would have accomplished as much in taking care of the coal traffic of the country, and the life of such storage facilities would have been double the life of the cars, with a very much less maintenance cost.

The reports of the sub-committees follow:

EASTERN GROUP

Ohio, Pennsylvania and West Virginia.—If coal is to move from storage near the mines by water, it should be stored during the fall and winter months and moved during the spring and summer. If coal is to be moved by rail, it is the consensus of opinion that it should be stored near the mines during late fall when traffic is heavy and winter when transportation costs are high, and moved to point of consumption during the spring and summer months. The consensus of opinion in regard to the coals named in the region under consideration, which may be screened without excessive breakage, seems to be that the coal best adapted for storage is the ¾ in. to 1¼ in. lump. In the case of very friable coals such a separation of sizes is not practicable, for which reason they should be stored as run-of-mine and the storage piles so made as to minimize the danger attendant upon storing the coal of mixed sizes.

While in the district in question attempts have been made to store coal, there was found to be considerable variation in figures representing cost of storage. It is felt, however, under conditions which are reasonably favorable, the cost of storage should not exceed 35 cents a ton, and under quite favorable conditions, the cost should be less.

This report included reports from the storage of various coals. The report is signed by: W. H. Averill, B. & O., chairman, sub-committee.

SOUTHEASTERN COAST GROUP

The consensus of opinion of both railroad executives and of at least one coal operator in the district, is that it is both desirable and feasible to store coal. From the railroad's standpoint, it is agreed that lump coal of a firm quality, in order to resist powdering, is the best. The Central of Georgia has been very successful in storing slack with a large per cent of nut. From the operators' viewpoint, run-of-mine should be stored, as it leaves nothing on their hands.

All the roads in this district have storage centers and store coal regularly each summer. One coal operator has a storage plant in North Carolina with a capacity of 150,000 tons. The cost of operating this storage plant for two different periods is shown below:

Unloading Cost, June 24 to October 4, 1912:

		No. of tons	Cost per ton
Pay roll	$2,148.74		.0172
Repairs to plant, supplies, etc.	373.14		.0029
Fuel for crane	594.50		.0047
Total	$3,116.38	125,696	.0248
Depreciation at 10 per cent per annum on $71,000 for 6 months	$3,550.00		.0282
Interest at 5 per cent for 6 months	1,775.00		.0141
Total	$5,325.00		.0671
	$8,441.38		

Reloading Cost, October 8 to January 31, 1913:

		No. of tons	Cost per ton
Pay roll	$1,797.62		.0138
Repairs to plant, supplies, etc.	727.44		.0056
Fuel for crane	646.70		.0050
Total	$3,171.76	129,778	.0244
Depreciation at 10 per cent per annum on $71,000 for 6 months	3,550.00		.0274
Interest at 5 per cent per annum on $71,000 for 6 months	1,775.00		.0137
Total	$5,325.00		.0655
	$8,496.76		

Total average cost for dumping and reloading, 13.26 cents per ton.

Unloading Cost, From May 1 to August 31, 1914, Inclusive, 2,703 Cars:

		No. of tons	Cost in cents per ton
Pay rolls	$1,653.74	131,949	.0125
Repairs to plant, supplies, etc.	576.72		.0044
Fuel for crane, estimated at 2½ tons per day	600.00		.0045
Total	$2,830.46		.0214
Depreciation at 10 per cent per annum on $71,000 for 6 months	$3,550.00		.0269
Interest at 5 per cent per annum on $71,000 for 6 months	1,775.00		.0135
Total	$8,155.46	131,949	.0618

One road in this district has a Dodge plant which consists of a 20 ft. by 40 ft. pit, 15 ft. deep, into which the coal is dumped from hopper bottom cars. Encircling this pit is a track for a traveling crane which takes the coal from the pit and stores it in a circular pile around the pit. The same crane is used for coaling engines by placing the coal in an overhead bin from which it is loaded on tenders. This device is both successful and economical.

The report is signed by: A. P. Wells (C. of G.), chairman, sub-committee.

SOUTHWESTERN GROUP

It is the consensus of opinion of executives of railroad and mining companies that Mr. Hall's reasons for, and the desirability and advantages of, storing coal (which were reported at the 1914 convention) are correct. It is generally agreed that lump and nut coal with at least 25 per cent of slack removed is the best kind to store, that is, with the coals which will store without great danger of spontaneous combustion.

All who have tried to store Texas and part of the Arkansas coal have found that it is a failure on account of the liability to spontaneous combustion. All other coals in the second territory—Oklahoma, Kansas, Missouri, and Northern Arkansas—can be stored and the loss in heating value and weight will be from 2 per cent to 8 per cent.

The greatest danger from spontaneous combustion is caused when the coal is stored in the open during the hottest months of the year—July and August. If the coals in this territory were stored in May, June, September, and part of October, the

danger of firing would be greatly reduced, and practically all conditions make this possible. It is the opinion of practically all men in this territory that it is better to store coal at the railroads' larger coaling stations, as the facilities at these coaling stations are sufficient to handle larger amounts of storage coal. Usually there are enough laborers employed around coaling stations who could be used in storing coal part of the time in addition to their other duties.

The cost of handling storage coal varies greatly. The best figures obtainable are as follows:

Tons coal handled, 84,378.

		Average per ton
Cost to unload	$3,576.59	$0.0424
Cost to reload	2,320.15	.0275
Miscellaneous and tracks	2,663.22	.0315
Total cost	$8,559.96	$0.1014

Another system reports that the total cost to unload by—

Clam shell	5 cents per ton
By hand	7½ cents per ton
Reload—Clam shell	5 cents per ton
Reload—By hand	7½ cents per ton

Total average unloading and reloading, including supplies and walls, where necessary, by—

Clam shell	10 cents per ton
By hand	15 cents per ton

Other figures vary from 15 cents to 30 cents per ton for total cost of handling storage coal.

Some roads have mixed fresh coal with coal that has been in storage for several months and have had good results, while some other roads have used a little crude oil with storage coal by throwing several bucketfuls over the coal when it is put on the tender, both methods producing results practically as good as obtained from coal just from the mines.

Some say that their observations have been that the loss in heating value of storage coal (Arkansas and Louisiana) is usually less than 5 per cent. One company's analysis showed a loss in B. t. u. of about 25 per cent on account of so much spontaneous combustion and slacking. This is an exceptional case, but it is likely to be the rule with Texas and some of the Arkansas coal.

The report is signed by: J. B. Hutchinson (Sun. Cent.), chairman, sub-committee.

NORTH CENTRAL GROUP

Indiana, Illinois and Iowa.—The territory supplied by the mines of Illinois, Indiana and Iowa is gradually developing industrial plants which require ever-increasing quantities of screenings for their power plants. The increased production of lump coal in the winter months creates a surplus of screenings, which are sold as low as 10 cents a ton at the mines during the period of demand for domestic coals. In the summer months when the lump coal production has reached its minimum, the same screenings command a price of $1 at the mines. To equalize these two extremes would be a well-nigh ideal condition.

There is no question but that the storage of coal is feasible, when conditions make it desirable. Coal should be stored at ultimate destination during months April to August to be of greatest advantage to producer and carrier. In support of this statement data has been procured showing the relative consumption of the railroads procuring their supply from this district for periods April to July and October to January respectively, and reports from 24 roads (using conservatively 95 per cent of the railroad fuel coal supplied from this district) show:

April-July	8,118,400 tons
October January	15,075,650 tons
Increase in fall and winter months	6,957,250 tons or 85.7 per cent

Lump and egg coal should be stored at destination by railroads, industrial plants and domestic users during months April to August. Screenings should be stored at mines by coal operators during period September to January.

The only storage undertaken by railroads has been previous to strikes or suspension of work at mines. Figures submitted by one railroad covering coal stored in fall and winter 1913-14 and recovered in spring 1914 show:

	Tons	Total cost labor and supplies	Average cost per ton
Unloaded	54,227	$6,507.24	.12
Reloaded	53,763	3,006.36	.055
Loss	464	$9,513.60	.176

Note.—Locomotive crane and grab buckets were used for handling both ways. The higher cost of unloading is due to charging the cost of temporary tracks to unloading expense.

Following are figures submitted by another railroad covering coal stored in year 1910:

Location of pile How stored	C Semi-permanent trestle, drop bottom cars, clam shell used to widen pile	B Drop bottom cars and track jacked up
Tons unloaded	132,314	31,576
Cost of Unloading—Total		
Labor Charges	$19,922.09	$3,946.45
Switching, etc.	2,082.50	673.71
Total	$22,004.59	$4,620.16
Tons reloaded	107,096	31,576
Cost of Reloading—Total	$ 8,818.21	$2,516.95
Cost of Unloading—Per Ton		
Labor charges	$ .150	$ .125
Switching, etc.	.016	.021
Total	$ .166	$ .146
Cost of Reloading—per ton	.082	.080
Cost of Unloading and Reloading	$ .248	$ .226

In storing pile C, tracks were placed at each side of the main pile and a clam shell operating on these tracks took the coal from the main pile after it had been dumped from the cars and transferred it to an auxiliary pile parallel to the main pile and thus leaving the clam shell operating on tracks between the main and auxiliary piles. It is evident that this additional handling ran up the cost considerably, and if interest and depreciation on investment of trestle were included in the table it would seemingly prove to be an uneconomical method.

Pile *B* is just the ordinary storage pile where drop bottom cars are used and track jacked up on the coal.

The following information was furnished by one railroad showing laboratory tests of samples taken in October, 1911, from a storage pile containing 5,651 tons, the most of which was stored in the fall of 1907, the remainder in the previous year. The average results of these analyses are shown in the table in comparison with those of samples taken at the mine in July and August, 1909, and during August, 1911.

	Proximate analysis					B. t. u. determinations and sulphur:	
	Loss of moisture on air drying Per cent	Moisture Per cent	Volatile matter Per cent	Fixed carbon Per cent	Ash Per cent	Sulphur Per cent	B.t.u.
Average of surface samples.	5.9	9.93	34.14	34.75	21.18	4.60	8,953
Average of samples taken 18 in. below surface	6.0	10.93	36.18	34.06	18.83	4.08	9,390
Average of samples taken 4 to 8 ft. below surface	4.3	9.37	40.78	35.10	14.75	4.82	10,296
Average of 6 days' samples of engine lump, July and August, 1909		8.08	37.66	37.01	17.25	....	10,298
Average of 5 days' samples of engine lump, August, 1911		10.15	38.95	35.13	15.77	5.10	10,705

This was Wyoming lump coal prepared over shaker screens and finally over a revolving wire screen having openings which average 17/64 in. square. Therefore this is what would be termed "Lump Coal," though of course it is a very low grade of lump. In the preparation of this lump they make approximately 10 per cent slack. No precautions were taken in storing this coal and it was stored by dumping the cars and then jacking up the track and again dumping the cars. After the pile was completed the track was taken up and the pile was not even peaked on top as it should have been. There was therefore a flat space about 15 ft. wide, and the depth of this pile was about 18 or 20 ft.

The report is signed by Carl Scholz (Rock Island Coal Mining Company), chairman, sub-committee.

NORTHWESTERN TERRITORY GROUP

In Canada, due to the long and severe winters, the open car will never become popular; it is a box car country. Relative to this probability is the reduced usefulness of the locomotive crane and clam shell for purposes of loading and reloading. Again, the same cause puts the ban upon the "submerging method" of storing for this country. These considerations limit and localize the problem for us.

Coal should rest on a dry base, moisture from below being conducive to spontaneous combustion. Provide as much ventilation as possible and distribute the weight of the coal as much as possible. Combustion nearly always takes place within 90 days after storing. The storage plants should be wherever coaling stations are. Extra capacity or storage should have been an accompaniment of every coal-chute built. Even if not financially able at the time, space should be allotted for them, until such time as they could afford to build them. This eliminates the second handling, its enormous expense and blockade of traffic, reducing to a minimum the use of all equipment for our supplies

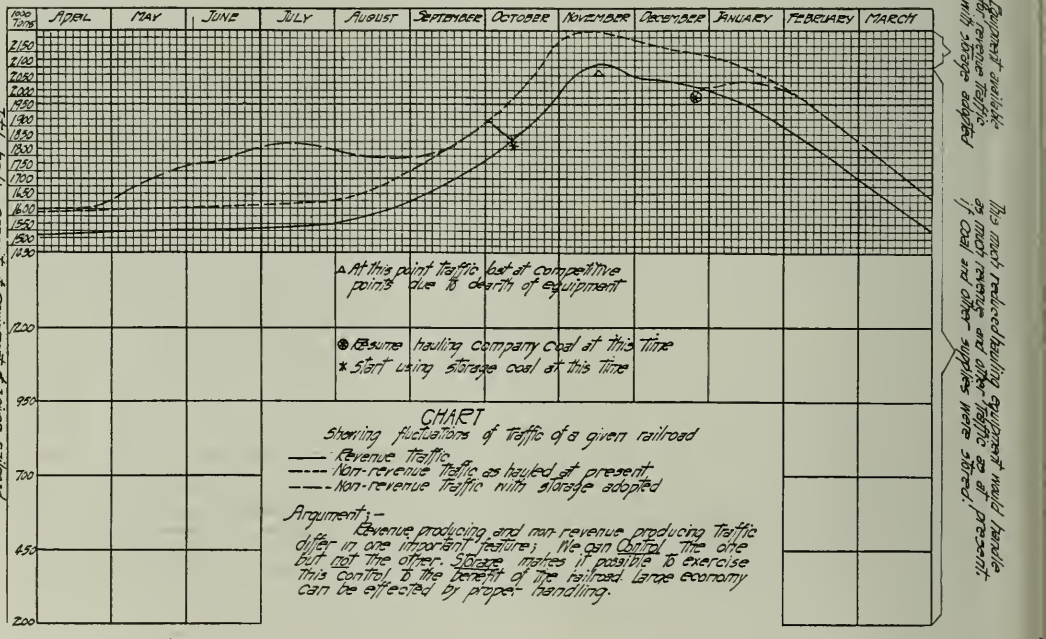
Mr. Hall's paper, that railroads incur higher expenditure in winter, in some cases as high as 31 per cent, implying the fact that the least possible of supplies should be hauled at this season also.

Again a great saving could be effected by eliminating the unnecessary delay to cars under the present system. A considerable number of cars are always held under coal. The storage plants would accommodate this surplus coal, with the result, that very many less cars would be engaged to do the same work. Once more, coal should be stored to protect long stretches of road not served with coal mines, at times of accidents, when supply would be cut off by wrecks, washouts, snow drifts, destruction of bridges or land slides.

The report is signed by: A. H. Davies (G. T. P.), chairman, sub-committee.

DISCUSSION

The storage of coal will not only assist the coal operators, which the railroads should be very willing to do, but also is of advantage to those roads which find it necessary to haul the coal long distances, or find it difficult to procure coal



and thereby provides the maximum of "right of way," in the shape of clear tracks and haulage equipment for revenue producing traffic.

To the railroads the practice of storing offers great benefits, well organized as they are. It opens up possibilities of economy and better organization that are surprising, in face of the apathy, almost antagonism, with which the idea of storing supplies has been received by the people concerned. Assuming for illustration that 15 per cent of our total hauling capacity is being utilized to haul our own supplies, at our busiest season, it is then evident that by hauling and storing at other times we could do without 15 per cent of our present equipment, and still haul the same amount of traffic.

With a view of demonstrating this phase further, through the courtesy of our secretary, the accompanying chart was obtained, that shows those different considerations at a glance. Lines denoting both kinds of traffic are in true proportion. A line is also drawn suggesting how supplies with a system of storage in vogue should be hauled, not forgetting the fact mentioned in

exactly when they want it. By the storage of coal at the proper time the coal carrying equipment will not only be released for carrying revenue coal at the rush periods, but also there will be much less equipment necessary to handle the business. From the fuel department standpoint the storage of coal is desirable, as it protects against strikes at the mines, train wrecks, interruption of traffic, etc. Where possible, the storage piles should be adjacent to the coal chutes in order to prevent rehandling, although in some cases it may be found practicable to store at some central point. Care should be taken to examine the coal piles periodically to prevent spontaneous combustion.

In the storage of coal a concrete floor will be found desirable, and care should be taken that there are no pockets in this floor for the accumulation of moisture. The height of the storage piles will vary according to the characteristics of the coal and the storage ground upon which it is placed. Many instances were mentioned where coal had been stored for 2 to 10 years with no trouble from spontaneous com-

bustion, while new coal would take fire quite readily. When coal is to be stored it should be carefully prepared at the time and not contain an unnecessary amount of impurities.

FRONT ENDS, GRATES AND ASH PANS

The committee on this subject sent out letters of inquiry to various railroads requesting information concerning the front end, grate and ash pan arrangements.

Front Ends.—The drafting of locomotives has always been considered a function of the front end alone, but speaking broadly, this is not correct. Drafting may be defined as the controlling factor in the combustion of the fuel, and rightly starts at the air openings in the ash pan. With these fixed the grate next governs, and then the firebox volume, tube area and length, the brick arch, etc. If these parts are properly adjusted it is not believed that any very delicate adjustment will be needed in the smokebox. There is nothing mysterious about the action of the exhaust jet to induce draft, and if all other factors receive their just due, it is not believed that we would have engines of the same class varying ½ in. in the diameters of their nozzles, with their draphragms clear down or clear up, etc.

Grates.—From a study of the information received regarding the grates it is found that the percentage of air openings of 62 bituminous grates varies between a minimum of 25.8 per cent in one design of interlocking finger grate to a maximum of 49.6 in a design of the herring-bone type, the average of all cases giving a percentage of 37.2 per cent. The degree of coarseness of the grates has been expressed in terms of the maximum dimensions of any air openings. This figure will vary between the limits of ½ in. and 1½ in. The 1 in. dimension of air opening is found to be that most generally used. The nature of the coal and the degree of tendency to form a clinkery ash will naturally govern the design in reference to the width of grate bars or length of the fingers.

Anthracite Grates.—The percentage of air opening for the anthracite grates varies between 32 per cent and 46.9 per cent, the average being 39.4 per cent. The coarseness of the grate in these cases, as represented by a maximum air opening, is ⅜ in. and ½ in.

Ash Pans.—From the information received on ash pans it is evident that there is a very great difference of opinion. The highest percentage of air opening in comparison to grate area for bituminous coal is 15.1 per cent, while the least is 5.78 per cent. With the tube area taken as a basis of comparison the maximum is 127.1 per cent and the minimum 50.8 per cent. The average ash pan air opening for all bituminous burning engines is 11.08 per cent as compared to the grate area and 82.1 per cent as compared to the tube opening. Previous investigations have shown that the air openings should total not less than 14 per cent of the grate area for best all around results. It would seem that the ash pan air opening should be not less than 110 per cent, instead of 75 per cent of the flue openings.

The ash pan volume should be made as large as possible; with modern power it can hardly be made too large. Delays en route might often be obviated if the necessity for dumping the pans could be obviated. On very large power with trailing wheels the use of the six hopper style of pans will often very materially increase the capacity over what might otherwise be obtained. A proper guard against the throwing of fire from the ash pan air openings must be provided. The report is signed by M. C. M. Hatch (D. L. & W.), chairman.

Discussion.—A. G. Kinyon, of the Seaboard Air Line, spoke strongly in favor of the table grate, as it provides a much greater air opening and will better distribute the air through the fire. Some success has been obtained by the use of the double-exhaust, the Delaware, Lackawanna & Western having made it standard on all anthracite burning locomotives and is now trying it out on the bituminous coal engines. The variable nozzle has been tried with but little success.

OTHER BUSINESS

The committees on Fuel Tests and Fuel Accounting submitted reports of progress. Arrangements have been made with the University of Illinois to conduct tests on various classes of fuel, as soon as the necessary contributions can be obtained for conducting the work. The committee on Fuel Accounting reported that it is to seek to reduce the number of forms in order to eliminate the clerical expense of this work. A paper on the Waste of Fuel in Railway Stationary Plants and Locomotives by Jos. W. Hays, of G. L. Simonds & Company, Chicago, was presented by F. A. Moreland, who also showed, by lantern slides, the common defects found in stationary boiler plants. From the statements by the author of the paper and others during the discussion it is apparent that the railways do not give the stationary plants the attention they deserve. Large sums of money can be lost if the plants are not maintained in proper condition.

The following officers were elected for the ensuing year: President, D. C. Buell, Union Pacific; vice-presidents, John G. Crawford, Chicago, Burlington & Quincy; E. W. Pratt, Chicago & North Western; W. H. Averill, Baltimore & Ohio; executive committee, W. C. Hayes, Erie Railroad; H. T. Brown, Illinois Central; M. C. M. Hatch, Delaware, Lackawanna & Western; A. G. Kinyon, Seaboard Air Line, and T. J. Lowe, Canadian Northern. Chicago was chosen as the next place of meeting.

The secretary-treasurer reported a total membership of 680 and a cash balance of $826.62; 316 members registered during the convention.

PROPOSED REVISION OF ACCIDENT RECORDS

William J. Meyers, statistician of the Interstate Commerce Commission, has sent out a series of new blanks for reporting accidents monthly to the commission, together with a further revision of the code of rules governing the preparation of the reports, modifying the proposals submitted by him last January and reported in the *Railway Age Gazette* of January 22, page 164. Since January, conferences have been held with railroad officers, and in particular with the committee of the American Railway Association, Messrs. Julius Kruttschnitt, W. W. Atterbury and W. G. Besler. The number of forms of blanks to be used for the different features is reduced from seven to four, and the principal blank, Form T, conforms pretty nearly to the suggestions made by the Kruttschnitt committee.

The proposed requirement for individual reports of non-train accidents—hitherto called industrial accidents—has been withdrawn, and the commission will require for these only a summary statement, as at present. The requirement of detailed reports of accidents to locomotives is retained, as is the blank calling for reports of the death of persons who have been previously reported as suffering non-fatal injury. A special blank has been added on which to report failures of rails whenever such a failure results in a train accident. The rule requiring reports of injuries to employees which disable them for less than three days is withdrawn. The comparison of accidents with train mileage is not to be asked for, but the blanks retain the forms for comparing the number of injuries to employees in non-train accidents with the number of hours worked by the men of those classes to which the injured men belong, five classes in all, the ratio to be shown for each class separately.

Those injuries, fatal and non-fatal, to persons on or around trains, where there is no train accident, which now are included in class C, are to be called "train-service accidents," and reported according to regulations much like those now in force, but in a great deal more detail. The date when the new regulations are to go into effect is left blank. It is desired that criticisms be received in Washington by June 1.

WOMEN RAILWAY EMPLOYEES IN ENGLAND

The employment of women on railway work in Great Britain is extending apace. The underlying idea is that by getting women to fill the places of men, more and more recruits may enter the army and maintain the requisite supply of soldiers. Even in time of peace the number of female railway employees in Great Britain amounted in the aggregate

Women Ticket Collectors at Paddington, Great Western Railway

to a fairly large figure, although it was mainly in the clerical, accounting and refreshment departments that scope was found for their services. A certain number of women were also employed on Scottish railways as car cleaners before the war. On the European continent the employment of women

Woman Ticket Collector on the London, Brighton & South Coast Railway

on railways has always been much more common than in Great Britain, women frequently acting as booking-clerks at stations and as gate keepers at grade crossings, while female station masters were by no means unknown.

The extension of the employment of women on British railways began with taking over an increasing number of women as clerks and for cleaning purposes.

The London & North Western introduced women clerks at Willesden Junction, about the end of March. At about the same time the Great Central tried the experiment of employing women as platform porters at Marylebone, its London terminal station. These women were selected from the car cleaners whom the company had already been employing with success. Their work is confined to platform duties. Obviously, women could not be expected to perform the more hazardous duties associated with a porter's occupation, such as switching, coupling and uncoupling cars and the like. Women ticket collectors were first introduced on the Great Western. One of the illustrations shows them at work at Paddington station. It will be noticed that the women collectors wear no distinctive uniform beyond a badge on the arm. The London, Brighton & South Coast, on the other hand, is putting its women ticket collectors into smart uniforms, one of which is illustrated herewith. Early in May female ticket collectors began their duties at Euston station

Restaurant Car Waitress, Great Western Railway

on the London & North Western, and that company is also engaging girls in the offices of the locomotive works at Crewe.

Owing to the large number of their employees who have joined the army, the three principal Scottish railway companies (Caledonian, Glasgow & South Western and North British) have also had under consideration the question of increasing the female staffs in their employment. They are already employing a number of women car cleaners. The proposed increase will affect mainly the various clerical departments, but it will also apply to booking clerks, parcel clerks, ticket collectors and telegraph operators.

Turks Building New Railways.—It is reported that the Turks are actively pushing forward the construction of a railway between Zonguldak and Ismidt, an important line, as Ismidt is not far from Skutari, with which it is connected by rail.

How the Operation of One Terminal Was Improved

Continued Serious Congestion Overcome By Change in Organization, Better Methods and Improved Discipline

By G. D. Brooke

Division Superintendent, Baltimore & Ohio, Chillicothe, Ohio

The enormous growth of our cities during the past half century has out-stripped the development of railway facilities within their ever widening limits. Property adjacent to the tracks has been in great demand for industrial sites, and has so increased in value as to render its use for railway purposes generally impracticable under present financial conditions. Moreover, even when suitable property is available, terminal improvements are extremely expensive and it is a difficult matter to justify their cost as an investment. Therefore, for the immediate future at least, the increased demands on terminal facilities will have to be met by more efficient operation of the existing plant.

Fifty years ago a railway extended its line to a certain middle-west city and established a terminal in the center of its commercial district. This terminal consisted of a small yard, a freight house and team tracks and an engine house and machine shop. These facilities, with a passenger station reached by a spur from the main line, were ample for the business then offered and apparently would be for a long time. With the advent of the railway, however, the city began a new industrial development, and the yard and narrow right of way forming the approach to it were walled in by warehouses, factories and industrial plants. To accommodate its facilities to the increasing business, the railway secured a site for another and somewhat larger yard on the outskirts of the city, where the topographic conditions were favorable. This in turn was surrounded by the expanding industrial district and a third yard further out and equal in capacity to the other two, was built on suitable ground and reached by a three-mile spur.

The absorption of another road and the construction of a connecting belt line established a through route, and, incidentally, added two other yards on the opposite side of the city. Five other railways have entered the city, and it is now one of the important gateways. The interchange, both of through business and of local cars for delivery within the switching district, is very heavy.

Meanwhile the industrial development has continued. Along the main tracks, industries have been established and provided with side tracks, many of which are inadequate for the requirements of the plants they serve. On the belt line a blast furnace and two steel mills have been established, also several fertilizer factories, brick yards and a number of smaller industries. In the early days a track was laid along an important street of the wholesale section for a distance of two miles, and a freight house and teaming yard established to serve an important district. A number of spurs lead off this track into warehouses and factories. There are altogether four freight houses and seven teaming yards in the city besides a fruit and produce shed and a team yard recently constructed to develop the wholesale fruit and produce traffic.

Twenty years ago the passenger terminal was rebuilt to accommodate the business of the home road, and to take in that of three foreign lines. It has been crowded for a number of years, and being of the stub-end type, the approach is badly congested during certain periods of the day.

Early in the last decade the main lines were double-tracked and equipped with automatic signals, and the junctions of the branch lines and of several foreign roads interlocked. Three crossings of foreign lines, however, near the throats of yards are operated by crossing watchmen with two-position crossing signals. A number of street crossings at grade have been eliminated, but a great many remain which are protected by watchmen and gates, and speed restrictions are numerous. The heavy increase in business which required these improvements made necessary also the remodeling and enlarging of two of the yards, one on either side of the city, where engine terminals were provided and which constitute the road terminals of the two adjoining divisions.

This terminal presents the most intense problem in operation of the entire system of 5,000 miles. Here is found the combination of a dense road movement, heavy classification work and industrial switching in congested districts. The only successful solution of such a problem is organization.

During the latter part of 1912 the terminal became congested; the heavy business taxed the facilities and the movement of through traffic became very slow; road trains were held out of the yards; there was a serious accumulation of bad order cars; delays to passenger trains and scheduled freights were frequent, and shippers complained bitterly of delays to cars and of poor switching service. These conditions were aggravated by similar congestion in the terminals of other roads entering the city. The situation was serious and the need of a strong directing head was apparent. The position of superintendent of terminals was created and filled by a man from the terminals of a foreign road in a distant city.

The new superintendent of terminals was an organizer. Prior to his appointment the terminal was operated by two general yardmasters reporting to the trainmaster of the division having jurisdiction over the terminal. Two weeks were spent in studying the facilities and the organization, and in becoming familiar with the movements to connections, the requirements of through business, and in a general way of the industries. Then was begun a series of changes in methods—and in a few instances, in men—which finally evolved the form of organization shown on the following page.

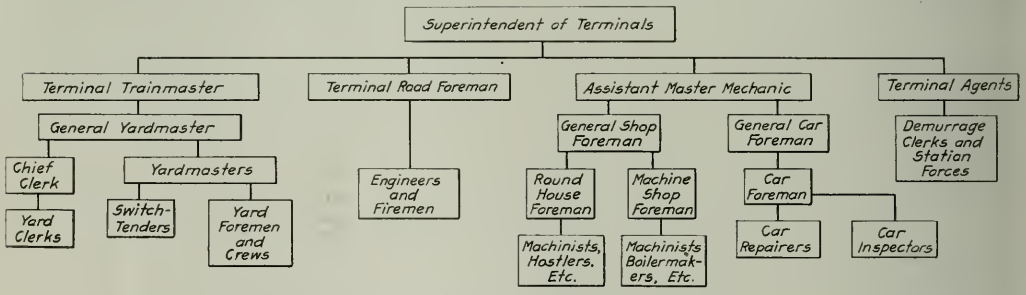
When any stranger enters an organization in a prominent capacity he is met with an instinctive undercurrent of mild antagonism. The organization braces itself to try the mettle of the newcomer. His every move is scrutinized to determine if the "old man" knows the game, and what his policy will be towards the older members of the organization. The new superintendent of terminals realized this, and knowing the value of "esprit de corps," called a staff meeting of the yardmasters, engine and car foremen, agents and clerks. His observation had convinced him that the personnel of the organization was generally good, and that the quickest results could be obtained from the material at hand. He therefore opened the meeting with a statement of reassurance, expressing confidence in the loyalty of each member of the staff and in their ability to contribute towards producing those results which were so obviously desirable. He then outlined his plan of campaign and explained briefly the reasons for each successive step to be undertaken. He emphasized the absolute necessity of each member of the staff supporting this plan in every detail, although he might hold an honest difference of opinion as to the method best suited to the case. In this way all latent prejudice and possible opposition were eliminated and a proper mental attitude towards the work in hand inculcated. Similar meetings were held frequently thereafter and were conducted so as

to elicit free discussion of each subject considered, to reach definite conclusions when there were differences of opinion, and to decide on a plan of action in every case. These plans were later issued in the form of written instructions to all interested parties to avoid all possibility of misunderstandings as to details. Besides accomplishing the immediate purpose in view, these meetings proved of great educational value, particularly to the less experienced yardmasters and clerks, and were very effective in promoting a feeling of joint responsibility and co-operation between the various departments or branches of the service.

The method of procedure consisted in selecting in succession the features of operation in the order of their importance; in studying each one thoroughly and broadly, having in mind its bearing on all the other problems; in determining on a definite course of action and putting it into effect, and in specializing on it until it became self-effective, or, as it were, automatic. Thereafter it required only periodic checking and such variations as might be required to meet changing conditions.

The first active undertaking was to reduce the number of cars in the working yards in the terminal. A comprehensive check indicated that in order to switch economically, a reduction of 40 per cent in the number of cars in the yard was necessary. Authority was obtained to destroy 200 bad order cars of old type and light capacity; a like number of empties were sent to the heavy repair shop at the terminal upon. Some duplicate checking was eliminated by assigning the checking of working yard tracks, interchange tracks and certain industrial tracks in the immediate vicinity of the yards to the yard clerks and the freight house and team tracks and usually the industrial tracks to freight clerks reporting to the several agents. These checks were completed by 7:30 a. m., and each yard and district reported to the car distributer by telephone. By the use of a special form the report for the entire terminal was quickly compiled and contained comprehensive information as to the location and character of movable loads, and the number and class of empty cars available for loading or movement. This report showed the situation in the terminal at a glance, and made it practicable to take steps to relieve promptly any tendencies towards local congestion, and to anticipate the needs of road power for the ensuing 24 hours. It also enabled the car distributer to dispose of the available empty equipment to the best advantage.

The movements between the several yards in the terminals, to foreign line interchange tracks and to certain of the outlying industrial districts required the use of a number of engines in drag or transfer service. These engines were being operated without any definite schedules or predetermined plan. Whenever a cut of cars was ready to move from any yard, the yard master would assign the first transfer engine available to handle it to its destination; if any cars were ready to be returned to the yard from which the engine started it would



Form of Yard Organization at One Important Terminal

of another division; it was arranged to increase the switching at the yards at the ends of the engine districts on each side of the terminal, and to make up the trains so that through business would not be delayed in the terminal yards, back haul would be avoided on business for connections and local delivery, and cars for each district of the terminal moved promptly from the yard where received; and by a campaign with the shippers an accumulation of unconsigned loads was gradually reduced and more prompt loading and unloading secured. Some additional road power was placed in service on the adjacent divisions, and it was arranged to store empty box cars held to protect loading in some unused sidings outside the terminal. These measures produced the anticipated results, and in three weeks the number of cars was materially reduced.

The next step was to establish a central car record office. The car record clerks from the offices of the general yard masters were transferred to the office of the superintendent of terminals and placed under the car distributer. Conductors' wheel reports of trains into and out of the terminals and the switch lists of yard foremen doing transfer, industrial, team track and freight house work reached this office promptly. This enabled the index work to be kept up to date and made an accurate location of all cars entering, leaving or moving within the terminal available at all times within reasonable limits. A daily report of the movable cars within the terminal from actual check of all tracks was determined take them; frequently it returned light and later there would be a light movement in the opposite direction. A meeting of the terminal superintendents of the several lines was called for the purpose of fixing definite hours for receiving and delivering cars at interchange tracks. This being accomplished, a schedule was worked out for the movements of each engine in transfer service, due regard being had for passenger and other scheduled trains. The several yards were required to have the cuts made up for the engines at stated hours and the transfer engines moved promptly on schedule. In working out the schedule it became apparent that more engines were in this service than were necessary, and in a short time three crews were taken off.

This scheduling of the movement of transfer engines brought the organization to a stage where it was practicable to cope successfully with the most important problem of starting passenger and scheduled freight trains on time, and running them on time within the limits of the terminal. The usual staff meeting was held to launch this campaign, the station master and his assistants, as well as representatives of the express companies and the superintendents of terminals of the foreign lines using the passenger station, being in attendance. The importance of starting scheduled trains on time and running them on time was dwelt upon at length, and the value to other movements of accomplishing this duly emphasized. It was pointed out that the conditions were very bad, and that success could be achieved only by

long and continuous effort. Above all things the train must start on time. Then proper respect for passenger trains must be installed into signalmen, switch-tenders, yardmen and men in freight service. Delays from various sources were to be expected, but one by one they would be eliminated and the men educated to the required standard. It was found advisable to appoint a yardmaster in charge of the coachyard and train shed, reporting to the station master and having full authority over all movements of passenger equipment into the station. The handling of express transferred from connections on close time was a serious difficulty, but was finally overcome by increasing the force and quickening the work. A yard foreman had to be dismissed before the practice of yard engines occupying main tracks and stopping passenger trains was broken up. In six weeks a decided improvement could be observed, and after six months of persistent endeavor the trains were moving with marked regularity, and the beneficial effect on the entire terminal was obvious.

The scheduling of the transfer engines and the efforts to run scheduled trains on time developed a weakness in the method of handling train movements within the terminal. Movements of yard engines and extra freights were handled principally by the signalmen and switch-tenders by telephone communication with adjacent offices and the yards. This resulted in frequent interference of movements; often with heavy delays. To systematize the handling of trains a three-trick dispatcher's office was inaugurated at the terminal headquarters. A telephone dispatching circuit was provided with connections at all interchange and heavy industrial points; telephone connection with all the yard and freight offices was also available by commercial service with a private exchange. This central control of all movements proved of great value. Yard engines could be given advantage of delays to passenger trains in making main track movements and still be kept out of the way of these trains; yardmasters could locate quickly any transfer or industrial switch engine with which they desired to communicate; all working at cross-purposes and misunderstandings were avoided and the movements made to the best advantage, having in view the general situation instead of the local one as formerly.

The switching of freight houses and team tracks was done by engines from the yards to which they were most conveniently located, and the general method was good. Definite work had been assigned to each engine to be done on an approximate schedule. The cars for placing were switched in order in one cut by the crews in the working yard; these were moved to the freight house and team yard by the engine assigned to that work and spotted after the outbound cars had been moved. The switching of merchandise and quick-dispatch cars required particular attention.

At a certain freight house the receipt of freight stopped at 5 p. m.; at 5:45 p. m. the cars were sealed and the night engine was standing on the lead ready to move the cars for points beyond the adjoining divisions. These cars were taken rapidly to the working yard and switched into eight classifications, five for the east and three for the west. In the meantime another engine had pulled the team tracks and was soon on the scene with the quick-dispatch loads, which it classified in turn while the first engine returned to the freight house to resume work there, taking with it a cut of cars from industries which had been collected by a day engine. It assisted in completing the classification and in switching the cars into one cut, with which it proceeded in turn to the east and west road terminal yards where the quick-dispatch trains were being made up for movement at 10 p. m.

The reverse of this procedure occurred the following morning, when the Q. D. run from New York arrived in two sections between 5:30 and 6 a. m., in order to have all the cars placed and ready for delivery when the freight house opened.

Success in handling the industrial switching was attained by determining just what service each plant was properly entitled to, and then planning the work of the engines so that this service could be performed with regularity. The smaller industries having a siding capacity of only a few cars presented no difficulties; a switch about the same hour each day was the rule, but it was thoroughly understood that no car should remain in the terminal longer than 36 hours before being placed.

The switching service at some of the larger industries had been the source of much adverse criticism and annoyance for months. The method in such cases was to make a call by appointment, on the manager of the plant and discuss fully the requirements of the industry and the practicability of giving the service desired. In a few instances it was readily shown that the siding capacity was inadequate and steps were taken to remedy this. A frank and thorough discussion of all questions involved always resulted finally in an understanding being reached as to the service to be performed, and in a short time a spirit of co-operation on the part of shippers was apparent. The character of the service having been determined upon in any given case, the work was assigned to a certain engine and followed for a few days by a yardmaster to insure the start being made right. Afterwards the work was checked periodically by observation and by inquiry of the manager of the plant, who was encouraged to report any poor service to the superintendents of terminals, and not to the traffic or general operating officers, as had been done formerly. By this means practically all complaints were remedied or adjusted locally, with much less delay and far greater satisfaction to all interested.

The proper movement and use of cars so as to provide empties for all loading offered required systematic and persistent checking. The agents were impressed with the importance of interesting shippers to load and unload cars promptly, and to place orders only for their actual needs. They were required to keep all demurrage records in such good shape that bills could be substantiated beyond question. Empty cars on industrial tracks not required for immediate use were moved out daily and used at other industries or stored in the working yard. The unloading of material for company use was systematized; a central storage site was selected adjoining a large heavy car repair yard, and a force was organized to unload the material there. The cars were placed regularly by the engine switching the repair yard, and the empties moved as soon as unloaded. The same force was used for transferring loads from bad-order cars for that section of the terminal, and a platform was built to facilitate this work.

While these changes in methods were gradually being evolved, the organization was being built up and strengthened. It was realized from the first that discipline was lax and the entire force disorganized. In going through the terminal, cars were found that had been broken up and others that had been shoved off the ends of stub tracks and not re-railed. Side collisions were not infrequent in the yards, and several accidents causing serious damage had been passed without investigations. These were the unmistakable indications that the men in the ranks did not have the proper respect for authority, and were not obeying the rules, and it was evident that this was applicable to the road crews running into the terminal as well as to the yard men. An undercurrent of dissatisfaction which occasionally amounted to antagonism was apparent, and was traceable to the policy of tardiness and unconcern in the settlement of minor grievances and the tendency to narrowness in considering doubtful wage cases.

A terminal train master was appointed for the distinct pur-

pose of promptly investigating all accidents and infractions of the rules. A man experienced in the administration of discipline was selected, and after he had become somewhat familiar with the physical conditions, he was assigned principally to office duty so as to be ready at all times during office hours to conduct investigations, employ new men and instruct and examine men on the rules. In case of accident he was also ready to proceed at once to the site and make a first-hand investigation on the ground. Notes taken in such instances often proved invaluable in fixing the responsibility ultimately.

In all investigations, and in fact in all dealings with the men, a quiet, dispassionate attitude was assumed, it being the intent to establish the impression that perfect fairness would be shown, and that the development of the real facts in every case was the object sought. At the same time absolute firmness was maintained in requiring obedience to rules and instructions. The system of discipline by record was in effect and it was the purpose to establish the feeling that every infraction of the rules, and every breach of discipline, would result in an entry in the record of the responsible employee. Yardmasters and other officers were encouraged to strengthen their own positions as much as possible by eliminating personal feeling and all display of temper in dealing with the men and by the personal assumption of authority for all instructions; they were afforded thorough support, but cautioned against hasty action which might necessarily mean the reversal of their decision upon appeal to higher authority. All grievances were disposed of promptly and a policy of liberality in disposing of doubtful wage claims adopted; on the other hand it was to be clearly understood that the men were well paid, and that first class service was expected. With the view of reducing accidents, the system of efficiency tests was prosecuted vigorously, and employees failing to comply with the rules in such tests were disciplined promptly. The tests were made as practicable as possible, and it was the aim to have them educational in character, the intended lesson being emphasized when the employee was interviewed in case of failure.

By the discussions at the staff meetings, and by missionary work in the form of conversations with some of the better class of men whenever the opportunity was auspicious, the mental attitude of the entire organization was gradually changed from one of carelessness and indifference to the company's interests to one of co-operation and of personal responsibility on the part of each individual for the success of the organization. The attainment of this "esprit de corps" was probably the most important asset developed in the new organization.

The changes in the methods and the improved discipline were productive of very gratifying results, the most important of which was that the traffic was moved with promptness and regularity. Scarcely less noticeable was the marked increase in efficiency of the switching crews and of the entire working force, which enabled a reduction of 25 per cent in the number of switch engines to be effected, and at the same time eliminated the working driving meal hours by the switching crews, except in the case of two crews which were assigned to switch important passenger trains during meal hours. As the organization became more effective this efficiency was stimulated by the promotion of friendly rivalry between the several yards, by commending crews and individuals for extraordinarily good work, and by establishing high standards and imbuing all with the idea that it was confidently felt that the standards would be maintained.

It was realized that the condition of the yard power had an important bearing on the efficiency of the work, and that there was opportunity for a large saving in the cost of fuel by the application of correct methods of firing and running engines. An assistant master mechanic was appointed to give closer supervision to the repairs to yard engines and a terminal road foreman to supervise the proper care of the locomotives when in service, and the use of fuel and engine supplies. The results obtained soon demonstrated the wisdom of providing this additional supervision and these officers proved of great value during a campaign on the part of the city authorities to abate the smoke nuisance.

The number of cars damaged in switching gradually diminished as the discipline improved, and the cost of repairing tracks damaged by derailed engines and cars showed a similar improvement. This relieved the car repair and track forces to a considerable extent and allowed them to apply their time to legitimate maintenance work. The efficiency of these forces was increased by persistent educational methods similar to those applied to the other terminal forces but adapted to their particular requirements. Car inspection was tightened, bad order cars repaired more promptly and the condition of the air brake equipment of trains leaving the terminal showed much improvement. Track conditions were likewise bettered, scrap of all kinds picked up promptly, material properly cared for and stored in orderly fashion, and yards and their surroundings kept free from accumulations of dirt and rubbish. Neatness seemed to be the order of the day and added materially to the air of businesslike activity which pervaded the entire terminal.

RAILROAD LEGISLATION IN MICHIGAN

The legislature of Michigan, recently adjourned, adopted nine laws affecting railroads. Two of these, house bills 466 and 467 amending the long and short haul law and the section of the railroad commission act relating to interchange of cars at terminals make no material changes, having been adopted to improve the phraseology of the statutes.

Senate bill 70 creates a board of mediation, conciliation and arbitration to deal with differences between employers and employees. So far as railroads are concerned they are allowed the option of taking advantage of the law or not as they may deem best.

Senate bill 234 provides for the inspection of boilers and creation of a board of three with authority to formulate rules for construction and use of steam boilers. Enforcement of the act is vested in the different municipalities. Any ruling of the board requiring changes in construction or in character of material used shall not apply until six months after approval by the governor and attorney general.

Senate bill 241 requires that when a railroad company enters a suit (to restrain the Railroad Commission from enforcing orders, etc.) it must be before the court of Ingham county.

Senate bill 328 provides that in the laying out of new highways the railroad commission shall have power to regulate crossings with railways, with the view of preventing dangerous crossings.

Senate bill 376 amends section 41 of the general railroad law so as to give the railroad commission authority to order connecting tracks laid between one railroad and another wherever practicable. Hitherto the law has required such connections only where the lines of two companies touched each other.

House bill 125 regulates the care and disposition of diseased hogs, and provides for the transportation of such animals to points where they may be disposed of. Under the general laws the railroads, when offered such shipments for transportation, can reject them as unfit freight.

House bill 150 puts on railroad companies the cost of paving streets crossing the railroad, including all necessary improvements and the furnishing of sewers. This, we understand, applies only to new streets.

New Zealand Railway Advertising.—The New Zealand Railway Department has decided that in future it will itself handle the business of advertising on railway stations instead of calling for tenders and letting contracts for that purpose.

Railway Storekeepers' Association Convention

Last Day's Proceedings of Annual Meeting Included Papers on Marking Couplers and Handling Signal Material

A report of the first two days' proceedings of the twelfth annual convention of the Railway Storekeepers' Association, which was held at Hotel Sherman, Chicago, May 17-20, was published in the *Railway Age Gazette*, May 21, 1915, page 1039.

The committee on the Uniform Grading and Inspection of Lumber, of which J. H. Waterman, C. B. & Q., is chairman, presented a brief report outlining the action taken during the year. The chairman stated that very little could be reported owing to a series of disappointments. Various conferences with lumber manufacturers' associations which it was hoped would lead to a better understanding between the railroads and the manufacturers as to specifications, etc., did not take place. These conferences were cancelled or postponed through no fault of the committee.

In a brief address, in which he referred particularly to the paper by W. H. Clifton on Substitutes for Expensive Lumber, A. E. Manchester, superintendent of motive power of the Chicago, Milwaukee & St. Paul, told of cars in service for 35 years on his road equipped with siding and roofing of high grade white pine, the wood still being in perfect condition. He also mentioned a building which has recently been wrecked, the lumber costing at the time the building was erected, 50 years ago, nine dollars per thousand feet. After the building was wrecked this lumber was sold for $27 per thousand feet.

J. H. Waterman, superintendent of timber preservation, Chicago, Burlington & Quincy, condemned the practice of accepting rejected lumber for any use whatever.

G. G. Yeomans told of at one time accepting rejected lumber on the Burlington at lower prices until 50 per cent. of the contents of the yard was culls. Several purchasing agents stated that there was no trouble in getting good lumber if the poor quality lumber is refused and the shipper compelled to pay the freight both ways. About 15 of the railways represented at the convention refuse to accept rejected lumber at any price. A member told of receiving a number of draft timbers, some of which were 10 ft. 3 in. long and some 12 ft. long. The shorter timbers were all satisfactory while about 50 per cent of the 12 ft. timbers were culls, the ends being in such a condition that the timbers had to be cut down to 10 ft. 3 in. The result of this practice was that the storekeeper was overstocked with 10 ft. 3 in. draft timbers while there was a shortage in 12 ft. timbers.

MARKING OF COUPLERS AND PARTS

The committee communicated with all the leading coupler manufacturers of the country and, while their suggestions were of some value, the members came to the conclusion, after tabulating various makes and styles of couplers and repair parts which are manufactured at the present time, that it would be better to number all parts, rather than to number a coupler and use a prefixed letter or letters to designate the parts. The committee therefore recommended the assigning of a series of numbers to each make of coupler and parts; the appointment of a standing committee to take care of assigning additional numbers as required; the publication of a booklet listing the various parts with the assigned numbers; and insistence, on the part of purchasing agents, on having manufacturers show, in raised figures wherever possible, the number applying to any particular part on the body of such part.

The committee submitted a list of such couplers and parts as it has been able to gather and has assigned numbers which it feels will give the desired results.

The report is signed by A. J. Kroha (chairman), C. M. & St. P., and L. H. Tutwiler, B. & O.

Discussion: The chairman of the committee stated that the manufacturers believe that all the information there is room for is now placed on couplers and parts, but he also stated his belief that if the association insists that the recommended numbers be placed on the couplers and parts, the manufacturers will agree to it. The report was adopted and referred to the American Railway Association for its action.

STANDARDIZATION OF TINWARE

W. F. Jones, New York Central, the chairman of the committee on the Standardization of Tinware, stated that the committee had no printed report but that the previous recommendations were still in the hands of a committee of the Master Mechanics' Association and the report was expected at the June convention in Atlantic City. The members of the association were referred to the issues of the *Daily Railway Age Gazette*, published at the Master Mechanics' and Master Car Builders' Association conventions at Atlantic City, for information as to the action of the Master Mechanics' Association.

BOOK OF STANDARD RULES

The report of the committee on the book of standard rules consisted of an index for the book of rules which was adopted at the 1914 convention.

HANDLING SIGNAL MATERIAL

C. R. Ahrens, storekeeper, Delaware, Lackawanna & Western, Hoboken, N. J., presented a paper on the above subject, of which the following is an abstract:

All railroads do not handle signals and repair parts through their stores department. It happens to be the case on the Lackawanna and I believe the practice has been completely successful, both in keeping signal stock down to a minimum and in getting material to the place wanted at the right time, not only for repairs, but on new installations as well. This requires the greatest care and vigilance on the part of the storekeeper in charge of signal material; first, in order to meet the views of the management of the road; second, in regard to the needs of the signal department, in not delaying its work by failing to have material on the ground when wanted.

The storekeeper in charge of signal material should work in accord with the signal engineer or his assistants, not only in regard to any work being done but in changes in types of signals and repair parts.

To keep down the stock to the lowest possible quantity, and yet have material when wanted is no easy task, for where the signal stock is concentrated at one store, the storekeeper cannot borrow or transfer. To keep from getting accumulations of inactive or obsolete material is just as important as it is to have material when wanted, for we must not keep the signals out of operation on account of not having material for repairs. On railroads having large mileage where the signal material is handled by the stores department it is necessary to carry signal material at more than one store unless they have good facilities for quick shipment anywhere on the line where a derailment or breakdown may occur.

Where a freight transfer is located near the storehouse, it may be possible to reduce labor expense in the storehouse and facilitate shipments by having the different division foremen and supervisors have their requisitions for maintenance material forwarded at a certain date, and arrange for material ordered on the purchasing agent's requisitions to arrive about the same date.

In handling the smaller repair parts, bins are used similar to those in any storehouse, while such items as front rods, throw rods, lock rods, etc., I have found are handled more quickly by placing them on a raised floor or platform while

detector bars, ladders, etc., can be placed in the same rack with signal pipe, poles, etc. Foundation legs, piers, etc., are piled on the storehouse platform where they can be conveniently loaded and unloaded.

When a practical man cannot be secured for receiving clerk it will be found helpful on items of signal material, either for stock or direct shipment, to number each item ordered and request the signal companies furnishing them to show on their shipping notices the parts which apply on each item ordered; for instance, if a cylinder complete for a switch movement is shipped to us in three parts each part on the shipping notice is marked "Item 16" or whatever number the cylinder was numbered on our requisition.

We have a signal machine shop in the same building as our storehouse and all relays, mechanisms and such items returned to us for credit or repairs are turned over to this shop and, after they are looked over and repaired, we take them back and allow credit for the value, provided the signal department advises that the repaired material can be used in place of new. All classes of signal scrap are shipped to the division storehouse on each division, except worn out battery elements, for which we have a special place prepared.

Each requisition received from the signal department is numbered. When the material ordered has been shipped we make a shipping notice covering the shipment, sending a copy to the general storekeeper, a copy to the signal engineer and a copy to the supervisor in charge of the division ordering the material. The last named in turn sends the notice with a detachable stub to the maintainer or repairman and, if the material has been received in good condition, the stub is returned to us with the signature of the man who ordered the material. At the end of the month a statement is made up, showing all notices covering signal material, and this is furnished to the signal engineer.

R. D. Long, C. B. & Q., also presented a paper on this subject, in which he stated that the signal supply storekeeper should be a practical signal man. An untrained man in this position can waste much material while a trained man can save much, particularly by reworking and using second hand material. The plan of handling signal material on the Burlington was outlined. A change in signals on this road made obsolete a considerable amount of material such as relays, etc. These were changed so that they could be made use of, and a considerable saving resulted. This could not have been accomplished without a signal man being in charge of the stores for this branch of the work.

ELECTION OF OFFICERS

The nominating committee presented a report recommending that J. G. Stuart, general storekeeper, Chicago, Burlington & Quincy, Chicago, be elected president; W. A. Summerhays, general storekeeper, Illinois Central, Chicago, first vice president; H. S. Burr, general storekeeper of the Erie Railroad at New York, second vice-president, and J. P. Murphy, general storekeeper, New York Central, Collinwood, Ohio, secretary-treasurer. The recommendations of the committee were unanimously adopted by the convention.

Railway Construction in Bolivia.—The government of Bolivia has announced its intention of beginning at once the construction of a railway from Tupiza in southern Bolivia to La Quiaca in the northern part of Argentina. La Quiaca is near the Bolivia-Argentina boundary and is the northern terminus of one of the great Argentine lines. Tupiza is on the Bolivian railway system and is connected with the Pacific coast by three lines touching the coast in southern Peru and northern Chile. The connection of these two lines, now proposed, will mean another trans-continental railway for South America. The Bolivian railway system consists chiefly of a north and south trunk line through the great elevated region in the vicinity of Lake Titicaca which line is connected with the Pacific coast by three distinct lines running respectively to Antofagasta and Arica, Chile, and Mollendo, Peru.

JULIUS KRUTTSCHNITT URGES CHANGES IN MEDIATION AND ARBITRATION LAW

Amendment to the Newlands mediation, arbitration and conciliation act to make the law apply to all railway employees, co-ordination of the Board of Mediation and Conciliation with the Interstate Commerce Commission and compulsory investigation and mediation of labor controversies, are urged in a letter written by Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific, to Frank P. Walsh, chairman of the United States Commission on Industrial Relations. The letter was written for the purpose of amplifying some of the views Mr. Kruttschnitt expressed when testifying before the commission at Chicago on April 10, in reply to questions as to what could be done to settle labor disputes and maintain industrial peace. Mr. Kruttschnitt says in part:

"The act of Congress, approved June 15, 1913, known as the Newlands act, providing for mediation, arbitration and conciliation in controversies between certain employers and employees, is a great improvement on the Erdman act, which it superseded, but it relates to employees engaged in train service or train operation only, of common carriers engaged in interstate commerce. Its usefulness would be greatly increased if it were made to apply to all railway employees engaged in the interstate business of the employer, including those engaged in keeping in repair cars, locomotives, appliances, machinery, track, roadbed, and other instrumentalities of interstate commerce. The Board of Mediation and Conciliation, appointed by the President under the act, has proven useful in maintaining industrial peace; but as it frequently results, as a consequence of invoking the services of this board, that railway expenses are increased, it is very important to the carriers that the board should be closely co-ordinated with, or, better still, subordinated to the Interstate Commerce Commission so that the same authority responsible for increasing expenses of the carriers should at the same time incur a corresponding responsibility for providing revenue to meet the expenditures. The reasonableness of such a provision is apparent when the complete control of revenues, and almost equally complete control of expenditures by the government at the present time, is considered.

"The Newlands act provides that when a controversy arises either party may apply to the Board of Mediation and Conciliation for its adjustment, and the board may offer its services to the parties in controversy where interruption to public service is imminent. There is no obligation, however, other than a sense of obligation to the public, on either employer or employee to submit differences to mediation. Instances have occurred where mediation and arbitration have been stubbornly refused, with utter disregard of the public's interest and rights, and the act offers no remedy. This defect could apparently be remedied, as is done in the Canadian industrial disputes investigation act of 1907, which makes a combination, lockout, or strike illegal until the questions at issue shall have been thoroughly investigated and made public; and there should be a provision that where the board *offers* its services for investigation, mediation, and conciliation, it shall be obligatory on and not optional to the parties, to submit their differences so that the public may judge the dispute intelligently.

"The desirable feature in the Canadian act is that it compels investigation and publicity, and peace pending investigation; and paves the way, as the Newlands act does, to arbitration, which, however, is optional with the parties to the dispute The Canadian Department of Labor, in its bulletin of April, 1914, reviews the proceedings under the industrial disputes investigation act of 1907 for a period of seven years, during which it had been in effect. One hundred and sixty-two applications had been received, as a result of which 141 boards of conciliation and investigation were established. In 19 cases the matters in dispute were adjusted by mutual agreement while steps were

pending for the establishment of boards. Two applications were under consideration at the end of the year. There were altogether only 18 cases in seven years in which strikes were not either averted or ended through the instrumentality of the act. Out of this total, one occurred in the operation of railways, five in railway offices, shops and yards, and one in the operation of a street railway. In a report dated December 9, 1912, on "The Industrial Disputes Investigation Act of Canada, 1907," made by Sir George Askwith, chief industrial commissioner to the British Board of Trade, and presented to both houses of Parliament of Great Britain, the purposes of the act are defined as follows:

> The simple purpose of the act is to insure the recognition of the interests of the public as a third party in trade disputes, and the insistence that that third party, through the government, shall have a voice in regard to a dispute affecting their interests, and, according to the act, before a stoppage of work takes place. In practice, the recognition extends to cases arising before or after a stoppage of work. While this principle of the recognition of the public interest in trade disputes is emphasized in the act, the actual interference with the parties in the settlement of their differences is sought to be reduced to a minimum by the act being confined to industries whose uninterrupted continuance is of high importance to the well-being of the nation (mining, railways, shipping, and other public utilities); and to a brief suspension of the right to stop, as distinct from a complete prohibition of stoppage.

"Reports of the satisfactory operation of the Canadian act, and a conviction that like benefits would accrue through the adoption of some of its provisions in the United States, induced me to send an assistant to Canada in September, 1914, to learn at first hands from the managers of Canadian railways, and from the Canadian Department of labor, their experience with the operations of the act. The opinion alike of railway executives, and of the commissioner of labor, was that their disputes and investigation act was satisfactory and very successful in preventing lockouts and strikes. In discussing the results of our observations with the executive heads of some of our important railway systems the opinion was expressed, without exception, that the provisions of the Canadian act were most helpful in the interests of employers, employees, and the general public, the three parties to every industrial disturbance."

WAGON HAULS FOR FARM PRODUCTS

In a bulletin issued by the Department of Agriculture, Frank Andrews, chief of the division of crop records, describes the results of an inquiry just completed by the bureau of crop estimates, showing that the average distance from market of the farms of the United States is 6½ miles, while those farthest away from market, excluding the rarer instances, average 8.7 miles. The number of round trips per day averages for all farms 2.1, and for the more remote farms 1.6 trips. In other words, it requires about one-half day for the average farmer to make a round trip with a wagon from farm to market and back, and nearly two-thirds of a day for the farmers who are farthest from market. The average wagon load of cotton is three bales, or about 1,500 lb., while the average wagon load of wheat is 53.5 bu., or 3,200 lb., and of corn 40.5 bu. The estimated time spent in hauling from farms in an average year is given as 6,358,200 days for corn, 6,857,400 days for wheat, and 2,532,300 days for cotton.

The article states that while the figures for 1906 are not strictly comparable with those for 1915, it is evident that wagon hauls are shorter than they were nine years ago. In 1906 the average haul from farm to shipping points was, for wheat, 9.4 miles; for corn, 7.4 miles; cotton, 11.8 miles. Railroad building during the past nine years has brought some farms nearer to shipping points and markets and has helped to shorten the average distance hauled and to increase the average number of trips per day. It is also stated that the improvement of wagon roads during the past nine years has probably helped to increase the average quantity of farm products moved by a day's wagon haul.

A. R. A. REPORT ON FREIGHT EFFICIENCY

The report of the Committee on Relations Between Railroads, presented at the semi-annual meeting of the American Railway Association in New York City, May 19, was briefly noticed in our account of the meeting, printed in the issue of May 21, page 1088. The most important feature of this report is the series of resolutions (adopted by the association) which were prepared by the Committee on Packing, Marking and Handling of Freight. These are as follows:

(1) WHEREAS, For the fiscal year 1914 the railways of the United States and Canada have paid out over $36,000,000 for freight loss and damage, a larger amount than ever before; and

WHEREAS, No one department of the railways and no one association is competent to deal exclusively with the prevention of loss and damage and the reduction of these payments, but a combined effort is necessary by practically all railway associations, departments, officers and employees, be it

(*a*) *Resolved*, That, as the extension of interline or through waybilling of freight from point of origin to destination is desirable as an aid in economical and efficient railway transportation, lessens the time required for transporting freight, is helpful in the operation of junction agencies, reduces the number of overcharge claims, and facilitates the investigation of loss and damage as well as overcharge claims, the attention of the traffic associations and the traffic departments of the railways members of The American Railway Association be called to the apparent need for joint through rates and division sheets covering such rates for apportioning among carriers the revenue incident to through waybilling of freight; and be it

Further Resolved, That the utmost co-operation be recommended between the various traffic organizations, the railway traffic departments and the Association of American Railway Accounting Officers in obtaining as promptly as practicable the greatest possible extension of through or interline waybilling of freight.

(*b*) *Resolved*, That the auditing departments be requested to enforce proper rules for the prompt and accurate billing of freight in accordance with the standards of the Association of American Accounting Officers, with special reference to over and astray freight.

(*c*) *Resolved*, That the classification committees be requested to continue their work of adopting uniform and effective rules for the packing and marking of less than carload freight and for the loading of carload freight, and that they be further requested in the formulation of their loading rules to co-operate with the Master Car Builders' Association.

(*d*) *Resolved*, That the traffic associations be requested to eliminate so far as practicable all exceptions to classification rules for the packing, marking and loading of freight.

(*e*) *Resolved*, That the traffic departments be requested to co-operate in the elimination of these exceptions, and that they be further requested to give their hearty co-operation to the other associations and departments in the enforcement of these rules for the packing, marking and loading of freight.

(*f*) *Resolved*, That the operating departments be requested either directly or in co-operation with the inspection bureaus to inspect and enforce the administration of the packing, marking and loading rules in the classifications, the loading rules of the Master Car Builders' Association and the loading and L. C. L. rules of the American Railway Association, and that they be further requested to experiment with and suggest improvements in these rules and standards.

(*g*) *Resolved*, That the inspection bureaus be requested in co-operation with the traffic and operating departments, to inspect and enforce these rules and to suggest improvements therein.

(*h*) *Resolved*, That the Freight Claim Association be requested to so amend its rules that claims involving defective equipment be paid by the road on which the car is loaded, unless that road can clearly show that it has inspected and repaired the car in

accordance with the rules of the Master Car Builders' and American Railway Associations.

(*i*) *Resolved,* That the Master Car Builders' Association be requested to continue its efforts to secure proper inspection and maintenance of equipment and safe loading of freight, and it be requested to co-operate with the classification committees in the question of loading.

(*j*) *Resolved,* That the general managers' associations be requested to continue their co-operation in securing safe carriage of freight.

(*k*) *Resolved,* That the American Association of Freight Agents be requested to continue its efforts in the prevention of loss and damage and that it be asked to recommend to the American Railway Association such changes in the rules as it thinks desirable.

(*l*) *Resolved,* That the operating departments of the railways members of the American Railway Association be further requested to frame and enforce rules for the careful handling of freight during receipt, transfer and delivery by local and through freight trains and in yards, and for the prevention of robbery, and that they be recommended to keep their interested employees, including agents, freight and yard conductors and enginemen, advised as to the extent of loss and damage on their lines, and especially of loss and damage for which they are responsible.

WEIGHING AND PER DIEM

On the recommendation of the committee a resolution was adopted by the association to the effect that over and short reports at all common points be checked at least twice a month.

Three interpretations of the National code of weighing rules, covering L. C. L. freight weighed on track scales and certain phases of the reweighing of cars loaded and light, were presented by the committee and approved by the association. A resolution was also adopted providing that weight agreements at highly competitive points should be issued and checked by weighing and inspection bureaus or other joint agencies.

On the recommendation of the committee a resolution was adopted that when a subscriber to the per diem rules agreement delivers cars subject to the per diem rules to a non-subscriber it should collect not less than the per diem rate.

Per Diem Rule 1 was amended on the recommendation of the committee to read as follows:

1. The rate for the use of freight cars shall be 45 cents per car per day, which shall be paid for every calendar day, and shall be known as the per diem rate; except that where per diem is not reported to car owner within six months from the last day of the month in which it is earned, the rate shall be increased 5 cents per car per day.

An amended form of Per Diem Rule 14, offered by the committee, was ordered referred to letter ballot.

The committee recommended changes in Car Service Rules 3, 14 and 15, which were approved by the association. Rule 3 provides that empty cars may be short-routed, with the consent of the roads over which they are to move and subject to Rules 1, 3 and 4, at a reciprocal rate of 2½ cents per mile, plus bridge and terminal arbitraries, with a minimum of 100 miles for each road handling the car. The road requesting the movement must secure such consent and pay the charges.

Under Rule 14 no mileage will be paid for switching movements at terminals, nor for movement of empty cars for which charges are assessed under freight car tariffs. Rule 15, covering cases where freight is transferred because of a defect in a car that is not safe to run, according to M. C. B. rules, is changed so as not to include cases where the repairs can be made under load as per M. C. B. Rule 2.

An amendment proposed to Car Service Rule 5 was referred to letter ballot. A resolution was adopted requesting the Master Car Builders' Association to enforce its Interchange Rule 30 at all interchange points. The committee reported that the amended demurrage rules providing for an increased rate on refrigerator cars were put into effect generally in New England and Trunk Line territory on February 1, 1915, and in Central, Western and Southern territory on April 1, 1915.

The association approved amendments to Demurrage Rules 6 and 8, making more strict the regulations for collecting demurrage on shipments delayed because the shipper does not furnish billing promptly, and for collecting from consignee on goods so frozen in transit as to delay unloading.

Amendments have been made to Interpretations Nos. 902 and 903 of the Demurrage Rules, and new interpretations have been made of Nos. 364 and 365; and these have been agreed to by the National Industrial Traffic League. On the recommendation of the committee, an amended form of Constructive Placement Notice was adopted, to be put into use October 1, next.

THE REWEIGHING AND RESTENCILING OF CARS

By J. V. James

Chief Clerk, Special Department, Missouri, Kansas & Texas, Parsons, Kan.

One of the greatest leaks in the transportation of freight results from the incorrect weights stenciled on equipment. Recently in relight-weighing and restenciling 500 cars, over 85 per cent showed a decrease of from 200 to 500 lb. in tare weights. These cars were cleaned of all refuse and reweighed in clear weather. Fifteen per cent of the total number showed an increase in the tare weight from 200 to 300 lb. over the old weights, caused by the installation of United States standard appliances and new draft rigging. This discrepancy averaged about 250 lb.

As a rule heavy-repair cars are light-weighed and restenciled at repair points, but there are points where repairs are made where there are no track scales, consequently these cars will probably go several months before being reweighed. On the other hand, wooden and steel underframe cars will run from 8 to 14 months before being reweighed and the new weights will run from 200 to 500 lb. lighter than the old.

M. C. B. Rule No. 30 provides that all wooden cars and steel underframe cars shall be reweighed and restenciled every 12 months during the first two years they are in service, and thereafter every 24 months. All steel cars must be reweighed and restenciled at least once every 36 months. This rule is one of the most important in the M. C. B. code both for the shippers and the transportation companies and yields a good profit for doing the work. Weighing foreign box and other cars, except stock cars, nets an average of about 80 cents each and it saves that much on each system car. On account of the expense of cleaning stock cars, weighing will not net any revenue, but at points where this class of equipment is cleaned and disinfected the light-weighing and restenciling is just as profitable as with any other equipment.

The writer recently started a campaign on the matter of light-weighing and restenciling cars and was surprised to find such a large number of employees whose duties pertained to such work who were absolutely unaware of the fact that any revenue could be derived from such work. It had never occurred to them that in hauling a car weighing 500 to 1,000 lb. less than the stenciled weight, loaded with coal for a distance of 200 miles, at a rate of $1.50 per ton, the company was losing $0.75 to $1.50 and this is the lowest rate applied. After a tentative plan was outlined with all yardmasters, weighmasters, engine foremen and employees of the car department, cars of certain classes which could be held from 5 to 8 hours without unnecessarily delaying them were reweighed. This class of equipment consisted of mine empties coming in during the day that would not be run out until the early morning mine trains. All cars to be reweighed in accordance with M. C. B. rules, system and foreign, were carded by the car department to weigh. As this only requires a few seconds nothing was lost if the yard forces did not get time to switch them out for weighing, but the carding of all cars coming under the rule made it possible to use the yard engines for a valuable service at every possible opportunity. When a car to be weighed was found in making a switch it was placed on the scale track until there was an accumulation of

10 or 15 cars. They were then weighed light, the weighmaster taking the old and new weights and the car men immediately restenciling all cars.

All stock cars brought from the disinfecting plant well cleaned are weighed and restenciled, as it only requires about 30 seconds to weigh each car. Thus the time to weigh a cut of from 15 to 20 cars can be found some time during the day with any kind of business. The scales used are Fairbanks standard beam track scales, 42 ft. long, 100,000 lb. capacity, thus necessitating cutting all cars at one end and at both ends when possible. While it has been claimed that proper weights can be obtained by weighing cars coupled at both ends, our observations are that there is too much of a chance that proper care will not be exercised, and we require that all cars be uncoupled at one end at least when being light-weighed.

After getting all yard employees interested in the matter of reweighing foreign cars to earn a profit and system cars to save the cost of having other lines do it, and at the same time increasing our margin of profit by correct weights, our number of cars reweighed and restenciled per month has increased 300 per cent. A weekly bulletin is issued showing the number of foreign cars light-weighed and the amount earned on same and the number of system cars light-weighed and the amounts saved by doing the work on our own line, also the average discrepancy in weights in favor of the shipper, which, with the correct weights, will reflect a created profit for the company by light-weighing and restenciling. The forces in the different terminals vie with each other to make the best showing which, of course, is based on the number of cars handled at a terminal.

In one weekly review of the light-weighing of cars it was noticed that a foreign car was weighed which had not been light-weighed according to the stenciled weights, for six years. This car's stenciled weight was 36,300 lb., and the new weight was 34,200 lb., a difference of 2,100 lb. To satisfy curiosity the last move of this car under load was traced. It was found that the car had been received loaded with ore. The rate from the point of origin to destination was 11½ cents per 100 lb. The car was not weighed before loading, but was weighed after being loaded and the stenciled light weight on the car was used in determining the weight of the load, which showed the load's net weight was 61,000 lb. The railroad had hauled 2,100 lb. of ore 230 miles for nothing, having practically given the shipper $2.41 in this one trip for the lack of a few minutes work reweighing and restenciling the car to the correct weight at some scaling point.

In this matter, cars of some of the largest and most efficiently operated trunk line railroads in the United States have a tendency to show just as great a neglect as some of the smaller lines. In summing up this matter, it appears to the writer that one of the greatest opportunities for increasing and creating revenue, is to place correct weights on equipment and l. c. l. shipments, which will insure the railroad companies getting paid for what they actually haul.

WITHIN THE MEMORY OF ONE MAN

In a recent address before the Engineers' Society of Western Pennsylvania, A. W. Thompson, vice-president of the Baltimore & Ohio, said that "there is living in Cumberland, Md., the first agent of the Baltimore & Ohio at that point, Judge Oliver Gephart. In company with his father he attended the laying of the corner-stone of the Baltimore & Ohio at Mt. Clare, Baltimore, in 1828, and remarked at the time that it was his desire to reach the age of Charles Carroll, of Carrollton, who was then past 90. Mr. Gephart is now past 96 years of age, is in full possession of all his faculties and his reminiscences are extremely interesting. He worked on the grading of the canal near Cumberland, and associated himself with the Baltimore & Ohio in its early days.

"While serving as ticket agent at Cumberland he studied law, was admitted to the Maryland bar and later became judge of the Orphans' Court. He is a very well-known and influential citizen of Cumberland and takes a keen interest in everything pertaining to his home city. He is a director of the Second National Bank, one of the strongest banks in the state of Maryland, and for 39 years has attended the directors' meetings regularly.

"Thus within the memory of one man, of over a period of 80 years, the American railroad transportation machine has developed from stage coach to steel passenger train. Out of the old stage coach days and the period of early railroading Judge Gephart has passed to our time with its fast engines, dining cars and automobiles to meet them. It is now possible for him to travel in one day, surrounded by comforts undreamed of, a distance which would have required a week in his boyhood."

MASTER BOILER MAKERS' CONVENTION

The annual meeting of the Master Boiler Makers' Association opened at the Hotel Sherman, Chicago, on Tuesday morning, May 25, President James T. Johnston, Atchison, Topeka & Santa Fe, presiding.

An address was made by E. W. Pratt, assistant superintendent motive power and machinery, Chicago & North Western, of which the following is a brief abstract: The work of boiler inspection has been carried on and developed by the government with very little opposition. The government inspectors and the railroad representatives have co-operated for the benefit of both and of the public. There were good reasons for some of the railroad legislation enacted during the past years, but the general opinion seems to be that this has been overdone and that the railroads have been exhausted by the excessive doses of correctives applied. They now need a rest.

Statements made before legislative committees as to the millions of dollars involved by certain enactments do not produce any very great effect. On the other hand, a simple statement made before such a committee in reply to a request for detailed information from the general manager on any topic and showing, for instance, that it is necessary for a railroad to haul 4½ tons of coal one mile to pay for the cost of a postage stamp, has a much better effect on the committee and the galleries than many statements in which millions of dollars figure.

Mr. Pratt also mentioned the tendency of politics to become cleaner and the necessity of men in responsible positions, such as occupied by the master boiler makers, taking an active part in civic affairs. Decreasing the revenue of the railroads, coupled with increases in taxes and wages, makes it dependent upon all interested to see that conditions are improved. To this end every man should go to the primaries and see that the proper men are nominated and elected. Keep in close touch with the employees. Be fair and honest with them, for without the support of rank and file no man can secure permanent advancement. Be courteous and considerate, and be as careful as to how a thing is said as to what is said, and the strength of the individual as well as the Master Boiler Makers' Association will be augmented.

Mr. Pratt recommended the use of oxy-acetylene and electric welding machines and urged the necessity of having as many shops and terminals as possible equipped with them. He also directed attention to the necessity of following closely the minute details of boiler work, such as keeping the flues clean; inspecting the beads on flues; boring out flues; inspecting beading tools to see that they are in proper condition; maintenance of arches, ash pans and front ends; watching the tendency of the sheets to corrode at the grate frame and packing the space between it and the sheets with something to keep the ashes out; last of all the advisability and necessity of being courteous to the men.

The treasurer's report showed a balance on hand of $758.66. The secretary's report was not ready because of illness. This covers the proceedings for Tuesday. The remaining sessions will be covered in our next issue. A list of the exhibitors will be found in the News Section.

General News Department

At the meeting of the American Railway Association held in New York last week, the sum of $7,500 was appropriated to carry on the investigations of rail manufacture conducted by the Rail Committee of the American Railway Engineering Association. This action rescinds that taken last November by which the appropriations which have been made for several years were discontinued.

W. G. Lee, president of the Brotherhood of Railroad Trainmen; A. B. Garretson, president of the Order of Railway Conductors; W. S. Carter, president of the Brotherhood of Locomotive Firemen and Enginemen, and Samuel Gompers, president of the American Federation of Labor, have addressed telegrams to Governor Brumbaugh of Pennsylvania, asking him to veto the bill repealing the Pennsylvania "full-crew" law passed by the legislature.

The "Old Guard" of the Nashville, Chattanooga & St. Louis, recently held, at Nashville, its eighth annual meeting. This organization is composed of men who were working for the road during the civil war, and who have since continued in the service. When the "old guard" was formed in 1907, there were 26 members, but since that time eleven have passed into the great beyond. This year fourteen of the fifteen members were present. Five of the members of the old guard were in the same company of the First Tennessee Regiment, and one of them, J. H. Latimer, was conductor of the train which conveyed Jefferson Davis, president of the Confederate States, and his cabinet, out of Richmond. Major W. L. Danley is the oldest general passenger agent in the United States, in point of service. He began railway service in 1857, and has been general passenger agent since August, 1868.

The "roll of honor" issued by the Pennsylvania Railroad monthly in connection with the doings of its pension department, gives in the last issue a portrait of George W. Barker, who has been track watchman in the tunnel at Baltimore for 34 years. During that time he has walked about ten miles a day, or enough to go nearly five times around the world; and more than three-fifths of this distance was within the tunnel. He has never neglected his duties or received a reprimand. William Furman, who also retires at this time, began his service as second fireman, on a wood burner, of the Camden & Amboy, when all engines on that road had two firemen. George W. Scott, who has just died at Bordentown, N. J., at the age of 93, and who has been on the pension list many years, entered the service of the Camden & Amboy in 1846, was a fireman in 1850 and an engineer in 1852. He was the man who, in 1893, ran the old locomotive "John Bull," from Philadelphia to the World's Fair at Chicago under its own steam.

The United States Civil Service Commission will hold examinations June 23 for the position of junior railway civil engineer for the Interstate Commerce Commission, grade 1 and grade 2; salaries in grade 1 from $1,200 to $1,680, and in grade 2 from $720 to $1,080. Applicants must be between 21 and 36 years old.

The United States Civil Service Commission announces examinations for expert passenger-rate clerk, for men only, on June 23, 1915, to fill a vacancy in this position in the Quartermaster Corps at St. Louis, Mo., at a salary of $1,200. This position is due to the maintenance of troops on the Mexican border, and may not continue permanently. The duties are the revision, preparation and payment of passenger transportation accounts. Applicants must be thoroughly conversant with the intricacies of the various passenger compendiums and tariffs and the rules and customs, both written and unwritten, of carriers in matters of divisions, etc., when used in settlement for service performed for the government over land-grant, bond-aided, free, and indebted carriers. Only those who have had experience in general passenger offices or in ticket-auditing offices of railroads will be considered. Age, 20 years or over on the date of the examination. Applicants must submit to the examiner on the day of the examination their photographs, taken within two years, securely pasted in the space provided on the admission cards sent them after their applications are filed. Tintypes or proofs will not be accepted. Intending applicants should apply for Form 1312, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C., or to the United States Civil Service Board at any of the numerous cities where such boards are maintained.

Disastrous Collision in Scotland

Press despatches of May 22 report a collision of passenger trains on the Caledonian Railway at Gretna, Scotland, nine miles from Carlisle, England, which, measured by the loss of life, appears to be the worst railroad disaster that ever occurred in the United Kingdom. One of the trains was filled with soldiers, about 500 men, and the total number of persons killed is given as 156, of whom a considerable number were burned to death, the wreck taking fire immediately. Fully as many more were seriously injured. No information is given as to the cause of the collision. It appears that first there was a rear collision on the southbound track and that this wreck was immediately run into by an express train on the northbound track.

Brooklyn Marginal Railroad

The New York legislature, after months of discussion, has passed, and the governor has approved, the Cullen bill, authorizing the city of New York to make a contract for the operation of a freight railroad along the east shore of New York Bay from South Brooklyn northward. Such a line would connect a number of terminal properties where cars are now delivered by boats. To form a satisfactory organization for the operation of a road of this kind, it is necessary to secure the co-operation of the important trunk lines terminating on New York Bay, and the present law removes restrictions, hitherto existing, which forbade the railroads from participating in such an enterprise. Extensive tracts of the property desired are already owned by the city and additional tracts are to be bought.

Illinois Campaign Against Train Limit Bill

In the Illinois legislature the bill limiting the length of freight trains to 50 cars, which was killed in committee, has been placed on the calendar of the house.

In view of this action the railways of Illinois, on May 25, began an advertising campaign in the newspapers of the state to show that the proposed legislation would not only cost the railways large sums of money, but that it would tend to increase rather than reduce the number of accidents. A half-page advertisement was published in the Chicago morning papers of May 25, with the heading in large display type, "A bill to increase accidents on railways." Statistics of accidents and train mileage were given to show that when the number of freight trains run has increased there almost invariably has been an increase in accidents, and when the number of freight trains has decreased there has almost invariably been a decrease in accidents. The advertisement pointed out that the purpose of this proposed legislation is not to promote safety, but to increase the number of men the railways must employ, and that its passage would cause an enormous increase in railway expenses. The advertisement concluded as follows: "Communicate with your representatives and senators at once and tell them that you are opposed to this legislation." This advertisement was followed by another showing the increase in railway expenses, and both advertisements were published in papers throughout the state and posted on bulletin boards at railway stations.

The Lumbermen's Association of Chicago has addressed a circular to its members asking them "to get after the mem-

bers of the legislature immediately" and to oppose the bill. The letter says in part: "As a lumberman you are threatened today with an inexcusable increase in freight rates on account of labor union activity. Your assistance is needed to show the legislators that you do not believe in inefficiency, do not believe in increasing the danger of railroading, do not believe in increasing the cost of operating and do not believe in unnecessarily increasing freight and passenger rates by placing a foolish burden upon the railroads. This bill, if passed, would greatly increase the cost of operating trains of dead freight, such as lumber and coal, but is being strongly urged by the labor unions so as to give more men employment."

A committee of presidents of the railways has sent to the newspapers a statement appealing to the people to cause the defeat of the bill in the legislature. Statistics are given to show that the bill would unnecessarily increase railway expenses in Illinois by $7,350,000 a year, would render valueless investments amounting to over $53,000,000 in Illinois, and would force new and unnecessary investments of over nineteen millions. The interest at 5 per cent on the new investments necessary would be $981,000, and the annual increase in operating expenses would be $6,368,000.

Accidents to Trespassers, Classified

At the annual convention of the Association of Railway Claim Agents, held at Galveston, Tex., May 12, F. V. Whiting, of the New York Central, explained the method by which the committee of the association, in charge of this work, had gathered its statistics concerning the trespassing evil; and in connection with his statement gave, for the fiscal year 1914, the following data covering the statistics of accidents to trespassers on railroads aggregating over 191,000 miles in length. This statement includes nearly 11,000 items, or about 90 per cent of the total for the year reported by the Interstate Commerce Commission. It is as follows:

Classification of Accidents to Trespassers

		Number	Per cent	
4. Extent of accident	Killed	4,746	44	
	Loss of one limb	826	8	
	Loss of two limbs	172	1	
	Other injury	5,041	47	10,785
5. Place	In country district	3,421	32	
	In city	3,482	32	
	In town or village	3,882	36	10,785
6. Residence	Near place of accident	4,994	46	
	Far from place of accident	3,876	36	
	Unknown	1,915	18	10,785
7. Was injured person living at home with family or parents?	Yes	4,914	46	
	No	4,303	40	
	Unknown	1,568	14	10,785
8.	Male	10,224	95	
	Female	561	5	10,785
	Married	2,359	22	
	Single	4,618	43	
	Unknown	3,808	35	10,785
9. Occupation	None	1,846	17	
	Unskilled laborer	3,675	34	
	Skilled laborer	1,160	11	
	Profession	159	1	
	Merchant	99	1	
	Clerical	134	1	
	Housewife	281	3	
	Unknown	3,431	32	10,785
10. Regularly employed at time of accident	Yes	2,391	22	
	No	4,346	40	
	Unknown	4,048	38	10,785
11. Nature of accident	Walking on track	4,712	44	
	Riding on train	3,840	36	
	Other accidents	1,511	14	
	Unknown	722	6	10,785
12. Was injured person known as a tramp or hobo?	Yes	1,313	12	
	No	6,326	59	
	Unknown	3,146	29	10,785
13. Age	5 years or under	145	1	
	Over 5 and under 10	339	3	
	Over 10 and under 15	565	5	
	Over 15 and under 21	1,608	15	
	Over 21 and under 30	3,437	32	
	Over 30 and under 50	3,048	29	
	Over 50 and under 60	627	6	
	Over 60 and under 65	247	2	
	65 and over	316	3	
	Unknown	453	4	10,785
14. Was injured person intoxicated?	Yes	1,789	17	
	No	5,455	50	
	Unknown	3,541	33	10,785
15. Nationality	American	7,282	68	
	Foreign	2,086	19	
	Unknown	1,417	13	10,785

Report of Texas Railroad Commission

The railroad commission of Texas has issued its twenty-third annual report, which is for the year ending June 30, 1914. It shows the length of railroad in the state as 15,569 miles, a net increase of 286 miles in twelve months. The new lines put in operation during the year, with the mileage of track (not road) of each, were the following:

Greenville-Northwestern, 11.48 miles; Riveria Beach & Eastern, 9.70 miles; San Antonio, Fredericksburg & Northern, 25.07 miles; total, 46.25 miles. Old lines increasing mileage were: Galveston, Harrisburg & San Antonio, 9.93 miles; Galveston, Houston & Henderson, 114.61 miles; Gulf, Colorado & Santa Fe, 15.31; Houston & Brazos Valley, 4.36; Houston Belt & Terminal, 6.37; Houtson & Texas Central, 42.38; International & Great Northern, 5.20; Missouri, Kansas & Texas, 18.14; Pecos & Northern Texas, 103.67; Quanah, Acme & Pacific; 40.70; Rio Grande & Eagle Pass, 4.75; Rio Grande, El Paso & Santa Fe, 4.07; San Antonio & Aransas Pass, 11.78; San Antonio, Uvalde & Gulf, 83.30.

The total assessed valuation of railroads in 1914 was $339,410,849; in 1913 it was $433,635,318; average amount per mile in 1914, $21,842, in 1913, $22,598.

Boiler Makers' Association Exhibitors

The following concerns had exhibits at the Master Boiler Makers' Association convention, which met at the Hotel Sherman, Chicago, this week:

American Arch Company, New York—Model of Security arch. Represented by LeGrand Parish, W. L. Allison, John P. Neff, H. D. Savage, J. T. Anthony, George Wagstaff, R. J. Himmelright, G. C. Denney and F. G. Boomer.

American Flexible Bolt Company, Pittsburgh, Pa.—American staybolts. Represented by C. A. Seley, R. W. Benson and Louis Weidmeier.

American Locomotive Company, New York—Photographs of locomotives. Represented by C. A. Delaney.

Baldwin Locomotive Works, Philadelphia, Pa.—Photographs of locomotives. Represented by A. S. Goble.

Bird-Archer Company, New York—Boiler chemicals. Represented by L. F. Wilson, J. M. Robb and C. J. McGurn.

Boiler Maker, The, New York.—Copies of paper. Represented by George Slate.

Brubaker & Bros., W. L., Millersburg, Pa.—Taps, dies and reamers. Represented by W. S. Rose and J. A. W. Brubaker.

Burden Iron Works, Troy, N. Y.—Staybolt iron and rivets. Represented by John C. Kuhns, Fred Gardner, Gilbert H. Pearsall and D. W. Talcott.

Carbon Steel Company, Pittsburgh, Pa. Represented by Fred T. Connor.

Castle, A. M., & Co., Chicago. Represented by George R. Boyce and L. M. Henoch.

Champion Rivet Company, Cleveland. Represented by D. J. Champion.

Chicago Pneumatic Tool Company, Chicago—Pneumatic drills and hammers, Boyer rivet busters and electric drills. Represented by C. E. Walker, J. C. Campbell, J. L. Canby, G. G. Smallwood, W. S. Delaney, Thos. Aldcorn, G. A. Barden, W. P. Pressinger and J. B. Corby.

Cleveland Pneumatic Tool Company, Cleveland—Pneumatic riveters, chippers, air drills and Bowes hose couplings. Represented by H. S. Covey and C. J. Albert.

Cleveland Punch & Shear Works Company, Cleveland. Represented by A. J. Canfield.

Cleveland Steel Tool Company, Cleveland—Pneumatic hammer, rivet sets, chisel blanks, punches and dies. Represented by R. J. Venning and H. W. Leighton, Jr.

Dearborn Chemical Company, Chicago—Descriptive literature of scientific treatment of feed water. Represented by J. D. Purcell, J. F. Roddy and J. H. Cooper.

Ewald Iron Company, Louisville, Ky. Represented by S. F. Sullivan, E. V. Shakleford and R. Kilpatrick.

Faessler Manufacturing Company, J., Moberly, Mo.—Boiler makers' tools, expanders, flue cutters, etc. Represented by J. W. Faessler, C. F. Palmer and G. R. Maupin.

Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio—Samples of iron. Represented by John E. Chisholm.

Flannery Bolt Company, Pittsburgh, Pa. Represented by B. E. D. Stafford.

Garratt-Callahan Company, Chicago. Represented by W. G. Willcoxson.

Globe Seamless Steel Tube Company, Chicago—Boiler flues. Represented by Frank J. O'Brien, H. A. Bowles and T. B. Kirby.

Hilles & Jones Company, Wilmington, Del.—Photographs of punches, shears, bending rolls and boiler shop machinery. Represented by W. H. Connell, Jr.

Imperial Brass Manufacturing Company, Chicago—Oxy-acetylene welding and cutting apparatus. Represented by J. A. Schroeder.

Independent Pneumatic Tool Company, Chicago—Pneumatic and electric tools. Represented by H. H. Henricks, H. F. Finney, F. J. Hurley, R. F. Gummere and W. A. Nugent.

Ingersoll-Rand Company, New York—Pneumatic riveting and chipping hammers and drills. Represented by Geo. A. Gallinger, Walter A. Johnson, R. C. Cole, C. F. Overly and E. J. Welsh.

Interstate Commerce Commission—Boilers in operation demonstrating circulation of water. Represented by E. J. Reardon, district inspector locomotive boilers.

Jacobs-Shupert U. S. Firebox Company, Coatesville, Pa.—Models of Jacobs-Shupert firebox and Lukens iron and steel. Represented by J. H. Smythe and A. W. Whiteford.

Locomotive Superheater Company, New York—Photographs of superheater. Represented by Geo. Bourne, G. E. Ryder and George Spangler.

Lovejoy Tool Works, Chicago—Locomotive jack. Represented by W. H. Dangel.

Mahr Manufacturing Company, Minneapolis, Minn.—No. 15 portable oil burning rivet forge and No. 2 boiler torch. Represented by H. H. Warner and H. B. Hazerodt.

McCabe Manufacturing Company, Lawrence, Mass.—Pneumatic flanging machine. Represented by F. H. McCabe.

Monongahela Tube Company, Pittsburgh, Pa. Represented by W. A. Roome.

Mudge & Company, Chicago—Mudge-Slater spark arrester. Represented by Burton W. Mudge, R. D. Sinclair and G. W. Bender.

Christopher Murphy & Company, Chicago—Tube cutters and square rib chucks. Represented by Christopher Murphy.

National Boiler Washing Company, Chicago—Safety First fire door. Represented by H. A. Varney and E. B. White.

National Railway Devices Company, Chicago—Shoemaker fire door. Represented by V. W. Goodman and J. G. Robinson.

National Tube Company, Pittsburgh, Pa.—Spellerized lapweld locomotive tubes, Shelby seamless locomotive tubes, Kewanee unions and N. T. C. regrinding valves. Represented by P. J. Conrath, G. N. Riley, E. J. Graham, James Goodwin, L. R. Phillips and J. W. Kelly.

Never Slip Safety Clamp Company, New York—Never slip safety clamp for handling boiler plate. Represented by E. R. Adler.

Otis Steel Company, Cleveland. Represented by George E. Sevey.

Oxweld Railroad Service Company, Chicago—Portable and stationary oxy-acetylene apparatus and specimens of cutting and welding. Represented by C. B. Moore, E. V. Lea, F. C. Hasse, E. S. Richardson, M. R. Day, W. L. Bean, G. H. Pearsall and R. W. Alfonte.

Parkesburg Iron Company, Parkesburg, Pa.—Charcoal iron boiler tube. Represented by J. A. Kinkead, W. H. S. Bateman and L. P. Mercer.

Pittsburgh Steel Products Company, Pittsburgh, Pa. Represented by C. R. King.

Q. & C. Company, New York—Ross-Schofield boiler system. Represented by Charles F. Pierce, E. R. Packer and Alfred Robertson.

Rome Merchant Iron Mill, Rome, N. Y.—Rome "Superior" staybolt iron. Represented by C. W. Floyd Coffin and Weston Jenkins.

Ryerson & Son, Jos. T., Chicago—Samples of Ulster special staybolt iron, Ulster engine bolt iron, Nykrome steel tube expanders, high speed drills and small tools. Represented by J. P. Moses, H. S. Smith, H. B. Hench, J. T. Corbett, J. C. Porric and E. T. Hendee.

Scully Steel & Iron Company, Chicago—Staybolt chucks and headers, expanders, bevel and splitting shears, Everlasting blow-off valves and Draper flue welders. Represented by J. W. Patterson, A. Verschuur and C. L. C. Magee.

Superior Oxygen Equipment Company, Pittsburgh, Pa.—Oxy-acetylene welding and cutting apparatus. Represented by J. A. Warfel.

U. S. Graphite Company, Saginaw, Mich.—Mexican boiler graphite. Represented by J. W. Eviston and J. G. Draught.

Worth Bros. Company, Coatesville, Pa. Represented by B. M. Clements.

Railway Signal Association

The second stated meeting of the Railway Signal Association for the year 1915 was held in the Hotel Astor, New York City, May 26 and 27. President T. S. Stevens, signal engineer, Atchison, Topeka & Santa Fe, presided and about 225 members and guests were in attendance.

At the Wednesday session, Committee III on Power Interlocking, presented specifications for electro-pneumatic interlocking containing numerous revisions of the specifications in the Manual. A revised specification for fiber conduit was presented to provide for different sizes of conduit in addition to the 3 in. size to which the present specifications limit this material. The specifications for incandescent electric lamps, which were referred back to the committee at the last annual convention, were presented again in revised form. The discussion brought out the difficulty which is experienced in getting lamps with the dimensions between the base and the point of concentration of the filament accurate and uniform. This is an important point in light signals, although some of the members did not feel that a reasonable variation in this dimension would particularly affect the service of a lamp with a semaphore signal. These specifications will be presented to the annual convention for final action and letter ballot.

Committee V on Manual Block, submitted a paper on the "Care and Maintenance of Dry Batteries" and instructions governing the maintenance of dry cells, gravity cells and caustic soda cells. These instructions are expected to be presented at the annual meeting for submission to letter ballot. Progress was reported on the preparation of instructions governing the maintenance of storage batteries, but these will probably not be ready to preesnt at the next convention.

The special Committee on Electrical Testing presented a progress report outlining methods of testing electrical signal apparatus and circuits, a large part of which was based on the practice of one large road, and specifying suggested ranges and scales for d. c. testing instruments for use in the field. The discussion brought out many points as to the need for better testing methods and further development in testing instruments to cover all conditions.

The members of the association in attendance at the meeting were the guests of the Signal Appliance Association on a trip to West Point Wednesday afternoon. The proceedings of the Thursday meetings will be reported hereafter.

American Railroad Master Tinners', Coppersmiths' and Pipefitters' Association

At the third annual convention of the American Railroad Master Tinners', Coppersmiths' and Pipefitters' Association to be held at the Sherman House, Chicago, from July 13 to 16, papers will be presented as follows: Autogenous Welding, by W. J. Moffett, C. Borcherdt and J. P. Hahn; Tinware, by A. Paulis and J. P. Shoemaker; Crude Oil Burners and Forges, by W. J. Moffett and J. E. Harbough; Locomotive Jackets, by O. E. Schlink, W. W. Nash and T. J. Burke; Lubrication, by C. Borcherdt and A. D. Homer; Smoke Prevention, by J. G. Thompson and J. S. Richards; Metals and their Alloys, by G. B. Hosford; Gaskets and their Application to Locomotives, by F. Bucholtz; Coach Heating, by G. Schwenk and F. B. Gralike, and Piping, by W. E. Jones.

Salt Lake City Transportation Club

R. E. Rowland, secretary of the Salt Lake City Transportation Club, has addressed a letter to the various transportation and traffic clubs of the United States, extending to their members the hospitality of the Salt Lake City Transportation Club during any stopovers that may be made in Salt Lake City during the coming summer. The club has appointed a committee for the purpose of arranging special sight-seeing trips, and is prepared to welcome in every way not only single members of the clubs, but also any organizations passing through the city in a body.

Canadian Railway Club

At the thirteenth annual meeting of the Canadian Railway Club officers were elected as follows: President, L. C. Ord; first vice-president, R. M. Hannaford; second vice-president, George Smart; secretary, James Powell, and treasurer, W. H. Stewart. T. C. Hudson, E. E. Lloyd, J. Hendry, C. Manning, E. B. Tilt and Prof. H. O. Keay were appointed on the executive committee, and W. S. Atwood, W. H. Winterrowd and F. A. Purdy on the audit committee.

Engineers' Society of Western Pennsylvania

At the regular meeting of the mechanical section of the Engineers' Society of Western Pennsylvania, to be held in the society rooms in the Oliver building, Pittsburgh, on June 1, a paper will be presented by R. S. Lord, vice-president of the Hope Engineering & Supply Company, Pittsburgh, entitled, "Pipe Couplings."

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

American Association of Demurrage Officers.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

American Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Railway Tool Foremen's Association.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway General Foremen's Association.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

Master Car Builders' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

New York Railroad Club.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

Niagara Frontier Car Men's Association.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

Peoria Association of Railroad Officers.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

Railroad Club of Kansas City.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

Railroad Men's Improvement Society.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

Railway Electrical Supply Manufacturers' Association.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

Railway Signal Association.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

Railway Supply Manufacturers' Association.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

Railway Telegraph and Telephone Appliance Association.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

Richmond Railroad Club.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

Salt Lake Transportation Club.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

Toledo Transportation Club.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of Jacksonville (Fla.).—R. H. May, Jacksonville, Fla. Meetings, 1st Saturday in month.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.

Traffic Club of Newark.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

Traffic Club of New York.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meetings, 2d Monday in June.

Train Dispatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

Transportation Club of Detroit.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Utah Society of Engineers.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Western Canada Railway Club.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday afternoon in month, except June, July and August, La Salle Hotel, Chicago.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meetings, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

Both houses of the Ohio legislature have passed a bill repealing the state maximum freight rate law.

The Senate of the Illinois legislature has reported unfavorably the bill authorizing the state public utilities commission to increase passenger fares to 2½ cents a mile.

J. B. Ford, assistant general freight agent of the Queen & Crescent, Cincinnati, Ohio, in his latest bulletin, dated May 11, giving information to shippers and others concerning opportunities for business in foreign countries, fills four pages with statements of dates of sailing of vessels to all parts of the world.

The Western Pacific has announced a partial embargo on traffic destined for the Orient and Australia from San Francisco because of the difficulty in obtaining space on ocean steamers. Agents will be authorized to sign bills of lading on shipments for China, Japan, Australia, New Zealand and the Philippine Islands, provided specific bookings can be made.

The Chicago & North Western has announced an amplification of its present passenger train service between Chicago and Denver, to take effect on May 30, when a new train to be called the Denver Special will be put in service, leaving Chicago at 6:05 p. m., and arriving at Denver at about 9:00 p. m. the next day. Similar service will be established eastbound. This service is in addition to the Colorado Special and the Colorado Express.

A change in passenger train schedules was put in effect on the Baltimore & Ohio on Sunday, May 23, by which the running time of the Interstate Special between Chicago and Washington is reduced by two hours, and train No. 8, from Baltimore to Chicago, is operated by way of Wheeling, W. Va., instead of from Baltimore to Pittsburgh. This train will be known as the West Virginian. Trains No. 9 and 10, which for the past few months have been operated between New York and Pittsburgh, are restored to the old runs between New York and Chicago.

A Novel Railroad Exhibit

The Denver & Rio Grande, the Western Pacific, the Missouri Pacific and the St. Louis, Iron Mountain & Southern have an interesting exhibit at the Panama-Pacific Exposition in San Francisco, consisting of a globe 51 ft. in diameter, on the outside surface of which is shown a relief map of North America with tracks running across it representing the main lines of these roads from St. Louis to San Francisco, on which trains are run back and forth by means of electrical apparatus contained within the globe. The lower part of the globe is cut off so that it stands 44 ft. high. It is supported by a series of arches through which visitors may enter the interior. Between the arches are large sculptured figures about 8 ft. high, representing a brakeman, a farmer, a fisherman, a miner, and representatives of other industries, each standing on a pedestal representing the front part of a locomotive, about 10 ft. high. On the interior of the globe are artistic reproductions of western scenery, such as the Royal Gorge, and model views of Denver, Salt Lake City, Leadville and other cities along the lines. Adjoining the globe is an annex, at the top of which is a replica of Marshall Pass. As the trains cross the continent the names of the principal cities are flashed electrically on the map as the train passes through.

National Industrial Traffic League

At the spring meeting of the National Industrial Traffic League, held at Memphis, Tenn., on April 13 and 14, the Tariff Committee was instructed to formulate a resolution to be sent to the Interstate Commerce Commission, recommending a rule that no other fraction than ½ cent be considered in publishing freight rates. This subject arose from the fact that the recent

decision of the Interstate Commerce Commission allowing a 5 per cent advance in freight rates in Official Classification Territory resulted in a large number of rates containing decimal fractions, which are inconvenient to handle. The plan of requesting the railroads in Central Freight Association and Trunk Line territory to publish association tariffs was also discussed, and the Committee on Simplification of Tariffs was instructed to circularize members of the league and other shippers, asking for suggestions for a basis of simplifying freight tariffs.

The Committee on Transportation Instrumentalities presented a report on the subject of pooling freight cars, including a discussion of the plan adopted by a number of lines in Texas providing for joint use of cars on an equalization basis, and it was recommended that the railroads take steps toward the pooling of cars by adopting some such plan in other territory. It was expressed as the sense of the league, however, that the term "free interchange" is preferable to "pooling." After discussion of a request from a sub-committee of the American Railway Association Committee on Standard Box Cars, asking for suggestions from the shippers, it was decided that while the league was in favor of standardization of cars it should take no position toward determining what the standards should be. There was considerable discussion of the new M. C. B. rules for the protection of car doors, in which the opinion was expressed that while the shippers ought to make carload shipments safe, they should not be required to pay for this additional protection. The Committee on Unit Basis of Classification reported that the Western Classification Committee was using such a basis in some cases, but not using it in others. The committee felt that the system used ought to be revised or else dropped; and the committee was instructed to consider the matter further, reporting at the next meeting whether a feasible and practical unit basis for classification could be adopted.

New Uniform Bill of Lading

C. C. McCain, chairman of the Uniform Bill of Lading Committee for all the roads east of Chicago and north of the Ohio river has issued a circular giving the form of section 3 which hereafter is to be inserted in bills of lading to make them conformable to the Cummins amendment forbidding railroads to limit their liability for loss and damage below the actual value of the goods, which amendment goes into effect June 2. The new section 3 is as follows:

SEC. 3. No carrier is bound to transport said property by any particular train or vessel, or in time for any particular market or otherwise than with reasonable despatch, unless by specific agreement indorsed hereon. Every carrier shall have the right in case of physical necessity to forward said property by any railroad or route between the point of shipment and the point of destination; but if such diversion shall be from a rail to a water route the liability of the carrier shall be the same as though the entire carriage were by rail.

The amount of any loss or damage for which any carrier is liable shall be computed on the basis of the value of the property at the place and time of shipment under this bill of lading.

Except in cases where the loss, damage, or injury complained of is due to delay or damage while being loaded or unloaded, or damaged in transit by carelessness or negligence, claims must be made in writing to the carrier at the point of delivery or at the point of origin within four months after delivery of the property, or, in case of failure to make delivery, then within four months after a reasonable time for delivery has elapsed. Suits for recovery of claims for loss or damage, notice of which is not required, and which are not made in writing to the carrier within four months as above specified, shall be instituted only within two years after delivery of the property, or, in case of failure to make delivery, then within two years after a reasonable time for delivery has elapsed. No claims not in suit will be paid after the lapse of two years as above, unless made in writing to the carrier within four months as above specified.

Any carrier or party liable on account of loss of or damage to any of said property shall have the full benefit of any insurance that may have been effected upon or on account of said property, so far as this shall not void the policies or contracts of insurance.

As the question of just what ought to be done to comply in all respects with the Cummins amendment is still pending before the Interstate Commerce Commission, Mr. McCain suggests that it may not be best to print large numbers of the new form at present and calls attention to the fact that old forms may be made legal by stamping on them a declaration saying that section 3 is subject to the amendment, as above set forth, which amendment is printed in Supplement No. 18, to the Official Classification, which is to take effect June 2.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

A hearing will be held before Examiner Burnside in New York on July 12 relative to the reasonableness of certain tariffs of the Erie proposing increased ferry charges between New York and Jersey City.

Examiner Bell held a hearing at Chicago on May 19 and 20, on tariffs filed by the western railroads which have been suspended by the commission, abolishing the stopping of cars in transit to complete loading or for partial unloading on shipments moving under through rates. Representatives of the packers opposed the change, saying that the present system is no hindrance to the railroads.

The commission has suspended from May 15 and subsequent dates to September 21 tariffs of various carriers in official classification territory proposing to cancel the existing commodity rates on paper and commodities taking the same rates, including wrapping, printing, writing and newsprint paper, boxboard, binder board, strawboard, building and roofing paper and roofing composition in carloads between various points throughout that territory. If such commodity rates are cancelled, as a general rule, class rates will apply.

The Interstate Commerce Commission has set June 1 as the date for a continuation of the hearing begun at Washington on May 17, on advanced ratings carried in Supplement No. 9 of the Official Classification, which have been suspended by the commission, although there is a prospect that the hearing will be adjourned to a still later date. The principal changes involve higher ratings on beer in carloads, tobacco, paper, paper stock and other articles, which are included in the list of commodities named in the first report of the Interstate Commerce Commission in the five per cent rate case, in which the commission suggested that the car mile revenues appeared to be so low as to suggest the advisability of carefully examining them to ascertain whether additions to the revenues might not be made by increasing rates on those commodities rather than by a horizontal advance in all rates. R. N. Collyer, chairman of the Official Classification Committee, was the principal witness for the railroads, and a number of representatives of the shippers testified in opposition to the changes in rating.

Rates on Cotton Piece Goods from North Adams, Mass.

In re rates on cotton piece goods from North Adams, Mass., and other points to New York and other points. Opinion by the commission:

The commission finds that the carriers have justified proposed increased rates on cotton piece goods and woolen piece goods from North Adams, Mass., and other points on the Boston & Maine and Boston & Albany to New York and other points. (34 I. C. C., 41.)

Rates to Freeport and Rockford, Ill.

Chamber of Commerce of Freeport, Ill., v. Chicago, Milwoukee & St. Paul, et al. Opinion by Commisisoncr Meyer:

The commission finds that the present class rates between Freeport and Rockford and points in central freight association trunk line and New England territories are discriminatory, and that the Rockford rates in addition are unreasonable. With the rates in effect at the upper Mississippi river crossings fixed upon approximately a 117 per cent basis, and at Peoria upon 110 per cent basis, the commission believes that the rates at Freeport should be 114 per cent, and at Rockford 112 per cent, an adjustment which will give Freeport an 89.8 cent scale to and from New York and Rockford an 88.3 cent scale. This determination is not an extension of the McGraham scale to Freeport and Rockford, and the bases prescribed are slightly higher than the ratio between the distances Freeport and Rockford to New York and the Chicago-New York distance. (33 I. C. C., 673.)

Rates on Grain and Grain Products

In re rates on grain and grain products from Topeka, Kan., Kansas City, Mo., and other points to Dubuque, Ia., and other points. Opinion by Commissioner Hall:

The commission finds that the carriers have justified proposed increased joint through rates on grain and grain products from stations in Kansas and other states to points in Iowa, published to correct rates published in error. The carriers have also justified a proposed cancellation of joint through rates on grain and grain products from stations in Kansas and other states to points in Wisconsin, leaving in effect combinations of local rates on the Missouri river. (33 I. C. C., 666.)

Rates on Coke from Georgia Points

Durham Coal & Iron Company et al. v Central of Georgia et al. Opinion by Commissioner Hall:

The commission finds that the rate on coke in carloads from Durham and Chickamauga, Ga., to Pacific coast terminals is discriminatory and prejudicial to the extent that it exceeds the rate contemporaneously in effect to the same points from the Birmingham, Ala., district. It is also found that to apply the minimum carload weight is unreasonable when the cars in which the shipments are made are too small to carry that weight. Tariffs should provide that in such cases the marked capacity of the car used will govern. (34 I. C. C., 10.)

Joint Rates With the Kansas City Missouri River Navigation Company

Kansas City Missouri River Navigation Company v. Chesapeake & Ohio et al. Opinion by Commissioner Clark:

The commission finds that the carriers should establish through routes and joint rates on grain and grain products from Kansas City to Norfolk and Newport News, Va., for export, with the complainant, a water line operating on the Missouri and Mississippi rivers between Kansas City and East St. Louis. It is also held that if defendants engage in the practice of exchanging bills of lading they discriminate against complainant in refusing like recognition to its bills of lading. (34 I. C. C., 67.)

Joint Rates With Stone's Express

Stone's Express, Inc. v. Boston & Maine et al. Opinion by Commissioner Clark:

Stone's Express, conducting an express and freight service, the latter under the name of the Lynn & Boston line, by means of a barge and tug service between Lynn and Boston, Mass., is awarded in this case joint rates with a number of other carriers, not including the Boston & Maine, which is the only one of them also serving Lynn. Such joint rates will apply only on freight shipments to and from petitioners' terminal at Lynn, and if the express company continues to perform any team service in connection with such shipments, no part of it may be included in the joint rates. Some 160 rail and water carriers are affected, including the Boston & Albany; the New York, New Haven & Hartford; the Metropolitan Steamship Company and the Merchants & Miners Transportation Company. (33 I. C. C., 638.)

Railway Ownership of Boat Lines

The commission in a number of decisions written by Commissioner McChord has granted the petitions of several carriers to retain their interest in various boat lines. They are as follows: The Pennsylvania Company and the Canadian Pacific are each allowed to retain a one-third interest in the Pennsylvania-Ontario Transportation Company, which owns and operates a car ferry on Lake Erie between Ashtabula, Ohio, and Port Burwell, Canada. (34 I. C. C., 47.)

The Grand Trunk Western may continue its interest in the Grand Trunk Milwaukee Car Ferry operated by the Detroit, Grand Haven & Milwaukee (controlled by the Grand Trunk Railway of Canada), between Grand Haven, Mich., and Milwaukee. (34 I. C. C., 54.)

The Grand Trunk Railway of Canada and the Buffalo, Rochester & Pittsburgh are each allowed to retain their interest in the Ontario Car Ferry Company, Ltd., which operates the Ontario No. 1, a car ferry and passenger vessel plying between Genesee Dock, N. Y., and Cobourg, Ont., connecting the terminus of the Buffalo, Rochester & Pittsburgh at Genesee Dock with the terminus of the Grand Trunk Railway of Canada at Cobourg. A similar boat, the Ontario No. 2, is now under construction. (34 I. C. C., 49 and 52.)

The Ann Arbor may continue to operate its three car-ferry boats from its terminus at Frankfort to the ports of Manistique, where cars are delivered to and received from the Soo line and the Manistique & Superior; Menominee, where deliveries are made to the Chicago, Milwaukee & St. Paul, and the Chicago & North Western; Kewaunee, where connection is made with the Green Bay & Western and, over that line, with the Chicago, Milwaukee & St. Paul; and Manitowoc, where cars are interchanged with the Chicago & North Western and the Soo line roads; all on the west shore of Lake Michigan. (34 I. C. C., 83.)

The Pere Marquette is allowed to continue the operation of its ferries on the Detroit river between Detroit, Mich., and Windsor, Ont., on the St. Clair river between Port Huron, Mich., and Sarnia, Ont., and on Lake Michigan. This road and the Bessemer & Lake Erie are each allowed to continue their interest in the Marquette & Bessemer Dock & Navigation Company, operating a car-ferry on Lake Erie between Conneaut, Ohio and Port Stanley, Ont. (34 I. C. C., 86.)

In each case it is held that the participation of the petitioner (or petitioners) in through all-rail routes between the ports served by the boat line in which it is interested makes it possible for it to compete with such line within the meaning of section 5 of the act as amended by the Panama Canal act. It is also held in each case that the facts support a finding that the existing service by water is being operated in the interest of the public and is of advantage to the convenience and commerce of the people and that an extension of the petitioner's interest is of advantage to the convenience and commerce of the people, and that a continuance will neither exclude, prevent nor reduce competition on the route by water under consideration.

Rates on Vegetables from New Orleans to Chicago

New Orleans Vegetable Growers, Merchants & Shippers' Association v. Illinois Central et al. Opinion by the commission:

The commission finds that the present rates and minimum weights on cucumbers, cabbage, potatoes, beets, beans and vegetables of the lettuce family, moving in carloads from New Orleans, La., to Chicago and other northern markets are not unreasonable. The commission, however, directs complete revision of defendants' schedules of estimated weights applying on such shipments as it appears that the present system is unlawful.

Rates on vegetables from New Orleans to Kansas City and to Buffalo-Pittsburgh territory are found to be discriminatory to the extent that they exceed by more than five cents a 100 lb., the rates contemporaneously maintained from Southport Junction, La. (34 I. C. C., 32.)

STATE COMMISSIONS

The Missouri Public Service Commission has completed the taking of testimony on the application of the railroads of the state for authority to make an increase in passenger fares. R. A. Knapp, president of the United Commercial Travelers of Missouri, protested against any increase in fares and complained of the number of passes issued by the railroads. It turned out, however, that the passes of which he was complaining were those given to railroad employees. S. C. Bates, secretary of the Manufacturers' & Jobbers' Association of Springfield, Mo., told the commission that his organization favors an increase in fares provided the railroads will restore their train service to what it was before the two-cent fare law became effective.

The Pennsylvania Public Service Commission has issued its decision on the long-pending complaint of people in Philadelphia in relation to the increases in suburban passenger fares made by the railroads entering that city several months ago. The principal controversy was concerning one hundred-trip tickets on which the railroads made a large advance in price. The commission recommends that for distances of more than eight miles the present maximum rate, 1½ cents a mile be reduced on a sliding scale, the rate to decrease as the distance increases. It is recommended that these tickets be made good for one year instead of six months. The commission refuses to grant the complainants a further hearing, and they say that they will at once prepare a new case with a view to presenting their grievance even more urgently than before.

PERSONNEL OF COMMISSIONS

The seven men nominated for the Pennsylvania Public Service Commission last week (*Railway Age Gazette*, May 21, p. 1095) were confirmed on May 20 and will organize June 1. Local newspapers speak of "the new commission," but the change is simply one of personnel. The first appointments under the act creating the commission were made in 1913 after the Senate of 1913 had adjourned. The law requires confirmation by the Senate. The next Senate met in January, 1915. When it met there was also a new state administration and the appointments made by Governor Tener in 1913 were not confirmed, this postponement being made out of courtesy to the new governor, Dr. Brumbaugh. Governor Brumbaugh withdrew all of Governor Tener's appointments, saying that he wanted a wholly new commission. But the commissioners named in 1913 held office until their successors were named and confirmed. The governor appointed two of the former commissioners. Next week he will designate a chairman, and officers will be elected. There is pending a bill to allow the commission to have testimony taken by masters anywhere in the state and to simplifying appeals.

COURT NEWS

Arguments in the injunction proceedings instituted by the Ann Arbor to restrain the enforcement of the Michigan two-cents-a-mile passenger rate were heard before the three judges of the United States District Court at Grand Rapids, Mich., on May 19.

The St. Louis & San Francisco and the Kansas City Southern were granted a temporary injunction by the United States District Court at Little Rock, Ark., on May 19, restraining the Arkansas Railroad Commission from enforcing its general freight tariff which was to become effective on May 20. Hearing on the petition for a permanent injunction was set for May 28. The railroads contended the tariff would be confiscatory.

In the federal court at Cleveland, Ohio, May 26, the grand jury returned indictments against the Delaware & Hudson and the Erie railroads and F. D. Underwood, president of the Erie, for making in 1912 illegal reductions in fares of passengers in a private car furnished for W. B. Miller, secretary of the Diamond Rubber Company, of Akron, Ohio, and seven friends, for a trip from Akron to Beverly, Mass. The indictment charges that on July 2, 1912, the trip was made and that instead of charging 25 full fares for the car, as provided in the tariff, Mr. Underwood and the indicted railroads let Mr. Miller and his friends have the private car for eight fares.

Delivered Shipment—Destruction By Fire

The Nebraska Supreme Court holds that when a railroad company has transported freight to destination, has notified the consignee of arrival, and given him permission to unload; and the consignee has broken the seal, locking the door with his own lock, and retained the key, and later a fire occurs in the car, the company is not liable, and it is error for the court to submit to the jury the question of liability, negligence being neither alleged nor shown. McEntire v. Chicago, R. I. & P. (Neb.), 152 N. W., 305.

Lightning Stroke—Workmen's Compensation Acts

A railroad track laborer was killed by a stroke of lightning while he was in a barn in which he had taken refuge from a storm at the direction of his foreman. The Michigan Supreme Court holds that his death did not result from an "injury arising out of and in the course of his employment," since there was nothing in his employment that rendered him particularly liable to lightning strokes. There could, therefore, be no recovery for his death under the Workmen's Compensation Act. This is in line with rulings in similar cases by the English and Wisconsin courts under like statutory provisions. Except in cases where the employment necessarily placed the employee at the time of his injury in a position subjecting him to unusual risk from lightning, compensation has been denied. Klawinski v. Lake Shore & M. S. (Mich.), 152 N. W., 213.

Railway Officers

Executive, Financial, Legal and Accounting

J. L. Lancaster, president of the Memphis Union Station Company, Memphis, Tenn., has been appointed assistant to the vice-president and general manager of the Texas & Pacific, with headquarters at New Orleans, La.

Edward A. Haid, assistant general attorney of the St. Louis Southwestern, has been appointed general attorney, with headquarters at St. Louis, Mo. Samuel H. West has resigned as general solicitor and the office has been abolished.

W. S. Trowbridge, assistant auditor of the Boston & Albany at Boston, Mass., has been appointed auditor, with headquarters at Boston, succeeding W. A. Cormier, who has been assigned to other duties at his own request. W. J. Turck, auditor of freight accounts at Boston, has been appointed assistant auditor, with headquarters at Boston, succeeding Mr. Trowbridge, and Christian Petersen has been appointed auditor of freight accounts, succeeding Mr. Turck, effective June 1.

W. R. Holt, paymaster of the Boston & Albany Railroad at Boston, Mass., has been appointed cashier, succeeding Frank H. Ratcliffe, who has retired as cashier under the pension rules of the New York Central. Mr. Ratcliffe is 70 years old and has been in the continuous service of the Boston & Albany and its predecessors for more than 50 years. He remains as treasurer of the Boston & Albany Railroad Company, with headquarters at Boston, Mass.

C. O. Jenks, general manager of the Spokane, Portland & Seattle at Portland, Ore., has been elected also a member of the board of directors and vice-president and general manager of the Spokane & Inland Empire, succeeding W. D. Scott, deceased. He has been elected also vice-president and general manager of the Pacific & Eastern, with jurisdiction over the operating, mechanical and purchasing departments, succeeding William Gerig, resigned, and vice-president of the Oregon Electric.

Operating

W. R. Armstrong, assistant general manager and chief engineer of the Salt Lake & Utah at Salt Lake City, Utah, has been appointed general manager and chief engineer.

Traffic

Arthur T. Jackson has been appointed district passenger agent of the Union Pacific System, with headquarters at Los Angeles, Cal. Mr. Jackson will take his new position on June 1.

H. H. Taylor, commercial agent of the Texas & Pacific at Kansas City, Mo., has been transferred to Chicago, succeeding James Stuart, transferred to Texas. P. B. Doddridge, commercial agent at Denver, Colo., has been transferred to Kansas City, succeeding Mr. Taylor. A. T. Pratt, commercial agent at Birmingham, Ala., has been transferred to Denver, succeeding Mr. Doddridge. O. E. Duggan, traveling freight agent at Chicago, has been appointed commercial agent at Birmingham, Ala., succeeding Mr. Pratt.

Engineering and Rolling Stock

P. H. McFadden has been appointed roadmaster of the First district, of the Oregon-Washington Railroad & Navigation Company, with headquarters at Spokane, Wash., vice J. Mohr, assigned to other duties.

J. A. Mitchell, locomotive foreman of the Grand Trunk Pacific at Biggar, Sask., has been appointed general foreman at the Transcona, Man., shops, and A. McTavish, locomotive inspector at Transcona, has been appointed locomotive foreman at Biggar.

OBITUARY

John Sullivan, roadmaster of the Chicago, Burlington & Quincy, at Galesburg, Ill., died at Galesburg on May 20, at the age of 73 years. He had been employed by the Burlington for 58 years, starting in 1857 as a section hand, and had been road-

master of a single main line division, the Aurora division, since 1869.

H. E. Howard, formerly and for many years an officer of the Connecticut River and later of its successor, the Boston & Maine, died at his home in Springfield, Mass., May 24, at the age of 77. He was general freight agent of the Connecticut River from 1870 until 1891, when he was promoted to the position of general traffic manager of the company, including its northern connections. In 1893, on the lease of the road to the Boston & Maine, he was made superintendent, and a year later became superintendent of car service for the Boston & Maine System. He held this position until 1908, when he retired from railroad service.

General Thomas H. Hubbard, chairman of the executive committee of the Toledo, St. Louis & Western, whose death on May 19, at his home in New York, was noted in these columns last week, was born at Hallowell, Me., on December 20, 1838. He graduated from Bowdoin College, attended Albany Law School, and was admitted to the bar in 1860. He served with distinction in the civil war, and subsequently became a prominent railroad corporation lawyer in New York. He was vice-president and a director of the Southern Pacific from 1896, to 1900; president of the Mexican International from 1897, to 1901, also of the Houston & Texas Central from 1894, to 1901, and later served as president of the Guatemala Central, director and chairman of the executive committee of the Chicago & Alton, and the Toledo, St. Louis & Western, and also of the American Light & Traction Company. He had been a director and member of the executive committee of the Wabash Railroad, and the Western Union Telegraph Company, also a director of the Philippine Railway Company and of a number of other corporations. A few days before his death he again became a director of the Southern Pacific. He was a trustee of Bowdoin College and made it large gifts.

T. H. Hubbard

Coal in Germany.—Reports from the Rhenish-Westphalian coal-mining district state that it has not been possible to increase the production of coal to any material extent. Extra shifts do not counteract the effect of calling up further instalments of skilled hands. Under these circumstances, it has caused considerable satisfaction that the Department for War, after negotiations with leading coal-mining circles, has decided to allow a fair number of the miners thus called up to return on leave for some fixed time, so as to effect an increase in the production. This step will, it is stated, be taken promptly, and hopes are expressed that the much-longed-for increase in the production will then ensue. In spite of the rise of prices, which came into operation on April 1, there seems to be no falling-off in the demand, rather the contrary. The advent of warmer weather is not expected to make any difference in this respect. The large stocks at the Upper Rhine, and although in South Germany, are almost exhausted, which circumstance, coupled with the uncertainty as to a possible rise in prices from September 1, is likely to produce an active market during the summer. The increased demand for coke, which may now amount to about half the allotment figure, is attributed to the continued increase in the activity of the iron industry. A number of blast-furnaces and other iron industries have recently again been set going, which, of course, means a greater demand for coke. The negotiations about the renewal of the Rhenish-Westphalian Coal Syndicate have led to the acceptance of a draft agreement by the majority of all mines.—*Engineering.*

Equipment and Supplies

LOCOMOTIVE BUILDING

The Havana Central is in the market for 6 Consolidation type locomotives.

The Roby & Northern, Roby, Tex., is inquiring for a number of locomotives.

The Texas & Pacific is in the market for 10 switching and 6 freight locomotives.

The New York, Ontario & Western is in the market for 12 Santa Fe type locomotives.

The Wilmington, Brunswick & Southern is reported to have ordered 1 locomotive from the Georgia Car & Locomotive Company.

Fort Worth & Denver City.—The orders for locomotives and cars reported in the *Railway Age Gazette* of May 14 as having been placed by this company with the Baldwin Locomotive Works and the Haskell & Barker Car Company, respectively, should not have been reported as new orders. These locomotives and cars were but parts of orders placed by the Chicago, Burlington & Quincy, reported in the issues of February 26 and March 12.

CAR BUILDING

Fort Worth & Denver City. See item under Locomotive Building.

The Roby & Northern, Roby, Tex., is inquiring for a number of cars.

The New York, Ontario & Western will build 20 caboose cars in its own shops.

The Norfolk & Western is reported to be contemplating the purchase of 1,000 box cars.

The Detroit, Toledo & Ironton is in the market for 200 40-ft. 40-ton steel underframe box cars.

The Northern Pacific is in the market for 750 center sill structures and 1,500 sets of draft sills.

The Long Island has ordered 100 steel underframe box (X1) cars from the Pressed Steel Car Company.

The Chesapeake & Ohio has ordered 700 steel underframe 30-ton box cars from the Central Locomotive and Car Works.

The Havana Central is inquiring for 500 20-ton and 50 30-ton flat cars, 100 30-ton box cars and 10 30-ton caboose cars.

The Wilmington, Brunswick & Southern is reported to have ordered 5 cars from the Georgia Car & Locomotive Company.

The Western Maryland's inquiry for passenger cars includes 4 baggage cars, 8 coaches, 2 cafe-parlor observation cars and 1 parlor-buffet car.

The Lehigh Valley will repair 2,000 box cars and has divided the work between the American Car & Foundry Company and the Standard Steel Car Company.

The Russian Government is negotiating with the Pullman Company for the purchase of 40,000 freight cars. These cars, if purchased, will be built according to American standards except as to gage, couplings and wheels. The gage will be the broad gage of the Russian railways and the couplings and wheels will also be according to Russian standards. This order may be closed this week.

The Pennsylvania Lines have placed orders for 189 passenger cars as follows: Pressed Steel Car Company, 47, including 10 coaches (P70), 8 combination passenger and baggage cars (PB70) and 5 baggage cars (B74a) for the Lines East, and 14 coaches (P79), 4 combination passenger and baggage cars

(PB70) and 6 dining cars (D78) for the Lines West; Standard Steel Car Company, 39, including 20 coaches (P70) and 12 combination cars (PB70) for the Lines East and 7 baggage cars (B60a) for the Lines West; American Car & Foundry Company, 20 coaches (P70) for the Lines East; J. G. Brill Company, 15 baggage cars (B60) for the Lines East; Pullman Company, 12 baggage and mail cars (BM70e) for the Lines West, and the Altoona shops, 56, including 14 passenger, baggage and mail cars and 42 baggage and mail cars for the Lines East. The order is thus divided 146 cars for the Lines East and 43 for the Lines West. With the completion of these cars the Pennsylvania System will have in the passenger service on its lines 3,823 all-steel cars, 593 of this number being all-steel Pullman cars. The Pennsylvania began substituting steel cars for wooden equipment in 1906, when it was announced that in the future all passenger cars built or ordered would be of all-steel construction. The total number of passenger cars on the system at the present time is 6,869, so that when the cars that have just been ordered have been delivered, more than half of all the passenger equipment used on all of the 11,991 miles of railroad of the system, will be of all-steel construction. This number, 3,283 cars, is almost one-third of all the steel passenger cars in the United States.

IRON AND STEEL

The Baltimore & Ohio has ordered 1,800 tons of rails from the Illinois Steel Company.

The Missouri, Kansas & Texas has ordered 1,200 tons of steel from the Illinois Steel Company.

The Southern Pacific has ordered 25,000 tons of rails from the United States Steel Corporation.

The Chicago & Alton is reported to have ordered 8,000 tons of rails from the Illinois Steel Company.

The Cleveland Railway Company has ordered 1,100 tons of open-hearth steel rails from the Algoma Steel Company.

The Lehigh Valley has ordered 1,500 tons of steel from the Lackawanna Steel Company for the new terminal at Buffalo.

The Boston & Maine has ordered 1,200 tons of steel from the American Bridge Company for a bridge near Greenfield, Mass.

The Russian Government is reported to have ordered 12,000 tons of rails from the United States Steel Corporation, supposedly for use on the Chinese Eastern.

The Pennsylvania Railroad has ordered 1,850 tons of bridge material, 1,100 tons from the McClintic-Marshall Company, and 750 tons from the Fort Pitt Bridge Works.

The Dallas Union Terminal Company has ordered 181 tons of steel for one 152-ft. highway span at Commerce street, Dallas, Tex., from the American Bridge Company.

The New York Central has ordered 15,500 tons of rails from the Illinois Steel Company. Of this order 5,500 tons will be for the Michigan Central, 8,500 tons for the Cleveland, Cincinnati, Chicago & St. Louis and 1,500 tons for the Cincinnati Northern.

The New York Public Service Commission, First district, will receive bids until June 11, for 2,500 tons of rails and corresponding quantities of ties, spikes and other track equipment materials for use on the New Utrecht avenue elevated railroad in Brooklyn, a branch of the Fourth avenue subway.

The Berlin Surface Railways.—The effect of the European war was not felt on the Berlin surface railways until the autumn of 1914, but the annual report of the Grosse Berliner Strassenbahn for last year shows that losses in traffic on account of the war and of additional rapid transit and omnibus competition led to a reduction in dividends from 8 per cent in 1913 to 6 per cent in 1914. During mobilization there was a feverish increase in travel, but in August the loss as compared with 1913 was 13 per cent, and by December it had increased to 15 per cent. The mobilization of 15 per cent of the operating staff made it necessary to reduce service 25 per cent until the 5,000 employees could be replaced. Service on certain parallel lines was reduced or eliminated, while on the active lines trailers were increased, headways were lengthened and schedule speed was raised.

Supply Trade News

M. E. Duncan, vice-president of the Canadian Car & Foundry Company, and formerly of the American Car & Foundry Company, died in Montreal on May 23.

The Laconia Car Company, Laconia, New Hampshire, is working on a contract for shrapnel for the Russian government, sublet to it by the Canadian Car & Foundry Company.

George H. Russel, vice-president and founder of the Russel Wheel & Foundry Company, Detroit, Mich., of which he was president until 1906, died on May 17 at his home in Detroit, Mich.

F. C. Severin, formerly salesman for the Niles-Bement-Pond Company, Inc., at Birmingham, Ala., has been transferred to the New York office, and his territory will cover a portion of New York state.

The Industrial Works, Bay City, Mich., have established as their Pacific coast agents, N. B. Livermore & Co., of San Francisco and Los Angeles, Cal., and the Northwestern Equipment Company of Seattle, Wash., and Portland, Ore.

The United States Cast Iron Pipe & Foundry Company, Burlington, N. J., will open a new office in Kansas City, Mo., at 1404 R. A. Long building, about June 1. The new office will be in charge of R. C. Clifford, formerly of the St. Louis office of the company.

C. B. Yardley, Jr., at present eastern railroad representative of the William C. Robinson & Son Company, Baltimore, Md., with office at New York, will on June 1 become manager of the railway department of the Lubricating Metal Company, 2 Rector street, New York. Mr. Yardley was for a time manager of the railway department of the United States Metal Products Company, and previous to that was for several years railroad representative of Jenkins Brothers, New York. Mr. Yardley is a prominent member of the Railway Supply Manufacturers' Association. In 1912-1913 he served as chairman of the enrollment committee of that organization, and at present is chairman of its badge committee. He has also served as secretary and treasurer of the Railway Materials Association which is associated with the Railway Storekeepers' Association, and in May, 1914, was elected president of that organization.

C. B Yardley, Jr.

The operation of the plant of the Continental Car & Equipment Company at Highland Park, Louisville, Ky., which was shut down when the company went into bankruptcy, will be resumed by the Continental Car Company, which has been incorporated with $40,000 capital stock by A. H. McKinley and others.

The Hyman-Michaels Company has established a well equipped plant in the St. Louis district for the manufacture of scrap iron, having installed a number of shears, an acetylene cutting apparatus and a contrivance for sorting, cutting and testing materials. It has also installed a rail plant for handling new and relaying rails.

Bruce V. Crandall, who has been secretary of the National Railway Appliances Association since July 1, 1911, has resigned, effective on May 31. At a meeting of the board of directors on May 21, C. W. Kelly, of the Kelly-Derby Com-

pany, Chicago, treasurer and director of exhibits of the association, was elected secretary for Mr. Crandall's unexpired term.

The plan of reorganization for the Barney & Smith Car Company, announced May 24, contemplates the organization of a new company under the laws of Ohio with a capitalization as follows: First mortgage five per cent bonds $2,000,000; seven per cent cumulative preferred stock $1,500,000 and common stock $2,000,000; total $5,500,000. The present capitalization has the same amount of bonds and common stock, but also includes $2,500,000 of eight per cent cumulative preferred. The present preferred stock will be exchanged for new common in the ratio of four shares of new common for ten shares of old preferred. The present common stock will be exchanged for new common stock in the ratio of one of new common for ten shares of old common. Of the new preferred, $1,250,000 will be offered to present preferred stockholders at par in proportion to their holdings, one share of new to two shares of old, such preferred to carry with it 40 per cent of new common. The remainder of the new preferred stock will be offered to present common shareholders at par in proportion to their holdings, one share of new preferred to eight shares of old common, such preferred to carry with it 40 per cent of new common. Non-dividend bearing scrip will be issued for fractional shares of preferred and common, exchangeable for shares when presented in amounts of one or more shares of the respective kinds of stock. The committee reserves the right to dispose stock not taken by present stockholders. The committee for the common stockholders will bid for the plant for the sole benefit of stockholders who deposit their stock and assent to this plan. Any money accruing, as the result of a sale to stockholders who enter into this agreement, will not be distributed in cash, but will be applied as a subscription to new preferred stock.

Westinghouse Electric & Manufacturing Company

The Westinghouse Electric & Manufacturing Company and its subsidiary companies in the United States in the fiscal year ended March 31, 1915, had gross earnings of $33,671,485 as compared with $43,733,646 in 1914. Its cost of sales was $31,109,073, so that the net manufacturing profits were $2,562,412. There was also other income of $1,158,527, leaving a gross income from all sources of $3,720,939, as compared with $5,998,078 in 1914. The net income applicable to interest and other charges was $3,278,662. The interest charges totaled $1,268,918, a considerable reduction from the $1,706,005 of 1914, and the net income available for dividends and other purposes was $2,009,744, as against $4,058,809 in the previous year.

The value of unfilled orders on March 31, 1915, was $8,951,410, as compared with $7,951,785 on March 31, 1914. The average number of employees during the year was 15,145, as compared with 18,635 during the previous year.

During the year the company exchanged 85 per cent of the issued capital stock of the Westinghouse Machine Company for the common stock of the Westinghouse Electric & Manufacturing Company on the basis of one share of the latter for three shares of the Machine Company. In the same period the capital stock of the Societe Anonyme Westinghouse (the French company) was sold to the British Westinghouse Electric & Manufacturing Company, Ltd., and payment was received in other securities. The British company now owns the controlling interest in the French company, and through the latter the controlling interest in the Italian company.

On March 31, 1915, the company had total current assets of $18,626,776, of which $8,855,280 was cash and $6,657,731 was accounts receivable. The current liabilities on the same date were $3,704,102, including $2,270,038 accounts payable. The company's liabilities also include $2,720,000 of collateral notes, $4,500,000 of such notes having been retired on maturity in the course of the year. The company's surplus at the close of the fiscal year was $7,473,412.

Canal Extension in Bombay.—The Marquess of Crewe has sanctioned the Gokak canal extension in Bombay as a protective irrigation work.

Railway Rates in Spain.—A syndicate of Spanish railway bondholders and bankers is working to prevent proposed reductions in freight rates.

Railway Construction

Atchison, Topeka & Santa Fe.—This company has purchased the Oil Belt Terminal Railway from Jennings to Oilton, Okla., and the Cushing Traction Company from Cushing to Pemeta. It will build a line connecting Pemeta and Oilton, and also a branch from Pemeta to Drumright. When it is completed it will give the Santa Fe a direct line from Jennings to Cushing. The grading contract has been awarded to Michael Dougherty, Guthrie, Okla. The track will be laid by company forces.

Brooklyn Marginal Railroad.—See an item in General News in regard to this proposed line along the east shore of New York bay in the borough of Brooklyn, New York City.

Chicago, Burlington & Quincy.—Work is now under way on the short section between Wendover, Wyo., and Guernsey, to connect the C. B. & Q. line from the junction with the Northern Pacific near Billings with the company's Nebraska lines. (January 29, p. 211.)

Intercolonial.—Residents of Guysborough and Antigonishe counties, Nova Scotia, are asking for the construction of an extension of the Intercolonial from Sunnybrae east to Eden Lake, thence southeast to Country Harbour and northeast following the valley of the Salmon river to Guysborough, thence around the head of Chedabucto bay and following the shore of the Strait of Canso to Port Mulgrave, where the line will again connect with the Intercolonial.

Musgraves-Merrill Shipment Company.—This company proposes to construct a railroad from Fort Davis, Tex., to Marfa, 18 miles. We are advised that contracts will be awarded as soon as the company obtains the deed to the right of way. B. Q. Musgraves, Fort Davis, Tex., is president, and H. A. Hardaway, Deming, N. M., is chief engineer.

New York Connecting.—Bids are wanted until June 7, by A. C. Shand, chief engineer, Southern division, Broad street station, Philadelphia, Pa., for the construction of the grading and masonry of a portion of Section 2, of the New York Connecting Railroad, extending from a point near Bowery Bay road to the south side of Fremont street, in the borough of Queens, New York, about 4.21 miles.

Nevada Short Line.—This company has just started construction on a 12 to 14 mile extension from Nenzel station on the Southern Pacific to the gold and silver mines at Rochester, Nev. The contract for grading and track laying has been awarded to Ottoman & Duprey, San Francisco, Cal. There will be five timber bridges, about 460 ft. in all, and will be built by the railway company. Depots and sheds will also be built.

New York Subways.—Bids for the construction of Section No. 2, of the Gravesend avenue elevated railroad were opened recently by the New York Public Service Commission, First district, and the contract probably will be awarded soon. This section extends from Bay Parkway to avenue X. The Oscar Daniels Co., was the lowest bidder, and offered to do the work for $863,775.

The commission is having plans made for the construction of the Utica avenue subway, in the borough of Brooklyn. This will be a branch of the Eastern Parkway subway, and is to be constructed from Eastern parkway down Utica avenue to Flatbush avenue.

A new route for an elevated line to be built through Westchester avenue, to connect the Bronx Park branch of the existing subway at Simpson street with the proposed Pelham Bay Park branch of the Lexington avenue subway, in the borough of the Bronx, has been adopted by the commission.

Savannah, Piedmont & Western.—This company, which was incorporated recently in South Carolina has preliminary surveys made and the right of way secured, it is said, for the line to be built from a point on the Savannah river at or near North Augusta in Schultz township, Aiken county, north to a point in Saluda county, thence northwest to Greenwood, about 60 miles.

J. Peyton Clark, New York; S. H. McGhee and K. Baker, Greenwood, S. C., are incorporators. (April 2, p. 768.)

Tucson, Cornelia & Gila Bend.—Bids are being asked for until June 10, to build a railway from Gila Bend, Ariz., south to Ajo, about 42 miles. The company expects to develop a traffic in oil, sulphuric acid, ore, concentrates and copper. L. D. Ricketts, president, Warren, Ariz., and R. H. Jones, chief engineer of construction, Gila Bend.

Wisconsin & Northern.—This company will extend its line from a point just north of Van Ostrand, Wis., north to Crandon, a distance of 29 miles. The contract for grading and timber culverts has been awarded to Peter Nelson & Co., Minneapolis, Minn. The track will be laid by company forces. The Wisconsin Bridge & Iron Company, Milwaukee, Wis., has been awarded the contract for a 307-ft. steel bridge over the Wolf river, just north of Van Ostrand.

RAILWAY STRUCTURES

Algiers, La.—Morgan's Louisiana & Texas Railroad & Steamship Company will construct new shop buildings and probably install some new tools and equipment at this place. The tools and equipment have not yet been definitely determined.

Anderson, S. C.—The Piedmont & Northern has given a contract to the Fiske-Carter Construction Company, Greenville, S. C., to rebuild the freight house at Anderson which was damaged by fire.

Bessemer, Ala.—The Railroad Commission of Alabama has directed the Louisville & Nashville to build a new brick and stone station in Bessemer, it is said, to cost about $30,000, and the Alabama Great Southern to build a station to cost $25,000.

Kinnickinnick, Wis.—The Chicago & North Western contemplates building a 1,000,000-bu., reinforced concrete grain elevator at this point.

Montezuma, Ind.—The Cincinnati, Hamilton & Dayton has asked for bids on a bridge to be built over the Wabash river at this place. It will be a 150-ft. open floor through riveted truss steel span designed for Cooper's E-50 loading. There will be one pier and one masonry abutment.

Sidney, Ohio.—The Cincinnati, Hamilton & Dayton has asked for bids on a bridge to be built over Fair avenue at Sidney. It will be a 79-ft. deck plate girder span designed for Cooper's E-50 loading. It will have two masonry abutments.

Trenton, N. J.—An officer of the Pennsylvania Railroad writes regarding the report that the company will build a new bridge over the Delaware & Raritan canal at Trenton, that the company has submitted a tentative plan to the city for the construction of a structure similar to the bridges already built over the canal. No conclusion has yet been reached as to the location or design of the bridge.

The Pennsylvania Railroad has given a contract to the American Dredging Company for dredging the channel of the Delaware river to a depth of 12 ft. for about three-quarters of a mile, in connection with the new bridge at Trenton. This will involve the dredging of about 92,000 cu. yd. of material.

Troy, Ohio.—The Cincinnati, Hamilton & Dayton has asked for bids on a bridge to be built over a highway, the Miami & Erie canal and the Hydraulic canal, consisting of one 30-foot I-beam span, one through plate girder span 79 ft. long, one deck plate girder span 38 ft. long, two deck plate girder spans 51 ft. long and one deck plate girder span 45 ft. long. It will also have five piers and two masonry abutments.

Van Ostrand, Wis.—See Wisconsin & Northern under Railway Construction.

Walla Walla, Wash.—The Oregon-Washington Railroad & Navigation Company will build a one-story, 10-stall roundhouse at this place. It will have brick walls, mill interior and concrete pits. The approximate cost will be about $25,000. Moore Brothers, Portland, Ore., have been awarded the contract and have just started the work.

Wilkinsburg, Pa.—The Pennsylvania Railroad has given a contract to Irwin & Leighton, Philadelphia, for building a new station at Wilkinsburg.

Railway Financial News

Boston & Maine.—The bill before the Massachusetts legislature providing for the reorganization of this company has been passed in the House by a large majority and is now believed to be in such shape that its final passage by both houses is assured. On the last day of debate the status of the Hampden railroad was discussed at length, but the law was finally so shaped as to allow the absorption of this road by the B. & M. provided the consent of the Public Service Commission shall be secured; which, however, must not be given until after notice and a public hearing; and the commission must find that the proposed acquirement of the Hampden will be in the interest of the public, will be just and equitable as between the two contracting corporations and is to be made for a consideration not exceeding the reasonable and proper cost incurred in the construction of the Hampden Railroad as determined by the Public Service Commission in its report made December 24, 1913.

The law provides that the new company must earn as well as pay 5 per cent dividends before its securities can be accepted as proper investments for savings banks.

Chesapeake & Ohio.—The directors, at their meeting on May 21, took no action in the question of a dividend, the announcement being made at the close of the meeting that a decision would be made at the regular meeting on June 17.

International & Great Northern.—Judge Burns in the United States district court at Houston, Tex., May 17, handed down a decree ordering the sale of this road at Houston on some day subsequent to August 1 next. The Master to conduct the sale is yet to be named.

Missouri Pacific.—The executors of the Gould estate, holding $6,000,000 of the three-year six per cent notes of this company, have agreed to an extension of the notes for one year. It is said that all holders of these notes receive in return for this concession a cash payment of $5 on each one thousand dollar note. It is said that the holders of a large majority of all of the notes—$25,000,000—have agreed to the extension of time.

New York New Haven & Hartford.—Judge William H. Hunt in the United States District Court at New York City has set October 25 as the day for the trial of twelve directors and former directors of the New Haven road in the long pending suit of the government charging conspiracy, in violation of the anti-trust law, in the consolidation and purchase of certain railroads, and other acts done by the board of directors in past years. The defendants are: Lewis Cass Ledyard, Charles F. Brooker, D. Newton Barney, Robert W. Taft, James S. Hemingway, Charles M. Pratt, A. Heaton Robertson, Frederick F. Brewster, Henry K. McHarg, Edward D. Robbins, Alexander Cochrane and John L. Billard. Immunity was granted recently by Judge Hunt to William Skinner and James S. Elton, but the government is appealing from Judge Hunt's decision in this regard. Judge Hunt also granted a separate collective trial to William Rockefeller, George F. Baker, T. De Witt Cuyler, Theodore N. Vail, Edward Milligan and Francis T. Maxwell.

Pere Marquette.—At Detroit, May 24, Judge Tuttle fixed October 1 as the date for the sale of the road, unless some satisfactory reorganization plan is submitted at once. He intimated in reply to the objection of consolidated bondholders that they would have a chance at the hearing on the petition to submit a plan for reorganization as the only alternative. The formal conditions of the sale will be announced June 7 and the receivers will file a petition asking for the disposal of the property for the purpose of paying its debts. Claims against the system which have been recorded in court actions and at various investigations amount to more than $88,000,000. Underlying bondholders, in their petition asking for the sale of the road, guaranteed to bid a sufficient amount of money to clear away the equipment indebtedness as well as their own claims.

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*Illustrated.

The Conference on Valuation

The conference on the valuation of railways, called by Director of Valuation Prouty, and held at Washington last week, was the most important meeting to consider this subject ever held.* It was so important because of the leading character of the questions specifically discussed, because of the large and able representation of the railways and of the states present, and because of the magnitude of the general undertaking to which the conference related. The ultimate success of the valuation work will depend largely on the degree of co-operation obtained between the Interstate Commerce Commission, the railways, the state governments and commercial and banking interests, the latter of which may later awaken to a realization of the extent to which they may be affected. The participation of the railways in the conference was notable not only by reason of the large and able representation of the legal, engineering and accounting departments, but also by reason of the careful preparation of their case, which was evinced, and by the harmony of view manifested in presenting it. It is well known that there are differences of opinion between individual railway men on the subject of valuation, but the railway managers have recognized the expediency of harmonizing their differences and presenting a united front on all the larger issues. The ideal way to carry on the valuation would be to get all the parties concerned to agree on the fundamental principles involved and on the methods that should be used. This is doubtless impracticable, but the course adopted by Director Prouty of bringing representatives together for thorough but somewhat informal conferences of this kind, will tend to reduce the number of points of difference, to simplify and expedite the work and to keep down the expense of doing it.

Accidents to Long and Short Trains

Legislation to limit the length of freight trains is being advocated by the labor brotherhoods as a means of reducing railway accidents. It has been pointed out in reply to this that a reduction in the length of trains would cause an increase in the number of them run, and that the statistics of the Interstate Commerce Commission show that almost invariably an increase in the number of trains run results in increase of accidents, and a decrease in the number of trains run results in a decrease of accidents. This answer to the argument for train limit legislation seems strong enough, but it is interesting to find that statistics show further that on the whole there are more accidents to short freight trains than to long ones. The Illinois railways have compiled statistics which demonstrate that on 23 of the principal steam railroads in that state which operate trains of 50 cars or over, the chance of death or injury to railroad employees was 37 per cent greater in 1913 on trains of 50 cars or less, than on longer trains. These 23 roads in that year operated in Illinois 236,702 trains of over 50 cars, on which 23 employees were killed or injured for every 3,430 trains run. The same roads ran 413,510 trains of 50 cars or less, on which 43 employees were killed and 149 seriously injured, or one to every 2,154 trains run. On the longer trains one man was killed for every 10,291 trains run and one was injured for every 5,145; whereas on the shorter trains one was killed for every 9,616 trains and one injured for every 2,775. Probably the main reason for the greater proportionate number of accidents in connection with the operation of short trains is due to the fact that they ordinarily are run faster. The Kansas railways also have found that there are more accidents to short than to long trains in that state.

The New Haven Bill Vetoed

Governor Walsh of Massachusetts has vetoed the two bills which had been passed by the Massachusetts legislature after conferences with the state public service commission, which it was believed would have made possible a readjustment of the New Haven's financial affairs and the reorganization of the Boston & Maine, at least insofar as Massachusetts is concerned. Some of the comments of Governor Walsh accompanying the veto are published in the financial columns of this issue. The gist of the governor's objections seemed to be that the bill would legalize something which had hitherto been illegal and make it possible for the New Haven at some future date to get out of the clutches of Massachusetts. Regardless of the merits of the charge which the governor makes that the legislature changed in certain very essential ways the two bills at the last moment and without the approval of the railway commission, the whole situation is deplorable. It illustrates in a striking way the evils of state regulation of railroads. Openly and shamelessly the three states principally concerned in the Boston & Maine tangle have

squabbled over local questions. New Hampshire had already passed adversely on a bill similar to the Massachusetts Boston & Maine bill because its interests were not sufficiently "taken care of." On the other hand, both Connecticumt and Rhode Island, which are concerned in the New Haven financial readjustment, have approved bills which would grant the relief aimed at by the Massachusetts-New Haven bill. The Boston Transcript, after the New Haven and Boston & Maine bills had been passed by the two houses of the Massachusetts legislature, and before the governor had acted on them, said:

> With all too little assistance from the governor, who has appeared both confused and vacillating with regard to the whole railroad situation, the legislature has solved its railroad problems in conference and in co-operation with the public service commission. . . . President Elliott of the New Haven and President Hustis and the trustees of the Boston & Maine were freely consulted and showed at all times a realization of their responsibilities to the public as well as to their respective parties.

As has been pointed out before in these columns, the Massachusetts law which did not permit the sale of stock except at the market quotations by making financing through stock issues wholly unattractive, has been as potent as any other one factor in bringing about the present Boston & Maine situation. Now when the whole New England railroad situation is in a most critical state, sectional jealousies, local and selfish interests, and political prejudice are allowed to have a predominating part in the state regulation of the New England railroads.

DEPRECIATION AND RAILROAD CREDIT

THERE is published elsewhere in this issue an article by Morrell W. Gaines, characterizing the commission's rules for charging for depreciation and retirements of equipment as a threatened "billion dollar confiscation." The article brings out in a very interesting way one side of this question of a charge to operating expenses for depreciation concurrently with a charge to operating expenses and to profit and loss for the original cost of the equipment retired. The point is made that this new requirement of the commission, which permits only so much of the original cost of a unit of equipment to be charged against accrued depreciation as has been accrued on that particular unit, and requires that the remainder, less scrap value, be charged in part to expenses and in part to profit and loss, while at the same time a charge must be made to expenses for depreciation of equipment, puts a double burden on the present generation of railroad securityholders that is entirely unwarranted. This fact can hardly be disputed. The commission may argue that if all railroad companies had on July 1, 1907, accepted the theory of depreciation, and thereafter made an adequate charge to expenses for depreciation, there would be now no undue burdening of the expense accounts through charges for retirements, and that the charge to profit and loss was sound accounting, tending in the long run to make the books show accurately the cost of assets and the earning power of the property. The fact remains, however, that the commission's theories of depreciation were a matter on which there could be an honest difference of opinion and that the majority of the roads did not accept these theories on July 1, 1907.

The credit of a railroad company is one of its assets, and if it were a fact that through arbitrary rules enforced by the Interstate Commerce Commission the credit of railroads were seriously detracted from, it would be entirely proper to call this confiscation. On the other hand, if the commission's rules call for a degree of publicity and a form of statement of what is, however stated, an actual fact, it is hardly fair or accurate to call this confiscation, even if it temporarily hurts the credit of some railroads.

The position of each individual railroad is a separate case which presents individual problems. The Interstate Commerce Commission has not as yet fixed a rate of depreciation which is mandatory. It is to be hoped that at least for a number of years the commission will not fix such a rate. The fixing of a rate for depreciation and the charging of depreciation is the distribution of a business risk, but it is also guessing. If the management of a railroad property, familiar with the physical condition of its equipment and its policy in regard to repairs and renewals, guesses at what the rate of depreciation—in practice generally a rate of obsolescence rather than depreciation—will be, the guess may be somewhere near the mark. If the Interstate Commerce Commission were to make a guess for the whole country and then make this guess mandatory, it would in a great number of instances be dangerously wide of the mark and might also work very real and serious harm to some railroad companies.

The situation appears to be this: The commission's theories about depreciation and charges for retirements are in general sound. Any number of individual instances may be cited where the facts would fail entirely to conform to the theory; but this does not vitiate the general soundness of the rules for charging depreciation. If rates are to be fixed with regard to the value of the property, and if the commission is inclined to permit such rates as will yield a fair return on the value of the property, the sooner an accurate method of stating cost of property and an estimate of its yearly depreciation is adopted the better. Co-operation between individual railroad companies and the Interstate Commerce Commission should, if the commission takes a broad point of view and the railroad managements a helpful attitude, minimize the hardship that will be worked on present securityholders. If this attitude of co-operation is adopted and the commission does not arbitrarily fix a rate of depreciation, but continues to make a study of the subject with the aid of the railroad managements, it would seem that the situation ought to work out to the ultimate good of the railroads.

TURN BACK THE CLOCK!

THERE are some people who think that the development of modern transportation has contributed more than anything else to the promotion of the economic welfare of the public. There are others who think that the development of modern transportation has been a crime against the public welfare and ought to be stopped.

The latter class are advocating the passage in Illinois and other states of a law to limit the length of railway freight trains. They could not advocate any measure which would more effectively and completely destroy the principal economies that already have been introduced in railway transportation and prevent the introduction of any more. From the time such a law went into effect all substantial reductions in the cost of railway operation would cease, and, if increases in wages continued, enormous and unprecedented advances in the cost of transportation would begin. For the handling of traffic in larger and larger units has been the most characteristic feature of modern transportation on both water and land; it has been the only thing which has enabled the railway companies to stand the heavy increases in wages and other expenses in recent years without proportionate increases in rates; and if the increase in the size of transportation units is to be stopped there can be no further substantial increases in wages and improvement in working conditions without proportionate increases in transportation costs and transportation rates. The attitude of those advocating this legislation is, "Turn back the clock. Transportation progress must stop. Human welfare demands it. The increase in the size of freight trains saves labor and thereby prevents as many men being employed as otherwise would be employed."

But let us be consistent. If we are to stop progress in railway transportation in the purported interest of labor, let us stop it in all other lines of transportation.

Goods are now being hauled on the highways in five-ton motor trucks. This is all wrong. It causes unemployment of horses and men. A law ought to be passed to prohibit the use of motor trucks. More horses and men would be required to handle the

traffic in four-horse wagons. Better still, let us go back to two-horse wagons. Or, better yet, let us go back to the two-wheel cart drawn by one ox. That was ideal highway transportation. On the precious theory of the "50-car bill" advocates transportation on highways exclusively in one-ox two-wheel carts gave the maximum amount of remunerative employment to labor.

Turn back the clock! In the name of human welfare, restore to us our ox-cart transportation!

So with water transportation. The tendency on the great lakes and the oceans is to handle traffic in larger and larger steamships. The purpose of this is to save labor and other expenses. This is all wrong. A law should be passed to limit and reduce the size of steamships. Better still, let us prohibit steamships entirely. It requires more human labor to carry a given amount of freight in sailing vessels than in steamships. But the ideal toward which we should work is a return to the exclusive use of those ancient vessels known as galleys, which were propelled by slaves chained to the oars. They afforded the maximum employment to human labor in proportion to the amount of traffic handled.

Turn back the clock!

And while we are legislating regarding the length of freight trains, why make their maximum 50 cars? Why not make it 25 cars? That would be twice as beneficent. Why not make it 12 cars? Or, why not provide that a train shall consist of an engine, one freight car and a caboose? Think of the men who would be given employment then!

Why has not one of the innumerable inspired jackasses who busy themselves in framing labor legislation rendered himself immortal by drafting a law to require all water transportation to be conducted in flat-bottomed skiffs and all land transportation to be conducted in wheel-barrows?

RAILROADS IN THE HANDS OF RECEIVERS

THE total mileage of railroads of the United States in the hands of receivers is at present almost exactly the same as the total on June 30, 1896, which was the highest ever recorded in the history of the country. Of course the proportion of mileage in the hands of receivers to total mileage operated is much less than it was in 1896, because of the very much larger mileage now operated.

The comparison is rather startling, however, because on June 30, 1896, the railroad situation was distinctly on the mend. Most of the larger roads then in the hands of receivers were practically already out of the woods. On the other hand, at present not a single one of the important large systems being operated by receivers is out of the woods. It is true that the Wabash has announced a reorganization plan, and although it is drastic and has been underwritten, the company will have to show materially better earnings than it did last year to insure the eventual success of the plan.

At present there is approximately 30,500 miles of railroad in the hands of receivers. The total mileage in the hands of receivers on June 30, 1896, was 30,475. The total par value of securities outstanding of roads being operated by receivers in 1896 was $1,795,900,000. The par value of securities outstanding for the roads now being operated by receivers is approximately $1,815,900,000. The fact that the capitalization of the roads now in the hands of receivers compares so favorably with the capitalization of the roads being operated by receivers in 1896 is apparently a coincidence, although, of course, it might be possible to point out some general truths which this fact probably illustrates. The Philadelphia & Reading, which was in the hands of receivers in 1896, had outstanding securities per mile much in excess of the road's power to earn a return on them. The same is true with the Wabash at present. The larger systems which are now in the hands of receivers are the Chicago, Rock Island & Pacific, with 8,328 miles of road; the St. Louis & San Francisco, with 4,747 miles of road; the Wabash, with 2,514 miles of road; the Pere Marquette, with 2,322 miles of road; the Chicago & Eastern Illinois, with 1,282 miles of road; the International & Great Northern, with 1,106 miles of road, and the Cincinnati, Hamilton & Dayton, with 1,015 miles of road. The principal roads that were in the hands of receivers in 1896 were the Northern Pacific, with 4,533 miles of road; the Union Pacific, with 1,836 miles of road, and its subsidiaries having an additional mileage of approximately 5,900 miles; subsidiaries of the Atchison, Topeka, & Santa Fe, with approximately 2,000 miles; the Baltimore & Ohio, with 2,073 miles; the Norfolk & Western, with 1,571 miles, and the Philadelphia & Reading, with 884 miles.

A study of the table which the *Railway Age Gazette* publishes in its annual review number, giving a record of roads thrown into receiverships since 1876, apparently indicates a very different situation at present than in 1896. The large mileage of roads that were still in the hands of receivers on June 30, 1896, was accounted for principally by the receiverships established in 1892 and 1893, in which two years there was a total of 39,848 miles of road which became insolvent. In 1896 itself only 5,441 miles of road was put into the hands of receivers, and in the previous year but 4,089 miles of road. On the other hand, the present large mileage is accounted for by roads that have gone into receiverships comparatively recently. The Rock Island receivership dates back but a few weeks. The mileage of roads that became bankrupt in 1914 was 4,222; in 1913, however, 9,020. With the exception of 1908, in which year the Seaboard Air Line and the International & Great Northern were turned over to receivers, there was no year in which as much as 4,000 miles of road became insolvent back to 1896. The Seaboard Air Line has been taken out of the hands of receivers since 1908, and the International & Great Northern was taken out, but had to again seek the protection of the courts at the outbreak of the European war.

The ten years following 1896 were years of unparalleled prosperity in the United States. They were, moreover, years in which a very large investment was made in American railroad securities by European investors. By June 30, 1896, the return of prosperity, at least insofar as the bankrupt railroads were concerned, was well in sight. The Atchison, Topeka & Santa Fe had been taken out of receivership in December, 1895, and this might be called the real turning point in the railroad situation. The Northern Pacific was taken out before the end of 1896, as were also the Union Pacific and the Norfolk & Western. The Baltimore & Ohio was reorganized without foreclosure sale in 1899. In 1896 no one of the large roads in the hands of receivers was in what might be called at all a hopeless situation. At present the Pere Marquette, the Western Pacific and the Atlanta, Birmingham & Atlantic have little, if any, immediate prospect of reorganization, and the St. Louis & San Francisco and the Cincinnati, Hamilton & Dayton quite probably cannot be reorganized at least until after the end of the European war. The Chicago, Rock Island & Pacific may have only a very short receivership. The conflicting interests connected with the property apparently hold such divergent views at present that any opinion that might be ventured as to when the property would be reorganized would be the purest guesswork.

One more black touch to the picture and we are done with it. There are two or three large systems which have just scraped off the rocks of receivership through a temporary extension of obligations falling due, and whether or not their mileage shall be added to the 30,500 miles of road now under the protection in the courts will depend largely on the business situation in the next six to nine months.

Of course the railroad situation taken as a whole is by no means as gloomy as one might suppose from looking only at the facts presented above in regard to receiverships. On the other hand, it is only right that railroad men as well as the Interstate Commerce Commission should face squarely the unpleasant facts as well as the hopeful features of the situation.

Letters to the Editor

THE UNIVERSAL HOME ROUTE CARD

Chicago, Ill.

To the Editor of the Railway Age Gazette:

The intelligent use of the universal home route card will pay a big return on the investment—so big, in fact, that if the attention of the chief operating officers can be secured long enough to make the matter clear, they will do the rest. Unfortunately, opposition is developing in unexpected places and differences have already arisen regarding points which must be uniformly understood if the plan is to accomplish its reasonable measure of usefulness.

It is the object of this letter to help to bring about this common understanding.

Our present plan of handling surplus foreign equipment involves a vast amount of telegraphing, much work in divisional and card record offices, switching to and from hold tracks, much unnecessary mileage, unknown amounts exchanged as per diem and more hazard of accident from defective equipment than is generally recognized.

The objective of the universal home route card is to have with the car at all times a complete junction record for use in effecting prompt and economical home routing.

The requisites are a supply of cards, stamps and ink-pads, plus the conscientious stamping of the cards for foreign cars received in interchange and the careful handling of all cards as per instructions. The returns to be secured are:

1. A great reduction in empty car mileage, with a corresponding saving in train miles.
2. Abolition of most of the disposition telegraphing.
3. Elimination of interference with the work of record clerks.
4. A substantial saving in switching.
5. Reduced wear and tear of equipment as per items one and four with proportionate reduction in repair expense.
6. Earlier return of surplus equipment to owners and in better order, making possible earlier restoration to serviceable condition.

That these are not visionary claims will be evident upon analysis. For example, does any one familiar with the matter doubt that if the elimination of that part of the cost of repairing freight cars properly chargeable to empty car movements which can be avoided by the intelligent use of the universal home route card were all there is to gain, it would still be one of the best opportunities yet offered for reducing operating expenses?

It is undoubtedly true that there are many difficulties to be overcome in the practical operation of the plan, but as some of our largest and most important lines are already operating successfully under system cards it is reasonable to conclude that the difficulties are not insurmountable, and surely even a low percentage of the theoretical efficiency would warrant the trouble and expense involved.

In the article on this subject which appears on page 884 of the *Railway Age Gazette* of April 23 occurs the following: "The proposed rule will require that the short route be used where it can be done without creating empty mileage in excess of the original loaded haul."

This statement, based on A. R. A. Circular 1525, I regret to say, is correct.

It may be, and probably is, true that at the present time it is impossible to go further, but it is also true that the entire plan rests on the principle of reciprocity and that much of its possible benefit will be lost unless each road's policy is broad and statesmanlike, including the making of additional empty mileage on its own rails with any car on which a substantial net saving can be made on other lines.

E. H. DeGroot, Jr.,
Superintendent of Transportation, Chicago & Eastern Illinois.

RIPLEY ON RAILROADS: FINANCE AND ORGANIZATION

London, Eng.

To the Editor of the Railway Age Gazette:

In common, I doubt not, with every other student of railroad affairs, I have read Professor Ripley's new book, "Railroads: Finance and Organization,"* with the utmost interest. To praise it is, I feel, almost an impertinence. We are accustomed by now to Professor Ripley's wide knowledge of facts, his capacity of mastering them and his keen-sighted criticism. We take it for granted that these qualities will be displayed in whatever proceeds from his pen. And in this case we are not disappointed.

And yet for my own part I am constrained to wonder whether there is not a good deal of truth in the old proverb that "lookers on often see most of the game." Certainly I cannot myself draw from the facts that Professor Ripley records the conclusion that he does. He, as I understand him, concludes that because there have been failures, mistakes, scandals and frauds in the history of American railways, therefore public authority must interfere with strict and detailed regulations to prevent the possibility of such occurrences in the future. My answer, on the other hand, if I were asked to advise the public authority, would be in the famous words of Lord Melbourne, "Can't you leave it alone?"

If I have a fault to find with Professor Ripley as a historian, it is that he tells us too much about the one sinner and forgets to mention the ninety and nine just persons who need no repentance. We hear much of Jim Fisk and Jay Gould, of the Alton, 'Frisco and New Haven scandals, but not one word of the constructive work of men like Roberts and Cassatt, of the Pennsylvania; of Charles P. Clark, of the New Haven; of Samuel Spencer and William Finlay, of the Southern. Even James J. Hill appears, not as the one man more responsible than any other for the building up of the Northwest, but either as the hero of the Northern Securities fight, or else as the fairy godmother of his fortunate shareholders. With Professor Ripley's summing up of his own conclusions no railway man, jealous of the honor of his profession, could reasonably quarrel. Speaking of construction methods, after a whole chapter of what he himself describes as "rather depressing comment," he writes as follows:

> The magnitude of the achievement, as a whole, must constantly be kept in mind. To have opened up a continent to settlement within the short space of seventy years is an accomplishment unparalleled in history. The creation of the greatest railway net in the world, practically within two generations, in spite of all the obstacles opposed by nature and the limitation of capital resources, should be a matter of national pride.

And again, summing up his chapter on speculation, which he describes as "but a sorry tale at best . . . embracing a range of operations from mystification and petty deceit to utter fraud," he continues:

> But the conclusion must be carefully avoided that, because such offences have at times been committed, American railroad finance on the whole is unsound. Such an opinion would be absolutely unfounded. A large majority of our common carriers are certainly on the whole as honestly administered as are private businesses. Nor has the integrity in the main ever been so high as it is at present.

We may then cite the evidence of Professor Ripley, and there is no more competent witness, as proving that probity and good judgment and honest administration have always been the rule; that the departures from this standard have always been few, and are now fewer than ever. The case for that state interference and minute regulation by public authorities which Professor Ripley pleads for seems hardly made out on his own facts. Indeed to an Englishman it is not clear why, because Jim Fisk robbed the Erie, railroads should be regulated. The essence of that matter is not railroading but robbery. And robbery should be regu-

*Reviewed in these columns in last week's issue.

lated not by commissioners and ministers, but by policemen and jailers. In this oldfashioned country of ours we deal with criminals of the Jim Fisk order by putting them personally in prison, and by making their estates liable in a civil action to the defrauded shareholders.

But one may go further. Before we start regulating railroad directors and officers, we surely ought to satisfy ourselves that the regulators possess the qualities which the regulatees lack. We must postulate that the personnel of legislatures, courts and commissions is superior to railroad personnel not only in intelligence and knowledge, but in honesty and impartiality. This is a subject that Professor Ripley does not discuss. He does mention that as early as 1858 the public authorities of Wisconsin were bribed as follows: Members of the senate, $175,000; members of the assembly, $355,000; clerks, $16,000; governors, $50,000. And, unlike the railroad men whose standard of integrity Professor Ripley tells us has never been so high as at present, legislators do not seem to have improved since, for on page 472 he speaks of "wholesale bribery of members of the legislature, of the press and of influential citizens" as occurring in Massachusetts within the last few years. Dishonesty of a different kind is charged by Professor Ripley against the legislature of Texas: "The conclusion is unavoidable that [owing to the Texas laws] people resident in other states have furnished Texas with transportation for which it does not pay." This dishonesty of course may not be deliberate, it may be merely stupid and untintelligent. Still it is proverbially better to deal with a knave than a fool. But presumably we may take it for granted that sheer dishonesty is infrequent; that even legislatures are imitating the railroad men and getting better. What about fairmindedness and impartiality? Shall we cite the postmaster general of the United States, or the chairman of the Iowa railroad commission as the more ideal type of the impartial regulator? As for intelligence and knowledge the case is even more patent. Nobody would claim that the members of railroad commissions know as much about the railroad business as the railroad men themselves. Would anyone claim that they were their equals in intelligence and general business capacity? If they are, why are they anxious to secure and retain appointments carrying a compensation that not merely presidents and vice-presidents, but even division superintendents and freight agents would decline to accept?

I can imagine Professor Ripley and others who share his views replying to the argument put forward above somewhat as follows: "Let us admit that in integrity and intelligence the personnel of the regulators does not surpass the personnel of the regulatees; and further that in special expert knowledge they are actually inferior. Still the regulators look at matters brought before them from a wider point of view. They take into consideration the interest of the whole community. The railroads naturally regard their own interests only." My answer would be, "Look at the facts." No one will doubt that regulation in the United States is seen at its best in the work of the Interstate Commerce Commission. No one will deny that to the disentangling of tremendously complicated issues, such as, for instance, the inter-mountain rates they have brought much patient toil and hard and clear thinking. No one will dispute that they have redressed very many grievances, not a few quite serious. But, tried by the crucial test of their action on the rates advance case last July, does one business man in a hundred doubt their lamentable failure to face a really big issue in a large way? Can it be doubted that it was the railway men who asked an increase, and not the commission who refused it who more truly represented the public interest? And does anyone doubt that the error of judgment of the Interstate Commerce Commission has cost not the railroads but the American public, millions upon millions of dollars?"

My fundamental difference with Professor Ripley is therefore that he has taken for granted that strict and detailed regulation from outside is in the public interest. He has not proved it. I do not believe that under American conditions it can be proved. Indeed I know no country where it can. Publicity by all means, and the more of it the better; and power to interfere drastically in case of "scandals." But of interference in matters not of morality or of certainty, but of business instinct, the less the better.

I have discussed fundamentals at such length that I have left no room to deal with individual points. But I will just mention two. Is Professor Ripley sure that the decision of the Interstate Commerce Commission, even though upheld by the Supreme Court, requiring the Kansas City Southern to write off out of income the capital cost of road abandonment on re-alinement, is right from a business point of view? Suppose that a railroad makes a tunnel and then, as has often happened in England, finding that the smoke and steam of the tunnel makes operations dangerous, converts it into an open cutting, must it write off out of income so much of the cost of tunnel construction as represents its excess over the cost of the number of cubic yards of open cutting which now replaces it? Or, again, supposing a railroad constructs a long trestle over a valley, and subsequently fills in with a solid embankment, ought the timber and construction cost of the trestle to be written off out of capital? It may be prudent—all writing down of capital is prudent in a sense—but is it not a mere question of business management? Is it essential for honest accounting? And, if not, should it be peremptorily imposed *ab extra?*. Is there in principle any difference between these two cases and the case of the Kansas Southern?

I am disappointed with Professor Ripley's treatment of physical valuation, which seems to me academic rather than practical. I agree that valuation was desirable, were it only to get rid once for all of what Professor Ripley frankly calls the "hoary headed bogey of over capitalization." But he assumes that it can be used as a standard against which to measure reasonable rates. How used, he does not tell us. If all the railroads of the United States were consolidated into one system, I could understand it, though even then outside competition not only of water carriage between United States points, but of Argentina and India and Siberia with the United States in the world's markets would cause some awkward puzzles. But how a reasonable rate, equal by all roads from New York to Chicago is to be connected up with the widely divergent valuations of the dozen different routes that at present compete for the traffic, I am at a loss to conceive. The problem lies so close to the surface that I am quite sure that it cannot have escaped Professor Ripley's attention. I wish he had tackled it.

Another question I think he ought to have tackled. Describing the issue of a stock dividend to the Connecticut River Railroad in 1893, Professor Ripley apparently endorses the description of the transaction by the governor of the state as "unconscionable." He adds in a note: "A lease in 1913 of the Northern Central to the Pennsylvania Railroad with a stock dividend of 40 per cent and a cash dividend of 10 per cent would appear to be a close parallel. This was long contested." It was. It was put forward by the Pennsylvania Railroad, whose financial integrity Professor Ripley does not question. It was contested, if I mistake not, before the commission of the state of Maryland and the courts. And, having run the gauntlet of full publicity and criticism, it was sanctioned. If it was "unconscionable," as Professor Ripley appears to imply, surely he ought to give his reasons, and not condemn it with a mere *ex cathedra* judgment.

Let me conclude by once more heartily thanking Professor Ripley for his book. If some of us cannot agree with him in his fundamental idea, he has at least done us the great service of compelling us to face the facts and search our own minds to see whether we can find there justification for the faith that is in us.

W. M. Acworth.

Douglas Fir Ties in England.—Considerable shipments of Douglas fir railway ties from the Pacific coast have been made to England. It is stated that one English firm placed an order for twenty million feet.

Fundamental Problems Involved in Railway Valuation

A Report of the Conference Held Last Week to Discuss the Important Questions Proposed by Director Prouty

Over 200 representatives of the engineering, legal and accounting departments of the railways and about 30 state railway commissioners met with Director Prouty of the Interstate Commerce Commission Department of Valuation and his staff at Washintgon on Thursday, May 27, for a three-day conference and discussion of some of the important problems now confronting the federal work. To conserve time the views of the carriers were presented by representatives of the President's Conference Committee under the general direction of Thomas W. Hulme, general secretary. The states were represented by a committee of the National Association of Railway Commissioners, M. Maltbie, formerly a member of the New York Public Service Commission, First district, chairman. The conference was limited closely to a discussion of questions presented by the director in a circular issued February 4, 1915. These questions and an abstract of the replies made by the representatives of the carriers and of the states follows:

The form and manner in which the report shall be presented to the commission by the valuation division and by the commission to Congress.

(a) What detail should be furnished Congress for the use of itself and the public?

(b) What detail should be served upon carriers and state commissions and other interested parties by the commission in order that the conclusions of the report may be properly checked up and verified?

(c) How should the report be prepared, to the end that it may be kept up to date by the federal commission and also by state commissions, if desired? Shall the valuation section used in federal and state valuation be the same?

While this question was not included in the revised program for the conference, it was discussed by George F. Patterson, counsel, eastern group, Presidents' Conference Committee, on behalf of the carriers. He quoted those sections of the valuation act outlining the form and manner in which the report is required to be presented by the department of valuation to the Interstate Commerce Commission and through it to Congress. He maintained that if the report to Congress is to be evidentiary to the subsequent proceedings under the Interstate Commerce Act, the detailed records in the commission's office must be so connected by record reference or order that all the information obtained by the commission can be produced in any proceedings. The final report to Congress must contain not only the final value of the property reported on, but all the facts and elements of values upon which the final figures are determined, so that if necessary the court can ascertain for itself the fair final value.

Secretary Hulme discussed the last part of the question, recommending the report on the New Orleans, Texas & Mexico as an example of the detail which should be shown in the final report. In reply to a question by Director Prouty he stated that it was the belief of the carriers that the information required by the commission's valuation order No. 3 with reference to additions, betterments and deletions was all that would be serviceable in keeping the inventories of the quantities up to date. He emphasized the fact that the prices applied to the original valuation would change from time to time so that the value of the property as a whole at any later date must be ascertained in the same manner as the commission is now making its valuation.

In determining "cost of reproduction new," to what extent should reference be had to conditions as they existed at the time of the original construction?

In determining the "cost of reproduction new," E. Holbrook, consulting engineer, Union Pacific, divided the construction of a road into four periods; the promotion, organization, assembling and development, all of which must be considered in reproducing a property. A carefully considered program of construction work must be prepared in the light of the best and most economical methods of the present day. He illustrated this by describing the "reconstruction new" of the Union Pacific today. As over 11,000,000 tons of ballast would be required for this road, all of which would be secured from a point west of Cheyenne, Wyo., it would be advisable to start the reconstruction of this road at the connection with the Colorado & Southern at Cheyenne and build both ways from this point. Work would also be started westward from Omaha and Kansas City. In reply to a question from Director Prouty, Mr. Holbrook stated that while a road could be placed in operation before it was able to operate at a profit, it must receive compensation in some other way if an attempt was made to secure the lowest cost of reproduction. He emphasized the necessity of studying each problem separately, and also urged consideration of the large amount necessarily spent for temporary structures in the building of a new line to hasten the work, citing the building of the timber bridges and the line over the summit of the Cascade mountains on the Puget Sound extension of the St. Paul, all of which have since been replaced.

The answer to this question by the state commissions was made by M. Maltbie, that as a general principle the "cost of reproduction new" should be determined on the basis of present conditions. The discussion of this and the other questions by the state commissioners was in most cases confined to a brief explanation of their answers.

(a) Should an allowance be made for clearing and grubbing, and, if so, shall it be allowed where the road runs through what is now tillage land, but what was at the time of construction a forest?

H. C. Phillips, valuation engineer, Atchison, Topeka & Santa Fe, replied for the carriers that as clearing and grubbing are essentially grading items, if the records of the carriers show that such work was done, it should be allowed the same as other excavation, even though all evidences of the existence have disappeared.

Mr. Maltbie replied to this question for the state commissioners that clearing and grubbing should not be allowed if the adjacent land is now tillage land and is now valued as such, but that allowance should be made for grubbing if the adjacent land is cleared and not grubbed, basing his reply on the fact that he considered the problem to be one of ascertaining the cost of reproduction new and not the original cost or the fair value.

(b) The road runs through an orchard which did not exist at the time of original construction. In determining cost of reproduction new, shall the value of the land be determined with or without the trees?

E. Holbrook replied for the carriers that the value of the trees should be included in the damages paid, while the value of the land should be that of adjacent land used for orchard purposes. The reply of Mr. Maltbie was that the value of the land should be determined without any allowance for trees.

(c) A building was wrecked when the road was constructed Is the expense of wrecking to be included in the reproductive cost?

E. Holbrook replied for the carriers that it should be assumed that at least an equal number of buildings would be c property today, and that therefore the cost of wrecking buildings when the road was constructed should be included. The answer of the state commissioners was "no."

(d) Are present geological and topographical conditions to be taken, or is inquiry to be made as to what these conditions were at the time of original construction?

E. Holbrook stated that the geological conditions existing at the time of construction must still be considered to exist and that a rock cut originally is still a rock cut. In estimating the cost of reproduction, geographical and topographical conditions should be taken as of the time of original construction, except where they have been changed, due to mining or other conditions which create difficulties which would have to be met today.

The reply of the state commissioners was that present conditions should be taken.

(c) Should it be assumed that present transportation facilities are in effect, or must reference be had to such facilities as existed when the road was constructed?

Pierce Butler, counsel for the western group, Presidents' Conference Committee, outlined the position of the carriers that all roads now in existence shall be considered to be in existence other than those of the carrier under consideration. The representatives of the state agreed with this answer. Director Prouty asked Mr. Maltbie if a highway, the moving of which was made necessary by the construction of a railroad at its own expense, should be considered in its original or present location. Mr. Maltbie replied that it was necessary to consider present conditions, but that the valuation department should report such data as an aid in the determination of the fair final value.

Should the road be reproduced in the form and manner in which it was originally built?

(a) For example, gravel was brought from a considerable distance in point of fact, but a gravel bank is today available at much less cost. Shall the road be allowed the haul which was actually made?

(b) The rail originally laid was relay. In determining cost of reproduction new, should we apply the relay price or the price of new rail?

(c) The rail now in branch lines or sidings was originally laid new in the main track and taken from there to the branch or siding. Shall this be treated as new rail and priced and depreciated accordingly, or shall it be treated as relay rail when laid?

W. L. Seddon, assistant to the president, Seaboard Air Line, replied in behalf of the carriers that a road should be reproduced in the form, but not necessarily in the manner originally built, but that it should be built according to the present day modern methods, securing materials at the most economical places. Transportation facilities other than those of the carrier assumed to be under reproduction, should be considered to be in existence to bring construction material onto the property under consideration. Thus, if gravel and other material can be obtained today by more economical sources than originally, it should be so obtained.

Mr. Maltbie replied for the states that the form and manner in which the road was originally built has nothing to do with the cost to reproduce it new unless the original plan and manner were in accordance with present good practice. He agreed with the carriers that gravel should be secured from the nearest available source.

The reply of the carriers to the last two sections of this question was that the price of new rails should be used. Mr. Maltbie answered that relay prices should be used where the present rail is relay rail and the price new where the present rail was new when laid in its present position. His answer to the last section of the question was that the rail should be treated as relay rail at relay prices. The customary practice is to place relay rail on sidings when built and the "cost of reproduction new" should not consider the use of new rail in such track since it is not in accordance with good practice. In reply to a question by Director Prouty, Mr. Maltbie stated that relay rail should be considered as bought in the open market and that freight should be added. He stated that the fair value of such rail would probably be the same when using the relay price or the price of new rail depreciated.

What overhead charges should be allowed and in what amount? By overhead charges are meant items like engineering, contingencies, interest, taxes, etc. How shall the time necessary to reproduce the property be determined?

Pierce Butler outlined the position of the carriers that allowance should be made for all necessary overhead charges, such as organization expenses, financing, administration during construction, legal and engineering expenditures, and interest during construction. There should also be included a proper amount for material on hand and working capital. In considering this problem a property must be considered non-existent and a definite program of construction worked out.

Charles Hansel, consulting valuation engineer, Pennsylvania Railroad, discussed the overhead engineering charges. Previous to 1907 all engineering charges were not allocated so the records of the carriers do not show the complete cost of this item today. A study of the overhead engineering charges on 7,000 miles of line has recently been made. On 4,300 miles in the west the average cost for engineering, excluding charges allocated to land and equipment was 4.1 per cent of the expenditures. Similarly on 800 miles of line constructed in the east this charge was 5.79 per cent, while on 1,700 miles of line constructed in the south this figure was 4.4 per cent, including in this latter case engineering expenditures incurred in the acquisition of land. On the basis of these figures he recommended that in the estimated cost of reproduction the minimum to be allowed for engineering should be five per cent for road accounts, exclusive of land. Since it has been the general practice to add two per cent to equipment cost for engineering, he recommended that this figure be adopted for such accounts until a more accurate figure can be ascertained.

E. Holbrook outlined the position of the carriers regarding contingencies, calling attention to many ways in which an estimate of the cost of reproduction of the property will necessarily fail to include all the proper costs, such as those resulting from storms, personal injuries, delays of transportation, etc. He urged that the percentage for contingencies should be stated for each account rather than being applied to the whole, as this item can be determined closely for some accounts, while not as closely for others. Different percentages should also be applied to the same account on different roads because of the difference of the completeness of the records.

W. E. Bailey, general auditor, Atchison, Topeka & Santa Fe, discussed the subject of interest during construction in which he stated that at the beginning of any year prudent management required that an amount of money equal to the estimated expenditure for construction during that year should be available. While the interest rate would vary in different sections of the country according to local conditions and the hazards of the enterprise, a minimum rate of six per cent should be allowed, while in many cases seven per cent or even more would be necessary.

A. H. Plant, comptroller, Southern, asked that the carriers be given an allowance no greater than the actual expenses necessarily incurred in bringing about arrangements for the leasing of railroads of other companies and for arranging for traffic rights over other lines. He referred to systems made up of lines owned outright, those with trackage rights and those leased, stating that a considerable expenditure was required to join these into one system. Where lines are operated under lease, separate valuations are made for each of the constituent properties and none of these valuations will show this development expense.

Mr. Maltbie outlined the position of the state commissioners on the general subject of overhead charges, by stating that such charges should be allowed on the basis of the present normal cost of such items as determined by actual experience in railroad construction under similar conditions. Overhead charges should include engineering, contingencies, interest and taxes during construction on the above basis, but no separate allowance should be made if such charges were included in the unit prices of material or elsewhere. The normal method of constructing railroads in sections should be adopted as a basis for determining the period of construction. He called attention to the fact that the cost of engineering on equipment items is frequently included in the prices paid for equipment, and should not therefore be al-

lowed again. He opposed considering unusual conditions, such as earthquakes, those leading to the failure of the Quebec bridge, etc., in making allowances for contingencies. He also opposed allowing overhead charges for the consolidation of lines into a system because of the possibility of this leading to absurd results.

Shall allowance be made for appreciation; and if so, as to what parts of the property? Shall account be taken of solidification and adaptation; and, if so, shall this be by addition of a percentage to all grading quantities?

What allowance, if any, shall be made for shrink or swell in determining quantities as shown by actual measurement in present embankment, and shall this allowance be made by reference to local conditions or by some uniform per cent?

W. G. Brantley, counsel, Southern group, Presidents' Conference Committee, opened the discussion of this subject on behalf of the carriers, quoting numerous court decisions showing the necessity for including allowances for appreciation. H. C. Phillips pointed out the improvement in an old well-established line as compared with a new one, showing that the former is a more valuable transportation tool and that therefore an allowance for its appreciation should be made. He defined adaptation as an adjustment of the physical line to its environments and purposes. The value of a property, as outlined in the present valuation act, is not concerned with the source of the money or whether it is secured from capital account or operating revenues. Aside from the roadbed and ballast, appreciation is largely confined to drainage and the adjustment of the line to traffic conditions, all of which are necessary to the development of the property.

In the various valuations which have been made by the state no attempt has been made to deny the existence of this value, although it has not always been allowed because of the difficulty in its determination. He suggested an allowance of two per cent per year for five years on all earth and loose rock quantities, and one per cent per year for five years on solid rock, with an addition of $600 per mile to cover additional maintenance charges. While an allowance should be made for shrinkage, no uniform percentage can apply for materials vary greatly in this regard. Each item must be studied in accordance with its nature and the methods used in construction.

Mr. Maltbie replied for the states that no allowance should be made for solidification and adaptation beyond the charges actually and necessarily made to investment account. In reply to a question of Director Prouty, Mr. Maltbie admitted that the roadbed became better as it seasoned, but stated that as the road was permitted to charge depreciation to operating it was not unjust to refuse to allow appreciation. He opposed allowing it because he stated that it represents no sacrifice on the part of the investor.

How shall depreciation be determined?

(a) By mortality tables? If used, shall these be general or made with reference to the property of each carrier?

(b) By actual observation?

(c) By combination of these two methods? If by combination, what weight shall be attached to age and what to the observed condition?

(d) Should obsolescence and inadequacy be considered?

W. G. Brantley stated on behalf of the carriers that the period of time required for the construction of any large railroad property covered such a period of years that all of the parts could not be new upon the completion of construction, that a condition of absolute newness could never be ascertained and that upon the completion of the property the owners would have made an investment considerably greater than would be found by a detailed examination of the component parts as ascertained by the government engineer. Depreciation cannot be determined by any rule of thumb, but only by the exercise of mature judgment after learning all the facts.

Deterioration is a matter of record, but the question of whether this affects the value of a composite property is a matter of law. If a property is not neglected to a point affecting its operation he maintained that there is no depreciation in its value as a whole, or in the transportation machine, although there will exist deterioration of the individual parts. Depreciation should be determined by a careful study of the records of the particular carrier, followed by an actual inspection of the property, made by a joint inspection party composed of experts representing both the government and the carrier. A standard of operating condition appropriate for the particular portion of the property under valuation should be determined upon by a study of the conditions required to be met by such property. Depreciation should not be determined by general mortality tables, for such tables being tables of averages cannot be closely followed in dealing with a particular property. Neither the age alone, nor the observed condition alone of the particular property, nor both combined, should finally determine the amount of the depreciation. Due weight should be given to each of these factors, but there is also to be considered the conditions required to be met by the particular property and the probable length of useful service life remaining in the property as indicated by the records of the carrier. In ascertaining "cost of reproduction new" and "cost of reproduction less depreciation," under the Act, depreciation due to obsolescence and inadequacy, if any, should not be considered because it is the cost of reproducing that particular piece of property under consideration. In determining the value of the property as a whole, if there exists depreciation due to obsolescence and inadequacy actually affecting such value, the same may be considered.

This question was answered by the state commissioners as follows: Deferred maintenance, if any, should first be determined. The age to date of appraisal and its scrap value shall be ascertained. The expected life shall be determined after inspection, examination of records and consideration of all parts that affect the period of usefulness. The accrued depreciation shall then be ascertained by the ratio which the age to date bears to the total life applied to the cost, less scrap value. Deferred maintenance should be added to this amount.

Mr. Prouty asked Mr. Maltbie when deferred maintenance began, to which he replied that this is a question of maintenance which the engineers must determine from some accepted standards. Mr. Prouty also asked whether if one road had a high standard of maintenance and another a low standard, would the road with the low standard be considered to have deferred maintenance? Mr. Maltbie replied to this that a road with a considerable deferred maintenance may still be able to serve the public satisfactorily. Mr. Maltbie stated that it was the idea of the state commission that depreciation must be shown separately for each unit of property. If this was done, it would then be difficult not to show depreciation on the road as a whole. In the period of years immediately following the construction the depreciation fund is not set aside in a bank by the railroad, but is invested in additional property of the carriers. As an inventory will then include this new property as representing original investment he considered it fair to consider depreciation. He pointed out that expenditures for maintenance alone are not sufficient but that provision must be made for ultimate replacement, illustrating by the fact that it is not only necessary to paint a car but to provide for its ultimate replacement. In reply to a question by Mr. Staples of the valuation board, Mr. Maltbie stated that the same rule cannot be applied to different properties and that conditions vary widely. In considering depreciation due to inadequacy and obsolescence it was not possible to consider that this would be the same in the future as in the past, and that it should only be based on the judgment of present conditions and those now foreseen. Mr. Maltbie expressed the opinion that the deferred maintenance will not be found important on most roads in the final analysis as he believed they are generally well maintained.

How shall unit prices be determined? If for an average period, what shall that period be and shall it be the same for all railroads, no matter as of what date they are valued?

What allowance shall be made for the cost of transportation of men and materials over the line of the carrier itself while under construction?

G. W. Kittredge, chief engineer, New York Central, stated for the carriers that in order that the cost of reproduction new may be estimated by the same measure for all carriers it is necessary that the price bases for determining the costs of materials and labor shall be the same as to time for all carriers. As the date June 30, 1914, is being used for the roads now under valuation, he advocated the continued use of this date. Where prices of this date are normally high or low because of business conditions, average prices for a number of years, not less than five or more than ten, preceding June 30, 1914, should be used. In determining unit prices it must be considered that construction work is carried on throughout the year and climatic conditions therefore must be given due weight. On those portions of the system under which the construction program is assumed to be completed, allowance should be made for the cost of transportation of men and materials at tariff rates. On those portions of the line under construction the actual cost of such transportation should be allowed.

Mr. Maltbie replied for the states that unit prices should be determined by an examination of contracts, records of actual cost and other available information covering a number of roads in that part of the country where the valuation is being made. The average prices for a period of time shall be taken, such periods being so fixed as to secure normal prices. Transportation should be charged at the actual and necessary net cost to the carrier.

How should the "present value" of lands used for transportation purposes be determined?

Should the cost of acquiring the right of way at the present time be determined and stated as a part of the cost of reproduction new?

The act calls for "the present cost of condemnation and damages in excess of present value of lands." What is the meaning of this phrase and how shall the information called for be arrived at?

What is meant by "each piece of property" as used in the paragraph of the Valuation Act designated "First"?

What is meant by "terminals" as used in the paragraph designated "Second"?

In discussing the "present value" of land, Pierce Butler spoke at length of the attitude of the courts on this subject. He stated that the present value of each piece of land used for transportation purposes must be determined upon the same principles which govern in the case of condemnation of private property for public use. In reply to Director Prouty's statement that many roads were built long ago, Mr. Butler stated that no matter how or when the land was acquired, the same principles governed. In the consideration of right of way, station grounds, terminals, etc., the value of the whole is also greater than the sum of the values of the individual parcels comprising the same because the elements of continuity, shape, etc., must be considered.

Mr. Butler called attention to the fact that the Valuation Act was passed March 1, 1913, at a time when the arguments had been made in the Minnesota, Arkansas and Missouri rate cases, but before decisions had been rendered. At this time there was a wide difference of opinion regarding the land question, and Congress therefore required each piece of property to be listed with three values and other elements of value, if any, the purpose of the act being to require the commission to ascertain all the facts so that the data would be on hand to comply with any theory of valuation or rate making. He quoted at length from the decision of the Minnesota rate case and drew the conclusion that this decision did not consider the "fair market value" to be that value for other purpose but what a railroad was required to pay. He cited numerous other decisions showing that an owner is entitled to a "fair market value" of this land, taking into consideration every use for which it may be needed. The value of land is what it costs when purchased prudently.

Secretary Hulme replied, "Yes" to the second subdivision of this question on behalf of the carriers, outlining numerous ways in which the cost of the land is increased above normal acreage prices in large tracts. In reply to the third subdivision of the question he gave numerous figures of the cost of condemnation proceedings on different roads. When acquiring property for extensive second track work on the Norfolk & Western in 1912 and 1913, the average cost of condemnation proceedings was $175 with the awards varying from $25 to $200. In valuing property he called attention to the impossibility of establishing zones in cities and to the necessity of considering conditions as actually found on each piece of property.

The reply of the states as outlined by Mr. Maltbie was that the present value (as used in paragraph "second" of section 19-a of the Valuation Act) of land used for transportation purposes should be determined from the value of similar adjacent land. The answer to subdivision a was, Yes, and to subdivision b, that the phrase means, present, reasonable and necessary cost as shown by existing local conditions. Information should be secured by investigation. The answer to subdivision c, was, that the law contemplates the classification of property and appraisal of each class, due regard being had for large or peculiar units of property.

When are lands "owned or used" for common-carrier purposes? Should lands in any case be classified as held for common-carrier purposes unless they are actually so used?

When are lands "dedicated" to the public use?

Thomas Cooper spoke for the carriers in reply to this question, stating that land actually used for common carrier purposes should be valued as such irrespective of whether owned or not. Land owned and held for future common carrier purposes in anticipation of reasonable need therefor, should be valued as common carrier land, irrespective of whether now actually used or not. Land owned or held for purposes other than those of a common carrier should be valued under paragraph numbered "third." Lands are dedicated to public use within the meaning of this act when originally acquired for the purposes of a common carrier by the present or any predecessor common carrier but where the lands were acquired for other than the purposes of a common carrier the time of dedication to public use shall be taken to be the time when the intention was formed to hold the land for common carrier purposes.

Mr. Maltbie replied to this question that lands to be appraised as "owned or used" for common carrier purposes or dedicated to public use should be only land actually so used, and land needed for such use in the immediate future.

When original cost can not be shown from the books of the carrier, shall an estimate be made?

Secretary Hulme replied to this question that where records of original cost are incomplete, there is no use in making an estimate of the original cost, but that where carriers' records are complete an estimate of the original cost may be of use. A study of the records of the carriers shows that those of many roads have been destroyed by fire or lost.

Mr. Maltbie replied that since the original cost represents the sacrifice of the investors, the determination of this amount was exceedingly important. Director Prouty called his attention to the fact that the original cost and the actual investment may be widely different.

Should the value of equipment be apportioned between different states; and, if so, upon what basis shall the distribution be made?

Shall the value of a great terminal—like, for instance, the Pennsylvania passenger station in New York—be distributed; and, if so, upon what basis?

George F. Patterson replied to this question on behalf of the roads, calling attention to the fact that the Valuation Act provides that the value of the property as a whole and separately as to states and territories must be determined, and that the notes of the tentative valuations shall be given to the governor of any state. It is therefore necessary for the commission to divide the property between states. This is not a serious problem as far as lands and other real property are concerned. The situs of real estate is the state in which it is located. The value of terminal property such as that of the Pennsylvania in New

York should be allocated to the state in which it is situated. The same applies to personal property such as tools. With reference to movable property such as equipment, he outlined four methods for its distribution on the basis (1) equipment days, (2) ton miles, (3) miles of track, (4) car mileage. He recommended that equipment used only in one state or a few states, be assigned to those states, and that the balance be apportioned on the basis of locomotive or car miles. Work equipment could be assigned either on the basis of miles of line maintained or in proportion to the maintenance of way expenses. The car mileage should include both revenue and non-revenue and would also include privately owned equipment.

The committee of the states was in substantial agreement with this reply of the carriers except that they would exclude privately owned equipment. Mr. Patterson contended that in valuing the property the private cars bore the same relation to the road as those owned directly. He would not, however, value foreign cars where found.

Although not included in the revised program, Sanford Robinson, assistant counsel, Eastern group, Presidents' Conference Committee, presented the ideas of the carriers regarding the allowances to be made for going value, location value, earning capacity and other intangible values. He called attention to the Valuation Act requiring the inclusion of all values, and to the discussions on the floor of the Senate where the act was revised to include such values and all reference to the physical valuation alone was eliminated. He quoted from numerous court decisions showing the necessity for the inclusion of such values.

M. Atkinson, chairman, Missouri Public Service Commission, called the attention of Director Prouty to the demands in Missouri for the separation of the properties used for freight and passenger service, and asked that the commission consider the development of a formula to bring out this information. He stated that the valuation now being conducted by the Interstate Commerce Commission is of little value from this standpoint.

Mr. Maltbie asked on behalf of the states that where appraisals have been made by states, the division made in these valuations shall be followed by the Interstate Commerce Commission so that the data so obtained may be of use to the states. Mr. Hulme replied for the carriers that the roads have no objection to this in those states where the sections were determined by the convenience of the work, but that there might be objections where such sections were determined arbitrarily. The determination of valuation sections could be determined after a conference with the carriers.

As both the carriers and the states desire further time to prepare written briefs upon these various questions, Director Prouty gave the carriers to June 15, to file such briefs, and the states one week later to file their briefs and reply to the carriers.

A BILLION DOLLAR CONFISCATION

By Morrell Walker Gaines

In an age of economic vivisection the railroads have been the subjects for the chief experiments and the major operations. Rate theories, valuation processes, new ideas in finance and corrective principles in accounting and operation are being applied to them by powerful federal and state commissions. Their actual administration has been assumed by these bodies in such generous measure that the supremacy of authority over responsibility is now become barren and oppressive. Theory, as ordered and symmetrical as the Garden of Eden in the New England Primer, shoulders to one side experience, rough grown from the soil of struggle. It is a day of counsels of perfection, of control dependent on statute and free of natural law. The investment in railroads meets the common fate of barriers across the flow of governmental regulation. It is tossed about as if it were a toy, to be broken and mended at will.

One of the foremost of the regulatory abstractions, disdainful of evolutionary imperfections and yet itself powerless to produce life and growth, is the project of establishing a valuation of railroad properties. Upon the value when found there is to be decreed a fair and compensating return. It is a valorization downwards. In seeking value the Interstate Commerce Commission turns toward cost, availing itself of fragmentary history and arbitrary estimate. It is, and must be, unbiased by market price, which is the accepted valuation of railroad properties. The re-valuation is thus the application of a brand new acid test to securities. Where hitherto their place in the market has rested on earning power, it must come now to stand on assets, as marshaled and appraised by an extraneous agency, impatient of the existing order.

Valuation of the entire railroad system is still a dim and colossal project of the future. Ten years of field labor and the expenditure of fifty millions of dollars will, perhaps, bring the program to the beginning of the era of court decisions and of working results. But in the meantime the theory of valuation has permeated the Interstate Commerce Commission's accounting orders. The foot of the camel is within the tent of railroad management. The equipment depreciation regulations, as now prescribed, are a form of valuation accounting which strikes at both assets and earnings. They have resurrected from the past a deficiency of a billion dollars of value alleged to be lost, and charged it against the present, and have increased the operating expenses over a period of years, independently, in almost equal amount. These regulations impose a burden which translates itself to stocks and bonds, to construction and improvements, and is conducive to an increasing paralysis of development.

The spontaneity and freedom of railroad growth and adaptation, in other and more flourishing days, was due to a different conception of values, supported by a different method of accounting for equipment. On the whole, the cost of the railroads of the United States has been a speculation in transportation futures. They were financed and built for what they could earn. All value lay in the earning power and the construction and purchase of road and equipment was regarded as an initial outlay, or sunk investment, for the sake of the perpetual annuity from the traffic. Charges to property account showed what had been paid out and not what was coming in. If now a valuation is made that may deduct depreciation, losses and mistakes from the money, or securities, expended, and the income is then limited to a fair return upon this valuation, the case is so altered that there can be no more speculation in railroad construction in the free sense of the past. Few will have the temerity to venture the heavy investment involved in going long of transportation by building railways.

Until 1907 the railroads had, with the sanction and by the express command of the Interstate Commerce Commission, kept up their equipment by charging renewals to expenses, without creating funds or reserves for replacements in advance of the actual destruction. As the roads had been built, so were they operated. The quota of cars and locomotives was treated as incident to the general capital outlay for construction, and the cost was part of the investment sunk against future traffic. The income created by the aggregate expenditure should take care of all regularly recurring repairs, renewals and replacements due to use and age. To add to it by formal reserves would have been either to duplicate invested capital or to cut in two expected income. That this was a sound working theory is proved by the unusual vigor and rapid progress of the American transportation system, which attracted, and sustained, an investment of fifteen billion dollars from the financial markets of the world.

In 1907 the Interstate Commerce Commission issued the Third Revised Classification of Operating Expenses, requiring the railroads to charge to operating expenses each month, for depreciation, "a certain rate per cent" on the cost, or book or estimated value, of locomotives, passenger and freight cars, to be set up as a reserve. No percentage rate was officially prescribed. The depreciation reserve of 1907 could be used for replacements, for purchase of additional cars, or for retirement of car trusts. This was, at the beginning, a mild form of depreciation accounting, aimed at keeping the value of equipment up to the existing

level with greater uniformity than under the superseded renewals charges. It added no burden to expenses.

In 1909 a progressive change began under which it was sought to compel the railroads to maintain equipment at its original, or cost, value, and to throw the difference between that value and the normal, or used, value into the expense and the profit and loss accounts. At first it was ruled that the depreciation reserve could not be used for replacements, but that cars destroyed should be charged to it. In 1910, a year later, more complete regulations were issued providing that the reserves could not be used for any purpose at all, except, mite by mite, as the individual cars against which depreciation was accrued, came in course of time to be destroyed. Thus depreciation was changed from a pooled reserve, available for general equipment needs, to a unit reserve available only for the individual car and locomotive when worn out.

The regulations now finally in effect provide that depreciation must be accrued separately on each car and engine, month by month, and that each unit of equipment sold, destroyed or retired from service shall be credited to capital account, with the appropriate charges to materials account for salvage, to the depreciation reserve for the amount of depreciation already set up against that unit, to profit and loss for the estimated depreciation accrued prior to 1907, and to expenses (retirements) for whatever balance of original cost may remain after deducting the salvage and depreciation. The theory of these highly technical requirements was explained in 1912. "The replacement (depreciation) reserve is not to be closed out, and is not exhausted as long as the road is in operation. At all times it stands as the measure of depreciation."

It is necessary to state the depreciation regulations in order that discussion may not appear a mere vault from premise to conclusion. But it is not necessary to follow out in their entirety the complicated bookkeeping entries. The grounds for objection lie not so much in the narrowness of the concept and the tedious and costly detail of its application, as in the unsound principles upon which the orders are, quite logically, based. The regulations constitute a thrust at values in two different directions, the channels of attack being the profit and loss account and the operating expenses.

With respect to profit and loss the case is simple. Railroad equipment has cost, on a rough estimate deduced from the number of cars and engines owned, upwards of three billion dollars. The age of this equipment averages, probably, eleven to twelve years, or over 40 per cent of a term of natural life that may be taken, for purposes of calculation, as twenty-five years. By simple arithmetic the depreciation already accrued, on the percentage basis, amounts to upwards of one and one-quarter billions of dollars. Depreciation accrued prior to 1907 was one billion dollars, and this amount the regulations formally require the railroads to charge, gradually, to profit and loss surplus. The profit and loss surplus of the railroads of the United States amounted to $750,000,000 in 1907, and to $1,039,000,000 in 1910, when the order was promulgated, according to the report of the Interstate Commerce Commission itself. It is not, today, large enough to carry the burden which the new depreciation accounting has sought to impose on it.

The edge, but not the weight, is taken from the process of subtraction by the fact that it is to be spread out over the term of years during which equipment on hand in 1910 shall come, through age and wreck, to retirement. The commission and the railroads are alike hopeful that a new and larger surplus will have been created in this time to meet the brunt of the depletion with better grace than would be possible now. But, even in this view, a surplus is a commodity of varying distribution. Some roads have an abundance, others little. The difficulty is not only that the general margin of safety and profit built up in three generations of railroad operation is annulled, but that individual roads will be forced into deficits, if they follow the accounting through.

In principle the sums taken from accrued surpluses are profits earned in the years before 1907, profits earned and largely paid out in the form of dividends, ten, thirty or even fifty years ago. These profits and these distributed dividends are required to be paid back through depreciation by the stockholders of the present and the immediate future, although they had been properly made, and properly accounted for during the best part of a generation under rules devised by the Interstate Commerce Commission itself. The accounting for accrued depreciation is retroactive and, clearly, confiscatory.

With respect to expenses the case is more complex. The burden on expense, although a much more serious matter from the practical standpoint, has hardly been generally recognized or understood. Theoretically the current depreciation charged expenses is exactly equal to the annual cost of renewals, on a seasoned road, making good the perennial wastage of cars and locomotives in operation. The increase in expenses arises from the unit system of accruing the depreciation, which makes the roads carry a double burden of renewals and depreciation simultaneously, for an initial period of twenty to twenty-five years.

Each car has its separate reserve. That reserve takes, say twenty-five years, to fill, at the regular percentage rate, to the point where it is adequate to take care of the car against which it stands. It cannot be charged against for another car, or for any other purpose. Cars have a mortality from casualties that is a large share of their total death rate. Furthermore, they may become obsolete from various causes, and are in no sense close observers of the average term of life on which the depreciation is figured. Accordingly a very large number of cars will be retired before their respective depreciation reserves have been built up to the point of providing completely for their cost. The unprovided balance of cost must, under the rules, be charged expenses under the heading of retirements. The company's expenses are therefore increased because the aggregate of the depreciation charges is already, if correctly calculated, equal to the normal annual charge to cover cars destroyed.

Or, to state the case the other way about, a large share of the depreciation charge, for a period of twenty-five years, is an addition to the renewals expense that a railroad would have had to carry if it were maintaining its equipment under the old style of accounting, without depreciation. This increase in expense is not accompanied by any compensating increase in physical maintenance, but is an accounting requirement pure and simple.

Expenses are also increased in three other ways.

Cars of abnormally long life, if owned in 1907, should bring a burden similar to that pertaining to cars of short life. For, the commission has ruled that the charge to expenses for depreciation must be continued until the unit of equipment has been written down to the salvage value, although in the case of old cars much of the depreciation accrued prior to 1907. Thus in the end some considerable part of the heavy toll directed at profit and loss, for past depreciation prior to 1907, will be in fact transferred to the expense account, where it can be borne with greater difficulty.

During the years 1907 to 1914, a large number of roads made only a half-hearted and technical compliance with the depreciation instructions. They used a low percentage rate, insufficient to meet the theoretical requirement based on probable life. The deficiency of the reserves accrued in these seven years must also be made up through expenses, as the cars owned during that period come to be destroyed.

Finally, wherever profit and loss surpluses are exhausted, as a source of depreciation, there will be a tendency to use the expense account to fill the breach. Many conservative railroads are unwilling to draw upon profit and loss for this purpose and are actually charging the entire cost to expenses.

The factors dealt with by the depreciation regulations are of great magnitude. The sum of these four items, even on the assumption that they apply altogether to no more than 40 per cent in value of the aggregate equipment now owned, means an increase of expense that a billion dollars would hardly cover.

It is true that the increase in expenses is spread, in irregular

fashion, over a period of twenty-five years, after which time depreciation imposes no increase in expense. But this period is too short to make the burden equable and too long to allow the investment level of securities to escape its weight. The swelling of the expenses of an arbitrarily selected term of years over and above what is properly the expense of that period is unfortunate for security holders. The revenues applicable to interest and dividends are decreased, the outlook is darkened and the depreciation supercharge comes in the last analysis and to an exaggerated extent out of the present value of stocks and bonds.

As the depreciation reserves are accrued they must be credited to cost of equipment, or stand as an offset against that cost. That is to say, they are in effect deducted from the value of the equipment asset as it stands on the balance sheet, one of the objects of the whole accounting process being the establishment of what is considered by the commission to be a correct valuation for the equipment. When the process is completed, and the reserves are full, the books will, accordingly, indicate some ten per cent of their entire construction investment to have been returned to the railroads in the form of a depreciation reserve. Rates on traffic, if the commission's depreciation theory has the validity as a basis for transportation charges which one section of the railroad valuation law appears to assign to it, must yield a reasonable return upon the remaining 90 per cent only. This is a permanent effect, entirely distinct from the depletion of surplus and increase of expenses, and it is equivalent to another loss to security holders, whenever valuation shall assume effective control over rates, amounting to well over a billion dollars.

Influences of gradual depression act like slow poison. Their direct effect is not conspicuous, even if the general condition is deteriorating. The strong and vigorous throw off the influence, and the first signs of disaster are with the sick and enfeebled. Up to the present time no very great emphasis has been laid by the railroads on the depreciation accounting as one of the larger, among the many, burdens under which they have been approaching a condition of distress. This is especially true, because the wealthier roads do not object to padding their maintenance accounts by means of the depreciation surcharge, while others have hardly begun to make the full percentage compliance with the regulations. Nevertheless, the ultimate goal of the depreciation accounting has already been fully demonstrated, and especially in the case of financially embarrassed railroads.

A large system in the hands of receivers recently defaulted the interest on its underlying bonds, small issues whose protected position had made them absolutely secure in the eyes of investors. Upon the appearance of the annual report it developed that the amount required to pay this interest had been applied by the receivers, under direction of the court, to the depreciation charges. Including a similar accounting requirement in connection with abandoned property, the Interstate Commerce Commission had put two million dollars into expenses, and brought up the operating ratio to 106 per cent, the money so represented being diverted from the physical property instead of put into it, in so far as the unit system of reserves could accomplish this result. This is a somewhat onerous impost for a company in struggle to rehabilitate itself for reorganization. The defaults were of a type previously thought impossible, under any stress of circumstances, and they added a deeper shade to the discredit in which, especially in foreign markets, American railroad securities had come to be held.

Another of the larger systems proposed some time ago to readjust its finances. It had had no mortgage bonds or other salable securities upon which to raise money and, for this reason, its traffic facilities had become inadequate and outgrown and, in the endeavor to keep up its service, it had accumulated a large floating debt. In order to have a sound basis of fact upon which the readjusted corporation could ask of investors the new cash needed in rehabilitation, chartered public accountants were called in to verify, and restate, the books of account. This is the necessary procedure in reorganization. But the accountants insisted that the books of a reorganized company should write off at the outset the past depreciation on equipment which the regulations require living companies to write off gradually. It would not be proper for a new company to enter as an asset the loss of the old. The amount of the accrued depreciation was of sufficient magnitude to convert the corporate surplus into a heavy deficit. As there is no way of issuing securities against a deficit, naturally the financial readjustment became impossible.

Both of these instances are typical of what will happen on a larger and more general scale, if the depreciation regulations are to apply to the numerous companies now in difficulties or insolvent which must, at some time, be reorganized. In the past a bankrupt railroad has paid what it could; fixed interest obligations to the extent of the assured earning power, adjustment bonds and preferred stock to cover probable earnings after convalescence and recovery, and common stock against the hope of the more distant future. This was no more than honest to creditors, and at the same time it provided the only way of attracting liberal supplies of new capital for reconstruction and development. The chance of participating in the revived prosperity after reorganization has, in fact, been the mainstay of strength behind a very large proportion of American railroad securities. But the depreciation accounting cuts off this mainstay. If the theoretical loss on used equipment must be taken into account by corporations formed in reorganization, properties coming out from receivership must cut off their stock and scale down their bonds. Otherwise the liabilities will exceed the assets, and the securities become illegal. Theories of valuation, as applied to equipment depreciation, imply reorganizations of a drastic and circumscribed type, the disastrous effects of which will tend to taint the standing of railroad investments as a class.

The principle followed by the Interstate Commerce Commission in its depreciation regulations is simple, and rests logically upon the idea that railroad assets are subject to valuation as a basis for rates. Cars and locomotives wear out. They are therefore a wasting asset. The waste is continuous, and must be construed as an impairment of capital and of profits, to be balanced by reserves. From a purely abstract point of view this inventory theory of the commission has as much in its favor as the investment theory of the railroad builders, that the equipment in use should stand at cost.

But the results of the commission's idea are destructive. It replaces a vitally constructive principle. Furthermore, it is hardly just to wipe out surplus and overload current expenses for the sake of enforcing a change in methods of accounting. In fairness to railroads and to investors, the commission should offer some reasonable basis of reconciling the old accounts and the new, without burden and without confiscation. In this, as in other matters, it has greatly overestimated the margins of earnings, of solvency and of confidence, to be drawn upon before exhaustion.

The unit system of accruing and segregating the depreciation should be given up, the attempt to create reserves against the past abandoned, and the current reserves made directly available for renewals, replacements and additions. The Interstate Commerce Commission has recently recognized the financial needs of the railroads by granting increases in rates. It cannot consistently impose upon them, at the same time, increase in expenses, depletion of surpluses, and incidental repudiations in reorganization, by a retroactive and confiscatory form of depreciation accounting.

English Passengers Requested to Limit Amount of Baggage.—The Railway Executive Committee has issued an appeal to passengers to refrain from taking an excessive amount of luggage with them. The appeal is based on the grounds that the staff has been considerably depleted.

Norfolk & Western Elkhorn Grade Electrification

Mountain Grades Electrified; Speed of Trains Doubled; Single Phase Transmission and Three Phase Motors

The electrified section of the Norfolk & Western, known as the Elkhorn Grade, is located on the main line in the southern part of West Virginia, about 105 miles west of Roanoke, and extends from Bluefield to Vivian, a distance of about 30 miles. The section is double track throughout, except in the Elkhorn tunnel, which is single track. There are also a large amount of third track, or passing sidings and branches into the coal workings, and yard trackage. A map of the section is shown in Fig. 1. The grades on the line are heavy, varying from 1 per cent at the west end to 1.5 and 2 per cent up the grade, to and through the summit tunnel, a distance of about ten miles. Thence the line descends on a 2.5 per cent grade for about a mile and then

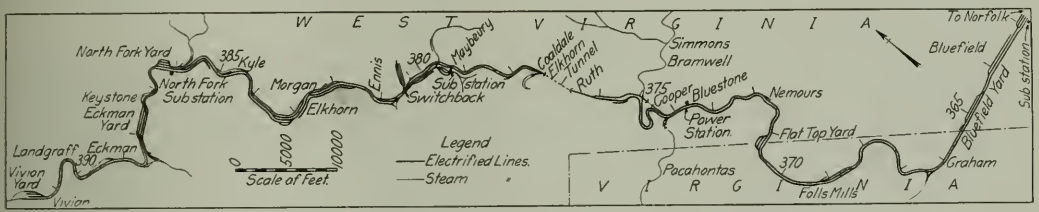


Fig 1—Map of the Elkhorn Grade Electrification of the Norfolk & Western

rises again at the ruling rate of about 0.25 per cent for 10.5 miles, and finally up a 1.22 per cent grade for 3 miles into Bluefield, the easterly end of the division. (See Fig. 2.) Fully 60 per cent of the line is on curves, the maximum being about 12 deg.

The electrification of this section of the railway is primarily for the purpose of collecting from the mine sidings and yards in the coal fields the entire eastbound coal tonnage and transporting it up the grades and over the summit to the classification yard at Bluefield, a division point. From Bluefield, after classification, it is shipped east to the various destination points, chiefly to the

time required to handle trains and to provide a more economical and efficient service over the heavy grades. To this end the heavy freight trains are handled with electric locomotives at a running speed up the grades of 14 m. p. h. as compared with about 7½ m. p. h. under steam operation; and a further saving in time is also effected by the elimination of the delays steam trains have heretofore occasioned by occupying the tracks while the engines take coal and water, one at a time, at the several coal and water stations on the grade. The effect of increased speed is especially marked at the single track Elkhorn tunnel, 3,000 ft. long on a 1.5 per cent grade, where on account of ven-

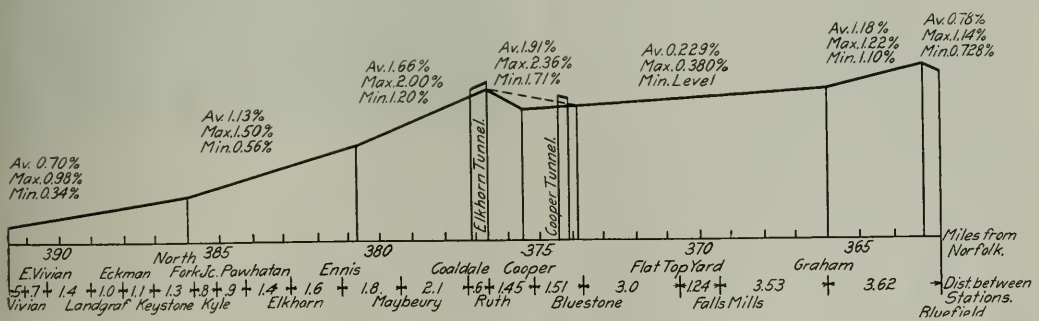


Fig. 2—Profile of the Electrified Section of the Norfolk & Western

Norfolk & Western's marine shipping pier at Lamberts Point, near Norfolk, Va. All coal traffic originates west of Flat Top, about 6 miles east of the summit of the heavy grade, and although much of the coal goes west the easterly shipments are very heavy and this constitutes the chief load handled electrically. Some coal originating east of the summit is shipped to the West, and this is also handled by the electric service to yards near the westerly end of the electrified section.

There are numerous colliery sidings throughout the coal fields, and the electric service includes the collection of loaded cars or

tilation requirements, it has been necessary under steam operation to reduce the speed up grade in the tunnel to about 6 m. p. h. This requires about 7 minutes to clear the block, whereas under electric operation this movement is made in about 3 minutes.

The heavy coal trains, handled in this service, weigh 3,250 tons and have formerly been handled up the grade by three steam locomotives, a road engine and a helper, being used over the entire section, and the third, serving as a pusher up the 1.5 and 2 per cent grades, and being cut off at the summit. These steam engines are of the highly developed heavy Mallet type fitted with

mechanical stokers and superheaters. Under electric operation a single road engine is used over the division and a second electric engine is used as a pusher up the 1.5 and 2 per cent grades. Thus it will be seen that one electric engine takes the place of two Mallets over the division, or two electric engines take the place of three Mallets up the grades and handle the train at approximately double the speed. The speed at which the electric locomotives handle the trains on the 0.4 per cent grade between Cooper and Graham is 28 m. p. h.

Another condition favorable to electric traction is the fact that trains may be despatched at fairly uniform intervals throughout the day, and thus desirable loading conditions on the power system are obtained, and at the same time the full service is handled with a moderate number of locomotives, each making a number of round trips per day.

The electrical installation has been laid out and power plant, locomotives and other equipment provided for handling 20 tonnage trains, or 65,000 tons, a day eastbound over the division and ample provisions have been made for additional traffic and extensions when required. The number of these tonnage trains handled per day at present is about 12, in addition to which pusher and helper service is provided for through freight and passenger trains.

The single-phase system of traction is used, power being generated, transmitted and distributed single phase at 25 cycles and collected from the overhead catenary trolley contact system at 11,000 volts. The locomotives, however, are unique in that they are equipped with phase converters, which, in connection with the main step-down transformers on the locomotive, transform the single-phase power of the trolley to three-phase power for use in the three-phase induction type traction motors. Thus, while retaining all the advantages of high voltage single-phase distribution and collection, the advantages of three-phase induction motors for these heavy traction mountain grade conditions are also secured.

Another characteristic feature of the installation is the fact that as the result of the use of traction motors of the polyphase induction type it is feasible without the use of additional or complicated apparatus and devices to utilize the locomotives for electrically holding or braking the trains at constant speed while descending grades. This utilizes the energy in the moving train descending the grade to drive the motors as generators and thus return energy to the line. On the Elkhorn Grade the conditions are such that the full advantages of this form of braking can be secured in that the trains are very heavy, the grades are severe, and the speeds are relatively high. The performance of this feature of the installation has proven highly satisfactory under operating conditions, the heaviest trains being handled down the mountain grades with a single engine at a uniform speed of about 15 m. p. h. with ease, the air brakes being held in reserve for bringing the train to a standstill when required. This results in a large reduction in the wear on brake shoes and wheel tires and wear and tear on draft gear and on the cars and locomotives generally.

Next to the electric locomotives, the most interesting feature of the electrification is probably the catenary line construction. In designing this feature of the installation, the engineers had uppermost in mind the two important requirements of reliability of service and low cost of maintenance. An effort has been made to secure the maximum degree of flexibility and freedom from hard spots at the contact wire so as to avoid rapid deterioration and frequent breakages and failures, and a special effort has also been made to provide the highest type of insulation so as to avoid interruptions to service due to insulation breakdowns.

In designing the supporting structures an effort has been made to secure a neat and attractive appearing structure which would not interfere with the view of signals and which would present the least surface for corrosion and minimize the cost of painting and repairs as well as the first cost of installation. In working out the design on these lines, the catenary system has taken the form of the single catenary with an auxiliary messenger wire above the trolley, one main hanger being provided for every two intermediate connections between the auxiliary and trolley on tangents. On curves the angularity of the hangers provided the necessary flexibility, the auxiliary messenger and trolley wire being connected to the hanger at the same point.

The principle of providing more than one single insulator between the live parts and ground has been adopted and suspension insulators are used throughout as being the least liable to fail due to transverse stresses. For the main line tracks three suspension insulators are connected in series so that the failure of one or even two at any point will not result in the complete breakdown of the insulation and interrupt the service. For the yard tracks and sidings two such insulators are used. Great care has been taken also to provide ample clearance between every live part and adjacent grounded structures and as a rule this clearance is maintained at not less than 18 in. so as to avoid the

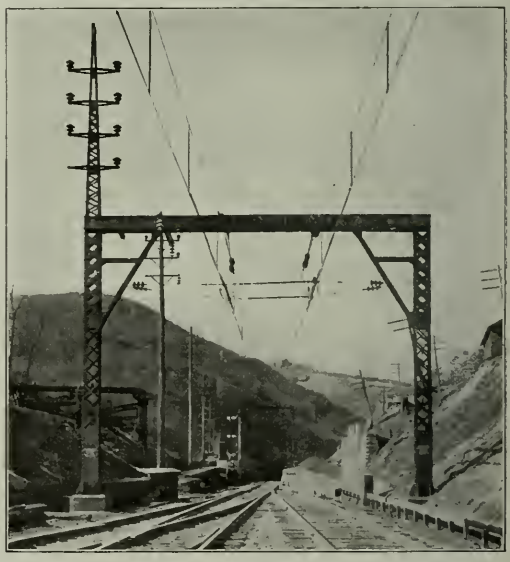


Fig. 3—Self Supporting Bridge at East Portal of Elkhorn Tunnel. Note the Section Break in the Contact Line, the Crossover and Wood Pole Transmission Line Over the Mountains to the Left

danger of birds or foreign materials causing a short circuit. The same principle applies in the tunnels; the insulators are, however, placed off to the side and out of the direct blast from locomotive stacks and here two 44,000 volt transmission line insulators in series are used in all cases between live points and ground.

In laying out the electrical installation a great deal of attention has been given to the provision of adequate and convenient facilities for the inspection and maintenance of all parts of the installation. The center and headquarters of the whole system is at Bluestone, where the power house is necessarily located on account of the water supply. After much study it was decided to locate the inspection building and machine shop for maintenance of electric locomotives here also rather than to try to take care of electric engines at the steam engine shops at Bluefield. The headquarters of the line maintenance force are also located at Bluestone

and are in constant touch, by means of a patrol telephone line and telephone placed at signal bridges, in addition to the usual telephone facilities, with all parts of the electrified section. The company has also provided dwellings for foremen and others on its property near the power house at Bluestone.

In addition to the direct advantages and savings resulting from the electric train service the railway has taken advantage of the presence of an adequate power supply at net cost of generation for the operation of various auxiliary plants. Thus a large steam pumping station at Bluestone for the water supply for steam locomotives has been shut down and the pumping is done at the electric power station located nearby, and the fans for ventilating the Elkhorn Tunnel will now be driven by electric motors. Likewise

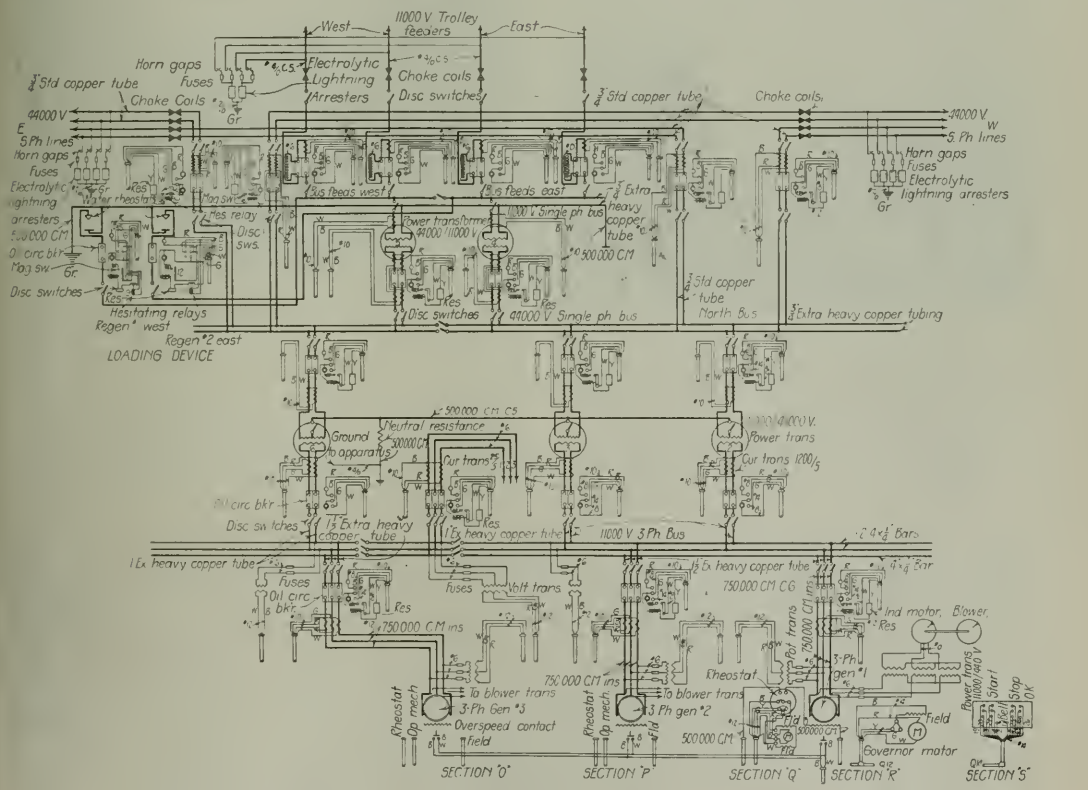


Fig. 4—Diagram of General Connections Between Power House and the Principal Substation Apparatus

electric power will also be ultimately used for operating shops and pumps at Bluefield and several other points on the division.

The electrification of this section had long been under consideration, but the decision to electrify was not reached until about two years ago. The layout and design of the entire installation was worked out in all details by Gibbs & Hill, engineers for the company. All construction, excepting the power house and inspection buildings and some of the power station equipment, was carried out by a specially organized railroad force under the supervision of the engineers.

TRANSMISSION

High tension power is transmitted at 44,000 volts, 25 cycles, single phase. The wires are carried on the catenary supports, except at the tunnels, where the line goes above ground over the summits. The method of support is clearly shown in Fig. 3. There are two single-phase lines between the power house and substations. These consist of four No. 2/0-seven strand hard drawn copper wires. A ⅜ in. steel ground wire is carried on the poles for the length of the line. The high tension insulators are of the four petticoat pin type with a maximum diameter of 12 in. and are tested at 165,000 and 120,000 volts respectively, for dry and wet flashover; their ultimate mechanical strength is about 4,000 lb., applied at right angles to the pin at the wire groove.

The wood poles of the lines over the tunnel summits are of chestnut and vary from 45 ft. to 55 ft. in length. At present they carry three arms each with provision for a fourth. The two upper cross arms carry the 44,000 volt wires and the lower arms the 4,400 volt signal wires. An 11,000 volt trolley feeder is carried over the Elkhorn Tunnel Summit. The cross arms on all poles are connected to the ground wire which is grounded by means of a copper cable which terminates in a copper plate bedded in the earth at the base of every fourth pole. The high tension lines are sectionalized at each substation by means of air break switches on steel structures on the roof.

SUBSTATIONS

All power supplied to the trolley system and trains is obtained from transformers which step down the voltage from 44,000 to 11,000 volts. These are housed in suitable buildings. One of the substations is located in the transformer and switching house at the power station. On ac-

count of objectionable conditions which would result from short circuits it was decided not to feed the nearby sections of trolley lines directly from the power house generator bus. Fig. 4 shows the general connections with the principal substation apparatus. The buildings are all of the same type, similar to the Maybeury station shown in Fig. 5.

The oil circuit breakers in the substations are remote-controlled and will be operated from adjacent signal towers or passenger stations, or at the yard master's offices, thus requiring no attendance. Power at 440 volts for the operation of the oil circuit breakers is obtained from two step-down transformers, one connected to the 11,000 volt bus and one to the 440,000 volt bus.

Fig. 5—Maybeury Substation—Norfolk & Western Electrification

The equipment of substations is as follows:

Bluefield	2—3,000 k. v. a. units	6,000 k. v. a.
Bluestone (power house)	2—2,000 k. v. a. units	4,000 k. v. a.
Maybeury	2—5,000 k. v. a. units	10,000 k. v. a.
North Fork	2—3,000 k. v. a. units	6,000 k. v. a.
Vivian	1—2,000 k. v. a. unit	2,000 k. v. a.
Total capacity		28,000 k. v. a.

The transformers are of the Westinghouse single-phase, oil-insulated, water-cooled type with primaries wound for 44,000 volts and secondaries for 11,000 volts. They are equipped with thermostats which at high temperatures close a bell alarm circuit to the nearest operator's office. Two transformer oil filter outfits have been provided—one for the power house and one for the substations. The latter outfit is transferred from one substation to another as required.

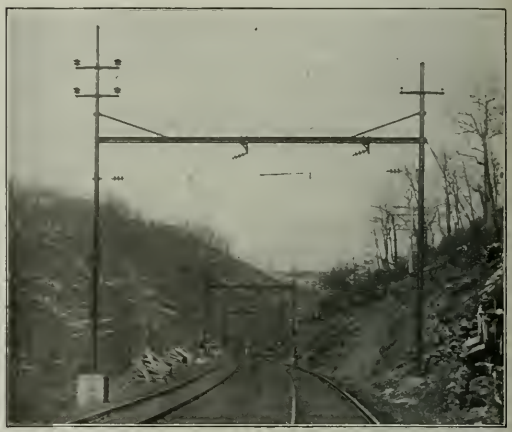


Fig. 6—Tubular Pole Construction at Transition Point, Showing a Typical Curve on the Main Line

Distribution and Catenary Construction

One advantage of using a very high voltage on the contact system is that no supplementary feeders are required, the distribution of power from substations being effected entirely by means of the trolley lines proper.

Supporting Structures.—There are two distinct types of struc-

Fig. 7—Cross Catenary Construction Used in the Yards of the Norfolk & Western at Flat Top—Notice the Small Amount of Obstruction Offered by This Type of Construction

tures used for supporting the system of catenary or trolley lines; one, which is used on the main line, where the wires are suspended from overhead beams or girders and the other, used in yards, where an overhead cross-catenary cable is used to support the longitudinal catenary wires of a large number of tracks. Fig. 6 shows a typical main line structure. It consists of two tubular steel poles set in concrete foundations and carrying between them a structural H-beam. The beam being partially supported by means of sag braces up to the poles. The poles extend above the crossbeam and sag braces and support cross arms which carry the high tension feeders and the signal feeders. The protecting ground wires are clamped to castings

Fig. 8—Norfolk & Western Electric Locomotives Hauling a Tonnage Train

screwed on the top of the poles. The structure as a whole is unguyed if on tangent track, but on curved track is guyed against the curve pull of the catenary system.

The catenary supporting structures are nominally 300 ft. apart on tangent track and somewhat closer together on curves, depending on the degree of curvature and whether or not intermediate pulloff poles are used between adjacent supporting structures. The foundations are of 1:2:5 concrete, reinforced with rods, and cored with a collapsible form. A copper ground plate is set in coke underneath one of the two foundations and a substantial copper cable carried up through the concrete for later attachment to the pole with an expanded pin type bond terminal. The steel poles are built up of various lengths, sizes and weights of steel pipe swedged together.

The guys are of very substantial construction and are relied upon to carry a material portion of the load. The guy anchors are made of concrete slabs containing two or more pieces of old rail. Double guys are used, the two rods making an angle of 20 deg. with the pole. While the above describes the normal main line structure, there are many variations, including bridges having both structural posts and girders which are used where the structures carry signals as well as the catenary system; similar though lighter structural bridges are used on curved track where property for guy anchors is not available.

In the yards the catenary carrying structures consist of two or more high structural steel posts or columns, guyed or self-supporting depending on the location and available property. From the top of one post a cross-catenary cable of extra high tension galvanized steel strand is run across the tracks to the top of the opposite post. In many instances this is 1½ in. cable, having a breaking strength of about 240,000 lb. It is designed to have a large sag which, where the yard is several tracks wide, necessitates high posts. A second strand of steel cable is carried horizontally from post to post, below and suspended from the top cross-catenary cable with ¾ in. rods. Fig. 7, showing a view in the Flat Top yard, is typical of this yard type of construction. The steel structures other than tubular poles were fabricated by the Virginia Bridge Company.

The Catenary System.—The appearance of the catenary system is so simple that one has to actually build it before appreciating the many problems and difficulties that surround its design and construction. The object in the present case is to hold a 3/0 grooved phono-electric contact or trolley wire at a uniform height of 24 ft. above the top of the rails in such a location that it will not vary horizontally more than 12 in. from the center of the rails (allowing for superelevation) and that the bottom of the wire will present an unbroken level surface on which the pantagraph shoe will ride smoothly.

Over tangent tracks the construction is simple. From each of the supporting structures a steel casting attached to the horizontal beam or girder serves as a support for three suspension type insulators. Each of these three insulators is of itself good for a working voltage of 11,000 volts and three are used as a special insurance against line troubles. Since the initial energizing of the line about the middle of December, there has not been a single failure of any of these strings of insulators. To the bottom insulator is attached a malleable iron casting which supports and clamps the messenger wire. This casting has ample bearing for the wire and arcing horns so that should an insulator fail the arc will probably be from the casting instead of the wire.

The messenger wire is ½ in. extra high tension galvanized steel stranded cable having a breaking strength of over 30,000 lb. The nominal sag in the messenger wire is 5 ft. in a 300 ft. span, the actual sag, of course, depending upon the particular span. Spaced 30 ft. apart along the messenger wire are bent strap clips which hold the hanger straps. To the bottom of the hangers is bolted a pair of malleable iron trolley clips which, however, on tangent track do not grip the contact or trolley wire

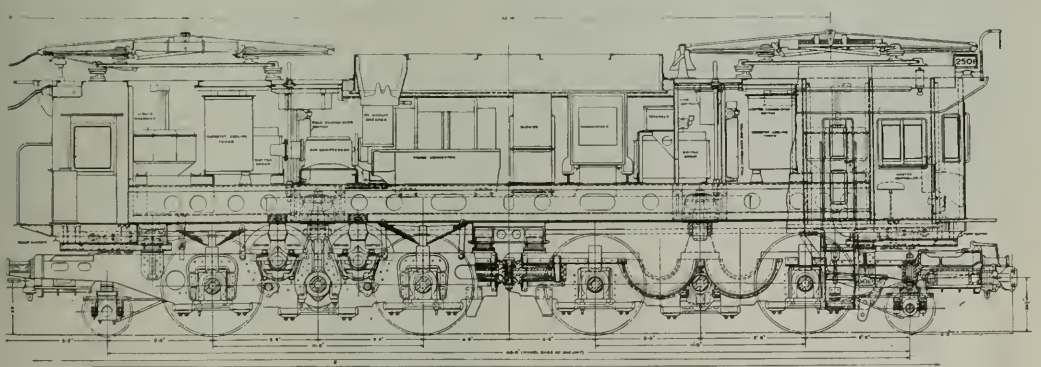


Fig. 9—Section of Norfolk & Western Electric Locomotive

but hold an auxiliary messenger wire. This auxiliary messenger wire is a No. 0 round copper or steel wire depending on whether the load conditions require the added carrying capacity of copper over steel. From the auxiliary messenger wire the 000 grooved contact or trolley wire is supported by a pair of clips bolted together and spaced 15 ft. apart, but so spaced that they are equidistant from the hangers holding up the auxiliary messenger wire. The result is an extremely flexible or "smooth" running trolley. All calculations are made for an average temperature of 60 deg.

Steady strands hold the trolley wires in place crosswise to the tracks where this is found necessary in the longer tangent stretches. All such steady strands are insulated from ground by a string of three suspension type insulators and where one of these cross steady strands from pole to pole of structure attaches to the wires over two or more tracks, it is sectionalized between the tracks by an impregnated wood stick insulator 4 ft. long. The trolley is sectionalized longitudinally where necessary by breaking the messenger wire with two strings in parallel of three insulators each. Directly below this electrical break in the messenger wire the auxiliary messenger and contact wires are attached with turnbuckles to the ends of a heavy impregnated wood stick insulator. Tee iron runners are supported from the trolley wires and from the wood stick insulator, the runners, being supported at opposite ends and sides of the insulators, have ample electrical clearance from each other. At those section breaks which are provided to permit isolation of parts of the line for repairs, but which are normally connected through electrically, specially designed disconnecting knife switches are mounted on top of the wood section break insulators. These can be opened or closed from the ground by means of a long impregnated wooden switch stick.

At certain locations the catenary system is anchored longitudinally or dead ended by being solidly attached to the cross girders of special structural bridges provided for that purpose, the messenger being insulated from the bridge by the double string of three insulators. Such anchors are to limit the zone of trouble should a wreck or other unforeseen accident break a messenger wire. The normal messenger wire support at the bottom of the strings of insulators is so designed that at a certain pull the messenger will slip through. Hence should a messenger break between anchors it is expected it will slip through several supports adjacent to the break and thus distribute the abnormal strain over several bridges instead of the strain coming all on the two structures at each side of the break.

The above while particularly describing main line tangent track construction applies in large measure to all the catenary system. Where the track is curved, as it is in the larger portion of the work, the system has been designed within limits such that the contact wire may be 12 in. off the center line of track in one direction at the bridges or points of support and 6 in. off the center line of track in the other direction at the center of the span. This allows the trolley curvature to be less than the track curvature. In speaking of center of track and departure of trolley wire, therefore, what is really meant is the loci of the middle point on the pantagraph shoe.

The hangers on curves are 15 ft. apart and the clips at the bottom hold both the auxiliary messenger and the contact or trolley wire. This is essential since unless held vertically below the auxiliary messenger by resistance to bending in the clips and the hangers, the curve pull of the contact wire would pull it up to the same level as the auxiliary messenger. This holding of both wires by the same clips at the ends of the hangers does not, however, result in "hard spots" in the trolley. In this district

The extension or wing at the right end of the power house is a substation and the structures for carrying the outgoing feeders are shown.

Fig. 10—General View of Power House from the West, Showing the Inspection Building to the Left, Intake Canal and Cooling Pond to the Right

most of the track is curved and a large portion of it is a relatively high degree of curvature running to a maximum of 12 deg. In order to avoid an uneconomically close spacing of structures on the high track curves one and sometimes two pull-off poles are used between bridges.

In the yards the catenary system is, of course, very similar to that on the main line except that the messenger insulators are

Fig. 11—View of Turbine Room from the West End Showing the Main Generating Units. The Operating Gallery is on a Level with Crane Track

supported from the lower or horizontal wire strand of the cross-catenary bridge. In yards only two of the suspension type insulators are used between live wires and grounded structures and the auxiliary messenger wire is omitted, the clips at the end of the hanger straps holding the contact wire in tangent as well as in curved construction.

In the Elkhorn Tunnel special catenary construction was necessary. This is a single track tunnel, 3,000 ft. long, the walls

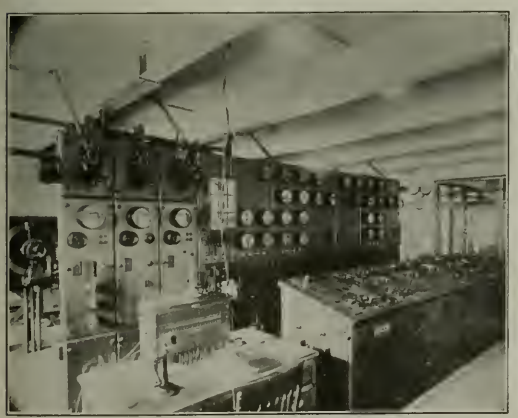


Fig. 12—Control Boards in the Operating Gallery of the Power House

are 14 ft. apart at the spring line and 13 ft. apart at the base, the spring line is 11 ft. 1 in. above the top of the rails, while the top of the arch is 19 ft. 3 in. high. The arrangement adopted was to have a supporting structure every 75 ft. apart. At each side of each structure two cast iron brackets held to the brick lining of the tunnel by large bronze expansion bolts, each carry a 44,000 volt transmission line insulator. A 2 in. brass pipe is carried parallel to the tracks by the pair of insulators on each side. Another line insulator on each side is mounted by bronze castings at the middle of these pipes and a cross pipe bent to follow the arch of the tunnel, forms the support for a bronze messenger wire. The live catenary parts have, therefore, double 44,000 volt insulation to ground. Despite the necessarily very limited clearances, the work in this tunnel stood a test of three times normal trolley voltage and has so far performed very satisfactorily for the several weeks it has been in service. Fig. 3 shows the east portal of this tunnel in which the contact wire is 17 ft. 3 in. above the rails.

On branches and coal mine sidings, the wooden pole bracket type of construction is used. In such places, only two of the suspension type insulators are used. The messenger wire is 3/8 in. steel strand and the contact wire No. 2/0, no auxiliary messenger being used.

Track Bonds.—A special type of track bond has been designed for this installation. By manufacturing the bonds with only one terminal attached and crimping or looping the cable near one end, the bond may be installed by removing only one bolt in the fish plate. In this way these bonds may be installed almost as

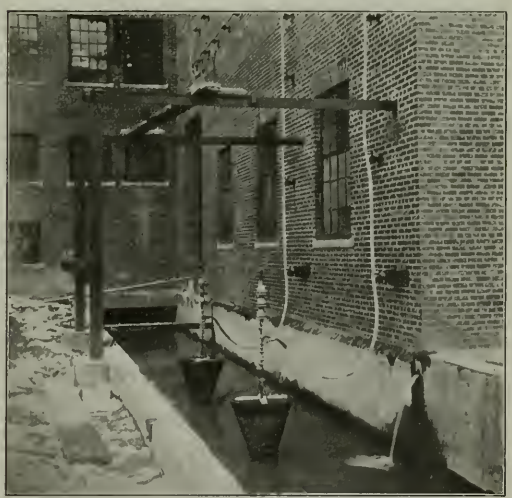


Fig. 13—Water Rheostats for Absorbing Excess Regenerated Power

quickly as the exposed type while retaining all the advantages of the concealed type. The cable consists of 37 strands of 0.0534-0.475-in. copper wire. At signal bridges the rail joints are insulated and it is necessary to install bonds so that the flow of propulsion current shall be continuous. This result is accomplished by the use of impedance bonds which prevent the flow of 60-cycle signal current from getting past the insulated joint, but at the same time do not interfere with the flow of 25-cycle propulsion current.

Protection of Telephone and Telegraph Lines.—In order to protect the telephone and telegraph lines along the railway from danger of interruption of the service due to the electrical installation, it was necessary to make certain provisions, first, against the hazard of physical contact between falling telegraph wires and high tension power wires, and, second, against induction set up in parallel telephone and telegraph lines due to current flowing in the power circuits. It was found preferable to move the telephone and telegraph lines entirely to the north side of the tracks and locate them at the extreme edge of the right-of-way so as to be as far as possible from the power circuits. The nearest 11,000 volt traction power wire to the telephone and

telegraph circuits is the trolley over the northerly or westbound track.

To provide against induction it was decided to place the main transformer substations somewhat closer together than would be required by considerations of voltage regulation and losses and to place the end substations near the ends of the line. This results in feeding each important or long section of trolley from both ends and consequently the induced voltage in parallel telephone and telegraph lines is largely localized and neutralized. In addition to this, however, in order to provide for emergency conditions when one substation may be out of service and for excessively high currents which occur in cases of short circuits and grounds, it was decided to install so-called track transformers or boosters in the trolley and track circuit at intervals of about one mile. The purpose of these transformers is to cause the return current, a considerable amount of which would ordinarily leak to earth, to flow in the track rails and thus keep it at a fixed distance from the trolley wire and the telephone and telegraph wires. There are two sets of coils wound on the core of each transformer, one for the eastbound and the other for the westbound track, hence only one transformer is required at each point. By the use of a combination of all of the above appliances and devices it is found that the telephone and telegraph service is not interfered with by the operation of the electric train service.

LOCOMOTIVES

The traffc on the electrified section is handled by twelve 270-ton Baldwin-Westinghouse locomotives, each consisting of two 135-ton units or halves (see Figs. 8 and 9). It is necessary in handling heavy trains on mountain grades to have a part of the motive power at the rear of the train. In this case the power is divided equally between the two ends of the train and the trains are of such length in this mountainous country that there is difficulty of transmitting the starting and stopping signals from one locomotive to the other and thus the locomotives are subject to treatment which would be considered impossible in ordinary service. This would require very careful handling with the ordinary locomotive, but these locomotives are designed to meet these severe requirements of the service without involving special manipulation. In meeting these conditions the rugged construction of the three-phase induction motor, being free from commutators, and the liquid rheostat are of the greatest importance. The liquid rheostat not only gives the smoothest possible gradations of tractive effort, but the latent heat of steam makes it possible without difficulty to dissipate the large amount of heat generated in the rheostat in meeting this severe requirement. The inherent characteristics of the induction motor which enable the locomotive to automatically hold the train at a constant speed on descending grades by regenerating and returning power to the line, also accentuate the advantages of this type of locomotive.

The locomotive units have a 2-4-4-2 wheel arrangement, the two trucks being connected by a hinge joint. The cab is of the box type and is supported on the main truck entirely by spring cushioned friction plates, there being no weight on the center pins, which serve only to maintain the cab in its proper position on the trucks. An engineer's compartment is provided at one end of each unit, the two units being so coupled as to provide for operation from either end of the locomotive.

Each locomotive is equipped with eight traction motors of the 3-phase induction type, with wound secondaries for 4 pole and 8 pole operation. The motors are forced cooled by air from the main ventilating duct, which also delivers air to the phase converter and to cooling towers for the liquid rheostats. There are two running speeds, 14 and 28 m. p. h. In starting, resistance is inserted in the secondary circuit of the motor by means of a liquid rheostat. For the 14 m. p. h. speed all motors are connected in parallel, having the eight pole motor combination and for the 28 m. p. h. speed they are also connected in parallel, but with the four pole motor combination. The locomotives are equipped with unit switch type of control and arranged for the simultaneous operation of the two units from the control end of either.

The control equipment is built for handling alternating current, which is collected from the 11,000 volt line by the pantagraph trolleys. This current is fed to the main transformers through an oil type circuit breaker. A phase converter is connected to the low tension side of the transformer and operates constantly when the locomotive is in service. To its extended shaft are coupled a blower for cooling the motors, transformers and other parts, and, through a clutch the air compressor. The converter is an induction motor with a short circuited or cage wound secondary having two windings on its stator, one to drive the rotor and the other to furnish current out of phase with the main supply current.

The motor circuit of the primary winding of this converter is connected across the secondary of the locomotive transformer and receives current at 725 volts. The arrangement of windings is such that with the converter running, a current of 90 deg. phase displacement is induced in the second winding on the primary of the converter. By connecting this displacement circuit to the middle tap of the main transformer, a three phase current is produced. It is only necessary to convert a portion of the current used in the main motors as a large portion comes directly from the main transformers. For starting the converter a single-phase series commutator type motor is mounted directly on the shaft of the converter.

Two trolleys are mounted on the roof of each unit; they are of the pantagraph type, but are unique in that they have been arranged so that if necessary they may be fitted with end horns which will automatically fold in when the pantagraph is lowered by the tunnel trolley wire. The trolley is raised and held in contact with the overhead wire by springs and is lowered by compressed air. Double insulation is provided for the pantagraphs, that is, two separate sets of insulators are arranged in series. If one set fails, the other set will be effective in sustaining the service.

On each unit there are four liquid rheostats, one for each motor. The rheostats are operated in pairs, each pair having in common, one storage reservoir and cooling tower, one circulating pump and one operating mechanism. The liquid rheostats provide the motor circuit resistance required in order that the speed of the motors may be slow at starting and may be gradually increased as the resistance is cut out of the circuit.

The essential elements of each rheostat are a cast iron tank in which are mounted electrodes consisting of certain metal plates connected to the motor and another set of such plates adjacent thereto and connected to ground; a hollow plunger, located at the center of the tank for regulating the height of the liquid and which is raised or lowered by an operating mechanism; and a motor-driven centrifugal circulating pump by which the liquid is continuously circulated to prevent excessive heating, the liquid being forced up through the bottom of the tank and over the top of the hollow plunger when the plunger is raised and back through the inside of the plunger to the storage reservoir.

When the liquid is raised so as to submerge the lower ends of the plates, current may flow between the motor-connected plates and the adjacent ground-connected plates, the circuit between the three phases of the motor being thus established. The higher the liquid rises on the plates, the lower the resistance becomes; when the plates are entirely submerged, the liquid going all the way up, the resistance is reduced to the minimum. To keep the temperature of the circulating liquid as low as possible, a portion is by-passed through a cooling tower containing a series of trays so arranged that the liquid will flow over them in a thin sheet and be cooled by air from the main ventilating duct to which the towers are connected.

For the purpose of cooling the various pieces of apparatus, there is a 36-in. Sirocco fan mounted on the shaft of the phase converter, and arranged to deliver the air to a duct built into the cab floor under the deck. The duct runs lengthwise through the cab and is arranged with openings at various points where con-

nections are made to the traction motors, phase converters, cooling towers, etc.

The following table shows the principal dimensions and weight of each complete locomotive:

Length overall	105 ft. 8 in.
Driving wheel base, total	83 ft. 10 in.
Rigid wheel base	11 ft. 0 in.
Truck wheel base	16 ft. 6 in.
Height, rail to pantagraph (locked)	16 ft. 0 in.
Height, rail to top of cab (maximum)	14 ft. 9 in.
Width, overall (maximum)	11 ft. 6¼ in.
Width over cab body	10 ft. 3 in.
Diameter of driving wheels	62 in.
Diameter of pony wheels	30 in.
Weight on drivers	220 tons
Total weight of locomotive	270 tons

The following table shows the performance of these locomotives under varying conditions of load:

	Train on 1.5 and 2 per cent grades	Train on 1 per cent grades	Train on 0.4 per cent grades
Weight of train, tons	3,250	3,250	3,250
Locomotives per train	2	1	1
Approximate speed, miles per hour	14	14	28
Drawbar pull per locomotive, lb.—			
Uniform accelleration	91,800	114,000	79,400
At speed on 2 per cent grade	75,400		
At speed on 1 per cent grade		85,800	
At speed on 0.4 per cent grade			4,600
Maximum guaranteed accelerating tractive effort per locomotive	133,000	133,000	90,000
Approximate maximum guaranteed h. p. developed by motors	5,000	5,000	6,700

On tests and in service the locomotives have developed a drawbar pull considerably in excess of the guaranteed maximum, the highest record with the dynamometer car being 180,000 pounds. This corresponds to an adhesion of about 40 per cent.

POWER STATION

The power station is of the usual type using steam boilers and steam turbines as the prime movers. It is located at Bluestone, on the Bluestone river, about 11 miles west of Bluefield, mainly for the reason that this is almost the only available source of water for boiler feed and condensing purposes in the district. Fig. 10 is a general view of the plant. The building is constructed of hand-burnt brick; the design is plain and substantial in character. The main structure is about 135 ft. by 158 ft., with a 52-ft. by 33-ft. extension at the northeast corner.

The main building contains a boiler room 79 ft 3 in. by 158 ft. 6 in., and a turbine room 56 ft. by 158 ft. 6 in. Across the east end of the turbine room a section 26 ft. wide is assigned for switching equipment, offices and other facilities, and fitted with intermediate floors and galleries. On the second, or mezzanine floor of this section, are located the locker and toilet rooms for the engineers and firemen. Above this, on the main floor, is the low tension switching room, which is separated from the turbine room by heavy wire screens. The next floor is the operating gallery, overlooking the turbine room, and a small office and a lavatory. The top gallery is used for offices. On the ground floor of the extension building or transformer house are the step-up and step-down transformers, and on the second floor is located the high tension switching apparatus.

The boilers, stokers, stoker engines and feed water heaters are located on the main floor of the boiler room, while the pumps, oil filters, air compressor, ash handling equipment, and the forced draft fans are in the basement, the pumps and filters being in a separate room. The main material storeroom also occupies a separate room extending along one side of the basement. The main turbo-generator units, exciters and signal generators, are located on the main floor of the turbine room, the condenser equipment and fans for cooling the generators being in the basement. The turbine room is spanned by a 30-ton traveling crane. The basement floors are at the ground level, while the turbine room floor is 18 ft., and boiler room 13 ft. 6 in. above.

Generators.—The main turbo-generators are of the Westinghouse type having a rating of 10,000 kw. at 80 per cent power factor, 11,000 volts, 25 cycles, single phase. At this rating, the generators are specified to operate for 24 hours with a rise in temperature not exceeding 60 deg. C. above the temperature of the cooling air. They are capable of delivering a single phase output of 12,500 kw. at 80 per cent power factor for 5 minutes without injurious heating. The field coils are of the two pole type wound with copper strap and insulated for a one minute potential of 1,000 v., a. c. Provision has been made for the insertion of plugs for balancing. The armatures are wound for 3-phase power and are insulated for a one minute voltage test of 22,000 volts, and the insulation is capable of withstanding a temperature of 90 deg. C. without injury. Thermo couples imbedded in the armatures furnish a continuous temperature record. A view of the generator room is shown in Fig. 11. Each generator is ventilated by a No. 6 Sirocco blower, having a capacity of 50,000 cu. ft. of air per minute.

There are two turbine-driven and one motor-driven exciter generators. The turbo-driven sets consist of small Westinghouse horizontal turbines rated at 150 kw. The generators are compound wound machines of the rotary armature type with commutating poles and have a rating of 600 amperes at 250 volts when running at 2,200 r. p. m. The motor-driven set consists of a 3-phase induction motor rated at 150 kw. at 440 volts, 25 cycles, running at 720 r. p. m. The generator is a compound wound machine of the 6-pole type with a normal rating of 600 amperes at 250 volts. The motor takes power from a 3-phase self-cooled oil transformer rated at 200 k. v. a. A Tirrill regulator is used to vary the exciter voltage and current over sufficient range to insure practically constant voltage on all three main generators under all operating conditions.

Power for signal service in the electrified zone is supplied by two turbine-driven generators. Each set consists of a horizontal Westinghouse steam turbine direct connected to a 50 kw., 4,400 volt, 60 cycle single phase generator.

Switching Apparatus.—The main 11,000 volt bus is sectionalized and 3-phase power for auxiliary purposes is taken from the island section. No brick or concrete bus compartments are used, the bus being of copper tubing carried on insulators mounted on pipe framework. Copper tubing and bare wire is used wherever possible; insulated wire being used only where conductors are carried in conduits. The power supply to the 11,000 volt side of the three 5,000 k. v. a. step-up transformers is controlled by three 2-pole oil circuit breakers. The high tension leads from the step-up transformers, pass up through openings in the floor above to the oil circuit breakers and 44,000 volt bus. Copper tubing and bare wire are used in the bus work and wiring on this floor. The 44,000 volt bus is sectionalized, two high tension feeders being taken from each side. The high tension feeders and trolley feeders leave the building through openings in the south wall. The lighting arresters are located on the roof of the building.

All oil circuit breakers are electrically controlled from the operating gallery. Knife disconnecting switches are installed between busses and all oil circuit breakers and on the line side of all high tension and trolley feeder circuit breakers. Electrolytic lightning arresters are connected to all feeders.

The electrically operated switching and control equipment receives power from the auxiliary d. c. bus or a storage battery which is located in the northeast corner of the turbine room basement. This set has a capacity of 160 ampere hours at 220 volts, and is charged by a 5 kw. motor generator set located in the operating gallery. All switching apparatus is controlled from the operating gallery. The switchboards consist of a generator bench, main power board, auxiliary power board and a signal power board, as shown in Fig. 13.

Regeneration Loading Rheostats.—Excess regenerated power returned to the power house at no load passes to the 11,000 volt bus and through the various transformers back to the generators if the generators are running under very light load or no load. If no other load were provided, the regenerated power would reverse the generators and operate them as motors. To prevent this a loading device consisting of electrodes immersed in the intake canal and controlled by suitable switches is provided. The operation of the switches is made automatic by means of a group

of relays and magnetic switches, current transformers, etc., so connected as to give the following results.

When the amount of excess regenerated power reaches, say, 300 k. v. a. the closing relays throw in one water rheostat on the 11,000 volt bus. As soon as the regenerated power exceeds the capacity of one water rheostat by 300 k. v. a. another closing relay throws the second water rheostat in on the 11,000 volt bus. The difference between the amount of excess regenerated power and the capacity of the water rheostats in service is made up by the generators.

When the excess regenerated power has become reduced to zero with one rheostat in service all of the rheostat load being supplied by the generators one of the tripping relays trips the circuit breakers which cuts the rheostat off the 11,000 volt bus. With two rheostats in service, when the excess regenerated power drops to 2,000 k. v. a. one of the relays opens the breaker which was closed first and cuts one rheostat out of service. The other rheostat remains in until the excess regenerated power drops to zero when it, too, is cut out of service.

The water rheostats are located outside of the transformer house at the Bluestone power station. (See Fig. 13.) Each rheostat consists of a steel cone carrying a lead from the circuit breakers, and a fixed ingot iron plate located at the bottom of the intake canal, and grounded to a copper plate bedded in the earth outside of the canal. The power dissipating capacity is adjusted by varying the distance between the cone and the iron plate. The cone is raised or lowered in the water of the canal by means of a hand-operated winch and cable carried on a steel bracket across the canal.

Steam Turbines.—The initial equipment consists of three main generating units, with space provided for a fourth. These units are horizontal turbines of the Westinghouse-Parsons impulse reaction double flow type rated at 10,000 kw. with steam at 190 lb., superheated 150 deg. F. and 28½ in. vacuum when running at 1,500 r. p. m. The governor consists of an oil relay mechanism for operating the steam valves. Oil is maintained at a pressure of 45 lb. for the governor mechanism and reduced to about 10 lb. for lubrication. In case of interruption to the oil supply the stop valve automatically and instantly operates and shuts off the steam supply. A simple speed limit governor trips the automatic stop valve whenever the speed of the turbine exceeds a predetermined value. Each turbine is equipped with a separate condenser of the Le Blanc Jet type. The condenser injection water and air pumps are driven by a horizontal turbine. The air pump discharges into the intake canal and the ejection pump discharges into a pipe leading to the spray cooling poud.

Water for all purposes, excepting drinking, is taken from the Bluestone river by way of an intake canal. At the intake are two rows of 5 ft. by 7 ft. screens, having structural steel frames and three kinds of mesh—a fine mesh, 4 in. by 4 in. of No. 12 gage wire, medium mesh, 1 in. square of No. 10, gage wire, and coarse mesh, made up of 2½ in. by ¼ in. flat bars spaced 2½ in. on centers.

The water from the circulating pumps of all condensers is discharged into the cooling pond. If the supply of river water is low or not suitable for boiler use, it being very muddy at certain seasons, the water is sprayed into the pond and thence discharged into the intake canal. If there is sufficient cold river water of suitable quality, the water from the condensers is not sprayed but is discharged into the pond from which it is allowed to flow into the river reservoir several hundred feet below the intake and circulates up stream to the intake, the complete circuit being about 1,400 ft.

The cooling pond is 90 ft. wide, 296 ft. long and 5 ft. deep. Altogether there are 280 nozzles with space provided for addition of 140. The pond is capable of cooling 16,800 gal. per minute.

Boilers and Stokers.—The boiler plant comprises ten Stirling type water tube boilers, arranged in two rows with the firing aisle between, each row consisting of two batteries of two boilers each and one single boiler. Space is provided in the present building for four additional boilers. The boilers are designed for a working pressure of 225 lb. gage, and each has a total effective heating surface of 6,772 sq. ft., comprised in 3 steam drums 42 in. in diameter and 16 ft. 4⅛ in. long, and 487 tubes 3¼ in. in diameter. The boilers are equipped with superheaters capable of superheating the steam 150 deg. F. at normal rating. Each boiler is fitted with an underfeed stoker of sufficient capacity to evaporate 61,000 lb. of water per hour into steam at 200 lb. gage pressure 150 deg. F. superheat when supplied with feed water at 200 deg. F. The stokers are capable of developing 300 per cent of normal boiler rating when burning coal having a heating value of 12,250 B. t. u.'s per pound.

The forced draft installation in the boiler room basement consists of three Sturtevant multivane turbine driven fans, driven by steam turbines through a 4.1 herringbone reduction gearing. These turbines are of the standard Sturtevant E-5 type, and have a normal rating of about 300 hp. each. The stack is of the Custoclis radial brick type 268 ft. in length.

Steam from the exhaust header is discharged into horizontal Cochrane feed water heaters and purifiers located on the boiler room floor. These are of the cylindrical type, and each heater is capable of heating 225,000 lb. of water per hour from 40 deg. to 205 deg. F. The heaters are equipped with oil separators. The feed water is taken from the intake canal and pumped to the heaters by two lowhead pumps of the horizontal volute single stage double suction type, having a capacity of 650 gal. per minute. These pumps are direct connected to 20 hp. steam turbines. There are two suction lines to the lowhead pumps, each containing a Lagonda strainer. The two boiler feed pumps are of the horizontal volume three stage double suction type designed to operate against a working head of 600 ft. These pumps are driven by 175 hp. steam turbines.

The coal is received in hopper bottom cars on a siding along the south side of the power station. The cars discharge into a hopper under the tracks. Below the hopper is a single roll crusher which empties into an inclined conveyor of the continuous bucket type, having a capacity of about 60 tons per hour at a speed of 80 ft. per minute. This conveyor elevates the coal to a hopper at the east end of the boiler room monitor. From this hopper the coal is fed to a horizontal distributing conveyor. Two storage bins are suspended above and between the boilers from the building girders. Their capacity is about 350 tons. The coal handling machinery is driven by A. C. motors.

A narrow gage (24 in.) track is located under each row of boiler ash hoppers in the boiler room basement for steel platform cars, carrying two buckets of one cubic yard capacity each, which are used for removing the ashes. They are run outside the boiler room basement to a loading trolley emptied into the gondolas by means of a traveling electric hoist.

Compressed air is supplied for operating tools in the locomotive repair shop, for cleaning generators and for general use about the plant. The compressor is of the steam-driven type, having a capacity of 412 cu. ft. of free air per minute at 165 r. p. m., maintaining a pressure of about 100 lb. per sq. in. This equipment was supplied by the Chicago Pneumatic Tool Company, of New York City.

A complete signal communicating system has been installed. A monitor board is installed on the south wall of the turbine room. Symbols governing the operation of the main generators, exciters and signal generators are painted on ground glass and are illuminated by the operation of push button switches in the operating gallery. Return signal lamps are also provided on the main power board in the operating gallery. Pneumatic whistles are provided in the boiler room, pump room and turbine room, as well as the indicating signals at each main turbo-unit.

FACILITIES FOR INSPECTION AND MAINTENANCE

The inspection building and repair shop is a 148 ft. by 68 ft. structure of the same type as the power station which is just north of it. There are two main pits running the full length of the building. At the west end of the shop is a short wheel pit which is connected to the two other pits by means of a covered

lateral pit. This pit is equipped with a narrow gage track to handle the pneumatic jack by means of which the wheels are removed from the locomotives and run along to the storage track in front of the heavy wheel lathe. The southern pit is used almost exclusively for inspection. For this purpose a 112-ft. platform has been located 12 ft. 8 in. above the rails. All repair work is done in the northern part of the building, where the machine tools are located. This part of the shop as well as one inspection pit and the short wheel pit are spanned by a 30-ton Whiting crane.

The following machine tools are installed:

Motor Driven Tools—

80-in. heavy wheel lathe.
30-in. by 8-ft. planer.
60-in. by 6-ft. No. 1 horizontal boring and drilling machine.
3-ft. Mueller radial drill.
20-in. Stockbridge crank shaper.
73-in. boring mill.
36-in. double back geared lathe.

Belt Driven Tools

1 Style C Diamond double emery grinder.
1 No. 5 mat Diamond wet tool grinder.
36-in. Aurora vertical drill.
18-in. by 10 ft. single back geared lathe.
14-in. Barr 2 spindle sensitive drill.
50-ton pneumatic press.

The building is well lighted by Tungsten lamps. Rolling steel doors are provided at the entrance to all tracks and the building is steam heated. The locomotives are not handled in the shop by their own power, but are drawn in and out by means of a cable and motor-driven winch, located at the east end of the building between the two main tracks. A blacksmith shop is located in an extension at the northwest corner of the building.

The headquarters for the maintenance of the overhead catenary trolley construction and the transmission lines are at Bluestone. The line repairmen will be available and subject to call at any time during the day or night. On a siding an emergency repair train consisting of a tower car, tool car and flat car is constantly held in readiness for heavy emergency repairs. The ordinary repairs, however, will be taken care of by comparatively small gangs consisting of three to five men, who will be sent out on small gasolene cars. Wherever possible repairs are made from the overhead bridges or from ladders, and in order to avoid interruption to electric service to the greatest extent possible, specially treated and impregnated wooden ladders are provided and can thus be used for light repairs to trolley fingers, clips and other details on the 11,000 volt catenary system while alive. Certain of the line repairmen are regularly stationed at one or two other points on the line from which they can quickly respond to an emergency call by the use of gasolene cars.

In order to expedite the inspection and maintenance of the line, a patrol telephone line is installed over the entire length of the electrified section. This patrol line is connected with the power house, and through the power house telephone operator communication can be had over this line with the train despatcher and other officials.

AUTOMATIC SIGNALING EQUIPMENT

The electrified section of the railway was formerly equipped with automatic signals of the d. c. type requiring primary storage batteries, these signals being usually mounted on posts along the track. Under electric operation, however, it was deemed advisable to make use of these signals, which were only recently installed and practically new, on other parts of the railway, and to provide new a. c. signals in connection with a. c. track circuits, the signals being mounted on the catenary bridges. This part of the work was carried out by the railway company.

Excursion Fares on the Egyptian State Railways Restored.—The Egyptian state railway authorities, who at the beginning of the war increased all first and second-class fares by 10 per cent and suppressed return tickets and week-end tickets at reduced fares, have now re-established the latter, and week-end tickets between Cairo and Port Said, at about a fare and a half are again available. Port said is 210 miles from Cairo.

REPORT OF CHICAGO RAILWAY TERMINAL COMMISSION

The Chicago Railway Terminal Commission, of which John F. Wallace is chairman, has submitted a preliminary report to the Chicago City Council Committee on Railway Terminals, based on its investigation of the Chicago railway terminal situation since its formation on May 25, 1914. In addition to the Chicago situation the commission has made a personal examination on the ground of the terminals at Toronto, Montreal, Boston, New York, Liverpool, Manchester, London, Paris, Brussels and Antwerp. After a general discussion of the development and the present aspect of the Chicago railway terminal situation the commission submits a series of recommendations which it summarizes as follows:

"In the interests of the city, the railroads, the shippers and the general public, the railroad terminals now existing in the congested area bounded by the Lake on the east, Chicago avenue on the north, Desplaines street on the west and Sixteenth street on the south, should be readjusted and simplified by combination and co-operation.

"The through passenger service of all the railroads now using terminals in that portion of the congested area above described, which lies east of the south branch of the Chicago river, should be combined in one, or two, union passenger stations, with the exception of such of these roads as can properly be taken into the new Canal street Union Station west of the river.

"Advantage should be taken of the substantial opportunities which now exist for the practical application of the through routing principle to Chicago suburban service. These opportunities would be increased by certain changes which are easily practicable.

"The present extensive and superficially spread out competitive freight terminals within the congested area should be regrouped and simplified. The commission is gratified to be able to report that it has found, on the part of a number of influential railroad officials, a distinctly favorable disposition toward this suggestion and a willingness to assist in the working out of practicable plans to carry it into effect.

"The south branch of the Chicago river should be straightened so that La Salle street, Fifth avenue and Franklin street can be extended through as continuous north and south thoroughfares, and so that railroad properties now cut off by the river and only superficially used, can be made available for intensive development. Provision for river-straightening was made in the Canal street Union Station ordinance, and the commission has secured assent to substantially similar provisions in the Baltimore & Ohio Chicago Terminal Railroad ordinance, and in the pending ordinance relating to the Chicago & Western Indiana Railroad. Other railroads, whose interests would be affected, have also indicated to the commission their willingness to co-operate in some practicable plan of river straightening. The commission has prepared certain tentative plans showing the river straightened and how the property then thrown east of the south branch of the river can be utilized to the joint advantage of the railroads and the public.

"No carload freight should be handled within the congested area, bounded as above, except that which is intended for consumption or use within the district. All other carload freight should be interchanged, transferred or delivered by co-operative methods, agencies and facilities outside of this district, such as those already adopted at Clearing by 12 of the Chicago railroads, operating 15 trunk lines. Here, or at similar co-operative yards, should be interchanged all carload freight which it is not essentially necessary to handle within the congested area. Less than carload freight should be interchanged or transferred, as far as practicable, on general principles substantially similar to those applied at Clearing to the carload freight. It is apparent that, to the extent that this interchange or transfer can be accomplished at one or more points outside of the congested area

of the city, a distinct public benefit will be conferred, and the railroads themselves will probably be financially benefited.

"Outbound L. C. L. freight should not, as a general rule, be sorted or loaded to destination at the freight terminals within the congested area. No outbound L. C. L. freight which had been loaded into trap cars on private sidings should be brought into this congested area, but should be taken directly from the point of origin to an outlying station or yard where it will be transferred as may be necessary. Outbound L. C. L. freight brought by teams or trucks to freight stations or team tracks within the congested area should be unloaded as directly as practicable from the vehicles into trap cars and should be taken in these cars directly to outlying clearing stations or yards, there to be transferred as may be necessary.

"Outlying L. C. L. clearing stations or yards should be established and operated by roads which do not already have them; and the co-operative or union principle should be applied and extended as rapidly as experience justifies and opportunity permits. This commission is not now prepared to say that the larger railroad systems may not find it advantageous to operate individual clearing station yards of their own or that one joint station or clearing yard may be found as efficient as two or more. It may be that there should be three union co-operative clearing stations or yards located in different sections of the outlying territory of Chicago and devoted to freight destined west and northwest, south and southwest, east and southeast, the sections into which the entire railroad system, when considered in relation to Chicago, naturally subdivides the country.

"Universal freight stations should be established at appropriate points in the central terminal area, in sufficient number to afford convenient opportunity for the shippers in the respective sections of this area to deliver at a single station L. C. L. freight destined to different roads, or at least to any of the roads within one of the above mentioned groups. The freight received at such universal stations should be taken to the outlying clearing station or yard of all the roads, or of the roads of one of these groups, depending on the system, and then this freight should be sorted, transferred and loaded to destination.

"In the event—but only in the event—that this service is found to involve extra expense to the railroads over the cost to them of handling freight teamed to their respective individual receiving stations, the shipper utilizing these universal stations should pay an appropriate charge for the privilege which enables him to reduce the cost and the delays of teaming. It is not suggested at this time that all the railroads should immediately adopt the universal freight station system, or that each railroad should convert all of its existing freight stations into universal stations. But it is believed that a sufficient beginning should be made on the universal freight station plan to give that plan a fair and adequate trial, and under circumstances which will permit of its extension to the extent that this is justified by experience.

"In the plans prepared by the commission, as tentative studies of the terminal situation, locations have been indicated for new universal freight houses by way of suggesting where such houses be located. In actually working out the problems, other locations may be found more suitable or more available. The commission has been gratified to find that the universal freight house principle is being given friendly consideration by Chicago railroad men, and it confidently hopes for the inauguration of this principle in the near future.

"None of the plans submitted is intended to represent the matured judgment of the Chicago Railway Terminal Commission. The sole purpose of all that is here presented is to report progress toward the solution of the railway terminal problem and to indicate some of the practical steps that may lead further in this direction."

The report contains a large number of interesting charts and statistical tables showing the present situation and the proposed development of the Chicago railway terminals, and also a general discussion of the terminal situation in other large cities of the United States and in Europe which the commission visited last summer.

The commission consists of John F. Wallace, chairman, representing the city of Chicago; Walter L. Fisher and Bion J. Arnold, representing the Citizens' Terminal Plan Committee; Edward H. Bennett, representing the Chicago Plan Commission; L. E. McGann, commissioner of public works; John W. Beckwith, corporation counsel; Ellis Geiger, chairman, Council Committee on Railway Terminals.

DEMURRAGE REGULATIONS IN ENGLAND

The Railway Clearing House, London, has announced that on July 1, 1916, the following uniform regulations and scale of charges for demurrage on goods wagons will be put into effect throughout England, Scotland and Wales. The date is set far in the future because in a part of the country (Birmingham, South Staffordshire and South Wales) the new tariff will effect an increase.

FREE PERIOD

Before conveyance—

At stations ..... One day, exclusive of the day upon which the loading is begun.

At private sidings and docks.... Two days, exclusive of the day upon which the loading is begun.

After conveyance—

At stations ..... Two days, exclusive of the day of arrival.

At private sidings and docks.... Three days, exclusive of the day of arrival.

At docks (shipment traffic only).. Four days, exclusive of the day of arrival.

CHARGES

Ordinary wagons.....1s. 6d. (36 cents) per wagon per day.
Sheets.....3d. (6 cents) per sheet per day.

High capacity wagons—	Per wagon per day
Above 16 tons and not exceeding 20 tons carrying capacity	2s. ($0.48)
Above 20 tons and not exceeding 30 tons carrying capacity	3s. (.72)
Above 30 tons	5s. (1.20)
Specially constructed wagons—	
Above 15 tons and under 20 tons carrying capacity	3s. (.72)
20 tons and under 30 tons carrying capacity	6s. (1.44)
30 tons and above	10s. (2.40)
Refrigerator and insulated vans—	
If not unloaded within one day, exclusive of day of arrival	6s. (1.44)

It appears that for many years prior to 1905, owing largely to competition between railway companies, the scheduled charges for demurrage on wagons and sheets were rarely enforced. Thereupon the railway companies' attitude was taken advantage of in several quarters and wagons were detained most unduly awaiting loading or unloading, and sometimes actually used as a trader's storehouse, being moved from place to place as found convenient. Finally, the companies were very seriously affected by shortage of available wagons, congestion in yards where large numbers of wagons were kept under load, and in other ways, and it became imperative to enforce demurrage charges.

Shippers and consignees are much the same, the world over, and we read that for a considerable time there was strong opposition to the new regulations on the part of traders, who withheld payment of the demurrage charges due. At a later date, however, they fell in with the decision given in the Scotch Courts in 1910 in a test case brought by the Glasgow & South-Western against a colliery company, this decision being in favor of the railway.

The rates shown above are already in force, and have been since February 7, last, except in the three districts mentioned.

AUSTRALIA ORDERS LOCOMOTIVES.—The Australian government has recently placed an order with a Queensland company for 20 locomotives for use on the trans-Australian railway, now under construction. Ten are to be delivered at Port Augusta, the eastern terminus, at a price of $37,462, and ten at Kalgoorlie, the western terminus, at a price of $35,355. The locomotives are about equal in weight to the heaviest locomotives now in use in New South Wales.

Convention of Master Boiler Makers' Association

Report of the Proceedings of the Last Three Days of the Ninth Annual Meeting, Held Last Week in Chicago

A report of the first day's proceedings of the ninth annual convention of the Master Boiler Makers' Association was published in the *Railway Age Gazette*, May 28, 1915, page 1129.

Frank McManamy, chief boiler inspector of the Interstate Commerce Commission, presented a paper in which he called attention to a tabulated statement of the work that had been done in the matter of boiler inspection by the commission during the first nine months of each of the fiscal years, 1912 to 1915 inclusive, with the results that had been obtained therefrom.

One of the causes of accidents, in the prevention of which satisfactory progress is not being made, is arch tube failures. Of course, when we take into consideration the increased number of arch tubes in use, some progress towards preventing failures has been made, but inasmuch as the records show that approximately three out of every four of such failures are due to improper application or failure to keep the tubes clean, the progress made is far from satisfactory and the remedy is, to a great extent, in the hands of the master boiler makers.

Accidents due to tube failures also indicate that, in too many instances, quantity rather than quality is the controlling factor, when passing upon the qualifications of the flue welder.

Failure of injector steam pipes is another source of accident in the elimination of which satisfactory progress is not being made.

OXY-ACETYLENE PROCESS FOR BOILER WORK

The report, after citing the necessity of having an oxy-acetylene apparatus in the boiler shop, gave a partial list of the work that can be done with it. This list, with the methods used, is as follows:

Welding in side sheets and patches. When welding in side sheets, some boiler foremen make an allowance for contraction by dropping one end of the sheet, while others get good results by not making any allowance for contraction. The welding in of side sheets, instead of riveting them, has been made a standard practice by some railroads; in fact one railroad is now cutting the side sheets off just above the mud ring and also at the seam at the crown sheet. In this way they save taking out the mud ring rivets and do not disturb the corners. When welding patches in side sheets, good results have been obtained by putting in round or oval shaped patches. Other roads use disk or make box patches for welding. It is necessary to do this to take care of the contraction.

Building up washout plug holes around the firebox or front flue sheet.

Welding cracks in side sheet doors and crown sheets.

Welding up cracked bridges in flue sheets. One method used in welding cracked bridges is to cut out the crack, then hammer the ends of the bridge in and weld. After it is welded and while hot, it should be hammered back straight. This takes care of the contraction. There are some welders who can weld broken bridges without doing this.

Welding seams in door holes instead of riveting or plugging. This is done in two ways; one is to make the lap of the door flange long enough to cover the holes in the back head and weld what would be the calking edge, if rivets were used. The other is to cut the flange in the back head off just back of the rivet holes and butt the door flange to it; then weld it the same as welding in a patch or side sheet.

Welding in tube sheets and door sheets. This is now being done by some railroads; in fact, fireboxes are now being applied in which the only rivets used are those in the mud ring.

Welding cracked and broken mud rings. The general practice in welding cracked or broken mud rings is to cut a piece out of the firebox sheet, then cut a V-shaped piece out of the mud ring and weld the ring from the top side, although some successful welds have been made by cutting out a V-shape and making the weld from the bottom.

Welding tubes in back tube sheet. The welding of tubes in back tube sheets does not seem to be as successful with oxy-acetylene as with the electric process. It is also slower. Some success has been reported where copper ferrules are not used.

Welding up pits in tubes. Large savings are reported by some railroads doing this.

Welding safe ends on superheater flues. In doing this, two methods might be mentioned; one is to butt weld by placing the flue and safe end in an angle iron, spot weld it in four places, then turn the flue while the operator welds it. The other way is to bell the flue if the weld is made on the firebox end and insert the safe end, leaving a lap of ½ in. The weld is then made at the edge of the flue. If the weld is made on the front end of the flue, the safe end should be belled. This is done so the edge will not obstruct the flow of gases or the flames get under the lap. The claim made for welding flues in this manner is that in case the weld should fail, the danger of breaking off is removed by the lap holding the flue.

Welding up staybolt holes in side and crown sheets. This saves bushing holes and sometimes patching.

Some of the uses for the cutting torch are: Cutting out shell sheets; cutting out firebox sheets; scrapping boilers; cutting out superheater flues; cutting out countersunk rivets; cutting off rivets on shells and mud rings; cutting off staybolts and radial stays; and cutting off staybolt ends for driving.

In order to use the oxy-acetylene process to the best advantage, the shop should be equipped with an acetylene generating plant and piped throughout.

Without going into the chemistry of the subject, it is pertinent to point out that purity in oxygen is of first importance, not only because the foreign matter usually enters to some extent into combination with the metal of the weld, but because the flame temperature is reduced and the rate of welding or cutting is also reduced. Oxygen loses rapidly in efficiency with each per cent of impurity much the same as incandescent lamps lose rapidly in candle power for small drops in voltage.

With reference to the manufacture of oxygen, it was stated that at the present stage of the art, it is unwise for any company to generate oxygen by chemical means unless in some small shop exceedingly remote from any source of supply of commercial oxygen.

The largest producer of oxygen in this country employs the liquid air process. That company is admirably equipped for meeting its customers' needs, since it has 10 plants and 16 warehouses at important cities throughout the country. Any user realizes the value of an unfailing oxygen service represented by numerous charging stations and by hundreds of thousands of cylinders. Since freight charges enter into the cost of oxygen, numerous sources of supply and cylinders of minimum weight are both important factors.

Liquid air oxygen has a very small percentage of nitrogen which, being an inert gas, does not make an explosive mixture with the oxygen, and on that account the liquid air product is absolutely safe. Recent competitive tests in cutting operations have shown liquid air oxygen to be high in efficiency; in fact it invariably demonstrated its superiority over oxygen produced by other systems.

Oxygen cylinders can be brought to the work, but in large shops, or in fact in any shop employing two or more welders, it is better to install a pipe and to discharge a battery of 10 to 20

cylinders into it through one reducing valve. This plan has the advantages, first that the gas is available at numerous points in the shop, and second that the operators lose no time through shortage of oxygen, or through carting cylinders from job to job or to and from the storehouse. A continuous supply of oxygen is a valuable asset in doing long jobs.

Acetylene can be used with perfect safety. In selecting a generator, one should only consider those which have been approved by the laboratory of the National Board of Fire Underwriters. None but carbide to water feed should be considered.

In this country there are two principal classes of generators, high pressure, by which is meant pressure over one pound per square inch, and low pressure, or less than one pound per square inch. All things considered, the pressure type is the better for railroad work.

Low and constant pressure is desirable for safe and economical operation. The Underwriters' rules prohibit pressure, on undissolved acetylene, in excess of 15 lb. per sq. in. Most high pressure generators work up to 15 lb., which is taken as the maximum safe pressure because acetylene is unstable under high pressures and one of the essentials, in fact the greatest essential of safe operation, is low pressure.

It is absolutely certain that any shop possessing apparatus generating or storing free acetylene above 15 lb. pressure is courting accident.

It is not wise from the standpoint of safety to truck any form of acetylene generator through a crowded railroad shop. Danger from tipping over, collisions, falling objects, electric wires, portable furnaces, etc., make it much more risky to use a portable generator than to isolate a stationery machine in a small separate building designed for the purpose, and to carry the gas, by approved methods of piping, throughout the shops.

A question might well be asked concerning the attendance expense of the duplex generator. It is very low. In one shop, near Chicago, employing nine welders regularly, one of them tends to the oxygen manifold and acetylene generator. Those duties occupy him, on the average, 1½ hours per working day of nine hours. Therefore the attendance requires 15 per cent of the time of one man out of nine or 1.85 per cent of the total time of all the welders, an almost negligible item of expense.

No operating problems are involved, providing the pipe lines are properly laid out and installed, to give safe and economical service, such as hydraulic flash back traps which absolutely prevent fire from traveling backwards through the hose to the pipe line.

Without going into details here, it is correct to state that any shop regularly employing two or more welders should pipe for both oxygen and low pressure acetylene, rather than to use any form of portable apparatus.

Because of the unstable nature of acetylene under pressure, it cannot be stored in tanks or cylinders like air or oxygen, but must be compressed in receptacles containing fibrous material, usually asbestos and also a liquid known as "acetone."

Acetylene in this form is very useful for lighting purposes and for operating blow pipes at remote points, where pipe lines do not reach and generators would prove too bulky. Emergency work, such as cutting operations at wrecks or occasional jobs at small outlying shops can best be handled in this way, but it is not advisable for many reasons to regularly use the tanks in shops employing two or more operators.

The main repair shops of railroads owning 150 or more locomotives should not entertain compressed acetylene installations, simply because the volume of work warrants a generator plant in order that the highest operating efficiency may prevail.

Compressed acetylene costs the consumer from 2½ cents to 3 cents per cubic foot at the blow pipe, when all items of expense are considered, such as first cost, freight, investment, etc., compared to a cost of less than one cent for acetylene from a generator. The presence of the acetone in the cylinders, mentioned above, has an important bearing on operating expenses. Most acetylene cylinders are made in sizes suitable for lighting purposes, where the demand of the burner is much less in cubic feet of acetylene per hour than when blow pipes are used, especially the larger ones, such as used on locomotive work. Consequently when the blow pipe requires from 40 to 60 cubic feet of gas per hour, as on plates ⅜ in. thick and larger, on mud rings, frames, etc., the cylinder is worked beyond capacity, especially if not freshly charged, and there is difficulty in getting ample acetylene for the burner, without drawing out some of the acetone, which has the bad effect of reducing the temperature of the welding flame, thereby reducing the efficiency and raising the cost of doing work. Also the replacing of acetone at the time of recharging is a factor in the cost of gas.

DISCUSSION

Care must be exercised to see that the proper proportions of oxygen and acetylene are used. If there is too much acetylene there will be a tendency to crystallize the metal, and if the oxygen is in excess the metals will be oxidized. It is also well to have the sheets brought together and heated to a welding temperature so that they are really joined before putting in the welding material.

ELECTRIC WELDING IN BOILER MAINTENANCE

It was the opinion of the committee and a number of boiler makers who were consulted that it is a mistake to weld cracks in fireboxes, more than 8 in. long, as it is only a temporary job and gives much trouble. They have to be rewelded often and this should not be practiced in back shop repairs. A horizontal crack can be more successfully welded than a vertical crack, as the expansion of the firebox is more even vertically than horizontally. This is true in welding cracks in the top flange of tube sheets, as horizontal cracks have been welded and known to give good results for engine house repairs, holding up for six and eight months when cracks from tube holes to rivet holes have to be rewelded often.

In getting sheets, patches and cracks ready for welding, the best results are obtained by beveling both edges of the sheets, or cracks, at 45 deg., and leaving an opening 3/16 in., so as to get the weld through the sheets. In building up thin spots or reducing the size of holes, all scale and grease should be removed, as clean sheets insure good welding. All welds should be built up 1/16 to ⅛ of an inch.

The chairman of this committee has had much success in welding tubes at the firebox end and at the time of this report the Erie division of the Northern Central has tubes welded in passenger service that have been running two years and three months.

The welding of tubes, if properly done, will reduce the tube troubles to a minimum. Where tube welding is a failure it is usually due to the use of improper methods.

The tubes should be applied the same as if no welding was being done, except that no oil should be used on the tools in working the tubes, for electric welding is unsuccessful if oil is on the work. The proper way to prepare tubes for welding is as follows: After ferrules are applied and tubes in place, an oil soft soap should be used as a lubricant instead of oil, on the tube prossers and rollers, after the tubes are beaded; rough the sheet around the head with a roughing tool ¼ in. wide. This will remove all the scale from the sheet and gives good metal for welding; then heat the sheet with a burner, which will burn up the soft soap, and this will leave the sheet free from grease and the tubes are ready for welding. Any time the sheet gets wet, dry it or leaky tubes will result.

Care should be taken that the voltage is not too high. High voltage makes it easier for the operator, but it is not good for the tubes, as the operator with high voltage keeps the metallic pencil ½ to 5/8 in. from the sheet and the metal only sticks and does not weld. A voltage of 64, and 125 amperes makes the operator get within 3/16 in. of the sheet and at this distance a good weld results.

Such good results are not obtainable in welding tubes that have been in service eight or ten months before the welding, as from welding tubes at the time they are applied. Tubes, if properly

welded at the time they are applied, should give three years' service as far as the firebox end is concerned. It pays to weld tubes if only one year of service is obtained as it will eliminate the engine house tube trouble.

The general opinion of the committee is that it is an advantage to use electric welding for side sheets, patches on mud ring corners, small cracks, building up thin spots on sheets and welding tubes, but a disadvantage to weld long vertical cracks in any sheet where there is expansion and contraction.

DISCUSSION

The discussion was almost entirely limited to a consideration of the welding of tubes, as this was the principal use to which the electric welding was applied. It was recommended in connection with this that no oil should be used on the work. The holes should be drilled with soda and a soft soap made of linseed should be used with the expanding and rolling tools.

UNIFORM RULE FOR LOAD ON STAYBOLTS

The maximum allowed load on staybolts and boiler braces has been fixed by the rules of the Interstate Commerce Commission, hence the committee confined itself to a recommendation as to the diameter of staybolts to be used. This recommendation was made because small staybolts are more flexible and give greater life to fireboxes than large bolts; the first firebox will last longer than the second; the second will last longer than the third. The shorter life of the second and third firebox is due to the increase in the size of staybolts made necessary by repeated application of staybolts. It was recommended that ⅞ in. staybolts be applied as a minimum and that 1 in. be the maximum size, and that all bodies of rigid bolts beyond 1 in. be turned down to 25/32 in. between the sheets.

THE STANDARD SLOPE OF CROWNSHEETS

The investigations of the committee showed that there was no standard slope for crownsheets, but the recommendation was made that ½ in. to the foot be used, starting at the tube sheet and going back to the door sheet. The camber should be ¾ in. to the foot each way from the center.

Sheets constructed in this manner are comparatively easy to keep clean and free from scale and sediment, and will give the best results.

The advantages of a sloping crownsheet are:

First: In case of low water the highest point in the crownsheet will become over-heated first, and in all probability will let go quicker and do less damage than if it had no slope.

Second: With this slope the heat strikes the crownsheet more uniformly and is more evenly distributed, thereby causing less strain on the sheet and giving greater life to crownsheets and better results therefrom.

Third: There is more absorption of heat units in the front end than in the rear end of the firebox, and more room is allowed for combustion to take place.

Fourth: A greater amount of heating surface can be used at the front than at the rear end.

Fifth: It gives more room for tube spacing in the back tubesheet.

Sixth: It also gives more room for cab and cab mountings.

The only disadvantage of the sloping crownsheet is that in the construction of the crown and side sheets in one piece there is more waste of material.

TREATING LOCOMOTIVE FEED-WATER

The report gave a general review of the situation as to feed-water treatment and called attention to the fact that an untreated water, although low in incrusting solids, may have a decided tendency to cause foaming, when used in connection with treated water; and at the same time cause incrustations of injectors, line checks, and boiler check valves.

While no recommendation to that effect was made, the tone of the report seemed to favor the treatment of water in the locomotive tanks rather than in roadside treating plants.

DISCUSSION

The treatment of water has effected a very considerable saving on the Missouri Pacific. At Kansas City, where the water is of 36 grains of hardness, the life of tubes when using the raw water was limited to about 10 months, whereas by the use of water treated in a plant, the life has been lengthened to 21 months, while leaks in the firebox and cracks in the sheets have become things of the past. On the Colorado division pitting occurred to such an extent in the tubes that, after cleaning from scale, it was usually necessary to throw at least 65 per cent of the tubes into the scrap. The water also attacked the crownsheet. It has been found that it is not good policy to mix treated and untreated water in the boiler as it is apt to start pitting and other troubles. On the Wichita division, there are no treating plants and the water is treated with soda ash in the tanks, and here, too, the life of the tubes has been increased from 9 to 14 months. However, it is generally recognized that it is not desirable to use the boiler as a treating plant and that the work had best be done before the water is put in the boiler.

This attack on tubes by the water of the Colorado division was not due to the kind of tube used, as experiments have been made with every tube on the market, the results all being the same. In these bad water districts it is necessary to wash the boiler out every 400 miles.

Another speaker stated that the use of soda ash had made it possible to extend the period between washouts by 33 per cent and that there had been no bad effects noticed as the result of the soda ash treatment.

One representative had had an extended experience with the use of polarized mercury and he found that the period between washouts could be extended by about one-third. He found that there is considerable difference in the manner of the circulation of the water when used in boilers having long tubes from what it is in those with short tubes and that this circulation is much freer with the latter. Polarized mercury does not create any tendency to pit, nor does it produce any galvanic action, and when it is used the tubes have a life of about two years and seven months, possibly a little more. Put in figures of miles run this means that the tubes have a life of about 120,000 miles, whereas, before this, they were sometimes limited to 17,000. There were records of a tube life of 147,000 and even 262,000 miles.

In another case it was found that the failures of tubes as indicated by cracking had greatly decreased after the introduction of soda ash treatment, while the number of burst tubes had greatly increased, as the soda treatment seemed to have increased the tendency to pit.

There was a marked difference in the action or apparent action of locomotives fitted with superheaters from those using saturated steam. With the latter, when the tender treatment had charged the water up to the foaming point the foaming was very evident, but in the case of the superheater locomotives, considerable foaming could apparently occur and the water that was carried over into the superheater pipes would be dried out and be delivered to the cylinders in the form of steam.

There was some evidence given to support the idea that the use of soda ash tended to cause pitting, though there were a number of speakers who stated with great positiveness that they could not detect any such tendency.

It was also agreed among those who had had any experience in the use of pure water, such as water that had been treated to a condition of purity, or rain water, that such waters did have a tendency to produce pitting.

CROSS STAYS IN FIREBOXES

In the Belpaire firebox, and some designs of crown bar fireboxes that have flat or nearly flat surfaces where sheets converge from the side to the roof, it is necessary that they be properly braced with cross stays. In this construction, however, there is a considerable distance between the connections of the firebox staybolts to the roof sheet and the necessary slings,

braces or stays in the crownsheet, which permits of a certain flexibility, that will allow some adjustment to take care of the stresses which are the result of the greater expansion of the side sheets of the firebox under the high temperature of direct contact with the fire, as compared with the expansion of the outside side sheets.

The radial stay boiler, however, should have a circular cross section above the crownsheet, and the use of cross stays in this type of boiler restricts the proper equalization of stresses, which result from the unequal expansion of the firebox, as compared with the roof sheet, which, in the case of radial stay boilers, has practically a continuous connection through the staybolts and radial stays. It is believed that a rigid cross stay above the crownsheet in a radial stay boiler increases the bending stress in radial bolts at about the line where cross stays are applied. Breakage of radial staybolts, in the zone indicated, has been experienced, due to the presence of cross stays in this type of boiler, and when their use was discontinued no further trouble from this cause was apparent. The committee does not consider cross stays in the radial stay boiler desirable or necessary, provided the boiler is properly designed with a circular cross section.

REDUCTION OF STRENGTH IN CORRODED OR PITTED BOILER SHELLS

An examination, supplemented by drilling at what appears to be the thinnest part, should be used to determine the thickness of the sheets, and in no case should the boiler be allowed to pass without repairs if the percentage so found has approached closely to that of the joints carrying the same strain.

DISCUSSION

It was suggested, inasmuch as there is no law or generally accepted practice in this matter, that the marine regulations should be adopted, in which the thinnest part of the sheet is the controlling factor. It was also suggested that the age of the boiler should be taken into account in determining the reduced percentage of strength that should be allowed and the practice of the Pennsylvania Railroad was cited as a case in point. On that road the factor of safety is made 4 for the first five years; from 5 to 10 years it is 4½; from 10 to 15 years it is 5; from 15 to 20 years it is 5¾; from 20 to 25 years it is 6½; from 25 to 30 years it is 10 and at the age of 30 years the boiler is scrapped.

DRIVING STAYBOLTS

The objection to driving staybolts with pneumatic hammers and holding-on bar is that the vibration of the holding-on bar, when a pneumatic hammer is used, is such that a number of blows are struck by the hammer while the holding-on bar is rebounding; therefore the bolts are not properly upset in the holes, and naturally the method does not make a good tight job.

To drive staybolts or radial stays successfully with air tools, it is absolutely necessary to hold them on by the same process; the trouble is not in the driving of the bolt any more than it is in the improper methods of holding-on.

In driving these bolts, use a set slightly higher in the center than on the edge, with a small radius on the outer edge, and a staybolt set made especially for this work. This set is used on the inside, as well as the outside end of the bolts; this cuts off all the ragged particles that may be around the edge of the bolts, making a smooth job, which is less liable to gather any accumulations of foreign matter. This work is done with a No. 90 air hammer, and held on with air holding-on tools, made especially for this class of work. In some places a set is used with a center tit to drive the bolt on the outside. This is done where the tell-tale holes are put in staybolts before the bolts are applied. The tit is inserted in the tell-tale hole so as to keep the set centered on the bolt as well as to keep the tell-tale holes in the bolts from being closed up; this is also a very successful method, but some prefer to apply the bolts and have them driven solidly in the center, before the tell-tale hole is drilled. Either one of these methods is good practice.

The trouble with leaky staybolts is not always due to the improper driving, or methods used in driving. There are quite a number of other reasons that contribute directly to these troubles, and if not properly taken care of, the bolts will leak and give trouble, no matter by what method they are driven or held on. It is absolutely necessary to have good threads in all staybolts, as well as radial stayholes, and a full thread on all bolts. It is necessary to have bolts fit the hole properly. If the staybolt and radial stayholes are properly tapped and the bolts have first-class threads, and are properly fitted to the holes, three full threads will be sufficient to make a good serviceable head.

The report closed with a recommendation to use a longstroke air hammer for the work.

REMOVING AND REPLACING FIREBOXES

On the different classes of boilers on the Santa Fe, there is an extra back end suitable for interchange so that when an engine enters the shop, the back end can be cut off and the extra back end complete with new firebox applied, holding the engine not to exceed ten days. This method has a new back end in reserve for interchange, and has proved satisfactory.

It is not necessary to remove the frames or break the connection at the smoke box on engines of the modern type whose firebox is directly over the frames. Experience has also taught that it is a more expensive method to cut the back end and door sheet loose, in order to avoid cutting away at the connection.

In some cases where the O G box passes through the frames, it is customary practice to separate the boiler at the smoke arch and have the work done in the boiler shop, going over the machinery while the boiler is receiving a new firebox. Otherwise it is simply cut off and the back end is replaced in the manner described.

It costs at the Topeka shops from $650 to $900 to put the firebox and back end in first-class shape, depending solely on the size of the boiler. Where the fireboxes are interchangeable, it is not necessary to bring the boiler to the boiler shop, but simply put it in the rear of the file of engines to be turned out of the shop during the month.

The way in which the work is done must be governed largely by the facilities of the shop doing it.

Where there are proper lifting appliances and the erecting shop space, it is more economical to lift the boiler from the frame and send it to the boiler department and the frame to a department for necessary repairs. This will give a track in the erecting department to repair another engine while the boiler and frame are undergoing repairs.

DISCUSSION

The discussion centered around the variations in the methods of removing and replacing the firebox without cutting out the back head, and this was the method in general that was used by the speakers with one or two exceptions. In detail the work was done by cutting off all the staybolts and cutting up the inside sheets with a torch, merely leaving two staybolts in each piece that were cut off, to hold it in place until all of the work was done, and then cutting the pieces loose and allowing them to fall out. The work can be done with the boiler either in the frames or removed. Sometimes the firebox was burned out as a whole and dropped down; sometimes the boiler was turned upside down and the firebox lifted out. In some cases the firebox was put in intact and riveted in place; in others it was put in piecemeal and sometimes each sheet was put in by itself and fitted and riveted. In other words, the new firebox was built in place. It seemed to make no difference whether the firebox were of the wide or narrow type, it is well to cut it out without removing the back head.

OTHER BUSINESS

The report on constructing locomotive tanks consisted of a brief review of the steps to be taken in the construction of a tank of the ordinary type with a mere reference to the circular tank of the Vanderbilt type.

The secretary's report showed that at the beginning of the year there were 419 members in good standing, that there were 77 new members taken in during the year and that there were 125 of these who were dropped, resigned or had died, leaving a present membership of 371.

The following officers were elected for the ensuing year:

President, Andrew Green, general foreman boiler maker, Big Four, Indianapolis, Ind.; first vice-president, D. A. Lucas, general foreman boiler maker, Burlington, Havelock, Neb.; second vice-president, John B. Tate, foreman boiler maker, Pennsylvania Railroad, Altoona, Pa.; third vice-president, Charles P. Patrick, Erie Railroad, Cleveland, Ohio; fourth vice-president, Thomas Lewis, general foreman, Lehigh Valley, Sayre, Pa.; fifth vice-president, Thomas F. Madden, general boiler inspector, Missouri Pacific, St. Louis, Mo.; secretary, Harry D. Vought, 95 Liberty street, New York City; and treasurer, Frank Gray, 705 W. Mulberry street, Bloomington, Ill.

INFORMATION DESIRED BY INTERSTATE COMMERCE COMMISSION FOR PASSENGER RATE CASE

The Interstate Commerce Commission has addressed to the western railroads a list of 18 interrogatories outlining the character of the evidence and data desired by the commission to be presented at the hearings to be held at Chicago beginning on July 6, on the advanced passenger fares filed by the western railroads, which have been suspended. Responses are to be made by the president or chief accounting officer of each road, and filed at the opening of the hearing.

Questions 1 to 5 relate to the separation of operating expenses between passenger service and freight service. Carriers that regularly make such a separation are asked to submit a statement for the years 1913 and 1914, showing for each primary expense account the amount directly allocated to freight service or to passenger service and the amount of expenses regarded as common, giving the division of the common expenses on bases deemed by carrier to be most nearly equitable. Question 1 states that the basis of division should be stated for each account and that the data used in making the apportionment of the common expenses should be given. Question 2 asks for a statement showing the total operating revenues for the years 1913 and 1914 of the freight service and the passenger service. Question 3 asks for a statement showing the operating ratios for both services for 1913 and 1914. Question 4 asks for a statement showing by years for the period 1907 to 1914, the total revenues, expenses and operating ratio for passenger service and freight service, respectively, for each year or for such part of the period as the separation has been made. Question 5 asks carriers that have made any study of the subdivision of the revenues and expenses of passenger service, as between the various classes of service, to describe the methods and results of such study.

Question 6 asks for the information, for the two years ending June 30, 1914, as to passenger miles per passenger traveling, in sleeping and parlor cars; revenues on account of such passengers, essential features, of contract with a sleeping car company, and passenger train car miles classified as between the various kinds of cars. For express cars and cars used for various services the commission desires information as to the car foot miles made in the baggage, mail, express or other service. This question also calls for information as to the average weight and length of standard cars used in the various services and repairs per car mile.

Question 7 asks information regarding the revenues and expenses of dining car service. If dining cars are operated on certain trains or between certain points at a loss, the commission desires to know on what ground the operation of such cars is justified or in what way the just demands of the traveling public could be met without entailing such a loss. Question 8 asks about the profitableness of other branches of the passenger service which can be definitely segregated, with revenues and expenses for a period of two years.

Question 9 asks for a statement as detailed as practicable, showing changes in the character of passenger service during the past 10 years, including specific illustrations as to the speed of trains, kind and weight of passenger train cars and frequency of service, safety and comfort of passengers. Question 10 asks whether the respondent furnishes any passenger train service considered unwarranted or unnecessary to meet the reasonable demands of the traveling public, and if so, a statement of the amount of such service considered unnecessary, with the reasons why it is furnished.

Question 11 asks whether the roads have made any investigation to determine the relative profitableness of passenger trains of different classes, such as suburban passenger business, and if any investigation has been made of the relative profitableness of through passenger trains between important terminals or in highly competitive territory, and trains in districts or communities where competition is not so keen, the commission desires a statement of the results.

Questions 12, 13 and 14 ask for information regarding changes in the labor cost per unit of service rendered, increases or decreases of rates of wages since July 1, 1907, with the effect upon the cost of conducting freight and passenger service, changes in the cost of fuel and in the cost of cross ties since 1907. Specific questions are asked regarding the practice of using treated ties, the proportion of such ties, the estimated average life, etc.

Question 15 asks for information regarding important changes since 1907 in the price of materials and supplies other than equipment, cross ties and fuel. The roads are asked to submit a list of articles on which there have been marked changes in price. Question 16 asks for the purchase price of passenger equipment in 1914 as compared with 1907, with reference to weight and tractive power of locomotives, and weight and seating capacity of passenger cars.

Question 17 asks for a statement of the result of any attempt to separate the cost of road and equipment as between property assignable to passenger and freight service, and property used in common.

Question 18 asks what sums have been expended in raising the standard of the property which have been charged to operating expenses.

Belgian Coal Industry.—The production of coal in Belgium has increased of late, although yet a long way below the normal, and it is still proportionately lower than the reduction in the number of hands. This is due to the less skilled hands, which it has been necessary to employ to a considerable extent, and to the circumstance that, in many places, they do not work every day, only five or four, or even not more than three days, a week. The coal mines belonging to the mixed undertakings—Cockerills, Ougrée-Marihaye, and others—in the first instance satisfy their own requirements. The mines of Louvière and Sars-Longchamps are working, and have even lately added a new pit; also the Houssu concern is working a new pit. The most active working takes place in the Charleroi district, where several concerns have joined in one union so as to be better able to overcome the difficulties of the railway traffic. The improvement in the canal traffic may also help to facilitate the transport of coal, even if only by degrees. The situation at Charleroi has been a little less hopeful of late on account of a reduction in the domestic demand, and stocks are apparently accumulating in the absence of any export, and with reduced requirements on the part of industry and the railways. At the end of December there were about 300,000 tons stock in the Borinage district, but financial difficulties stand in the way of greater activity.—*Engineering.*

MINIATURE RAILWAY AT THE PANAMA-PACIFIC EXPOSITION

By Bradley B. Brown

The large area covered by the Panama Pacific Exposition has created demands for transportation about the grounds which have been met in several ways. The most interesting means employed is the Overfair Railway, a 19-inch gage line operated by steam locomotives.

The road has five locomotives, four of the Pacific type for passenger service and one six-coupled tank engine for switching service. These locomotives are larger and more powerful than

Tank Locomotive for Switching Service

most miniature engines and the design is such that their general lines follow closely those of standard gage steam road locomotives, while the working parts are designed with a view to obtaining the greatest efficiency in the service for which they are intended. As compared with large locomotives the principal dimensions of the miniature engines have been made one-third size but it was necessary to make some parts larger than called for by this scale. For instance the cab had to be made large enough to accommodate two enginemen and as shown in one of the illus-

Pacific Type Passenger Locomotive for the Overfair Railway

trations, it was necessary to use a full size eight-inch air pump.

The principal dimensions of the Pacific type locomotives are:

Gage	19 in.
Fuel	Hard coal
Total weight	24,000 lb.
Weight on drivers	15,000 lb.
Tractive effort	3,765 lb.
Total length	17 ft. 2 in.
Total wheel base	12 ft. 1¾ in.
Height from top of rail to top of stack	5 ft. 6 in.
Diameter of drivers	26 in.
Cylinders, diameter and stroke	8 in. by 9 in.
Valves, type	Piston
Valves, travel	2½ in.
Boiler pressure	200 lb. per sq. in.
Firebox, length and width	36½ in. by 31½ in.
Tubes, number and diameter	162—1¼ in.
Tube heating surface	404 sq. ft.
Firebox heating surface	39 sq. ft.
Total heating surface	443 sq. ft.

The switching engine weighs nine tons, has cylinders 7 in. in diameter by 9 in. stroke and driving wheels 19½ in. in diameter. All five locomotives are equipped with the Walschaert valve gear.

The passenger cars are built of wood and weigh approximately one ton each. They are 20 ft. long, 3 ft. 6 in. wide and 5 ft. 1½ in. high inside. Each one seats 16 people, the seats being so arranged that half the passengers ride forward and half backward. There are 64 of these cars, all of which are equipped with automatic couplers and automatic air brakes.

The line starts at Machinery Hall and follows the bay shore westward for two miles, terminating at the race track. There are five intermediate stations on the line. A branch line continues westward for another half mile, terminating at the aviation field. The engines will start 12 loaded cars on level track and attain a speed of 16 miles an hour in a distance of one-fifth mile. The stations are so near together, however, that full speed is never reached. The time required to make the run between Machinery

Cars Used on the Overfair Railway

Hall and the race track is 15 min. and a fare of 10 cents is charged.

The entire line is double tracked and laid with 20 lb. rails. The track is largely level, there being only a few short grades; the sharpest curves have radii as small as 100 ft. but the trains take these without difficulty. Turntables are provided at the three terminals.

The locomotives and rolling stock were designed and built in the shops of L. M. MacDermot, Oakland, Cal.

English Railways Increase Cartage Charges.—The English railways have recently found it necessary to make increases in their cartage and lighterage charges, the increased rates having gone into effect on May 1. The charge applies particularly to "S. to S." (station to station) traffic, which excludes the service of collection and delivery. The increased rates are due primarily to the increased expenses, particularly the higher cost of horses and feed, resulting from the war. The cartage strength of the railways in addition has been seriously depleted by the shrinkage of horses and men.

General News Department

The Boston & Maine announces that liquors will no longer be sold in the dining cars of the road.

The Brotherhood of Locomotive Engineers, at a convention held in Cleveland last week, adopted a resolution advocating a federal law requiring power headlights on locomotives on all steam railroads in the country.

The Illinois legislature has passed a bill authorizing the construction by the state of a navigable waterway from Lockport to Utica, a distance of 65 miles, connecting the drainage canal with the Illinois river and the Mississippi river.

The Chicago & North Western announces that out of 850 passenger trains operated between Chicago and Milwaukee during the month of April 847 trains arrived at the terminals exactly on time, and in the other three instances there was only a few minutes' delay.

A party of Lehigh Valley Railroad officers, including both operating and traffic men, has just returned from a business trip in the west, where they sought to learn at first hand what their patrons in the middle west had to suggest for the betterment of the service. The party visited all the larger cities, and saw, also, prominent western railroad men.

The Pennsylvania Railroad and the Public

[From statement before the Commission on Industrial Relations.]

The policy of publicity which the Pennsylvania Railroad pursues is framed with a view to keeping the public advised of the company's activities; in short, to take the public into its confidence. The company started its publicity work some nine years ago by first inaugurating a plan of full publicity regarding all accidents on its lines. Since that time the work has been extended to cover the activities of all departments.

The road makes an effort to see to it that what the press publishes about the railroad shall not consist of complimentary notices about the railroad or its officers, but real facts of consequence. If the road is going to be able to work out its problems properly, it has got to be believed in. It must get imbedded in the public mind that it is doing its work as best it can and doing it, in the main, exceedingly well.

The first plan of distribution worked out was to give information in Philadelphia, and then to send copies to the papers throughout the system. But it became obvious that the local representative of the company in each city must of necessity know what was being given to the papers and the plan was developed whereby representatives were appointed to deal with the press in each place, the general superintendent, the superintendent, or the agent.

The road never pays any newspaper anything to print anything as news, or as an editorial, regarding its service. The papers can do as they wish; publish or throw in the waste basket. What they do does not affect in the slightest the attitude of the company toward them.

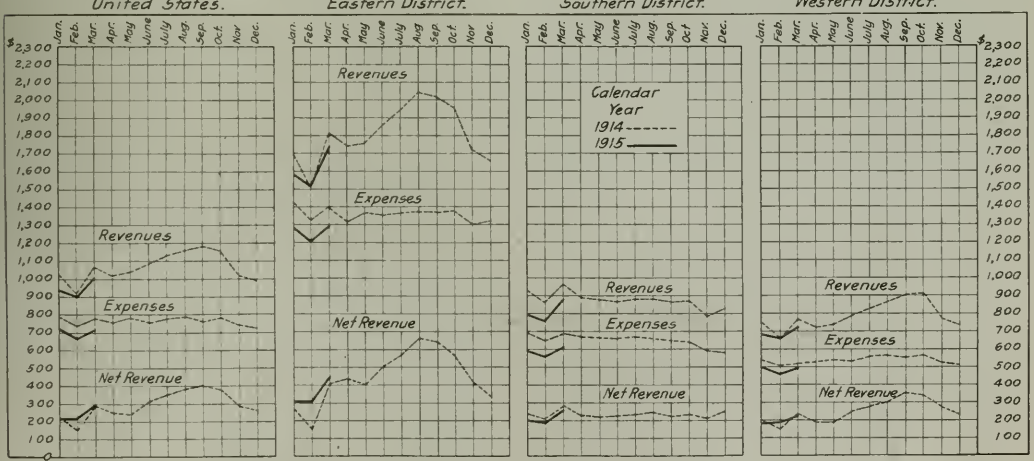
The Pennsylvania Railroad is just beginning its publicity work. It is continually trying to find new angles from which to approach the public with information about the work the railroad is trying to do.

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for March, 1915, are as follows:

Net operating income of the railways of the United States for March increased $3 per mile, or 1.2 per cent, as compared with March, 1914. This increase was due not to an increase in gross earnings but to reductions in expenses, which have been effected throughout the country, but particularly in the East. In March, 1914, net operating income per mile was 2.9 per cent greater than in March, 1913.

Total operating revenues amounted to $231,499,126, a decrease



Monthly Revenues and Expenses per Mile of Line in 1914 and 1915

from 1914 of $15,923,105. Operating expenses were $164,731,902, a decrease of $16,966,890. Net operating revenue amounted to $66,767,224, an increase of $1,043,785. Taxes amounted to $11,133,218, a decrease of $187,273. This left $55,581,122 for net operating income, available for rentals, interest on bonds, appropriations for improvements and new construction, and dividends. Operating revenues per mile of line averaged $1,012, a decrease of 7.3 per cent; operating expenses per mile averaged $720, a decrease of 10.2 per cent; net operating revenue per mile averaged $292, an increase of 0.7 per cent, while taxes per mile were $49, a decrease of 2.5 per cent. Net operating income per mile

was $243, an increase of 1.2 per cent. Railways operating 228,661 miles of line are covered by this summary, or about 90 per cent of the steam railway mileage in the United States.

Total operating revenues of the eastern railways per mile of line decreased 5.9 per cent as compared with March, 1914, operating expenses decreased 11.0 per cent, net operating revenue increased 12.7 per cent, taxes increased 0.6 per cent, and operating income increased 15.6 per cent.

Total operating revenues of the southern railways per mile decreased 11.9 per cent, operating expenses decreased 12.3 per cent, net operating revenue decreased 10.9 per cent, taxes decreased 4.7 per cent, and operating income decreased 12.0 per cent.

Total operating revenues of the western railways per mile decreased 6.5 per cent, operating expenses decreased 7.8 per cent, net operating revenue decreased 3.8 per cent, taxes decreased 4.5 per cent, and operating income decreased 3.8 per cent.

The nine months of the current fiscal year show a decrease in total operating revenues per mile of line of 7.8 per cent as compared with the corresponding period of the preceding year, a decrease in operating expenses per mile of 9.8 per cent, a decrease in net operating revenue per mile of 2.8 per cent, and a decrease in net operating income of 3.0 per cent.

The net operating income per mile increased 6.0 per cent in the East, decreased 19.5 per cent in the South, and decreased 4.0 per cent in the West.

March net operating income per mile was 1.2 per cent greater in 1915 than in 1914, 3.6 per cent greater than in 1913, 6.7 per cent less than in 1912, and 9.1 per cent less than in 1911.

Railway Signal Association

The May meeting of the Railway Signal Association, held in New York City last week (see page 1132), finished its business on Thursday by discussing the four additional committee reports named in the program.

Committee VI, on standard designs, presented four new and four revised drawings. The revisions include a terminal block, a clamp for the base of ground mast signals, a blade for upper quadrant signals and a binding post. The new plans show tang ends with screw jaws, an adjusting crank and assembly, and switch adjustment brackets, insulated and non-insulated.

Committee VIII, on electric railway and alternating current signaling, presented specifications for reactors. These were discussed at some length and members made numerous suggestions for minor changes.

Committee X, on storage battery and charging equipment, presented, in revised form, a set of specifications for nickel-iron alkaline storage batteries, and gave data showing typical figures for costs of various methods of charging storage batteries for automatic signals.

The special committee on lightning protection presented revised specifications for vacuum-gap and air-gap lightning arresters and for choke coils, to be used with lightning arresters.

The Atlantic City Conventions

J. D. Conway, secretary of the Railway Supply Manufacturers' Association, announces that 67,680 sq. ft. of space on the Pier at Atlantic City has been taken by the exhibitors for the conventions of the Master Mechanics' and Master Car Builders' Associations, and several other firms are negotiating for space. The total space which has been contracted for from the owners of the Pier is 70,000 sq. ft.

All of the entertainment features of the conventions are to be held on the Pier this year. There will be dances on June 9, 10 and 11, the dance on the 11th being a carnival dance, and a vaudeville performance on June 12. The vaudeville performance will be held in the Auditorium, which is directly over the Convention Hall, and which seats 5,000, so that there will be ample room for all members and guests. On Sunday a golf tournament will be held at the Seaview Golf Course.

American Electric Railway Association

After June first the headquarters of the American Electric Railway Association will be located at 8 West Fortieth street, New York. The headquarters were formerly at 29 West Thirty-ninth street.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 2-5, 1916, Atlanta, Ga.

American Association of Demurrage Officers.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

American Association of Dining Car Superintendents.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next meeting, October 21-23, 1915, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, Illinois Central, East St. Louis, Ill.

American Association of Passenger Traffic Officers.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.

American Association of Railroad Superintendents.—E. H. Harman, Room 101, Union Station, St Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

American Electric Railway Association.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 4-8, 1915, San Francisco, Cal.

American Electric Railway Manufacturers' Association.—H. G. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

American Railroad Master Tinners, Coppersmiths and Pipefitters' Association.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 19-21, 1915, Detroit, Mich.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 21-23, 1916, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

American Railway Tool Foremen's Association.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—Chas. Warren Hunt, 220 W. 57th St., New York, Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

American Wood Preservers' Association.—F. J. Angier, Supt. Timber Preservation, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 18-20, 1916, Chicago.

Association of American Railway Accounting Officers.—E. R. Woodson, Rooms 1116-8, Woodward Bldg., Washington, D. C. Annual meeting, June 28, 1916, Detroit, Mich.

Association of Manufacturers of Chilled Car Wheels.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, 2d Tuesday in October, 1915, New York.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

Association of Railway Telegraph Superintendents.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

Bridge and Building Supply Men's Association.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

Canadian Society of Civil Engineers.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

Freight Claim Association.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

General Superintendents' Association of Chicago.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

International Railway Fuel Association.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago.

International Railway General Foremen's Association.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next meeting, October 19-21, 1915, St. Louis, Mo.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 14-16, 1915, Detroit, Mich.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 349 Peoples Gas, Bldg., Chicago. Next convention, March, 1916, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICES.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May. Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December, 1915, Waldorf-Astoria Hotel, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Next meeting, October 5-7, 1915, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Annual meeting, September 14-16, 1915, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each montb, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., 1134 La Salle St. Sta., Chicago. Annual meeting, September, 1915.

SOUTHEAN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldgs., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., East Buffalo, N. Y. Annual meeting, September 7-10, 1915, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and Wednesday after 1st Thursday in January, Chicago. August, generally on other Monday evenings. Annual meeting, 1st

Traffic News

The Western Maryland has filed tariffs with the Interstate Commerce Commission, making the fare from Baltimore to Chicago $16; and Baltimore now has a differential. The standard rate from Baltimore to Chicago is $18.

The Atchison, Topeka & Santa Fe has put in service seven new package freight cars from Chicago to Arkansas City, Guthrie, Fort Worth, Dallas, Temple and Houston on shortened schedules, giving a third day arrival in Arkansas City, and a four-day schedule to the other points, except Houston, where there is a five-day service.

The Pennsylvania Railroad announces that it will comply with the order of the Public Service Commission of Pennsylvania by making the 100-trip ticket good for a period of one year instead of six months, and all tickets of this character sold since December 14, 1914, will be good for one year, irrespective of the limit of six months, under which they were sold, and this will also apply to tickets for interstate travel.

The Western Classification Committee has filed with the Interstate Commerce Commission supplement No. 6 to classification No. 53, giving the new form of Section 3 of the uniform bill of lading to make it conformable to the Cummins amendment forbidding railroads to limit their liability for loss and damage below the actual value of the goods, which goes into effect on June 2. The new Section 3 in the Western Classification is identical with that published in last week's issue, page 1134, as issued by C. C. McCain, chairman of the Uniform Bill of Lading Committee for the roads east of Chicago and north of the Ohio river. The supplement also contains the new rule 2 of the classification, stating that ratings are conditional upon actual valuations declared by the shippers at time and place of shipment. Where a shipper refuses to declare value at time and place of shipment goods will not be accepted for transportation. The old rule 2 provided that when invoice value is made a condition of the ratings shown in the classification, the shipper must sign a statement declaring that the invoice value of the property does not exceed the value as stated. The supplement also contains amendments to various items in the classification for which ratings are based on value, stating that the actual value of each article is not to exceed certain amounts named, instead of saying that the value of the article is declared by the shipper not to exceed the amount named.

New Transcontinental Rates July 15

Traffic officers of the transcontinental railroads, after a meeting held in Chicago last week, announced their intention of accepting the latest decision of the Interstate Commerce Commission in the transcontinental fourth section cases and putting into effect the rates prescribed on July 15, the date on which the commission made effective its orders in the original fourth section case and the supplemental orders relating to rates to the "back-haul" territory. This puts into effect the system by which rates to western intermediate points are allowed to exceed the rates to coast terminals by fixed percentages from five zones, which was involved in the decision of the Supreme Court sustaining the commission. The order also puts into effect on July 15 the rates covered by the recent application of the railroads for special permission to make low rates to the Pacific coast on articles especially subject to water competition, without correspondingly reducing their rates to intermediate points.

New Passenger Train Service to Pacific Coast

The Chicago, Burlington & Quincy on May 30 put in service seven new passenger trains from Chicago and four from St. Louis to the Pacific coast, including trains leaving Chicago at 10:05 a. m., running west of Denver over the Union Pacific and the San Pedro, Los Angeles & Salt Lake to Los Angeles, and via the Union Pacific and Southern Pacific to San Francisco; a train leaving Chicago at 11 p. m., running over the Union Pacific and the Western Pacific to San Francisco, the Union Pacific and Southern Pacific to San Francisco, and the Union Pacific

and the San Pedro, Los Angeles & Salt Lake to Los Angeles; a train leaving Chicago at 10:10 a. m., in connection with the Northern Pacific west of St. Paul and Minneapolis to Portland, Seattle and Tacoma; a train leaving Chicago at 10:15 p. m., in connection with the Great Northern west of St. Paul and Minneapolis to Portland, Seattle and Tacoma. Two of the trains from St. Louis are for California and two for the North Pacific coast. New service was established also on May 30, by the Wabash, Union Pacific and Southern Pacific, between St. Louis and San Francisco. The Union Pacific has put on three additional trains eastbound and three westbound in connection with the New Burlington and Wabash service, and a new train running between Chicago and Denver via the Chicago & North Western.

Passengers Must Declare Value of Baggage

The various passenger traffic associations are working out the details of the new rules governing the transportation of baggage which will be required under the Cummins amendment. The Interstate Commerce Commission has decided that the law seems clearly to recognize the carrier's right to fix conditions and terms applicable to the transportation of baggage dependent upon the value as declared by the person who offers the baggage for transportation, and the various associations have practically decided to adopt rules, effective on June 15, requiring declaration of value of baggage at the time of checking, with the understanding that where the amount is not known the value is declared to be not in excess of $100. For smaller stations a baggage waybill has been suggested. For large stations large sheets similar to hotel registers on which passengers may declare the valuation and sign their names, has been proposed. The Trunk Line and Southeastern Passenger Associations have already adopted rules and regulations requiring declarations of value by passengers. Most of the trunk lines are expected to apply these rules also to intrastate shipments. The Central, Eastern, Canadian and New England Associations are expected to adopt rules substantially similar to those adopted by the Trunk Line Association. The Western Passenger Association and the Transcontinental Passenger Association still have the rules under consideration, as there are many details to be settled. When the passenger declares a greater value than that which the railroads will carry free under their rules, there will be an additional charge at the rate of 10 cents for each $100 or fraction thereof, above such maximum value.

The Pennsylvania has issued a circular prescribing the new rules necessary to insure compliance with the law and fixing 10 cents as the charge for each $100 value beyond $100 for the baggage of each adult passenger. The circular says:

"Carriers cannot limit their liability for loss or damage which may arise through negligence or carelessness unless the carrier obtains from each owner or shipper of baggage a signature in writing. . . . Baggagemasters [on trains] must not check baggage to interstate points unless they are able to secure a declaration of value, and must not check baggage of excess value beyond the end of their runs, nor to points where there are no agents. All declarations of value will be delivered with baggage to agent at destination, with instructions to collect proper charges for excess value, if any.

"Each declaration of value must be dated by office stamp or in writing, and the same be carefully preserved at the station for ready reference for a period of six years.

"In the many cases of baggage left behind by passengers, any agent asking that same be forwarded must state in his letter or telegram that he has obtained certification of value, and name the amount. Baggage will then be forwarded under C. O. D. charges for excess value, if any. It must be borne in mind that to obtain certification of value of baggage, and issue checks therefor, in some cases and not in others, would be unlawful, and that if, for any reason, this certification cannot be obtained covering any piece of baggage, then in such cases it must not be checked.

"Transfer companies checking baggage will be instructed that they must obtain a declaration of value and attach 'stop check' to baggage check showing such value, for the information of the station agent, who will then compute charges for excess value, if any, and forward C. O. D. the same as in the case of excess weight of baggage.

". . . In the case of baggage checked between intrastate points no declaration of value will be required."

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Lumber from Norman, N. C.

Snow Lumber Company v. Raleigh, Charlotte & Southern et al. Opinion by the commission:

The commission finds that the rates on lumber from Norman and Ellerbe, N. C., to points in Virginia, West Virginia and various states north thereof are not unreasonable or prejudicial. Complaint dismissed. (33 I. C. C., 587.)

Rates on Salt from Milwaukee

Petit Salt Company v. Chicago, Milwaukee & St. Paul et al. Opinion by the commission:

The rates on salt in carloads from Milwaukee to trans-Mississippi points on the Chicago, Burlington & Quincy are not found to be unreasonable or discriminatory as compared with the rates from Chicago to the same points. (33 I. C. C., 590.)

Minimum Weights on Lumber

Funck Lumber Company v. Baltimore & Ohio Southwestern et al. Opinion by the commission:

The commission finds that the minimum weights on lumber in mixed carloads of 30,000 lb., in cars less than 36 ft. in length and of 34,000 lb. in cars of 36 ft. or more, for shipments from Ohio and Mississippi river crossings to central freight association and trunk line territories are not unreasonable or discriminatory. (33 I. C. C., 511.)

Rates on Lumber from Mackland, La.

Lumbermen's Association of New Orleans v. Morgan's Louisiana & Texas. Opinion by the commission:

An export rate of 8 cents per 100 lb. on lumber and articles taking lumber rates to New Orleans, La., from Mackland, La., and other stations on defendant's Alexandria branch line between Mackland and Opelousas, is found unreasonable to the extent that it exceeds 7 cents. Reparation is denied. (33 I. C. C., 516.)

Automobiles Not Emigrant Movables

L. G. Ochsenreiter v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The commission finds that the provisions of defendants' tariffs excluding automobiles from the application of rates provided for emigrant movables is not unreasonable. The evidence is not sufficiently definite to permit a finding with respect to the non-inclusion of gasolene engines with emigrant movables. Complaint dismissed. (33 I. C. C., 518.)

Fourth Section Application Denied

Cullman Commercial Club v. Louisville & Nashville. Opinion by Commissioner Meyer:

The commission finds that the maintenance of higher class and commodity rates from New Orleans, La., to Cullman, Ala., a point intermediate to Decatur, Ala., than are contemporaneously maintained to Decatur, is discriminatory against Cullman. (33 I. C. C., 634.)

Southern Pacific Ownership of Associated Oil Company's Steamers

Opinion by Commissioner Clark:

The Associated Oil Company, a majority of the stock of which is owned by the Southern Pacific, operates seven oil steamers from Monterey, Gaviota and Port Costa, Cal., to San Francisco, Linnton, Ore., Everett and Seattle, Wash., Honolulu, Hawaii, and ports of Alaska. The commission refuses to grant the petition of the carrier to retain its interest in the boats operating to Oregon and Washington, for the reason that although the Southern Pacific does not reach these points over its own rails, it participates in joint rates to them.

On the other hand, it holds that unless the Southern Pacific

participates, by its rail lines, or in connection with other lines, in transportation of oil from California points to a port for transshipment to Alaska, the continued ownership and operation of its oil steamers between the California ports and ports of Alaska, transporting only oil destined to Alaska, will not be in violation of law.

It also grants the petition of the carrier to retain its interest in the oil steamers operating to Hawaii. (34 I. C. C., 77.)

Rates on Roofing Paper to Oklahoma Points

Hooker-Hendrix Hardware Company et al. v. Missouri, Kansas & Texas et al. Opinion by the commission:

The commission finds that the carload rates on prepared roofing paper and building paper from East St. Louis, Ill., St. Louis, Mo., and Kansas City, Mo., to Muskogee, Tulsa and McAlester, Okla., are unreasonable. Rates for the future are prescribed as follows: From St. Louis and East St. Louis, to Muskogee, 37 cents; to Tulsa, 38 cents and to McAlester, 40; Kansas City, to Muskogee, 26 cents; to Tulsa, 27 cents, and to McAlester, 29 cents. Reparation awarded. (34 I. C. C., 3.)

Rates on Coal from the Crooksville District

Son Toy Coal Company v. Akron, Canton & Youngstown, et al. Opinion by Commissioner Harlan:

The commission finds that the rates on bituminous coal in carloads from San Toy, Ohio, and other points in the Crooksville coal district to Chicago and to points in Illinois, Indiana and Michigan discriminate against shipments from the mines of the complainant and others located in the same district in favor of mines located in the middle district of Ohio and defendants are required to remove the discrimination. The rates from San Toy and other points in the Crooksville district to Lake Erie ports for transhipment are not shown to be unreasonable. (34 I. C. C., 93.)

Notice of Arrival of Consignment

Ohio Iron & Metal Company v. Elgin, Joliet & Eastern. Opinion by the commission:

The defendant mailed a notice of the arrival of a car of scrap iron at Chicago Heights, Ill., which was never received by the consignee. As a result the car was held for some time and demurrage charges of $48 imposed. The commission finds that the carrier's duty was performed when it placed the notice in the mail and that the demurrage charges were properly assessed. (34 I. C. C., 75.)

Lumber Rates to Sioux City, Ia.

In re lumber rates from points in Arkansas and other states to Sioux City, Iowa. Opinion by Commissioner Hall:

The commission finds that the carriers have failed to justify a proposed increased rate of 30 cents a 100 lb. on yellow-pine lumber in carloads from the producing territory west of the Mississippi river, generally described as the southwestern blanket, to Sioux City and a rate of 29 cents from the territory lying north of this blanket. The present rate from both territories is 28 cents. (34 I. C. C., 102.)

Complaints Dismissed

Streever Lumber Company v. Chicago, Milwaukee & St. Paul et al. Opinion by the commission:

The reasonableness of a charge of $40 for feeding, watering and resting a carload of horses at Schenectady, N. Y., is found not to be within the jurisdiction of the commission. (34 I. C. C., 1.)

A. P. Brantley Company v. Atlantic Coast Line. Opinion by the commission:

The commission finds that the rates on sea-island seed cotton from points in northern Florida to Blackshear, Ga., are not unreasonable. (34 I. C. C., 21.)

Blackburn-Warden Company et al. v. Illinois Central et al. Opinion by the commission:

The commission finds that the double first-class rating under southern classification for grapes in baskets in less than carloads is justified. (34 I. C. C., 58.)

Parlin & Orendorff Company v. Illinois Central et al. Opinion by the commission:

The commission finds that the discrimination at present existing against Canton, Ill., in favor of Peoria, in the rates on agricultural implements in carloads to local points on the Illinois Central in Kentucky, Tennessee and Mississippi is not undue. The commisison does not decide the question of reasonableness of rates from Canton because of a readjustment which is now under way. (34 I. C. C., 90.)

Otto Jaeger v. Ann Arbor et al. Opinion by the commission:

The complainant purchased a mileage book entitling him to 1,000 miles of transportation over defendants' lines. One of the conditions on which the book was sold provided that if the cover was presented to the proper bureau within 18 months from date of issue a refund of $5 would be made to the purchaser. Complainant lost his book and did not find it in time to present it within the time limit, and when he did finally present it to the defendants in accordance with their tariff regulations, refund was refused. The commission finds that this regulation is not unreasonable. (34 I. C. C., 28.)

Rates on Motorcycles to the Pacific Northwest

Ballou & Wright v. New York, New Haven & Hartford et al. Opinion by the commission:

The commission finds that certain rates charged for the transportation of motorcycles in carloads from Armory, Mass., to Portland, Ore., and Seattle, Wash., were unreasonable to the extent that they exceeded the first-class rates contemporaneously in effect. It also awards reparation, holding that where a shipper has paid an excessive rate he may recover as reparation the difference between the rate paid and what would have been a reasonable rate at the time, even though the freight charges were added to the selling price of the article transported. (34 I. C. C., 120.)

Reconsignment

Reeves Coal Company v. Chicago, Milwaukee & St. Paul. Opinion by the commission:

The complainant ordered a shipment reconsigned, provided the lowest rate between original point of origin and final point of destination would apply. Reconsignment was effected and lawful charges, higher than those which would have accrued at the lowest rate from point of origin to final destination, were collected. The commission finds that this case does not differ materially from one involving merely a misquoted rate and dismisses the complaint. (34 I. C. C., 122.)

Ex-Lake Grain to Middletown, Conn.

Meech & Stoddard, Inc., v. Grand Trunk Railway of Canada et al. Opinion by the commission:

To meet competition from Buffalo defendants maintain joint through rates on ex-lake grain from Georgian Bay ports to numerous points in New England. Middletown, Conn., is a similarly situated point and competes with the other points involved in the purchase and sale of grain and grain products, but defendants refuse to extend these rates to Middletown on the ground that the rates are unremunerative and that they desire not to enhance their losses. The commission finds that by following this policy the defendants discriminate against Middletown and it is ordered that this discrimination be removed. (34 I. C. C., 39.)

Fitting Cars for Grain Shipments

National Council of Farmers' Co-operative Associations v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Clark:

The shippers of grain owning elevators at country stations in Illinois, Iowa, Minnesota, Nebraska, Kansas, North Dakota and South Dakota, allege that the defendants fail to furnish cars in suitable condition for the transportation of grain in bulk, and ask that they be required either to furnish cars suitable in all respects for carrying this traffic or that they make an allowance to shippers for work done and materials furnished to prepare the cars for loading.

The commission holds that it is the duty of the carriers to

furnish cars suitable to transport in safety traffic which they hold themselves out to carry, and that this duty is not fulfilled when a carrier furnishes a car, upon reasonable request of a shipper, which requires repairing to prevent leakage of grain in transit. It is also held, however, that it is not unreasonable to expect shippers to do a limited amount of cleaning or to make minor and inexpensive repairs on such cars and that it would be impracticable to fix by order any allowance that should be paid shippers for labor performed or materials furnished. The suggestion is made that carriers specify in their tariffs what they will furnish in the way of materials, which must be uniform and adequate.

The carriers' practice at terminal points with reference to preparing cars for loading grain in bulk is not found to be discriminatory against complainant's members. Complaint dismissed. (34 I. C. C., 60.)

STATE COMMISSIONS

The State Corporation Commission of Virginia has authorized the New York, Philadelphia & Norfolk to advance its passenger rates on June 10 from two cents a mile to two and one-half cents.

The New York Public Service Commission, Second district, having received inquiries from all quarters of the state, says that the "auto-bus law," which has been in effect for the last two years, has been repealed by the recent enactment of the jitney bus law, and that it is no longer necessary for persons and corporations desiring to operate auto bus lines on state highways to come to the commission for certificates of approval. It will be necessary, however, for all persons and corporations owning or operating state routes, bus lines or motor vehicles carrying passengers for a fare of fifteen cents or less, on any street, in any city, except New York, to procure first the consent of the local authorities and next a certificate of convenience from the Public Service Commission.

COURT NEWS

The United States District Court at St. Paul has issued a temporary injunction restraining the Arkansas Railroad Commission from putting into effect the two-cents-a-mile passenger rate, and the roads are allowed to charge three cents pending the final decision.

The Supreme Court of Appeals of West Virginia has issued a mandamus requiring the Baltimore & Ohio to comply with the order of the State Public Service Commission, forbidding an advance in passenger rates from two cents a mile to two and a half cents, no action to be taken until the Public Service Commission can consider the application presented by the road for authority to make the increase.

Infant Trespassers

A nine-year-old girl and her eleven-year-old brother had been sent by their mother to pick coal on the tracks of the Baltimore & Ohio. They entered the tracks at a crossing where the company's watchman was stationed and were seen by him. They commenced picking coal when about 200 ft. from the crossing, near a standing freight train. On the approach of another train they, not having sufficient time to go around the standing cars, stood with their backs agains them, and while in this position the girl was struck by or drawn under the passing train, receiving injuries for which suit was brought. The Pennsylvania Supreme Court holds that the children were trespassers and no actionable negligence on the part of the company had been shown.—Lumis v. B. & O. (Pa.), 93 Alt., 952.

Delivery of Livestock on Private Tracks

In an action by a Nashville stockyard company it was alleged that the railroads deliver, on the plaintiff's spur track, all kinds of freight, except livestock, which they refused to so deliver, insisting that stock must be first delivered to the Union Stockyards, following which they would deliver cars to the plaintiff's place on receipt of a switching charge of $3. This refusal was alleged to be arbitrary, and illegal, and to be because of a contract with the Union Stockyards by the terms of which the carriers made these yards an exclusive depot in Nashville for livestock. The defendants admitted the existence of the agreement. It was held by the Tennessee Supreme Court that the statute prohibiting the giving of undue preferences, etc., does not require the carrier to make deliveries of livestock shipments in carload lots at private stockyards maintained by the consignee. The company's agreement with the Union Stockyards to make all such deliveries at that company's yards at the carrier's expense was valid, because the nature of the traffic, the necessity for quarantine, and the danger and delay which would be caused by extra switching thereby made necessary was sufficient to justify a different rule from that applied to inanimate freight, which the carrier must deliver on a private track.—Smith v. L. & N. (Tenn.), 175 S. W., 557.

Private Crossings—Duty as to Construction

A Nebraska railroad company, when it obtained its right of way through a farm, constructed an adequate private crossing at grade, under an agreement with the owner of the farm, and maintained it for about 27 years without injury to any person. During that time there was no substantial change of physical conditions. The present owner of the farm now insists that the company construct for him an overhead crossing at a cost of $1,000 and with a heavy maintenance charge. The State Railway Commission made an order requiring the company to construct the overhead crossing desired. The Supreme Court holds the order to be oppressive and unjust. Moreover, to require the company to construct such a crossing would discriminate unjustly in favor of the owner of the farm and against all other persons similarly situated. The commission's order was reversed.—Postle v. C. B. & Q. (Neb.), 152 N. W., 379.

Chicago Switching Rates—Lowery Tariff

The railroads entering Chicago agreed as to through freight rates where one company brought goods to the city and they were there switched by the others. The Illinois Railroad and Warehouse Commission's rates having been suspended, it entered an order continuing such agreed rates until they should be changed by agreement of the parties or by hearing before the commission. The statute authorizes the commission to establish through rates when necessary for the accommodation of the public, provided they do not give one road an undue advantage over another. An appeal from an order requiring the C. M. & St. P. to abide by the agreed rates, the Illinois Supreme Court holds that the order is valid. The establishment of the rates agreed on (known as the Lowery tariff) was not an appropriation of the company's terminal facilities without due process of law, for the entire city could not be regarded as a single terminal point.—C. M. & St. P. v. State Public Utilities Commission (Ill.), 108 N. E., 737.

Roundhouses—Sufficiency of Construction

A hostler, rated as an engineer, in the employ of an interstate railroad company, tried to board an engine as it was passing through the doorway of a roundhouse and was caught between the tender and the doorjamb and killed. In an action for his death the United States Circuit Court of Appeals for the Second Circuit holds that the company was not guilty of negligence in failing to provide a safe place to work, as the doorway, while narrower than those in some of the more recently constructed roundhouses of the road, was sufficient for all ordinary conditions, and the company could not be held responsible because the hostler saw fit to try to mount his engine as it was about to pass through the door. His duties did not make it necessary for him to do so, and no superior officer directed him, either then or at any other time, to do such a foolhardy thing; there was no emergency calling on him to do as he did. The court held the case to be governed by New York Central v. Dailey, 179 Fed., 289, decided in 1910. In that case a dead engine with no air to operate the brakes came in and was handed over to a hostler. A coemployee with another engine kicked it into the roundhouse from the turntable. It was given such speed that the hostler was afraid it would go through the building, and started to jump off to block the wheels, when he struck the post between the stalls and was injured. There was a clearance between the engine and

post of about eleven inches. The court there held that the company was not chargeable with negligence because the space was not greater, the construction being safe under any circumstances to be reasonably anticipated.—Hogan v. New York Central.

Recovery for Mental Suffering

Intending passengers were compelled, because a train properly flagged did not stop, to walk some distance in the rain so as to take another train to their destination. They became ill as a result of the wetting, and were unable to attend the funeral of a relative. In an action for damages the Arkansas Supreme Court holds that damages for mental anguish in not being able to attend the funeral were not recoverable. There was not such causal connection between the physical injury and the mental anguish as to make the railway liable in damages for both. Chicago, R. I. & P. v. Mizell (Ark.), 175 S. W., 396.

Trackage Charges

The Minneapolis & Rainy River operates a number of connecting stub lines, the roadbed and ties of which are owned by a lumber company. It owns the rails and fasteners; it laid the rails, and maintains the tracks and roadbed in condition. It is in exclusive control as a common carrier. It maintains a distance mileage tariff for freight originating on the stub lines and consigned to Deer River, the same as from points on its main line to Deer River. It exacts a trackage charge of one dollar a car, in addition to its published tariff rates, for cars originating on the stub lines, except those of the lumber company, and pays this money to the lumber company. For such charges it renders no service. The Minnesota Supreme Court holds that such charge is invalid, and that shippers, paying involuntarily, are entitled to recover it. McCallum v. Minneapolis & R. R. (Minn.), 151 N. W., 974.

Stipulation As to Manner of Delivery

A bill of lading provided that, when goods were consigned to a station where the carrier had no agent, the carrier might, regardless of the weather, deposit the goods on the platform, whether there was any one there to receive them or not. Goods sent by a freight train which was 50 minutes late in arriving, were deposited in a warehouse, one of the keys to which, for the convenience of consignees, was, by recognized local custom, left with a householder in the vicinity. The Missouri Court of Appeals, in an action for the unexplained loss of the goods, held that the delay in arrival did not entitle the consignee to notice, as it did not appear that the train would have been met if on time, and the placing of the goods in the warehouse was not a conversion rendering the company liable for their loss. Morrison T. & E. Co. v. Illinois Central (Mo.), 175 S. W., 220.

Relief Contracts—Statutory Provisions

A contract between a railroad employee and a relief association, maintained by the railroad company and associated corporations, provided for the payment by the employee of monthly dues to be deducted by the company from his wages, stipulated for benefits in the event of sickness or injury or accidental death, and declared that acceptance of benefits should operate as a release of all claims against the company. The Indiana Appellate Court holds that the contract is void under Burns' Ann. St., 1914, section 5308, declaring that no railroad company may maintain a relief association, the rules of which require any employee becoming a member to surrender any rights or damages against the company for personal injuries or death, and the employee, who had never received any benefits from the association, was entitled to recover the part of the wages retained by the company. Acton v. Baltimore & O., S. W. (Ind.), 108 N. E., 535.

Regular Train

In an action for damages for unreasonable delay in transporting livestock it appeared that the railroad company had operated a stock train, designated as an extra train, on Sundays, Tuesdays and Thursdays of each week for about 10 years. Occasionally the train was not run on Thursdays for want of freight, but that was exceptional. However, evidence that reports were gathered from all the stations as to the amount of freight to be transported showed that the train was not operated unless there appeared to be sufficient freight to warrant making it up. A station agent contracted to furnish the plaintiff a car for the extra train on a Thursday, but the train did not run. The Iowa Supreme Court held that it was a question for the jury whether the extra train was a regular train and held out to shippers, as such, and, their answer being in the affirmative, the contract was not one for special service prohibited by the Interstate Commerce act. J. W. Stewart & Son v. Chicago, R. I. & P. (Iowa), 151 N. W., 485.

Safe Appliances—Couplers—Case for Jury

A brakeman, employed by a railroad company engaged in interstate commerce, inserted his arm between an engine tender and the car next back of it to make an adjustment of the couplers, as they would not work automatically by impact. His arm was crushed, necessitating amputation, for which he sued and recovered damages. The New Jersey Court of Errors and Appeals holds that, under the safety appliances act, the duty of the company to provide couplers which would work automatically by impact was an absolute one; and from the fact that the couplers did not so work on the given occasion, it was inferable that the company had failed to comply with the standard raised by the act. Therefore, under the federal employers' liability act, the employee was to be held not to have been guilty of contributory negligence, nor to have assumed the risks of the employment, and the company was not entitled to a directed verdict, but the case was properly submitted to the jury, which returned a verdict for the plaintiff. Parker v. Atlantic City (N. J.), 83 Atl., 574.

Ambiguous Order As to Rates—Contempt

An order of the Michigan Railroad Commission fixing rates for carriage of logs, put into effect on February 19, 1915, read: "Above rates to apply when the manufactured product is reshipped via the D. & M. And when not to be so reshipped, the railway company will collect in addition to the above rates 50 cents per 1,000 ft. But if later reshipment is made over the D. & M., the company will refund to such shipper the 50 cents per 1,000 ft. collected." In proceedings by the railroad commission against the D. & M. to adjudge that company guilty of contempt for failure to comply with the order of court commanding it to put the rates in effect, the Michigan Supreme Court holds that the commission's order is sufficiently ambiguous to permit the company to exact the extra charge in the first instance and rebate only on proof that the manufactured product of the logs shipped in had been shipped out over its line, without being in contempt of the order of court. Michigan R. R. Commission v. Detroit & M. (Mich.), 152 N. W., 193.

Crossing Other Railroads—Permission of Commission

Illinois Laws, 1889, p. 233, section 1, as amended by laws, 1907, p. 475, provides that any railroad company desiring to cross the track of any other railroad company shall apply to the Railroad and Warehouse Commission for permission, and the commission, after investigation, shall give a decision as to the place where and the manner in which the crossing shall be made, provided that it shall be at such place and made in such manner as will not necessarily impede or endanger the travel on the railroad to be crossed. The Illinois Supreme Court holds that this provision does not repeal Railroad Act 1872, section 19, authorizing a domestic railroad company to cross the tracks of another railroad company. It merely has the effect of withdrawing from the company seeking to make the crossing the arbitrary power of selecting the place and manner and to confer upon the commission the power to prescribe such place and manner. It also withdraws from the companies the power to enter into an agreement as to the place and manner of crossing, and imposes upon the commission the duty, in every instance, of determining at what place and in what manner the crossing shall be made. But the commission cannot withhold its permission to cross at the place and in the manner selected by the company desiring to make the crossing unless it prescribes some other place where or manner in which the crossing may be made. An order of the commission granting the right to cross the tracks of another company will not be disturbed, unless it be shown that the commission abused its discretion in its determination. Railroad & Warehouse Commission v. Peoria & P. U. (Ill.), 108 N. E., 655.

Railway Officers

Executive, Financial, Legal and Accounting

Adam Darling has been appointed claim agent of the Denver & Rio Grande, with headquarters at Denver, Colo., succeeding C. S. Mitchell, resigned.

T. A. Martin, general storekeeper of the Oregon Short Line at Pocatello, Idaho, has been appointed assistant auditor, with headquarters at Salt Lake City, Utah.

W. S. Martin, general manager of the Denver & Rio Grande at Denver, Colo., has been elected president of the Union Railway, with headquarters at Memphis, Tenn., succeeding J. L. Lancaster, resigned.

William S. Trowbridge, whose appointment as auditor of the Boston & Albany, with headquarters at Boston, Mass., has already been announced in these columns, was born on January 11, 1880, at Pawling, N. Y. He attended high school until June, 1895, and the same month entered the service of the New York Central & Hudson River as a clerk in the accounting department, and subsequently held various positions until he became general bookkeeper. He remained in that position for several years, until his appointment on June 5, 1911, as assistant auditor of the Boston & Albany, which position he held at the time of his recent appointment as auditor of the same road, as above noted.

Operating

John C. Maus has been appointed supervisor of demurrage and weighing of the Illinois Central, with office at Chicago, vice Fred W. Souerbry, resigned to engage in other business.

James Russell, assistant to vice-president of the Denver & Rio Grande, at Denver, Colo., has been appointed general manager, with headquarters at Denver, succeeding W. S. Martin, resigned.

J. M. Cameron, assistant general superintendent of the British Columbia division of the Canadian Pacific at Vancouver, B. C., has been appointed general superintendent of the Alberta division, with headquarters at Winnipeg, Man.

M. A. Mulligan, who was recently appointed acting superintendent of the New York division of the Lehigh Valley, has been appointed superintendent of the same division, with headquarters at Jersey City, N. J., succeeding M. C. Roach, deceased.

D. E. Wilcox, assistant superintendent of the second division of the Denver & Rio Grande at Salida, Colo., has been appointed assistant superintendent of the Salt Lake division, with headquarters at Salt Lake City, Utah, succeeding Roscoe Mahon, deceased.

W. H. Hall, superintendent of telegraph of the Missouri, Kansas & Texas at Denison, Tex., has been appointed general superintendent of telegraph, with headquarters at Denison, and J. Hickman has been appointed superintendent of telegraph, with headquarters at Parsons, Kan.

J. W. Wassum, superintendent of the Spartanburg division of the Southern Railway at Columbia, S. C., has been appointed superintendent of the Columbia division, including Columbia terminals, with headquarters at Columbia, vice G. V. Peyton, resigned, and William Maxwell, trainmaster at Columbia, succeeds Mr. Wassum.

M. V. Hynes, superintendent of the Wellston and Delphos divisions of the Cincinnati, Hamilton & Dayton, at Dayton, Ohio, has been appointed superintendent of the Indianapolis division, with headquarters at Indianapolis, Ind., succeeding R. B. White, resigned to go to the Baltimore & Ohio Southwestern. A. A. Iams, trainmaster at Dayton, succeeds Mr. Hynes, and R. W. Brown, road foreman of engines at Lima, succeeds Mr. Iams.

A. E. Stevens, general superintendent of the Alberta division of the Canadian Pacific at Calgary, Alta., has been appointed general superintendent of the Eastern division, with office at Montreal, Que., succeeding George Hodge, who has been appointed assistant to the general manager at Montreal. R. G. Edwards has been appointed assistant superintendent of district No. 2, with office at Montreal, succeeding E. J. Melrose, who has been appointed assistant superintendent of district No. 3, succeeding C. W. Lott, transferred as assistant superintendent to district No. 5, with office at Smith's Falls, Ont.

J. C. Hagerty, superintendent of the Baltimore & Ohio Southwestern at Seymour, Ind., has been promoted to general agent on the staff of the general manager of the Southwestern district, with headquarters at Cincinnati, Ohio. E. W. Scheer, superintendent, at Flora, Ill., succeeds Mr. Hagerty, and R. B. White, superintendent of the Indianapolis division of the Cincinnati, Hamilton & Dayton at Indianapolis, Ind., succeeds Mr. Scheer. G. S. Cameron, assistant superintendent in charge of the Cincinnati terminals of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, has been transferred as assistant superintendent to Chillicothe, succeeding E. N. Brown, deceased, and H. H. Broughton, assistant superintendent at Cleveland, has been transferred to Cincinnati, in charge of the Cincinnati terminals.

Traffic

F. R. Smalley has been appointed district passenger agent of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Duluth, Minn.

C. B. Williamson, superintendent of the Chesapeake Western, has been appointed also traffic manager, with office at Harrisonburg, Va., vice C. A. Jewett, resigned to engage in other business.

Frank D. Powell has been appointed commercial agent of the Canada Southern Line, operating over the Michigan Central via Buffalo, N. Y., and the Pennsylvania Railroad and connections, with office at Chicago, Ill., vice L. S. Livingston, transferred.

E. G. Mustain, division freight and passenger agent of the El Paso & Southwestern, at Tucson, Ariz., having been transferred to another department, the office has been abolished. Territory heretofore under his jurisdiction has been assigned to Richard Warren, general agent at El Paso, Tex.

Engineering and Rolling Stock

R. S. Mounce has been appointed general foreman of car repairs of the Erie, with office at Jersey City, N. J., succeeding P. Fox, deceased.

John Dwyer has been appointed superintendent maintenance of way of the Norfolk Southern, in charge of maintenance of track, bridges and buildings, with headquarters at Norfolk, Va.

M. B. McPartland has been appointed master mechanic of the Colorado and Nebraska divisions of the Chicago, Rock Island & Pacific, with headquarters at Goodland, Kan., succeeding E. F. Tegtmeyer, resigned.

G. E. Sisco, assistant engineer of motive power of the Pennsylvania Lines West, at Columbus, Ohio, has been appointed master mechanic, with headquarters at Toledo, Ohio, succeeding J. W. Hopkins, transferred

E. Keough, roadmaster and assistant trainmaster of the Chicago, Burlington & Quincy, at Aurora, Ill., has been appointed assistant engineer of maintenance of way of the Canadian Pacific Lines East of Winnipeg, with headquarters at Montreal.

O. P. Reese, master mechanic of the Pennsylvania Lines West, with headquarters at Crestline, Ohio, and Pittsburgh, Pa., has been appointed assistant engineer of motive power, in the office of general superintendent of motive power, vice T. R. Cook, resigned.

H. R. Carpenter, engineer of maintenance of way of the Missouri Pacific-Iron Mountain System, has been appointed assistant chief engineer, with headquarters at St. Louis, Mo., succeeding C. E. Smith, resigned. A. F. Dorley, principal assistant engineer, has been appointed engineer maintenance of way, succeeding Mr. Carpenter.

Christopher Thane Sponsel, roadmaster of the Northern Pacific at Mandan, N. D., has been appointed roadmaster at Garrison, Mont., succeeding Frank William Barnes, resigned, and Frank G. Cook, assistant engineer, has been appointed roadmaster, to succeed Mr. Sponsel. John Henry Hayes has been appointed roadmaster at Moscow, Idaho, succeeding Frank Hartman, resigned.

B. Violett, roadmaster of the Chicago, Burlington & Quincy, at Beardstown, Ill., has been transferred to Galesburg, Ill., in the same capacity, succeeding J. A. Sullivan, deceased. J. Emerson, assistant roadmaster at Galesburg, Ill., has been appointed roadmaster at Beardstown, Ill., succeeding Mr. Violett. J. D. Farrington, roadmaster at Council Bluffs, Iowa, has been appointed roadmaster and assistant trainmaster at Aurora, Ill., succeeding E. Keough, resigned. J. S. Miller has been appointed roadmaster at Council Bluffs, Iowa, succeeding Mr. Farrington.

OBITUARY

P. Fox, general foreman of car repairs of the Erie at Jersey City, N. J., died on May 10.

H. W. Cowan, chief engineer of the Colorado & Southern, died at his home in Denver, Colo., on May 29, at the age of 53.

John G. McCullough, vice-president of the Chicago & Erie, died on May 29, at his home in New York. He was born in 1835, at Newark, Del. In December, 1874, he became vice-president of the Panama Railroad, and subsequently became president of the same road. In 1873 and 1874 he served as a director of the Central Vermont. From 1877, to 1883, he was vice-president of the Bennington & Rutland, and later became president of that road. From November, 1884, for several years he served also as president pro tem. of the New York, Lake Erie & Western, and from September, 1890, for over ten years was also president of the Chicago & Erie. From July, 1893, to 1896, he was also receiver of the New York, Lake Erie & Western, and later became vice-president of the Tioga Railroad. At the time of his death he was vice-president of the Chicago & Erie, now a part of the Erie.

RUSSIAN RAILWAYS AND WATERWAYS.—Notwithstanding the war, the Russian government has found it possible to allow a survey for the construction of two large new railways, i. e., for the Achinsk-Minusinsk Railway from the station of Achinsk, on the Siberian Railway to the town of Yeniseisk, from the town of Minusinsk to the village of Grigorievsky, and from Minusinsk to Kuragino, and it is also proposed to build another railway with a total length of 1,150 versts (725 miles) from the station of Krasnoufimsk on the Moscow-Kazan Railway, or one of the near-lying points of this line, to Kostroma, with a branch from Nolinsk to Kotelnich. The Ministry of Ways and Communication has just drafted the grandiose project for a trunk waterway from Ekaterinoslav to Riga. This project embraces almost the entire length of the Black Sea-Baltic waterway, some 1,900 versts (1,200 miles) out of the total length of 2,200 versts (1,375 miles) from Kherson to Riga being included in the new project.

RUSSIA'S IMPORTS OF COAL AND COKE.—The imports into Russia during 1914 of coal across the European frontier amounted to 4,700,000 tons, which compared with the previous year, shows a decrease of 2,820,000 tons, or 37.4 per cent. The deficit falls entirely upon the second half of the year, inasmuch as the first six months of 1914 show an increase compared with the corresponding period of the previous year of 630,000 tons, while the decrease on the second six months amounted to 3,400,000 tons. The imports of coal from different countries were as under:

	1913. Tons	1914. Tons	Decrease. Per cent
England	3,600,000	2,500,000	39.8
Holland	3,250,000	2,000,000	37.5
Austria	89,000	84,000	7.0
Various countries	190,000	200,000	4.0 increase

The imports of coke have decreased still more than those of coal, the imports during 1914 amounting to 530,000 tons, against 960,000 tons in 1913. The decrease consequently amounted to 430,000 tons, or 44.7 per cent, the imports during the second half of last year being quite insignificant.—*Engineering.*

Equipment and Supplies

LOCOMOTIVE BUILDING

THE WESTERN MARYLAND has ordered 15 Mallet type locomotives from the Lima Locomotive Corporation.

THE NEWBURGH & SOUTH SHORE has ordered one superheater Mogul type locomotive from the Baldwin Locomotive Works.

THE YOUNGSTOWN IRON & STEEL COMPANY, Youngstown, Ohio, has ordered 2 standard gage oil-burning locomotives from the H. K. Porter Co.

THE TOLEDO TERMINAL has ordered one superheater Consolidation type locomotive from the American Locomotive Company. This locomotive will have 22 by 28 in. cylinders and 51 in. driving wheels.

THE CHESAPEAKE & OHIO has ordered 24 Mallet type (2-6-6-2) locomotives from the American Locomotive Company. These locomotives will have 22 and 35 by 32 in. cylinders, 56 in. driving wheels and will be provided with superheaters.

CAR BUILDING

THE CHESAPEAKE & OHIO is inquiring for 50 caboose cars.

THE MISSOURI PACIFIC will repair a large number of freight cars.

THE TEXAS & PACIFIC is reported to be inquiring for 500 coal cars.

DARLING & COMPANY, Chicago, are inquiring for prices on 15 tank cars.

THE DELAWARE & HUDSON is in the market for 18 coaches and 6 baggage cars.

THE MISSOURI, KANSAS & TEXAS, reported some time ago as being in the market for 1,200 gondolas, will not purchase any freight equipment this year.

THE UNION TANK LINE has recently exercised an option covering the purchase of 1,000 tank cars from the Standard Steel Car Company. These cars are in addition to the 1,000 cars ordered last December, the option for the additional 1,000 cars having been taken at that time. The specialties for the cars on the new order have already been provided for.

IRON AND STEEL

THE LEHIGH & NEW ENGLAND has ordered 1,700 tons of rails from the Bethlehem Steel Company.

THE CENTRAL RAILROAD OF ARGENTINA has ordered 8,000 tons of rails from the Pennsylvania Steel Company.

THE NEW YORK CENTRAL has ordered 270 tons of bridge material for two bridges to be built at Jersey City from the Fort Pitt Bridge Works.

THE NORFOLK & WESTERN has ordered 5,100 tons of rails from the Carnegie Steel Company, and 3,000 tons from the Pennsylvania Steel Company.

MACHINERY AND TOOLS

THE PENNSYLVANIA RAILROAD is asking bids on four special machines for use in the making of piston valves.

THE SEABOARD AIR LINE is reported to be taking preliminary bids on equipment to replace that damaged recently by fire at its shops.

THE DELAWARE, LACKAWANNA & WESTERN has ordered a steam hammer, a bolt-cutter and one or two other machines, and is taking bids on another bolt-cutter.

Supply Trade News

George C. Wilson, of the Independent Pneumatic Tool Company, Chicago, has been appointed manager of that company's branch at Atlanta, Ga., succeeding F. H. Charbono, who has been transferred to Boston.

J. Drew Allen, northwestern representative of the Taylor-Wharton Steel Company, received a fatal injury while examining the tracks of the Salt Lake City Traction Company, and died on May 16, at the age of 33.

W. D. Waugh, district representative in St. Louis, Mo., of the Kalamazoo Railway Supply Company, Kalamazoo, Mich., has been appointed district representative in charge of the St. Louis office of the Detroit Graphite Company, succeeding Benjamin Randolph, resigned

The directors of the Baldwin Locomotive Works have postponed action on the semi-annual dividend of 1 per cent on the common stock usually paid at this time. They have, however, declared the regular semi-annual dividend of 3½ per cent on the preferred stock payable July 1.

At the annual directors' meeting of Fairbanks, Morse & Company, recently held in Chicago, C. H. Morse, Sr., retired from the office of president of the company, which he has held for 24 years, and C. H. Morse, Jr., was elected to succeed him. Mr. Morse, Jr., has for a number of years been president of the Fairbanks-Morse Manufacturing Company, Beloit, Wis., and will continue to hold that position. Other officers of the company were re-elected.

Merton A. Peacock has been appointed district sales manager of the Terry Steam Turbine Company, Hartford, Conn., for the territory included in Minnesota, North Dakota and South Dakota, with office at 400 Endicott building, St. Paul, Minn. This arrangement supersedes the previous selling agreement with the Robinson, Cary & Sands Company, St. Paul. The company has also appointed the Hawkins-Hamilton Company, Peoples National Bank building, Lynchburg, Va., as its representatives for Virginia.

Benton C. Rowell, an inventor of numerous mechanical devices for use in railroad operation, and one of the most prominent advocates of automatic train control, died suddenly of heart failure on May 29 at Chicago, aged 58 years. He had made practically a life study of automatic train control. In 1891 he demonstrated his safety stop on the Boston, Revere Beach & Lynn, and in 1893 on the Intramural Railway at the Chicago World's Fair. In 1893 and 1894 the device was installed on the Chicago South Side Elevated Railroad, and in 1894 and 1895 on the Metropolitan West Side Elevated Railroad at Chicago. It was also given a service test on the Chicago, Burlington & Quincy in 1908 and 1909. Mr. Rowell also had numerous patents pending on appliances connected with railroad signaling.

Guy E. Tripp, chairman of the Westinghouse Electric & Manufacturing Company, has been quoted as follows: "The Westinghouse Electric & Manufacturing Company has purchased the property and assets of the Stevens Arms & Tool Company and the Stevens-Duryea Automobile Company, and a company has been incorporated under the laws of Massachusetts to own and control these two properties. This company will be known as the New England Westinghouse Company, and all of its $2,000,000 capital stock is owned by the Westinghouse Electric & Manufacturing Company. The company has no bonded debt. These two companies were purchased by the Westinghouse as a result of the order for 1,000,000 rifles which we have taken from the Russian government. This large order will be filled entirely from the two Stevens companies that have been purchased. It is not the intention of the Westinghouse Electric & Manufacturing Company to make any alterations whatever to its present plants in connection with this rifle order. In other words, it is to be filled by companies which are thoroughly experienced in the manufacture of this class of product, so that there are few uncertainties in connection with the transaction."

C. E. Smith, recently assistant chief engineer of the Missouri Pacific-Iron Mountain System, has opened an office as consulting engineer at 2075 Railway Exchange building, St. Louis, Mo. He will engage in general railway and municipal practice, with special attention to valuations, terminal problems, grade crossing eliminations, bridges and miscellaneous structures. Mr. Smith has had a varied experience in all branches of civil engineering of about 17 years. He was graduated from the Massachusetts Institute of Technology in 1900 in civil engineering, and during vacations worked as rodman for the New England Railroad, and also as assistant city engineer of the cities of Putnam and Willimantic, Conn., which position he also held from June, 1900, to November, 1900. In November, 1900, he entered the service of the New York, New Haven & Hartford as bridge engineer at New Haven, which position he held for three years. From November, 1903, to March, 1904, he was with the bureau of yards and docks of the United States Navy Department at Washington, D. C., and in March, 1904, he returned to railroad service as assistant bridge engineer of the Lake Shore & Michigan Southern at Cleveland, Ohio. From March, 1905, to December, 1906, he was text book writer and instructor for the International Correspondence Schools, Scranton, Pa. From December, 1906, to July, 1907, he was with the United States Geological Survey as field assistant at Washington, D. C., San Francisco, Cal., and St. Louis, Mo., engaged in investigating and reporting the effects of the fire and earthquake on San Francisco buildings and reporting the results of work accomplished at testing laboratories at the World's Fair grounds, St. Louis. In August, 1907, he became connected with the Missouri Pacific as bridge engineer, and later was promoted to assistant chief engineer, in which positions he was in charge of all bridge and grade crossing work on the system, and during the last two years had full charge of engineering work of every nature, including tracks, bridges, grade crossings, depots and other buildings.

TRADE PUBLICATIONS

Brick Arches.—The American Arch Company, New York, has issued a booklet entitled "Uncle George's Primer," made up of questions and answers pertaining to the use and construction of the locomotive brick arch.

Air Meters.—A four-page folder has been issued by the New Jersey Meter Company, Plainfield, N. J., dealing with the tool-om-eter, a recently developed form of air-blow meter. This device is adapted to checking the amount of compressed air used with the various types of portable pneumatic tools.

Salt Lake Route.—The passenger department of the San Pedro, Los Angeles & Salt Lake has recently issued a very attractive folder containing views and descriptions of Yellowstone and Glacier National Parks. The booklet gives also detailed information relative to tours through these parks.

Wiring.—The Fargo Manufacturing Company, Inc., Poughkeepsie, N. Y., has recently issued catalog No. 800, relative to its type A and B connecting devices for electric wiring. The catalog is well illustrated with sectional drawings and engravings showing the construction of the various types of connectors.

Wagon and Truck Loaders.—This is the title of book No. 210 of the Link-Belt Company, Chicago, relative to a line of portable loaders for use in handling such material as coal, sand, stone, gravel and other loose material from storage piles into wagons, trucks or cars. The book has 47 pages and is profusely illustrated.

Riveters.—Catalog No. 3 of the Vulcan Engineering Sales Company, Chicago, deals with a line of pneumatic riveters manufactured by the Hanna Engineering Works, Chicago. These machines are of various types and sizes, the special feature of the line being the toggle motion by which the power is transmitted to the ram.

Boiler Water Treatment.—The Bird-Archer Company, New York, has recently issued a 40-page pamphlet dealing with boiler maintenance and discussing its system of polarized metallic boiler chemicals for locomotive use. A portion of the book is devoted to a brief treatise on locomotive boiler maintenance prepared by a general boiler inspector.

Arch Tube Cleaners.—Catalog W-1 of the Lagonda Manufacturing Company, Springfield, Ohio, is devoted to its line of arch tube cleaners. Several types of cutting heads are shown,

and there are listed a number of accessories, including repair parts for the cleaner. In addition to the pneumatic cleaners, water and steam-driven cleaners are shown.

Fabrikoid.—In a publication entitled "The Orange Book" the DuPont Fabrikoid Company, Wilmington, Del., presents a number of exhibits which are extracts from proceedings or articles dealing with upholstery, all of which are given to show the superiority of Fabrikoid over the poorer grades of split leather for use in furniture upholstery, automobiles, etc.

Expanded Metal Lath.—Kno-Burn expanded metal lath is the subject of a 52-page booklet, issued by the North Western Expanded Metal Company, Old Colony building, Chicago. The advantages claimed for this type of lath are shown in detail, stock sizes and weights are given, and a large number of illustrations are included giving details of application.

Expansion and Toggle Bolts.—The 1915 catalog, No. 40, that has been recently issued by the Steward & Romaine Manufacturing Company, Philadelphia, Pa., illustrates and explains the many types of expansion and toggle bolts manufactured by this company. It also shows some tools for use in drilling holes for bolts in brick, concrete, granite and hollow bricks, etc.

Portable Air Compressors.—Form No. 3,015, issued by the Ingersoll-Rand Co., 11 Broadway, New York, contains 32 pages, 6 in. by 9 in., and is a complete treatise on the subject of portable air compressing outfits. A list of bulletins is given describing in detail each particular line of portable compressors, as well as catalogs of the various pneumatic tools and equipment mentioned.

Storage Battery Cars.—Bulletins No. 30, 31, 32 and 34, issued by the Railway Storage Battery Car Company, New York, illustrate and describe a number of city and interurban cars equipped with storage batteries for supplying driving power. One of the bulletins gives some comparative costs between standard overhead construction and the equipment necessary when Edison batteries are used.

Locomotive Cranes.—The Ohio Locomotive Crane Company, Bucyrus, Ohio, has issued a 56-page catalog in which the construction of its line of locomotive cranes is set forth in detail. The catalog contains a large number of illustrations of detail parts, as well as reproductions from a number of photographs, showing the cranes in service. Clearance diagrams of various types of cranes are also given.

Water Meters.—The Harrison Safety Boiler Works, Philadelphia, Pa., has issued engineering leaflet No. 18, dealing with the Cochrane V-notch weir, used in the Cochrane metering heater. This pamphlet is a reprint of two papers on the V-notch weir, showing the refinements essential to accuracy in investigating problems in hydraulics and the constancy of the V-notch weir when used under those conditions.

Pressed Steel Building Construction.—"Kahn Pressed Steel Building Construction," is the title of a booklet which has just been issued by the Trussed Concrete Steel Company, Youngstown, Ohio, describing the use of pressed steel construction for small buildings, and showing how such buildings can be erected by any ordinary mechanic with the use of a hammer as the only tool, and can then be covered with stucco.

Safety Rules.—The Whiting Foundry & Equipment Company, Harvey, Ill., has recently issued a poster containing safety rules for cranemen, crane operators, floormen and repairmen. The poster has the words "Safety First" printed in large red letters at the top and the rules are from a safety bulletin issued by the National Founders' Association. The poster is suitable for placing in shops for the guidance of workmen.

Automatic Highway Crossing Gate.—The Cook; Railway Signal Company, Denver, Colo., has recently issued a booklet entitled "Safety First in Reality," describing in detail the construction and operation of the Cook automatic electric highway crossing gate. This gate operates from track circuits or track instruments like an automatic signal. When lowered by the coming of a train, the gate arm is suspended horizontally about 13 ft. above the track, and from it there hang crucible wire tell-tales usually about 8 ft. long. At the same time a bell is rung and two lights are shown, one, a red light, appearing as a warning to the vehicle on the highway and the other, a white light, lighting up the tell-tales and the crossing.

Railway Construction

Chicago, Milwaukee & St. Paul.—The Seattle, Port Angeles & Western has been opened for traffic from Port Angeles, Wash., west 26 miles. The line is being extended from Port Angeles east to Puget Sound, about 45 miles, and it is expected that this section will be completed in about six months.

Cumberland & Manchester.—Incorporated in Kentucky with $50,000 capital and headquarters at Manchester. The plans call for building from Barbourville, Ky., north to Manchester in Clay county 24 miles. C. F. Heidrick, president; F. N. Heidrick, vice-president, both of Brooksville, Pa., and G. M. Richards, Jr., secretary and treasurer, Clarion, Pa. C. B. Lyttle, is a director, Manchester, Ky. (See Cumberland Northern, May 7, page 993.)

Cumberland Northern.—See Cumberland & Manchester.

Edmonton, Dunvegan & British Columbia.—The Canadian parliament has granted an extension of time to this company in which to build the extension from Spirit river, Alta., to a junction with the Pacific Great Eastern at the Alberta-British Columbia boundary, and has also authorized the building of an additional line through Grand Prairie district to Jasper House, Alta. (April 23, p. 913.)

Jacksonville & Florida (Electric).—Organized in Florida with $500,000 capital to build the electric line from Jacksonville, Fla., southwest to Middleburg, about 25 miles, thence west to Providence in Bradford county, in all about 60 miles. Financial arrangements have been made to build the first section of ten miles, and construction work is now under way. A. W. MacKinlay, president; R. F. Ensey, vice-president. (See Jacksonville-Middleburg, March 5, p. 427.)

Kanawha, Glen Jean & Eastern.—Preliminary arrangements are being made to start work soon on a line to the Laura, Red Star and Harvey coal mines in West Virginia. The company now operates an 8-mile line from Glen Jean, in Fayette county, W. Va., south to Tamroy, also a branch from Glen Jean, west to Pax, 9.5 miles, and has plans already made to build an extension from Tamroy, south to Skelton. (March 14, p. 1033.)

Kansas City Connecting Railroad.—The Missouri Public Service Commission has authorized this company to reconstruct seven miles of tracks and terminals of the stock yards at Kansas City, including the construction of a subway under the Union Pacific tracks near the Kaw river. Four and one-half miles of the tracks will be in Missouri and two and one-half in Kansas.

Midland Railway.—A charter has been granted this company in Georgia, it is said, with a capital of $1,000,000, and construction work is now under way. The plans call for building from Savannah, Ga., northwest, via Pineora, Statesboro, Swainsboro, Wrightsville and Sandersville, to Milledgeville, about 150 miles. A number of branch lines are also to be built. H. O. Buman, Savannah, is an incorporator, and G. M. Brinson, Springfield, is said to be interested (May 7, p. 993).

Naas & Skeena River Railway.—See Pacific, Peace River & Athabaska.

New York Subways.—The New York Public Service Commission, First district, will open bids on June 15 for the construction of Section No. 1, between Eastern Parkway and Church avenue, of Route No. 29, a part of the Nostrand avenue subway in the borough of Brooklyn. This line is a branch of the Eastern Parkway subway.

The commission has awarded the contract for the construction of Section No. 2 of Route No. 49 to the Oscar Daniels Company, the lowest bidder, who offered to do the work for $863,775. (May 28, p. 1139).

Bids for the completion of construction and station finish in the Fourth avenue subway, Brooklyn, from Flatbush avenue extension to forty-third street, have been received by the commission (May 21, p. 1099).

Norwich, Colchester & Hartford Traction.—This company's charter has been amended and the time extended for two years in which to complete an electric line between Norwich, Conn., and Hartford. About seven miles of the line is finished, from Silver Lane to Glastonbury, and there remains about 25 miles yet to be built. New York financiers have become interested in the proposition. W. S. Garde, Hartford; E. Robinson, W. A. Strickland, Glastonbury; S. R. Ketcham, New York; Dr. C. E. Stark, Mayor T. C. Murphy, F. Kromer and C. S. Holbrook, Norwich, are directors. (January 29, page 211.)

Oklahoma & Texas Southern.—According to press reports, grading work has been finished by this company on a line from Montague, Tex., southwest to Bowie. It is understood that an extension is to built from Bowie southeast to Denton, about 40 miles. W. A. Sqiores, Henrietta, Tex., is said to be interested.

Pacific, Peace River & Athabaska.—The Canadian parliament has authorized a change in the location of the Pacific coast terminus, from the mouth of the Naas river to the Kitimat arm, and has also granted an extension of time in which to build the line. The plans call for building from the Pacific coast east to Prince Albert, Sask. The company has also secured the charter of the Naas & Skeena River Railway, which has been granted an extension of time in which to build from Nasoga gulf to the Skeena river. The tramway which this company plans to build at Vermillion Falls on the Peace river under the name of the Peace River Tramway & Navigation Company will be standard gage, and is to be five miles long. It will be operated by steam at first, but later by electricity. The company also plans to build another tramway about 15 miles long between Smith's Landing and Fort Smith.

Peace River Tramway & Navigation Company.—See Pacific, Peace River & Athabaska.

St. John & Quebec.—The New Brunswick government has passed an act providing for the appointment of a commission to complete the St. John Valley Railway in case the contractors fail to meet their obligations within a specified time. The central section from Centreville to Gagetown has been completed, and the Intercolonial is now operating the section from Fredericton to Centreville, 88 miles. The line is being built from Grand Falls, N. B., southeast following the St. John river to St. John, about 210 miles. (March 19, p. 649.)

Seattle, Port Angeles & Western.—See Chicago, Milwaukee & St. Paul.

RAILWAY STRUCTURES

Kansas City, Mo.—The Alton Grain Elevator Company, a subsidiary of the Chicago & Alton, is constructing a reinforced concrete elevator, consisting of a working house and 8 bins. Its capacity will be 275,000 bu., but it is so designed that it can be increased to 1,000,000 bu. It will be operated by electricity. The elevator was designed by E. Lee Heidenreich of Kansas City. The contract has been awarded to Wells Brothers, 53 West Jackson boulevard, Chicago. The construction is in active progress under the supervision of H. T. Douglas, chief engineer of the Chicago & Alton, and it is expected the elevator will be completed by September 15.

Ottawa, Ont.—Bids are wanted until June 8, by J. W. Pugsley, secretary, Department of Railways and Canals, Ottawa, for a number of small bridges on the main line of the Intercolonial Railway.

Sayre, Pa.—The Lehigh Valley will at once build a fireproof roundhouse, with stalls for 50 locomotives at Sayre. Contract for the building, which is to be of hollow tile and cement construction, has been given to Westinghouse, Church, Kerr & Company, New York. The total cost of the improvements will be $400,000, including a new turntable and accessories.

Somerset, Pa.—The Baltimore & Ohio has completed plans for a new passenger station, to be built at Somerset, to replace the present structure. The new station will be 30 ft. by 75 ft. of brick construction with tile roof. The work is to be started at once and will be carried out by the company's forces. The present station will be moved across the tracks and fitted up as a freight station, having separate team and house tracks.

Railway Financial News

Missouri Pacific.—On Wednesday night the directors announced that they had received $21,349,000 of the $25,000,000 notes which were due on June 1, and of which they asked the extension to June 1, 1916. The extension plan has been declared operative.

E. E. Ravellain, holding $72,000 notes, presented the notes for payment on Wednesday, and upon the refusal of the company to make payment he brought suit and obtained an attachment on the property of the company in New York state, which is said to consist of nothing but the office furniture. The company gave out a statement saying that Mr. Ravellain did not appear on the company's books as the owner of any of the notes.

National Railways of Mexico.—A cable despatch from London says that the $27,640,000 2-year 6 per cent notes of the National Railways of Mexico, due June 1, were not paid, but it is not announced as to what provisions have been made for the extension of these notes or for legal action under the terms of the indenture securing them.

New York, New Haven & Hartford.—Governor Walsh of Massachusetts has vetoed the validation bill which provided for the reorganization of the finances of the New York, New Haven & Hartford and the Boston & Maine, both of which bills had been passed by both houses of the Massachusetts legislature. In sending his veto to the legislature Governor Walsh said in part:

"This question is now of national importance. The issue is whether the public shall be called on to pay only a return on honest investment, or shall be charged with all sorts of extortion based on all kinds of artificial capitalization.

"Common honesty as well as the common welfare requires that the issue shall be fought out and decided in favor of what is now the sound and established policy of this commonwealth, even if the controversy should require an amendment to the national constitution."

St. Louis & San Francisco.—Bankers connected with the reorganization committees have been quoted as saying that it is hoped that the receivership may be ended by July 1, and that a tentative plan has been accepted by the committees representing the refunding 4 per cent bonds and the general lien 5 per cent bonds, but that the question of the amount of assessment has not as yet been decided on.

Wabash.—National banks of New York City holding, it is said, about $40,600,000 first refunding and extension 4 per cent bonds of the Wabash, recently asked the Controller of the Currency whether they could assent to the plan of reorganization by which the holders of these bonds underwrite the issue of new preferred stock in exchange for an assessment. (May 7, pages 957 and 978.)

Men of English Railway with the Colors.—In the latest Roll of Honor poster issued by the London & North Western Railway, it is stated that 13,659 members, or 15.8 per cent of the whole of the company's staff, have joined the colors.

Electrification in Silesia.—Just before the war trial runs were about to be made on the Silesian lines of the Prussian State Railways, between Lauban and Königszelt. The work has now been stopped, and it is extremely unlikely that anything further will be done until after the war. Altogether, 310 miles of track are being electrified, the line being 170 miles long. The lines are in a mountainous district, where normally there is a heavy coal and passenger traffic. It is intended to run 500-ton passenger trains and 1,200-ton freight trains. In common with all other recent German electrification schemes, single-phase current is to be used, the trolley voltage being 15,000 at 16⅔ cycles. When the war began there were under construction 14 locomotives for high-speed passenger service, 30 for freight and seven for light passenger service. The average speed of the freight engines is to be 12.4 miles an hour, and the maximum speed 27.9 miles an hour.

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

The New Convention Hall

In one of the Dailies of last year we called attention to the necessity for enlarging Convention Hall and improving its arrangement. The very next day we received a letter from the representative of the Million Dollar Pier authorizing us to state that such changes would be made in time for the 1915 convention. Not only has the hall been considerably enlarged, but the arrangement of the presiding officer's desk is such that members can be seated to better advantage and will undoubtedly be able to follow the proceedings much more closely than was possible in the old hall. With the more commodius quarters and the change in the arrangement the members can move in and out between the discussions of the various reports with less disturbance to their fellows. It only remains for those taking part in the discussions to speak loudly and clearly to make this year's proceedings the very best.

This Year's Exhibit

There seemed to be an impression in some quarters that the exhibit this year would be very much smaller than usual. While it is not as large as last year, it covers over 70,000 sq. ft. of space and is in many respects more instructive and novel than any of the previous exhibits. It is doubtful if there were ever so many new appliances on exhibition in any one year. Moreover, there are more new names on the list of exhibitors than has been true for many years past. The average amount of space per exhibitor is somewhat larger than usual. The machine tool exhibit would undoubtedly have surpassed that of any previous year had it not been that the demand for certain classes of these tools has been so great, because of the manufacture of war munitions, that some of the exhibitors had to cancel arrangements for space because they could not secure a single tool for the exhibition at Atlantic City. In spite of this, however, the machine tool exhibit is every bit as attractive and practically as large as that of last year, which was a record breaker.

THE MAN AND THE JOB

A REPORT of more than ordinary interest and importance is being made by Dean Herman Schneider, of the University of Cincinnati, at the annual meeting of the National Association of Corporation Schools, which is now in session at Worcester, Mass. Probably no problem has given progressive railway officers and foremen more anxiety than that of the selection of men—and this not only for the more important or supervising positions but for each individual job on the railroad. The efficiency of a particular piece of equipment or machinery has in many cases been studied and analyzed to the last detail, but when it comes to the human element which controls the machine, the great variety of factors involved, many of them apparently indeterminate, has baffled the ingenuity of railway officers and industrial managers in trying scientifically to select and train the men to secure maximum individual efficiency.

Many officers have been attracted in the past few years

by the possibility of selecting men on the basis of an examination of their physical and other visible characteristics; others have even gone to the study of phrenology. Then, too, applied experimental psychology has seemed to many to present great possibilities for the final and logical solution of the problem. Dean Schneider, in connection with the development of co-operative engineering courses at Cincinnati, has made it his business to have a critical study made of the progress and development of each individual student, both in the practical work in the shops and in the class rooms and laboratories of the university. There are probably at least 1,000 of these young men whose characteristics are thoroughly well known and whose progress has been followed critically. In studying these men from the standpoint of physical characteristics or phrenology, Dean Schneider has been forced to the conclusion that this method of selecting men is not at all reliable, and he reaches the same conclusion regarding applied experimental psychology, which he says seems now to be where chemistry was when it was alchemy.

The final conclusion reached is that the only way by which men can be properly selected for a given job is to actually test them out on the job. Summing up, Dean Schneider finds, first, that a worker's failure is as significant as his success and should be analyzed to indicate a new and fitting job; second, the characteristics developed by analysis of many successes and failures furnish a basis for placement which works better than any known plan; third, while this method is crude and unscientific and requires a period of time much greater than the other methods proposed, it insures a reliable verdict.

THE READING TYPE LOCOMOTIVE

THE Philadelphia & Reading has on more than one occasion exhibited at the Atlantic City conventions an example of motive power designing which has aroused the keen interest of railway mechanical officers. The locomotive which this road has placed on the track exhibit at the conventions this year is of the 4-4-4 type and has been designated by the builders as the "Reading" type. A description is published in another part of this issue. While the wheel arrangement is unique, the engine has in addition a number of special features which make it by far the most interesting example of motive power designing which has been placed in service in this country for some time. Among these may be mentioned the employment of a four-wheel trailing truck which is interchangeable with the leading truck, a boiler with a firebox unusually large for passenger service, a unique design of ashpan, a cable-operated reversing mechanism, hollow axles of a design which is believed to form a precedent, the use of aluminum to reduce the weight of the reciprocating parts, and a weight on each driving axle of 73,100 lb., a figure which exceeds that of any other locomotive on our records, the nearest being that of the Pennsylvania Pacific and Atlantic type locomotives exhibited at last year's conventions, which have a weight per axle of 66,700 lb. and 66,500 lb. respectively.

A glance at the locomotive is sufficient to show that every effort has been made to keep the weight of the running gear to a minimum in order to provide as large a boiler as possible. Heat-treated steel has been used wherever possible and aluminum is used in the crosshead shoes and the main valves; the appearance of the axles, the crosshead and guides and particularly the valve gear is most striking because of the evidence of the extreme lightness of the parts employed. No figure is available for the dynamic augment, but with a weight per driving axle of 73,100 lb. this would of necessity be kept within very reasonable limits, and the appearance of the reciprocating parts indicates that nothing was left undone to keep the augment as low as possible. The design of axle employed should result, with the heat treatment, in the production of a steel of very high quality and the results obtained in service from this feature of these locomotives should prove of exceptional value to locomotive designers.

With a tractive effort of 36,600 lb., it is plain that advantage has been taken of every bit of the 146,200 lb. weight on the drivers. In fact, it would seem that the designer has gone quite to the limit in this feature when we consider that the factor of adhesion is only 3.99. The maximum tractive effort, 36,600 lb., compares with 29,500 lb. for the Pennsylvania Atlantic type locomotive, class E6s, and 41,800 lb. for the Pennsylvania Pacific type locomotive, class K4s. The driving wheel diameter, 80 in., is the same for all three of these engines and the cylinder dimensions for the Reading engine and the Pennsylvania Atlantic type are the same; but the Reading locomotive has an advantage of 35 lb. per sq. in. in boiler pressure. The maximum tractive effort of the new locomotive is exceptional for an engine having only four drivers and is as high as that of many Pacific type locomotives now in service.

For comparison with its boiler the boilers of the same two Pennsylvania locomotives have been chosen, and some of the principal features of each are shown in the accompanying table.

	Grate Area, Sq. Ft.	Heat. Surf. Sq. Ft. Firebox.	Heat. Surf. Sq. Ft. Tubes.	Heat. Surf. Sq. Ft. Equivalent.
Reading 4-4-4..	108	292	2199	3509
P. R. R. 4-4-2..	55	196	2660	3937
P. R. R. 4-6-2..	70	288	3747	5766

It will be noted that there is but little difference between the firebox heating surface of the Reading type and the Pennsylvania Pacific type, although the Pennsylvania engine has a grate area of 70 sq. ft., as against 108 sq. ft. for the Reading locomotive, the latter, of course, being an anthracite coal burner. This is probably accounted for to a considerable extent by the increase in heating surface due to the square corners of a Belpaire firebox over the curved surfaces of a Wootten firebox. When comparing the Reading locomotive with the Pennsylvania Atlantic type, the latter falls far short in firebox heating surface, but a greater number of tubes, and these 18 in. longer than those of the Reading locomotive, give the Pennsylvania engine an advantage of about 400 sq. ft. in equivalent heating surface, the latter being the total evaporative heating surface plus one and one-half times the superheating surface. Employing the system of boiler proportioning developed by F. J. Cole and now used by the American Locomotive Company, the Reading engine has about an 83 per cent boiler.

Regarding the most unusual feature of the Reading locomotive, which is the 4-4-4 wheel arrangement, little can be said until the locomotives have been tried out pretty thoroughly in service. The designer doubtless had a good reason for employing this wheel arrangement, but a first glance at the engine would lead to the belief that with what is practically equivalent to a four point suspension, it would be likely to roll considerably. This, however, as well as other effects on the riding qualities, can only be determined from service results. The four-wheel trailing truck is probably as light as, if not lighter than, some designs of two-wheel trucks, although no figures are available for this weight, but it does not seem probable that it is lighter than the best designs of two-wheel trailer trucks now employed, and there is added another pair of bearings to maintain. That the officers of the Reading have confidence in the design, however, is evident from the fact that four of these locomotives are being built and the results of their operation will be watched with more than passing interest.

PROGRAM FOR THE WEEK
MASTER MECHANICS' CONVENTION

WEDNESDAY, JUNE 9, 1915
9.30 A. M. to 1.30 P. M.

Prayer	9.30 A. M. to 9.35 A. M.
Address of President	9.35 A. M. to 9.50 A. M.
Intermission	9.50 A. M. to 9.55 A. M.
To allow those who wish to retire to do so, although all are requested to remain.	
Action on minutes of convention of 1914	9.55 A. M. to 10.00 A. M.
Reports of Secretary and Treasurer	10.00 A. M. to 10.15 A. M.
Assessment and announcement of dues; appointment of committees on correspondence, resolutions, nominations, obituaries, etc.	10.15 A. M. to 10.25 A. M.
Election of auditing committee	10.25 A. M. to 10.30 A. M.
Unfinished business	10.30 A. M. to 10.35 A. M.
New business	10.35 A. M. to 10.45 A. M.
Discussion of reports on:	
Mechanical stokers	10.45 A. M. to 11.15 A. M.
Revision of standards	11.15 A. M. to 11.45 A. M.
Safety appliances	11.45 A. M. to 12.00 M.
Topical discussions:	
(1) Advantages, if any, of compounding superheater locomotives	12.00 M. to 12.30 P. M.
(2) Side bearings on tenders	12.30 P. M. to 1.00 P. M.
Discussion of report on:	
Smoke prevention	1.00 P. M. to 1.30 P. M.

ENTERTAINMENT

11.00 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.00 P. M.—*Social Gathering and Informal Dance.* Special Feature, Costume Recital, Miss Betty Lee. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

THURSDAY, JUNE 10, 1915
9.30 A. M. to 1.30 P. M.

Discussion of reports on:	
Locomotive headlights	9.30 A. M. to 10.15 A. M.
Design, construction and inspection of locomotive boilers	10.15 A. M. to 10.30 A. M.
Standardization of tinware	10.30 A. M. to 10.45 A. M.
Superheater locomotives	10.45 A. M. to 11.30 A. M.
Fuel economy	11.30 A. M. to 12.00 M.
Individual paper on:	
Variable Exhausts. By Mr. J. Snowden Bell	12.00 M. to 12.30 P. M.
Topical discussions:	
Tender derailments, causes and remedies. To be opened by Mr. H. T. Bentley	12.30 P. M. to 12.45 P. M.
Road instructions for enginemen and firemen	12.45 P. M. to 1.00 P. M.
Cross-head design. To be opened by Mr. A. R. Ayers	1.00 P. M. to 1.30 P. M.

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.30 P. M.—*Informal Dance.* Special Feature, Costume Recital, Miss Betty Lee. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

FRIDAY, JUNE 11, 1915
9.30 A. M. to 1.30 P. M.

Discussion of reports on:	
Joint meetings with M. C. B. Association	9.30 A. M. to 9.45 A. M.
Standardization of tinware	9.45 A. M. to 10.00 A. M.
Revision of air-brake and train signal instructions	10.00 A. M. to 10.15 A. M.
Train resistance and tonnage rating	10.15 A. M. to 10.30 A. M.
Locomotive counterbalancing	10.30 A. M. to 11.00 A. M.
Maintenance and operation of electrical equipment	11.00 A. M. to 11.15 A. M.
Forging specifications	11.15 A. M. to 11.30 A. M.
Boiler washing	11.30 A. M. to 11.45 A. M.
Dimensions of flange and screw couplings for injectors	11.45 A. M. to 12.00 M.
Subjects	12.00 M. to 12.05 P. M.
Resolutions, correspondence, etc.	12.05 P. M. to 12.15 P. M.
Unfinished business	12.15 P. M. to 12.30 P. M.
Election of officers, closing exercises	12.30 P. M. to 1.30 P. M.
Adjournment.	

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.00 P. M.—*Carnival Dance.* Special Feature, "Charlie Chaplin Fox Trot," Miss E. M. Kegel and Mr. Frank Carlin. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

ENTERTAINMENT FEATURES

Those attending the convention this year will find a number of new features in the entertainment program which will add materially to the pleasure of all. The most radical, and what bids fair to be the most appreciated change is that of holding all social gatherings and dances on the pier. The entertainment committee has arranged for the exclusive use of the entire pier on Wednesday, Thursday, Friday, Monday and Tuesday nights, only those wearing badges to be admitted.

One of the severest criticisms of Atlantic City as a meeting place has always been the fact that great difficulty has been found in keeping the crowd together. The concentrating of all entertainment features will do much toward correcting the trouble. In the past, also, the gatherings at the hotels have been much impaired because of lack of room, and the dancers especially will welcome this innovation.

The Don Richardson Orchestra will play at both the morning and afternoon concerts on the Million-Dollar Pier, as well as at the evening dances. Mr. Richardson, the leader, is a talented violinist. The orchestra, which was formed three years ago in New York City, has made a specialty of playing at private entertainments and club affairs. It has a reputation for spirited playing by its various members in special compositions, of which one or two are usually included in each of the programs. Mr. Richardson is the composer of several popular dance airs, and his orchestra was recently retained to make a number of dance records for the Columbia Graphophone Company.

Miss Betty Lee, who appears in special costume recitals at four of the informal dances, is a Southern girl, and has achieved great popularity in rendering the folklore songs of different nations. Her recitals of Southern and Japanese songs are said to be particularly good. She accompanied

the Boston Grand Opera Company on its Canadian tour last year and gave costume recitals as special numbers.

The Carnival Dance on Friday night will be one of the special attractions, and though we are not permitted to divulge the details, there are surprises in store for all.

A special vaudeville entertainment will be held in the Hippodrome on the end of the pier on Saturday night, this being the first time in five years this has been done.

The Second Annual Golf Tournament, open to members of the A. R. M. M. A., M. C. B. A., R. S. M. A. and official registered guests, will be held on June 13, at the Sea View Golf Club, further details of which will appear in The Daily.

ATTEND THE OPENING EXERCISES

The opening exercises of the Master Mechanics' Association will be held in Convention Hall at 9:30 o'clock this morning and all the convention visitors, and particularly the ladies, are invited to attend them. The enlargement of the hall has given it such an increased seating capacity that a much larger number can be accommodated than has been the case in past years, and it is hoped that the guests and more particularly the ladies will take advantage of the opportunity to be present at least at the opening session.

INFORMATION BUREAU, TICKET OFFICE AND POST OFFICE

An Information Bureau is located on the Pier adjoining the Registration Booth. In conjunction with this bureau, the Pennsylvania Railroad and the Philadelphia & Reading have established a local office where tickets and reservations may be secured.

United States mail addressed in care of the Secretary's Office, Million Dollar Pier, Atlantic City, will be taken care of and distributed direct to the exhibitors' booths.

SPECIAL TRAIN FROM CHICAGO

The Chicago M. M. and M. C. B. Pennsylvania special train, consisting of an observation car, seven sleepers, two dining cars and a combination baggage and club car, arrived at Atlantic City at 4.32 P. M. Tuesday. This train left Chicago at 5.30 P. M. Monday as second section of the Pennsylvania Limited No. 2, instead of at 3 P. M. as in former years. The train was in charge of E. K. Bixby, district passenger agent, Pennsylvania Lines.

REGISTRATION

The work of registering M.M. and M.C.B. members was started on Monday afternoon at two o'clock and since that time the booth has been pretty steadily patronized except when it was closed for short periods at the lunch and dinner hours. For the remainder of the conventions the following schedule will be followed for the registration of members and their guests:

Wednesday	(9th).....	9	to 1.30;	2	to 6	P. M.;	7	to 9 P. M.
Thursday	(10th).....	9	to 1.30;	2	to 6	P. M.;	7	to 9 P. M.
Friday	(11th).....	9	to 1.30;	2	to 6	P. M.;	7	to 9 P. M.
Saturday	(12th).....	9	to 1				5.30	to 9 P. M.
Sunday	(13th).....	10	to 12;	2	to 4	P. M.		
Monday	(14th).....	9	to 1;	2.30	to 6	P. M.		
Tuesday	(15th).....	9.30	to 12;	2	to 4.30	P. M.		
Wednesday	(16th).....	9	to 11 A. M.					

The greater number of the members of the Railway Supply Manufacturers' Association registered on Monday and Tuesday. Newcomers may register at the times shown below during the remaining days of the conventions:

Wednesday	(9th).....	9	to 12 A. M.;	1.30	to 5	P. M.;	7	to 9 P. M.
Thursday	(10th).....	9	to 12 A. M.;	1.30	to 5	P. M.		
Friday	(11th).....	9	to 12 A. M.					
Saturday	(12th).....	9	to 1 P. M.				5.30	to 9 P. M.
Sunday	(13th).....	10	to 12 A. M.					
Monday	(14th).....	9	to 12 A. M.;	2	to 5	P. M.		
Tuesday	(15th).....	9	to 12 A. M.;	2	to 5	P. M.		
Wednesday	(16th).....	9	to 11 A. M.					

The following rules, which are quite similar to those of last year and which are authorized by the M.M. and M.C.B. Associations, will govern the registration of M.M. and M.C.B. members and their guests. These will be strictly enforced:

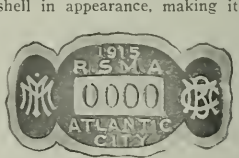
"Badges for members of the Master Mechanics' Association, Master Car Builders' Association, or special guests, shall not be given to any but the rightful owners. No member of the Railway Supply Manufacturers' Association will be permitted to pay for or take one for delivery except upon the owner's written order, and the receiver must sign for the badge.

"No badges shall be issued to members of the Master Car Builders' Association except on the payment of a fee of $1.00. The Master Mechanics' Association and special guest badges will be issued to those entitled to them free of all charges until noon Saturday, June 12, at which time M.M. badges will be withdrawn and a charge of $1.00 will be made for all special guest badges, except that a member of the Master Mechanics' Association taking out a special guest badge and paying the fee of $1.00 will be given his M.M. badge gratis. Likewise members of the M.M. Association who are also members of the M.C.B. Association can get their M.M. badge by paying for the M.C.B. badge."

THE BADGES

Last year a radical change was made in the design of the badges; while those used this year are somewhat similar in general design they differ greatly in appearance from anything which has heretofore been used. The M.M. and M.C.B. badges have the standard enameled emblems included in the center of the badge, presenting a possibly somewhat more symmetrical appearance than the scheme which was followed last year in which the emblem was placed off center and near the upper part of the badge.

The corrugations on the outer edge of the badge, with the projection on the lower side, which carries the number, resemble somewhat a seashell in appearance, making it specially appropriate for use at Atlantic City. The Railway Supply Manufacturers' Association badge is elongated rather than circular, as it was last year, and is not so conventional. The M.M. and M.C.B. monograms on either end of the badge add to the artistic effect. For the supply men the enamel on the badges is royal blue; for the supply ladies, white; for the railroad ladies, light blue; for the complimentary men's badges, red, and for the complimentary ladies' badges, yellow.



Railway Supply Manufacturers' Association Badge

M.M. Badge

M.C.B. Badge

WOMEN EMPLOYEES OF THE RAILWAYS OF RUSSIA.—The steps recently taken to introduce women as railway workers in the United Kingdom make it interesting to note that there are between 20,000 and 30,000 women regularly employed on the Russian State railways as gatekeepers, clerks and telegraph operators.

The Railway Supply Manufacturers' Association.

The Remarkable Exhibit of Railway Appliances at the Conventions is Due to the Efforts of this Organization

The work of the Railway Supply Manufacturers' Association is so well understood by attendants at the convention that it would be superfluous to describe it in detail. When one reviews the wonderful exhibition of railway supplies and machinery and considers the vast amount of detail planning which must have been done in advance to get it all delivered to and properly arranged on the Pier, the task appears to be a stupendous one. While the exhibition is somewhat smaller than usual this year the officers of the Association are to be congratulated on the fact that in spite of the peculiar business conditions it covers about 70,000 sq. ft. of space. That officers and committee members of the Association have done some tall hustling is indicated by the large percentage of exhibitors who are at Atlantic City this year for the first time.

But the gathering together and arrangement of the exhibit is only part of the work of the Association—entertainment features must be looked after; transportation matters both as to railroads and the use of roller chairs must be given much attention; the enrollment committee must painstakingly see that several thousand attendants are properly registered and that classified printed lists of the total enrollment are issued each day; the hotel committee sees to it that arrangements are made for the accommodation of the convention attendants at the hotels; and the badge committee looks after the designing and providing of the badges. Then there is the finance committee, with the responsibilities which always rest upon such a committee, and the committee on by-laws, which studies the needs of the Association and sees that the by-laws are revised from time to time in order that the Association may do its work most effectively.

The Association is headed this year by President J. Will Johnson, general manager of the Pyle-National Electric Headlight Company, with which company he has been associated for almost 13 years, as noted in the sketch of his career which appeared in the *Daily* of June 10, 1914, page 1263. For many years Mr. Johnson has been one of the most energetic and efficient workers in the R. S. M. A. Among other positions he has been chairman of the entertainment committee, chairman of the exhibit committee and vice-president, and in all these offices did work which contributed greatly to the success of the conventions. It should be added that when there was a band he was one of the most tuneful members of it. His advancement to the office of president was an honor well earned and well deserved.

Oscar F. Ostby, vice-president of the Association, is with the Commercial Acetylene Railway Light & Signal Company, and last year was chairman of the exhibit committee of the Association. This year in addition to his duties as vice-president he is chairman of the hotel committee. An outline of his past achievements appeared in the *Daily* of June 10, 1914, page 1265.

The secretary-treasurer, John D. Conway, devotes all of his time to the affairs of the Association and has officiated as its secretary since 1910.

EXECUTIVE COMMITTEE

The executive committee is distributed over seven geographical districts as follows: First district (New England states and Canada), one member—F. M. Nellis, Westinghouse Air Brake Company, Boston, Mass. Second district (New York and New Jersey), three members—J. C. Currie, Nathan Manufacturing Company, New York City; O. F. Ostby, Commercial Acetylene Railway Light & Signal Company, New York City; and C. B. Yardley, Jr., Lubricating Metal Company, New York City. Third district (Pennsylvania), two members—P. J. Mitchell, Philip S. Justice & Co., Philadelphia; and C. E. Postlethwaite, Pressed Steel Car Company, Pittsburgh, Pa. Fourth district (Ohio, Indiana and Michigan), two members—C. F. Elliott, Acme White Lead & Color Works, Detroit, Mich.; and J. C. Whitridge, Buckeye Steel Castings Company, Columbus, Ohio. Fifth district (Illinois, Wisconsin, Iowa and Minnesota), two members—J. H. Kuhns, Republic Rubber Company, Chicago; and George H. Porter, Western Electric Company, Chicago. Sixth district (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Kentucky and Tennessee), one member—Frank E. Beal, Magnus Metal Company, Altanta, Ga. Seventh district (states west of the Mississippi river, including Louisiana, but excepting Iowa and Minnesota), one member—S. M. Dolan, Chicago Varnish Company, St. Louis, Mo.

Four of these members will automatically retire at the close of the convention, including F. M. Nellis (first district), Oscar F. Ostby (second district), J. C. Whitridge (fourth district), and S. M. Dolan (seventh district).

The four new members of the executive committee elected last year were F. E. Beal, sixth district; Philip Justice Mitchell, and C. E. Postlethwaite, third district; and George H. Porter, fifth district. Brief sketches of these new members follow:

F. E. Beal is a Wolverine, having been born in Detroit. After finishing a high school and a Detroit Business College course he entered the employ of the Fulton Iron & Engine Works in the early eighties as timekeeper. Later he was promoted to the position of assistant cashier, and then bookkeeper. This company was at that time owned by J. B. Wayne, Senator James McMillan and Congressman John S. Newbury and was engaged in the manufacture of car journal bearings under the original Hopkin's patent for lead lined bearings and saw mill machinery. Mr. Beal succeeded to the position of cashier and bookkeeper and served in that capacity until Mr. Wayne's death, when he was appointed assistant general manager, which position he held until 1902 when the company was sold to the National Fulton Brass Manufacturing Company. He was made vice-president, remaining in that position until 1905, when the business was purchased by the Magnus Metal Company. In 1907 Mr. Beal was transferred to New York City as sales manager for the Magnus Metal Company, and after serving in this position for two years was transferred in 1909 to the position of manager of shop operations and sales department of the Georgia plant of that company.

Philip Justice Mitchell was born in Philadelphia and educated at the Friends' Central High School of that city. For several years he was employed by a large banking and shipping concern, and in 1886 went with the firm of Philip S. Justice & Co., importers and dealers in railway specialties. It is said that this firm imported the first steel rails used in the United States. On the death of Philip S. Justice in 1901 Mr. Mitchell, with his father, J. Howard Mitchell, formed the partnership under the same firm name, Philip S. Justice & Co., which continued until the death of his father in 1912. In addition to conducting the business of Philip S. Justice & Co., Mr. Mitchell is treasurer of Dienelt & Eisenhardt, Inc., engineers and machinists, and treasurer of the Lovekin Pipe Expanding & Flanging Machine Company, both of Philadelphia.

George H. Porter, in charge of the steam railway sales department of the Western Electric Company, Chicago, was

R. S. M. A. Officers, Executive Committee Members and Committee Chairmen

J. H. Kuhns
Chairman, Exhibit Committee

F. M. Nellis
Chairman, Finance Committee

J. Will Johnson
President

John D. Conway
Secretary-Treasurer

Oscar F. Ostby
Vice-President

C. F. Elliott
Chairman, By-Laws Committee

George R. Carr
Chairman, Entertainment Committee

C. B. Yardley, Jr.
Chairman, Badge Committee


Frank E. Beal
J. C. Whitridge
Harold A. Brown
Chr., Enrollment Committee
S. M. Dolan
George T. Cooke
Chr., Transportation Committee
J. C. Currie
Philip J. Mitchell
C. E. Postlethwaite
George H. Porter

chairman of the transportation committee at the 1914 convention; a brief sketch of his career was given in the *Daily Railway Age Gazette* of June 10, 1914, page 1265.

C. E. Postlethwaite, manager of sales for the central district for the Pressed Steel Car Company, Pittsburgh, Pa., was born in Mount Union, Huntington county, Pa., and after graduating from the Altoona high school in 1883 entered the service of the Pennsylvania Railroad, where he remained until 1890, acting successively as rodman, telegraph operator and car clerk. For the following nine years he was connected with the Norfolk & Western as chief clerk to the general superintendent and later as assistant to the general agent. He became connected with the Schoen Pressed Steel Car Company in October, 1897, shortly after the first steel freight cars were built, and remained with the company when it was merged into the Pressed Steel Car Company. He entered the sales department in February, 1902.

EXHIBIT COMMITTEE.

Joseph H. Kuhns is chairman of this committee, with J. C. Whitridge and C. E. Postlethwaite, also members of the executive committee, as the other two members.

ENTERTAINMENT COMMITTEE.

George R. Carr, vice-president of the Dearborn Chemical Company, Chicago, is chairman of this committee, which is responsible for providing the entertainment features during the convention. One of the notable features of the program this year will be the golf tournament, which is noticed at length in another part of this issue. The other members of the entertainment committee are M. G. Baker, American Vanadium Company, Pittsburgh, Pa.; E. H. Bankard, Jr., Cambria Steel Company, Chicago; Walter H. Bentley, Curtain Supply Company, Chicago; G. R. Berger, Gould Coupler Company, Chicago; B. A. Clements, Worth Brothers Company, Chicago; C. W. F. Coffin, Franklin Railway Supply Company, Chicago; J. F. A. Comstedt, Atlas Automatic Jack Corporation, New York City; T. K. Dunbar, Acme Supply Company, Chicago; C. D. Eaton, American Car & Foundry Company, St. Louis, Mo.; R. J. Faure, Commercial Acetylene Railway Light & Signal Company, New York City; J. F. Forney, Ralston Steel Car Company, Baltimore, Md.; R. H. Gwaltney, T. H. Symington Company, New York City; H. W. Hegeman, U. S. Metal & Manufacturing Company, New York City; Langley Ingraham, Yarnall Paint Company, Philadelphia, Pa.; C. D. Jenks, Edwin S. Woods Company, Chicago; W. K. Krepps, Crucible Steel Company, New York City; J. B. Landreth, Garlock Packing Company, Chicago; Albert MacRae, MacRae's Blue Book, Chicago; William W. Melcher, Massachusetts Mohair Plush Company, Boston, Mass.; Burton W. Mudge, Burton W. Mudge & Co., Chicago; G. E. Ryder, Locomotive Superheater Company, New York City; D. E. Sawyer, Illinois Steel Company, Chicago; Harold N. Scott, Griffin Wheel Company, Chicago; L. B. Sherman, Railway Age Gazette, Chicago; A. B. Wegener, Camel Company, Chicago.

George R. Carr, chairman of the committee, was born at Argenta, Ill., where he attended the public schools. In the fall of 1893 he moved to Chicago, where he has since lived and where he attended the Austin High School. He was graduated at the University of Illinois, School of Chemistry, in 1901. Immediately after graduation he entered the service of the Dearborn Chemical Company in the sales department and has been with that company in various capacities continuously since that time. He was elected vice-president and general manager in the spring of 1908, which position he now holds.

TRANSPORTATION COMMITTEE.

This committee has charge of all matters referring to transportation and is headed by George T. Cooke, Chicago Car Heating Company, New York City. The other members of the committee are E. A. Averill, Standard Stoker Company, New York; W. Anderson, The Pantasote Company, Chicago; J. T. Anthony, American Arch Company, New York; R. W. Benson, American Flexible Bolt Company, New York; C. C. Bradford, U. S. Light & Heating Company, Niagara Falls, N. Y.; D. L. Clement, Pratt & Lambert Company, New York; H. Chamberlain, Transportation Utilities Company, New York; A. N. Dugan, Bronze Metal Company, New York; L. S. Hungerford, Jr., Peerless Rubber Manufacturing Company, Chicago; A. S. Lewis, Chicago-Cleveland Car Roofing Company, New York; A. L. McNeill, Central Electric Company, Chicago; T. P. O'Brian, O. M. Edwards Company, New York; H. K. Porter, U. S. Metal & Manufacturing Company, Atlanta, Ga.; J. L. Randolph, Economy Devices Corporation, New York; C. C. Schumaker, The Carborundum Company, Chicago; L. S. Wright, National Malleable Castings Company, Chicago.

The chairman, George T. Cooke, was born in Chicago, May 28, 1883, and was graduated from the grammar and high schools of that city, after which he received a mechanical training and entered the service of the Pullman Company as a draftsman in 1901. Later he was made chief draftsman of the repair department, then chief repair inspector, and finally mechanical inspector. In 1911 he resigned his position with the Pullman Company to accept a position with the Chicago Car Heating Company as southern manager, with headquarters in Atlanta, Ga. This position he held for two years, and in 1913 was transferred to New York as eastern manager, which position he now holds.

ENROLLMENT COMMITTEE.

Harold A. Brown, eastern representative of the Pocket List of Railroad Officials, New York, is chairman of this committee for the second time, having held the same position last year. A sketch of Mr. Brown's career was published in the *Daily* of June 10, 1914, page 1265. The work of the enrollment committee is most exacting, and during the past few years a considerable improvement has been made in organizing it so as to distribute it more evenly among the various members and thus not demand too much of any one of them.

The other members of the committee are F. N. Bard, The Barco Brass & Joint Company, Chicago; G. A. Barden, Chicago Pneumatic Tool Company, Philadelphia, Pa.; C. W. Beaver, Yale & Towne Manufacturing Company, New York; W. J. Fleming, Jr., Automatic Ventilator Company, New York; Charles H. Gayetty, Quaker City Rubber Company, Philadelphia, Pa.; L. D. Mitchell, Detroit Graphite Company, Chicago; R. F. Moon, Westinghouse Electric & Manufacturing Company, Philadelphia; E. T. Sawyer, Commercial Acetylene Railway Light & Signal Company, New York; F. H. Smith, Gold Car Heating & Lighting Company, New York; T. D. Starr, Wm. C. Robinson & Son Co., Philadelphia; J. A. Stevens, F. W. Devoe & C. T. Raynolds Company, New York; and H. G. Thompson, Edison Storage Battery Company, Orange, N. J.

BADGE COMMITTEE.

C. B. Yardley, Jr., is chairman of this committee, of which Oscar F. Ostby and George H. Porter are the other two members, all being members of the executive committee. Mr. Yardley has been president during the past year of the Railway Materials Association, associated with the Railway Storekeepers' Association. A sketch of his career appeared on page 1266 of the *Daily* of June 10, 1914. Since that time he has been connected with William C. Robinson & Son Company, and on the first of this month went with the Lubricating Metal Company, New York, as manager of the railway department.

COMMITTEE ON BY-LAWS

C. F. Elliott is chairman of this committee, with F. E. Beal and George H. Porter as the two other members, all three being members of the executive committee.

HOTEL COMMITTEE

Oscar F. Ostby, vice-president of the Association, is chairman of this committee, with S. M. Dolan and P. J. Mitchell, both of the executive committee, as his associates.

FINANCE COMMITTEE

F. M. Nellis, who last year was chairman of the committee on by-laws, is this year chairman of the finance committee and has as his associates J. C. Currie and C. F. Elliott. A brief sketch of Mr. Nellis' career appeared in the *Daily* of June 10, 1914, page 1266.

MOTT SHERWOOD KILLED

M. E. Sherwood, master mechanic of the Michigan Central at Jackson, Mich., was shot and killed while automobile riding with his wife and a party of friends in the fair grounds at Jackson last Friday evening at 9.30 o'clock. It was at first believed that he had died of apoplexy, but examination later developed the fact that a bullet had entered the back just below the left shoulder and passed through the heart. Apparently the shot was fired by boys in the grand stand who were shooting at the lights and tires of passing automobiles. Mr. Sherwood entered the employ of the Michigan Central about 25 years ago as a mechanic and was made a master mechanic five years ago. He was 46 years of age and is survived by a widow and a son, William.

ROLLER CHAIRS

The Transportation Committee has issued the following instructions for the use of roller chairs during the conventions.

"Roller chairs will be furnished free from the following four stations at the periods noted and only to members wearing the official badges:

The Pier	9.00 A. M.	to	6 P. M.
Marlborough-Blenheim	9.00 A. M.	to	6 P. M.
Chalfonte Hotel	9.00 A. M.	to	6 P. M.
Strand Hotel	9.00 A. M.	to	6 P. M.
To both informal dances on pier	8.30 P. M.	to	10 P. M.

"Unoccupied chairs may be stopped at any point on the Boardwalk, except between the Marlborough-Blenheim and the Pier, and they may be used in either direction, but must be reported at the first checking station passed. Convention chairs are not allowed to wait more than fifteen minutes.

"Any of Shill's chairs may be had after hours for a continuous trip in any one direction for 25 cents per person. Hourly riding can be arranged for on the regular rate basis. Private chairs may be secured at special rates through the Transportation Committee only."

MASTER MECHANICS' REGISTRATION

Aldcorn, Thomas, Chicago Pneumatic Tool Co.; Shelburne.
Averill, E. A., Standard Stoker Co.; Shelburne.
Babcock, W. G., M. M.; N. Y. C.; Sterling.
Barry, Frank J., M. M.; N. Y. O. & W.; Traymore.
Bentley, H. T., S. M. P. & M.; C. & N. W.; Blenheim.
Boyden, J. A., M. M.; Erie; Chalfonte.
Boyden, N. N., M. M.; Southern; Shelburne.
Boulineau, W. W., M. M.; C. of Ga.; Chalfonte.
Cole, F. J., Chief Consult. Engr.; Amer. Loco. Co.; Blenheim.
Cooper, F. R., Supt. M. P.; Hobart Allfree Co.; Dennis.
Daley, W. W., M. M.; N. Y. O. & W.; Traymore.
Davis, John E., M. M.; Hock. Val.; Chalfonte.
Davis, Wm. P., M. M.; N. Y. C.; Sterling
Depue, G. T., Gen. Supt.; Erie; Dennis.
Dolan, S. M., Chicago Varnish Co.; Dennis.
Dooley, W. H., S. M. P.; Q. & C.; Dennis.
Endsley, Prof. L. E., Prof. of Ry. Mech. Engr.; Univ. of Pittsburgh.
Ferry, F. C., M. M.; L. H. & St. L.; Absecon.
Fetner, W. H., M. M.; C. of Ga.; Chalfonte.
Flynn, Walter H., S. M. P.; Mich. Cent.; Blenheim.
Giles, C. F., Supt. Mchy.; L. & N.; Chalfonte.
Glass, John C., M. M.; P. R. R.
Graburn, Al., M. E.; Can. Nor.; Blenheim.
Hayes, W. C., Supt. Loco. Oper.; Erie; Chalfonte.
Henderson, Geo. R. Consult. Engr.; Galen Hall.
Hogan, C. H., A. S. M. P.; N. Y. C.; Blenheim.
Hyndman, F. T., S. M. P. & Cars, W. & L. E.; Blenheim.
James, Charles, M. M.; Erie; Dennis.
Kells, Willard, A. S. M. P.; A. C. L.; Dennis.
Kinney, M. A., S. M. P.; Hock. Val.; Traymore.
Laizure, L. H., M. M.; Erie; Alamac.
Leach, W. B., Hunt, Spiller Mfg. Co.; Blenheim.
Lewis, W. H., S. M. P.; N. & W.; Blenheim.
MacBain, D. R., S. M. P.; N. Y. C.; Blenheim.
McCarthy, M. J., S. M. P.; C. H. & D.; Blenheim.
McQuillen, J. E. Mech. Supt.; G. C. & S. F.; Traymore.
Montgomery, H., M. M.; P. R. R.; Ardmore.
Montgomery, Hugh, S. M. P.; Rutland; Dennis.
Moore, B. R., S. M. P.; D. & I. R.; Traymore.
Parish, LeGrand, American Arch Co.; Blenheim.
Parks, G. E., M. E.; Mich. Cent.; Blenheim.
Pfafflin, Louis, M. M.; Indianapolis Union.; Biscayne.
Pratt, E. W., A. S. M. P.; C. & N. W.; Blenheim.
Pratt, John G., Hunt Spiller Mfg. Co.; Dennis.
Rae, Clark H., A. S. M. P.; L. & N.; Chalfonte.
Randolph, V. C., M. M.; Erie; Alamac.
Shoemaker, H. Mech. Supt.; Bangor & Aroostook; Traymore.
Smith, P. F., Jr.; S. M. P.; Penna. Lines; Brighton.
Smith, R. D., S. M. P.; Boston & Albany; Dennis.
Sprowl, N. E., S. M. P.; A. C. L.; Chalfonte.
Riley, Geo. N.; S. M. P.; McKeesport Conn.; Blenheim.
Strauss, M. H.; M. M.; N. Y. C.; Sterling.
Symons, J. E., M. M.; C. C. & S. F.; Traymore.
Taylor, Jos. W., Secty.; A. R. M. M. Assn.; Blenheim.
Turnbull, R. J., Mech. Supt.; Mo. Pac.; Chelsea.
Wagstaff, Geo., American Arch Co.; Chalfonte.
Watson, R. B., Engr. Tests; Erie; Traymore.
Wildin, G. W., Mech. Supt.; N. Y. N. H. & H.; Chalfonte.
Wright, R. V., Managing Editor, Railway Age Gazette, Dennis.

MASTER CAR BUILDERS' REGISTRATION

Bentley, H. T., S. M. P. & M.; C. & N. W.; Blenheim.
Boyden, N. N., M. M.; Southern, Shelburne.
Dooley, W. H., S. M. P.; Q. & C.; Dennis.
Endsley, Prof. L. E., Prof. of Ry. Mech. Engr.; University of Pittsburgh, Chalfonte.
Ferry, F. C., M. M.; L. H. & St. L.; Absecon.
Flynn, Walter M., S. M. P.; Mich. Cent.; Blenheim.
Giles, C. F., Supt. Mchy.; L. & N.; Chalfonte.
Graburn, A. L., M. E.; Can. Nor.; Blenheim.
Grimm, E. B., Ch. Draftsman, N. P.; Dennis.
Hyndman, E. T., S. M. P. & Cars, W. L. E.; Blenheim.
Justus, I. J., Ch. Car Insp.; N. Y. C.; Blenheim.
Kells, Williard, A. G. S. M. P.; A. C. L.; Dennis.
Kinney, M. A., S. M. P.; Hock. Val.; Traymore.
Lewis, W. H., S. M. P.; N. & W.; Blenheim.
MacBain, D. H., S. M. P.; N. Y. C.; Blenheim.
McQuillen, J. E., Mech. Supt., G. C. & S. F.; Traymore.
Montgomery, Hugh, S. M. P.; Rutland, Dennis.
Moore, B. R., S. M. P.; D. & I. R.; Traymore.
Pratt, E. W., A. S. M. P.; C. & N. W.; Blenheim.
Rae, Clark H., A. S. M. P.; L. & N.; Chalfonte.
Shoemaker, H., Mech. Supt. Bangor & Aroostook, Traymore.
Smith, P. F., Jr.; S. M. P.; Pa. Lines, Brighton.
Smith, R. D., S. M. P.; Boston & Albany, Dennis.
Taylor, Jos. W., Secty., M. C. B. Assn.; Blenheim.
Turnbull, R. J., Mech. Supt.; Mo. Pac.; Chelsea.
Wildin, G. W., Mech. Supt. N. Y., N. H. & H.; Chalfonte.
Wright, R. V., Managing Editor Railway Age Gazette, Dennis.

SPECIAL GUESTS

Alleman, C. W., Supt. of Stores, P. & L. E.; Overbrook.
Bell, J. Snowden, Wiltshire.
Boring, T. J., M. P. Insp., P. R. R.; Arlington.
Chambers, Andrew, Retired Engr.
Coe, C. W., Supt.; W. & L. E.; Blenheim.
Crosby, R. M., Gen. M. M.; N. P.; Dennis.
Ferry, Miller, Absecon.
Gibson, J. A. B., M. E.; R. F. & P.; Blenheim.
Grimm, E. L., Ch. Draftsman, N. P.; Dennis.
Healey, J. M., Atl. City Press.
Kadel, B. W., Draftsman, M. P. Dept. N. & W., Maryland.
Kilpatrick, H. F., Chalfonte.
Merrill, Arthur J., Secty; S. & S. W. Ry. Club, Dennis.

Moody, W. O., M. E. I C., Shoreham.
Oakes, C. E., M. E.; K. C. So.; Craig Hall.
Steinmeyer, C. S., Asst. Engr.; Monongahela Con., Strand.
Storey, J. W., C. D., C. of Ga.; Arlington.
Wightman, D. A., Dennis.

THE GOLF TOURNAMENT

The second annual golf tournament, open to members of the A.R.M.M.A., M.C.B.A., R.S.M.A., and official registered guests, will be held on June 13 at the Sea View Golf Club. The tournament will consist of two contests run simultaneously, one an 18-hole Medal Play Handicap, the other an 18-hole Kickers Handicap. Loving cups will be presented to the three low men in each contest.

The winning score in the Kickers Handicap will be between 71 and 76 inclusive. Each participant in this tournament will have the privilege of selecting his own handicap prior to starting, with a view of securing a net score from 71 to 76 inclusive. Net scores under or over 71 to 76 respectively will be disqualified. In case of ties in either the 18-hole Medal Play Handicap

Reproduction of the Golf Tournament Poster

or in the 18-hole Kickers Handicap additional rounds will be played by those who are tied, either on Monday, June 14, or Tuesday, June 15, at the Sea View Golf Club.

The Sea View Golf Club is a private course, and it is through the personal invitation of its President, Clarence H. Geist, that our associations are privileged to hold the tournament there. No entrance fees for the tournament will be charged by the Association, but the club will levy the usual greens fee of $1.00 per day per person.

Entries for both tournaments can be made to any of the members of the golf committee, prior to June 13, or can be made at the first tee on June 13, prior to starting. The golf committee consists of E. H. Bankard, Jr., chairman; L. B. Sherman, C. D. Jenks, D. E. Sawyer, H. N. Scott, M. G. Baker, R. H. Gwaltney, and C. R. King.

In order that adequate luncheon preparations may be made at the club Sunday noon, the manager of the Sea View Golf Club has been advised that between 75 and 100 golfers will probably have luncheon there. It will therefore be wise to make reservations for tables, etc., as early as possible.

The Bergdoll Taxicab Company has agreed to take any number of persons up to six in a car to the Sea View Golf Club and return for $5.00. If the party requests a layover, a charge of $2.00 for each hour of the layover will be added to the round trip rate. The golf committee suggests that in order to make transportation to and from the club as economical as practicable, those desiring to play golf shall make up parties of six or less in advance, and the taxicab company will deliver its cars wherever it is instructed to.

RECTANGULAR EXHAUST NOZZLE

The illustration shows a rectangular exhaust nozzle which is being exhibited by the Economy Devices Corporation. This nozzle is claimed to produce a jet, the gas entraining surface of which is increased 20 per cent over that of the circular nozzle having an equivalent area, the production of draft being thus increased without resort to bridges or other obstruction which impede the flow of steam and result in

Rectangular Exhaust Nozzle

increased back pressure. It is also claimed that the jet formed by this nozzle is better adapted to fill the stack under all conditions than the usual jet of circular section. Under ordinary operating conditions the horsepower required to produce draft often forms a considerable portion of the total output of the engine and any means whereby the necessary draft may be produced with a decreased back pressure may be expected to result in a saving in fuel consumption.

CHILEAN RAILWAY CONSTRUCTION.—The following railways are in course of construction in Chile at the present time: Iquique-Pintados, 842 men, beginning excavation; Rancagua-Donihue, 60 men, rail laying completed; Alcones-Pichilemu, 217 men, grading; Linares-Colbun, 69 men, grading; Pinto-Recinto, 88 men, track is laid; Confluencia to Tome and Penco, 1079 men, track is laid to kilometer 78; Selva Oscura-Curacautin, 129 men, grading; Cajon-Llaima, 155 men, track laid to kilometer 52.5.

A Passenger Locomotive of Unusual Interest

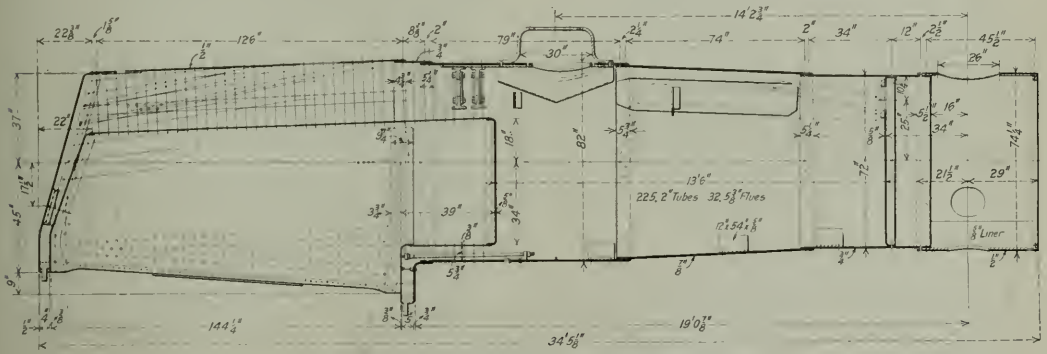
New Reading Engine of the 4-4-4 Type Has a Weight of 73,000 lb. per Driving Axle; Large Firebox Heating Surface

The Philadelphia & Reading has on exhibition at the conventions a locomotive of a new type, which has been designated as the "Reading" type, and has a 4-4-4 wheel arrangement, a four-wheel truck being employed under the firebox. This truck is interchangeable with the leading truck. The locomotive is the first of four which were designed and are being built at the company's shops at Reading, Pa., for heavy, fast passenger service.

These engines have a number of interesting and unusual features, apart from the wheel arrangement. These include a special design of back frame and ashpan, hallow axles with an unusual amount of metal removed from the centers, a cable-operated reverse gear and a weight on drivers of 146,200 lb., or 73,100 lb. per axle. Heat-treated steel has been liberally employed to reduce weight, and aluminum was resorted to for this purpose in the crossheads and some other parts.

A back frame is placed longitudinally under the central portion of the firebox. This frame is constructed of two rolled plates 1 in. by 30 in. by 16 ft. 9¼ in., flanged to a pulling casting to its back end. This back frame provides a passage-way for a reversing cable and piping, five lines of piping passing through it.

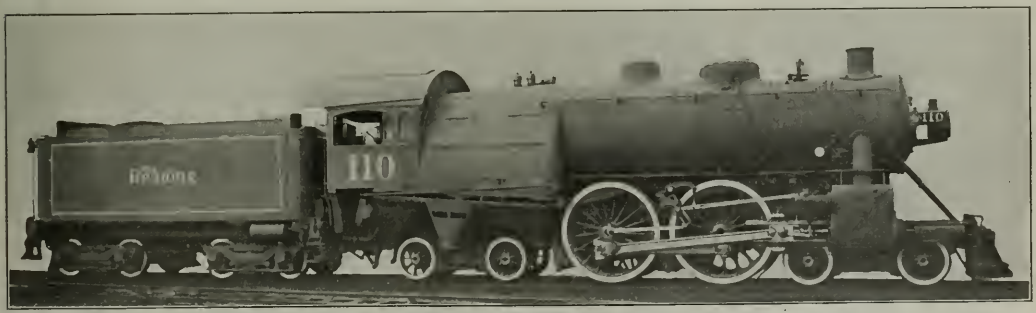
Three conical ashpans are provided on each side of the locomotive, giving large, self-cleaning receptacles, which also provide ample air openings at a considerable distance below the grates. Flatly flaring sides, where ashes can collect, are eliminated. The middle pans on each side catch the light rakings, which, in emptying the pans, can be dropped to the side of the track outside the rails, or deflected between the rails into the pit, by means of a short chute. The front and back pans receive the fire and ashes from the front and back drop-grates, when the fires are cleaned, and discharge it into the pit between the rails, ahead of and behind the truck.



The Boiler of the Reading 4-4-4 Type Locomotive

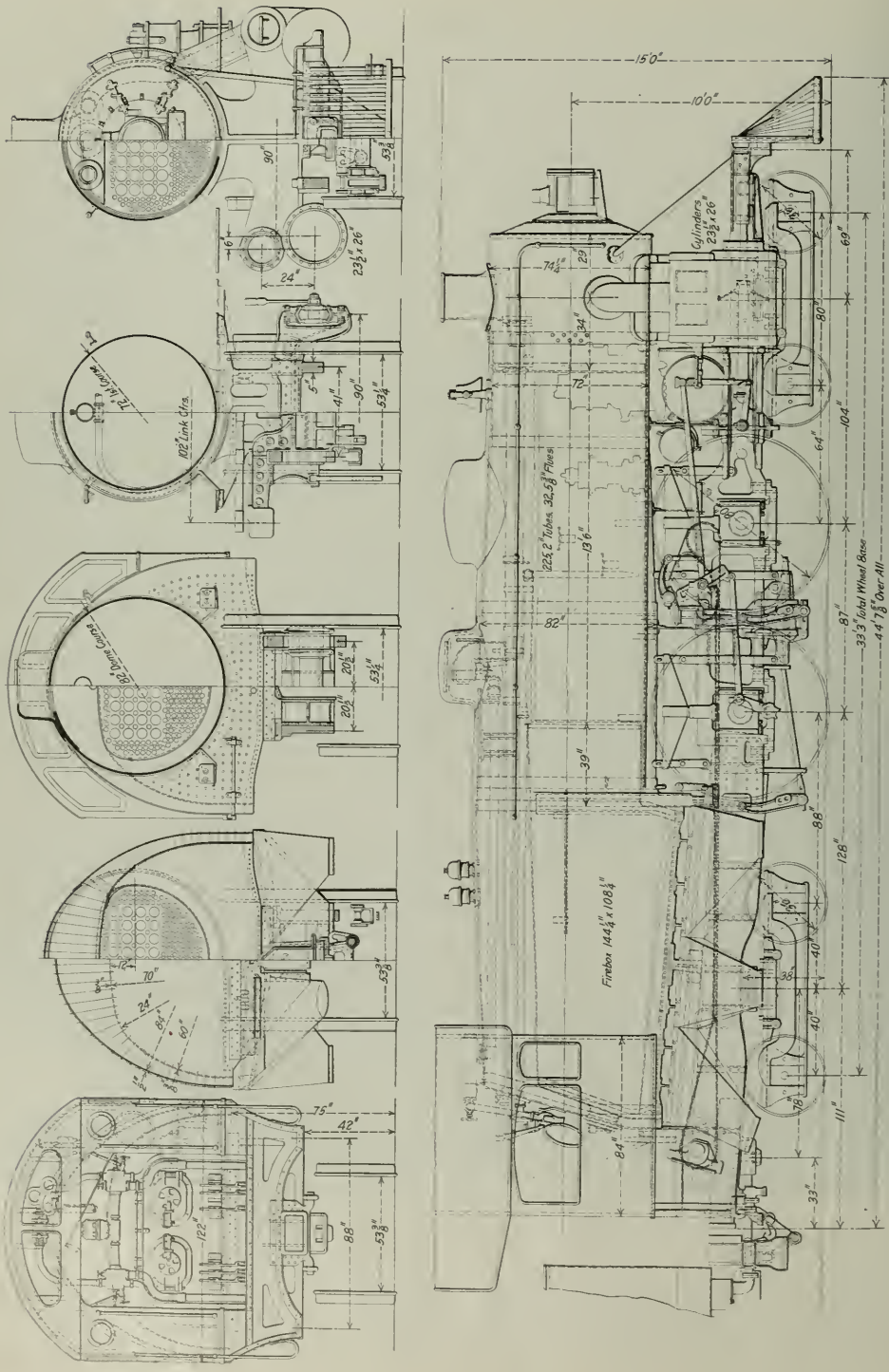
A rear cab arrangement of ample dimensions is combined with a very wide Wootten type firebox, for burning anthracite coal, without creating excessive weight at the rear of the locomotive. This permits the engineman and fireman to be together.

The firebox and grate surface is probably the largest of the prevailing types ever applied to a passenger locomotive, and, with a few exceptions, as large as any ever applied to a freight locomotive. The firebox and combustion chamber heating surface is 292 sq. ft., which is equivalent to 8.32 per cent of the total heating surface. As a square foot of firebox heating surface is ordinarily considered equivalent to five



Passenger Locomotive of the "Reading" or 4-4-4 Type

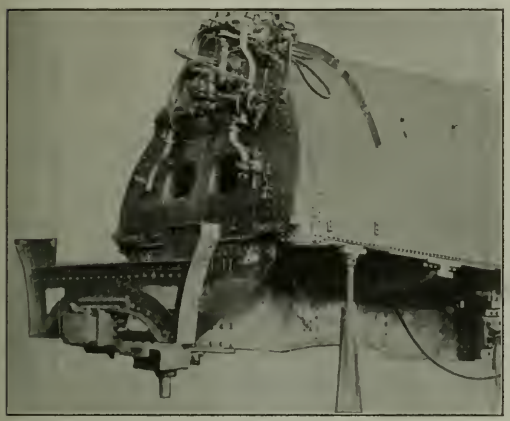
suitable shape and spaced 10 in. apart by spacers of a channel section, to which they are riveted. The main frames terminate under the front of the firebox, where they are tied together by means of a cross-brace casting, into which the back central frame is fastened. A center plate is riveted under the middle portion of the back frame, and a



Elevation and Sections Showing General Arrangement of the Reading 4-4-4 Type Locomotive

or six square feet of tube heating surface, ample steaming capacity is expected from the boiler.

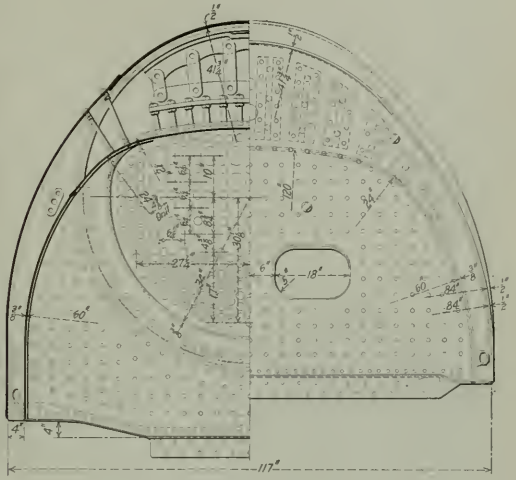
This large firebox is of advantage in burning low grades of anthracite coal. The 9 ft. by 12 ft. grate gives one square foot of grate for every 32.5 sq. ft. of heating surface in the boiler, which approximately equals what is considered good practice for stationary work in burning anthracite coal. This large proportion of grate surface to heating surface should also be advantageous in burning low grades of bituminous coal.



Firebox and Back Frame During Construction

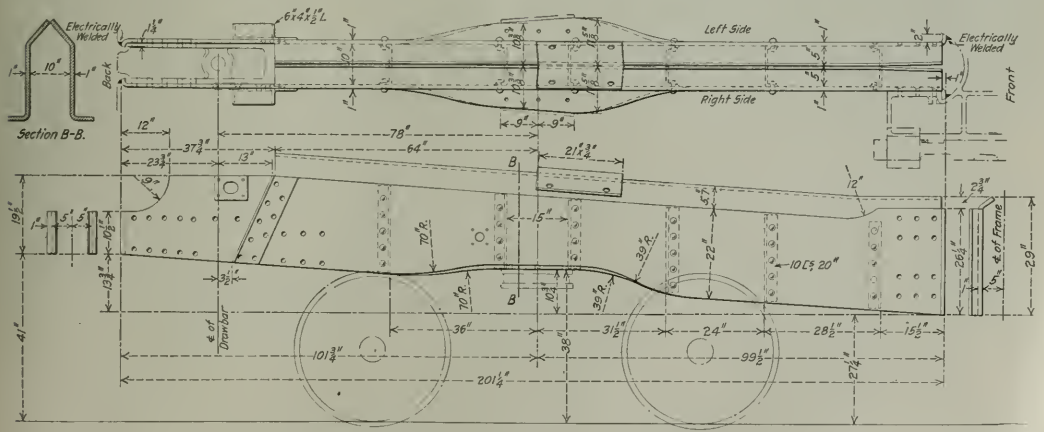
An anti-clinker device provides for the introduction of steam to the ashpan under the grates from the exhaust cavity of the cylinders and from the air pump, with means in the cab for turning this steam supply either under the grates or into the locomotive stack. This device assists the burning of low grade coal which runs together forming clinker and thus interferes with the operating of the grates and the working of the fire.

A special study has been made to obtain lightness in every part of the locomotive, so that all available weight could be put into the boiler. All castings and forgings have been designed with this in view. Heat-treated steel and high-grade materials have been used, with the result that this locomotive has a larger boiler than any other passenger locomotive now in service on the Reading, while at the same time the total weight of the locomotive is less than that of some engines of other types now in heavy passenger service; nevertheless, a greater weight is carried on the drivers, the result being a comparatively light but powerful locomotive with a large boiler capacity.



Cross Section and End Elevation of the Reading Locomotive Boiler

Mayari chromium-nickel heat-treated steel is used in the following parts: main and side rods, driving and engine truck axles, main crosshead guides, piston-rod-extension guides, crosshead centers, pistons and piston rods, valve motion parts, and a number of minor parts where special strength was required with a minimum of metal. Aluminum is used for the main crosshead shoes, crosshead for piston-rod-extension, main steam valves, valve-stem crosshead, hand reversing wheel, cab window frames and smokebox door clips.



Details of the Back Frame for the Reading Locomotive

Hollow driving and engine truck axles are used. The main driving axles have 6-in. holes, and the engine truck axles

3½-in. holes, which is much in excess of anything heretofore used. This feature lightens the parts and greatly assists in the heat treatment of the metal.

V-shaped guides are used for the crossheads and piston-rod-extension crossheads. These guides are made from bent plates of heat-treated steel, the main guides being ½ in. thick and the front guides 3-16 in. thick. The V shape gives a strong guide with large bearing surface, and allows the crosshead to be made much smaller and lighter than other constructions now in general use. The crosshead has a heat-treated steel center portion which contains the wrist pin hole and the piston rod key slot. Aluminum upper and lower shoes are cast solidly to this center, these aluminum shoes being provided with babbitt wearing faces. The piston is forged and turned to conical shape from a disc of heat-treated steel, and it is believed to be the lightest ever used for high pressure and heavy service. The web of this

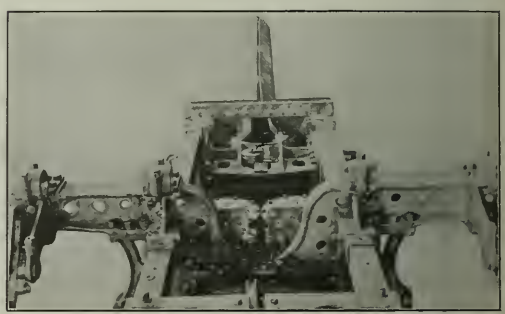
The Assembled Frames

piston tapers from 5-16 in. thick, where it joins the outer rim, to ½ in. thick where it joins the center.

The reciprocating parts, throughout, are very light. This allows a great weight to be carried on the driving wheels without creating excessive loads at the higher speeds.

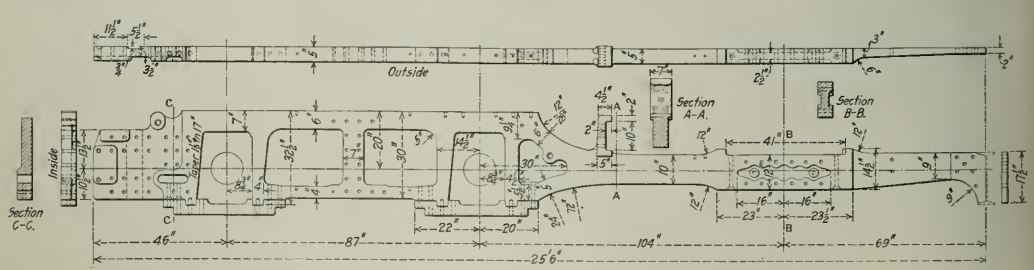
A hand wheel is used to operate a cable reversing mechanism connected to the tumbling shaft. A 7-16 in. steel cable runs through the duct formed by the back frame, from a drum under the cab to an arcuated lever on the tumbling shaft. A counterbalance is attached to this cable, to balance the weight of the lifted parts. An advantage is claimed for this cable mechanism over the ordinary reverse lever, in that it moves the valves easily under all operating conditions of the locomotive. It is also believed to have an advantage over the power-operated reversing devices, in that it indicates to the engineman the condition of the lubrication of

Weight in working order	230,800 lb.	240,000 lb.
Weight on drivers	146,200 lb.	133,100 lb.
Weight on leading truck	28,800 lb.	55,000 lb.
Weight on trailing truck	55,800 lb.	51,900 lb.
Weight of engine and tender in working order	390,800 lb.	398,000 lb.
Wheel base, driving	7 ft. 3 in.	7 ft. 5 in.
Wheel base, total	33 ft. 3 in.	29 ft. 7½ in.
Wheel base, engine and tender	63 ft. 1⅜ in.	63 ft. 10½ in.
Ratios		
Weight on drivers ÷ tractive effort	3.99	4.52
Total weight ÷ tractive effort	6.30	8.15
Tractive effort × diam. drivers ÷ equivalent heating surface*	835.0	599.0
Equivalent heating surface* ÷ grate area	32.5	71.3
Firebox heating surface ÷ equivalent heating surface,* per cent	8.32	4.93
Weight on drivers ÷ equivalent heating surface*	41.6	33.8
Total weight ÷ equivalent heating surface*	65.8	61.0



Frame Arrangement Looking Toward the Rear

Volume both cylinders, cu. ft.	13.1	13.1
Equivalent heating surface* ÷ vol. cylinders	268	300
Grate area ÷ vol. cylinders	8.24	4.21
Cylinders		
Kind	Simple	Simple
Diameter and stroke	23½ in. by 26 in.	23½ in. by 26 in.
Valves		
Kind	Piston	Piston
Diameter	13 in.	12 in.
Greatest travel	7 in.	7 in.
Outside lap	1⅜ in.	1 5/16 in.
Inside clearance	¼ in.	.....
Lead in full gear	5/16 in.	.....
Wheels		
Driving, diameter over tires	80 in.	80 in.
Driving journals, diameter and length	11 in. × 14 in.	9 ½ in. × 13 in.
Engine truck wheels, diameter	36 in.	26 in.



Arrangement of the Main Frames of the Philadelphia & Reading Locomotive

the main steam valves, as it becomes hard to operate when the valves are dry.

The following table gives the principal data for the Reading 4-4-4 type locomotive and the Pennsylvania 4-4-2 type, class E6s:

General Data		
	Reading 4-4-4	Penn. 4-4-2
Gage	4 ft. 8½ in.	4 ft. 9 in.
Service	Pass.	Pass.
Fuel	Hard coal	Bit. coal
Tractive effort	36,600 lb.	29,500 lb.
Engine truck journals, diameter and length	6½ in. × 13 in.	5½ in. x 10 in.
Trailing truck wheels, diameter	36 in.	50 in.
Trailing truck journals, diameter and length	6½ in. x 13 in.	....
Boiler		
Style	Wootten	Belpaire
Working pressure	240 lb.	205 lb.
Outside diameter of first ring	72 in.	78½ in.
Firebox, length and width	144⅛ in.×108¼ in.	72 in. × 110½ in.
Firebox plates, thickness	⅜ in.	⅜ in. & 5/16 in.
Firebox, water space	5 in.	5 in.
Tubes, number and outside diameter	225–2 in.	242–2 in.

Flues, number and outside diameter	32–5¾ in.	36–5¾ in.
Tubes and flues, length	13 ft. 6 in.	15 ft.
Heating surface, tubes and flues	2199 sq. ft.	2660 sq. ft.
Heating surface, firebox	292 sq. ft.	195.7 sq. ft.
Heating surface, total	2491 sq. ft.	2856.2 sq. ft.
Superheater heating surface	679 sq. ft.	721.0 sq. ft.
Equivalent heating surface*	3509 sq. ft.	3937.7 sq. ft.
Grate area	108 sq. ft.	55.1 sq. ft.
Smokestack, height above rail	15 ft. 0 in.	14 ft. 11⅛ in.
Center of boiler above rail	10 ft. 0 in.	9 ft. 10 in.
Tender		
Frame	12 in. channels	....
Weight	160,000 lb.	158,000 lb.
Wheels, diameter	36 in.	36 in.
Journals, diameter and length	5¾ in. × 10½ in.	5½ in. × 10 in.
Water capacity	8,000 gal.	7,000 gal.
Coal capacity	12 tons	13 tons

*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

EXCEEDING THE SCHEDULE

Secretary Joe Taylor has lots of trouble keeping the convention sessions up to the program schedule. It is just as bad to run too fast as too slow. Railroads are sometimes worried with this same problem of keeping the trains from running too fast. An instance of this sort is described in the following letter which was recently received by the general claim agent of a southern road:

"Repleighing to your leter the 29 Beg to say we ar awair of the fack that X and Y dus not run fas enuf to endangur the life of a hog when it is runing skedul, but i am in possisshun to pruve that the trane maid a extrey effurt tow ketch this animule and exseyded ther spead limet having thur advantatige of the po hog by its being down graid the hog dun all in hets power to eskape but was overtucked by the enjine en put to deth. so i shal cuntend for the value of this animule as it is noan hear that the X and Y dus not pay for enything in thur weigh of stoc if it can avoyd so i am tuning this over to My atturneigh unles setle by return male."

LITTLE INTERVIEWS

J. Will Johnson, president of the Railway Supply Manufacturers' Association, remarked yesterday that the most marked tendency which he had noted during the ten years that he has been coming to the conventions, has been a growing disposition on the part of both the railway men and the supply men to make the conventions and the exhibits more efficient along purely business lines. "In the first place," said Mr. Johnson, "the railway men themselves have taken the conventions, and especially the exhibits, more and more seriously. The effect of this has been that the supply men have taken more pains to make their exhibits worth while. The proportion of improved devices or entirely new ones shown has increased until many concerns exhibit practically no others. The entertainment features have been modified until they occupy a very subordinate place as compared with the one they formerly occupied. The supply men co-operate together better than ever before, there being a better realization year by year that it is important to make not only the individual exhibits, but the exhibit as a whole, interesting and instructive. While the space used is reduced this year, owing to conditions with which all are familiar, I believe that the exhibit will be found to be at least as good as any we have ever had."

THE SWISS HAUENSTEIN BASE TUNNEL.—For a time, work on the Hauenstein Base Tunnel, the contractors for which are a German firm in Berlin, was interrupted, largely owing to the workmen having been called away to erect fortifications on the top of the range beneath which the tunnel runs. This having been accomplished, the men have been allowed to resume work on the tunnel, which is now completely excavated and which is expected to be lined by the end of May, the date of the opening having been provisionally fixed by the Swiss Federal Railways for October, 1915.

Conventionalities

J. W. Fogg, formerly master mechanic of the Baltimore & Ohio Chicago Terminal, comes to the convention this year for the first time in the guise of a supplyman. He is selling Boss nuts to all the "bosses" now.

W. O. Moody, mechanical engineer of the Illinois Central, with Mrs. Moody and friend, Miss Josephine Whalen, arrived Monday for the week. This is Mrs. Moody's first visit to the conventions. Mr. Moody reports a total of 75 locomotives and 1000 cars ordered by his road so far in 1915. Evidently the I. C. officers are no pessimists.

E. R. Hibbard, president of the Grip Nut Company, Chicago, will not be able to attend the convention this year. He, however, will be represented by his son Howard Hibbard, who this year for the first assumes the duties of official representative of his father's company.

Those many friends of "Tom" Dunbar of the Acme Supply Co., will be sorry to learn that owing to a recent operation for appendicitis in San Francisco he will be unable to attend

F. T. Hyndman, Superintendent Motive Power and Cars, Wheeling & Lake Erie

the conventions this year. We are glad, however, to report that he is well on the road to recovery, though for a time his condition was serious, this being his third operation.

C. D. Jenks, general manager for Edwin S. Woods & Company of Chicago, will be unable to attend the convention this year. He has had a serious case of iritis and his physician advises him to remain at home. His condition is improving. H. M. Perry of the same company, who has attended these conventions for many years, is here.

W. H. Cook, our genial English friend who has so well represented the Fastnut, Ltd., of London, was prevented at the last moment from visiting the conventions this year. He had booked passage on the Philadelphia, but owing to the sinking of the Lusitania, the berths were all taken, and furthermore, there seemed great difficulty about getting back, as it appeared that he would not be able to return to England until late in July.

G. W. Wildin, mechanical superintendent of the New York, New Haven & Hartford, Mrs. Wildin and their niece, Miss Josephine Fish, were among the arrivals on Tuesday. Mr.

Wildin was unable to get to the conventions last year because of a press of work in the car department, but says he hopes to be left in peace this year till both meetings are over.

George W. Lyndon, president of the Association of Manufacturers of Chilled Iron Car Wheels, made the trip to the conventions by easy stages. He came from Chicago to Pittsburgh, where he spent one night, and then to Philadelphia, where he spent another night. Last year Mr. Lyndon was accompanied to the conventions by his three daughters, but he is alone this year.

W. H. Lewis, superintendent of motive power of the Norfolk & Western and D. A. Wightman, formerly superintendent of the Pittsburgh Locomotive Works, were engaged in a fanning contest in the entrance hall on Tuesday while discussing old times. Mr. Lewis has been a member of the Master Mechanics' Association since 1876 and Mr. Wightman since 1878.

Dick Sawyer, of the Commercial Acetylene Railway Light & Signal Company, whose alibi is "E. T.," is not expected at the convention this year. Dick has been attending these conventions nigh unto nineteen years and but for a forced absence of one year on account of sickness, the string would be con-

H. C. Manchester (D. L. & W.) on the Job in His Office at Scranton

secutive. As a matter of fact, Dick just naturally grew into a place at these meetings because long before he was personally interested, his father used to bring him. For the past few years he has been active on the enrollment committee. His many friends will miss him this year.

E. W. Pratt, assistant superintendent of motive power and machinery, Chicago & Northwestern, and past president of the Western Railway Club, arrived Tuesday with Mrs. Pratt. Mr. Pratt is receiving congratulations as an A-1 star actor, he being the chief perpetrator and responsible for the recent "scandalous" performance at the annual meeting of the Western Railway Club. He is also receiving condolences from those who have not yet "bit." For full particulars see W. E. Symonds, the "villain" of the evening; Joe Taylor, or the members of the "Boosters' Committee" of the club.

Those of us who have to get here during the late afternoon of the Sunday before the convention opens, always find on the hotel register the names of certain members of the "old guard." We refer especially to Mr. and Mrs. D. C. Noble, of Pittsburgh; Mr. and Mrs. Scott Blewett, of St. Louis, and Mr. and Mrs. J. D. Hurley, of Chicago. And they usually stay to speed the last parting guest. Perhaps this leisurely way of doing things explains why none of them has aged a particle during the last ten years. Mr. Noble, however, is not feeling as fit as usual. Some of the facial nerves are disposed to be contrary, with the result that Mr. Noble suffers considerable pain at times.

One of the convention visitors for many years past who will be missed this year is A. R. Foley, of the Home Rubber Company. Mr. Foley was among the American citizens who were drowned when the Lusitania was sunk. He sailed for England, expecting to be gone only a few weeks, and had made his plans to attend the conventions. Mr. Foley had long been identified with the Stokes interests in Trenton, N. J., where he lived. He was born in England, came to this country when quite young, and early became connected with the Stokes Iron Works. When the Stokes interests organized the Home Rubber Company, he became its sales agent, and long traveled all over the United States. For the last three years he had been looking after the company's foreign interests. He was a jovial, big-hearted man, who had numerous friends among those who attend the conventions.

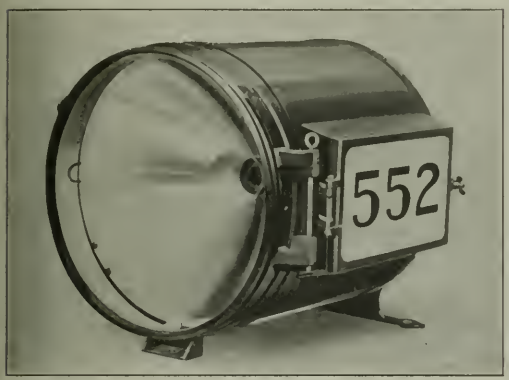
H. T. Bentley, superintendent motive power and machinery, Chicago & North Western, has lost his faith in Atlantic City. Having suffered with neuralgia due to Chicago's inclement month of May he came to the famous seaside resort extra early this year to get in fighting trim for the conventions. The god of storms, however, decided otherwise and Mr. Bentley has hardly seen the sun since his arrival. He and his daughter, Louise, were passengers on the ill-fated Lusitania on their return from England last summer, they arriving in New York July 31. Mr. Bentley reports that the North Western was one of the first to enter the pulverized fuel game. Orders have been placed with the Locomotive Pulverized Fuel Company for equipment for a 21 in. by 26 in. Atlantic type superheater engine. This engine will be equipped within a month and will operate on the Galena division out of Chicago. The purpose of the installation is to test out the possibilities of this fuel for eliminating smoke, noise and cinders, the city ordinances of Chicago being quite rigid in this respect.

For the first time in 25 years L. B. Sherman, vice-president of the *Railway Age Gazette,* is not among the visitors at the conventions this year. His absence is due to a very serious illness, from which he is slowly but steadily recovering. Mr. Sherman had already had several attacks of illness, from which he speedily recovered, when in the early part of last March, he was suddenly stricken at his home at Hubbard's Woods, a suburb of Chicago. He was hurried to St. Luke's Hospital and an operation performed. The surgeons found his condition so critical that all hope of his recovery was given up, but he pulled through the day following the operation and, although there were several days when his condition seemed to be almost hopeless, he showed a remarkable vitality, which carried him through. He was well enough last week to play a game of golf, the first since his illness. He is still somewhat weak, however, and will probably not be back at work until the late summer or early fall. Mr. Sherman is probably one of the best known men who attend the conventions. He was formerly secretary of the Railway Supply Manufacturers' Association, he has served on various committees of the association, he was a member of the Entertainment Committee for this year, and he was one of the prime movers in arranging for the first golf tournament in connection with the conventions, which was held last year. He has been one of the most efficient workers on *The Daily* ever since it has been under its present management, and he will be greatly missed this year by all his friends, and especially by his associates on *The Daily.* However, the regret caused by his absence is compensated for by realization of the fact that he soon will be well again.

INCANDESCENT HEADLIGHT EQUIPMENT

A recently-developed incandescent headlight equipment designed especially for use in switching service is being exhibited by the Pyle-National Electric Headlight Company, Chicago.

The new equipment is known as type "K," and the generating unit has a normal capacity of 300 watts; it weighs only 120 pounds, and occupies but little space, so that it can be mounted in any convenient place on the locomotive. The



Special 14-in. Incandescent Headlight Case

general outline is similar to the type "E" equipment, except that it is of smaller dimensions and has a number of new features.

The entire unit is self-contained, and shows a very high efficiency for a turbine of this size. The governor is well designed and controls the turbine speed within two percent, maintaining practically a constant voltage, which is absolutely necessary for incandescent illumination. The turbine operates on all steam pressures ranging from 60 lb. up and on

Method of Focusing the Lamp in the 14-in. Headlight Case

superheated as well as saturated steam without adjustment. The turbine is fed by a ⅜-in. pipe, and the exhaust outlet is fitted with a 1½-in. pipe. The rotar revolves in a partial vacuum, this tending to insure a high efficiency in the use of steam.

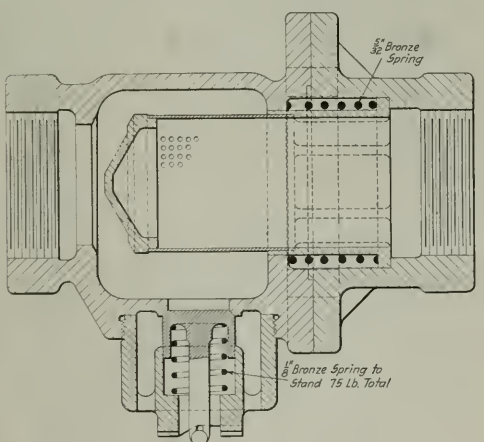
The generator is wound for 32 volts. With this voltage it is possible to obtain lamps of almost any desired candle power. This voltage has been recognized as standard, and has been proven to be the most desirable for locomotive illumination. The armature and commutator are mounted on the shaft, and are held in place by one screw. The brush holder attachment is fixed, and it is impossible for the brushes to get out of adjustment.

A special 14-in. headlight case has been designed in connection with this equipment, in which the lamp is supported horizontally from the back of the reflector. The goggle is hinged at both sides and may be readily removed. The reflector and slide are mounted on guides, and may be withdrawn from the front of the case, the electrical connections being made automatically by blade contacts when the reflector and slide are in place. The method of adjusting the lamp for focusing is clearly shown in one of the illustrations, the three adjustments being entirely independent of each other.

For switching service a 100-watt nitrogen lamp is supplied, with which it is said to be possible to distinguish objects clearly for a distance of 800 ft. For road service where a modified light is desired a 150-watt lamp of the same type is used. This is said to increase the range of distinct vision to 1200 ft.

COMBINED WATER STRAINER AND STRAINER CLEANER

The tank hose strainer shown herewith has recently been developed by the Barco Brass & Joint Company, Chicago, and is included in its exhibit on the pier. The strainer has the usual perforated cylinder through which the water passes from outside to inside. The strainer cylinder is secured at one end to a movable sleeve and at the other to a cone shaped valve which seats against the inner end of the water connection. Should the strainer become clogged it may be cleaned by merely turning steam pressure back through the injector suction pipe. This moves the strainer cylinder and



Tank Hose Strainer with Automatic Cleaning Device

sleeve towards the water connection, which it closes, thus preventing the flow of steam back through the hose. The pressure of the steam will blow the dirt from the strainer hose and will unseat the check at the bottom of the strainer body, allowing the dirt and water to be blown out to the ground. As soon as the steam pressure is turned off the springs will cause the return of the parts to their normal operating positions. In order to provide for the entrance of steam to the tank hose to prevent freezing in winter, the seat of the strainer may be scored or the end drilled to provide a small passage to the water compartment.

Railway Supply Manufacturers' Association Exhibit

Includes Names of Exhibitors, Brief Descriptions of the Exhibits, Names of Representatives, and Space Numbers

The exhibit this year is a little smaller than that of last year, but from the standpoint of the number of new devices and educational value probably averages higher. Its more important features are commented on in our editorial columns. Following is a list of the exhibitors, with data as to the devices exhibited, names of representatives, and location of exhibit:

Acme Supply Company, Chicago, Ill.—Acme simplex diaphragm; Acme reverse unifold diaphragm; Acme vestibule curtain outfit; Acme diaphragm opening attachments; Acme vestibule curtain revolving shield and sash locks; duplex weatherproof window; Regal revolving shade box; Kass safety step tread; Acme safety step box; Acme steel freight car ladder; Gosso beds for hospital bunk and caboose cars; Chanarch steel flooring; Acme steel passenger car doors; Faultless steel baggage car doors; Peerless steel baggage car doors; Acme anti-pinch hinge shield; Crown and Gem pinch handle curtain fixtures; Acme fool-proof curtain fixture; Acme friction roller curtain fixture; drawn steel mouldings. Represented by H. U. Morton, S. W. Midgley and R. C. Munro. Spaces 568-569.

Allegheny Steel Company, Pittsburgh, Pa.—Forsyth forged steel truck side frames; steel ties; continuous tie plates; rail braces; anti-creeping devices; spring plates; journal box lids; pressed steel specialties. Represented by W. D. Forsyth, Ralph McCarthy and L. C. Farquhar. Space 189.

Alston Saw and Steel Company, Folcroft, Pa.—Unbreakable hack saw blades in operation. Represented by Oscar W. Alston and William J. McArdle. Space 369.

American Abrasive Metals Company, New York, N. Y.—Feralun slip-proof treads for car steps, vestibule floors and door sills; Standard door sills for subway cars; new perforated slip-proof step tread for general use as passenger coach step; Feralun slip-proof floor plates; Feralun wheel truing brake shoes. Represented by William H. Sayre and Ellsworth Burger. Space 626.

American Arch Company, New York, N. Y.—Security sectional arch; Gaines combustion chamber. Represented by LeGrand Parish, John P. Neff, Harlow D. Savage, J. T. Anthony, George Wagstaff and R. J. Himmelright. Spaces 408-410.

American Balance Valve Company, Jersey Shore, Pa.—Valve motion models. Full size valves which have been in service and models of Jack Wilson high pressure slide and semi-plug piston valves, both adapted to old power as well as new. Represented by J. T. Wilson, Frank Trump and C. C. Young. Space 383.

American Brake Company, St. Louis, Mo.—Reception booth. Represented by R. E. Adreon and T. L. Burton. Spaces 19-29.

American Brake Shoe & Foundry Company, Mahwah, N. J.—Locomotive and car brake shoes illustrating modern practice. Represented by F. W. Sargent, W. S. McGowan and R. M. Brower. Space 416.

American Car and Foundry Company, New York, N. Y.—Cast iron wheels. Represented by William C. Dickerman, Scott H. Blewett, Clark D. Eaton, A. E. Ostrander, John McE. Ames and Benj. Wilson. Space 619.

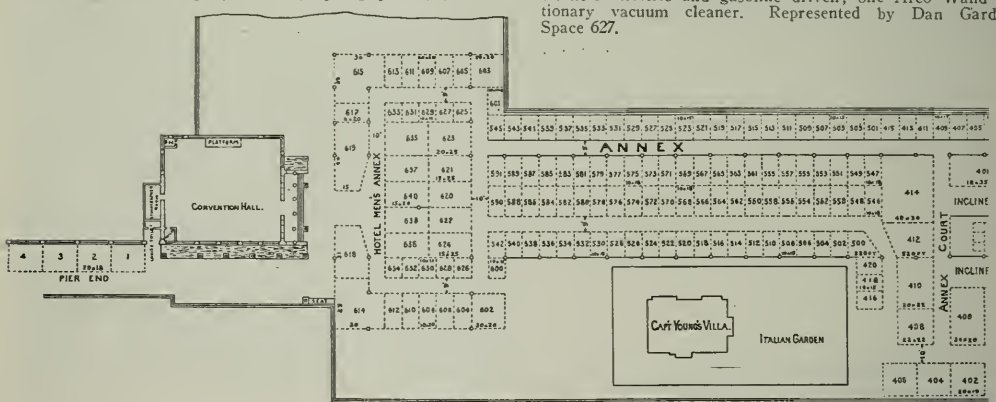
American Car & Ship Hardware Manufacturing Company, New Castle, Pa.—The Babcock safety water gage protector; bronze bushings. Represented by F. H. Babcock and P. J. Flaherty. Space 373.

American Flexible Bolt Company, Pittsburgh, Pa.—American staybolts; American staybolt bushings; U. S. self-locking bolt. Represented by C. A. Seley, R. W. Benson, H. T. Frauenheim, J. A. Frauenheim and L. W. Widmeier. Space 174.

American Malleable Castings Association, Cleveland, Ohio.—Walker wedge testing machine; photo-micrographs of malleable iron in its various stages of manufacture and sample castings and specimens of malleable iron. Represented by John C. Nulsen. Spaces 113-115.

American Mason Safety Tread Company, Lowell, Mass.—Mason safety treads, lead and carborundum filled, steel and brass base; Mason structural steel treads; Empire safety treads; Stanwood non-slipping, self-cleaning car steps and treads; Karbolith composition car flooring for steel cars; Mason non-slip safety ladder shoes; Mason non-slip "Dentil" nosing. Represented by Henry C. King and Ralph C. Davison. Space 542.

American Radiator Company, Chicago, Ill.—Arco Wand vacuum cleaners—electric and gasoline driven; one Arco Wand stationary vacuum cleaner. Represented by Dan Gardner. Space 627.



Arrangement of the Exhibit Spaces at the Ocean End of the Pier

American Saw Mill Machinery Company, Hackettstown, N. J.—Portable saw mill machinery; variety woodworker; saw tables for railroad shop use; circular saws. Represented by H. H. Hirschfeld and M. C. Hall. Spaces 162-164.

American Steel Foundries, Chicago, Ill.—The Vulcan truck; Andrews side frames; cast steel bolsters; Simplex bolsters; Simplex couples; American coupler pocket, Economy draft arms; Davis cast steel wheels; brake beams; springs; Susemihl roller side bearings; miscellaneous steel castings. Represented by R. P. Lamont, G. E. Scott, W. J. Lynch, J. V. Bell, G. F. Slaughter, W. Ross Gravener, D. T. Harris, T. H. Hopkirk, R. E. Janney and L. E. Jones. Space 193.

Anchor Packing Company, The, Philadelphia, Pa.—Packing for air pumps; throttles and general railroad purposes. Represented by W. R. Haggart, L. E. Adams, D. J. P. Murray, E. C. Adams and B. J. Miller. Space 371.

Armstrong Cork & Insulation Company, Pittsburgh, Pa.—Nonpareil corkboard insulation for cars and cold storage rooms; Nonpareil insulating brick; Nonpareil high pressure covering; cork covering for drinking water lines, brine and ammonia lines and cold pipes; Linotile for floors. Represented by C. H. Young and S. L. Barnes. Space 170.

Ashton Valve Company, The, Boston, Mass.—Master mechanic standard locomotive muffler and open pop safety valves; locomotive steam and air gages; wheel press recording gages; whistles; dead weight gage testers; piston Schwabs; locomotive boiler appliances. Represented by A. C. Ashton, J. F. Gettrust, H. O. Fettinger and J. W. Motherwell. Space 518.

Automatic Ventilator Company, New York, N. Y.—The Automatic car ventilator, as applied to monitor-deck and arched-roof steam and electric cars, shown by means of full sized and miniature demonstrating models. Represented by George H. Ford, Wm. J. Fleming, Jr., George H. Bryant and Frank A. Barbey. Space 313.

Baker & Company, Inc., H., New York, N. Y.—High speed and tool steel; metal specialties. Represented by A. W. Stephenson, A. S. Reeder and F. R. Decker. Space 364.

Barco Brass & Joint Company, Chicago, Ill.—Barco flexible joints; engine tender steam air and oil connections; metallic steam heat connections for cars; terminal car heating and air sets; water strainer; gage bracket; smoke box blower fitting; drip valves. Represented by F. N. Bard, C. L. Mellor and L. W. Millar. Space 609.

Beggs Signal Company, Julian, Terre Haute, Ind.—Automatic speed control. Represented by Stephen Smith. Space 183.

Besly, Charles H. & Company, Chicago, Ill.—One No. 15-30 inch C. Besly direct connected motor driven pattern makers' disc grinder. One No. 51-26 inch G Besly motor driven disc grinder with 18 inch helmet pressed steel ring wheel chuck. Represented by Edward P. Welles, Charles A. Knill and William H. Allen. Space 148-150.

Bettendorf Company, The, Bettendorf, Iowa.—Bettendorf all steel box car; 42 foot 40-ton steel box car underframe; section of improved refrigerator car underframe; single center sill for 40 foot 50-ton car; semi equalized 70-ton freight car truck; Bettendorf standard 40-ton freight truck. Represented by J. H. Bendixen, A. F. Macpherson, F. K. Shults, P. P. Beck, E. E. Silk, C. J. W. Clasen, W. G. Ransom and A. K. Reading. Space 200.

Bird-Archer Company, The, New York, N. Y.—Samples of polarized metallic boiler chemicals; anti-foaming chemicals; anti-leak chemicals. Tubes drawn from engines having used the Polarized treatment. P. B. Bird, C. A. Bird, J. A. McFarland, L. F. Wilson, H. V. Bootes, John Barnes and C. J. McGurn. Space 37.

Blackall, R. H., Pittsburgh, Pa.—Blackall drop handle ratchet; flat car type ratchet; improved Lindstrom brake lever; old style Lindstrom ratchet with back-off cap; pull-up ratchet arrangement with beveled gears and vertical shaft; tunnel brake ratchet arrangement using chain instead of shaft and separate winding drum for chain; Blackall trap door for vestibules. Robert H. Blackall and E. Emery. Space 588.

Buckeye Steel Castings Company, The, Columbus, Ohio.—Two 50-ton cast steel Buckeye type truck bolsters; one 50-ton cast steel pedestal type side frame; one 50-ton cast steel Buckeye Andrews type side frame; one Buckeye cast steel yoke for friction gear; one Buckeye cast steel yoke for tandem gear; cast steel journal boxes; Major coupler. Represented by S. P. Bush, C. B. Goodspeed, G. A. Macpherson, J. C. Whitridge, J. G. Bower, F. H. Bonnet, E. W. Campion, Geo. Groobey, G. T. Johnson and A. H. Thomas. Spaces 603-605.

Buffalo Brake Beam Company, New York, N. Y.—Buffalo freight brake beams for all classes and capacities of equipment. Truss beams with either malleable iron or forged steel struts to M. C. B. standards; also beams for E. & L. equipment and all classes and capacities of tenders and electrical equipment for standard broad and narrow gage. Buffalo passenger brake beams for all classes of service, including P. C. and L. N. equipment with automatically adjustable heads and safety locks. S. A. Crone, E. Strassburger, R. C. Fraser and O. W. Meissner. Spaces 550-551.

Burr Company, The, Champaign, Ill.—Dynamometer car Southern No. 2 track exhibit. Represented by E. M. Burr and L. R. Gulley. Space 632 and on track at Mississippi Avenue and Boardwalk.

Burroughs Adding Machine Company, Detroit, Mich.—Burroughs Master Car Builders machine. Represented by F. A. Willard. Space 534.

Byers & Company, A. M., Pittsburgh, Pa.—Wrought iron pipe. Represented by W. W. Williams, T. L. Lewis, R. A. Bruce and R. W. Kenney. Space 625.

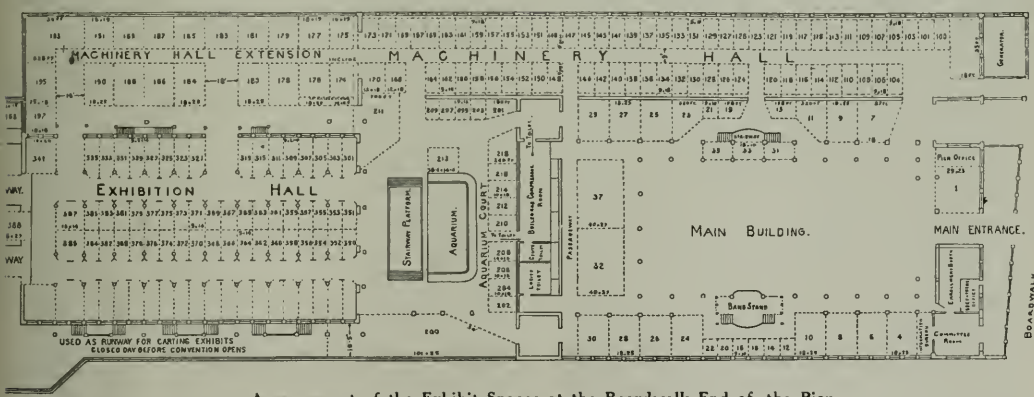
C. & C. Electric & Manufacturing Company, Garwood, N. J.—One 400 ampere C. & C. electric arc welding outfit complete with main control panel and three separate single welding panels, equipped with their patented system of automatic control throughout. This is an operating exhibit. Represented by Geo. W. Cravens, C. H. Florandin, John E. Chamberlin and Francis Caldwell. Space 2 pier end.

Cabot, Inc., Samuel, Boston, Mass.—Car insulation; fireproof car quilt; wood preservative; shingle stains; protective paints. Represented by John C. Donnelly. Space 381.

Cambria Steel Company, Philadelphia, Pa.—Slick draft gear. Represented by C. B. McElhany, W. S. Ottinger, H. G. Uphouse, L. B. Morris and R. V. Sage. Spaces 514-516.

Camel Company, Chicago, Ill.—Reception booth. Represented by J. F. Comee A. B. Wegecier J. M. Hopkins and P. M. Elliott. Space 536-538.

Carnegie Steel Company, Pittsburgh, Pa.—Schoen steel wheels, for steam railway service; Slick wheel products consisting of gear blanks, gear ring, gear rim blanks, turbine disc blanks, industrial wheels, street car wheels, rolled steel pipe flanges, submarine signal disc blanks, bevel roller blanks, automobile fly wheel blanks shaft couplings crane track wheels, and rolled steel locomotive pistons, together with exhibit of ingots and discs from which wheels are made. Standard steam railway ties, joints and fastenings. Alloy steels. Steel sheet piling. Represented by Wm. G. Clyde, I. W. Jenks, R. B. Woodworth, W. W. Scott, Jr., N. B. Trist, T. W. Williams, A. R. Willard, C. B. Friday and D. E. Sawyer. Space 414.



Arrangement of the Exhibit Spaces at the Boardwalk End of the Pier

Chambers Valve Company, New York, N. Y.—Chambers throttle valve. Represented by Frank H. Clark and J. M. Coffey. Space 418.

Chase & Company, L. C., Boston, Mass.—Chase mohair car plushes; Chase artificial leather for car seats. Represented by W. P. Underhill and H. T. Wight. Space 10.

Chicago Car Heating Company, Chicago, Ill.—Multiple regulation vapor system of car heating; Positive lock steam train line couplers; steam and hot water car heating specialties; emergency stoves. Represented by Egbert H. Gold, J. E. Buker, B. A. Keeler, R. P. Cooley, Eugene E. Smith, Elmer W. Rietz, Geo. T. Cooke, Harry F. Lowman, Frank F. Coggin, Edward A. Schreiber and A. D. Bruce. Spaces 212-214-216-218.

Chicago-Cleveland Car Roofing Company, Chicago, Ill.—Car roofs; steel carlines; composite box car ends: all steel ends. Represented by R. C. Dudley, T. N. Russell, J. L. Stark and A. S. Lewis. Space 506.

Chicago Varnish Company, Chicago, Ill.—Panels exemplifying their Ce-Ve process of painting railway coaches and engines. Represented by George S. Bgelow, Harry S. Whitehair and S. M. Dolan. Space 535.

Coe Manufacturing Company, W. H., Providence, R. I.—Coe's ribbon leaf and gilding wheels. Represented by E. J. Arlein and S. H. Swallow. Space 633.

Commonwealth Steel Company, St. Louis, Mo.—Catalogs, folders, drawings and a few models, all pertaining to the Commonwealth specialties. Represented by Clarence H. Howard, Harry M. Pflager, Geo. E. Howard, Boone V. H. Johnson, C. S. Shallenberger and W. P. Stout. Spaces 386-387.

Consolidated Car-Heating Company, Albany, N. Y.—Thermo-Vapor pressure system of heating; two-piece straight port steam couplers; steam traps; train line end valves; admission valves. Represented by C. C. Nuckols, Thomas Farmer, Jr., W. S. Hammond, Jr., Butler Keys and A. T. Harding. Space 179.

Consolidated Railway Electric Lighting & Equipment Company, New York, N. Y.—Type L-3 regulator with ampere hour meter control of the battery charging current and Type D-5 ball-bearing generator for car lighting. Represented by Thos. L. Mount, J. L. Watson and W. R. Hungerford. Space 588.

Crane Company, Chicago, Ill.—Crane locomotive pop safety valves; locomotive blow-off valves; locomotive cab valves; Crane railroad fittings, full line of globe, angle check and gate valves for railroad service, Crane-Erwood automatic stop and check valves; steam separators; steel valves for high pressure and superheated steam; automatic exhaust and relief valves; steam traps. Represented by F. D. Fenn and F. W. Venton. Spaces 552-554.

Crosby Steam Gage and Valve Company, Boston, Mass.—Locomotive safety valves; locomotive pressure gage; Johnston blow-off valve; recording gage for hydraulic presses; gage testing apparatus; indicators and their attachments. Represented by Edward C. Kenyon and H. B. Forbes. Space 630.

Curtain Supply Company, The, Chicago, Ill.—Car window and vestibule curtains; diaphragms and sash balances; ring fixtures; Rex rollers; Rex vestibule outfit and steel diaphragms. Represented by R. F. Hayes, G. E. Fox, W. H. Bentley and F. M. Egolf. Space 638.

Damascus Brake Beam Company, The, Cleveland, Ohio.—Forged steel fulcrums; adjustable brake heads; Brascott freight car ladder; Damascus water glass protectors. Represented by John F. Schurch and Albert Waycott. Space 555.

Dearborn Chemical Company, Chicago, Ill.—Water treating preparations scientifically prepared to suit conditions shown by analyses of the boiler water supplies, for prevention of scale, corrosion, pitting and foaming. Represented by Robert F. Carr, George R. Carr, J. D. Purcell, Grant W. Spear, Wm. H. Kinney, J. H. Cooper and A. W. Crouch. Spaces 6-8.

Delaware Railway Specialty Company, Wilmington, Del.—Parson's system of combustion. Represented by William H. Savery. Space 370.

Detroit Lubricator Company, Detroit, Mich.—Bullseye locomotive lubricators; flange lubricators; air cylinder lubricators; sight feed lubricators; force feed oilers; Detroit packless radiator valves. Represented by H. I. Lord, A. D. Homard and A. C. McChesney. Space 637.

Dixon, Joseph, Crucible Company, Jersey City, N. J.—Specimens of scale removed from locomotive boilers obtained through the use of Dixon's boiler graphite; photographs of various types of structures protected by Dixon's Silica-graphite paint; samples of Dixon's graphite lubricants especially adapted for railroad work; instruction cards. Represented by H. A. Chase, J. A. Tucker, H. A. Neally, W. H. Houston and L. H. Snyder. Space 24.

Draper Manufacturing Company, The, Port Huron, Mich.—Pneumatic locomotive turn-table motors; pneumatic flue welders; pneumatic superheater tube welders; tools for repairing superheater units; valve facing tools; ball check valves; hollow brass balls. Represented by Thos. Draper and Thos. Robinson. Space 528.

Duff Manufacturing Company, The, Pittsburgh, Pa.—Genuine Barrett track jacks; Duff high speed ball bearing screw jacks; Barrett car jacks; Duff improved geared ratchet jacks; Duff-Bethlehem forged steel hydraulic jacks; Duff journal box jacks. Represented by T. A. McGinley, E. A. Johnson, C. A. Methfessel, C. N. Thulin and G. E. Watts. Space 401.

DuPont Fabrikoid Company, Wilmington, Del.—Fabrikoid car window curtain material; Fabrikoid vestibule curtain material; Fabrikoid car seat upholstery material. Represented by C. Hallock Silkman, J. W. Stark and J. K. Rodgers. Spaces 548-549.

Durbin Automatic Train Pipe Connector Company, St. Louis, Mo.—Automatic train pipe connector; automatic safety car coupler; these will be operated by compressed air to show operation. Represented by V. S. Durbin and C. W. Durbin. Space 168.

Eagle Glass and Manufacturing Company, Wellsburg, W. Va.—Oilers, torches, supply cans, tallow pots, etc. Represented by J. L. Fusner and S. O. Paull. Space 600.

Economy Devices Corporation, New York, N. Y.—Ragonnet power reverse gear; Casey-Cavin power reverse gear; Universal valve chest; "Economy" exhaust nozzle; models of radial buffer; "Economy" engine truck; Woodard centering arrangement; bulletins, blueprints and drawings of Economy engine truck; four wheel Economy tender truck; multiple pipe clamps; Cole extended main driving box. Represented by H. F. Ball, J. L. Randolph and Hal R. Stafford. Spaces 408-410.

Edison Storage Battery Company, Orange, N. J.—Edison storage batteries for train lighting; industrial shop and baggage trucks; multiple unit control; locomotive headlights; railway signaling; inspection lamps. Represented by H. G. Thompson, F. V. McGinness, W. F. Bauer, C. A. Luckey and O. R. Hildebrant. Space 636.

Edwards Company, Inc., The O. M., Syracuse, N. Y.—Window fixtures; extension platform trap doors; sliding trap doors for high station platforms; all metal sash balances and shade rollers; weather stripping, and railroad padlocks. Represented by O. M. Edwards, E. W. Edwards, W. A. LeBrun, E. F. Chaffee, C. H. Rockwell, W. C. Bradbury and T. P. O'Brian. Spaces 527-529-531.

Elastic Car Waste Company, Philadelphia, Pa.—Packing for car journals. Represented by A. B. Birch, Jas. Gibson and A. Ahrens, 3d. Space 363.

Electric Controller & Manufacturing Company, The, Cleveland, Ohio.—Youngstown safety limit stop; crane switchboard with overload release; automatic machine tool controllers; push button controllers for wood working machinery; drum type controllers; cast grid resistance, literature of lifting magnets handling scrap iron, rails, etc. Represented by R. G. Widdows, E. C. Ryan and W. C. Jackson. Space 135.

Electric Storage Battery Company, The, Philadelphia, Pa.—E. S. B. constant voltage axle lighting system in operation; Hyray-Exide low voltage isolated plant for country home electric lighting, in operation; Chloride Accumulator and Ironclad-Exide cells for car lighting; Exide, Hycap-Exide; Thin-Exide and Ironclad-Exide cells for vehicle propulsion; Exide automobile starting and lighting batteries. Represented by J. Lester Woodbridge, J. MacBurney, F. G. Beetem and H. E. Hunt. Space 624.

Enterprise Railway Equipment Company, The, Chicago, Ill.—Car models showing all types of dump cars and door mechanism for same, including hoppers, gondolas, general service, divertible ballast and coal, convertible ballast or coal, plow gondola or ballast; also one convertible general service or ballast car on exhibit track at Mississippi Avenue. Represented by Argyle Campbell and A. E. Zimmer. Spaces 584-585.

Equipment Improvement Company, New York, N. Y.—Markel solid main rod end, lateral motion plate, shoes and wedges, removable driving box; Trojan packing; Wine roller side bearing. Represented by Frank H. Clark, C. W. Cross and E. C. Sawyer. Space 418.

Esterline Company, The, Indianapolis, Ind.—Golden Glow locomotive headlights; mine locomotive headlights; electric railway headlights; marine, dock and industrial searchlights; Esterline graphic meters. Represented by W. McKay White. Space 382.

Ewald Iron Company, Louisville, Ky.—Reception booth. Represented by R. B. Hickman, S. F. Sullivan, R. F. Kilpatrick, E. V. Shackleford and H. E. Pierce. Spaces 537-539.

Fastnut, Ltd., New York, N. Y.—Fastnut devises—washer, key and wrench. Represented by A. L. Story and J. D. McGrath. Space in passageway between ballroom and court.

Flannery Bolt Company, Pittsburgh, Pa.—Tate flexible staybolts, including standard water space stays, flush type, adjustable crown stays, section of boiler showing typical installations, tools for installation of Tate bolts, photographic views of various installations and display at the Panama Pacific Exposition. F. B. C. nut locks for freight and passenger cars. Represented by J. Rogers Flannery, B. E. D. Stafford, Charles Hyland, Geo. E. Howard, W. M. Wilson, Thos. J. Leahey, Barton H. Grundy and Jas. J. Flannery. Spaces 590-591.

Fort Pitt Malleable Iron Company, Pittsburgh, Pa.—Reception booth. Represented by Frank J. Lanahan, J. S. Lanahan and A. M. Fulton. Space 619.

Franklin Railway Supply Company, New York, N. Y.—Franklin fire door; Franklin water joint. Represented by J. S. Coffin, Sr., S. G. Allen, W. H. Coyle, R. G. Coburn, C. W. F. Coffin, J. S. Coffin, Jr. and H. M. Evans. Spaces 408-410.

Frost Railway Supply Company, The, Detroit, Mich.—Harvey friction spring gears; Detroit metal weather strip. Represented by Harry W. Frost, George A. Cooper and George L. Harvey. Space 560.

Galena-Signal Oil Company, Franklin, Pa.—Reception booth. Represented by S. A. Megeath, C. C. Steinbrenner, E. H. Baker, Barton H. Grundy, William Holmes, George L. Morton, William A. Trubee, William J. Walsh, J. E. Linahen, J. G. Arn, W. E. Brumble, J. W. Bunn, B. P. Corey, E. W. Grieves, E. G. Johnson, G. E. McVicar, P. H. Stack, W. O. Taylor, J. F. Walsh and J. A. Whalen. Space 32.

Garlock Packing Company, The, Palmyra, N. Y.—Air pump and

throttle packings; air brake and triple valve gaskets; special packings for accumulators and compressors; general line of shop packings. Represented by H. N. Winner, J. P. Landreth, W. G. Cook, Geo. T. Ramsey, T. P. Dunham, L. P. Duggan and F. W. Moore. Space 508.

General Brake Shoe & Supply Company, Chicago, Ill.—Brake shoes for use on all steam railway service. Represented by H. H. Hiland, C. E. Stecher, J. V. Valleau, B. J. Meyer, Ira C. Hubbell, John J. Stevens, Jr. and Wm. B. Neal. Space 4.

General Electric Company, Schenectady, N. Y.—Electric arc welding equipment; electric furnace; electric oil tempering bath; several types of motors; control; flow meters; incandescent lamps. Represented by W. J. Clark, P. A. Dyer, F. S. Hartman, W. O. Kellogg, C. A. Raymond, C. C. Peirce, B. F. Bilsland, J. A. Seede, C. Fair, J. Eaton, R. E. Woolley and L. W. Shugg. Spaces 157-173.

Gold Car Heating & Lighting Company, New York, N. Y.—M. C. B. standard steam hose couplers; vapor system; combination pressure and vapor system; automatic temperature control for steam heated trains; automatic temperature control for electrically heated trains; packless quick opening supply valve; steam traps; pressure regulators; ventilators. Edward E. Gold, E. B. Wilson, A. B. Strange, W. H. Stocks, J. M. Stayman, J. O. Brumbaugh, E. J. Ronan, A. E. Robbins, F. H. Smith and F. T. Kitchen. Spaces 301-303-305.

Goldschmidt Thermit Company, New York, N. Y.—All materials for welding locomotive frames and other broken locomotive parts; large sample welds on crank shafts; photographs of important welding operations; demonstrations of the process as applied to pipe welding and samples of metals and alloys produced free from carbon by the Thermit process. Represented by W. C. Cuntz, W. R. Hulbert, J. G. McCarty, William Aldrich, F. W. Cohen, H. S. Mann and H. D. Kelley. Spaces 137-139.

Goodwin Car Company, New York, N. Y.—Full size and working model of automatic dump and ballast car. Represented by Joseph Thayer Gilman, O. B. Gilman and Howard Van Scoy. Space 207—also track exhibit.

Goodyear Tire & Rubber Company, Akron, Ohio.—Samples of the Subers hose. Represented by L. H. Conger. Space 9.

Gould Coupler Company, New York, N. Y.—Gould cast steel jaw type side frame; high capacity freight friction draft gear 2½ in. travel, 250,000 capacity; fraction draft gear 3¼ in. travel, 300,000 capacity; fraction buffer for heavy steel passenger equipment; friction draft gear for passenger equipment, 2½ in. travel, 125,000 to 150,000 capacity; intermediate type of freight coupler; new type passenger coupler with all cast steel shank; pinless lid journal box; simplex system electric car lighting; storage batteries. Represented by F. P. Huntley, Geo. G. Milne, Clarence E. Rood and Geo. R. Berger. Spaces 608-610-612.

Greene, Tweed & Company, New York, N. Y.—Palmetto braided packing for piston rods; twist packing for globe valves, etc.; packing in sets for air pump service; packing in sets for throttle valve service; Manhattan packing for hydraulic pressures; Favorite reversible ratchet wrench for nut turning. Represented by H. S. Demarest, V. B. Nickerson and F. M. Thomson. Space 628.

Greenfield Tap and Die Corporation, Greenfield, Mass.—Motor driven bolt cutter; Acorn screw-cutting dies; reversing tapping chucks; automatic opening die head; reamers of all descriptions; new style or gun tap; friction tapping chucks; gages; hand taps and stay bolt taps. Represented by F. W. Strecker, F. C. Hoffman and W. A. Cook. Space 147.

Griffin Wheel Company, Chicago, Ill.—Car wheels on standards. Represented by C. K. Knickerbocker, H. N. Scott and A. A. Hale. Spaces 153-155.

Hale & Kilburn Company, Philadelphia, Pa.—Walkover car seats, latest styles; all-steel standard passenger coach seats; parlor and reclining car chairs; interurban car seats; metal doors for coaches and baggage cars; Steel integral window frame; Steel interior finish for coaches, parlor, dining and sleeping cars; Pressed steel mouldings, posts and parts for car construction. Represented by F. C. Edson, B. H. Forsyth, C. W. Laskay, A. F. Old, R. H. Pilson, F. F. Robb, H. R. Rochester and W. von Schlegell. Spaces 404-406.

Hammett, H. G., Troy, N. Y.—Trojan metallic packing; Trojan bell ringers; machine for expanding and beading copper pipe to coupling sleeves. Represented by H. G. Hammett and A. O. Van Dervort. Space 420.

Haring, Ellsworth, New York, N. Y.—E-H double X high speed steel, tool steels and specialties. Represented by Ellsworth Haring. Space 158.

Harrington, Son & Company, inc., Edwin, Philadelphia, Pa.—Chain hoists and travelers for overhead track. Represented by W. J. Somerset and Roger Sherron. Spaces 149-151.

Heywood Brothers & Wakefield Company, Wakefield, Mass.—Car seats for steel coaches. Represented by E. C. Lang, C. W. H. Frederick, Bertram Berry and Frank N. Grigg. Space 575.

Hunt Spiller Manufacturing Corporation, South Boston, Mass.—Cylinder bushings; cylinder packing; piston heads; valve bushings; valve packing; valve bull rings; eccentrics and straps; crosshead shoes; driving boxes; pedestal shoes and wedges; rod bushings. Represented by W. B. Leach, Frederic Parker, John G. Platt, A. B. Root, Jr., V. W. Ellet, J. M. Monroe, E. J. Fuller and H. McB. Parker. Spaces 562-563.

Hutchins Car Roofing Company, Detroit, Mich.—Half-tone cuts of all steel car roofs. Represented by F. M. Whyte, M. F. Ryan, D. W. Hawksworth and W. D. Thompson. Space 523.

Hulson Grate Company. Space 365.

Illinois Steel Company, Chicago, Ill.—Samples of heat treated track and crossing bolts with physical tests. Represented by D. E. Sawyer Space 414.

Imperial Car Cleaver Company, Newark, N. J.—Cleaners for cane seats and plush cushions. Represented by J. MacMarell Wilson, Frank Sherritt, J. Whitney Wilson and J. T. Hartnagel. Space 213.

Independent Pneumatic Tool Company, Chicago, Ill.—Reception booth. Represented by James Buchanan Brady, John D. Hurley, R. T. Scott, R. S. Cooper, H. F. Finney, Vernon Job and W. H. Rosevear. Space 574.

Ingersoll-Rand Company, New York, N. Y.—Little David pneumatic chipping and riveting hammers; jam riveters; holderons; pneumatic drills; Crown sand rammers and Imperial motor hoists. Represented by George A. Gallinger, E. H. Hinkens, M. O'Connor, Phil. Weiss, George S. Johnston, P. J. Christy, R. C. Cole, A. L. Wilhelm, C. R. Hewitt, W. A. Johnson, C. F. Overly and Wm. Wilhelm. Spaces 582-583.

International Oxygen Company, New York, N. Y.—I. O. C. system of oxy-hydrogen generators and accessories; I. O. C. stud valves; oxygen testing apparatus; high pressure oxygen cylinders. Represented by E. W. Erwin, P. J. Kroll and D. J. Tonkonogy. Space 341.

International Steam Pump Company, New York, N. Y.—One 12x7x10 Laidlaw Feather Valve air compressor, direct connected by close belt drive to 50 H. P. General Electric Motor; model of Glenora triple plunger deep well pump; Jeanesville horizontally split case turbine centrifugal pump. Represented by Paul B. Fenlon, C. Troutman, Thomas C. McBride and LeRoy Hilyard. Space front of Machinery Hall.

Jacobs-Shupert U. S. Firebox Company, Coatesville, Pa.—Models; photos; illustrations and circulars. Represented by C. Ducas, A. W. Whiteford, H. W. Jacobs, L. M. Henoch, Geo. R. Boyce, J. H. Smythe, G. T. Schnatz, F. H. Gordon, H. S. Coleman. Space 621.

Jenkins Bros., New York, N. Y.—Jenkins Bros. valves in brass, iron body and cast steel, for all pressures and purposes; round house valves; equalizing stop and check valves; mechanical rubber goods; sheet packing; gaskets; valve discs and rings; new oil-proof sheet packing, car heating discs. Represented by Frank Martin and B. J. Neely. Space 553.

Jessop, William & Sons, Inc., New York, N. Y.—Jessops steel tools. Represented by J. E. Sandmeyer, E. M. Britton and O. H. Reynolds. Space 504.

Johns-Manville Co., H. W., New York, N. Y.—Magnesia lagging; fire felt lagging; vitribestos; pipe coverings; air pump and throttle packing; sheet packing; gaskets; millboard; Transite and Ebony asbestos wood; asbestos shingles; friction and rubber tapes; electrical materials; fibre and sectional conduit; dry batteries; asbestos roofings; asbestos corrugated roofing; waterproofing and mastic; J-M expander rings; hair felt insulators; passenger and refrigerator car insulations; Vulcabeston; high temperature and insulating cements; smoke jacks; cork; armored hose; brake band lining; asbestos-metallic brake blocks. Represented by J. E. Meek, J. C. Younglove, G. A. Nicol, H. G. Newman, P. C. Jacobs, Geo. Christenson and F. J. Horne. Spaces 572-573.

Jones & Laughlin Steel Company, Pittsburgh, Pa.—Reception booth. Represented by Roland Gerry, Frank S. Slocum, George B. Mitchell and J. K. Barker. Space 409.

Kernchen Company, Chicago, Ill.—Kernchen siphonage ventilators. Represented by M. W. Hughes and P. R. Simmonds. Space 368.

Kerite Insulated Wire & Cable Company, The, New York, N. Y.—Kerite insulated wires and cables. Represented by R. D. Brixey, Azel Ames, P. W. Miller, J. W. Young and J. A. Renton. Space 510-512.

Keyoke Railway Equipment Company, Chicago, Ill.—Murray all cast steel friction draft gear and cast steel coupler yoke. Represented by George C. Murray and R. J. Cook. Space 321.

Keystone Equipment Company, Philadelphia, Pa.—Keystone driving box and assortment of Keystone tool holders. Represented by A. C. Buzby, H. A. Buzby and J. N. Mowery. Space 543.

Landis Machine Company, Waynesboro, Pa.—One 4 in. pipe threading and cutting off machine; chaser grinder; one 2 in. single spindle bolt cutter, belt driven; one 1½ in. double spindle bolt cutter, motor driven; one 2 in. stationary type pipe die

head; one 8 in. stationary type pipe die head; one 1¼ in. automatic screw cutting die head; one 1 in. solid adjustable die head. Represented by C. F. Meyer, F. C. Delcher, Dorsey Thompson, F. W. Heefner and J. W. Willis. Spaces 117-119.

Lehon Company, The, Chicago, Ill.—Roofing for railroad buildings; plastic car roofing; insulating paper; waterproof canvas for passenger coach, cab and caboose roofs; saturated burlap for waterproofing concrete construction work; paint for waterproofing, roofing and metal work. Represented by Tom Lehon. Space 18.

Liberty Manufacturing Company, Pittsburgh, Pa.—Turbine cleaners for arch tubes operated by steam, air and water. Represented by H. A. Pastre. Space 416.

Locomotive Stoker Company, Schenectady, N. Y.—One type "C" Street locomotive stoker. Represented by W. S. Bartholomew, Clement F. Street, W. G. Clark, J. J. Hannahan, O. B. Capps and J. J. Byrne. Spaces 403-405-407.

Loco-Light Company, Indianapolis, Ind.—One 32 volt incandescent headlight equipment. Represented by Robert H. Pyle. Space 614.

Locomotive Superheater Company, New York, N. Y.—Locomotive superheaters and accessories. Represented by Geo. L. Bourne, R. M. Ostermann, F. A. Schaff, G. E. Ryder, H. B. Oatley and W. A. Buckbee. Spaces 408-410.

Long, Charles R. Jr. Company, Louisville, Ky.—Railway paints of all kinds for locomotive and car departments. Represented by Charles R. Long, Jr., Harry Vissering, G. S. Turner, S. W. Russell and W. H. Heckman. Spaces 577-576.

Lubricating Metal Company, The, New York, N. Y.—Noheet bearing metal; Noheet metallic packing. Represented by C. B. Yardley, Jr., and Thatcher H. Soule. Space 367.

Lucas Machine Tool Company, Cleveland, Ohio.—Number 32 "Precision" horizontal boring, drilling and milling machine. Represented by W. L. Cheney, J. A. Leighton, Jr. and F. P. Sprague. Space 121.

Lukens Iron & Steel Company, Coatesville, Pa.—Reception booth with photographs of mill operation. Represented by Chas. Ducas, A. W. Whiteford, Henry W. Jacobs, L. M. Henoch, Geo. R. Boyce, J. H. Smythe, G. T. Schnatz and F. H. Gordon. Space 621.

Lundie, John, New York, N. Y.—The Lundie tie plate. Represented by John Lundie. Space 158.

Lunkenheimer Company, The, Ohio.—High grade steam engineering and motor accessory appliances; valves, bronze, iron body brass mounted, puddled semi-steel and crucible cast steel; whistles, water gages and gage cocks; ground key specialties; oil and grease cups; lubricators and oiling devices. Represented by Howard J. Evans and Andrew Lauterbach. Spaces 517-519.

M. C. B. Committee on couplers. Space, pier end.

MacRae's Blue Book Company, Chicago, Ill.—MacRae's blue book; the railway supply index catalogue. Represented by Albert MacRae, Alex. Smith and R. S. Lundy. Space 13.

Mahr Manufacturing Company, Minneapolis, Minn.—Mahr patent portable torches for car repair; boiler shop, foundry, brazing, paint burning and oil burning rivet forge work. Represented by J. A. Mahr, H. A. Warner and R. B. Ecker. Space 3, pier end.

Manning, Maxwell & Moore, Inc., New York, N. Y.—And subsidiary companies, comprising the Putnam Machine Company, Ashcroft Manufacturing Company, Consolidated Safety Valve Company, Hancock Inspirator Company and Hayden & Derby Manufacturing Company—Putnam latest car wheel boring mill; latest pattern 36 in. geared head lathe; No. 4 new pattern double axle lathe; journal turning lathe; National Machinery Company's latest type machines for forging and bolt cutting; a complete exhibit of brass goods consisting of Hancock inspirators, check valves, steam valves, hose strainers, boiler washers and other locomotive appliances; Metropolitan injectors; Consolidated safety valves; Ashcroft gages; Tabor indicators and instruments for measuring steam, water and gas. Represented by A. J. Babcock, James B. Brady, J. N. Derby, P. M. Brotherhood, F. P. Smith, Chas. L. Brown, Jos. H. Bush, R. A. Bole, F. J. Baumis, H. F. Brandes and E. R. Frost. Spaces 104 to 130.

Massachusetts Mohair Plush Company, Boston, Mass.—Car seat plushes and friezes and railway car seats. Represented by William W. Melcher. Space 22.

McConway & Torley Company, The, Pittsburgh, Pa.—Pitt passenger couplers; Pitt 3-stem passenger coupler equipment; Pitt freight coupler; Penn freight couplers of top and side operating designs. Represented by Stephen C. Mason, E. M. Grove, Wm. McConway, Jr., H. C. Buhoup, I. H. Milliken and W. J. Regan. Spaces 501-503-505.

McCord & Company, Chicago, Ill.—Steel and malleable journal boxes; force feed locomotive lubricators. Represented by A. C. McCord, D. W. McCord, J. A. Lamon, Morrell Dunn, W. J. Schlacks and H. E. Creer. Space 509-511.

McGraw Publishing Company, Inc., New York City.—Copies of Electrical Railway Journal; Electrical World, Engineering Record; Metallurgical & Chemical Engineering. Represented by Messrs. H. W. Blake, F. Kingsley, C. A. Babtiste, S. T. Henry, W. K. Beard, C. A. Henley and F. H. Behrens. Space 7.

McKinnon Chain Company, Buffalo, N. Y.—Electric welded chain. Represented by Geo. J. Armstrong. Space 366.

Midvale Steel Company, The, Philadelphia, Pa.—Reception booth. Represented by H. M. Deemer, Samuel Griffith, T. W. Illingworth, F. H. Philbrick, R. L. Williams and W. S. Edger. Space 640.

Miner, W. H., Chicago, Ill.—Friction draft gears; side bearings; centering devices and other railway specialties. Represented by W. H. Miner, A. L. Canavan, S. R. Fuller, Jr., J. R. Mitchell, W. E. Robertson, J. F. O'Connor, G. I. Haight and G. A. Johnson. Spaces 584-587.

Monroe Calculating Machine Company, New York, N. Y.—Machine which multiplies, divides, adds and subtracts without the use of complements, reciprocals or complicated manipulations of any kind. Represented by E. S. Maulsby and R. B. Hays. Space 558.

Mudge & Company, Chicago, Ill.—Mudge-Slater spark arrester model and Mudge-Peerless car ventilator. Represented by Burton W. Mudge and George W. Bender. Space 201.

Nathan Manufacturing Company, New York, N. Y.—Number 10 "XX" Monitor injector; number 11 Simplex injector type "R" flanged; number 10 Nathan injector, flanged; number 10 Simplex "HW" nonlifting injector flanged; 3-feed "BE" cup with cut out with booster; never leak gauge cock; coal sprinkler; balanced starting valve; 2-in. double boiler check type "T," 2-in. starting valve flanged; 2-in. intermediate steam valve; Locomotive pumps with 4 feeds; type "B" stationary pump 1 quart, 3-feed; type "A" pump 1 pint; type "A" pump ½ pint; balanced steam valve flanged bonnet; quadruple "BE" type 166 with cut out; quintuple feed "BE" 166 with cut out; single and double air cylinder attachment; never-leak gauge cock; 3-sided Delco water gauge guard; 4-sided Delco water gauge guard; Klinger water gauge guard number 4; Sectional model of type "B" pump; Woods pump 1 quart, 3-feed. Represented by E. S. Toothe, J. S. Seeley, J. C. Currie and Robert Wood. Space 578, 579.

National Boiler Washing Company, Chicago, Ill.—Safety first fire doors; photographs of the National boiler washing system. Represented by W. White, H. A. Varney and E. B. White. Space 629.

National Brake Company, Inc., Buffalo, N. Y.—Peacock passenger, freight and baggage car brakes. Represented by Frank D. Miller and W. D. Brewster. Space 385.

National Car Wheel Company, Pittsburgh, Pa.—"Star special" cast iron car wheels. Represented by John Howard Yardley, J. Baueis Weisbrod, James D. Rhodes, H. E. McClumpha, R. H. Tate, C. A. Maher, George P. Rhodes and E. H. Chapin. Spaces 530-532.

National Graphite Lubricator Company, Scranton, Pa.—Graphite lubricators for locomotives and stationary engines. Represented by Edward L. Pollock, Lewis S. Watres, Thornton N. Motley, C. B. Flint and David J. Lewis. Space 307.

National Lead Co., New York, N. Y.—Red lead in paste form; steel cars (models) painted with paste red lead. Represented by F. M. Hartley, Jr., and Chas. Barr Field. Space 329.

National Lock Washer Company, The, Newark, N. J.—Models of car curtains; curtain and window fixtures; National lock washers; Hipower nut locks. Represented by F. B. Archibald, J. Howard Horn, R. F. Horsey and Daniel Hoyt. Space 541.

National Malleable Castings Company, The, Cleveland, Ohio.—Couplers; journal boxes; brake staff mechanism; malleable iron castings. Represented by T. W. Aishton, C. A. Bieder, J. J. Byers, W. E. Coffin, Chas. Gaspar, R. T. Hatch, J. H. Jaschka, O. W. Loomis, G. V. Martin, B. Nields, Jr., Jas. A. Slater, J. H. Slawson, S. L. Smith, E. O. Warner and L. S. Wright. Spaces 613-615.

National Railway Devices Company, Chicago, Ill.—Shoemaker fire door; National release rigging and single link release rigging. Represented by Jay G. Robinson and Percy P. Hinckley. Space 187.

National Tube Company, Pitsburgh, Pa.—Reception booth. Represented by L. F. Hamilton, G. N. Riley, P. J. Conrath, J. F. Goodwin, J. W. Kelly and W. S. Bitting. Spaces 548-549.

Newkirk, W. P., Portsmouth, Ohio.—Portable blue flag derail. Represented by W. P. Newkirk. Space 631.

New York Air Brake Company, The, New York, N. Y.—Reception booth. Represented by Scott R. Hayes, B. Pratt, O. E. Moore, C. E. Leach, Thomas O'Leary, Jr., H. F. Bickel, N. A. Campbell and William Owens. Spaces 374 to 377.

Niles Bement Pond Company, New York, N. Y.—Niles 44 inch vertical boring and turning mill; Bement 60 inch duplex horizontal borer, driller and miller. Represented by James K. Cullen, Edward L. Leeds, Geo. F. Mills, Chas. L. Lyle and D. J. Normoyle. Spaces 134-136-138-140-142-144.

Norton, A. O., Inc., Boston, Mass.—Self lowering high speed jacks. Represented by A. O. Norton, Harry A. Norton, J. O. St. Pierre, Henry J. Wilson, F. L. Gormley, R. L. Skidmore and Chas. H. Smith, Jr. Space 559.

Nuttall Company, R. D., Pittsburgh, Pa.—Flexible gears and pantograph trolley as installed on Pennsylvania Railroad motor cars Philadelphia to Paoli electrification; locomotive rings, gears and third rail pantograph trolleys; ten inch trolley wheel and harp for high speed interurban and locomotive service; display of heat treated steels as applied to railway gears and pinions. Represented by Milton Rupert, W. H. Phillips and L. H. Keim. Spaces 143-145.

Nutter & Barnes Company, Hinsdale, N. H.—Automatic cold sawing machines; abrasive wheel metal cutting machines; automatic metal saw sharpeners, universal tool grinders; hydraulic plain cylindrical grinders; saw-gear and milling cutter sharpeners; motor driven. Represented by W. S. Howe and A. E. Champagne. Space 156.

O. and C. Company, The, New York, N. Y.—Emergency knuckles; skid shoes; car and engine replacers; diaphragms; E. M. Smith, Edmund Quincy and F. F. Kister. Space 187. Ross-Schoefield system of boiler circulation; snow flangers. Represented by C. F. Quincy, C. F. Pierce, J. V. Wescott.

Okonite Company, The, New York, N. Y.—Reception booth. Represented by F. J. White and W. T. Kyle. Space 500.

O'Malley-Beare Valve Company, Chicago, Ill.—Multiplate; full line of round house service valves, globe, angle and checks; locomotive special valves; duplex blow-out valves. Represented by Edward O'Malley and Thos. O'Malley. Space 210.

Pantasote Company, The, New York, N. Y.—Agasote headlining and panelling; Pantasote curtain material and upholstery leather. Represented by Wm. Anderson, Wm. A. Lake and John M. High. Space 400.

Parkesburg Iron Company, The, Parkesburg, Pa.—Charcoal iron boiler tubes; safe ends; arch tubes and locomotive superheater tubes; and Lohmannized boiler tubes. Represented by H. A. Beale, Jr., George Thomas, 3rd, W. H. S. Bateman, J. A. Kinkead, J. R. Wetherald and G. W. Denyven. Space 388.

Paxton-Mitchell Company, The, Omaha, Neb.—Piston rod, valve stem, air pump and cylinder packing. Represented by James L. Paxton and Wm. Leighton. Space 209.

Philadelphia & Reading Railway.—Reading or 4-4-4 type of passenger locomotive. Space on exhibit track at Mississippi Avenue.

Pilliod Company, The, New York, N. Y.—Engine model with Baker valve gear. Represented by R. H. Weatherly, K. J. Eklund, F. S. Wilcoxen, C. M. Jennelle, R. G. Graham and F. E. Pilliod. Spaces 556-557.

Pocket List of Railroad Officials, The, New York, N. Y.—The pocket list of railroad officials. Represented by J. Alexander Brown, Charles L. Dinsmore and Harold A. Brown. Space 7.

Power Specialty Company, New York, N. Y.—Full size model of Foster locomotive superheater. Represented by L. B. Nutting, G. B. Ferrier, Jr. and Frank Page. Space 635.

Pressed Steel Car Company, New York, N. Y.—Photographs of products. Represented by O. C. Gayley, J. F. MacEnulty, J. H. Regan, C. A. Lindstrom, C. E. Postlethwaite, J. H. Mitchell, L. O. Cameron, J. C. Anderson, J. S. Turner, W. H. Wilkinson, M. S. Simpson, H. S. Hammond, G. W. Ristine and F. L. Johnson. Spaces 545-601.

Pyle-National Electric Headlight Company, Chicago, Ill.—Type "E" arc headlight equipment, with special headlight case; type "K" incandescent headlight equipment, with special headlight case; Young locomotive valve gear; Young locomotive reversing gear; Young locomotive piston valve; Van Dorn sectional and one piece steel car ends. Represented by J. Will Johnson, J. E. Kilker, C. E. Miller, Wm. Miller, C. P. McGinnis, R. C. Vilas and O. W. Young. Spaces 602-604-606 and 90.

Pyrene Manufacturing Company, New York, N. Y.—Pyrene fire extinguisher for railway coaches, freight platforms, signal towers, buildings, offices, oil houses. Represented by E. L. Kent, W. H. McKinnon and O. E. Meske. Space 203-205.

Railway Age Gazette, New York, N. Y.—Publications Railway Age Gazette; Mechanical Edition Railway Age Gazette; Signal Engineer; other publications devoted to the transportation industry. Represented by E. A. Simmons, Samuel O. Dunn, Roy V. Wright, R. E. Thayer, A. C. Loudon, C. B. Peck, Geo. Mitchell, C. W. Foss, F. W. Kraeger, A. R. Gegen, M. E. Christy, C. R. Mills, Henry Lee, F. H. Thompson, A. F. Ashbacker, W. M. Ford, H. H. Marsh, W. D. Horton and F. S. Dinsmore. Space 1.

Railway Devices Company, St. Louis, Mo.—"Western" angle cock holder; Perfect drop brake handle; "Iron Horse" or pedestal; "Spiral" pipe clamps; "Interlox" brake mast ratchet and pawl. Represented by Louis A. Hoerr and Sterling Campbell. Space 618.

Railway Master Mechanic, Chicago, Ill.—The publication itself. Represented by Charles S. Myers and Laurence A. Horswell. Space 20.

Railway Materials Company, The, New York, N. Y.—Brake shoes. Represented by T. B. Cram, George Hoeffle, E. C. Folsom, I. B. Lesh and G. F. Allen. Space 561.

Railway Review, Chicago, Ill.—Railway Review current issues and files of previous issues. Represented by Willard A. Smith, Arthur E. Hooven, J. E. Gougeon, Jno. M. Lammedee and Clyde F. Burns Spaces 12-14.

Railway Utility Company, Chicago, Ill.—Various types of honeycomb ventilators for Monitor and arch roof cars; thermostat control for steam and electric heat. Represented by W. J. Pine and G. E. Pratt. Space 380.

Ralston Steel Car Company, The, Columbus, Ohio.—Model "Ohio flush side door." Represented by J. S. Ralston, A. Becker, A. D. McAdam, F. E. Symons, J. R. Forney, W. T. Sheldon, R. R. Weaver and C. S. Rea. Space 607.

Readng Specialties Company, Reading, Pa.—Rail benders; rail joints; guard rail clamps; rerailers. Represented by J. Turner Moore, M. G. Moore, B. J. Buell and R. G. Ross. Space 315.

Remy Electric Company, Anderson, Ind.—American 6 and 32 volt incandescent headlight. Represented by Thomas B. Arnold. Space 614.

Robinson Company, The, Boston, Mass.—Robinson exhaust nozzle. Represented by Frederic Parker and Frank Robinson. Spaces 564-565.

Rochester Germicide Company, Rochester, N. Y.—Automatic disinfecting appliances; general line of disinfectants; bubbling drinking fountains; liquid soap; soap dispensers. Represented by C. J. Pearson and D. N. Calkins. Space 502.

Rome Merchant Iron Mill, Rome, N. Y.—Rome "Superior" stay bolt iron and "Perfection" engine bolt iron. Represented Weston Jenkins. Space 614.

Ryerson & Son, Joseph T., Chicago, Ill.—Ulster special staybolt iron; Ulster engine bolt iron; Nikrome locomotive forgings; photographs and drawings of special railroad shop machinery. Represented by Geo. M. Basford, H. A. Gray, J. B. Warren and E. W. Kavanagh. Space 176.

Safety Car Heating & Lighting Company, New York, N. Y.—Safety "Under-frame" car lighting equipment; Pintsch mantle car lighting equipment; gas and electric car lighting fixtures; safety electric fan; Oxy-Pintsch metal cutting and welding equipment. Represented by R. M. Dixon, J. A. Dixon, A. C. Moore, G. H. Chadwell, W. L. Garland, J. S. Henry, R. C. Shaal and G. E. Hulse. Space stairway platform.

Safety First Manufacturing Company, Chicago, Ills.—Safety first combustion chamber; caboose stove; angle cock bracket; armored hose; safety parcel rack for passenger coaches; perfection door guide and seal; Fitch check holders for passenger cars; asbestos and magnesia products. Represented by Fay E. Posson and L. L. Cohen. Space 175.

Sargent Company, Chicago, Ill.—Sargent safety water guage; Wirth automatic safety water glass cocks; Sargent blow-off valve; safety valves; Loeidge quick acting blower valve; Lenz safety lathe dog. Represented by Frank G. Dunbar and George H. Sargent. Space 738.

Sellers, William & Company, Inc., Philadelphia, Pa.—Reception booth. Represented by Strickland L. Kneass, John D. McClintock, Charles T. Wilson, E. L. Holljes and L. H. Burns. Space 623.

Simplex Air Brake and Manufacturing Company. Space 614.

Southern Locomotive Valve Gear Company, Knoxville, Tenn.—Miniature locomotive and model equipped with the Southern valve gear. Represented by E. L. Chollman. Spaces 522-524.

Standard Asphalt & Rubber Company, Chicago, Ill.—Permanent waterproofing; mineral rubber pipe coating; mineral rubber floor. Represented by Chas. V. Eades. Space 634.

Standard Car Truck Company, Chicago, Ill.—One 50-ton truck and one 70-ton truck full size; one 70-ton car on exhibit tracks; 12 various models; 6 various parts. Represented by J. C. Barber, J. T. Milner, F. L. Barber, L. W. Barber and E. W. Webb. Spaces 178-180.

Standard Coupler Company, New York, N. Y.—Reception booth. Represented by Geo. A. Post, E. H. Walker, Geo. A. Post, Jr., R. D. Gallagher, Jr., and A. P. Dennis. Space 617.

Standard Heat & Ventilation Company, Inc., New York, N. Y.—Car heating apparatus of all kinds; Passenger car ventilators; steam hose couplers; end train line valves; automatic traps and regulators; Standard Econotherm. Represented by Samuel Higgins, C. F. McCuen, C. H. McCormick and L. B. Rhodes. Space stairway platform.

Standard Stoker Company, Inc., New York, N. Y.—Mechanical stokers for locomotives. Represented by Frank L. Connable, James A. Carey, Eugene duPont, David T. Williams, E. A. Averill, F. H. Cunningham and Walter Coopey. Space 211.

Stark Car Coupler Corporation, Washington, D. C.—The Stark car coupler and two miniature cars equipped with the coupler. Represented by C. H. Kadie and L. A. Shepard. Space 174.

Stockbridge Machine Company, Worcester, Mass.—One machine tool—20 inch Stockbridge patented two-piece-crank motion

motor driven shaper. Represented by A. W. Beaman and Radford Stockbridge. Space 132.

Summers Steel Car Company, Pittsburgh, Pa.—One freight car truck equipped with Summers arch bar side frame. Represented by E. W. Summers and J. M. Summers. Space 111.

Superior Oxygen Company, Pittsburgh, Pa.—Oxygen and oxy-acetylene welding and cutting apparatus. Represented by J. A. Warfel. Space 515.

Symington Company, The T. H., Rochester, N. Y.—Reception booth. Represented by C. J. Symington, A. H. Weston, C. R. Naylor, D. F. Mallory, R. H. Gwaltney, W. W. Rosser, T. C. deRosset and I. O. Wright. Spaces 570-571.

Transportation Utilities Company, New York, N. Y.—National steel trap doors; Flexolith composition flooring; metallic steel sheathing; Imperial car window screens; National standard roofing; Resisto insulation; Reliance and Perfection sash balances; deck sash ratchets. Represented by D. W. Pye, W. L. Conwell, Garrett Burgert, H. B. Chamberlain, F. N. Grigg and W. S. Humes. Spaces 566-567.

Union Draft Gear Company, Chicago, Ill.—Draft gear and side bearings. Represented by Jas. R. Cardwell, L. T. Canfield, J. W. Hathaway, W. G. Krauser, Jas. E. Tarelton and H. Barnard. Space 409.

Union Railway Equipment Company, Chicago, Ill.—Pries metal roofs; Union drop brake shaft; Pries refrigerator radiators; Pries brine tank valves. Represented by W. B. Hall. Space 507.

Union Spring & Manufacturing Company, Pittsburgh, Pa.—Kensington pressed steel journal boxes; coil and elliptic springs for any service on steam and electric roads; machinery and agricultural implement springs; pressed steel spring plates and journal box lids; pressed steel shapes of various designs. Represented by L. G. Woods, C. S. Foller, A. C. Woods and H. F. Ayres. Space 620.

United Engineering & Foundry Company, Pittsburgh, Pa.—Photographs of forging press installations in railroad and other forge shops. Represented by Arnold P. Bark. Space 540.

United States Graphite Company, The, Saginaw, Mich.—Graphite products for railroad use; Mexican boiler graphite; number 205 lubricating graphite. Represented by J. W. Eviston, W. W. Lampkin, C. M. Williamson and A. B. Turnbull. Space 526.

U. S. Light & Heating Company, Niagara Falls, N. Y.—Complete U-S-L electric lighting equipment for railroad cars, in operation; U-S-L axle generators in various sizes, each a unit in an equipment; U-S-L storage batteries in types for car lighting; U-S-L storage batteries in types for operation of automatic signals. Represented by L. R. Pomeroy, H. A. Mathews, J. A. White, R. C. Haley, W. L. Bliss, C. C. Bradford, E. F. Oates, Wm. G. Davis, J. Allan Smith, A. H. Ackermann, W. A. Turbayne and L. S. Cunny. Spaces 333-335.

U. S. Metal & Manufacturing Company, New York, N. Y.—Cayuta ball and cone bearing screw jacks, high speed and standard; ratchet jacks, pressed steel seamless gear case; Linofelt and Fibrofelt. Represented by B. A. Hegeman, Jr., Chas. C. Castle, F. C. Dunham, H. A. Hegeman, H. K. Porter, H. S. Norris, E. D. Hillman, H. A. Stone and W. T. Goodnow. Space 622.

U. S. Metallic Packing Company, The, Philadelphia, Pa.—King metallic packings; Leach sanders; Gollmar bell ringers. Represented by Morris B. Brewster, H. M. Wey, John S. Mace and R. R. Wells. Space 525.

Universal Car Seal & Appliance Company, Albany, N. Y.—Universal line of car door fasteners for wood or steel construction and standard for any car seals; "Universal" car seals. Standard for any car door fasteners. Represented by Wm. C. Martineau and Allston Headley. Space 520.

Universal Draft Gear Attachment Company, Chicago, Ill.—Full sized model cast steel draft arms, with twin spring key connected draft gear; keyed yokes for friction and tandem draft gears; lock yokes for friction draft gears; one-piece cast steel riveted yokes for friction and spring draft gears; miscellaneous malleable iron and cast steel draft plates; lugs, etc. Represented by C. J. Nash and C. C. Kinsman. Space 521.

Valentine & Company, New York, N. Y.—Valentine's Valspar railway finishing varnish; panels showing our various systems of painting wood and steel railway equipment; various tests showing action of weather, moisture, car soaps and cleaners on various grades of varnish, panels showing our signal enamels. Represented by Langdon B. Valentine, Irving H. Munford and Harry L. Bell. Spaces 580-581.

Vissering & Company, Harry, Chicago, Ill.—Viloco locomotive sanders; duplex engineers' valve; bell ringer; bell ringer throttle valve; one piece brake step; Crescent metallic packing. Represented by Harry Vissering, Chas. R. Long, Jr., Guilford S. Turner and Wm. H. Heckman. Spaces 576-577.

Walker Company, Inc., Sheridan A., New York, N. Y.—New improved all-steel railroad car-seats. Represented by A. H. Flint and S. A. Walker. Space 589.

Warner & Swasey Company, The, Cleveland, O.—One number 2A universal hollow hexagon turret lathe, operating on bar work; one number 3A universal hollow hexagon turret lathe operating on chucking work. Represented by A. C. Cook, L. K. Berry and H. E. Witham. Space 123-125.

Waugh Draft Gear Company, Chicago, Ill.—Draft gear. Represented by C. H. Osborn. Space 513.

Wayne Oil Tank & Pump Company, Fort Wayne, Ind.—Hand and power driven self-measuring pumps and storage tanks. Represented by W. M. Griffin, Edward H. Barnes and B. F. Geyer. Space 11.

West Disinfecting Company, New York, N. Y.—Liquid soap dispensers and liquid soap; Formosal fumigators; automatic drip machines; Protectus machines; sanitor closet; West portable steam sterilizer; fumigating lamps; Coro-Noleum. Represented by Geo. L. Lord, H. E. Daniels and Dr. Hyde R. Fussell. Space 26.

Western Railway Equipment Company, St. Louis, Mo.—Western brake jaws; Acme pipe clamps; Security dust guards; Western steel carline; Linstrom syphon; Acme brake adjuster. Represented by Louis A. Hoerr and Sterling Campbell. Space 618.

Western Steel Car & Foundry Company, New York, N. Y.—Photographs of products. Represented by O. C. Gayley, J. F. MacEnulty, J. H. Regan, C. A. Lindstrom, C. E. Postlethwaite, J. H. Mitchell, L. O. Cameron, J. C. Anderson, J. S. Turner, W. H. Wilkinson, M. S. Simpson, H. S. Hammond, G. W. Ristine and F. L. Johnson. Spaces 545-601.

Westinghouse Air Brake Company, Pittsburgh, Pa.—Reception booth. Represented by A. L. Humphrey, Walter V. Turner, E. A. Craig, J. R. Ellicott, C. P. Cass, C. J. Olmstead and F. V. Green. Spaces 19-29.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Reception booth. Lighted with 200-watt type C Mazda Lamps. Represented by J. C. McQuiston, W. H. Patterson, J. H. Bryan, H. W. Beaumont, R. F. Moon, R. J. Ross, H. C. Mode and L. W. Popp. Spaces 19-29.

Westinghouse Friction Draft Gear Company, Pittsburgh, Pa.—Reception booth. Represented by Robert Burgess, H. E. Chilcoat and S. J. Kidder. Spaces 19-29.

Westinghouse Lamp Company, East Pittsburgh, Pa.—Reception booth. Represented by Elliott Reid. Spaces 19-29.

Westinghouse Machine Company, East Pittsburgh, Pa.—Reception booth. Represented by E. H. Sniffin, M. C. McNeil and R. E. Miller. Spaces 19-29.

Westinghouse Pacific Coast Brake Company, Emeryville, Cal.—Reception booth. Represented by S. G. Down and C. C. Farmer. Spaces 19-29.

Westinghouse Traction Brake Company, Pittsburgh, Pa.—Reception booth. Represented by F. M. Nellis. Spaces 19-29.

Wheel Truing Brake Shoe Company, Detroit, Mich.—Samples of abrasive brake shoes for truing up car wheels and locomotive driver wheels. Represented by J. M. Griffin. Space 533.

White American Locomotive Sander Company, Roanoke, Va.—Combined pneumatic track sander and pipe cleaner. Represented by W. H. White, John E. Graham and R. J. Donahoe. Space 379.

Willard Storage Battery Company, Cleveland, Ohio.—No-wash train lighting storage battery and parts. Represented by W. E. Ballantine, R. N. Newolt, F. S. Gassaway, Louis Sears and E. L. Myers. Space 611.

Wilson Remover Company, Newark, N. J.—Wilson removers and appliances. Represented by J. MacMaull Wilson, J. Whitney Wilson, Frank Sherritt and J. T Hartnagel. Space 213.

Windsor Machine Company, Windsor, Vt.—Reception booth. Represented by F. L. Cone and Thomas F. Du Puy. Space 101, 102.

Wray Publishing Company, Chicago, Ill.—Periodical; Railway Electrical Engineer; monthly. Represented by Edward Wray and C D. Sperry. Space 16.

Wright Safety Air Brake Company, Greensboro, N. C.—Automatic train stop; air brake. Represented by J. E. Latham, J. B. Wright, F. O. Lawson, F. H. White and J. C. Watkins. Space 384.

Yale & Towne Manufacturing Company, The, New York, N. Y.—Yale triplex hoists, trolleys, electric hoists, battleship projectile hoists, Yale coach door closers. Represented by C. W. Beaver and W. A. Hall. Spaces 152-154.

COAL IN SPAIN.—An article in a Spanish journal states that in 1913 the coal basins in Spain were found to cover an area of about 494,000 acres, containing 3500 collieries, of which 762 only were working, embracing an area of 98,000 acres. The probable quantity of coal existing in the province of Asturias alone has been estimated at 5000 million tons.

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

The discussion of the report of the Committee on Mechanical Stokers brought out very definitely that the stoker manufacturers, or at least some of them, do not claim a saving in fuel by the use of stokers. They do, however, claim a marked increase in locomotive capacity; that is, a locomotive can haul a greater tonnage at a higher speed when stoker-fired than when hand-fired, and all the testimony seems to bear this out conclusively. Statements made during this discussion to the effect that stokers have been known to fire as high as 15,000 lb. of coal per hour, also show that there need be no limitation placed on locomotives as far as fuel consumption is concerned, as the stoker can be made to supply any amount of fuel which can be consumed on the grate. The particular field, therefore, of the mechanical stoker is not direct saving in fuel but increased tonnage.

Stokers and Increased Capacity

President Gaines made an excellent suggestion in his address when he directed attention to the fact that many of the associate and honorary members of the association, who are in position to help considerably in the investigations of the various committees and in preparing the reports, are being overlooked. If the work of the association is reviewed it will be found that certain associate members, because of their special knowledge or because of having time to devote to the work, have helped to prepare some of the most important and valuable of its reports and papers.

Make Better Use of Associate Members

Of course there may be subjects which, because of their nature, must be handled entirely by men in responsible positions in actual service, but these are comparatively few in number and there is hardly a committee in either the M. M. or M. C. B. Association which could not use the services of some of these members to excellent advantage. The matter can be easily adjusted if the executive committee will keep it in mind in outlining the work of the coming year.

In explaining the attitude of the Interstate Commerce Commission on the subject of autogenous welding in boiler work, Frank McManamy, chief boiler inspector, said that some of its over-enthusiastic friends are using it for purposes which will result only in retarding its development and restricting its legitimate field. Among the uses mentioned as not meeting with approval was that of repairs to boiler sheets that are wholly in tension, without any staying to assist in their support or in the absorption of stresses. We do not know to what extent this practice is being followed, but we have seen autogenous welding methods employed in repairing parts of locomotives which were in direct tension, and the practice would seem to have many possibilities for producing serious results. Autogenous welding processes are not a cure-all for all locomotive breakages and their use for some of the purposes indicated is likely to prove a set-back to their development along legitimate lines.

Restrictions on Autogenous Welding

That the prevention of locomotive smoke is an all-absorbing and important question to roads operating in cities which have smoke ordinances there is no question. The roads that are not now handicapped with city ordinances should profit by the experience of those that are and see to it that the cities which they serve do not find it necessary to even think of smoke ordinances. This can only be done by concerted action on the part of all the roads. It will be found much more satisfactory, and far cheaper, for the railways to show a sincere disposition to keep the locomotive smoke as unobjectionable as possible. While the report of the committee on Smoke Prevention discloses very amicable relations between the city smoke inspection bureau and the railways in Chicago, it will be realized that this is possibly more of an exception than the rule. The committee describes clearly the method followed by the railways entering Chicago and it could very well serve as a guide to those roads that are farsighted enough to get together and forestall objectionable ordinances.

Locomotive Smoke Prevention

If there were any doubts as to the success of the mechanical stoker in locomotive service, they would be removed by a perusal of the committee report presented at the recent convention of the International Railway Fuel Association and the report of the stoker committee of the Master Mechanics' Association. In the words of the former committee, "the stoker has arrived." Concerning fuel consumption, there seems to be as yet very little definite information, but there is no question that stoker-fired locomotives are capable of hauling greater tonnage than the same engines hand-fired because of the stoker's ability to maintain steam pressure under conditions beyond the physical limitations of the fireman. Like all new machinery, the mechanical stoker has had to pass through a period of development; some parts have had to be strengthened, some eliminated and others added. Because of this development work the cost of stoker maintenance, as referred to in the Master Mechanics' committee report, has not been reduced to the point which might have otherwise been reached. But it is encouraging in this respect to learn that efforts are being made to confine the failures to

The Mechanical Stoker

places where repairs can be conveniently made. Attention is also being given to the matter of a better arrangement of the parts of the locomotive which are affected by the application of a stoker. It would seem that in the case of new locomotives which are to be equipped with stokers, opportunities are presented for simplifying and otherwise improving the machine by co-operation between the locomotive and stoker designers. The stoker designer is frequently confronted with severe limitations in applying a stoker to an existing locomotive, but there does not seem any good reason why he should not be given a better chance in the case of new power. The report of the Master Mechanics' committee also disposes effectively of the doubt as to the possibility of producing a stoker that will handle run-of-mine coal.

Centralized Control of Associations

The recommendation of President Gaines in his opening address, for the formation of one mechanical association to assume direction and control of the various associations now in existence, seems a good one. Just how the plan would be worked out would, of course, have to be determined by conferences of all those concerned; but there does not seem any reason why the various associations should not retain their individuality to a considerable extent, while the centralized control of such matters as the subjects acted on by the various committees and presented for discussion should be the means of eliminating much of the duplication of effort and working at cross-purposes which is now evident to anyone who attends many of the mechanical conventions. We believe that much good could come from such an organization and that this recommendation should not be set aside without further attention, but that on the contrary every effort should be made to develop some logical plan to concentrate the efforts of the various associations to a much greater extent than is now possible.

RECLAMATION OF MATERIAL

IN the *Railway Age Gazette* of May 21, 1915, page 1039, there was published an abstract of the Railway Storekeepers' Association committee report on the reclamation of material. The discussion of the report brought out a number of points which seem worthy of the most careful consideration. One of the principal of these was that of applying the recommendations of the committee to any particular road. It should be remembered in connection with reports of this nature that because of the great number of plants which are visited and taken into consideration, with conditions varying in many respects, the findings cannot be anything but general in character, and while they should be of the utmost value as a guide for anyone wishing to install a reclamation plant, they should be used as a guide only and no attempt be made to adhere rigidly to the recommendations when conditions may be so different as to make this impracticable. This is particularly true in the case of labor conditions, which vary so in different parts of the country and on different roads, that methods which give satisfaction on one road might prove inapplicable on another. The report of this committee and the various published articles dealing with reclamation work on different roads throughout the country may be made of great value in the installation of a plant on any road, but if such a plant is to be a success the final details will have to be worked out to meet the local conditions.

Another point that should be borne in mind is that the foreman of a plant for reclaiming material is naturally anxious to make as good a showing as possible, and his overenthusiasm may, in consequence, lead him into practices that are not economical. Cases are not wanting where material has been "reclaimed" only to be found useless after a considerable expense has been involved in the work of reclaiming it. It is easy to imagine a reclaiming plant, because of such practices, wasting a considerable percentage of what the plant is saving in other directions. There is a difference between reclaiming material and repairing it. There is a great deal of material now going through reclamation plants for which credit is being taken for reclamation when, as a matter of fact, the material is only repaired, and cannot in any sense be considered as scrap reclaimed. Carrying this a little further, there is much material now being reclaimed which should never have been scrapped at all, much of it being in first-class condition. The reclamation of scrap material has been proving of great value as a money saver to those railways that have put it into effect, but it should be remembered that, like almost anything else, it can be overdone, and it is well for those who are in touch with this work to keep in mind such points as those above indicated.

THE MECHANICAL DEPARTMENT AND OPERATING RESULTS

IT behooves every railway officer to look about him frequently and take account of himself and of the results he is producing for his company. To be sure, if he is not producing reasonably satisfactory results, he will be told of it by those above him in no uncertain language. But there is, or should be, more to the question of "satisfactory results" than the mere matter of a man's pride or self-satisfaction in the knowledge that he is keeping up his end of the game about as well as anyone else on the road. Are these results, that are approved by the higher officers, as satisfactory to you as they might be? Are the methods employed in obtaining them the best you can develop? Are you trying only for results that will "get by," or are you extending every effort to produce real economy and at the same time improve operating conditions?

A certain division operates for three months without an engine failure. Naturally the master mechanic is proud of it. But he may be of the type of men who are content to rest on this record; he may believe that his organization is so perfected that his division will continue to operate with a minimum of failures. If he is wise he will look carefully into the matter to see where he can find possibilities for improvement—breaks in his fences which, if left unheeded, may produce an engine failure record of another character. The time has never been, and certainly is not now, when a railway man can afford to view his achievements as the best possible under the conditions: if he is going to keep up with the game he must be just a little bit ahead of it all the time.

On the methods pursued in building up and maintaining an organization depends much of its success. We are all used to hearing railway men say, "We have very bad labor conditions on our road." Undoubtedly, labor conditions are bad on very many roads; but, Mr. Mechanical Department Officer, what steps are you taking to improve them? Are you following the policy of let well enough alone, and trusting that nothing will arise to start any trouble? Or are you ever on the alert, in close touch with the conditions on your road and making every step count toward better relations with the men? The labor problem cannot be solved over night by any one man; but every mechanical department officer can help toward better relations between the company and its employees. The road foreman of engines can accomplish much with enginemen: haggling over little things of minor importance does much to antagonize this class of men. Engine house foremen and shop foremen can assist the road foreman in this respect, and can also go far toward building up a better feeling among the shop men.

On the master mechanic rests the responsibility of either finding or developing the right kind of foremen—men of character and with ability to control those under them without antagonizing them. And for the higher officer there is the necessity of making a wise choice of his immediate subordinates and instilling the spirit of harmony into the entire force, for his attitude is more than likely to be directly reflected in the attitude of those under him. In the final analysis, the type of man who holds a minor official position depends on the type of man at the head of the organization.

TODAY'S PROGRAM

Discussion of reports on:

Locomotive headlights	9.30 A. M. to 10.15 A. M.
Design, construction and inspection of locomotive boilers	10.15 A. M. to 10.30 A. M.
Standardization of tinware	10.30 A. M. to 10.45 A. M.
Superheater locomotives	10.45 A. M. to 11.30 A. M.
Fuel economy	11.30 A. M. to 12.00 M.

Individual paper on:

Variable Exhausts. By Mr. J. Snowden Bell	12.00 M. to 12.30 P. M.

Topical discussions:

Tender derailments, causes and remedies. To be opened by Mr. H. T. Bentley	12.30 P. M. to 12.45. P. M.
Road instructions for enginemen and firemen	12.45 P. M. to 1.00 P. M.
Cross-head design. To be opened by Mr. A. R. Ayers	1.00 P. M. to 1.30 P. M.

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.30 P. M.—*Informal Dance.* Special Feature, Costume Recital, Miss Betty Lee. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

TINWARE EXHIBIT

The Committee on Standardization of Tinware announces that it has arranged with the American Car & Foundry Company to exhibit the standards recommended in its report at the exhibit space of that company. The exhibit was provided through the courtesy of the Johnson Manufacturing Company. I. G. Johnson is in charge of the exhibit.

COMMITTEE ON OBITUARIES

The following members were appointed to act on the Committee on Obituaries: For Mott E. Sherwood, of the Michigan Central, D. R. MacBain, E. W. Pratt and L. R. Pomeroy. For C. Phillips, of the New Orleans and Northeastern, C. F. Giles.

R. S. M. A. DISTRICT MEETINGS

Four new members of the Executive Committee of the Railway Supply Manufacturers' Association will be chosen on Saturday, June 12. The voting place will be the room, adjoining the enrollment booth, in which the executive committee holds its meetings; and the polls will be open from 10 o'clock A. M. to 12 noon.

LOCOMOTIVE ORDERS

The New York, Ontario & Western has ordered twelve 2-10-2 type locomotives from the American Locomotive Company to be equipped with Street stokers.

The Denver & Salt Lake has ordered eight Mikado locomotives from the Lima Locomotive Corporation.

CLEANING OUT THE BOOTHS

The Exhibit Committee calls attention to the fact that it is not necessary for exhibitors to bring men in from outside to clean their booths. A force of eight men and a foreman is employed by the committee to sweep all dirt from the aisles during the night, and the regular employes of the pier are expected to remove it from the aisles. Men are also kept on duty during the day to keep things clean. It is not only unnecessary, but undesirable to bring in cleaners besides those employed by the committee, because close supervision cannot be exercised over them, and in consequence things are likely to disappear from the booths. The committee requests that if the work of cleaning is not properly done complaint shall be made to it, and prompt attention will be given to the matter.

LOST

M. K. Barnum, superintendent motive power, Baltimore & Ohio, lost his Master Car Builders' Association ex-president's badge yesterday. It has his full name on it, and he will greatly appreciate the courtesy if the finder will return it to the *Railway Age Gazette* office.

SACRED CONCERT

As usual, a sacred concert will be given in the solarium of the Marlborough-Blenheim at 10.30 o'clock Sunday morning by the hotel orchestra. Through an inadvertence the announcement of this concert was not included in the printed entertainment program.

GET-TOGETHER MEETING OF NORTH WESTERN CLUB

An informal meeting of North Western Club will be held at the Shelburne Hotel at 8.30 o'clock Saturday evening. Its purpose is to enable all those attending the conventions who formerly were or are now employed on the Chicago & North Western to get together, and all of either class who are here are invited to be present.

PENNSYLVANIA TRANSPORTATION

The announcement was made at the meeting yesterday morning that transportation would be provided over the Pennsylvania if the request was made to the secretary of the association, Joseph W. Taylor. In accordance with the requirements of the law, such transportation must be limited to bona fide railroad officials only and cannot include members of boat lines, car lines or switching lines operated by industries.

HONORARY MEMBERS

The following were elected to honorary membership in the Master Mechanics' Association at the meeting of yesterday morning:

Rufus Hill, who joined the association in 1874 and continued as a member until 1880, when he resigned. He renewed his membership in 1892 and has maintained it to the present time. Mr. Hill is now past 80 years of age.

H. G. Beckhold, who has been a member of the association for 22 years.

SOCIAL GATHERING AND DANCE

The social gathering and informal dance held on the pier last night proved to be most enjoyable. As was predicted in The Daily, the change to holding this affair on the pier with its spacious dance floor proved a marked success. The program rendered by Don Richardson's Orchestra was the last word from New York, and the costume recital of Miss Betty Lee the finished expression of an artist. The committee in charge was composed of Burton W. Mudge, chairman; C. D. Eaton, C. D. Jenks, C. W. F. Coffin, H. W. Hegeman, A. MacRae, J. P. Landreth and L. Ingraham.

R. S. M. A. NOMINATIONS

The nominating committee, composed of A. L. Humphrey, Westinghouse Air Brake Company (chairman); Scott H. Blewett, American Car & Foundry Company; Walter B. Leach, Hunt-Spiller Manufacturing Corporation; H. I. Lord, Detroit Lubricator Company; E. P. Welles, Charles H. Besly & Company; George L. Morton, Galena Signal Oil Company, and J. Allan Smith, U. S. Light & Heating Company, has recommended the following for officers: For president, Oscar F. Ostby, Commercial Acetylene Light & Signal Company, New York; for

vice-president, Edmund H. Walker, Standard Coupler Company, New York. The nominees will be voted for at the annual meeting of the Railway Supply Manufacturers' Association, to be held in Convention Hall, Million-Dollar Pier, at 12 o'clock noon Saturday, June 12.

TURN IN YOUR GOLF HANDICAPS

Those intending to play in the golf tournament on Sunday are requested to give their club handicaps, club pars and average scores to F. H. Thompson at the booth of the *Daily Railway Age Gazette*. A large number of prospective players sent their handicaps to E. H. Bankard, Jr., who was to have served as chairman of the golf committee. Mr. Bankard unfortunately is unable to attend the conventions and it will therefore be necessary for those who sent their handicaps to him to turn them in again. D. E. Sawyer will serve as chairman of the golf committee in place of Mr. Bankard.

It is desired to have as many as practicable participate in the tournament. Those who have not brought clubs can rent them at the Sea View Club for a nominal sum. While it is desired to have the entries made early, they will be accepted at the first tee on the course up to the beginning of play on Sunday morning.

STREET STOKERS IN SERVICE

C. F. Street, vice-president of the Locomotive Stoker Company, states that there are now in actual service 583 locomotives equipped with the Street stoker. Of these 583 stokers, 184 are applied to Mallet locomotives, 287 to Mikados, 75 to engines of the Santa Fe type, 27 to Consolidations, 6 to Pacific type passenger locomotives, 3 to Mountain type locomotives and 1 to a locomotive of the Centipede type. In addition this company is delivering 34 stokers to the Chesapeake & Ohio, 24 of which are for new locomotives and 10 for application to existing engines, and has an order for the application of stokers to the 12 locomotives of the 2-10-2 type which are to be built for the New York, Ontario & Western.

A. E. MANCHESTER'S FIFTIETH ANNIVERSARY

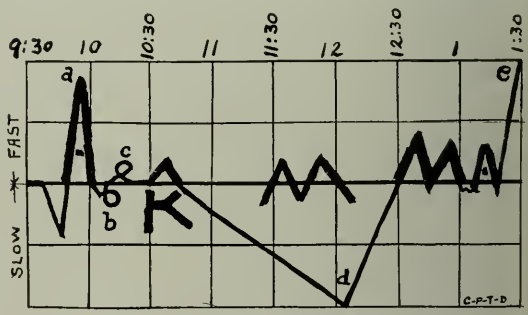
A. E. Manchester, superintendent of motive power, of the Chicago, Milwaukee & St. Paul, celebrated his fiftieth anniversary of continuous service with this road at Milwaukee on December 16, 1914. He was tendered a banquet by 250 of his associates and friends. J. F. DeVoy, assistant superintendent of motive power, was the toastmaster and the address of the evening was made by Burton Hanson, general solicitor of the road. Mr. Manchester was presented with a loving cup and an autograph album containing the names of all officials under his jurisdiction. Later he received a bound volume of the addresses of the evening, together with various clippings from magazines and newspapers publishing an account of the banquet.

Mr. Manchester is 68 years old and started with the road as a machinist at Portage, Wis., now on the LaCrosse division, when the road operated but 46 locomotives. He has held, successively, the positions of roundhouse foreman, division foreman of engines and master mechanic, and was appointed assistant superintendent of motive power in 1893. He was appointed to superintendent of motive power June 15, 1901. He joined the Master Mechanics' Association in 1894 and the Master Car Builders' Association in 1907, having missed only two or three of the conventions since he started to attend.

The guests at the banquet included the Governor of Wisconsin, Emanuel Phillips; J. H. Hiland and E. D. Sewall, vice-presidents of the St. Paul road; J. W. Taylor, assistant to the president; J. T. Gillick, assistant to the general manager; W. S. Cooper, general superintendent, and several division superintendents; S. P. Bush, president of the Buckeye Steel Castings Company, and Mr. Manchester's predecessor, James McNaughton, vice-president, American Locomotive Company; Charles Ridell, Baldwin Locomotive Works; H. T. Bentley, superintendent of motive power and machinery, Chicago & North Western, and all of Mr. Manchester's subordinates who were able to attend.

JOE TAYLOR'S EFFICIENCY CHART

They made a lot of fun of Joe Taylor and his efficiency methods at the meeting on Wednesday morning, but at the end of the session Joe was able to get up and demonstrate that he had made a schedule for the first day's session which worked out with fairly good results, even if it did have a stormy time at various times during the morning. Some of the committee chairmen had to duck when Joe developed the fact that he was forced to lay out his program before all of the committee reports had been turned in. The meeting



(Puzzle: Can you find A. R. M. M. A.?)
Joe Taylor's Efficiency Chart

started out 15 minutes late but closed 10 minutes ahead of time. The following notes will explain the various kinks in the diagram:

a—High peak of President Gaines' address.

b—Treasurer's report—not "in the hole" as chart indicates.

c—Taylor's report—looping the loop.

d—Locomotive stokers—Time lost was due to no *failure*, but there were four makes of stokers on the engine and there was not coal enough to keep them all supplied—capacity, 15,000 lb. each.

e—The fog at this point of the chart represents only an infinitesimal part of the smoke prevention in Chicago.

ADDITIONAL EXHIBITS

We said that H. Baker & Company, Inc., were making an exhibition of tool steel in space 364 in our list of exhibitors yesterday. Everyone who knows anything about the tool steel business would know we meant H. Boker & Company, Inc.

The Camel Company announces the substitution of A. B. Wegener as attending the convention in its interests in place of A. B. Wegecier, as we stated in our list of exhibitors yesterday.

Jerome-Edwards Metallic Packing Company, Chicago, is to to be found in space 362 with models of super-heat packing. Geo. C. Jerome and N. Huggins are representing the company.

The Hulson Grate Company, whose home office is in Keokuk, Iowa, is showing a new device in locomotive grate at space 365. Mr. A. W. Hulson is explaining its merits.

A new coupler and samples of a new replacer are to be found in space 311, shown by the Kelley Railway Appliance Company, of Gradyville, Ga. The company is represented by A. C. Kelley and O. Starling.

The Simplex Air Brake & Manufacturing Company, of Pittsburgh, Pa., whose exhibit is to be found in space 614, is showing engine air brake equipment. Milton D. Hays, the president, and Peter Wertz, the inventor, are in attendance, assisted by J. N. Weaver, Adam Goodwin and James Wardley.

Master Mechanics' Association Proceedings

Includes President's Address, Report on Stokers and Discussion on Compounding and Tender Side Bearings

The first session of the forty-eighth annual convention of the American Railway Master Mechanics' Association was held in Atlantic City, June 9, 1915. President F. F. Gaines called the meeting to order at 9.45 a. m. The past presidents and the officers of both the American Railway Master Mechanics' Association and the Master Car Builders' Association were invited to take seats on the platform. The opening prayer was made by the Reverend Doctor Newton D. Cadwell, Pastor of the Olivet Presbyterian Church of Atlantic City.

ADDRESS OF PRESIDENT GAINES

In looking over the developments of the past year, I do not recall any radical departure in locomotive design. There have been, however, developments along other lines which I recommend to you for the most serious consideration.

F. F. Gaines
President, Master Mechanics' Association

I will admit that personally I have been somewhat against the idea of one mechanical railroad association heretofore, believing that there was sufficient work and a broad enough field for the existence of the present organization. However, I think that the time has now come when we should have, under whatever title we may choose, one organization only, divided into such sections as may be found advisable. Most of the members of the various associations come under the jurisdiction of the mechanical department of a railroad. It would seem to me not only advisable, but very desirable, that some such new association should be formed to take over to a certain extent control of all the others. They need not necessarily meet at the same time; in fact, I think it would be better to spread the meetings out as at present, but the executive committee of the supreme association should pass upon the work of the minor associations.

Heretofore, the great argument for consolidation has been the saving of time, and I will admit frankly that my objection to consolidation has previously been on the basis that little could be done along this line; however, whether time can be saved or not seems to me a minor consideration and one that can be determined later. It is rather a question of having one recognized supreme authority on all mechanical matters pertaining to railroad work.

Until very recently the work of the Master Mechanics' Association has been more of an educational character with very few standards and very few specifications. This situation is now, of course, being changed, but I wish most urgently to call attention to the advisability of having standards for such things as it is possible to standardize in the way of methods, and also specifications for all classes of material used in locomotive

E. W. Pratt
First Vice-President, M. M. Association

work. Our standing committee has done some very valuable work, but I do not think we have nearly completed the task. We should be in a position at any time to say that such and such is our standard practice; or, that we have a specification for such material.

I would also suggest to the Committee on Specifications that in drawing up specifications for material they be not too rigid in their requirements; in other words, we want to obtain a fair grade of material under such specifications, but we do not want the specifications of such a nature as to involve a greatly increased cost, which would have the effect of a majority of the railroads not using them. After we have gone further into the matter in the way of standards and specifications a committee should be appointed to confer with the American Railway Association; the committee now in existence on Relations between Railways and Legislation might try to get the Ameri-

can Railway Association to lend its efforts toward the adoption by the railroads of such standards and specifications as the Master Mechanics' Association, or its successor, may produce.

I have several times, from the floor, called attention to the committees not issuing their reports until just a few days before the opening of the convention. It is exceedingly important that the committees get to work early in the year and have their reports in the hands of the secretary in time, so that they may be published and distributed at least two weeks before the opening of the convention. Many times it would add to the value of the proceedings and the information of the members were these reports available a sufficient length of time to allow of gathering data and investigating practices, so as to be able to discuss them intelligently and, perhaps, produce further information. A more thorough discussion of the reports would also add very largely to the value of our proceedings and the amount of information obtained.

Another matter that is worthy of consideration, is the greater use on the various committees of associate and

William Schlafge
Second Vice-President, M. M. Association

F. H. Clark
Third Vice-President, M. M. Association

honorary members. Many of these have had an excellent technical training, are familiar with committee work and possibly have a greater amount of time at their disposal than men actually in railroad service. It has been suggested to me by one such member that he would be only too glad to work on any committee, help them get their reports in shape and lined up in such form as to be readily investigated and in the best form for discussion.

I would like to suggest to the incoming Executive Committee the taking up of the form in which reports are prepared for the association. It has been suggested that all reports should be indexed on the margin for ready reference, that the logical handling of the subject be followed through consecutively and that the report, in general, be made as clear and concise as possible.

We have now, to a greater or less extent, adopted the principle of representative membership in the Master Mechanics' Association. This should be further encouraged and those roads which have not taken out representative membership should be urged to do so, as there is no good reason why every railroad of any consequence should not recognize its obligations to make common cause for the common good and unite to consummate the objects for which the association exists, until we have practically a complete representative membership, the same as in the Master Car Builders' Association.

It would seem from reports that we are not giving thorough enough training to our inspectors who look after the Federal boiler law, safety appliance and other Interstate Commerce orders. It has also been recommended that the railroads pay more attention to the educating of road foremen of engines, enginemen and firemen, and provide a more thorough examination for firemen before promotion.

The University of Illinois has an elaborate testing plant, large enough and of sufficient capacity to take the heaviest locomotive that is built, and it has been suggested the matter of testing locomotives and appliances be conducted on this plant and the results furnished the members of the association, the railroads to bear the expense in proportion to the number of locomotives owned. A test under such conditions would be cheaper to make than if actual road tests were made by any single road, and on account of the locomotives being under cover and not subjected to the variations of temperature, etc., conditions would be practically uniform for all tests.

[Reference was made at this point to the promising outlook as the result of experimental work in the use of pulverized fuel and induced draft.]

Consideration should be given to the developing and refining of present types of locomotives on economic lines rather than size or weight solely. Furthermore, while this association discusses engineering questions and questions of locomotive practice; it does not go very deep in the discussion of whether investment in either equipment or appliances brings returns on the investment. Do we investigate sufficiently the question of what becomes of the dollar

that we spend for these items? Very little is heard concerning cost. It might also be well to give consideration to the cost of doing various standard classes of work in different shops, so that those of us who are working inefficiently may see just where the leaks are and make the necessary changes to reduce the expense. Every member of this association should put himself in the attitude of a business man towards a dollar. As items that would be of interest to all, I suggest a partial list: Cost of small tools and supplies; cost of power in power houses; comparative costs and results from using Thermit, oxy-acetylene end electric welding; cost of tube work, turning locomotives, staybolt renewals, spring repairs, turning driving wheels, and fitting up driving boxes, shoes and wedges. If basic figures could be obtained on these, we could work more intelligently towards reduced cost.

Do we know, when a new engine of a new type is put in service whether its increased weight, capacity and cost are justified? Do we follow up this matter and obtain sufficient data to justify our expenditures? Do we know when a new

Angus Sinclair
Treasurer, M. M. Association

and improved machine tool is purchased and placed in the shop whether or not the cost is justified by the output?

The theoretical advantages of the superheater are well known; the practical saving in cost that can be accomplished is well known; but do we know that we are getting anything like this in every day service? Do we keep behind our roundhouse foreman to see that tubes are cleaned, superheater surfaces kept clean, joints kept tight, and that the proper handling for best results on the road is being carried out? If we do make these investigations, do we keep the operating department informed of them? Do we keep them informed as to results of improved devices and designs? Do we give information as to costs to subordinates in correct form so that they may analyze the results and endeavor to make reductions?

ASSOCIATION BUSINESS

The minutes of the last meeting were approved by the association.

The secretary's report showed the following figures regarding membership: Active, 979; associate, 19; honorary, 47, making a total of 1061. The report of the treasurer showed a cash balance of $1,213.28.

The report of the treasurer was received and referred to an auditing committee consisting of W. E. Dunham (C. & N. W.); M. D. Franey (N. Y. C.), and M. H. Haig (A. T. & S. F.).

The secretary reported on the two students attending the Stevens Institute of Technology on the Association's scholarships, stating that there are two vacancies in the scholarships at this Institute. He also stated that Joseph T. Ryerson & Son have increased the amount of their annual donation to cover two scholarships of $300 each, to take the place of one scholarship of $500. It was also arranged to increase the number of educational institutions at which the scholarships would be available. One scholarship will be vacant in June, 1915. Another scholarship will be available in 1916.

J. W. Taylor
Secretary, M. M. Association and M. C. B. Association

The secretary also referred to the proposed change in the constitution submitted last year in regard to the payment of dues. It was proposed to change Article III, Sec. 3, to read as follows:

"All active and associate members of the Association excepting as hereafter provided, shall be subject to the payment of such annual dues as it may be necessary to assess for the purpose of defraying the expenses of the Association, provided that no assessment shall exceed $5 a year."

In Article III, Sec. 3, Paragraph 2, it is proposed to have it read as follows:

"A representative member shall pay in addition to his personal dues as above, an amount for each additional vote to which he is entitled, as shall be determined each year by the Executive Committee, prorated upon the cost of conducting

such tests as may be determined upon at each convention."

These amendments to the Constitution were adopted.

The President: We have been pretty hard pressed financially for the last three years; quite a large number of the roads in various parts of the country have taken representative membership, and that has helped us out to some extent, but many of the roads have not done so. I hope you gentlemen will urge whoever may be the proper party with whom to take up this matter, that they will approve of the members of the Association acquiring this representative membership, because it is quite necessary for us to have the money which such representative membership will bring if we are to prosecute the work of the Association in a diligent manner.

The Secretary: At a meeting of the Executive Committee held last evening the question of a change in the hour for holding the election of officers, which was referred, during the closing hours of the convention of 1914, to the Executive Committee, was considered. It was thought that the plan now in force in M. C. B. Association, should be adopted by this Association and to conform thereto changes in the Constitution have been proposed. These changes will lie over until the next convention, in accordance with the requirements of the constitution.

At a meeting of the Executive Committee held last evening it was decided to recommend that the dues of active and associate members be fixed at $5 per year and representative members at $7 per one hundred engines per year.

(The action of the Executive Committee was approved.)

The Secretary: I move that W. C. Hayes, as the representative of the Traveling Engineers' Association, be accorded the privileges of the floor during this convention. (The motion was seconded and carried.)

LOCOMOTIVE STOKERS

Another year's experience with the locomotive stoker strengthens the conviction that it is not only accomplishing its purpose but withstands the test of continuous service with remarkable durability. Designs are being studied with the view of fixing the point of failure where repairs can be conveniently made, preferably without a road delay, and when it so happens that repairs can not be made on the road, the emergency can be met by resorting to hand firing until terminal is reached. The theory that the parts of the stoker be amply strong and in excess of the strength of the engine has its advantages.

In the consideration of designs, attention is being given the

A. Kearney
Chairman, Committee on Mechanical Stokers

matter of accessibility of parts, as well as certain features of the locomotive that are now, in some cases, difficult to reach on account of the stoker. Any of the stokers now in extensive use will, it seems, occasionally become inoperative by clogging. Viewing the prevention of foreign matter reaching the vital parts of the stoker as probably impracticable, the use of a reversible engine has been advocated, and, in fact, is receiving attention.

Time and experience have brought progress in the way of improving the manipulation of the scatter-type stokers, both in the care of the machine, as well as in a more efficient use of fuel. Instructions and experience have effected marked improvement on the operation of the stokers, and now it is rather rare to find a fireman disturbing the grates so long as a sufficient steam pressure is maintained to handle the train efficiently and successfully. The maximum depth of the fire should vary with the physical character of the coal, and to a degree with the chemical constituents in the ash. The committee is of the opinion that where the fireman will use his judgment the operation can be successfully manipulated with less physical exertion, and this precaution will result in reducing loss of fuel through the grates and relief valves, as well as reducing the physical effort on his part.

The cost of stoker maintenance has been somewhat affected in the aggregate during the past year by the modifications, improvements and changes introduced currently. From data gathered from the scatter-type stokers in more extensive use, the cost per 100 miles ranges from 43 cents to 68 cents, and the miles run per failure from 1000 to 5000.

Since the advent of the locomotive stoker it has been an open question as to whether it is more economical to prepare coal at wharves or on the tender of the locomotive. The aggregate cost of maintenance of a crusher at a wharf may be less than that for a number of locomotives, and it should not be forgotten that while crushers may be obtained that will fairly well handle the major portion of foreign matter found in fuel, it is conceded difficult to cope with such conditions after it reaches the locomotive. Regardless of this, however, it may be economical to equip locomotives with individual crushers on account of the proportion or volume of fuel supplied.

During the past year the Norfolk & Western put in operation sixteen Hanna and thirteen Standard stokers. The twenty-nine stokers were provided with crushing facilities on the tender to handle run-of-mine coal. The first few months these stokers were in operation some trouble was experienced while using run-of-mine fuel containing a large proportion of lump, on account of the presence of foreign matter. This, however, has been practically eliminated, or at least very much reduced, by constructing the conveyor to carry such foreign matter within reasonable sizes through to the fire bed with the fuel.

The past year has been marked by the successful performance of the Hanna and Standard stokers, which at the time of the committee's last report had been in actual service but a few months. Fifteen Hanna stokers have been applied to Mallet engines (2-6-6-2), 72.2 sq. ft. of grate area, and twelve Standards to Mastodon engines (4-8-0), 45 sq. ft. grate area, on the same road. They are handling sometimes slack and in other cases run-of-mine coal, from which the product under 2½ in. has been screened. The locomotives equipped with these stokers have been put in general fast and slow freight service, and in many cases the hardest runs on the division for which the respective types of locomotives are selected. These stokers, as well as the Street, have continued their successful work, each having its characteristic features.

The following stokers are reported in active service: Crawford, Street, Hanna, Standard, Kincaid, and Ayers.

Crawford Stoker. (Underfeed.)—At the present time there are 282 Crawford double-underfeed stokers in operation on the Pennsylvania Lines West of Pittsburgh. The stoker is still the only underfeed type in service. In addition to these 2 are being tried experimentally on the Bessemer & Lake Erie, 4 on the Vandalia and 3 on the Pennsylvania Lines East of Pittsburgh, making a total of 291 in service. It is reported that a new pattern of the Crawford stoker, known as type "30," is being constructed for test.

Street Stoker. (Overfeed or Scatter Type.)—The Street stoker still shows the largest number in service, totaling 531, with 24 on order. The type *C* stoker, which is the latest design, has a variable-speed engine and a friction clutch, instead of differential gear that was employed in the earlier type machines. The type *A* machine carried a crusher on the tank, but in the latter designs the crusher was set aside, the conviction being it was better under certain conditions to supply the fuel that would pass through the 2½ in. mesh on the locomotive tender. These stokers are in operation on fifteen railroads. The Street stokers are operated in passenger, general fast and slow freight service, performing their work satisfactorily. The machines have done remarkable work, on account of their durability, and nothing more is needed in their favor than their record and applications made. The principle upon which the machine is designed and operates is very widely known.

Hanna Stoker. (Overfeed or Scatter Type.)—The Hanna stoker is equipped with durable crushing facilities on the tank, consisting of a heavy helicoid conveyor screw and a bulkhead containing a restricted opening, partly encircled by two stationary knives. Coal is forced through the restricted opening in the bulkhead by the revolving conveyor screw, assisted by the two stationary knives for breaking the larger lumps. This stoker handles slack as well as run-of-mine coal quite efficiently.

regardless of weather conditions and moisture of the fuel. In the event of one of the stokers breaking down, it does not necessarily mean a failure, as the stoker is provided with two distinct recourses to be utilized in such emergencies; first, if any part of the tender conveyor becomes inoperative, the conveyor can be thrown out of operation by means of a clutch and the coal can be shoveled into the locomotive hopper through an opening in the deck; secondly, if the entire stoker becomes inoperative, coal can be shoveled to the plate by hand, from which it is driven to any section of the firebox by means of a blasting chamber and distributing plate. With the assistance of the distributing wings, which is a feature of the machine, the use of the fire hook is materially decreased.

Standard Stoker. (*Overfeed.*)—The Standard stoker is equipped with adequate crushing facilities on the tank, consisting of a durable helicoid conveyor screw and a bulkhead having a restricted opening partly surrounded by fixed center-punches. Coal is forced through the opening in the bulkhead by the revolving conveyor screw, assisted by the stationary center-punches for crushing the larger lumps. The apparatus is so constructed that it will handle moist coal quite satisfactorily. During the past year 20 Standard stokers have been put in operation, making a total of 22 in actual service. These stokers are being operated in slow and fast freight service, and are working satisfactorily. As has been previously explained, the stoker is under the deck of the engine, leaving the deck and boiler head clear. The machine makes very little noise in its operation, has a good distributing feature, and is very simple in its control. The latest development of the stoker is the type *AB*, which we understand possesses a number of distinct improvements over the type *A* stoker.

Gee Stoker. (*Overfeed or Scatter Type.*)—The Gee stoker continues in service on a consolidation locomotive on the Pennsylvania Lines East of Pittsburgh. It is still undergoing development.

Kincaid Stoker. (*Overfeed or Scatter Type.*)—The Kincaid stoker, which for the past year has been under development on a Chesapeake & Ohio yard engine, continues to progress. The distributing features of this stoker are attached to the fire door. Coal is shoveled into a hopper elevated in front of and attached to the door, from which it gravitates to a distributing apparatus and is delivered to the firebox. It is reported that a conveyor has been worked out and will be applied.

Elvin Stoker. (*Overfeed or Shovel Type.*)—The Elvin stoker is of rather novel construction, and is the only one that has not substituted some other device or devices for the scoop. A number of stationary tests have been made with the stoker, and it is thought that within the near future the machine will be tested out on a locomotive.

Raite Stoker. (*Underfeed or Overfeed.*)—The Raite stoker, claimed by the inventor to be either an underfeed or a scatter type, is the only one which the committee has any knowledge of that embodies a combination of the two methods. George B. Raite, of Indianapolis, advises that this stoker is still being developed and will soon be ready for application. The inventor further claims that special features were recently worked out which should materially improve the distribution of coal and aid combustion.

Ayers Stoker. (*Chain Grate.*)—The Ayers stoker, the sole member of the traveling-grate-type family, reports progress. Last summer and fall a number of experimental trips were made with this stoker as applied to a N. Y. C. engine, the results of which are reported to be encouraging. During the past winter the stoker has been further developed, and it is thought that it will soon be ready for service.

The following is a list of the operative stokers:

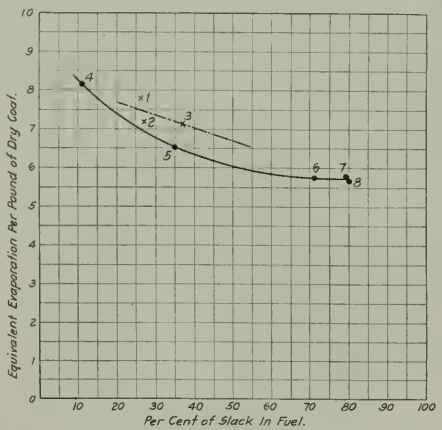
	Stokers in Active Service.	Stokers on Order.
Street	548	35
Crawford	301	31
Hanna	18	6
Standard	28	92
Gee	1	0
Ayers	1	0
Kincaid	1	0

Records have been taken during the past year with the scatter-type stoker in road service, and among others, observations were made on the Norfolk & Western, with a 4-8-0 locomotive having 24 in. by 30 in. cylinders, 200 lb. steam pressure, and a tractive effort of 52,437 lb.

Analyzing the results relating to fuel consumption, it was apparent that the amount of coal consumed varied according to its physical characteristics. The significance of the effect of the physical properties of the fuel stoker fired is shown in the accompanying chart, representing the relation between equivalent evaporation per pound of dry coal and the proportion of physically fine product in the fuel. It is found that the evaporative values of the coal vary inversely with the amount of the slack content. By the latter is meant the amount of fuel that passed through a 4-mesh-per-square-inch screen. It will be observed from the table giving the analysis of the different fuels considered that the variation in fuel consumption were hardly influenced by the difference in the quality of the fuel, except as it varied in physical properties.

For the Pocahontas nut fuel, which contains 11 per cent slack, the equivalent evaporation was 8.2 lb. of water per pound of dry coal, while for the Pocahontas slack, of practically the same heat value, but where the percentage of slack was about 80 per cent, the equivalent evaporation was only 5.6 lb. of water per pound of dry coal. Since these varying conditions of consumption were obtained while hauling the same identical train, with no change made in the drafting or any other feature of the locomotive, it was concluded that the fuel consumption with coal containing a higher percentage of the finer product took place, on account of a large percentage of the latter being carried through the flues and out through the stack before being completely consumed.

In conclusion it seems safe to say that the mechanical stoker has demonstrated by extensive service that it is capable of supplying coal to a locomotive firebox at a rate and under sufficient control to satisfactorily maintain the working steam pressure. It is also obvious, being a machine and working continuously, it should be capable of maintaining a more regular rate of steaming



All Fuel That Will Pass Through Four Mesh Per Sq. In. Screen Is Termed Slack.

No.	Kind of Coal.	Per Cent Slack.	Vol. Mat.	Ash.	B.T.U.	No.
1	Thacker slack.....	26	31.46	7.46	13385	1
2	Thacker slack.....	27	31.60	7.30	13455	2
3	Thacker slack.....	38	31.12	6.14	13725	3
4	Poca. nut.....	11	19.36	6.68	14058	4
5	Poca. rom.....	35	18.20	6.18	14105	5
6	Poca. slack.....	72	18.96	6.00	14028	6
7	Poca. slack.....	79	18.64	5.26	14260	7
8	Poca. slack.....	80	18.36	4.78	13337	8

Curve Showing Influence of Physical Properties of Fuel Upon Boiler Performance with Scatter Type Locomotive Stoker

with certain grades of fuel than might be obtained in average hand-firing practice. Greater work is done with the stoker, in terms of speed or tonnage, or both, under certain physical and operating conditions, while in another service with equally large engines and heavy tonnage, but under more favorable grade line and fuel conditions, as high efficiency has been obtained hand-firing.

As interesting as it would be to define the relation between hand and stoker firing, it is as difficult of determination as the fixing of the rate of efficiency for hand-firing. Many observations have been made and the range of possibility has been fairly well determined, but as can be appreciated, the enormous variable introduced by fuel and physical conditions makes the problem very complex.

The committee feels itself unable to point to any rule in terms of weight of engine or train load, or general conditions, where the stoker will always be applicable or necessary on account of the wide range of physical and operating conditions, as well as character of fuel, and the question of fuel is by no means a minor factor, for the reason that the choice of available coals demands consideration of their character as well as price, as the net result of using some of the finely divided grades of stoker-prepared or mixed coal may be offset by a more attractive rate of consumption, better evaporation, and lower cost per ton-mile

with run-of-mine after it has been crushed to the desired grade.

The report is signed by:—A. Kearney (N. & W.), Chairman; M. A. Kinney (H. V.); T. R. Cook (Penn. Lines); J. W. Cyr (C., B. & Q.); A. J. Fries (N. Y. C.); J. T. Carroll (B. & O.), and J. R. Gould (C. & O.).

DISCUSSION

A. Kearney (chairman): Some reference is made indirectly in the report to the damage to coal handled through the stokers. You will notice the committee speaks of run-of-mine coal being handled through the stoker, as compared with the same coal hand fired. That is on account of the further crushing of the coal as it passes through the helicoid screw. That is quite reasonable, and it was also noticeable in the results.

W. C. Hayes, Erie: I would like to ask if attention has been given to the question of the relative difference in the cost of the stokers and their value to the roads on which they are used.

Mr. Kearney: In order to get at the figures Mr. Hayes has mentioned, we would probably have to make a determination as to just how far we will be justified in spending money for a stoker. That has never been worked out.

L. R. Pomeroy: A locomotive with from 4,500 to 5,000 sq. ft. of heating surface, would require over 8,000 lb. of coal per hour. If it established that the stokers could easily handle 8,500 lb. of coal per hour, and the ordinary fireman can only handle 4,500 lb., the difference ought to be a measure by which you could compare and rate this economy and value of the stoker.

Mr. Kearney: On our stoker engines we have run up to about 12,000 lb. per hour.

D. R. MacBain (N. Y. C.): The mechanical stoker will increase the hauling capacity of the large locomotive, on such as they are installed, anywhere from 250 to 500 tons over what can be hauled with a fireman, and it seems to me that when you get into figures of that kind, that a few hundred dollars in the initial cost of the stoker applied to the locomotive might very consistently be lost sight of for the time being, while the developing is going on.

W. C. A. Henry (Penn. Lines): The Pennsylvania Lines West, within the last month, have ordered 50 consolidation locomotives having a tractive power of 53,000 lb. They were all to be equipped with the Crawford stoker. The stoker enables us to get about 8 to 10 per cent more ton miles per hour on the road, which makes it an attractive proposition. None of these locomotives have brick arches. Our passenger locomotives, however, where the fire box is deep enough to permit it, have arches. We have found the reversing mechanism for the stoker to be very nice, and all are being equipped with a very simple mechanism, by which the direction of the travel of the piston can be reversed at any time. There is no special preparation required as we simply use run-of-mine coal. The conveying mechanism, however, is so constructed that in case of a lump of such size that would interfere, the conveyer will not find it. If it finds its way to the opening of the conveyer mechanism, it will be broken.

M. K. Barnum (B. & O.): Stoker failures on the Baltimore & Ohio are very rare. From memory I should say that with about 223 stokers we are not having more than one or two failures a month, and those are of minor importance. We are getting excellent results on our power and in fact are operating some 2-10-2 locomotives with the stoker, which are probably larger than we could operate by hand firing, and get anything like satisfactory results.

W. E. Symonds: In connection with the item of the relative cost of the stoker; it has occurred to me to be not improper to suggest that the cost of a stoker at present might properly be compared with the salary of an additional fireman, which would be necessary on the large type of locomotives in order to work them to their capacity with hand firing.

C. F. Street (Loco. Stoker Co.): The important feature of the stoker is this question of increased capacity, and all these other features sink into insignificance when compared with it. I have never claimed that the locomotive stoker would save fuel. On the other hand, there are a great many devices which are put on the locomotives which will save fuel but are being used as economy increasers instead of fuel savers. The superheater is first and essentially a capacity increaser in actual service. Theoretically it is also a fuel saver. The stoker is essentially and only a capacity increaser. The stoker has made possible the building of locomotives which could not be run without stokers. I think none of the 2-10-2 types of locomotive, which have been introduced within the last year, and which was referred to by the president in his address, would ever have been built, had it not been known that a stoker could be secured for firing.

This increased tonnage possible with these larger locomotives is best illustrated by a remark made by A. N. Willsie, of the Chicago, Burlington & Quincy, at the recent convention of the International Railway Fuel Association held at Chicago, where he made a statement that the 2-10-2 type of locomotive, stoker fired, will haul 1,483 more tons than with a hand-fired Mikado, and that is a Mikado having 60,000 lb. tractive power. I said the stoker is not a fuel saver. He said the cost of coal per 10,000 ton miles is 34 cents, as against 45 cents for the Mikado, hand-fired.

Regarding the question of maintenance, we have been aiming at 50 cents per 100 miles and that varies in accordance with the manner in which the records are kept. Some roads keep records which include the cost of inspection in the cost of maintenance, and some would ignore that. It just depends on the way the records are kept. The same thing is true with regard to failures. I cannot help think that the miles run per failure of 1,000 to 5,000 is pretty low. I had a report recently from a superintendent of motive power, saying that his stoker fired locomotives had made 90,000 miles without a record of stoker failure at the present time. It just depends on what you call a stoker failure.

This report gives a curve which shows that the rate of fuel consumed, the water evaporated, varies in proportion to the amount of slack in the fuel. That is absolutely true up to a rate of burning of from 60 to 70 lb. of coal per square foot of grate. The water evaporated per pound of coal up to that point is not affected materially by the amount of slack in the coal, but when you get up to burning 120 to 150 lb. of coal per square foot of grate, the efficiency falls off in proportion to the amount of slack in the coal; and exactly the same thing is true in hand firing. I have seen reports of tests where there was an increase in the coal consumption of 20 per cent, owing only and absolutely to the amount of slack that there was in the coal used for hand firing. The difference probably is about the same with stoker firing, but only at the high rates of burning. With the stoker there is no condition of a steam failure no matter how high a rate of burning is used, while with hand firing when you get above a certain proportion of slack in the coal, it is impossible to maintain steam pressure. With the stoker it makes no difference how much slack there is in the coal; in fact, it is possible to stoke a fire and maintain steam pressure with coal that needs no lumps in it at all any larger than a finger nail, but of course it will take a larger amount of coal to produce those results.

Another feature which is important, in the development of the stokers, is the ability to use a much lower grade of fuel. This condition obtains in the West more than in the East. I have seen 15,500 lb. of coal put through a stoker in an hour; this was for a short time. Under those conditions of course the locomotive did not burn it economically.

I would not say that under all conditions on large locomotives, that the application of a stoker would enable increased tonnage. There are undoubtedly conditions under which large locomotives are working at slow speeds, where the stoker will not give you any marked increase in tonnage. The important feature is increased tonnage and increased average speed of heavy freight trains. That is what the stoker has actually accomplished.

Mr. Kearney: The committee mentioned here that the stoker failures ran between 1,000 and 5,000 miles per failure. The information is obtained from the firemen, and it is obtained after going over the record very critically. Last year the failures were taken from the despatchers' sheets and there they ran up four times the figures now published.

(Mr. MacBain called attention to the importance of providing ample diameter of stack.)

E. A. Averill (Standard Stoker Co.): I would like to emphasize what Mr. Street has been saying in his remarks in connection with the stoker on locomotives, which is primarily a matter of increased power or the opportunity given to use the power that is in the locomotive. In one case where tests were made, carefully conducted tests, it developed that the application of stokers on that particular division, to those particular engines, would result in saving approximately $100. per engine per month. That was very largely due to increased tonnage, and partially due to the elimination of the second fireman during the hot months. The report states: "If now the same grade of run-of-mine coal is retained for hand-firing, and in comparison we use the same coal with the stoker, crushing it on the locomotive, we might expect to find a difference of probably ten per cent in evaporated efficiency in favor of hand-firing." It may be true, of course, in some cases, but the tests I have been on and several others have shown under those conditions mentioned, using the same coal, and crushing it on the tender, the stoker does not use any more coal hand-firing, and on another test, it ran as high as 7 or 8 per cent in favor of the stoker in equivalent evaporation per pound of dry coal. These deductions were gained from two separate tests. These tests indicate that the conditions in arranging for the test were

such that the stoker was not extravagant in fuel, and did not use any more fuel than in hand-firing. In the case where it was given the opportunity of developing the full capacity of the locomotive it showed an evaporated efficiency as high as 11 or 12 per cent on the same basis.

Mr. Kearney: Do not forget there is quite a difference between Pocahontas and the higher volatile coals, and that was particularly mentioned in the report, and it was stated that in other fields an entirely different condition would obtain from that which is obtained with the use of Pocahontas coal.

REVISION OF STANDARDS AND RECOMMENDED PRACTICE

After consideration of the present Standards and Recommended Practices of the Association, together with the replies received to the Circular of Inquiry sent to the members, and instructions and other information received from the Executive Committee and from the Secretary of your committee, would submit the following report:

[Only the most important changes which were approved of by the committee are given below.—EDITOR.]

SPECIFICATIONS FOR STEEL AXLES FOR LOCOMOTIVE TENDERS (Standard)
Page 475.

The committee recommends the revision and modification in form of the present Specifications for Steel Axles for Locomotive Tenders, the requirements agreeing with the Standard of the M. C. B. Association.

JOURNAL BOX, BEARING AND WEDGE. (Standard and Recommended Practice)

For journals 6 in. by 11 in. Sheets M. M. L M and N.
Page 479.

A member suggests advancing these details to Standards from Recommended Practices. The committee concurs in the suggestion.

SPECIFICATION FOR BOILER AND FIREBOX STEEL. (Standard)
Pages 490-492.

The committee recommends the revision and modification of the present specifications for boiler and firebox steel as shown in Appendix *A*.

SPECIFICATIONS FOR LOCOMOTIVE DRIVING AND ENGINE TRUCK AXLES. (Standard)
Page 499.

SPECIFICATIONS FOR LOCOMOTIVE FORGINGS. (Standard)
Page 500.

The committee recommends the revision and modification of the present specifications for locomotive driving and engine truck axles and the present specifications for locomotive forgings and combining them in one, specifications for annealed and unannealed carbon-steel axles, shafts and other forgings for locomotives as shown in Appendix *B*.

SPECIFICATIONS FOR LOCOMOTIVE CYLINDER CASTINGS, CYLINDER BUSHINGS, CYLINDER HEADS, STEAM CHESTS, VALVE BUSHINGS AND PACKING RINGS. (Standard)
Pages 503-504.

The committee recommends the revision and modification of the present specifications for locomotive castings, cylinder bushings, cylinder heads, steam chests, valve bushings and packing rings as shown in Appendix *C*.

SPECIFICATIONS FOR CAST-STEEL LOCOMOTIVE FRAMES. (Recommended Practice)
Page 504.

The committee recommends the revision and modification of the present specifications for cast-steel locomotive frames substituting for them the specifications for steel castings for locomotives, as shown in Appendix *D*.

INSPECTION AND TESTING OF LOCOMOTIVE BOILERS. (Standard)
Pages 531-538.

The committee recommends the revision of these standards to conform to the latest revision in the Federal Regulations for the Inspection and Testing of Locomotive Boilers and their appurtenances.

NEW BUSINESS

Through the Secretary a communication was received advising that the Arbitration Board of the Master Car Builders' Association had been called upon for some rule in the Code to cover the use of brakes on locomotives handled dead in train and offered in interchange. An expression on this subject was requested from the A. R. M. M. Association, the details being referred to this committee. After considerable investigation the committee recommends the following regulations covering the operation of brakes on engines and tenders handled dead in train and offered in interchange:

1. All engines equipped with side rods must have them applied, when handled dead in trains, suitable washers, of wooden blocks clamped together with bolts, being used where necessary on main rod bearings to keep the side rods in place.

2. All engines and tenders hauled dead in trains must have the air brakes cut in and operative on drivers, trailers and on tender trucks.

3. Engines and tenders equipped with the Westinghouse ET, or New York LT brake must have the safety valve on the distributing valve, or control valve, adjusted to not less than 25 lb. or more than 30 lb.

4. Engines and tenders equipped with the automatic and straight air combined must have the safety valve in brake cylinder pipe adjusted to not less than 25 lb. or more than 30 lb.

5. Engines equipped with Westinghouse ET, or New York LT brakes, or with straight air must have positive stops applied to handles of automatic and independent valves to secure these handles in running position.

6. Engines and tenders equipped with high speed brake without the straight air, must have the high speed reducing valve set to reduce the brake cylinder pressure to not less than 25 lb. or more than 30 lb., or must have a safety valve applied to the brake cylinders or the brake cylinder pipe set to not less than 25 lb. or more than 30 lb.

7. Engines and tenders equipped with only the automatic brake must have a safety valve applied to the brake cylinders or the brake cylinder pipe set to not less than 25 lb. or more than 30 lb.

W. E. Dunham
Chairman, Committee on Revision of Standards and Recommended Practice

8. Engines fitted with power brakes other than air must be equipped with an air train line and connections.

9. Delivering line will be held responsible for flat spots on driving tires, trailer tires and tender truck wheels.

10. Owners shall be responsible for any special application of safety valves as required in Sections No. 3 to 8, inclusive.

The report is signed by:—W. E. Dunham (C. & N. W.), chairman; A. R. Ayers (N. Y. C.); M. H. Haig (A. T. & S. F.); A. G. Trumbull (Erie), and C. D. Young (Penn.).

APPENDIX A

SPECIFICATIONS FOR BOILER AND FIREBOX STEEL FOR LOCOMOTIVE EQUIPMENT

1. Scope.—These specifications cover two grades of boiler steel and shall be designated as flange steel and firebox steel.

MANUFACTURE

2. Process.—The steel shall be made by the open-hearth process.

CHEMICAL PROPERTIES AND TESTS

3. Chemical Composition.—The steel shall conform to the following requirements as to chemical composition:

	Flange.	*Fire-box.*
Carbon		0.12–0.25 per cent
Manganese	0.30–0.60 per cent	0.30–0.50 per cent
Phosphorus, not over	acid 0.05 per cent	0.04 per cent
	basic 0.04 per cent	0.035 per cent
Sulphur, not over	0.05 per cent	0.04 per cent
Copper, not over		0.05 per cent

4. Ladle Analysis.—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy shall be given to the purchaser or his representative. This analysis shall conform to the requirements in Section 3.

5. Check Analysis.—Analysis may be made by the purchaser from a broken tension test specimen representing each plate as rolled, which shall conform to the requirements specified in Section 3.

III. PHYSICAL PROPERTIES AND TESTS

6. (a) The steel shall conform to the following requirements as to tensile properties:

	Flange.	*Fire-box.*
Tensile strength lb. per sq. in.	56 000—85 000	52 000—62 000
Field point lb. per sq. in.	0.5 tens. str.	0.5 tens. str.
	1 560 000	1 500 000
Elongation in 8 in. min. per cent	Tens. str.	Tens. str.

(b) The yield point shall be determined by the drop of the beam of the testing machine.

7. Modification in Elongation.—For material over ¾ in. in thickness a deduction of 0.5 from the percentages of elongation specified in Section 6 (a) shall be made for each increase of ⅛ in. thickness above ¾ in. to a minimum of 20 per cent.

8. Bend Tests.—(a) COLD-BEND TESTS.—The test specimen shall bend cold through 180 deg. without cracking on the outside of the bent portion as follows: For material 1 in. or under in thickness, flat on itself, and for material over 1 in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen.

(b) QUENCH-BEND TESTS.—The test specimen, when heated to a light cherry red, as seen in the dark (not less than 1200 deg. F.), and quenched at once in water, the temperature of which is between 80 and 90 deg. F., shall bend through 180 deg., without cracking on the outside of the bent portion as follows: For material 1 in. or under in thickness, flat on itself, and for material over 1 in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen.

9. Homogeneity Tests.—A sample taken from a broken tension test specimen shall not show any single seam or cavity more than ¼ in. long, in either of the three fractures obtained in the test for homogeneity, which shall be made as follows: The specimen shall be either nicked with a chisel or grooved on a machine, transversely, about 1-16 in. deep, in three places about two inches apart. The first groove shall be made 2 in. from the square end; each succeeding groove shall be made on the opposite side from the preceding one. The specimen shall then be firmly held in a vise, with the first groove about one-fourth inch above the jaws and the projecting end broken off with light blows of a hammer, the bending being away from the groove. The specimen shall be broken at the other two grooves in the same manner. The object of this test is to open and render visible to the eye any seams due to failure of weld or to interposed foreign matter, or any cavities due to gas bubbles in the ingot. One side of each fracture shall be examined and the length of the seams and cavities determined, a pocket lens being used if necessary.

ALLOWABLE EXCESS (EXPRESSED AS PERCENTAGE NOMINAL WEIGHT).

Thickness Ordered. In.	Nominal Weight Lb. per Sq. Ft.	For width of Plate, as follows: Under 50 in.	50 to 70 in. excl.	70 in. or over	Under 75 in.	75 to 100 in. excl.	100 to 115 in. excl.	115 in. and over.
1/8 to 5/32	5.10 to 6.37	10	15	20	.....	.....	.....	.....
5/32 to 3/16	6.37 to 7.66	8.5	12.5	17	.....	.....	.....	.....
3/16 to 1/4	7.65 to 12.20	7	10	15	.....	.....	.....	.....
1/4	10.20	.....	.....	.....	10	14	18	.....
5/16	12.75	.....	.....	.....	8	12	16	.....
3/8	15.30	.....	.....	.....	7	10	13	17
7/16	17.85	.....	.....	.....	6	.....	10	13
1/2	20.40	.....	.....	.....	5	7	9	12
9/16	22.95	.....	.....	.....	4.5	6.5	8.5	11
5/8	25.50	.....	.....	.....	4	6	8	10
Over 5/8	.....	.....	.....	.....	3.5	5	6.5	9

11. Number of Tests.—One tension, one cold-bend and one quench-bend test shall be made from each plate as rolled and in addition one homogeneity test shall be made from each plate made into fire-box material.

(b) If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

(c) If the percentage of elongation of any test specimen is less than that specified in Section 7, and any part of the fracture is outside the middle third of the gaged length, as indicated by the scribe scratches marked on the specimen before testing, a retest shall be allowed.

IV. PERMISSIBLE VARIATION IN WEIGHT AND GAGE

12. Gage.—The thickness of each plate shall not vary more than 0.01 in. under that ordered.

13. Weight.—An excess over the nominal weight corresponding to the dimensions on the order shall be allowed for each plate, if not more than that shown in the preceding table, 1 cu. in. rolled steel being assumed to weigh 0.2833 lb.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR.].

APPENDIX B

SPECIFICATIONS FOR ANNEALED AND UNANNEALED CARBON STEEL AXLES, SHAFTS AND OTHER FORGINGS FOR LOCOMOTIVES

1. Basis of Purchase.—(a) These specifications cover annealed and unannealed carbon steel driving axles, engine and trailer truck axles, main and side rods, piston rods, crank pins and miscellaneous forgings.

(b) The manufacturer may, at his option, furnish annealed forgings when unannealed forgings are specified by the purchaser, provided they conform to the requirements specified for unannealed forgings.

I. MANUFACTURE

2. Process.—The steel may be made by the open-hearth or other process approved by the purchaser.

3. Discard.—A sufficient discard shall be made from each ingot to secure freedom from injurious piping and undue segregation.

4. Prolongation for Test.—The manufacturer and the purchaser shall agree upon forgings on which a prolongation for test purposes shall be provided.

5. Heat Treatment.—For annealing, the forgings shall be allowed to become cold after forgings. They shall then be uniformly reheated to the proper temperature to refine the grain (a group thus reheated being known as an annealing charge) and allowed to cool uniformly.

II. CHEMICAL PROPERTIES AND TESTS

6. The steel shall conform to the following requirements as to chemical composition:

Carbon	0.38—0.52 per cent
Manganese	0.40—0.75 per cent
Phosphorus, not over	0.05 per cent
Sulphur, not over	0.05 per cent

7. Ladle Analysis.—(Same as in Appendix *A*).

8. Check Analysis.—Analysis may be made by the purchaser from a forging representing each melt, which shall conform to the requirements specified in Section 6. Drilling for analysis may be taken from the forging or from a full-sized prolongation of the same, at any point midway between the center and surface, or turnings may be taken from a test specimen.

III. PHYSICAL PROPERTIES AND TESTS

9. Tension Tests.—(a) The forgings shall conform to the following minimum requirements as to tensile properties: For forgings whose maximum outside diameter or overall thickness is not over 12 in. when unannealed and not over 20 in. when annealed.

UNANNEALED

Size, Outside Diameter or Overall thickness	Tens. Str. lb. per sq. in.	Yield point lb. per sq. in.	Elongation in 2 in. per cent. Inverse Ratio	Elongation in 2 in. per cent. Not under	Reduction of area per cent. Inverse Ratio	Reduction of area per cent. Not under
Not over 8 in.	75 000	0.5 tens. str.	1 600 000 / tens str.	18	2 200 000 / tens str.	24
Over 8 to 12 in. inclusive	75 000	0.5 tens. str.	1 500 000 / tens str.	17	2 000 000 / tens str.	22

ANNEALED

Not over 8 in.	80 000	0.5 tens. str.	1 800 000 / tens. str.	20	2 800 000 / tens. str.	32
Over 8 to 12 in., inclus.	80 000	0.5 tens. str.	1 725 000 / tens. str.	19	2 640 000 / tens. str.	30
Over 12 to 20 in., inclus.	80 000	0.5 tens. str.	1 650 000 / tens. str.	18	2 400 000 / tens. str.	28

(b) The classification by size of the forging shall be determined by the specified diameter or thickness which governs the size of the prolongation from which the test specimen is taken.

(c) The yield point shall be determined by the drop of the beam of the testing machine.

(d) Tests of forgings shall be made only after final treatment.

10. Tension Test Specimens.—(a) Tension test specimens shall be taken from a full-sized prolongation of any forging. For

forgings with large ends or collars the prolongation may be of the same cross section as that of the forging back of the large end or collar. Specimens may be taken from the forging itself with a hollow drill, if approved by the purchaser.

(b) The axis of the specimen shall be located at any point midway between the center and the surface of the forging, and shall be parallel to the axis of the forging in the direction in which the metal is most drawn out.

(c) Test specimens shall be of the form and dimensions shown in the former specification.

11. Number of Tests.—Unless otherwise specified by the purchaser, tests shall be made as follows:

(a) For unannealed forgings one tension test shall be made from each melt.

(b) For annealed forgings one tension test shall be made from each annealing charge. If more than one melt is represented in an annealing charge, one tension test shall be made from each melt.

(c) If more than one class of forgings by size is represented in any lot, one tension test from a forging of each class by size shall be made as specified in Sections 9 and 10.

(d) If any test specimen shows defective machining or develops flaws, it may be discarded and another substituted.

(e) If the percentage of elongation of any tension test specimen is less than that specified in Section 9 (a), and any part of

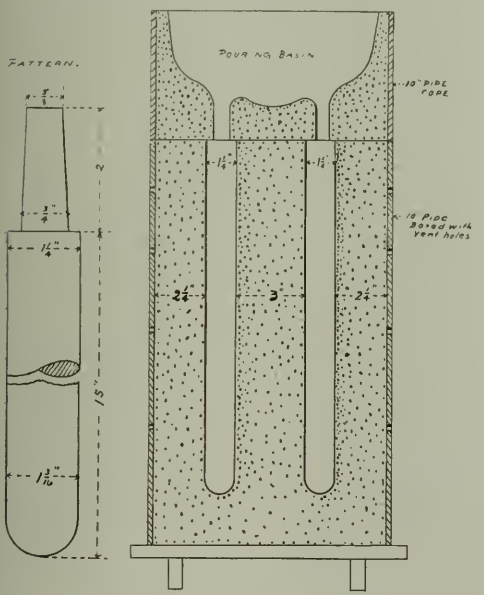


Fig. 1.—Mold for Arbitration Test Bar

the fracture is more than ¾ in. from the center of the gage length, as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

12. Retests.—(a) If the results of the physical tests of any test lot do not conform to the requirements specified, the manufacturer may reanneal such lot, but not more than three additional times unless authorized by the purchaser, and retests shall be made as specified in Section 11.

(b) When annealed forgings are specified, if the fracture of any tension test specimen shows over 15 per cent. crystalline, a second test shall be made. If the fracture of the second specimen shows over 15 per cent. crystalline, the forgings represented by such specimen shall be reannealed.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR].

APPENDIX C

SPECIFICATIONS FOR LOCOMOTIVE CYLINDER CASTINGS, CYLINDER BUSHINGS, CYLINDER HEADS, STEAM CHESTS, VALVE BUSHINGS AND PACKING RINGS

I. MANUFACTURE

1. Process.—Locomotive cylinders, cylinder bushings, cylinder heads, steam chests, valve bushings and packing rings shall be made from good quality close-grained gray iron cast in a dry mold.

II. CHEMICAL PROPERTIES AND TESTS

2. Chemical Composition.—Drillings taken from the fractured end of the transverse test bars shall conform to the following limits in chemical composition:

Phosphorus, not over	0.90 per cent
Sulphur, not over	0.12 per cent
Manganese, not over	0.70 per cent
Silicon for cylinders only, not over	1.60 per cent
Silicon for bushings, heads, chests and rings	1.50 to 1.80 per cent

3. Check Analysis.—A check analysis of drillings taken from the transverse test bar may be made by the purchaser, and shall conform to the requirements specified in Section 2.

III. PHYSICAL PROPERTIES AND TESTS

4. Transverse Tests.—When placed horizontally upon supports 12 in. apart and tested under a centrally applied load, the arbitration test bars, specified in Section 6 (a), shall show an average transverse strength of not less than 3200 lb. and an average deflection of not less than 0.09 in. The rate of application of the load shall be from 20 to 40 sec. for a deflection of 0.10 in.

5. Chill Test.—Before pouring, a sample of the iron shall be taken and chilled in a cast-iron mold, as specified in Section 6 (b). The sample shall be allowed to cool in the mold until it is dark red or almost black, when it may be knocked out and quenched in water. The sample, on being broken, must show a close-grained gray iron, with a well defined border of white iron at the bottom of the fracture. The depth of the white iron must not be less than 1-16 in. as measured at the center line.

6. Molds for Test Specimens.—(a) The mold for the arbitration bars is shown in Fig. 1. The bottom of the bar is 1-16 in.

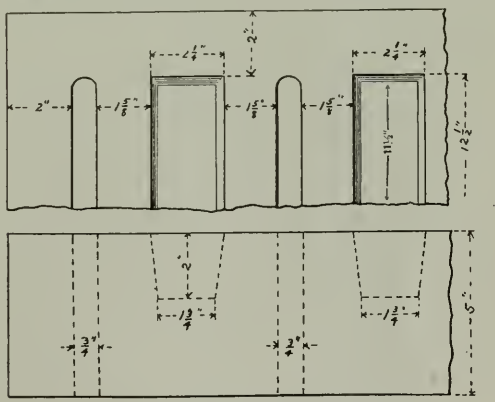


Fig. 2.—Mold for Chill Test Specimen

smaller in diameter than the top, to allow for draft and for the strain of pouring. The pattern shall not be rapped before withdrawing. The flask is to be rammed up with green molding sand, a little damper than usual, well mixed and put through a No. 8 sieve, with a mixture of 1 to 12 bituminous facing. The mold shall be rammed evenly and fairly hard, thoroughly dried and not cast until it is cold. The test bar should not be removed from the mold until cold enough to be handled. It shall not be rumbled or otherwise treated, being simply brushed off before testing.

(b) The form and dimensions of the mold for the chill test specimen shall be in accordance with Fig. 2.

7. Number of Tests.—(a) Two arbitration test bars, cast as specified in Section 6 (a), shall be poured from each ladle of metal used for one or more cylinders.

(b) One chill test, cast as specified in Section 6 (b), shall be poured from each ladle of metal used for one or more cylinders. The chill specimens may be cast in adjacent molds, but in such cases a space must be provided between the molds. (See Fig. 2.)

[NOTE:—Only the more important paragraphs of these specifications are shown here.—EDITOR].

APPENDIX D

SPECIFICATIONS FOR STEEL CASTINGS FOR LOCOMOTIVES

1. Basis of Purchase.—These specifications cover steel castings for locomotive frames, wheel centers and miscellaneous castings.

I. MANUFACTURE

2. Process.—The steel may be made by the open-hearth, crucible or other process approved by the purchaser.

3. Heat Treatment.—Castings shall be allowed to become cold.

They shall then be uniformly reheated to the proper temperature to refine the grain (a group thus reheated being known as an annealing charge) and allowed to cool uniformly and slowly. If, in the opinion of the purchaser or his representative, a casting is not properly annealed, he may at his option require the castings to be reannealed.

II. CHEMICAL PROPERTIES AND TESTS

4. Chemical Composition.—The steel shall conform to the following requirements as to chemical composition:

TABLE I

	Frames		Wheel Centers and Miscellaneous Castings
	Grade A	*Grade B	
Carbon	0.25—0.37 per cent	0.37—0.50 per cent	0.22—0.35 per cent
Manganese	0.40—0.75 per cent	0.40—0.75 per cent	0.40—0.75 per cent
Phosphorus, not over	0.05 per cent	0.05 per cent	0.05 per cent
Sulphur, not over	0.05 per cent	0.05 per cent	0.05 per cent

*When high carbon steel frames are specified this grade shall be used.

5. Ladle Analysis.—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section 4.

6. Check Analysis.—Analysis may be made by the purchaser from a test piece and also from any casting selected at random, and shall conform to the requirements specified in Section 4.

III. PHYSICAL PROPERTIES AND TESTS

7. Tension Tests.—(a) The steel shall conform to the following minimum requirements as to tensile properties:

	Frames		Wheel Centers and Miscellaneous Castings
	Grade A	Grade B	
Tensile strength lb. per sq. in.	65 000	75 000	60 000
Elastic limit lb. per sq. in.	30 000	35 000	25 000
Elongation in 2 in., min. per cent.	20	15	22
Reduction of area, min. per cent.	28	22	30

(b) The elastic limit shall be determined by an extensometer.

8. Alternative Tests to Destruction.—In the case of small or unimportant castings, a test to destruction on three castings from a lot may be substituted for the tension tests. This test shall show the material to be ductile, free from injurious defects and suitable for the purpose intended.

9. Test Specimen.—(a) Sufficient test bars shall be furnished from which test specimens required in Section 7 may be selected. They shall be attached to castings weighing 500 lb. or over, when the design of the castings will permit. If the castings weigh less than 500 lb., or are of such a design that test bars cannot be attached, two test bars shall be cast to represent each melt; or the quality of the casting shall be determined by testing to destruction as specified in Section 8. All test bars shall be annealed with the castings they represent.

(b) The manufacturer and the purchaser shall agree whether test bars can be attached to castings, on the location of the bars on the castings, on the castings to which bars are attached, and on the method of casting unattached bars.

(c) If the purchaser, or his representative, so desire, a test specimen may be cut from a finished casting, such casting so destroyed shall be paid for by the purchaser.

(d) The purchaser shall have the privilege of taking drillings for analysis from a casting, so long as it does not destroy or weaken the casting.

(e) Tension test specimens shall be of the form and dimension shown in the previous specifications. Annealing coupons shall be located at points agreed upon by the manufacturer and the purchaser.

10. Number of Tests.—One tension test shall be made from each locomotive frame, and in the case of wheel centers and miscellaneous castings, from an annealing charge, or from each melt if more than one melt is in an annealing charge.

IV. VARIATION IN WEIGHT

11. Weight.—All castings shall come within the maximum and minimum weight, where shown on the prints, and when castings weighing more than the allowable maximum weight are presented, such castings shall be accepted at the maximum weight provided they meet all other tests, the excess weight being at the expense of the manufacturer.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR].

DISCUSSION

C. D. Young (Penna. Lines): The committee in rendering the report incorporates the original silicon requirement for bushings, heads, chests and rings. With the increasing use of super-heated steam, it is becoming very desirable to have a close grained hard iron for this purpose and I believe the time has arrived when we should reduce the silicon requirement to make it agree with the silicon mixture requirement. I move that the bushings, heads, chests and rings have the same silicon requirement as that which is specified for cylinders, namely, 1.60 per cent.

(The motion to accept the report of the committee as amended, was put to vote and carried.)

SAFETY APPLIANCES

M. K. Barnum (B. & O.): The committee has only a verbal report to make. The committee met with the special committee on Relation of Railway Operation to Legislation and the subject was discussed at some length, but it was not thought necessary to make any written report, in view of the fact that the time limit expired several years ago for the full equipment of locomotives with the safety appliances which had been prescribed. The committee would therefore respectfully recommend that it be discharged.

(The report of the committee was accepted and the committee discharged.)

COMPOUNDING SUPERHEATER LOCOMOTIVES

Lawford H. Fry, (Baldwin Loco. Works): The conclusions which I wish to offer for discussion this morning are, first, the fact that compound cylinders applied to a single expansion locomotive will show a saving in fuel and water of from 15 to 25 per cent, whether saturated or superheated steam be used. I wish further to show that in securing the saving some additional complication is introduced, and the question as to whether compounding is practically worth while or not can only be answered after studying the local conditions in each case. Take first the process by which compounding effects a saving in steam consumption. If any given range of expansion be divided between two cylinders instead of being carried out in one, the same amount of work can be obtained with a smaller consumption of steam. This is due to the fact that the range in temperature in the steam coming in contact with any one portion of the cylinder will be reduced, and consequently the thermal losses, in initial condensation, will be less. In addition to this, compounding offers a further opportunity for economy, by making it feasible to use a higher ratio of expansion than can be efficiently done with a single expansion engine.

In a single expansion locomotive it will be found that the greatest economy is obtained with a cut-off at about 30 per cent of the stroke and that with a shorter cut-off in spite of the theoretical advantage of a higher expansion the practical result will be a decrease in efficiency. Take for example, the K-29 superheater, Pacific type locomotive of the Pennsylvania Railroad, tests of which are described in the Company's Bulletin No. 19. The diagram on page 98 of this Bulletin shows that while the rate per indicated horse-power-hour was 18 lb. for cut-offs between 30 per cent and 35 per cent, it grows to 20 lb. when the cut-off was shortened to 25 per cent. This is largely due to the action of the valve gear, which, if it is to be adapted to all the requirements of locomotive service, cannot operate economically at very short cut-offs. To quote from the Bulletin referred to above—"The ideal conditions in regard to the expansion of steam in the cylinder would be to admit steam up to the cut-off point and then expand it to the atmospheric pressure before release. With the necessity for draft on the fire and the practical limitations of valve gears this is not possible and the steam must be discharged at a comparatively high pressure." The Bulletin then gives figures showing that the number of expansions (that is the volume of steam at release divided by the volume at cut-off) is 1.37 for a cut-off of 45 per cent, 1.75 for a cut-off at 30 per cent, and 2.0 for a cut-off at 25 per cent. This means that at the most economical cut-off of 30 per cent, the steam is being released at a pressure of about 51 lb. per sq. in. As this steam may carry some superheat, or at least is perfectly dry, there would obviously be considerable advantage in expanding it further. The use of compound cylinders will enable the effective ratio of expansion to be practically doubled.

It should be noted that it is not only the limitations of the valve motion which prevent a high ratio of expansion in a single cylinder on a locomotive. If the valves were modified so as to make efficient the use of a high expansion in a single cylinder, there would still be a mechanical advantage in dividing the expansion into two cylinders so as to produce a more uniform cylinder tractive force. With a high ratio of expansion in a single cylinder there will be a wide difference between the initial and the final pressures, and consequently a considerable difference between the tractive force during admission and the mean tractive force average throughout the stroke. Therefore, if the cylinders be made large enough to allow the mean tractive force to utilize a proper proportion of the weight on drivers, there will be a danger of slipping during the time of maximum cylinder pressure while steam is being admitted. By dividing the expansion, the difference between

maximum and minimum pressure in each cylinder is reduced, and with the cylinders quartered a more uniform tractive force is obtained. Practically all of the foregoing applies equally whether the locomotive uses saturated or superheated steam, but the last point is of special importance in connection with superheated steam, since with this medium there is more to be gained by a high ratio of expansion. In fact, if the expansion is insufficient the steam when exhausted will still be superheated, a condition which represents avoidable waste. Having stated briefly the reasons for expecting economy in steam consumption with compound cylinders, let us now see what results are being obtained in practice. In Europe there is a growing tendency to use compound cylinders with superheated steam, and all reports show that the results are satisfactory.

In France five of the six principal railways have adopted four-cylinder compound superheater engines as standards for both freight and passenger service, and after comparative trials are abandoning the single expansion cylinders. A paper by Mr. Sauvage before the English Institution of Mechanical Engineers reports that the Paris-Lyons and Mediterranean Railway in tests of Pacific type engines in service found that the single expansion consumed from 19 to 21.5 lb. of water per 1 h. p. per hour, and the compound from 13.5 to 15.0 lb., a saving of nearly 30 per cent.

In Germany, during the past three years compound cylinders have been reintroduced for the latest high speed passenger engines of the 4-6-0 type, and are reported as giving satisfactory results. Comparative tests have shown a water consumption per horse power hour of 23.8 lb. for the single expansion and 18 lb. for the compound, approximately 25 per cent saving.

In England the majority of superheater engines have single expansion cylinders, but some of the railroads are trying compounding, and Mr. Fowler of the Midland Railway, in a paper read before the Institution of Civil Engineers, last year, gave some results of comparative tests between four engines, all similar except for the quality of steam used and the number of cylinders. Two of the engines were two-cylinder single expansion, one using saturated and one superheated steam, while the other two were three-cylinder compounds, one was saturated, the others with superheated steam. Taking the performance of single-expansion saturated steam locomotive as a basis of comparison, the following savings in coal were observed: Compounding alone, 15 per cent; superheating alone, 25 per cent; compounding and superheating, 37.5 per cent.

Having seen the evidence that the saving can be obtained, let us consider the difficulties to be overcome in order to secure it. In the first place there will be a slight increase in first cost, and an increase in weight of 2 or 3 per cent, the latter being offset, however, by the better balance to be obtained with 3 or 4 cylinders. There will be more pistons, rods, valves, etc., requiring increased attention and maintenance, but the division of power between more than two cylinders may prove advantageous by reducing the power to be transmitted by each rod. In addition to this multiplication of parts the designer must provide for a crank axle and must find space for the large low pressure cylinders. These problems have been solved in European practice; and although the difficulty is increased by the size of the locomotives in this country, their solution should not be beyond the power of our American designers.

There is one further point of importance to be considered if a compound is to run at anything more than a slow speed, and that is the question of back pressure, the larger area of the low pressure cylinder makes the engine more susceptible to the evil effects of back pressure. In order that the engine may work successfully and efficiently at high speed the blast pipe must operate with the lowest possible pressure and the exhaust passage be designed to offer the least possible resistance to the steam.

With expensive fuel and ample opportunities for supervision and maintenance, the conditions will favor compounding, but whether the saving is practically worth while or not will depend on local conditions.

George R. Henderson, (Baldwin Loco. Works): We all know the principal gain in compounding is by eliminating cylinder condensation. We also know that the superheater gets its main value in reducing or doing away with the cylinder condensation, and if we do away with the condensation by one means, it hardly looks reasonable that we can expect still to get the same amount of economy by trying to do away with it a second time. It would be very easy to make a compound locomotive more economical by the use of superheated steam, more so than to make a superheater locomotive more economical by compounding. What I mean is that a certain temperature, up to 200 or 250 degrees of superheat will prevent any condensation in the simple cylinder up to probably one-fifth cut-off, or five expansions normally. Now, if we go ahead and increase our superheat still greater, we increase the volume of our steam, it just happens that we get about the same ratio of increased work. If we go so far as to have superheated steam at the moment of exhaust, we have so enlarged our volume per pound of steam or water, that we cannot go on with the increasing amount of superheat and get a corresponding amount of economy. These things look to the fact that it is necessary in the tests mentioned by Mr. Fry to know whether in all cases the amount of superheat, that is the temperature of the steam, was the same, and whether all the conditions were strictly comparable.

Mr. Fry: I have very complete data on the English tests here, and so far as I can see they were as nearly comparable as possible. In regard to the point Mr. Henderson made about the opportunity for saving being less because the initial condensation is done away with, I think the superheater makes a saving at the other end of the stroke. With the single expansion engine the compounding cuts down the initial condensation. With the superheater engine it tends to save the steam you would throw away dry or slightly superheated. With the single expansion superheater, you do not get much initial condensation, but you have to throw away good dry steam at a fairly high pressure, but if you put another cylinder on behind that you can make that steam still do some work.

C. D. Young (Penn.): I think the conclusions Mr. Fry has drawn are quite correct, except that I would like to add that there hardly seems the possibility in this country, with our operating conditions, that we will go to compounding to any great extent on high speed engines. High speed carries with it a fairly high maintenance of the parts, which, as you all know, is rather difficult to obtain. Whether compounding or superheating would give you as fast an engine, with equivalent draw-bar pull, as the simple superheater engine, I much question. Even though you may have superheated steam with the compounding, you still have the problem of getting rid of a large quantity of steam from the low pressure cylinder, and also of obtaining a sufficient amount of steam to supply the high pressure cylinder, in comparison with the amount you must furnish to the low pressure cylinder. It seems to me for American practice, it is a question whether we will use compounding, for passenger work particularly. The requirements of slow speed lend themselves to compounding, and it is the ideal thing to have.

I believe if we could provide a valve design that would withstand a temperature of 800 deg. F., and you could obtain superheat in that vicinity, you would then get a proportional increase that would warrant a higher superheat than we are getting today with the average modern locomotive. I believe if that matter is to be met, so far as economy is concerned, it will have to be met in that direction. We are getting experience every year in the maintenance of parts subject to high superheat, and our experience in that direction should lead to the development of an efficient valve, different from the piston type of valve, perhaps a pocket type of valve, made of material which will withstand high superheat.

Prof. L. E. Endsley (Pittsburgh University): I think Mr. Young's point regarding the increasing of the superheat is important. We must, however, take care of the lubrication and some other things, and if we can do that, the gain of the last 100 degrees is going to be more than the gain of the first 100 degrees of superheat. In tests from 80 degrees to 240 degrees superheat, making three steps—80, 160 and 240, at three different temperatures—the last 80 deg. is worth three times as much as the first 80 deg. If I could go to 320 deg. the last 80 deg. would be worth considerably more.

I do not think we will get much advantage through compounding our American locomotives, if we get a large enough cylinder in the simple engine. All we want to do is to reduce pressure in our steam down to the point where it will get enough draft to steam the locomotive, and if you put on a compound cylinder and reduce it too low, to make the engine steam, you will not get the increased power we are getting today, by reason of the superheat. I think it is important that we get something to carry a higher degree of superheat, and then we will not have to go to the compounding and add to our troubles by the employment of a double set of cylinders and other things.

William Flynn (M. C.): We have 90 compound engines on our division, and at the present time we have about 12 of these engines equipped with superheaters. The results have so pleased the mechanical department, as well as the operating department, that I think I am safe in saying that we will apply superheaters to the balance of those locomotives. On the division where we conducted one of our most important tests we found we could increase the tonnage of the superheater compound over the saturated compound 15 per cent. That seems an astonishing figure, but it is true; and the superheater compound would

handle that increased tonnage more satisfactorily than a saturated compound would do it, and not burn quite as much coal. These are used in slow speed freight service. We had occasion to put one of these superheater compounds on a passenger train, and we found the engine would run about 10 or 12 miles faster than an engine of the same class without the superheater-compound arrangement.

Mr. Henderson: There is a difference between superheating compounds and compounding superheaters. With Mallet locomotives, for instance, there is a great advantage in the compounding feature, one being that the flexible pipes carry steam of moderate pressure, about 100 lb. The superheater is a great advantage there, because there is certainly some loss in temperature in passing through the receiving pipe, and you can put in a superheater in that engine, to make up for cylinder expansion and also loss of temperature in your pipe, and there is no question in such an engine it is a great advantage to have low pressure in the flexible pipes. I feel that if we need a little more economy, we had better get a little more superheat. The problem of superheating compounds is more logical than that of compounding superheaters.

Mr. Fry: Before compounding superheater locomotives over here we must weigh very carefully the disadvantages of the increased complication, and as a general proposition I doubt very much if it will be widely adopted in this country.

SMOKE PREVENTION

[The committee report on this subject covered very thoroughly the system employed by the railways in Chicago in handling the smoke problem. This system has been quite thoroughly described in these columns and special attention is called to the abstract of the paper on Smoke Prevention presented before the International Railway Fuel Association, published in the *Railway Age Gazette* of May 21, 1915, and the *Railway Age Gazette, Mechanical Edition* for June.—Editor.]

DISCUSSION

M. D. Franey (N. Y. C.): Speaking for the Fourth District of the New York Central Lines, we have a smoke washing device at our Englewood engine house. We handle approximately from 80 to 100 locomotives at that point each 24 hours. The smoke washing device consists of a 78-in. steel blade fan, motor driven. The house is piped with a conduit or duct extending over the portion of the house that is usually occupied by the smoke jackets. Connecting each pit with this smoke jacket is an adjustable telescope jack that fits down with a funnel over the smoke stack of the locomotive. The smoke is drawn up by means of the fan through the jacks and ducts and delivered at high velocity into vats of heated water, heated by steam. The action is such that it produces a wave motion and envelops the smoke and gases several times as they pass out through baffles and finally disappear through the stack. The solids, carbons, etc., are gathered on the top of the water in the form of a foam. The other gases pass out with steam whiteness from the top of the stack, and as they disappear it is very evident that the carbon is taken from the smoke. We obtain from eight to ten barrels of carbon out of the smoke,—this is pure carbon—and the whole plant is working very satisfactorily.

We have this disadvantage, that the acids produced are very injurious to the metals, and it even will eat out the concrete of which the duct or vat is composed. We have found it necessary in making the ducts, to make them of transite—that is the best product we have obtained so far. I am not prepared at this time to give you official figures, but from tests we have made, unofficial tests, the figures seem to be satisfactory and show a saving in fuel on engines stored in the engine house.

L. R. Pomeroy: Is there any salvage from the by-products of these plants?

Mr. Franey: We have deposited considerable of the carbon, but I am not prepared to say to just what extent it has been made a paying proposition.

Wm. Elmer, Jr., (Penna. Lines): I can say a word about Buffalo. The city council has endeavored for a year or more to agree on some ordinance, which would be acceptable to the manufacturing industries and to the railroads, regarding smoke prevention. Without an ordinance the railroads have done a good deal toward reducing the amount of smoke which the engines are making. All the railroads are alive to the situation and making every possible effort to prevent the making of very dense smoke, so as to forestall any drastic efforts of the part of the Council.

E. W. Pratt: I do not think there is anything special to say except to urge on those who have not had to go through the experience we have gone through, to cut down the smoke nuisance as much as they can before the authorities take action. If we had done that in Chicago we would not now be up against the expensive problem of electrification. The final report on that matter has not yet been made public but will cost approximately $192,000,000 for the cost of the electrification, and another $100,000,000, or $200,000,000, for incidental betterments due to changes in motive power. We will have to do some business to provide the interest on that $300,000,000.

ADDITIONAL MASTER MECHANICS' REGISTRATION

Andrus, C. H., M. M.; P. R. R.
Anthony, F. S., Alamac.
Appler, A. B., M. E.; D. & H., Blenheim.
Arp, W. C., S. M. P.; Vandalia, Blenheim.
Baker, Geo. H., Prest., Railway Eden. Assoc.; Dennis.
Barnum, M. K., S. M. P.; B. & O.; Dennis.
Barrett, C. D., A. E. M. P.; P. R. R.; Brighton.
Barton, T. F., M. M.; D., L. & W.; Traymore.
Basford, Geo. M., Jos. T. Ryerson & Son; Blenheim.
Bawden, Wm., M. M.; Term. R. R. Asso. of St. L.; Brighton.
Bennett, W. H., M. M.; P. R. R.; Traymore.
Black, W. G.; M. M.; N. Y. C.; Chester Inn.
Booth, J. K., Gen. For.; B. & L. E.; Traymore.
Bowers, O., M. M.; T. & O. C.; Chalfonte.
Brangs, P. H., Dennis.
Brennan, E. J., M. M.; B. R. & P.; Arlington.
Brewer, J. W., M. M.; C. & A.; Alamac.
Brown, H. M., S. S.; C. & O.; blenheim.
Brown, M. G., S. M. P.; G. & S. I.; Haddon Hall.
Butler, W. S., M. M.; C. & O.; Blenheim.
Carey, J. J., M. M.; T. & P.; Traymore.
Carroll, J. T., A. G. S. M. P.; B. & O.; Blenheim.
Carroll, W. P., M. M.; N. Y. C.; Dennis.
Cassady, J. A.; M. M.; Q. & C.; Traymore.
Chambers, C. E., S. M. P.; C. of N. J. R. R.; Dennis.
Clark, F. H., G. S. M. P.; B. & O.; Blenheim.
Combs, W. B., M. M.; M. D. & Sav.; Arlington.
Conners, Jas. J., A. S. M. P., C. M. & St. P.; Alamac.
Crandall, W. J., M. M.; N. Y. C.; Dennis.
Cross, C. W.; Equipment Imp. Co.; Traymore.
Darlow, A. M., S. M. P.; Buff. & Susq.; Chalfonte.
Davis, J. H., Elec. Engr., B. & O.; Shelburne.
Dawson, L. L., S. M. P.; F. W. & D. C.; Brighton.
Deaner, Chas. F., M. M.; N. Y. C.; Monticello.
Deeter, D. H., M. M.; P. & R.
Diehr, C. P., M. M.; N. Y. C.
Duffey, G. J., M. M.; L. E. & W.; Traymore.
Dunham, W. E., Suprv. M. P.; C. & N. W.; Blenheim.
Elmer, Wm., S. M. P.; P. R. R.; Brighton.
Elmes, E. E., A. E. M. P.; P. & R.; Blenheim.
Emerson, G. H., Gen. Mgr., Gt. No.; She burne.
Ettinger, R. L., C. M. E.; Southern; Dennis.
Ferguson, L. B., M. M.; V. S. & P.; Monticello.
Flanagan, M., M. M.; C. & O.; Blenheim.
Flavin, J. T., M. M.; N. Y. C.; Blenheim.
Flory, B. P., S. M. P.; N. Y. O. & W.; Blenheim.
Fogg, J. W., Boss Lock Nut Co.; Chalfonte.
Fowler, Geo. L., Conslt. Engr.; Dennis.
Franey, M. D., M. M.; N. Y. C.; Blenheim.
Frice, A. J., A. S. M. P.; N. Y. C.; Chalfonte.
Fuller, C. E., S. M. P. & M.; U. P.; Blenheim.
Gaines, F. F., S. M. P.; C. of Ga.; Blenheim.
Gallagher, G. A., M. M.; Ill. So.; Chalfonte.
Galloway, A. K., M. M.; B. & O., Dennis.
Gaspar, Chas. L., Sales Mgr.; National Mall. Cast. Co.; Traymore.
Gibbs, J. W., M. M.; Southern; Arlington.
Gillespie, H. C.; M. M.; C. & O.; Blenheim.
Gilmour, Geo., Supt. Insp.; Travelers Ins. Co.; Haddon Hall.
Goodrich, H., M. M.; N. Y. C.; New Holland.
Goodwin, G. S., M. E.; Rock Island.
Gould, J. R., S. M. P.; C. & O.; Shelburne.
Greenwood, H. F., S. S.; N. & W.; Traymore.
Griffith, W. S., M. M.; P. M.; Strand.
Haig, M. H., M. E.; A., T. & S. F.; Traymore.
Hamilton, Tabor, M. M.; Cumb. Val.; Brighton.
Harris, C. M., M. M.; Wash. Term.; Traymore.
Harris, H. Y., M. M.; Tampa & G. C.; Westminster.
Hartman, W. J., A. B. Instr. Rock Island; Edison.
Hassett, M. W., M. M.; N. Y. C.; Chalfonte.
Haug, Harry, M. M.; Brown. & Mid.; Lexington.
Henry, W. C. A., S. M. P.; Penna. Lines; Chelsea.
Highleyman, J. W., M. M.; U. P.; Schiltz.
Hill, J. F., M. M.; W. & L. E.; Blenheim.

Hill, W. H., M. M.; Cornwall R. R.; Lexington.
Hunter, H. S., M. M.; P. & R.; Devonshire.
Jaynes, R. T., M. M.; L. & H. R.; Traymore.
Jones, L. B., A. E. M. P.; Penna. Lines; Traymore.
Kantmann, A. G., Chalfonte.
Kearney, Alexander, A. S. M. P.; N. & W.; Traymore.
Keiser, C. B., M. M.; P. R. R.; Strand.
Kellogg, W. L., S. M. P.; M. K. & T.; Haddon Hall.
Kelly, J. P., C. A. B. E.; N. Y. C.; Chalfonte.
Kendrich, J. P., M. M.; B. R. & P.; Lexington.
Kiesel, W. F., A. M. E.; P. R. R.; Chelsea.
Kinney, W. H., Strand.
Knight, H. R., M. M.; West. Mary.; Monticello.
Kuhn, W. T., S. M. P.; T. H. & B.; Traymore.
Ladley, Walter E., S. M. P.; Reid Newfound. Co.; Blenheim.
Lillie, Grant W., Mech. Supt.; Rock Island; Cheltenham.
Little, J. C., M. E.; C. & N. W.; Traymore.
Lovell, Alfred, Conslt. Engr.; Traymore.
McAmis, W. H., M. M.; Charlotte, Har. & No.
McFarland, Prof. H. B., Engr. Tests; A. T. & S. F.; Chalfonte.
McGoff, J. H., M. S.; Mech. Supt.; A. T. & S. F.; Traymore.
McGuire, J. J., M. M.; B. & O.; Chalfonte.
McNulty, F. M., S. M. P. & R. S.; Mon. Con.; Chalfonte.
McRae, J. A., M. E.; Chalfonte.
Machesney, A. G., Detroit Lubricator Co.; Lexington.
Mackenzie, John, Johnson Wrecking Frog Co.; Louvan.
Maher, P., Blenheim.
Manchester, A. E., S. M. P.; C. M. & St. P.; Traymore.
Manning, J. H., S. M. P.; D. & H.; Marlborough-Blenheim.
Mannion, T. D., M. M.; Atlantic City Ry.
Marriott, J. F., C. D.; C. & O.; Shelburne.
Mauk, E. L., M. M.; G. F. & A.; Continental.
Maver, A. A., M. M.; Grand Trunk; Traymore.
Maxfield, H. H., M. M.; P. R. R.; Brighton.
May, H. C., S. M. P.; C. I. & L.; Chalfonte.
Meister, C. L.; M. E.; A. C. L.; Dennis.
Miller, Geo. A., S. M. P.; Fla. East Coast; Sterling.
Miller, J. B., S. L. & S. F.; Sommerset.
Miller, S. W., Rochester Welding Works; Haddon Hall.
Miller, W. J., S. M. P.; S. L. S. W.; Traymore.
Minshull, P. H., M. M.; N. Y. O. & W.; Traymore.
Moll, George, M. M.; P. & R.; Sterling.
Monfee, A. J., M. M.; Birmingh. So.; Dunlop.
Murray, E. A., M. M.; C. & O.; Blenheim.
O'Brien, Wm. J., M. M.; K. & M.; Haddon Hall.
Painter, J. H., Supt. Shops; A. C. L.; Chalfonte.
Parsons, J. G., Supt. Shops; N. Y. C.; Chalfonte.
Patterson, Robt., M. M.; Grand Trunk; Blenheim.
Pearce, J. S., M. M.; N. & W.; Chelsea.
Perine, U. M., S. M. P.; P. R. R.; Traymore.
Perrine, W. M., M. M.; C. of N. J.; Pennhurst.
Pfahler, F. P., Insp. I. C. C.; Arlington.
Pilcher, John A., M. E.; N. & W.; Dennis.
Pomeroy, L. R.; U. S. L. & H. Co.; Blenheim.
Porter, Chas. D., A. E. M. P.; P. R. R.; Brighton.
Potts, C. H., M. M.; P. R. R.; Chalfonte.
Purcell, J., A. V. P.; Asst. to V. P.; A. T. & S. F.; Blenheim.
Ramage, J. C., Supt. Tests; Southern; Brighton.
Rauch, H. S., Gen. For.; N. Y. C.
Raymond, P. L., M. P. Insp.; P. & R.
Redding, D. J., A. S. M. P.; P. & L. E.; Traymore.
Reynolds, O. H., Wm. Jessup & Sons; Dennis.
Rhodes, L. B., S. M.; Stand. Heat & Vent. Co.; Chalfonte.
Richardson, L. A., Mech. Supt.; Rock Island; Traymore.
Ricketson, W. E., M. E.; Big Four, Blenheim.
Rink, Geo. W., M. M.; C. of N. J.; Traymore.
Ripley, C. T., Gen. Mech. Insp.; A. T. & S. F.; Blenheim.
Robinson, M., M. M.; C. C. & S. F.; Traymore.
Rosing, M. H. V., Spec. Engr.; S. L. & S. F.; Traymore.
Rusling, W. J., A. E. H. P.; P. B. & W.; Brighton.
Scanland, N. B., M. M.; Mary. & Pa.; Arlington.
Schlafge, Wm., G. M. S.; Erie; Blenheim.
Seley, C. A., Chalfonte.
Sheafe, J. S., M. M.; S. I. R. T.
Sheahan, J. F., S. M. P.; A. B. & A.; Chalfonte.
Shelby, C. K., M. M.; P. R. R.; Chelsea.
Shepard, L. A., Scullin-Galagher Iron & Steel Co.; Brighton.
Sinclair, Angus, Editor; Locomotive Engineering; Chalfonte.
Slayton, C. E., M. M.; St. J. & G. I.; Arlington.
Smith, J. L., M. M.; P. S. & H.; Monticello.
Smith, M. R., M. M.; C. I. & L.; Haddon Hall.
Smith, Willard A., Prest., The Railway Review; Traymore.
Snell, E. J., M. M.; N. Y. C.; Lexington.
Stewart, R. L., M. S.; Mech. Supt.; Rock Island; Chelsea.
Stocks, W. H., Alamac.
Stockton, Jas., M. M.; New O. Term.; Arlington.
Stranahan, J. H., M. M.; D. & H.; Chalfonte.
Streeter, L. B., A. B. E.; I. C.; Chalfonte.
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Stubbs, F. W., M. E.; C. G. W.
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Sweeley, E. H., Gen. For. Loco. Rep.; L. I.; Chalfonte.
Symons, W. E., Conslt. Engr.; L. E.; Chalfonte.
Terrell, C. H., Asst. S. M. P.; C. & O.; Haddon Hall.
Thomson, S. G., S. M. P.; P. & R.; Lennox Apt.
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Tollerton, W. J., Mech. Supt.; Rock Island; Blenheim.
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Walsh, F. O., S. M. P.; Ga.; Strand.
Wanamaker, H., S. S.; N. Y. C.; Traymore.
Warthen, J. O., M. M.; Danv. & West.; Westminster.
Waters, J. J., S. M. P.; P. M.; Blenheim.
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Watkins, W. H., M. M.; I. C.; Arlington.
Whyte, F. H.; Hutchins Car Roofing Co.; Blenheim.
Wieseckel, G. F., M. M.; West. Mary.; Dennis.
Williams, W. H., M. M.; B. R. & P.; Alamac.
Woods, J. E., Gen. For.; B. & O.
Wright, O. C., A. E. M. P.; Penn. Lines; Blenheim.
Wyman, R. L., M. M.; L. & N.; Pennhurst.
Young, C. B., M. E.; C. B. & Q.; Traymore.
Young, C. D., Engr. Tests; P. R. R.; Brighton.

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Arp, W. C., S. M. P.; Vandalia; Blenheim.
Barnum, M. K., S. M. P.; B. & O.; Dennis.
Barrett, C. D., A. E. M. P.; P. R. R.; Brighton.
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Ettinger, R. L., C. M. E.; Southern, Dennis.
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Harris, H. Y., M. M.; Tampa & G. C.; Westminster.
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Slayton, C. E., M. M.; St. J. & G. I.
Smith, M. R., M. M.; C. I. & L.; Haddon Hall.
Smith, W. A., Editor, The Railway Review, Traymore.
Stockton, Jas., M. M.; New Orleans Term.; Arlington.
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Highleyman, M. R., Schlitz.
Holzemer, J. F., Pur. Agt.; T. & O. C.; Haddon Hall.
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Schoenen, Hermann, Spec. Appren.
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Snyder, W. H., M. M.; Erie; Alamac.
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Wilson, H., Fla. East Coast; Sterling.
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Woodworth, C. B., Super. Shop Practice; B. & O.; Traymore.

LITTLE INTERVIEWS

The expert on car wheels leaned back and remarked, "Some of the desirable features of a car wheel are inadvertent, as you may say. Do you see that street car wheel? The holes in the body of the wheel are extremely useful, but they do not in any degree serve the purpose for which they were first introduced. Originally the street car wheel was cast with spokes. As equipment became heavier the wheel was cast solid. The solid wheel was objectionable; in cities there was complaint that it rang. These holes it was hoped would deaden that ringing. Now, in my opinion, the wheels continue to ring just the same, but the holes in the wheel are retained since they are so convenient to hook chains into to drag the car and truck around when a wheel is broken."

Conventionalities

Burton W. Mudge came to the conventions alone this year. Burton, Jr., was in school, it was not desired to take him out, and Mrs. Mudge decided to stay at home with it.

L. A. Richardson, mechanical superintendent first district, Chicago, Rock Island & Pacific, Des Moines, Iowa, who arrived

B. P. Flory, Superintendent Motive Power, New York, Ontario & Western

on the Chicago special Tuesday, is accompanied by his daughter, Miss Dorothy. They are stopping at the Traymore.

John P. Landreth, of the Garlock Packing Company, is accompanied this year by Mrs. Landreth and little daughter. The fact that the little girl is familiarly known as "Ginger"

Hugh Montgomery of the Bangor and Aroostook, and George Wildin of the New Haven

indicates correctly that she has certain of the qualities of her energetic father.

F. W. Brazier, superintendent of rolling stock of the New York Central, is down a little early this year in order to get rested up in time to get in his usual hard work at the M. C. B. Association next week. He has been a little bit "under the weather" lately.

The Q. & C. Company has unintentionally been exalted by the "printer's devil." In the list of exhibitors yesterday it was shown as the O. & C., and for a little while, not being able to find the name, friends of the company were afraid that their exhibit had not arrived safely.

President Gaines of the M. M. Association has been ill for the past two or three weeks and has not yet fully recovered his strength. He found it necessary to have Secretary Taylor read his address yesterday morning, but was able to preside over the remainder of the session.

Friends of W. L. Allison, vice-president of the American Arch Company, were asking yesterday morning why it was that "Bill" had not come to the conventions this year. They will be glad to know that he is here and on the job, his name being omitted from the list of representatives of his company through an oversight.

George Wagstaff, of the American Arch Company, in "Uncle George's Primer," specifically states in the preface that it is not his intention to be technical. Is this a joke? The first part of the answer to the third question, for instance, reads: "By virtue of its position the brick arch

J. S. Sheafe, Master Mechanic, Baltimore & Ohio

becomes an incandescent refractory barrier between the furnace chamber and the outlet of the products of combustion, etc."

W. E. Symons, consulting engineer, has been pretty busy lately in connection with investigations into the proportion of operating cost which should be assessed against locomotives and cars for terminal and road charges. On the basis of these studies he has testified at several of the law suits in southwestern states to good effect.

J. C. Little, mechanical engineer of the Chicago & North Western, has been leading a strenuous life for the past few weeks. The building in which his office was located was burned some time ago and about 1,200 tracings which were not in the vault were destroyed. Among these was a set of drawings for a new stock car which was just being designed and of which no copies had been made. Outside of this, however, it is hoped that with the aid of an extra staff of draftsmen the other drawings will be fully replaced within a short time.

Jack Daly, a boilermaker on the Philadelphia & Reading, has the distinction of having built a model locomotive which is attracting considerable attention both because of the neatness and care with which the details have been worked out and

the circumstances under which it was built. The model forms a part of the Q. & C. Company's exhibit, where it is in operation with Mr. Daly at the throttle. To complete the engine required four years of his spare time in the basement of his own home. At the time his wife was in a sanitarium recovering from a protracted illness and he was left in charge of two growing boys. With the exception of a small lathe and drill press only hand tools were used and these by a novice in all but the boilermaker's trade. The result is worthy of a skilled mechanic.

While we all know J. D. Hurley as a maker of pneumatic tools, it happens that he is also responsible for the Thor motorcycle. Like many other normally peaceful citizens of the railway supply fraternity, Mr. Hurley has been repeatedly asked to bid on implements of war needed by the allies. His latest inquiry was for a price on "one hundred motorcycles fitted with gun brackets," without specifications of any kind—just as though we were all in the habit of going about the country on power cycles fitted with guns. Many other requests for prices are fully as indefinite. They remind us of the days when foreign railways first began to buy American built locomotives in any considerable number. Most of the New York export houses at once jumped into the breach

F. H. Clark, General Superintendent of Motive Power, Baltimore & Ohio

and asked for quotations on for example, "ten Forney type engines." Some of the war munitions inquiries are equally absurd.

The Rock Island lines are unusually well represented at the conventions this year. The delegation is headed by W. J. Tollerton, general mechanical superintendent, and includes the following: L. R. Richardson, mechanical superintendent first district, Des Moines, Ia.; G. W. Lillie, mechanical superintendent second district, Topeka, Kans.; R. S. Stewart, mechanical superintendent third district, El Reno, Okla.; George S. Goodwin and C. G. Chenoweth, mechanical engineers, Chicago; George W. Hartman, general air-brake inspector, Chicago; S. W. Mullinix, superintendent of the Silvis shops; J. N. Milton, superintendent car department, Chicago, and F. O. Bunnell, engineer of tests, Chicago. Two or three of the general car foremen will be here for the Master Car Builders' convention. Mr. Tollerton served as a member of the conference committee of managers which represented the western railways in the recent arbitration of their differences with their engineers and firemen. The result of the arbitration was that certain classes of employees were given increases in pay, but on the whole it was a victory for the railways.

TOOL HOLDER FOR HIGH SPEED STEEL CUTTERS

The tool holder shown in the illustration was designed by the Keystone Equipment Company, 21st and Clearfield streets, Philadelphia, Pa., with a view to protecting the cutting edge of the tool against both vertical and lateral strain. It is made of cold drawn steel and is case hardened to insure durability. In the top is a slot in which the high speed cutter is placed, set screws being provided through one side of the slot to hold the cutter in place. At the end where the cutting edge projects beyond the slot the body of the holder is extended below the tool and is so shaped as to form practically a continuation of the cutter itself. To protect the tool against the side pressure due to the feed, the back side of the slot is extended behind the projecting end of the tool.

The upper face of the cutter projects about 1-32 in. above the top of the holder and when clamped in the tool post the pressure is exerted directly against the cutter, firmly holding the tool in place. The only purpose of the set screws is to

Keystone Tool Holder

hold the cutter in the holder when not in place in the tool post.

The reinforcement provided by this holder is claimed to make possible the use of as high speeds and feeds with the small high speed steel cutter as are possible with a solid forged tool of the same size as the holder. The method of inserting the tool also reduces the waste of cutting steel since the tool may be used until it is too short to catch the set screw or clamps on the tool holder. Owing to the large area of contact between the cutter and the holder the transmission of heat from the cutting edge to the body of the holder is claimed to be especially rapid and to add to the life of the cutting edge.

The Keystone tool holders are made both right hand and left hand and for both round and square nose tools in 14 different sizes. A complete set of these tools is on exhibit at the booth of the manufacturer.

SEAMLESS DRAWN STEEL GEAR CASE.—A seamless and rivetless drawn steel motor gear case for use on electric cars has been developed which is adapted to withstand the vibration to which this part of the electrical equipment is constantly subjected. The manufacturing methods used in constructing these cases combine the operations of pressing and drawing in such a manner that the metal of the finished case is of uniform thickness and therefore well adapted to withstand vibration. These cases have been applied by the Pennsylvania Railroad on electric passenger cars for use on main line electrification. One of the Pennsylvania gear cases, which are of unusually large size, is being exhibited by the U. S. Metal and Manufacturing Company, New York, representing the manufacturers, the Chillingworth Manufacturing Company, Jersey City, N. J., in the southern and New England States.

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Contents

*Illustrated.

The Gretna train wreck, May 22, killing nearly 200 soldiers before they had even seen a battlefield, is briefly reported in another column. The British railway system, with the reputation of being the safest in the world, now records almost the worst train wreck ever known. Once more "a very small error produces a very great horror." The causes, in detail, are not fully explained; but there is enough explained so that it is easy to tell what American railway officers will say; they will congratulate each other on the popularity, and the extending use, in this country, of the track circuit and of automatic signals. Track circuits for a quarter mile at Quintinshill interlocking would have held the signals against that troop train. The track circuit system does indeed, show a percentage of failures, but the decimal has to be extended out with a good many ciphers to make the percentage comprehensible; and comparisons of automatic and non-automatic block signals, where comparisons are possible, show that proportionately the men make many more mistakes than do the machines. The English roads have made extensive installations of track-circuit locking at stations during the last few years, and this disaster undoubtedly will be followed by a rapid extension of this simple yet wonderful safeguard. This is the outstanding lesson of the calamity, far transcending all others.

The Railroad Disaster at Gretna

In an editorial in these columns last week a comparison was made between the mileage and capitalization of roads in the hands of receivers at present, and on June 30, 1896, and the erroneous statement was made that the mileage of roads in the hands of receivers in 1896 was the greatest in the history of the United States. As a matter of fact, in 1895 there were 37,805 miles of road in the hands of receivers and in 1894, 40,817 miles, as against 30,475 miles in 1896 and approximately 30,500 miles at present. The comparisons of conditions in 1896 and at present, as given in the editorial last week, are of course correct, but the fact that there was 30 per cent more mileage in the hands of receivers two years previous to 1896 than in that year, is a fact which should have been stated in the editorial last week.

Roads in the Hands of Receivers

On June 2 the eastern roads put into effect rules requiring all persons checking baggage for interstate transportation to sign a declaration of its value, and similar regulations are to be applied by the western lines. If the value of the baggage is declared to be in excess of $100 a charge of 10 cents for each $100 or fraction thereof over that amount will be made for insurance. This is one of the unexpected and probably unintended results of the Cummins amendment, which was jammed through Congress in the closing hours of the session which adjourned on March 4. Although the law has gone into effect without causing the general increase in freight rates which for a time it was thought would result from the careless way in which it was drawn, its application to baggage will hardly tend to increase the popularity of the senator whose name is attached to it. Heretofore the carriers have limited their liability for loss of or damage to baggage to $100. The Cummins act prohibits any limitation of their liability for property transported with the proviso that "if the goods are hidden from view by wrapping, boxing or other means, and the carrier is not notified as to the character of the goods, the carrier may require the shipper to specifically state in writing the value of the goods, and the carrier shall not be liable beyond the amount so specifically stated. The Interstate Commerce Commission has ruled that the provisions of the law apply to baggage. The railroads therefore cannot limit their liability for baggage unless they obtain a declaration of its value, which then constitutes the maximum amount recoverable from the company. If the new rules result in inconvenience to the traveling public, as they doubtless will, the public can place the blame not on the railroads, but on its representatives in Congress who passed such a law without taking time to consider the conditions to which it applied. The railroads have endeavored to work out rules which will avoid the inconvenience to passengers as much as possible. The Pennsylvania has announced that it will require the declaration only where specifically required by the law—on baggage checked for interstate transportation—although some roads have taken the position that it will be simpler to apply the rules to both state and interstate transportation. Small blanks have been prepared on which the declaration may be made and signed, but once for several pieces of baggage at one time.

Passengers Must Declare Value of Baggage

The act makes it a misdemeanor for passengers to misrepresent the value and under the rules, if the baggage masters for any reason fail to obtain a declaration the baggage will not be forwarded. The roads will not insist, however, that the owner make out the declaration in person. It may be done by a servant or member of the family. Strong protests are already being made by commercial travelers, especially those who carry samples of high value, and who will be required to pay the insurance charge each time they check baggage. One result of the rules will be that passengers will have to allow themselves more time for the checking of baggage at stations and the railroads are making every effort to secure full publicity, so that passengers may be prepared. The railroads, of course, as an offset to the revenue they will derive from the insurance, will be subjected to greater expense by the increased liability they are required to assume and the additional clerical expense of obtaining and recording the declarations which will have to be preserved for six years.

CHICAGO, ROCK ISLAND & PACIFIC HEARING

THE important points which were raised at the hearing before the Interstate Commerce Commission last week in regard to the Chicago, Rock Island & Pacific Railway Company's receivership were:

The immediate necessity of the appointment of a receiver and the propriety of the application for a receivership by some of the directors without consultation with the other directors or with the Sheldon Committee; the sharp and crazy advance in the Railway company's stock on the New York Stock Exchange in the latter part of March and early part of April and its sudden collapse after the receivership; the question as to the fundamental necessity of the appointment of a receiver at all; and the Interstate Commerce Commission's relations with this whole affair.

Roberts Walker, who has since been appointed general counsel for the receivers, took largely the responsibility for the application for receiver. This application was made nominally by a supply concern and was for a comparatively trifling sum. The company consented to the receivership and as was brought out at the hearing it was at the instigation of the company that the application was made. There is nothing inherently improper in this sort of proceeding. It is often necessary to have a creditor for a small sum bring proceedings in order to forestall an unfriendly receivership. On the other hand, Mr. Amster, who was a newly-elected director, felt that he should have been consulted before the application was made. The Sheldon committee which had co-operated in getting proxies for the annual meeting which took place in March was not consulted. The facts of the matter are probable that if the intention of the company to submit to receivership had been known by Mr. Amster and his counsel, every possible legal difficulty would have been placed in the way of the appointment of receivers. This accounts for the decision not to take Mr. Amster into the confidence of the majority directors. As has been previously pointed out in these columns, there are numerous conflicting interests within the majority Rock Island directorate. It was this conflict of interests which led to the application without consultation with the Sheldon committee, but while this is probably the real explanation, it does not make the manner of application for the receivership defensible.

The Missouri Pacific's tangled affairs are being straightened out by co-operation and consultation between the various interests affected. It is to be regretted and very much deplored that in the matter of the Rock Island receivership a similar course could not have been followed.

Mr. Amster claims that he could have raised $6,000,000, to do which he would have had to pay off a lien of $4,100,000, which was secured by collateral on which he had planned to raise $6,000,000. This would have left $1,900,000 net new money. The receivers have found it necessary to issue $1,494,000 receivers' certificates and to keep in the treasury $505,000, which would have had to be paid on equipment notes May 1, but which has been deferred under the period of grace provision in the indenture. This is a total of $1,999,000 which the receivers found immediately necessary against $1,900,000 which Mr. Amster would have raised, to temporarily tide over the May 1 crisis. While the consideration of these facts is not entirely conclusive in answering the first point mentioned above as having been raised by the Interstate Commerce Commission's hearing, it would lead nearly any fair-minded outsider to the belief that there was no more immediate reason for the appointment of receivers on April 1 than on April 20, at least insofar as the company's interests as distinguished from the private interests of the directors were concerned. Furthermore, the method of application was questionable, and coming as it did from the interests which have already been so severely criticized for their theories of high finance is to be deplored.

Samuel Untermeyer, who plays a somewhat dual role in this Rock Island investigation, as protector of minority stock holders and aid to Gov. Folk, the Interstate Commerce Commission's counsel, insinuated that the high stock prices for the Chicago, Rock Island & Pacific the latter part of March were the result of the rigging of the market by speculators associated with the Reid-Moore people. It was obvious to anyone that the market in Rock Island shares, when they were selling up to 39, was an artificial one. There was no testimony which was undeniably conclusive that any of the insiders helped to create this high price. On the contrary, Mr. Amster and his counsel have accused the Moore-Reid people and President Mudge of giving out bearish interviews in regard to their own stock. The whole stock movement looked far more like an attempt of a clique of comparatively small speculators to put up the price than any attempt on the part of the controlling interests to make a market on which they could unload their holdings.

As to the fundamental necessity for the receivership for the Chicago, Rock Island & Pacific, the *Railway Age Gazette* has already expressed some views in the issue of April 23. The Sheldon committee when they first began to ask for proxies for the annual meeting had an expert make a report on the physical needs of the property and previous to that the management had come to the conclusion that a very considerable amount of new capital would have to be raised to conserve the assets of the company and to eventually increase its earning power to an extent which would make it possible to show a margin of safety above its interest charges. Against this expert testimony there is only the general statement of Mr. Amster and his associates that the property is a "fine property." It would appear to any disinterested student of Rock Island affairs that some readjustment of its finances was absolutely necessary. Whether or not such a readjustment could have been made without the receivership if the conflicting interests had been willing to co-operate in the best interests of the property, it is impossible to say. Without passing final judgment one way or the other, it would appear that strong banking support and unity of interests could more easily have kept the Chicago, Rock Island & Pacific out of the hands of the receiver than the Missouri Pacific. But the Missouri Pacific had the strong banking support and the Rock Island didn't, and the consequence has been that the Missouri Pacific is in a fair way to be reorganized without a receivership, while the Rock Island had to seek the protection of the courts. That Mr. Amster's $1,900,000 could have been anything more than a temporary and extremely frail support is inconceivable. Various plans were put forward, but no one of them promises success, nor could any assurance be given that the stock-holders would raise the needed money, and in the meantime it was thought best to have the court's protection.

One thing must appear most unfortunate to anyone who really has the best interests of the thousands of security holders of the Chicago, Rock Island & Pacific, as well as the interests of the hundreds of thousands of other railroad security holders at heart, and that is that this sort of a tangle should have come up before the Interstate Commerce Commission. There are now

three proceedings in the courts. One an application to intervene in the receivership proceedings by minority stockholders represented by Mr. Amster. One a suit to recover from the directors approximately $7,500,000 which was lost when the St. Louis & San Francisco was divorced from the Rock Island, and the third a general suit in equity to prove that the April 12 meeting was illegal under the Illinois construction.

These are questions in which the courts will see that the minority stockholders and other security holders have a fair and open hearing, and it is in these suits that the wrong doing, if wrong doing there has been, of the Reid-Moore people can be and should be brought out and redress exacted.

LATERAL STRESSES IN RAILS

THE magnitude of the stresses, both vertical and lateral, created in rails by locomotives of various types running under different conditions has been the subject of serious discussion for many years. Such conclusions as have been drawn have been based largely on conjecture supported by occasional evidences of excessive stresses revealed by some accident or injury to the rail. As there has arisen during recent years a general feeling that we are approaching the limit of safety in the relation of wheel loads to track structure, there is a greater demand for accurate information regarding the stresses actually created in the track under service conditions. George L. Fowler's series of experiments, described in another column, is one of a limited number which have been undertaken recently to this end. While confined to a small number of measurements of the lateral stresses only at one location on tangent track, with one form of roadbed conditions and track construction, these experiments nevertheless bring out interesting and valuable information on a relatively unexplored subject. The tentative conclusions that the lateral stresses imposed on the rail at any particular point are dependent more on the condition of the roadbed than of the locomotive, and that track conditions are the controlling elements in track stresses, provide food for serious reflection on the part of maintenance of way officers. While the experiments could only approximate some of the unfavorable conditions with which a trackman has to contend continually, the uniformity of results secured gives weight to the conclusions reached. The insertion of a hump in one rail with a relatively long run-off, or of a hump in each rail not directly opposite, approximating a condition found where the track is out of surface or where low joints are prevalent, increased the lateral stresses very materially, particularly on the rebound. While the maintenance of surface has naturally been given the greatest attention on lines carrying high class passenger service to secure improved riding qualities, the increased stresses introduced in the rails because of rough track are a matter of serious concern under freight trains as well.

The effect of wide gage is also strikingly shown in the increased lashing of the engine and the accompanying increased intensity of the lateral stresses introduced, especially at the higher speeds. This is what one would expect and coincides with the increased wear of the rail under such conditions, observations of which have recently caused some roads to pay greater attention to this subject on tangents and to reduce the increased width formerly allowed on curves.

Studies such as this are not only valuable for the information they bring out directly, but for the light they shed on the general design of track and locomotives and the relations they bear to each other. While our track structure of today is not the result of theoretical design, but rather of rule-of-thumb practical methods which have been developed in the light of past experience, the continuance of tests such as these, and such as those being inaugurated by the joint committee of the American Railway Engineering Association and the American Society of Civil Engineers, will do much to harmonize practice and theory and to develop a more rational design of track.

CO-OPERATION WITH THE PRESS IN A GOOD CAUSE

JAMES A. McCREA, general manager of the Long Island, is conducting a campaign of public education in an attempt to cut down the quite appalling number of automobile accidents that occur at grade crossings each summer on Long Island. A brief description of the first steps which have been taken is published elsewhere in this issue. One of the most remarkable things, however, about this campaign is the success which has been met with in getting the whole-hearted co-operation of the newspapers published in New York. Every paper of any size is giving its support either through a description or picture of the signs which the Long Island is putting up, or by such a description and editorial comment. Such unanimous support as this is interesting and encouraging. It is primarily the result of two factors: a good cause and the devotion to this cause of the personal time and interest of Mr. McCrea. After a great deal of thought and care had been given to the campaign Mr. McCrea decided to give up two days of his own time entirely to talking over with newspaper editors the aims of his company and the methods which were to be used to further them. As a matter of fact it was probably more nearly a week than two days which was given up to this work, but it has already proved to be time well spent.

Of course, no campaign of publicity and of education could entirely eliminate reckless automobile driving and resulting accidents at grade crossings. On the other hand it is safe to say that there are many thousand automobile drivers on Long Island who are thoughtless rather than wantonly reckless. It is at this class of driver that the railroad's campaign of education is aimed, and the annals of advertising prove pretty conclusively that when a cause is as good as this one, and when it gets the amount of newspaper discussion that is being given to the Long Island's Safety First campaign, results almost inevitably follow.

After all it must be a rather careless and habitually reckless man who can pass a sign 50 ft. long with the reminder staring him in the face that the heeding of that sign may save his life today, who is not just a bit more careful, for a few hours at least, in approaching grade crossings. So far as the Long Island Railroad is concerned, the success which the officers hope to obtain in cutting down the number of accidents at grade crossings is a thing of paramount interest and the methods by which this success is obtained are of secondary interest.

To other railroad men, however, whose particular problems in this respect may be quite different and to whom the grade crossing problem may not necessarily be the most important problem for the solution of which they must obtain the co-operation of the public, the chief interest in the Long Island's campaign of education is the method by which the railroad corporation has obtained this great measure of newspaper support. There is an important lesson in the experience of the Long Island which is almost as old as the history of railroads in this country. Each time, however, that the principles which underlie the Long Island's success are demonstrated in practice the results obtained come almost as a revelation. This is because these principles are applied on a large scale by railroad companies in comparatively few instances. Of course in the main this is necessarily so. A routine has to be followed and there is no "news" in routine. It is in exceptional cases that there is "news."

The editor or managing editor of a large metropolitan daily newspaper ranks in intelligence with the president or the general manager of a large railroad company. The daily newspaper editor is more open to conviction than the ordinary business man. His outlook is generally far broader, and his profession, like the railroad man's, is "public service." A public service corporation can almost invariably get the co-operation of the better class of newspapers, if not of all newspapers, if the railroad man is willing to discuss his cause with the newspaper man and set it forth in such a way that it stands on its own merits.

ELECTRIFICATION OF THE NORFOLK & WESTERN

WHILE the electrification of the New York, New Haven & Hartford from New York to New Haven is for freight as well as passenger operation, it was brought about primarily by the necessity for the elimination of steam locomotives in passenger service at the Grand Central Terminal, New York City. Similar conditions have led to electrification at other points. The Norfolk & Western electrification between Bluefield, W. Va., and Vivian, described in the *Railway Age Gazette* of June 4, was not decided on because of conditions such as these, but to secure an increase in track and tunnel capacity and in economy of operation. While the Chicago, Milwaukee & St. Paul is now electrifying 220 miles of its main lines in Montana for reasons of economy, the Norfolk & Western is the first trunk line to adopt electric operation on a portion of its main line for these reasons.

Only 30 miles is electrified at this time, but this section is adapted to electric operation, because for most purposes it comprises a separate division. Over 72 per cent of the freight traffic of the Norfolk & Western consists of coal and coke, and this percentage is increasing steadily. Practically all of this business originates within the limits of the electrified zone. Over 23,000,000 tons of revenue coal alone was handled last year. When business is normal, about 2,000 cars are loaded daily. This 30 miles of line is, therefore, one of intensive traffic development. Nearly all of this coal originates west of Elkhorn tunnel, about 40 per cent of it going east. Over 700,000 tons was unloaded over the Lamberts Point, Norfolk, coal pier alone last month. This coal must be brought from the mines to the main line, the eastbound loads separated from the westbound, and the former hauled up the 2 per cent grade through Elkhorn tunnel to Bluefield. The westbound coal is taken to Eckman yard, a short distance east of Vivian, where it is made up into trains for further movement. Thus, for this coal traffic the electric locomotives will entirely replace steam without increasing the constructive mileage for steam locomotives, as has so frequently resulted.

From the standpoint of increased capacity, the article on this project in the issue of June 4 showed that the time required to clear the block through the single track tunnel is reduced one-half by electric operation, while the speed of the tonnage trains up the grades is similarly increased. The desirability of securing this greater expedition in the movement of trains is indicated by the fact that the total revenue coal traffic of the Norfolk & Western increased from 13,986,054 tons in the fiscal year 1910, to 23,221,742 tons in 1914, or 66 per cent, while that over the piers at Norfolk alone increased from 4,293,087 tons in 1910 to 5,986,910 tons in 1914, or 40 per cent. It is thus clear that the saving in the cost of constructing additional track facilities to provide the same increase in capacity will to a considerable extent pay for the electrification. Railway men will watch with much interest the actual results secured from the installation, since it is the first placed in operation to secure advantages from the purely railway standpoint, without other complicating features.

NEW BOOKS

A History of Travel in America. By Seymour Dunbar. The Bobbs-Merrill Company, Indianapolis. Four volumes, 400 illustrations, 1,600 pages. Bound in cloth. Price $10.

This is an interesting set of volumes showing the evolution of passenger transportation in America from the days of the Indian trail to the days of the railroad. The book has an historical value, for, although it, perhaps, touches primarily upon the more romantic and striking characteristics of its subject, it nevertheless conveys a remarkably clear idea of the effect of transportation upon the gradual extension of this nation westward from the Atlantic coast to the Pacific. The early part of the book, naturally, does not deal with railroads. The experiences of our forefathers who had to entrust themselves to Indian canoes, flat boats, river barges, or stage coaches and Conestoga wagons were so spectacular, however, that the first two volumes cannot fail to have their appeal to modern makers of transportation.

The book contains a detailed description of the introduction of the steamboat, emphasizing the fact, not too well known, that Fulton was by no means the real originator of water craft propelled by steam. The story of the introduction of the steamboat on the western waters of the country is especially attractive despite the emphasis placed upon the unsafe character of early river travel. The book tells also in detail of the many projects for canals, treats of their success or failure and gives a carefully compiled list of those that were completed. It describes travel upon the canal boats which at one time were very popular. These boats traveled at the prodigious speed of 3 or 4 miles an hour and the passenger paid usually 5 cents a mile including meals and bed.

The story of our railroads occupies a large portion of the books, but nevertheless not all that it deserves. The account is carried through from the beginning of rail transportation to the completion of the first transcontinental railroad. Definite data is given relative to the first railway, the first locomotives, the first trains, this being information that is always in demand and always hard to find in concise form.

The book treats carefully of the several early railroad lines. It names their routes, describes the early methods of track construction, tells of the difficulties with motive power and cars and treats of the lack of standard gages. It would, perhaps, be much more valuable in this connection did it contain maps showing these many lines, and it is a serious fault that these early railroads are not identified with the systems of which they are now parts.

In following the history of the early railroads, it is most interesting to observe the gradual introduction of new ideas. The first railroads had to choose between horses and steam locomotives. The first cars were stage coaches, and it was only gradually that the stage coach equipment evolved into a modern car with perpendicular lines and center aisles. The book does not neglect to mention the introduction of dining and sleeping cars and the various other modern necessities of our transportation system.

The reader is at a loss, however, to know why the author's treatment of our railroads should end at 1869. Surely the romantic features did not cease with the construction of the first transcontinental railway. The introduction of our signal system, a subject which is hardly touched upon, in itself should surely be of greatest interest. Nor does the book say a word about the part played by the railroads in the Civil War. One can well imagine how rich such material would prove at present.

Several chapters in the four volumes are devoted to the effects of the extension of the various new methods of transportation upon the settlement of the West, and it is from this that the book secures historical value. It is somewhat unfortunate, however, that so many chapters should have been set aside for consideration of the Indian problem. While that is an interesting and vital chapter of this country's history, it is not necessarily as important a part of the history of its transportation. A large part of the space used for the treatment of this subject could, therefore, perhaps be better used for a more adequate treatment of the public land policy, as the latter is certainly more closely related to the history of this country's transportation, particularly in so far as railroads are concerned.

The four volumes are most profusely illustrated. That part of the book which deals with the early history of the railroads, however, suffers slightly because in many chapters the illustrations are placed 100 or more pages ahead of the reading matter to which they are related.

To the person who desires to obtain a clear idea of the advance in the art of passenger transportation in this country the book is of greatest value. Its illustrations, the typographical work and the well chosen language make it most interesting.

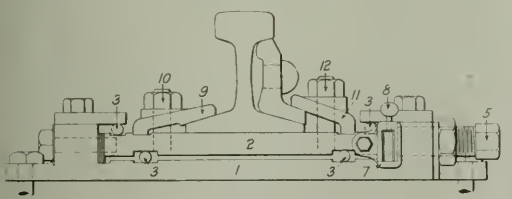
Lateral Stresses in Rails on Straight Track

Several Types of Locomotives Were Experimented With at Varying Speeds and Under Different Conditions

By George L. Fowler
Consulting Mechanical Engineer

The lateral stresses imposed on rails by running locomotives and cars have been the subject of much conjecture, some calculation and a little experimentation for a number of years, and the little of the last tends to show the unreliability of the other two methods of determination. It has been my good fortune to have conducted a series of investigations, the results of which may serve as indications of what probably exists, even though they may not be accepted as a final demonstration from which there can be no question.

The investigations were limited, for the most part, to the determination of the stresses imposed by locomotives. They may be divided into two parts: one in which the thrust of the locomotive as a whole, was measured on a tangent track, and the other in which the thrust of each individual wheel was measured on the outer rail of curves. In the case of the thrusts on the tangent it was the total lateral thrust that was measured and not the individual thrust of each wheel. Also, from the methods employed, it is impossible to state positively whether the records obtained were



Apparatus Used for Registering Lateral Stresses on Rails

those resulting from a single impact of a wheel against the rail or from the accumulated results of a series of impacts. But for the purposes of discussion they are considered to be the result of the impact of the engine as a whole.

THE TEST APPARATUS

The apparatus used for measuring the stresses is shown in the drawing. The rail was rigidly clamped to the plate 2 by the clamps 9 and 11 and the studs 10 and 12, a variation in form being made according to location, with provision for clasping the flange of the rail itself, or the splice bar at the joints. The whole was carried in the cast steel base 1, which was bolted to the tie in place of the usual tie plate. Plate 2 was floated on this base, being carried and held down by the rollers 3. When the apparatus was not in use the rail was adjusted to gage and held by bolts in place of those marked 5. When in service the bolt 5 was inserted, which carried a 1 in. hardened steel ball at its inner end. The clamp 7 attached to the plate 2 was provided with a thumb screw 8 for holding a cold drawn steel strip. This steel strip was interposed between the plate 2, against which it had a bearing and the ball on the end of the bolt 5. The bearing of this ball on the steel strip was all that prevented the spreading of the track as the locomotive passed. The result was that the outward pressure set up by the locomotive caused the ball to make an indentation in the strip the size of which indicated the amount of pressure exerted.

There were 120 of these units. The rail was of 85 lb. section. The ties were spaced 22 in. between centers and were laid in gravel ballast that came up flush with the top; the depth of the ballast beneath the ties was about 12 in. The location was on a fill about 5 ft. high, built on a muskeg foundation that was very elastic. A passing train produced a wave motion of the whole track that was quite visible to the eye, but no measurements were made of the height of the waves.

In placing the apparatus, great care was exercised that there should be no disturbance of the ties or ballast, and the bases 1 were allowed the same freedom of vertical motion on the ties that obtained in the track with the rails spiked down on the usual tie plate. In this way the rail conditions remained the same as in the normal track, with the single exception that they were raised 2 in. above the ties by the apparatus.

The steel plates used for the records were of cold drawn steel of a homogeneous structure, measuring ⅜ in. by 1¼ in. The metal was carefully calibrated to determine the relationship between the size of the indentation and the pressure required to produce it. The readings of the diameters of the impressions on the strips were made with a microscope worked with a micrometer screw reading to thousandths of an inch, but on which ten-thousandths were readily estimated.

The units or chairs were of such dimensions that the rail resting thereon was raised 2 in. above the ties. This necessitated a gradual rise from the regular track level to that of the apparatus. This run-off extended over a distance of three rail lengths in each direction, or at the rate of rise of 2 in. in 99 ft., or about 0.17 per cent. The run-off was carried on shims of varying thickness, so that there was no disturbance of the ties either at this point or under the units of the apparatus. The track was laid in a gravel ballast that dried out quickly after a rain. The ballast was well up to the tops of the ties at all points. The roadbed was springy and the whole surface of the ground and ties received a wavy motion under a passing train.

The tests were made in the month of August and during the whole period the weather was fair and dry and the condition of the roadbed uniform.

A speed recorder placed in the cab of the locomotive enabled the engineer to traverse the test track at any desired speed. The speeds selected for the tests were 30, 40 and 50 miles an hour for freight locomotives of the Consolidation and Mikado classes, and 30, 40, 50 and 60 miles an hour for passenger locomotives of the Pacific and Ten-wheel classes. The tests may be divided into two groups: those in which the rails and tracks were maintained in the regular, normal conditions of operation, and those in which humps or distortions were introduced in one or both rails.

It was found that there was a peculiar harmony in the range of high and low thrusts at the several units. A heavy thrust was apt to occur at the same tie in each of a series of runs and the same held for the lighter thrusts. When this recurrence became quite evident an explanation was sought in the vertical movement of the ties under the passing locomotives, but the improvisation for the work was too crude to give reliable results.

Following are some general data for the engines used in the tests:

	Mikado	Consolidation	Ten-Wheel	Pacific
Total weight, lb.....	225,000	226,000	167,000	219,000
Total wheel base....	35 ft. 5 in.	25 ft. 5 in.	24 ft. 11 in.	33 ft. 7 in.
Rigid wheel base....	16 ft. 5 in.	16 ft. 6 in.	14 ft. 6 in.	13 ft. 0 in.

All the locomotives had the standard Master Mechanics' Association tread, and each was surveyed to determine the amount of

lateral play in the journal boxes. All records were made with the engines using steam.

DETAILED RESULTS OF TESTS

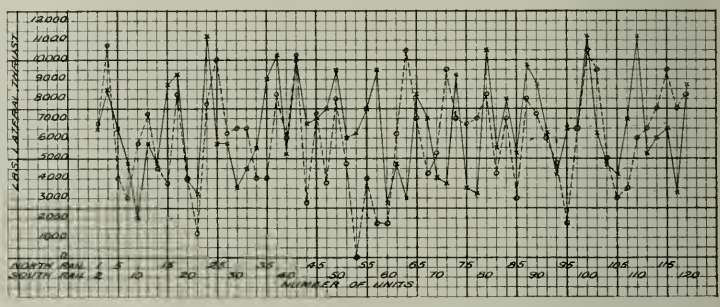
An examination of the diagrams plotted from the records shows that, in no case when the track was in its normal position, was there any indication of a tendency on the part of any of the locomotives to nose, that is, to move from one rail to the other and thus exert a maximum pressure on one, and a minimum pressure on the other. There was considerable lashing or dealing of heavy blows on one side or the other, but there was no uniformity in this, in so far as the delivery of a heavy blow at one end of the tie was accompanied by a slight blow at the other end.

Again, if we examine the averages of all blows struck on either rail they will be found to be remarkably uniform and with but a slight, if any, tendency to rise with the speed. The same statement holds for the maximum blow. It is noticeable that from August 5 to 8, inclusive, the highest average of blows was on the north rail; while from August 10 to 14, inclusive (the date of the last runs with the normal track) the higher average of blows was on the south rail, regardless of the class of locomotive tested. There was no marked difference between the averages of pressures exerted by the different classes of locomotives.

EFFECT OF SIDE PLAY IN JOURNALS

In the tests on the normal rail two of the locomotives were new. One was a Mikado, No. 5034. If the diagrams of this new locomotive are compared with those of No. 5012, on which there was an accumulated side play of something more than three times as much for the total of all of the wheels, it will be found that there was a marked increase in the steadiness of motion of the engine with the greater amount of side play. In the old engine the lash was moderate and uniform up to 50 miles an hour, with but a slight tendency to increase up to that point. At 60 miles an hour the lashing was notably more severe than at the lower speed. In the case of the new locomotive, No. 5034, the lashing was severe throughout the whole range of the tests, but was not markedly greater at high than at low speeds.

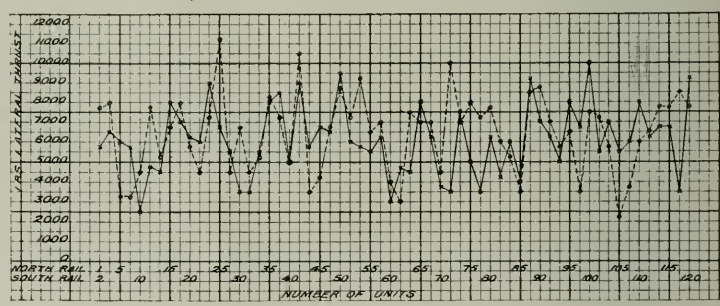
Consolidation engine 3950, tested on August 6, was also new, and Consolidation 3813, tested on August 13, was an old engine that had accumulated something more than three times the total amount of side play in the journal boxes obtaining on 3950. The same differences are to be noted as in the case of the Mikado just referred to. The worn engine, 3813, ran with remarkable smoothness showing a slight but gradual tendency to an increase of intensity of lashing as the speed was increased. The new engine, 3950, on the other hand, was very severe in its lashings, which also showed a slight tendency to increase as the speed was increased. Yet the average and maximum pressures exerted were not greatly different on the two engines, the difference between the two lying in the



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,496 lb. Maximum thrust, north rail..... 11,250 lb.
Average thrust, south rail..... 5,596 lb. Maximum thrust, south rail..... 10,500 lb.

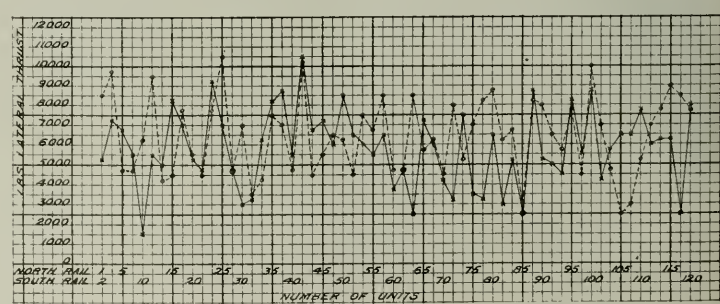
Lateral Track Stresses for Mikado Locomotive No. 5034 on Normal Track; Speed 52 Miles Per Hour; Test Made August 5, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,113 lb. Maximum thrust, north rail..... 10,000 lb.
Average thrust, south rail..... 6,450 lb. Maximum thrust, south rail..... 11,250 lb.

Lateral Track Stresses for Mikado Locomotive No. 5012 on Normal Track; Speed 30 Miles Per Hour; Test Made August 14, 1913



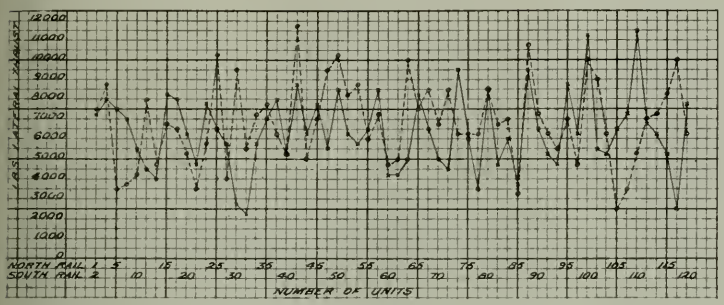
Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,842 lb. Maximum thrust, north rail..... 10,500 lb.
Average thrust, south rail..... 6,499 lb. Maximum thrust, south rail..... 10,500 lb.

Lateral Track Stresses for Mikado Locomotive No. 5012 on Normal Track; Speed 39 Miles Per Hour; Test Made August 14, 1913

rapid succession of blows which varied considerably in their intensity.

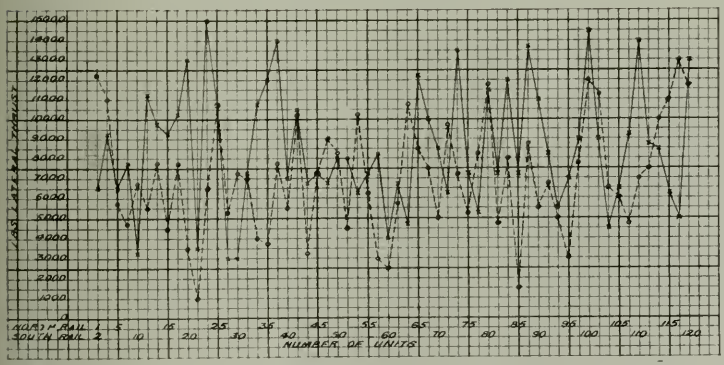
Basing the statement solely on these comparative records, it appears that the locomotive is easier on the rail after it has developed some side play in the axle boxes than when it is just out of the shops.



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,371 lb. Maximum thrust, north rail..... 11,500 lb.
Average thrust, south rail..... 6,829 lb. Maximum thrust, south rail..... 11,750 lb.

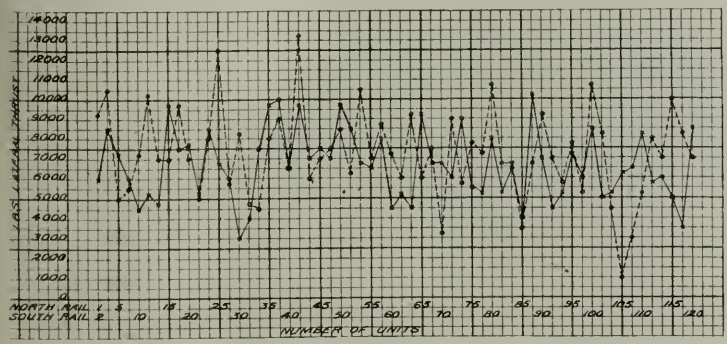
Lateral Track Stresses for Mikado Locomotive No. 5012 on Normal Track; Speed 50 Miles Per Hour; Test Made August 14, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 8,529 lb. Maximum thrust, north rail..... 15,000 lb.
Average thrust, south rail..... 7,037 lb. Maximum thrust, south rail..... 13,000 lb.

Lateral Track Stresses for Consolidation Locomotive No. 3950 on Normal Track; Speed 51 Miles Per Hour; Test Made August 6, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,675 lb. Maximum thrust, north rail..... 10,250 lb.
Average thrust, south rail..... 7,192 lb. Maximum thrust, south rail..... 13,250 lb.

Lateral Track Stresses for Consolidation Locomotive No. 3813 on Normal Track; Speed 50 Miles Per Hour; Test Made August 13, 1913

EFFECT OF DIFFERENT TYPES OF LOCOMOTIVES

As to the difference in the various types of locomotives, a comparison is possible between Pacific No. 1028; Consolidation Nos. 3921 and 3922; Mikado No. 5012 and Ten-wheel No. 919, all of which were fitted with the same type of trucks, and between Pacific No. 2229 and Consolidation No. 3819 which were fitted with another type.

Of these engines the smoothest diagrams were made by Ten-wheel No. 919, followed very closely by the Mikado No. 5012. There is very little to choose between the other three locomotives. On some runs the Pacific gave a slightly smoother record; on others it was in favor of the Consolidations. Considered together, the diagrams show the Pacific to be between the two Consolidations. From the diagrams it appears that the maximum blows in pounds delivered by the several locomotives on a normal track was as follows:

	Speed in Miles per Hour			
Type	30	40	50	60
Mikado—				
New	12,500	12,500	12,500	12,500
Worn	10,000	10,500	11,500	12,250
Consolidation—				
New	11,000	14,000	15,000	.....
Worn	10,250	13,500	12,750	.....
Pacific—				
Worn	13,250	14,000	12,250	12,250
Ten-Wheel—				
New	8,750	14,250	10,750	11,250

It was quite impossible to detect any consistent effect of rail joints. In some cases the greater thrust was at the last tie of the delivering rail, while on others it was on the first tie of the receiving rail, so that the effects were probably due to ballast and general track conditions rather than to the joints.

At the conclusion of the tests on the normal track, that is a track in which the average running conditions of a straight track were maintained as to the level of the two rails and the gage, it was decided to test the effects of a distorted track and various conditions were tried.

EFFECTS OF DISTORTED TRACK

The first change made was that of raising one (the south) rail ½ in. on the third tie in advance (east) of the apparatus or about 4 ft from it. There was a run-off at each end of about 4 ft. Two runs were made with the track in this condition at 30 and 40 miles an

hour respectively. The passage over the hump was not noticeable on the locomotive. The rise of the wheels was taken up by the compression of the springs, and the general appearance of the diagrams was unchanged. An examination of the two sets of diagrams of engine No. 5012 on the normal track at 30 and 40 miles an hour, shows them to be severally very similar, even in the details of their indications. The introduction of the hump disturbed this uniformity of action, but had no appreciable effect on the intensity of the blows delivered.

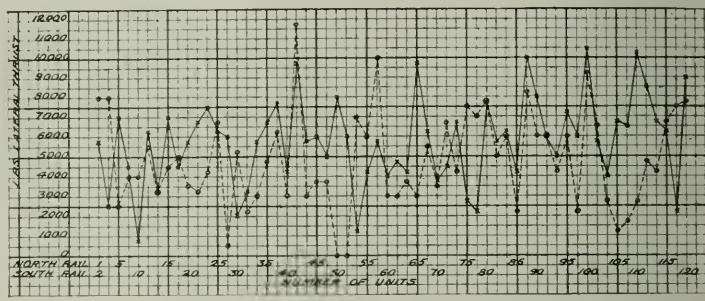
Owing to the slight effect produced by this distortion, the hump was raised to ¾ in. at the same place and engine No. 5012 was run over it at a speed of 30 miles an hour. This produced no more perceptible effect than the first distortion either on the engine or on the track.

The results of this distortion were that with engine No. 5012 running over the first hump of ½ in., which was short, at speeds of 30 and 40 miles an hour, there was no perceptible effect produced on the locomotive, when viewed from the track, nor was it perceptible on the engine. This held true also for the ¾ in. hump at the third tie when traversed at a speed of 30 miles an hour, making it evident that the momentary lifting of the wheels was cared for by the springs without moving the body of the locomotive itself, because of the short space of time during which the lifting force was in action.

In order to increase this time and give the springs an opportunity to act the hump was extended back from the third tie in advance of unit No. 2 for a full rail length at a height of ¾ in., and engine No. 5012 was run over it at speeds of 41 and 50 miles an hour. This produced an effect perceptible to the men on the engine, who could feel it rise, but did not feel any decided lateral blow when leaving the hump, nor was there any marked change in the character or intensity of the blows as indicated by the diagrams of the record.

Owing to the failure to produce results with a single short hump it was decided to introduce two humps, one on each rail. The north rail was raised for a length of 50 ft. and the south rail was raised for the same distance in advance of the apparatus. Mikado No. 5012 was run over it at speeds of 30, 41 and 49½ miles per hour.

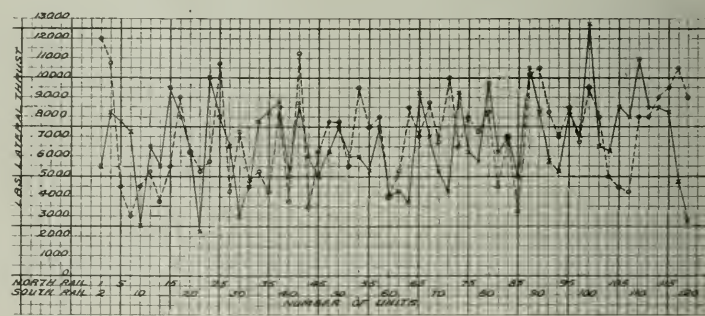
While this arrangement did not produce effects that were noticeable on the engine, it is evident from the diagrams that the lateral thrusts were very materially increased over those obtained on the normal track. On one run at 30 miles an hour a blow of 15,000 lb. was received on the south rail, and on both runs there was an increase of the heavy blows, especially on the south rail, with the engine running very steadily over the last half of the apparatus. These same results obtained at 41 miles an hour with a mere variation of the details. At 49½ miles an hour the lashing was increased and continued for the whole length of the apparatus. This showed that inequalities in track level, especially when alternating from



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,750 lb. Maximum thrust, north rail..... 10,500 lb.
Average thrust, south rail..... 4,825 lb. Maximum thrust, south rail..... 11,750 lb.

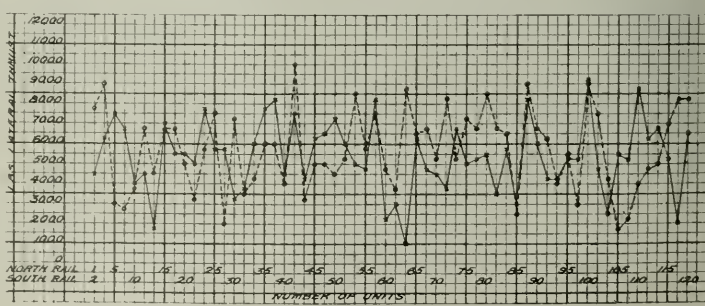
Lateral Track Stresses for Pacific Locomotive No. 1028 on Normal Track; Speed 50 Miles Per Hour; Test Made August 8, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,750 lb. Maximum thrust, north rail..... 12,750 lb.
Average thrust, south rail..... 7,042 lb. Maximum thrust, south rail..... 12,000 lb.

Lateral Track Stresses for Consolidation Locomotive No. 3921 on Normal Track; Speed 50 Miles Per Hour; Test Made August 7, 1913



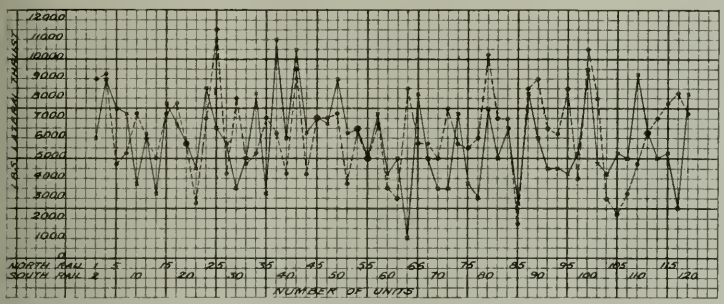
Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,382 lb. Maximum thrust, north rail..... 9,250 lb.
Average thrust, south rail..... 5,737 lb. Maximum thrust, south rail..... 10,000 lb.

Lateral Track Stresses for Pacific Locomotive No. 2229 on Normal Track; Speed 50 Miles Per Hour; Test Made August 10, 1913

one rail to the other, can set up side thrusts of considerable moment.

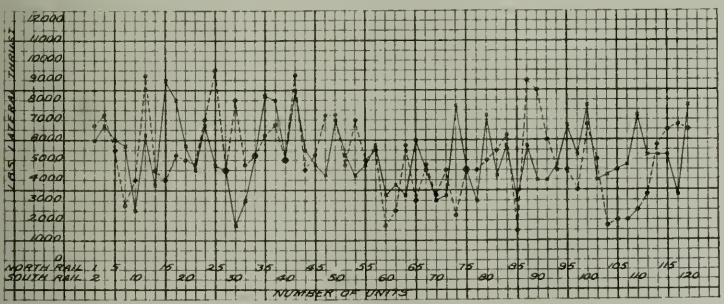
The next move was to place a hump in the north rail carrying it onto the apparatus itself and moving the two previous humps to the east or approaching side. This track was traversed at speeds of 30, 40, 45 and 46 miles an hour. At the higher speeds the engine was rolling to such an extent as to make it inadvisable to run any faster. Here we see, in a very marked manner the effect of throwing the engine over against the south by the hump in the north rail. The engine on entering the apparatus was dropped from the hump in the south rail and was lifted by that in the north. The result was a low pressure against the north rail and high ones against the south, rising to 15,000 lb. This was followed by a severe lashing that lasted throughout the whole length of the apparatus, causing a series of heavy blows, which while they did not raise the average or go very much above the maximum of the same engine on normal track, did show that the running of the engine was greatly disturbed.



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,904 lb. Maximum thrust, north rail..... 11,000 lb.
Average thrust, south rail..... 6,042 lb. Maximum thrust, south rail..... 11,500 lb.

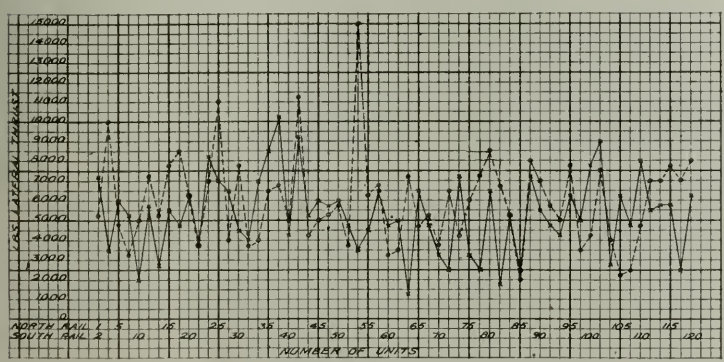
Lateral Track Stresses for Consolidation Locomotive No. 3922 on Normal Track; Speed 50 Miles Per Hour; Test Made August 11, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,229 lb. Maximum thrust, north rail..... 9,000 lb.
Average thrust, south rail..... 5,154 lb. Maximum thrust, south rail..... 9,500 lb.

Lateral Track Stresses for Ten-Wheel Locomotive No. 919 on Normal Track; Speed 50 Miles Per Hour; Test Made August 12, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,329 lb. Maximum thrust, north rail..... 10,250 lb.
Average thrust, south rail..... 5,979 lb. Maximum thrust, south rail..... 15,000 lb.

Lateral Track Stresses for Mikado Locomotive No. 5012 on Track with Two Humps Alternating on the Two Rails for 100 Feet East of Apparatus; Speed 30 Miles Per Hour; Test Made August 15, 1913

A run was made over the track in this same condition on August 16 with Consolidation No. 3813 at 30 miles an hour. The results were identical with those obtained with the Mikado.

The track was again changed. The humps were taken out of the north rail and one long hump was put in the south rail extending well out on the apparatus. The purpose of this was to give the springs ample time to lift the engine and assume a condition of equilibrium, before the engine left the hump. The elevation of the south rail was ¾ in., and this extended for about 100 ft.

Runs were first made over this track with a Consolidation locomotive. The effect was very apparent and striking. The hump in the south rail threw the engine over against the north rail, with the result that the pressure against the south rail was very light, while that against the north rail was comparatively heavy. This held true to unit 14, where the hump practically disappeared, and there was a sudden rise in the thrusts against the south rail, culminating in a very heavy blow on unit No. 42. This showed clearly on the 30 mile diagram, increased very markedly at 39 and 40 miles an hour, and reached a maximum at 47 and 50 miles per hour.

After the engine had been thrown back against the south rail at 47 and 50 miles an hour, it maintained that position to unit No. 88, when it had crossed to the north rail. This tendency was also shown at 30 and 40 miles an hour, but not quite so markedly. While the averages of the thrusts were not much higher with the hump than they were with the normal track the maximum blows were very much higher. If, however, the average of the thrusts received are taken for the por-

tion of the track after the engine left the hump they are considerably higher than with the normal track. This shows that while an engine is traversing a single long hump, it is thrown over against the low rail and the side stresses on the latter are less than on a normal track with both rails level; while on the high rail they are inappreciable. But when the engine leaves the hump it is thrown violently against the rail in which the hump was situated and will deliver thrusts of from 20 to 30 per cent in excess of those delivered on a normal track with the two rails level.

Again the hump was extended, this time to unit No. 26. This hump was traversed by Consolidation locomotive No. 3950 at 30, 40, 46, 48 and 50 miles an hour. The effect was essentially the same as before. The engine lay over against the north rail, putting comparatively little pressure against the south rail up to unit No. 26, the end of the hump, when it crossed quickly to the south rail and put on high pressure, crossing at the higher speeds to the north rail and again imposing comparatively heavy loads there, and at the same time extending the lashing for the whole length of the track.

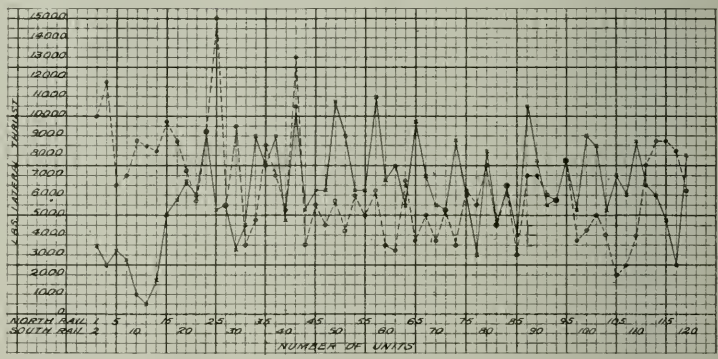
Pacific locomotive No. 1028 was run over the track in the above condition at 30, 40, 50, 50½, 60 and 61 miles an hour. The same general effect was produced as with Consolidation No. 3950, but more pronounced. The Pacific locomotive developed a heavier lashing than the Consolidation, and on this distorted track it carried the low pressure on the south rail out to the end of the hump on unit No. 26, and was then thrown back on that rail. It lay against it for nearly the whole length of the apparatus, only crossing back to the north rail at about units No. 100 to 106. This action appeared at 30 miles an hour, and increased to prominence as the speed increased until at 60 and 61 miles an hour there was a wide gap between the pressures on the two rails, and it was found that the Pacific locomotive put a much heavier stress on the south rail than the Consolidation. Evidently, too, the Pacific was much slower than the Consolidation in swinging from one rail to the other.

EFFECT OF WIDENING GAGE

The gage was then widened over the whole length of the apparatus by from 3/16 to ¼ in., and four runs were made at speeds of 30, 40, 50 and 58 miles an hour. The effect of the widening of the gage was not especially noticeable at 30 miles an hour. But as the speed increased the gap between the south and north rails increased, although the maximum blows delivered were not more. Apparently the extra play between the flanges and the rails, produced by the widening of the gage, gave the engine a chance to be thrown back against the south rail with enough greater force to hold it there with greater steadiness and relieve the north rail of a portion of its load, indicating that a loose gage tends to increase the lateral stresses which a locomotive will put on the track.

OTHER TESTS

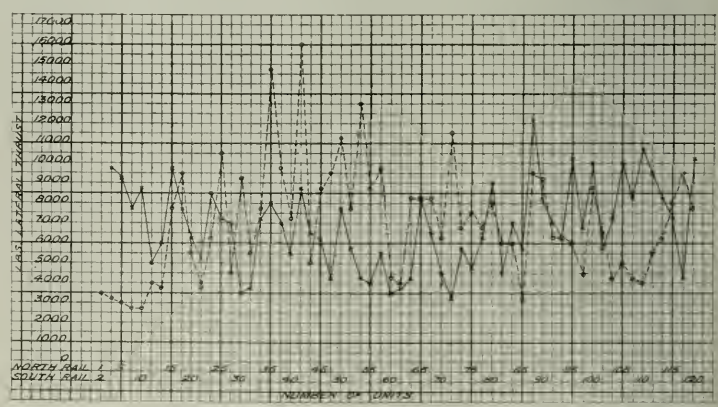
The track was changed again by bringing the rails back to standard gage, but leaving the long hump extending down to unit No. 26, as in its first condition. Mikado locomotive 5012 was again run over the track with the long hump. The effect was the same, but less pronounced than with the Pacific loco-



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,021 lb. Maximum thrust, north rail..... 11,000 lb.
Average thrust, south rail..... 6,338 lb. Maximum thrust, south rail..... 15,000 lb.

Lateral Track Stresses for Mikado Locomotive No. 5012 on Track with Three Alternating Humps in Advance of Apparatus; Speed 45 Miles Pe Hour; Test Made August 15, 1913



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 6,873 lb. Maximum thrust, north rail..... 12,250 lb.
Average thrust, south rail..... 7,021 lb. Maximum thrust, south rail..... 16,000 lb.

Lateral Track Stresses for Consolidation Locomotive No. 3813 on Track with Long Hump in South Rail to Unit No. 4; Speed 50 Miles Per Hour; Test Made August 16, 1913

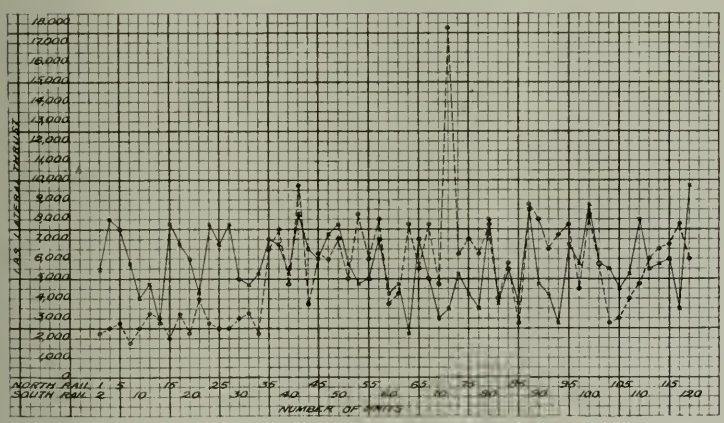
motive. The same steadiness of motion that characterized the Mikado on the normal track was found here, except that, when it left the hump, it lay over against the south rail and continued to put an excess of pressure on that rail, as compared with the north rail, out to unit No. 105, when it sometimes crossed to the north rail, though it usually held to the south rail to the end.

Taking the results obtained with the Pacific and Mikado locomotives, as compared with those of the Consolidations, it would appear that the trailer truck has a markedly steadying

effect to prevent lashing, and tends to hold the engine to the rail against which it has been thrown by running off from the hump. The hump, however, did not serve to raise the average thrusts of the engine on the north rail or the maximum for either rail to any extent, although the average for the south rail was higher for that portion after leaving the hump than when the track was in its normal condition.

On August 20, Pacific locomotive No. 2229 was run over the track. It was on this day that the rail deflections for each tie for each run were measured. A careful comparison of these deflections, as measured with the diagrams, fails to show any connection between the two. This, however, must not be taken to imply, in any way, that there is no connection, since the deflections were taken very crudely and cannot be assumed to represent the depression of the ties or the actual depression of the rail.

Pacific locomotive No. 2229 was also tested. It showed a general tendency that has already been noted, to lay over against the south rail after leaving the hump, but to a lesser degree. This engine had a swing link truck and a total side play in the axle boxes of 3 7/32 in., averaging 17/32 in. per axle. On the normal track it was quite steady and this same steadiness obtained when subjected to the action of the hump. The lashing effect increased with the speed and was quite severe at 50 miles an hour.



Full Line is for North Rail and Dotted Line for South Rail

Average thrust, north rail..... 5,704 lb. Maximum thrust, north rail..... 9,750 lb.
Average thrust, south rail..... 5,333 lb. Maximum thrust, south rail..... 17,750 lb.

Lateral Track Stresses for Ten-Wheel Locomotive No. 919 on Track with Long Hump in South Rail to Unit No. 26; Speed 49½ Miles Per Hour; Test Made August 22, 1913

Runs were made with Consolidation locomotive No. 3925 at 30, 39, 40 and 48 miles an hour. The records of this engine may be compared with those of No. 3921. The diagrams showed the same low pressures against the south rail up to the end of the hump at unit No. 26, and beyond. Then there was a transference of the pressure to the south rail, with the engine laying up against it to the end of the apparatus. The run of maximum blows was higher than with No. 3921 on the normal track, and the lashing was somewhat more severe at the highest speeds, decreasing as the speed decreased down to 30 miles an hour. Engine No. 3925 has a total side play of 5 13/16 in. ranging from 9/16 in. in the second driver to 2 9/16 in. in the truck axle.

Attention has already been called to the smooth running of the Ten-wheel engine, No. 919. This engine was tested again on the humped track at speeds of 30, 40, 49½, 59½, 60 and 61 miles an hour. When running on the hump it showed the same low even pressure on the south rail that all of the others had, then a crossing at the end of the hump to put the higher pressure on the south rail; but, beyond that, there was an almost entire absence of the heavy lashing effect of the other types of engines at high speeds. Even at 60 miles an hour the engine was very steady. The only exception was to be found at 49½ miles an hour, where a blow of 17,500 lb. was struck at unit No. 72, but the engine quieted down immediately and showed no further tendency to lash, out to the end of the apparatus. Hence here, as on the normal track the Ten-wheel engine showed that it tended to put less stress on the track than any of the other classes.

Finally a Consolidation locomotive was backed over the apparatus at a speed of 30 miles an hour. The effect of the hump on this locomotive was very marked when running ahead. Not only were the maximum blows delivered higher than those of the same engine on the normal track, but the plunge over to the south rail, when it ran off the hump, was very decided. This was indicated especially by a blow delivered to unit No. 42, a blow that increased with the speed and was sometimes followed by a heavy blow on a succeeding unit. Evidently the engine went back to the north rail as unit No. 87 gave evidence of heavy blows.

Contrary to the action of the Consolidation locomotives when backing over curves, the action of such an engine backing on a straight track does not differ essentially from its action when moving forward. In fact, in the latter case, the stresses was much more severe when running forward than when running backwards.

As in the previous trial with the widened gage, the effect was not noticeable at 30 miles an hour. At 40 miles an hour, it was more distinctive, showing the same tendency to increase the lateral stresses as the speed increased.

GENERAL CONCLUSIONS

Reviewing the whole series of tests they may be said to furnish the following indications, although the work has not yet been carried to the point where the conclusions reached can be said to have been demonstrated.

The probability is that the blow delivered or the stress imposed at any particular point is dependent more on the condition of the roadbed than of the locomotive. This is shown by the marked similarity of the diagrams of any particular locomotive, whereon it will be seen that the heavy and light blows are apt to occur at the same unit respectively, regardless of the speed at which the engine may be running. This checks with observations made elsewhere.

There is no tendency for locomotives to nose, that is to go from one rail to the other at regular or irregular intervals, and, in so doing put a heavy pressure on one rail while there is a light one on the other. Nor when the engine or wheels come up against the rail is it usual for the pressure to increase gradually over a number of ties. The maximum pressure is apt to follow a comparatively low pressure on the same rail. In fact, it is quite characteristic of the diagrams to show an excessively high pressure immediately succeeding an abnormally low one.

A goodly amount of side play in the axle boxes evidently serves to relieve the lateral thrust of the wheel on the rail. It is as though the wheels and axles were free to move from side to side of the track while the main body of the engine continues on in a straight line undisturbed by the side movement of the wheels.

Judging from the diagrams presented, the order of severity of stresses put on the rails by the locomotives tested, indicates that they stand in the following order: Ten-wheel, Mikado, Pacific, Consolidation, increasing from the first to the last.

As already intimated track conditions are evidently of great importance in the development of lateral stresses, but no data was obtained showing what the effect in detail of track deflection or yielding may have upon the lateral stresses. Nor was any determination possible, from the data obtained, as to the effect of rail joints. There were, of course, no low joints on the apparatus used.

As far as the riding qualities of the engine, or the development of lateral stresses, a short hump or elevation of one rail has no appreciable effect, even though that rise be as much as ¾ in.

With two humps, one on each rail and alternated, so that the engine is not on both at the same time, there is an appreciable rise in the intensity of the lateral stresses.

With three humps, two on one rail and one on the other, alternated in the same manner, the engine will be given a rolling motion, which may become dangerous at high speeds, and which will produce a very marked increase in the intensity of the lateral stresses imposed on the rail.

Where one rail is elevated above the other for a considerable distance, giving the springs time to lift one side of the engine and come to a state of equilibrium, the effect is to cause the engine to strike against the rail in which the hump is located, when the engine leaves it. This may be followed by a rebound against the other rail. A widening of the gage tends to increase the lashing of the engine.

Contrary to its effect on curves, there is no appreciable increase of lateral thrust caused by backing a Consolidation locomotive over a straight track. This seems to hold, at least for moderate speeds.

While no demonstrative evidence to that effect was obtained, the impression left by these tests is that the track conditions are the controlling elements in track stresses. As to just what these may be, in detail, no statement can be made.

From these tests, as well as from those made on curves, it is evident that no prediction is yet possible as to what will be the effect of any individual locomotive, at any speed on any track, curved or straight. It can only be assumed that the performance of the engine will fall within the limits that are characteristic of its type.

In connection with these tests it is to be noticed that most of the locomotives tested had dissymmetrical wheel bases; that is to say, the number of truck wheels on either side of the drivers was unequal. This holds for all of the engines except the Mikados. It has been found in other investigations, that locomotives with dissymmetrical wheel bases are easier on the track and more stable than those having symmetrical bases.

QUARTERLY ACCIDENT BULLETIN No. 53

The Interstate Commerce Commission has issued Accident Bulletin No. 53, containing the record of railway accidents in the United States during July, August and September, 1914. The number of persons killed in train accidents was 181, and of injured 2,555.

The total number of casualties of all classes reported, including industrial accidents, was 2,748 killed and 47,215 injured. The accidents are summarized as follows:

Table No. 1—*Casualties to persons—Steam railways*

Causes.	Passengers		Employees (including employees not on duty)		Other persons (trespassers and non-trespassers		Total persons	
	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd
Train accidents.								
Collisions	37	606	27	405	5	28	69	1,039
Derailments	36	850	39	381	28	59	103	1,290
Miscellaneous, including boiler explosions	...	10	8	213	1	3	9	226
Total	73	1,466	74	999	34	90	181	2,555
Other than train accidents.								
Accidents (229) to roadway or bridges not causing derailment	...	...	...	1	...	...	...	1
Other accidents (classes C3 to C12, inclusive)	44	2,215	470	10,200	1,954	3,640	2,468	16,055
Total	117	3,681	544	11,200	1,988	3,730	2,649	18,611
Industrial accidents to employees.								
While working on tracks or bridges	...	...	42	7,548	...	...	42	7,548
At stations, freight houses, engine-houses, etc.	...	...	19	6,304	...	...	19	6,304
In and around shops	...	...	17	13,177	...	...	17	13,177
On boats and wharves	...	...	9	432	...	...	9	432
At other places	...	...	12	1,143	...	...	12	1,143
Total	...	...	99	28,604	...	...	99	28,604
Grand total	117	3,681	643	39,804	1,988	3,730	2,748	47,215

The comparisons with the quarterly bulletin covering the corresponding quarter of the previous year shows* an increase in passengers killed in train accidents of 40 (33 to 73); employees killed (on duty) all causes, a decrease of 296 (759 to 463); employees killed in industrial accidents, a decrease of 33 (132 to 99) and a decrease in total persons killed, all classes, of 425 (3,173 to 2,748). The quarter now reported included three notable accidents: Tipton Ford, Mo., August 5, passengers killed, 36; Lebanon, Mo., September 15, passengers killed, 27; Livingston (Klondyke), Ala., September 18, passengers killed, 9.

The total number of collisions and derailments reported was 3,085 (1,095 collisions and 1,990 derailments), of which 97 collisions and 168 derailments affected passenger trains. The damage to cars, engines and roadway amounted to $2,342,511. A comparison with the same quarter in preceding years shows:

	Number	Killed	Inj'd	Damage
Total collisions and derailments this quarter	3,085	172	2,329	$2,342,511
Total for same quarter of 1913	3,913	208	3,760	3,239,159
1912	3,935	276	4,100	3,366,401
1911	3,034	189	3,776	2,533,170

The bulletin gives the usual tables classifying certain kinds of accidents in detail.

Fifteen accidents were investigated by the inspectors of the commission during this quarter, and the reports of these investigations fill 23 pages of the bulletin. These accidents occurred as follows:

Chicago & Alton	Lockport, Ill.	Jan. 3,	Derailment
Chic. St. P. Minn. & O.	Bigelow, Minn.	Feb. 9,	Derailment
Detroit, Jackson & Chic.	Michigan Center, Mich.	July 1,	Butting collision
Virginian	Fairmount Park, Va.	July 17,	Collision (st. cars)
Pennsylvania	Shannon, Pa.	July 23,	Derailment
Kansas City So.	Tipton Ford, Mo.	Aug. 5,	Butting collision
Tennessee Central	Green Hill, Tenn.	Aug. 13,	Derailment
Denver & Rio Grande	Thistle, Utah	Aug. 14,	Derailment
Chic. R. I. & P.	Talloway, Ark.	Aug. 21,	Derailment
Chic. St. P. Minn. & O.	Peak, Neb.	Aug. 27,	Butting collision
St. L. Iron Mt. & So.	Watson, Ark.	Sept. 14,	Butting collision
St. L. & S. F.	Lebanon, Mo.	Sept. 15,	Derailment
M. K. & T. of Texas	San Marcos, Tex.	Sept. 16,	Derailment
Alabama Great So.	Livingston, Ala.	Sept. 18,	Derailment
St. L. Iron Mt. & So.	Rixey, Ark.	Sept. 22,	Derailment

Electric railways reporting to the commission (not included in the foregoing statistics) had 125 persons killed during the quarter and 1,686 injured; and there were 44 collisions and 23 derailments. Train accidents are charged with 6 fatalities. The total number of passengers killed from all causes was 12, and of employees 15 (4 in industrial accidents). The number of trespassers struck or run over by cars was 49; 27 killed and 22 injured.

British Rail Exports.—The war is naturally telling upon English rail exports, the aggregate shipments to April 30 having fallen to 78,462 tons, as compared with 164,277 tons and 157,507 tons in the corresponding periods of the two former years.

Baghdad Railway Bridge Opened.—A Constantinople telegram states that the great bridge across the Euphrates near the railway station of Djerabulus, on the Baghdad Railway, has been opened for traffic.

*Preceding bulletins have been noticed in the *Railway Age Gazette* as follows: No. 52 (yearly), February 19, 1915, page 299; No. 51, December 11, 1914, page 1081; No. 50, July 24, 1914, page 170; No. 49, May 15, 1914, page 1072.

Federal Regulation of Railroads—A Suggestion

Division of the Country Into Districts and With Sub-Commissioners With Jurisdiction Over These Districts

By J. G. Code
General Manager, Wabash-Pittsburg Terminal

The "Act to Regulate Commerce," taking effect early in the year 1887, and based upon the constitutional authority of Congress to regulate foreign and interstate commerce, inaugurated a system of federal regulation and control of business interests of the greatest magnitude in themselves and so closely interwoven with the business and social activities of all the people as to make the manner, extent and character of regulation of vital importance as related to national welfare. The commission in its first annual report directed attention to this fact in the following words:

> The regulation of no other business would concern so many or such diversified interests or would affect in so many ways the result of enterprise, the prosperity of commercial and manufacturing ventures, the intellectual and social intercourse of the people, or the general comfort and convenience of the citizen in his every-day life. The railroads provide for the people facilities and convenience of a business and social nature which have become altogether indispensable, and the importance of so regulating these that the best results may be had, not by the general public alone, but by the owners of railroad property also, is quite beyond computation.

In the same report rendered after the act had been in operation about eight months it was noted that "one immediate effect was to cause inconvenience in many quarters," which comment is probably equally applicable to the situation after twenty-eight years of experience. This, however, is no indication that progress has not been made, nor good results obtained, as any restriction of individual or corporate action is practically certain to inconvenience some, even while generally beneficial.

The tremendous expansion of our resources in agriculture, mining, manufacturing, etc., during the latter half of the nineteenth century was made possible only by the rapid development of transportation facilities which, in many notable instances, proceeded materially in advance of actual needs, but in a manner to promote the opening of remote areas to population and all the activities of civilization. That in the public interests federal regulation became necessary, was adopted, justified its adoption, is therefore properly adhered to, and will be continued and made more extensive by the will of the people, are facts of the situation which for purposes of this discussion are assumed to be settled. I am also assuming and firmly believe that government ownership is not seriously considered by any great number of our people, and will not be until or unless the policy of regulation by commission has absolutely failed.

There is an old Scotch fairy tale of an enchanted flag given by a fay to a member of the Macleod clan. Thrice it would save him from the worst danger, but only thrice. After that it would be useless and must be burnt. As the story goes, Macleod waved the flag twice, once when his child heir was lost, again when the clan was hard pressed by enemies—but he never waved the flag the third time! Furled it lies in the treasure chamber of Dunvergan, while generations of Macleods bravely live and bravely die. No one of them will use the fairy's charm for the last time.

Government ownership is the last resort and its flag may well be kept in the treasure room of our castle, to be unfurled only when there is no other way to turn. Unlike the fairy banner, we can use it not thrice, but only once and must then abide the consequences.

Until very recently the repressive function of regulation has predominated. Naturally those features of the act aimed at the correction and prevention of abuses have been thoroughly worked to conclusion. There are now gratifying indications of an understanding that the function of repression of evil must be accompanied by cultivation of good through our instrumentalities of regulation if the people at large are to continue to enjoy the benefits of efficient transportation facilities. A broader conception of the duty devolving upon governmental authority will result in an extension of the powers of the commission, and a very considerable increase in the amount of work to be performed by it.

The suggestion which I wish to advance relates solely to the situation as it exists and to the very probable extension of the authority of the commission, and consequent increase in the amount of labor. Even though, as it now stands, a tremendous amount of business is handled by the commission, which docketed in the year 1913, 16,764 cases. There were conducted 1,401 hearings, in the course of which approximately 140,000 pages of testimony were taken, which represents a good sized printed volume for every working day in the year.

There has been no material change in the organization other than an increase in membership from five to seven and which it is now proposed to increase to nine. The quality of its membership has been well maintained, so that notwithstanding many acute differences of opinion, it must be conceded that we have a board composed of men ranking very high in ability, capacity, sincerity and devotion to the manifold tasks upon which they are continuously engaged.

The reference before made to the number of cases docketed, while indicating in a manner the volume of work directly handled or reviewed by the members of the commission, does not cover the entire work performed under the authority of the commission by its subordinate employees or bureaus, as of locomotive inspection, accounts, statistics and tariffs.

In working out the enforcement of the boiler inspection law it has been found desirable to locate the inspectors of this division at various points throughout the country in such a manner as to insure frequent observation of the locomotive boilers and appliances. That this organization is effective most of us know. The men are "on the job" and the figures reported by the chief inspector in his 1914 annual report showing 32 per cent decrease in the number of accidents, 36 per cent decrease in deaths and 32 per cent decrease in injuries as compared with the previous year are at least prima facie evidence of efficiency.

The division of accounts now maintains representatives in seven of our principal cities, where they are in close touch with the accounting features of our principal railroad systems. These men too are "on the job" and the theory of uniform accounting is being evolved into fact.

For valuation purposes the country has been divided into Eastern, Central, Western, Southern and Pacific divisions, with headquarters in four principal cities outside of Washington.

In the matter of hearings and investigations, however, the commission has no fixed local representation. Its principal office is in Washington and there is provision for the conduct of hearings and investigations by one or more commissioners in any part of the United States. This circuit riding feature was for a number of years frequently operative and it was quite the usual thing for members of the commission to conduct hearings at various points in the territory immediately concerned in the matters at issue. But as the work

*An address delivered before the Railway Club of Pittsburgh.

increased it became exceedingly difficult for members of the commission to absent themselves from headquarters at Washington until it is a rare occasion when a member of the commission takes direct charge of any proceeding at an outside point. Such are almost invariably conducted by subordinate representatives of the commission, known as lawyer examiners, who report to the commission for its review and action the evidence adduced, briefs filed and recommendations.

On account of the large amount of work and the probability that it will continue to increase, further addition to the membership of the commission has been proposed, and if it were wholly practicable to subdivide and assign to certain members a particular share of the duties, the end might be attained in this manner, which is workable, however, only in some minor matters.

Are not the work and territory involved and interests affected now great enough to subdivide in a more rational manner? I believe such to be the case, particularly as the development of successful regulation will require greater authority in the regulatory body, coupled with a greater degree of accountability to the whole people.

My suggestion, which I hope may be considered in the line of progress, is:

1. Divide the country into six districts—Eastern, Central, Southern, Southwestern, Northwestern and Pacific.

2. Assign to each district three sub-commissioners, with headquarters at convenient geographical locations in each district.

3. Let all hearings and investigations be conducted by these boards of sub-commissioners singly when intraterritorial, and by joint representation when interterritorial.

4. Forward to the Washington commission for review and decision the record of hearing and investigation, lawyers' briefs and sub-commissioners' recommendations as is now done in cases conducted by examiners.

5. Relieve the Washington commission generally of the direct conduct of hearings and investigations, except in cases of such importance as in their judgment may make it desirable for one or more of their members to sit with the local commissioners.

The personnel of all commissions is of vital importance. Salary and tenure of office should be such as to command experience, ability and honest devotion to the work. One member for each of the sub-commissions may well be assigned from the commission's corps of examiners, whose experience qualifies them to produce results. Give them a chance to settle down and get a thorough acquaintance with the transportation and business needs of a particular territory and they can do better work and more of it. One member on a sub-commission should certainly have general experience in the conduct of railway operations. A third member should be a representative of general business or shipping interests.

The benefits of such an organization are readily manifest. Among them may be cited:

1. Washington commission can give more concentrated and thorough attention to the larger problems and policies of regulation and control.

2. Washington commission can serve more efficiently in advisory capacity to Congress and the president. The chairman of the commission should be ex officio a member of the president's official family and on the same footing as a cabinet officer. The president and the Congress should have the benefit of the expert knowledge possessed by the commission in considering proposed legislation.

3. Local commissions should foster a better understanding and closer relationship and co-operation among all interests, including what is extremely important, state and other local regulatory commissions.

4. Business can be handled with greater expedition and we will have less standing still and marking time while waiting for action.

5. Much loss of time and long distance traveling may be avoided.

6. The commission will be "on the job."

SAFETY FIRST ON THE LONG ISLAND

The latest phase of the campaign for safety on the Long Island Railroad is the posting of signs on the highways, warning automobile drivers to be more careful at grade crossings. One of these signs, painted on a bridge, is shown in the accompanying engraving. This is at Broadway, Flushing, N. Y. It is 50 ft. long and about 10 ft. high. Other signs will be put on bridges at Winfield, Jamaica and other places, and also at places near grade crossings where the warning is likely to be useful. The signs are of different sizes, a common shape being 10 ft. wide and 10 ft. high. Some of the signs will be lighted at night. More than $15,000,000 has been spent already in the elimination of grade crossings on the Long Island, but there are still 631 crossings on the lines of this one railroad company. Work on the elimination of 32 more crossings is now in progress.

Coincidently with the posting of the signs the railroad company is publishing advertisements in the local newspapers. From

Sign on Broadway Bridge, Flushing, N. Y.

a series of several advertisements, the publication of which is to be spread over several weeks, we make the following extracts:

This is the first of a series of advertisements the sole purpose of which is to save life—your own life it may be or the lives of your family or friends. The automobile touring season is just beginning. Every year brings an increase in automobile accidents at grade crossings on Long Island. We have tried many ways to get people to be careful, but reckless driving is as common as ever. . . . We shall keep putting up more signs wherever they can do any good. *Look for them.*

A large percentage of the people hurt in grade crossing accidents on Long Island are people who are not familiar with the roads. Remember this when motoring on Long Island: When you see a railroad crossing sign, respect it! It may mean the saving of your life. You cannot miss the crossing sign. . . .

To take a chance at a crossing; to trust to luck to get across is worse than foolhardy; it is criminal. Let the sight of a grade-crossing sign instantly convey to you the warning to slow down or stop. It's the only way to be safe.

Even if you know none of the victims, there is a shock in reading the details of an accident to automobilists at grade crossings. . . . But how often do you take home the lessons your daily paper so constantly conveys? . . .

A train approaches a grade crossing. The gates drop, the automatic bells sound, or the flagman appears with his warning

lantern. But the chauffeur deliberately speeds up his car, smashes through the gates, and whirls across the tracks a hair's breadth ahead of the engine. Couldn't happen, you say? It happens at least once a week on Long Island. . . .

Remember where the grade crossings are and slow down or stop before you approach them. As fast as possible we are abolishing them. This is our part. Yours is the exercise of caution.

If you would always associate the sight of a grade crossing with the instant application of your motor's brakes—accidents to automobilists at grade crossings would soon be scarce. . . . Trains must run on tracks and on time. Their operators have no choice of routes. But the automobilist can choose his road and regulate his rate of speed.

Five hundred flagmen are on duty day and night at this railroad's grade crossings. We keep them there for your protection.

At the sight of a warning flag or lantern—stop your automobile.

STATISTICS OF ENGLISH RAILWAYS IN WAR TIME

By Julius H. Parmelee
Statistician, Bureau of Railway Economics

The virtual nationalization of the railways of Great Britain for the period of the European war has effected curious results, as regards both management and statistics of operation.

On August 4, 1914, the very day Great Britain and Germany locked horns, an Order in Council provided that the government should assume control of the railways of the United Kingdom. For this purpose an executive committee was created, composed of the general managers of a dozen selected railway companies, with the president of the Board of Trade as chairman ex-officio, and the general manager of the London & South Western as acting chairman. Beginning August 5, the railways have been administered as one system under the control of the government and in conjunction with the war office and the admiralty.

The annual reports of the English railways for the year ended December 31, 1914, reflect this government control in a number of aspects. By an arrangement perfected at the commencement of the period of control, the government agreed to compensate the railways for their services in connection with naval and military transport by guaranteeing them the same net revenues as were earned from rail operations during the corresponding period of the preceding year. In return, the railways have placed their facilities primarily at the disposal of the military organizations, and only secondarily at the disposal of the traveling public. All necessary expenditures are met by the railways, the government agreeing to make up any deficits and guaranteeing net revenues proportionate to those of the latest corresponding period of peace. Stating this differently, the government has practically commandeered the railways for its own use, paying therefor a sum equivalent to the deficit (if any) plus the normal net revenues of the period. The sole proviso is that if the net revenues for the first half of 1914 were less than for the corresponding period of 1913, a proportionate reduction is made in the net revenues for which the government stands guarantor.

Statistical interest centers in the form of accounts necessitated by these extraordinary conditions. The principal railways of England carry in their annual reports for 1914 a uniformly worded description of the arrangement with the government, and point out that the circumstances necessarily involve considerable alteration in the accounts and statistical returns for the year. The statements presented in these reports are prepared in the abridged form agreed upon with the Board of Trade.

The English railway reports for 1914 are, therefore, less detailed and contain fewer statistical tables than usual. None too enlightening at the very best, the reports now throw little light on actual operations. For example, the one vital account (No. 8, Revenue Receipts and Expenditure of the Whole Undertaking), which is the record of income and outgo for the year, is now made up almost wholly of two items. The income item is entitled "Receipts in respect of railway working, and of separate businesses carried on by the company, including estimated amount receivable under agreement with the government in respect of control of railways for the period August 5 to December 31, 1914," while the outgo item is entitled merely "Expenditures." These two heads cover transactions aggregating millions of pounds, without the slightest attempt at detail of any kind.

With the further sanction of the Board of Trade, the railways are varying the statutory form of accounts this year by omitting from their reports all accounts showing revenues and expenses in detail, especially the income account entitled "Receipts and expenditures in respect of railway working"; also statistical tables dealing with the auxiliary activities of the railways, such as the operation of omnibuses, steamboats, canals, docks, harbors, wharves, electric light and power plants, and so on; also the important records of passengers and freight carried, and the detailed traffic statistics. Whether these accounts are omitted for the sake of simplicity, or as a blind to the enemy, or to conceal actual conditions from the English public, is conjectural; but they serve to rob the reports of what little value they formerly possessed.

It is clear that the only item now remaining in the English railway accounts offering any index to business conditions is that of expenditures; for the traffic statistics have disappeared, and the income item is arbitrarily arrived at by adding expenses and normal net revenues. Comparison of the expenditures of the railways for the calendar year 1914 with those for 1913 is disappointing, therefore, in that little change is noted in either direction.

The available statistics cover 15,314 operated miles. The operating revenues for the calendar year 1914 amounted to $513,521,144, as compared with $505,656,203 in 1913; operating expenses in 1914 were $339,711,288, and in 1913 were $329,272,383.

A point of interest in the reports concerns the human side of the war—the enlistment of railway employees under the banners of the Empire. The London & North Western points with pride to 12,000 employees in the army and navy; "that they have acquitted themselves with honor is attested by the fact that their list of casualties to the latest recorded date, is, etc." Similarly, the Great Western takes satisfaction in 10,000 employees with the colors; the Midland in 9,000; and the North Eastern in 6,200. These roads, in common with others, are making allowances to dependent families of their employees while under arms, and will find positions for them on their return to civil life.

Another vital human touch is the official announcement of the North Eastern, in its annual report, that in the bombardment of Scarborough, Whitby and the Hartlepools 5 employees were killed and 32 injured.

Dining Car Service.—The railroads that have dining car service have a growing incentive to make that service all that the traveler could desire. Gastronomic expectations can be fulfilled with greater happiness and disappointed with greater bitterness than any other. There are two things that must be gone about in the right spirit. A "kick" by a patron, no matter how made, may represent a substantial cause for complaint which may have been going on unspoken for a long time, for not every one exercises his right to complain. In order that complaints may always be turned to good account, the invitation that they be made to the conductor is important. Try to make the kicker speak to the conductor, not to the waiter, for the latter can see it only as an effort to defeat his right to a tip. The other point is the strictest care to serve only fresh, well-prepared foods. Don't say, when a robust, healthy man has a sudden attack of ptomaime poisoning, that it is a matter you can't get at. A legislator can't get at it, but a good caterer can.—*The Railroad Herald.*

THE GRETNA DISASTER

The wreck of three passenger trains at Gretna, Scotland, on the Caledonian Railway, May 22, reported briefly in the *Railway Age Gazette*, May 28, page 1130, resulted in the death of 161 persons and the injury of 200 others. Nineteen passenger cars and 12 freight cars were wrecked and destroyed by fire, and four locomotives were damaged beyond repair. The English papers bring some details of the causes of the collision. The second smash, which occurred within about one minute after the first one, is more properly to be classed as a derailment, the northbound express train on the west track, running into the wreckage of the first collision, which had occurred on the southbound (east) track. A considerable number of the victims were soldiers who had alighted from the southbound train and were walking or standing on the northbound track. They were unable to escape from the oncoming express train because of the presence of freight cars on a side track west of the main line.

The collision occurred at a signal box known as Quintinshill, about a mile north of Gretna station. A northbound local passenger train was set off on the southbound track to allow two express trains to pass it. These expresses, when on time, leave Carlisle, a few miles south, ahead of the local. The local train would have been put on a siding, but for the fact that there was much congestion because of Whitsun traffic and the movement of troops. While standing on the east track the local was run into by a troop train coming from the north, at full speed, both the distant and the home signals being clear for it. As before stated, the northbound train then came on at high speed before there was time to send out an adequate warning. Flames broke out within a very few minutes, either from coals which fell from the fireboxes of the locomotives or from ruptured gas pipes. There was some use of fire extinguishers, but the testimony concerning the fire is rather indefinite and somewhat contradictory.

The collision occurred about 6:40 a. m., just as the night signalman was going off duty, and some confusion in the giving of information by the night man to the day man, or misunderstanding on the part of the latter, appears to be one reason why signals were cleared for the southbound troop train when the northbound local passenger stood in its way. Mechan, the night man, regularly remained on duty until 6:30, instead of going off at six, according to the regulations; this in order to enable the day man, Tinsley, to reach the cabin by a convenient train from Gretna, the very train which was standing in front of the cabin and which was run into. This irregular habit was concealed from the inspectors; the night man made no entries on the train sheet after 6 o'clock, leaving a memorandum from which these were made by the day man.

In the reports thus far at hand nothing is said concerning the qualifications or experience of either of the signal men.

When a northbound train is thus standing at a station on a southbound track the rules require that the signal man put a collar on the levers of the signals, so that he cannot absent-mindedly clear a signal for an approaching southbound train; but it appears that this use of the collar was habitually neglected.

The fireman of the local passenger train had gone into the cabin, and it was his duty to see that the collar was used, but this duty also was neglected.

A train of empty freight wagons, southbound, preceding the troop train had just arrived at Quintinshill, and had entered a side track. Whether the arrival of this train had been reported to the next station north appears to be in doubt; both the day man and the night man say that they did not make this report, which throws responsibility on Kirkpatrick, the block station next north; but the reports do not tell what happened there. The day man admits that he forgot all about the local passenger train, standing less than 100 ft. from his cabin. There was a freight train on a side track between the cabin and the main line which, however, does not appear to have formed a complete obstruction to his view of the passenger train.

The English papers refer to this disaster as the worst occurring on a railroad anywhere in the world since railroads were used, measuring, of course, by the number of persons killed and injured. So far as official records are concerned we have no facts at variance with this statement; but there was a wreck at Mailpois, Mexico, in June, 1881, which, according to the newspapers, resulted in the death of 214 persons and the injury of 50 others. A similar report from Santa Ana, Salvador, May 3, 1894, reported over 200 persons killed. A train wreck at Kobe, Japan, July 28, 1895, resulted, according to report, in 140 fatal injuries. In a train wreck at Maddur, India, September 24, 1897, the number of persons killed was reported as "five carloads." The longest death list in any train accident in the United States is that of the wreck at Eden, Colo., August 7, 1904, when a train broke through a bridge and 94 were killed.

RAILROAD LEGISLATION IN NEW YORK

The legislature of New York, recently adjourned, passed five laws affecting railroads, besides the items in appropriation bills for removing highway crossings. Senate bill No. 837, now chapter 281, amends the general law, section 52, requiring railroads to keep fences in good repair, by adding a clause including cattle guards, so as to make the railroad responsible for injuries to animals in case a cattle guard is not kept in good condition.

Senate bill 141, now chapter 240, amends the railroad law in relation to grade crossings by amending section 94, paragraph 7, so as to empower the Public Service Commission to authorize intermediate payments on an improvement taking a long time to carry out; and paragraph 8, requiring the legislature annually to appropriate $100,000 for paying the state's proportion of crossing changes, is cut out.

Senate bill No. 2112, now chapter 515, amends the banking law in relation to savings banks investments by an addition to paragraph a so as to make applicable to a consolidated road, like the New York Central, the provision requiring certain dividends to have been paid during the term of five years. In calculating the dividends all payments by all of the consolidating corporations may be included.

Chapter 559 amends the railroad law in relation to gates and flagmen at highway crossings, empowering the Public Service Commission to order the employment of a flagman or the erection of gates at any crossing where wayfarers on the highway cannot have a good view along the track when they come within 200 ft. of the crossing.

Chapter 564 empowers the Public Service Commission, on petition, to change the name of any railroad station.

A sixth law affecting railroads is that which gives the Public Service Commission authority over so-called "jitney bus" service in cities having less than one million population, the authority of the commission being made substantially the same as in the case of street railroads. The Long Island Railroad operates three trolley roads, and so is interested in this law. The company carries on this business without profit, for the general benefit of the people of Long Island. The law aims to prevent unfair competition on the part of automobiles with street cars.

The annual appropriation bill for the Public Service Commissions includes, for the elimination of highway grade crossings in the first district $200,000, and for the same purpose in the second district $552,000.

The Iron Cross.—The iron cross, the most highly-prized recognition of valor in the German army and navy, is not a casting, but is struck with steel dies in heavy coining presses. After being stamped out, the crosses are taken to the silversmith's, where the soldering is done, a fine silver border added, and the finishing completed. The silver border is polished on electrically-driven polishing and grinding motors.—*The Engineer.*

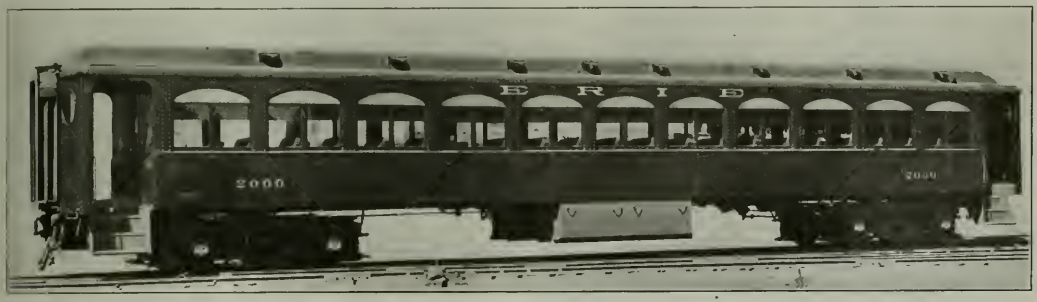
All-Steel Suburban Passenger Cars for the Erie

Coaches Have Seating Capacity of 86 and Are Exceptionally Light in Weight; Built for Future Electrification

A train of eight suburban passenger cars of all-steel construction, consisting of seven coaches and one combination baggage and smoker, has recently been placed in service by the Erie Railroad. The cars were built by the Pressed Steel Car Company, Pittsburgh, Pa., from designs prepared by L. B. Stillwell, consulting engineer, New York.

The design of these cars was made with a view to meeting the following conditions: Safety and comfort of passengers; low cost of operation; low cost of maintenance, and moderate weight per foot of over-all length, when compared with the lightest wooden cars in the same company's service.

The comparison per foot of over-all length is unaffected by the seat spacing, and is particularly interesting in this instance, as the new cars include heavy buffing and friction draft gears, as well as heavy draft sills, whereas the lightest wooden car has only the platforms and wooden draft sills with tandem spring draft gears. The light weight can be attributed to the exclusion of all unnecessary members. The deep and heavy center sill

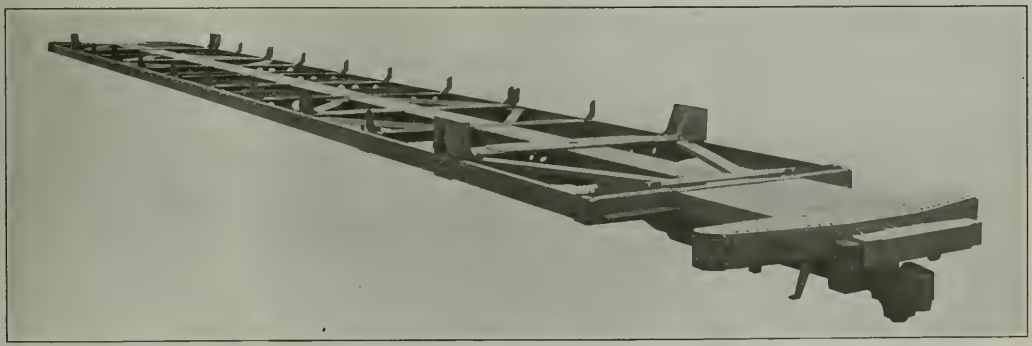


Erie All-Steel Suburban Coach

first cost. In general their construction is similar to that of the New York, Westchester & Boston electric suburban cars, described and illustrated in the June 14, 1912, issue of the *Railway Age Gazette*, and while they are built for steam operation, provision has been made for the ultimate addition of electric motive power equipment. One of the points of greatest interest in the construction of these cars is the arrangement of the superstructure, whereby all parts contribute to its strength to withstand shocks of derailment, overturning or collision. Other notable features are the light weight per seated passenger and the easy-riding qualities which have developed in service.

The coaches are 70 ft. 4 in. long over-all and weigh complete 95,400 lb. The table on page 1245 of comparative weights of Erie passenger equipment shows that the total weight is less than that of two classes of steel underframe passenger cars having a smaller seating capacity. It shows further that the all-steel car weighs less per seated passenger and closely approximates the construction of the fishbelly type has been dispensed with, and sills of uniform section are supported by the deep side frame through a system of crossbearers.

Provisions for application of electric motive power equipment consist in the suitable height and outline of roof to permit of application of overhead current collector if required; the arrangement of vestibule for application of platform control equipment; the arrangement of underframe members for the support of electrical motive power equipment in the most advantageous manner for operation and for thorough inspection and maintenance of apparatus, and the design of draft sills, bolster and of truck whereby clearance is provided for electric motors.



Underframe; Erie All-Steel Suburban Cars

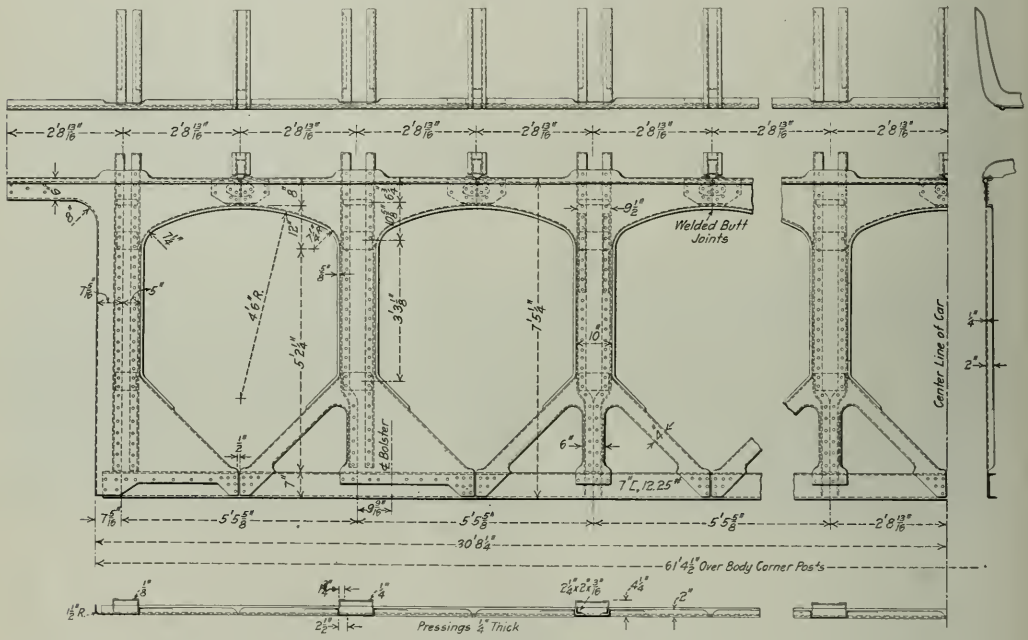
The center sill construction of these cars is of uniform depth and section between bolsters, and consists of two 8-in. 16.25-lb. channels spaced 14 in. back to back, with a 19-in. by ⅜-in. top cover plate and two 4-in. by 3½-in. by ⅜-in. angles reinforcing the bottom flanges. This gives a total section of 22 sq. in. Forward of

the bolsters deep pressed steel draft sills extending through the bolsters reinforce the center sills and at the point of maximum depth add 10 sq. in. to the section.

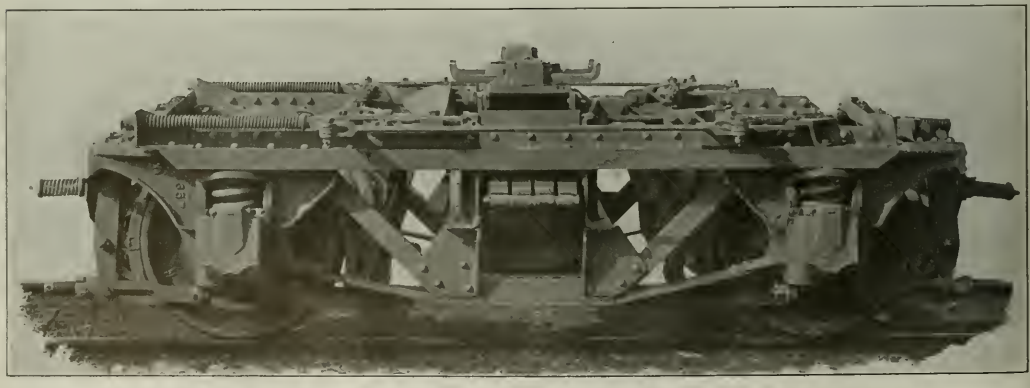
The center sill construction forward of the bolsters is supported by the high side frames through the body end sill and bulkhead construction. The bending moment occurring at this point due to the eccentric draft gear forces is resisted by the draft sills and is transferred by the body end sill and bulkhead to the high side frames. The center sill construction between bolsters is thus relieved of any eccentric loading from the draft gear forces, and the full section is available to resist the consequent direct compression because of the support afforded by the high side frames and heavy crossbearers placed under the side posts.

As the rigidity of an all-steel car underframe makes the use of a heavy draft gear practically imperative, and the installation of an effective buffing device equally necessary, the new Erie cars are fitted with a friction draft gear and buffing device calculated to be of sufficient capacity to absorb the most severe shocks received in service.

The side frames of the car are 7 ft. 5¼ in. from bottom of sill to top of side plate, and are 61 ft. 4½ in. long over body corner posts. The entire frame is designed as a girder, with a pressed steel compression member at the side plate and a 7-in. 12.25-lb. channel tension member at the side sill. The posts connecting these members are of 10-in. pressed channel form, ¼ in. in thickness, and are spaced 5 ft. 5⅝ in. between centers. They are furnished with integral diagonal braces below the windows.



Pressed Steel Unit Side Frame Construction of the Erie Suburban Cars



Truck Used on the Erie All-Steel Coaches

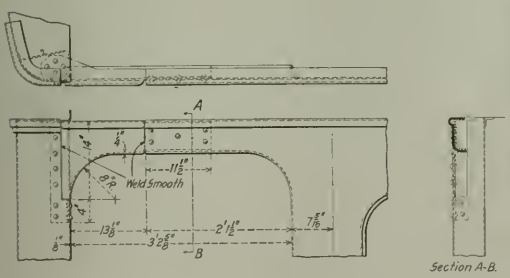
and with flanged gussets at the portal arches. The vestibule end posts consist of 9-in. I-beams framed into the sills and to the vestibule ceiling construction. The body end walls are fitted

Interior of Erie Steel Suburban Coach

with ¼-in. pressed steel corner posts 12 in. deep, with gusset connections to the side sills and to the side plates of flanged form ¼in. thick, thus bracing the end walls against collapse.

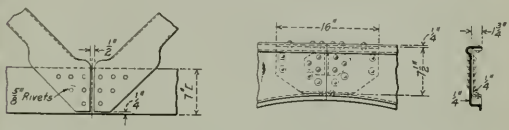
The roof structure is formed of pressed channel carlines, and is of the compound arch type. This form of roof is not only strong, light and inexpensive, but gives good ventilation good distribution of reflected light and is particularly suitable for the support of electric current collectors, should the cars later be fitted with electrical motive power equipment.

The trucks are 47 ft. 7½ in. apart from center to center and



Detail of Vestibule Corner Post Connection to Side Door Header

are of a non-equalized type, generally similar to those on the Westchester cars previously referred to. They are fitted with coil journal box springs and long quadruple elliptic springs under the bolsters. The proportioning of the springs is such as to produce the easy-riding qualities essential in steel car construction, not only for the comfort of the passengers but for the maintenance of equipment and roadbed. The trucks have an 8-ft. wheel base and complete, with clasp brakes and 33-in. wheels with 5-in. by 9-in. journals, weigh 12,500 lb. each. These trucks are designed with ample clearance for the application of electric motive power equipment, if at any future time their use in such service is required. Other features of interest on the trucks are Coleman bolster locking center pins which prevent the separation of car body from truck in case of derailment or collision, and



Details Showing Diagonal Brace Connection to Side Sill and Side Plate Splice

clasp brakes, which greatly reduce brake shoe and journal wear and facilitate smooth stops, which is an especially desirable feature in suburban service.

The illumination of these cars is secured by eleven electric fixtures arranged in center line of car, the form of ceiling outline being such as to reflect and distribute the light evenly over the seats and aisle without producing shadows. One 25-watt lamp is

Interior View of the Completed Framing; Erie Suburban Cars

used on each fixture. Power for lighting is furnished by a Wilson storage battery of 800 ampere hour capacity.

The equipment of the cars includes Miner friction draft gear and buffing device; Pitt couplers and Hale & Kilburn seats. Wherever renewals or maintenance require that a stock be kept on hand the railroad's standard parts have been used.

	New cars, all-steel	Class 1935-1950, steel underframe	Class 1910-1934, steel underframe	Class 1825-1874, wood	Class 1800-1824, wood
Number of seats	86	72	72	72	72
Average weight, lb	95,400	96,500	100,500	83,200	86,600
Weight per seated passenger, lb	1,100	1,340	1,400	1,140	1,200
Weight of lighting equipment, lb	Battery 8,000	Battery 8,000	Battery 8,000	Gas 2,000	Axle Gen. 6,500
Net weight of car, exclusive of lighting equipment	87,400	88,500	92,500	81,200	80,100
Weight per seated passenger, exclusive of lighting equipment	1,017	1,230	1,284	1,128	1,112
Length over-all	70 ft. 4 in.	66 ft. 3½ in.	66 ft. 3½ in.	66 ft. 3½ in.	66 ft. 3½ in.
Weight per ft. of over-all length, exclusive of lighting equipment	1,243	1,333	1,395	1,225	1,210

THE MEASUREMENT OF EFFICIENCY IN YARD OPERATION

By J. W. Roberts
General Superintendent of Passenger Transportation, Pennsylvania Lines West, Pittsburgh, Pa.

The results of efforts which may be directed toward the operation of terminal yards in accordance with appropriate efficiency standards, are affected either favorably or adversely by such a diversity of varying conditions that facts descriptive of the most minute details of the methods and practices of one yard, and apparently well adapted to its requirements, may not be accepted as conclusive evidence of a high standard of operation, but merely as one of numerous factors which enter into the formation of a correct measure of efficiency. Such results do not necessarily represent even the more prominent factors which a measure of terminal yard efficiency must embrace, but on the contrary owing to the wide range of view points as to the real functions of a terminal yard as part of a railway system, an achievement in the form of a comparatively low unit cost of operation at one point might in reality constitute the cause of legitimate criticism relative to unsatisfactory operation at other points because keen competition, irregular inbound and outbound train and interchange movements of cars, or inadequate car repair facilities and other like conditions may necessitate radical deviations from methods and practices calculated to produce a minimum unit cost of operation.

The classification of forces, assignment of shifting locomotives, selection of supervising assistants, and estimates of period appropriations, are all duties devolving upon the head of a terminal yard organization, which he cannot perform, correctly at least, in accordance with observations, but which demand reports descriptive of the exact situation in each part of the yard.

A very great variety of report and record forms have been designed to meet the three-fold requirement of measurement of service to be performed—measurement of member or unit capacity, and measurement of results obtained. Some of these forms doubtless serve the desired purpose, but as a principle it is safe to state that, to be most efficient, reports and records should be as brief and simple as possible consistent with the information they are expected to express, and should harmonize in all respects with the unit of service regardless of its character.

In the terminal yard this unit is the car, hence the current reports, records and permanent statistics should be based upon the *number of cars* handled in *each class of switching service* as illustrated by the accompanying report and record forms designated "A" and "B."

The reports and records relative to terminal yard operation which seem to be most popular among both large and small roads, are limited to information as to the *total* number of cars handled in and out of a terminal yard, including cars delivered to and received from connecting lines, and the direct operating expenses per car so handled. Such reports and records are fundamentally wrong and have no value as a gage of efficiency or proper unit expense. They do indicate whether the cost of handling a car varies within each of two corresponding periods when the business and other prevailing conditions generally are about the same, but the result when available is meaningless for the reason that within one period industrial switching service may have been very heavy, and through or interchange switching service very light; while within the other period involved by the comparison the directly opposite situation may have obtained. If reports and records do not meet the requirements of a single terminal yard, they can not possibly be employed to any advantage in connection with comparisons of the results of operations of different terminal yards of one railway system or of different railway systems.

The combination report and record forms "A" and "B" are designed to accommodate information showing the *total* number of cars handled by *each* switching crew in *each* of the four *distinct classes* of terminal yard service, and the total number of hours performed by *each* crew within a calendar day; the details specified and the total direct or the total direct and indirect expenses incidental to operations, constituting the measure of, (1) cost per car of all cars handled by each crew in each class of switching service within the limits of each district, and within the limits of the entire terminal yard; (2) cost of handling a car from the time it enters a terminal yard until it departs therefrom; (3) cost per car for the handling of cars to or from a particular industry or private track, and (4) causes of differences between items of cost referred to in sections (1) to (3) inclusive, as applied to different districts in the same terminal yard, to different terminal yards of a system, or to terminal yards of different systems.

Form "A" is intended to serve the three-fold purpose of a crew conductor's daily report of operations to his yardmaster, the yardmaster's daily report of district operations to the terminal yard organization head, and the basis for the maintenance of daily records on the form designated "B" by the crew conductor to measure operations under his immediate charge, the yardmaster to measure operations within the district under his immediate jurisdiction, and the terminal yard organization head to measure operations of the various branches or sub-departments of his organization.

FORM "A"

Report of Operation of { Switching Crew No... / District No..... } .....191...

Class of service	Number of cars handled	Number of loco. hours	Description of unusual conditions which affected operations
Passenger switching			
Classification (a)			
Switching (b)			
Interchange switching			
Industrial (c)			
Switching (d)			
Mine switching			

(a) Hump yard.
(b) General.
(c) Private industries.
(d) Freight houses, team tracks, repair tracks and other company tracks.

..... (Title of head.)

FORM "B"

Record of operation of ..... 191...

Date	Classification of switching service											
	Passenger		Classification				Interchange		Industrial			
			Hump yard		General				Private industries		Freight houses, team tracks and other company tracks		Mines	
	Cars	Hrs.	Cars	Hrs.	Cars	Hrs.	Cars	Hrs.	Cars	Hrs.	Cars	Hrs.	Cars	Hrs.
1														
2														
3														
4														
5														
6														

Note.—Record to be in book form so that the opposite page will in all cases indicate details of the corresponding day, week or month of the preceding year.

Both forms are in harmony with the theory that there is a unit in each class of service; that the supervisor over a service must know not only the capacity of his assistants, but the causes of variations in results of their efforts, and thus be in position to direct adjustments in forces and expenses immediately after conditions warranting that action become apparent; that the exhibited comparative results of member, branch or sub-department, and department operations are an essential part of a system of educating employees and creating interest in their work;

and that a terminal-yard organization head should be prepared at any time to make a very close estimate of the cost per car of all cars handled in each of the different classes of switching service; in any one of the classes of switching service, or to or from a particular industry or private siding. The latter detail is one which is very closely related to the service of "spotting cars," while the measure of switching cost is certainly the *right measure* also of the switching rates.

The four different classes of switching service as indicated are common to all terminal yards, which is likewise true of certain of the subdivisions of classes two and four as indicated. The classes which represent the movements of cars to and from mines, the handling of passenger cars, and classification through hump yards, are not common to all terminal yards, and since refinements with respect to cost more extensive than the four distinct classes of service might be required, the record and report forms provide for them.

A very natural criticism of the report and record forms referred to is that their use will entail considerable labor on the part of the supervising heads, in which criticism advocates of the theory that efficiency may be obtained without supervision other than observations will readily concur; the other side of the same proposition being that economical operations demand interest and efforts of employees to the extent of reliable current measurements of accomplishments, and that the results warrant the little additional labor necessary to obtain them. Inasmuch as the performance to be reported and recorded refers to *totals* in all cases, a loyal head of a branch or sub-department, informed as to the purpose of the reports and records in their relationship to his personal service and standing, should resent instructions prohibiting him from giving in that form evidence of his relative capacity, worth, and rights when the opportunities for advancement are presented. Furthermore, to maintain the records, which would be neither difficult nor expensive as proven by experiments in a large terminal yard, would be to anticipate requirements in the nature of measures for: (1) Switching rates sufficiently large to yield a fair profit, and represent a proportion of through transportation rates; (2) charges sufficient to cover the cost of handling carload shipments between loading or unloading points on private sidings, and reasonable distance limits from stations to or from which transportation rates apply; (3) charges representing at least the cost of switching and handling of cars at different points incidental to reshipments, reconsignments, etc., as authorized by published tariffs.

OVERHEAD CHARGES IN VALUATION

By Richard Hoadley Tingley

The scrap-heap, into which is thrown all items of construction expense that cannot find lodging in any other classification, is commonly known as the "Overhead." There are almost as many different ideas as to the make-up of this classification, and the value of the units that go into it, as there are commissions having to do with it. The truth of the matter is that the term "Overhead" has no clearly defined, well recognized definition; no really official standing in valuation nomenclature. The official classification of the Interstate Commerce Commission does not mention this term, but provides for "General Expenditures," into which must be placed all items of expense not specially mentioned as belonging elsewhere. Nevertheless, the term overhead has come into such general use; is so often spoken of and written about when reference is made to the valuation scrap-heap, and has occupied such an important position in the decisions of courts and commissions, that a brief study of its real meaning and significance may be instructive.

In the broadest acceptance of the term, overhead charges include: Engineering and superintendence, contingences, contractors' profit, promotion costs, bond discount, piecemeal construction, brokerage and general expenditures.

In this last item, which is recognized as one of the three grand sub-divisions of construction accounting by the Interstate Commerce Commission, is included further overhead items as follows: Organization expenses, general officers and clerks, law, stationery and printing, taxes during construction, interest during construction and other general expenses. To these may be added two more items which, although not fully recognized by commissions generally, are really members of the overhead family in certain classes of valuation, development costs, going value and franchise value.

There is no uniformity among the different commissions as to the acceptance or rejection of the above items, each choosing its own course irrespective of others.

Not only in the matter of looseness of definition is overhead noticeable. It is the weak point in valuations today; the feature about which the least amount of definite knowledge exists. Other elements of value have been and are being accurately determined. Inventories of visible assets have been and are being made with great care and scrupulous nicety. Land values have been and are being scrutinized by experts, and courts are deliberating and ruling on whether or not the unearned increment represented thereby shall be allowed as value. The subject of depreciation is being widely discussed with a view to ascertaining what place, if any, it has in valuations for rate making or other purposes, yet, except in a few cases of appraisal of water works properties, it is apparent that overhead has so far received no really careful study; no attention to compare in any way with the thought that has been given to other elements of value. Its importance warrants better treatment.

Professor M. E. Cooley says in the Journal of the American Electric Railway Association, 1911: "Depending on the locality, and whether certain of the items discussed may or may not be included in the cost without being separately stated, the total overhead charges may vary from 20 to 25 per cent, and from 50 to 60 per cent, of the cost as determined by inventory; that is to say, the total cost of the property will vary from 120 or 125 per cent to 150 or 160 per cent of the cost as determined by inventory of the physical elements alone." In this Professor Cooley writes from general knowledge only, and it must be admitted that the range is wide indeed. It is true, however, that such a range exists, though perhaps Professor Cooley has overdrawn it. Moreover, the determination of whether 20 per cent or 60 per cent of the inventory cost shall be added to appraisals is little better than one man's judgment as against another's, for no better information exists, and one expert's judgment, estimate or guess is as good as another's.

In an arbitrary manner the different state commissions have adopted certain percentages to be added to inventory costs to cover overhead. In practically no case does the determination of these percentages rest on a solid basis. In each case it is an assumed basis resting on general knowledge and a limited amount of actual data.

Many state commissions do not recognize development costs or going value as elements in valuations, and many, too, give no room as such to contractor's profit, contingences, etc., reasoning that in inventory costs these latter items have already been taken care of. If, however, full consideration is given in valuations to development costs, a much wider range of possible percentages to be applied to overhead will appear than that brought out by Professor Cooley. A lack of understanding as to what is included under this heading is responsible in some measure for the situation, and some distinction is made with respect to the purposes of the valuation. In several cases of valuation for purchase and sale the courts have upheld an addition of from 10 to 25 per cent to the inventory cost to cover going value, but in rate cases there has been a tendency to exclude this feature as well as development costs. The Wisconsin Commission usually gives full recognition to development costs, and in certain rate cases has allowed as high as 20 per cent of the cost of reproduction. L. R. Nash says in Stone and Webster Public Service Journal for October, 1912: "It will be of interest to consider the aggregate of all overhead costs as

compared with structural cost. The successive addition of percentages applying to physical property gives a cost of reproduction from 129 per cnt to 158 per cent of the structural cost. The further addition of percentages connected with the organization of the company gives totals of 131 per cent to 163 per cent of the structural cost. The final addition of percentages to cover development costs gives an undepreciated fair value from 141 per cent to 188 per cent of the structural cost. It thus appears that it is by no means inconceivable that such fair value in certain cases may be double the structural cost, if development costs are considered."

Robert H. Whitten says in his Valuation of Public Service Corporations: "The trouble with overhead is that nobody has yet taken the pains to study it, and that there is no uniformity of practice in the different states and commissions as to what items go to make up its total. In giving testimony the experts on behalf of both sides freely admit that they have no definite knowledge of the subject nor of the figures they are presenting to cover overhead. In summing up valuation cases and in rendering opinions, commissioners also are equally free in acknowledging their ignorance, and in stating that 'general knowledge' rather than definite and precise information governs." In reviewing opinions and findings of commissioners one frequently finds such references as the following: In the Public Service Commission of New York, First District, opinion and order of commission, October 20, 1911, Mayhew vs. Kings County Lighting Company: "It might be expected that the company itself would have data on which to base an estimate of a reasonable allowance for these terms (overhead). In this case the company has produced no such data. A request was made for the early records of the Kings County Gas & Illuminating Company, the predecessor of the present company, but they were not presented. An estimate must therefore be based upon general knowledge and experience." The theoretical figures of the company were then discussed, and the opinion goes on to say: "In the absence of data as to actual expenditures by the company, this amount is considered generous, probably too large." Again, in an opinion of the Los Angeles Board of Public Utilities is found. "The usual 20 per cent of cost, to cover engineering, supervision, interest and contingencies during construction," was allowed.

It seems to be apparent that in most cases a company should be able to substantiate its claims for overhead allowances by actual vouchers and other records of such expenses incurred in the construction of the property. There is no necessity for leaving this important matter entirely to expert opinion as to such costs, based on hypothetical conditions of assumed reconstruction. Suppose, for instance, that in the federal valuation of the railroads now in progress the matter was allowed to remain in its present chaotic state. The Interstate Commerce Commission, contending probably for low values, at least not for high ones, might be 10 per cent, or even 20 per cent, apart from the overhead value determined by the railroads, and in a total figure represented by many billions of dollars such a discrepancy would be serious indeed, and each faction would have as clear a title to its opinion as the other. Such a difference would render worthless all the carefully prepared inventories of visible assets, and would throw into disrepute the entire valuation matter. Its enormous expense would have been of no practical value. It would be like straining at a gnat and swallowing a camel.

The remedy for the troubles in overhead is quite clear. The National Association of State Railroad Commissioners has produced much valuable data bearing on valuation practice generally, in the different states. It might well occupy itself in defining the meaning and scope of overhead, and in determining and agreeing upon just what items of expense properly belong to this classification in valuations for the different purposes, rate adjusting, taxation, capitalization, purchase. This would insure at least uniformity. Furthermore, the state commissions, the Interstate Commerce Commission, and the various committees from the railroads might, and eventually must, occupy themselves, either jointly in one grand committee or separately, each for itself, in solving the greater overhead question; that of fixing upon a series of percentages that can safely be added to inventory costs to cover the various types of cases that present themselves in valuations. This field has never yet been covered. An organized search by experts of the books, accounts, histories and records of the railroads and utilities plants under review would be productive of illuminating results, and by covering a very large field, as in the case of the federal valuation of the railroads, and by carefully analyzing and tabulating results, a series of percentages could be arrived at that would mean something. As the matter now stands, a series of arbitrary percentages are applied to inventory costs to determine the overhead that mean little or nothing; somebody's opinion. As it might be worked out by the plan I have suggested, actual costs of overhead could be determined in a sufficient number of cases, so that the reverse would be the case: actual figures would then govern percentages. Such well digested and authenticated percentages could then be applied to plants and properties where no record exists, and where etsimates must of necessity prevail.

A NEW LUNCH COUNTER CAR

The Chicago & North Western on June 5 put in service a lunch counter car in connection with its "Golf Special" train, which leaves the Chicago passenger terminal daily, except Sunday, at 12:20 p. m., and reaches nearly a score of golf clubs located along its line on the north shore between Chicago and Waukegan. Returning the train reaches Chicago at 7 p. m.

Interior of the Lunch Counter Car

The car will be ready to serve a high grade lunch at popular prices at 12 noon, 20 minutes before the leaving time of the train, and thus will be a great convenience to the patrons of this train. The car contains a lunch counter running lengthwise of the train and occupying the entire length of the car, except for a short kitchen at one end. Seats are provided for 27 persons.

Signals on the Victoria Railways.—On the Victoria government railways 74.49 per cent of the stations, junctions and siding connections are interlocked. During the year ended June 30, 1914, fifty new electric train staff sections were brought into use and thirty-two tablet sections were replaced by the electrical train staff.

The Mechanical, Purchasing and Stores Departments*

Relations Between These Three Departments. Organization Necessary to Get Both Economy and Co-operation

By H. C. Pearce
General Purchasing Agent, Seaboard Air Line

There should be no division of responsibility between the purchasing and stores departments. These departments are logically one, and should more properly be termed the "Supply Department."

Our maintenance departments are organized and maintained primarily for the purpose of maintaining the equipment and roadway and structures in the best possible physical condition. Their unit of measure is the condition of the equipment and permanent way. They are not vitally interested in the investment for materials, or in any of the problems of purchasing, storing, distributing and accounting.

The supply department is organized for the purpose of providing, caring for, delivering and accounting for materials, and the assembling and disposing of the salvage. Its unit of measure is its ability to provide suitable materials promptly for the work at the lowest cost, and with the smallest permanent investment.

By a careful analysis, it will be found that the real cause of the unsatisfactory conditions which have prevailed, generally, is due to imperfect organization and supervision. The supply department should be so organized that it knows with reasonable accuracy what material will be needed, what quality is best suited for the work, and be in position to provide it promptly to the users when needed; recover and reclaim everything possible for re-issue, and market the salvage to the best advantage. In order to do this, there must be a well defined, practical plan, proper facilities and a sufficient number of trained men to handle the work. It is not expensive buildings and supply depots that are needed so much as sufficient room to properly segregate the material and protect it from the elements; facilities for handling and delivering economically, and, above all, a well trained organization that is in position to anticipate the requirements and provide for them in the shortest possible time, with the least expense, and with the smallest amount of material on hand.

The store delivery system, properly installed and supervised, offers the only practical way of keeping in touch with the actual needs and is the only economical method of delivering materials to the users in shops. The plan has as its basis a store delivery foreman with sufficient messenger boys and men to place the material in the hands of the users as wanted, and the bringing back to the storehouse of repaired and manufactured articles. The foreman in charge of this work should be a thoroughly competent man and be in close touch with the foremen of the different departments at all times. The messengers and delivery-men, by being in actual personal touch with the users of the material, become efficient and useful. The foremen and mechanics are able to confine themselves to the actual work at hand, thus saving the present loss of time of mechanics and helpers going back and forth from the storehouse for material, loss of the use of machinery; etc.; but, above all, it places the supply in touch with the actual needs

The supply train offers the only practical means of knowing what is needed for ordinary maintenance on the line, and is the most economical method of delivering material and collecting the salvage. The plan consists in moving the necessary supplies for all ordinary maintenance and operation on a regular schedule. The material and supplies in this train are so arranged that they can be issued in the least possible time. The crew consists of a supply car storekeeper and the necessary help or helpers to unload and deliver to the agents, telegraph officers, pumpers, section foremen, signal maintainers, etc., such material and supplies as will be needed to last until the next regular schedule of the train, after a thorough check has been made of what is actually on hand.

This train picks up all surplus material which may have been collected for any reason, materials and tools which can be reclaimed and repaired, and the scrap or salvage. It should be accompanied by the division engineers, roadmasters, and, whenever possible, by the superintendents. It will be found to be the most practical way of making a careful inspection of conditions by division officers. On railroads, districts, or divisions where the amount of supplies required does not make up a full train, dead-empties and loads can be moved to make up the tonnage. Engines moving light can be used to handle this train to advantage. The schedule should be prepared with this object in view. On railroads, districts, or divisions where these cars can be operated in locals during daylight, there is no objection to so doing, but the full usefulness of this train cannot be obtained unless it is operated properly.

These two branches of the service are fundamental to any efficient supply organization.

The organization should be such that the requisitions will be prepared so that they will go to the purchasing agent complete in every detail. The purchasing agent should so organize his office that only in exceptional cases should it be necessary to secure bids after the requisitions are received. In the majority of cases, agreements and contracts can be made to cover all standard supplies so that the orders can be placed immediately for most standard materials. It should not even be necessary to rewrite the orders. They should be made up complete at the time the requisition is prepared in the general storekeeper's office. Every day consumed from the time the requisition is prepared until the order is placed is time lost, without any contributing advantage. For the same reason the purchasing power should be used to its fullest extent to procure regular and uniform deliveries.

The maintenance departments should combine their technical knowledge and experience in the preparation of the specifications and standards. Probably no one thing is so badly needed on most of our railroads as carefully prepared, practical specifications and inspection. The specifications, when drawn, should combine the best practice and experience of the maintenance officers of our railroads, as well as the manufacturers.

Specifications, like organizations, should be flexible enough and broad enough to meet all conditions. Specifications are essential for the economical purchase and supply of materials. Specifications offer many advantages: They enable the manufacturers to produce their products at the lowest cost and place them in position to regulate their purchases of raw material and systematize their organizations so as to greatly reduce the costs and furnish better and more uniform material. They enable the supply department to arrange for its source of supply in advance and obtain it regularly. It is the only fair way to purchase materials, as it places all manufacturers on an equal basis.

Specifications, to be useful, must be prepared on the basis of service performed. Our chief engineers, mechanical engineers and engineers of permanent way have an opportunity to procure very valuable service records which should be

*From a paper read at the March meeting of the Southern and Southwestern Railway Club.

greatest service to the purchasing officer in arranging for materials.

Inspection is of fundamental importance, and should be thorough and complete. Material purchased to specifications and drawings should be inspected by the mechanical engineer or engineer of tests, and a certificate issued before it is accepted. Other material can be given a practical inspection by the section storekeeper who receives it. These men must be practical men and thoroughly informed regarding the materials for which they are responsible. Their knowledge of the purpose for which the material was ordered, and the purpose for which it is used, enables them to make a practical and useful inspection at the time they check it for quantity.

The manufacturing and repair departments of our railroads should be required to give as good service as any outside industry, and should be held responsible for regular and prompt deliveries. Proper regulation and supervision of this branch of the service will give great relief to the supply department and overcome many of the present complaints. This is particularly true of repair work, which is generally not given proper consideration. The manufacturing and repair departments on our railroads should be operated for the benefit of the railroad as a whole, and not for a particular department.

The maintaining of standards is of the greatest importance. Standards should not be so rigid as to destroy their usefulness, but they should not be changed until the benefits can be shown to fully offset all of the expenditures incidental to the change. A standing committee on standards, consisting of the chief maintenance, construction and supply officers, to which should be referred all recommendations for change in standards, will be found of great assistance and of practical value. The chief supply officer is conversant with manufacturers' standards, markets and other matters which would be of use to the committee. In addition to passing on standards, this committee could direct the preparation of specifications, arrange for the use of surplus and obsolete material, either for application to the company's requirements or by exchange agreements with the manufacturers.

All matters referred to in this paper apply equally to the maintenance of way as well as the maintenance of equipment department. There is a disposition on some railways for the maintenance of way department to consider its operations such that it should handle its own material, while the maintenance of equipment department, for some reason, is inclined to believe it should be the custodian of the stores.

In conclusion, from a broad viewpoint, the relations which should exist between these departments is one of useful, intelligent co-ordination. It may be truly said that the best organization is the one that requires each department to thoroughly understand its responsibilities and perform its duties, and I am firmly of the opinion that the relation between the mechanical, purchasing and stores departments on our railroads will be best improved and more efficiently administered by having each of these departments carry out every day the details of their organization in a careful and thorough manner, supervised by broad and experienced officers. The truest co-operation is that which comes from respect.

DESIGN OF STEAM PIPING.—Correctly designed steam lines skillfully erected are no more likely to fail and interrupt the service than other features, not duplicated. It is a matter of common experience that the hydraulic piping in a plant causes less trouble than the low-pressure house-service piping, because of the difference in installation. The same is applicable to steam piping.—*Power.*

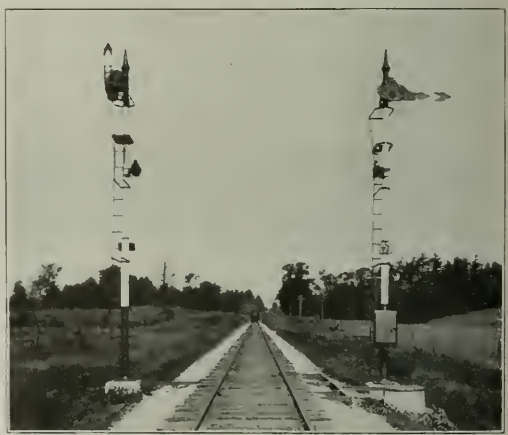
TORONTO, HAMILTON & BUFFALO

During the summer of 1911 the Toronto, Hamilton & Buffalo began its first automatic block signal installation on a short stretch of track, nine miles long, from Kinnear, Ont., to Vinemount. In 1913 this signaling was extended from Vinemount eastward to Welland, a distance of 26 miles, and in 1914 signals were installed on the west end from Hamilton to Brantford, a distance of 25 miles. There remains approximately 16 miles of single track between Brantford and Waterford which is not equipped with automatic block signals.

As shown in the accompanying map, the T., H. & B. forms a connection between the New York Central Lines on the south and the Canadian Pacific on the north. The traffic is heavy, the average being 32 trains a day, and the maximum 52 trains a day, as follows:

	Average.	Maximum.
Freight westward	6	10
Passenger westward	10	16
Freight eastward	6	10
Passenger eastward	10	16
Total	32	52

Trains were formerly operated by the telegraph block system in connection with train-order boards, and in some cases by



Double Signal Location Between Cainsville and Jerseyville

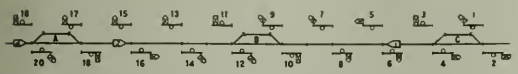
standard semaphore train-order signals. Trains following a passenger train were held at train-order stations until the passenger train was clear of the block, and a time interval of five minutes was maintained at train-order stations between following freight trains. Train orders and instructions regarding train movements are transmitted by telephone, and there is a telephone at each passing siding so that trainmen can communicate direct with the despatcher when occasion requires.

The system of signaling is the General Railway Signal Company's absolute permissive block, in which the block for opposing trains is from siding to siding, and for following trains from signal to signal as in double-track signaling. Signals governing movements from passing sidings into adjoining blocks are in all cases absolute, and, when in the stop position, must not be passed, as the block may be occupied by an opposing train. Signals governing trains approaching the siding are permissive, and, when in the stop position, may be passed after a stop has been made in accordance with the rules. Intermediate signals are permissive. Ordinarily there are two or three pairs of intermediate signals between passing sidings, but in some cases there is only one pair, in which case the intermediate signals are staggered in order to provide an adequate margin of safety if a train

should disregard an absolute stop indication and enter a block occupied by an opposing train.

The diagram herewith shows opposing trains 1 and 2 approaching a meeting point at siding B, and illustrates one of the important features of this system, the double distant or caution indication, signals 7 and 9, and signals 12 and 14, which affords maximum safety at meeting points, and insures proper signal indications. Owing to the arrangement of the control circuits it would be practically impossible for train 1 to pass signal 7 at clear and then find signal 9 at stop, or for train 2 to pass signal 14 at clear and then find signal 12 at stop. Absolute signals 10 and 11 protect against opposing trains.

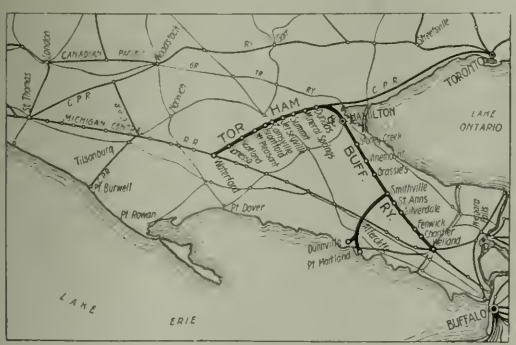
Intermediate switches are, in most cases, equipped with push-button indicators of the semaphore type and normally indicate that the block is not clear. Before opening the main line switch, trainmen are required by rule to press the push button; if con-



A. P. B. Signal System on T. H. & B. Showing Two Trains Approaching a Meeting Point

ditions are such that it would be safe to enter the main track, the indicator blade operates to the vertical position and indicates that the block is clear. If the block is not clear, the indicator blade remains in the normal position. This arrangement of de-energized switch indicators reduces to a minimum the chance of false clear indications. The push button operates two contacts which make and break both sides of the energizing circuit. The resistance ot the indicators is 690 ohms. Main line switches are equipped with model 5 switch-circuit controllers through which, in some cases, the control circuits are broken, and, in other cases, the track circuits are shunted.

Absolute signals are distinguished by a square-end red blade and by a red marker light below and in the same vertical plane as the active light. Permissive signals are distinguished by a pointed-end red blade and by a red marker light below and to



T. H. & B. Single Track Line Recently Equipped with Automatic Block Signals

the left of the active light. The roundels are R. S. A. standard, the colors being red for stop, yellow for caution and green for clear. The automatic signals are numbered according to their mile-post locations. The top and bottom parts of the signal masts and fittings are painted black, and the intermediate part white, making a conspicuous signal which stands out clearly against the usual backgrounds. Semaphore lamps are R. S. A. standard and are equipped with long-time oil burners.

The railway company furnished and installed in place insulated joints, insulated switch rods and connections and line-wire supports, and the General Railway Signal Company manufactured and installed the signals and signal appliances. R. L. Latham, chief engineer of the Toronto, Hamilton & Buffalo, had general charge of the installation, which was performed under the immediate supervision of A. A. Hurst, supervisor of signals.

Suitable rules governing the use of the automatic signals were adopted by the railway officers, and were printed in the back of the employees' time table with the operating rules. About the time the signals were ready for service, the railway officers held several meetings for instruction of the trainmen at Hamilton, the division headquarters, at which the signal aspects and indications were elucidated and discussed, as were also the rules governing their use. At these meetings lantern slides of the signal aspects and indications were thrown on a screen to illustrate the explanations, and a model 2-A signal mounted on a short mast, an indicator, a switch-circuit controller and other signaling appliances were operated as if under service conditions to afford a practical demonstration of the signal system and to fix the essential features firmly in the minds of employees.

The maintenance of these signals is in charge of a signal supervisor whose force consists of two maintainers, four battery men and two lampmen, who make a daily inspection of the signals and appliances on their respective districts. Each man is provided with a velocipede car on which he carries the necessary maintenance supplies and a kit of tools. Improper operations of the signal system are reported by the maintainer by joint wire to the chief engineer, the superintendent and the signal supervisor. Copies of the report are forwarded by railroad mail to the signal supervisor with full explanation of the cause. The signal supervisor investigates each case personally and works up a record which shows the performance of the entire signal system month by month.

The signal supervisor also keeps an accurate record of all labor and material chargeable to signal maintenance, so that maintenance costs can be determined for the entire system or any part thereof. The cost of maintenance per mile per month is about $16. Ordinary maintenance supplies are carried in stock at the general storehouse situated at Hamilton, and a few emergency supplies are kept on hand at maintainers' headquarters.

The officers of the T., H. & B. are well satisfied with the results obtained by the automatic signals, summarized as follows: (1) Under proper observance of the indications, the signals provide for opposing, as well as following movements, a definite space interval which reduces the likelihood of collisions to a minimum; (2) misplaced switches, broken rails, or any breaks in the continuity of the track cause the display of a stop indication at the signal governing entrance to the block, thus greatly reducing the likelihood of derailments; (3) the signals increase the traffic capacity of the line, as one train can follow another as soon as the first train passes the signal in advance, which is accomplished in considerably less time than the prescribed time interval of the telegraph block; (4) the signals afford maximum protection at meeting and passing points, serving as a check on despatchers' orders, also as a reminder to trainmen at scheduled meeting and passing points; (5) the signals more than double the safety factor in connection with flagging, as an approaching train would, in most cases, meet a caution or stop indication before the flagman could go out far enough to insure adequate protection; (6) owing to the high degree of protection which the automatic signals afford, "19" orders may be used in many cases where "31" orders would otherwise be required.

Crude Oil.—California's crude oil production in 1914 was 103,623,695 barrels, as compared with 97,867,147 barrels in 1913.—*Power.*

Cab Signals in England.—Among the English railway companies which are known to have commenced experimenting with locomotive cab signals are the Lancashire & Yorkshire, the Great Central, and the South-Eastern & Chatham. The Great Western and North Eastern have them in regular use, and the Midland has been trying two systems for some time.

By H. R. Kurrie

President of the Chicago, Indianapolis & Louisville

Entirely apart from the question of the legal duty of the state is the question of the best interest of the state. I maintain that no state can afford to gain the reputation, among men of large means, as being one that will add burdens to already overburdened existing investments without careful inquiry disclosing conditions which will appeal to any reasonable mind as justifying the increased burden.

Now, what has happened in the state of Indiana in the last 10 years relating to railway properties? In the first place, and without fear of contradiction, I make the statement (aside from the law limiting free transportation) the state has not done one single thing which will increase the revenues of the railway companies or reduce the expenses of doing business. Everything that the state has done has been in the way of adding a burden to an already over-burdened investment. In the year 1905 the law commonly known as the "railroad commission" or "public utilities law" was passed. Without going into detail, it is sufficient to say that this law brought improved methods of doing business at a substantially increased cost. In the same year, laws were passed which authorized certain cities to require track elevation. Track elevation means a very large outlay with no increased return, and while in many cases the condition justifies the separation of grades, yet the point which I am making is that the effect of the law was to add materially to the railroad expense in the state of Indiana. In 1907 a law was passed which materially reduced the charge of railway companies for handling excess baggage. A law was also passed limiting the hours during which the employees could be kept on duty. A law, commonly known as a "full train crew law," was passed. On the heels of this law the legislature passed a law requiring railroads to equip their lines with automatic block signals. This is the best known method of spacing trains, and avoiding collisions, and it also gives warning of a broken rail, an open switch, or any other track condition which imperils the advancing train, and in every case it gives warning in ample time. It is a silent sentinel, Argus-eyed, ever watchful and unfailing. The flagman is a duplication in a most crude and inefficient way of this protection. The crowning effort of 1907 was the enactment of the two-cent fare law. This was a horizontal reduction of 33⅓ per cent in the passenger fare. The legislature passed this law without any investigation of the value of these investments or whether the return at the time enjoyed was excessive. It was a sort of climax to an avalanche of hostile legislation which was directed at this form of investment—a frenzy in which the desire to apply the lash was much more in evidence than a sense of fair dealing.

It is a common impression now that when the fare was reduced from three cents to two cents, increased travel resulted, so as not only to overcome the apparent loss, but actually to make the two-cent fare more profitable to the railroads than the three-cent fare. On the Monon this is what actually happened: In the year 1908, which was the first year of the two-cent law in Indiana, the actual cash receipts were $103,000 less than in the last year under the three-cent law, while the passengers carried one mile increased in 1908—1,200,000. In other words, this increased service was rendered for $100,000 less money. In 1909 there was an increase of 4,500,000 in passengers carried one mile, while the revenues were $83,000 less than the last year of the three-cent law. In 1910 the receipts were $17,000 more than in the last year of the three-cent law, but the passengers carried one mile were 9,500,000 in excess of the last year of the three-cent law, so that the increased business was actually transacted at an increase of only $32,000 in the revenue. In 1914 the passenger receipts amounted to $300,000 more than in the last year of the three-cent law, but there was an increase of ing which the two-cent law has been in effect the passenger miles increased 22,000,000. In the seven years immediately preceding the two-cent law; or, in other words, the last seven years of the three-cent law, the passenger miles increased 21,300,000, so that the increase in the last seven years of the three-cent fare was considerably more than the increase in the seven years of the two-cent law. These figures show to a certainty, from the business actually handled, that the increase under the two-cent law was less than the increase in the same period under the three-cent law. It was a perfectly natural increase, due to the increase in population and not to the decrease in the rate, just as there has been an increase in every line of business.

This particular action on the part of the state has been made the subject of pretty careful investigation by the Interstate Commerce Commission of late. The commission points to the fact that the rate of fare as fixed by this law and other state laws of a similar nature, is too low and that if the carriers are to be allowed to earn the return which they are entitled to earn under the Constitution of the United States, it can only be by increasing the rates for other transportation service. It is the law that the state traffic must bear its fair share of the earnings of the transportation company; that the state traffic cannot be handled at cost, or less than cost under state-made rates and the interstate traffic compelled at substantially increased rates not only to pay the cost of its transportation, but also to create enough net earnings to pay interest on the value of the whole investment. That is what is actually happening now, at least insofar as the passenger traffic is concerned, and it seems to me that this policy on the part of the state, entirely apart from the fact that it is inconsistent with its own best interest, is certain to result finally in the United States taking jurisdiction over the entire transportation service.

If the state takes advantage of its authority to fix rates to handicap the United States in its action relating to interstate rates, then the United States, in order to make its own action effective and just, in the very nature of things, must take jurisdiction of the entire subject and the right of the states will disappear. There can be no doubt in the world that the United State has authority to assume jurisdiction of the entire subject of railroad regulation. Each year we find certain invasions by the United States into the authority which has been exercised by the state through the acquiescence or inactivity of Congress.

In line with the suggestion of the Interstate Commerce Commission, the railway companies of Indiana, last fall, began to appeal to the people of the state for a repeal of the two-cent fare law. These meetings were held in practically every important city and town in the state and with the exception of three cities, resolutions were passed in favor of the repeal of the two-cent fare law and the enactment of a two and one-half cent fare law to take its place. When the legislature convened a bill was introduced for the purpose of putting in the form of a definite law the public sentiment which was expressed in these resolutions. These resolutions were submitted to the members of the legislature and were made the subject of a great deal of comment by the publications throughout the state, and almost without exception that comment was in favor of the enactment of that law, but when it came to a vote, it was perfectly clear that the law would not pass. When this situation was brought home to the railroads, having full confidence in the merits of their case, they asked the legislature to pass a law authorizing the Public Service Commission of the state to inquire into the question of whether the rate of two cents was fair and if a greater rate was required to fix such rate. The legislature refused to entertain this proposition. The fact is that those who were charged with the responsibility of making this public opinion in the form of a law considered more the political future than the merits of the proposition. Investments can, through the slow but certain process of litigation, secure definite relief from the existing law, but the people of the state are interested in its industrial development; they are inter-

*From an address before the student body of the University of Indiana, at Bloomington, Ind., on May 12, 1915.

means that capital invested in the state will be fairly dealt with. In this case the largest single investment in the state was refused an opportunity to show that it was being unfairly dealt with. When you get down to the practical question of men investing their means in the state in the future, you can appreciate that men to whom this action has been brought home will withhold investments in this state.

The thing that is most important of all, in dealing with capital, and especially foreign capital, is to invite confidence, and that certainly cannot be done by imposing upon capital which is already here a burden the unfairness of which has been conceded by local action in practically every community in the state.

It seemed inconceivable when the state is so much interested in having men feel that they can come with confidence and permanently invest their money in this state, that the state would say to the owners of these properties, which represent the largest single investment in the state, that only two cents per mile will be allowed for passenger travel and that the question of whether that is or is not sufficient will not be open for investigation. The state cannot afford in its own interest to continue any such attitude.

In 1909 the legislature passed a law requiring electric headlights on locomotives. In 1911 it passed laws increasing the liabilities for loss of freight and for injuries to persons; also, a law providing for separation of grades in smaller cities. In 1913 the law with reference to separation of grades was further amended so that now practically any city having a population of more than 19,000 can have grade separation. Numerous other laws were passed adding less important burdens to railroad operation in 1914.

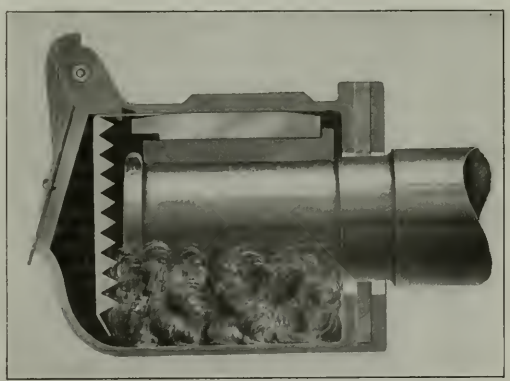
No one can successfully maintain that the Indiana railroads are earning what they should. Take the Monon—and I am giving figures which are taken from public record: In 1914 the cash investment in the Monon was $8,852,454 more than it was in the year 1900. In the year 1914, after the actual operating expenses had been paid, the amount which was left to take care of interest on bonded debt and to pay an income to the stockholders was less than the amount which remained in 1900. In other words, on this added investment of nearly $9,000,000, which had been made in the 14-year period, not one cent was earned for those who had made the investment. In the same period the state levied as its share of this return in 1900, $184,000; in 1914, $333,000. The increase in the amount of the income which the state has taken was 80.47 per cent. The increase in the property investment was 29.8 per cent.. The actual income to the owners of the property decreased 2 per cent.

It is interesting, as we observe now the avalanche of assaults which the state has been making on these investments, to hark back to the fact that in the beginning the state regarded the construction of railways so important to its internal development that it began the construction of what is now some of the important lines of railroad in the state. The first railway construction in Indiana was known as the Lawrenceburg & Indianapolis line, which was one and one-quarter miles long and opened in 1834. Its rolling stock consisted of one car which cost $222.12½, and a horse of unknown value. On the first day the total operating expenses were $12.62. The net receipts were $60. At sundown the first day a meeting of the board of directors was held and the amount remaining after paying the day's operating expenses was paid out to the owners of the property as a dividend, much to their satisfaction. That railroad was owned by citizens of the state. The first serious effort toward railroad construction in the state was the Madison & Indianapolis road. This was one of the lines the construction of which was undertaken by the state. This railroad was opened in 1838 and it had 18 miles of track completed by the month of April, 1839, and 10 miles were added later. The cost to the state of the construction of this 28 miles was $1,624,603, or $56,235 per mile. The locomotive for this particular railroad was on shipboard, taken down the Delaware bay into the Atlantic Ocean and was to be carried by the way of the Gulf of Mexico, Mississippi and Ohio rivers to Madison, Ind. It never arrived. The ship was sunk, and the first locomotive constructed for an Indiana line is still resting somewhere on the bottom of the sea. After the state had constructed this 28 miles at this excessive cost, it was very glad to relinquish its interest in the property to private interests, willing to complete the construction of the road.

I speak of this to show that there has been a decided reversal of state policy. This is an exceedingly important public question. If it is fairly dealt with, notwithstanding what has occurred in the past 10 years, I believe that it will be possible for our railroad credit to be restored, and fresh capital secured for our large industrial development. I do not believe that the citizens of this state can expect to have a further immigration of foreign capital unless they together join in an effort to bring about a distinct reversal of the state policy of the last 10 years, and assure fair treatment for the large investments which we find here now.

JOURNAL BOX PACKING GUARD

A packing guard for use in journal boxes which holds the packing under the journal and prevents it from working out between the lid and the box has been placed on the market by the Nuway Packing Guard Company, Tuscaloosa, Ala. It is formed from No. 14 gage steel with teeth extending back from the sides and bottom. A tongue extends back from the top of the guard, by means of which it is secured in the journal box. In applying the guard the weight of the car is raised from the journal and the box packed, the packing being pushed well back against the dustguard and the box filled only to the end of the journal. The guard is then placed in the box with the tongue, which is formed to fit the lugs at the top of the box, between the box and the wedge. When in position the weight of the car is let down on the journal, thus securely holding the guard in place. A small quantity of packing is then pushed around the sides of the guard. Holes are provided in the packing guard through which oil may be applied should the packing become dry. The guard is manufactured in different sizes and to fit the various types of journal boxes.



Packing Guard for Journal Boxes

ROLLING STOCK ON THE IRISH RAILWAYS.—The railways of Ireland on December 31, 1912, owned 901 locomotives, 3,302 passenger train cars, 22,151 freight cars and 1,030 other cars.

General News Department

The Clearing yard, near the southwest city limits of Chicago, was placed in service for the traffic of the Belt Railway only, on June 1. Interchange traffic between the 12 roads owning the Belt Railway will not be handled through this yard for the present.

A new wage schedule carrying higher pay for certain classes of trainmen on the Northern Pacific and a number of changes in working conditions has just been agreed upon by representatives of the company and of the employees, after 18 months of negotiation.

Near Lake City, Minn., on June 6, seven persons were killed, including four passengers, and several more were injured, when a passenger train on the Chicago, Milwaukee & St. Paul went through a bridge which had been weakened by a washout. Three of the cars fell into the Mississippi river.

The "Sunset-Central Boys' Educational Association" has been formed by officers of the Sunset Central Lines at Houston, Tex., for the purpose of organizing classes of office boys and messengers to study penmanship, arithmetic, typewriting and shorthand. Similar educational advantages are to be afforded to the young women employed by the company, of whom there are in Houston about 250.

The New York State Public Service Commission, Second district, announces that the statement published last week (page 1176) concerning the law to regulate the "jitney bus" had to do only with the second district. The law does not exempt the city of New York from its requirements. Under its provisions bus lines carrying passengers for fifteen cents or less in any city of the state must obtain certificates of public convenience and necessity.

In the Federal Court at Charleston, W. Va., June 4, three railroads, the Baltimore & Ohio, the Coal & Coke, and the Lewisburg & Ronceverte (electric) were fined for violation of the federal laws; the Baltimore & Ohio $1,000 for failure to observe the twenty-eight hour law relative to feeding livestock; the Coal & Coke $3,500, for violating the sixteen-hour law for employees, and the electric road, which is only four miles long, for not conforming to the federal rules regarding fittings on cars.

Among the employees of the Pennsylvania Railroad retired on pension May 1 last was William Watson, staybolt inspector in the shops at Altoona, who had been in the service of the company 34 years and for over 20 years was inspector of flues in locomotives. A portrait of Mr. Watson is given in the bulletin issued by the company, and it is calculated that during his twenty years of service in this occupation he had crawled through the fire doors of 20,000 locomotives, and had inspected 6,440,000 flues.

The Baltimore & Ohio reports that for the month of May the Shenandoah district of the road, embracing the line through the valley of Virginia from Harper's Ferry to Lexington, made a perfect record for punctuality of passenger trains; 300 passenger trains having arrived at their terminals on time. For several months the record for punctuality of trains on this road has been watched with special interest. Rivalry has been displayed by the employees to such extent that an act of negligence resulting in a delay is regarded as an offense against all of the co-workers of the district.

Railroads' Position on Mail Pay Question

The railway presidents who, to consider the question of mail pay, met in New York, following the May meeting of the American Railway Association, adopted unanimously the following resolutions:

"Resolved, that the position of the Committee on Railway Mail Pay has the approval of the representatives of the railroads present at this meeting, and that the railways of the United States continue to give their united support to the committee in its efforts to secure to the railways adequate compensation for transporting the mails.

"Resolved, further, that we believe the so-called space basis as proposed in the last Congress is wrong, and susceptible in practice of grave injustice to the railways in denying payment for services rendered.

"Resolved, further, that we endorse the views of the committee on the superiority of the existing weight basis, amended by annual weighing, payment for apartment cars and payment for or release from side or terminal messenger service.

"Resolved, further, that the Committee on Railway Mail Pay is urged to continue its work on this basis, and to ask Congress to enact a law that will give the Interstate Commerce Commission the same jurisdiction over the mail traffic that it now has over all other traffic of the railroads."

The chairman of the meeting was Howard Elliott, president of the New York, New Haven & Hartford. All of the proposals of the roads' committee were fully discussed, and, as stated in the resolutions, were fully endorsed; and the meeting represented fully 90 per cent of the railway mileage of the country. Of the half dozen prominent companies which do not appear in the list of roads represented, all are known to hold the same views as those embodied in the resolutions.

THE GREATEST ASSET OF THE PENNSYLVANIA RAILROAD*

THE management of the Pennsylvania Railroad System believes that the Company's greatest asset is the loyalty and efficiency of its men.

* * *

In normal times the Pennsylvania System has 250,000 employees. The Company pays the highest prevailing rate of wages received by railroad employees in the territory in which it operates. The policy of the Pennsylvania System is to insure that all its relations with its men shall be characterized by fairness and friendliness.

* * *

The Pennsylvania System early realized the importance of training its own officers. This, of course, carries with it the training of its own men. To make the service attractive it is essential that employment, as far as possible, be permanent.

* * *

The man of today is the officer of tomorrow. The organization is in substantial respects a civil service.

* * *

This Company is endeavoring continually to develop its organization, to assure itself of the loyalty of its men, and to build up an efficient and economical transportation enterprise.

*A placard, 12 in. x 20 in., posted in Pennsylvania Railroad stations.

Michigan Legislation

Senate bill No. 234, providing for the inspection of boilers, was not passed by the lower house of the Michigan legislature, and our account of the bills which became law in that state this year, published May 28, page 1124, is erroneous in that particular.

Washington Railroads, 5166 Miles

The Public Service Commission of the state of Washington reports that 400 miles of new main line have been added by Washington railroads during the past year, showing an aggregate of 5,165 miles as of January 1, 1915, excluding logging roads and electric lines.

Including second track and sidings, the railroads now show 7,235 miles of track. The principal increases during the past

Interbay line built by the Great Northern; 103 miles by the Spokane "air line," 43½ miles by the Northern Pacific (the new Point Defiance line) and 13½ miles added to the North Yakima & Valley; 39 miles on the Chicago, Milwaukee & St. Paul; Willapa Harbor line and 29½ miles of the Seattle, Port Angeles & Western.

Following is the detailed statement mileage shown by the railroads in their 1914 and 1915 reports:

Railroad	1914	1915
Bellingham & Northern	49.5	49.6
Chicago, Milwaukee & St. Paul	*637.4	580.4
Colorado & Puget Sound	55.2	55.7
Great Northern	855.5	1,005.0
Northern Pacific	1,767.9	†1,863.2
North Yakima & Valley	†39.0	.....
Oregon Trunk	.7	.7
O. W. R. & N.	787.0	898.0
P. S. & Willapa Harbor	9.5	48.6
Spokane & B. C.	36.3	36.3
Spokane International	17.7	17.7
S. P. & S.	409.6	409.6
Tacoma Eastern	92.1	92.1
Washington, Idaho & Montana	3.3	3.3
Waterville Railway	5.1	5.1
Idaho & W. N.	.....	*70.8
Seattle, P. A. & W.	.....	29.5
Total miles	4,765.8	5.165.6

*The Idaho & Washington Northern is included with the C. M. & St. P. for 1914, and the (†) North Yakima & Valley is included with the Northern Pacific for 1915.

Report on Oakwood (Wis.) Derailment

The Interstate Commerce Commission has issued a report, dated April 28, on the derailment of a passenger train on the Chicago, Milwaukee & St. Paul at Oakwood, Wis., January 30, when 21 passengers were injured. The train was derailed at a crossover when running about 55 miles an hour, and Inspector H. W. Belnap concludes that the cause of the derailment was the breaking of a steel tired wheel of the baggage car, the middle wheel on the right-hand side of a six-wheel truck, the forward truck of this car. The wheel was of a built-up type, cast iron hub or spider, two rolled steel cheek plates and a rolled steel tire. The parts were held together by 39 bolts. The tire broke into four pieces and it was found that ruptures through the bolt holes had started, in each case, at the inner diameter of the tire, thence passing through the metal in an outward direction to the surface of the tire and through the flange. Considerable wear was found at the bearing between the plate and the tire. The mate of the broken wheel was taken apart and in it were found incipient cracks at each of the twelve bolt holes in the tire; and similar incipient cracks were found in other wheels examined. None of these cracks were visible until the outer circle of bolts was taken out or one of the plates removed. The broken wheel had not been overloaded. It had run 276,396 miles, having been changed from one car to another a half dozen times. The study of the broken wheel, and of others of the same type, was made by J. E. Howard, engineer. He concludes that tires of this type are sometimes loose, while yet the looseness is not detected by the ordinary inspections. His principal recommendation is for better inspection of the metal at the bolt holes, which means, of course, that wheels would have to be taken apart, as the cracks above referred to cannot be seen in an ordinary inspection.

Legislation Affecting the New Haven Road

[From a statement by Howard Elliott, president of the New York, New Haven & Hartford, issued on the final adjournment of the Massachusetts legislature.]

During the past year a large amount of work has been done by the officers of the company, the public service commissions, the legislatures and the state executives in studying the complicated corporate and financial relations of the New Haven system and the differences in the laws of Connecticut, Massachusetts and Rhode Island. As the result of this study and of numerous conferences between the public service commissioners and the officers of the company, various bills were drafted, which have been passed as follows:

In Rhode Island (March 28): A general law curing certain minor defects in the corporate stock status of the company and making legal under suitable restrictions the issue of preferred stock and of mortgage bonds.

In Connecticut (March 19): A law permitting the company for short-time loans.

A general law (May 19) reducing the powers of the New Haven company and providing for increased supervision by the public utilities commission of Connecticut; providing that at least two-thirds of the directors of the company shall live in Connecticut, Massachusetts and Rhode Island, and permitting, under suitable restrictions, the issue of preferred stock and of mortgage bonds.

In Massachusetts (May 31): A law prohibiting the issue of fractional shares of stock, making the practice in Massachusetts similar to that of Connecticut and Rhode Island.

A law (May 31) permitting the issue of preferred stock.

A law (June 4) removing the obstacles and defining the limits to the issues of mortgage bonds and evidences of indebtedness and permitting this kind of financing in accordance with modern business requirements.

A law (June 4) validating the New Haven securities as of May 15, 1915, and providing for an investigation by the public service commission of the capital expenditures, investments and contingent liabilities of the New Haven company and their validity under the laws of Massachusetts and under the laws of any other state in which the company is organized; their report to be made not later than February 1, 1916, at an expense not exceeding $10,000, to be paid by the New Haven company. Also, for an investigation by the public service commission, the port directors and the attorney-general, of the rates to and from the Commonwealth pier in Boston, under the contract of July 1, 1912, between the state and the New Haven and Boston & Maine companies.

The passage of these bills gives the company the legal right to submit to its stockholders some plan for financing its present floating debt and for obtaining money for future needs if business conditions justify.

Now that these bills have been passed there is much work to be done in preparing any plan and in obtaining the necessary approval of the public service commissions of the states.

In trying to harmonize the laws of these states, there have been some differences of opinion among interested parties. . . . The public service commissioners, the members of the legislature, the executives and the company have all yielded something, with the result that the bills, while not giving all that the various parties wanted, are a long step forward in putting the New Haven in a position to re-establish its credit and to perform its duty as a common carrier.

The validation bill calls for an investigation, and the company is anxious to have that work proceed rapidly. It hopes that the public service commission can complete their report in the late autumn and it will co-operate in every way. As a result of the recent investigation of the company's affairs by the Interstate Commerce Commission, the Congress of the United States and the department of justice, there is a very large amount of material ready, which is at the disposal of the commission.

The company is ready to submit all information and facts about the Commonwealth pier contract of July 1, 1912. The rates on business controlled by the New Haven company conform to the terms of that contract. . . . The New Haven is owned very largely in New England, and with a resumption of business a restoration of confidence and credit should receive financial nourishment and support from its owners and from the public who live along its lines. The business men of New England have given greater attention than ever before to the question of railroad transportation, and have loyally supported the management in its efforts to obtain the remedial legislation.

The great interest and cordial support of the press of New England were also most helpful elements in working out the problem. In fact, if the plans of the company had not been presented in considerable detail to the public and to the business men of New England, and if those plans had not appealed to their judgment, the bills probably never would have become laws. The legislative sessions have ended with improved and more cordial relations between the company, the public, many business organizations, and the representatives of the state governments, which is a source of gratification to the company and a valuable asset for the future.

For the company I desire to express its thanks for the co-operation of all. A most important result is that the passing of these laws marks the starting out of a course of constructive

land transportation business, the success of which is so essential to New England.

Some New Jersey Railroad History

As is well known to most persons traveling by rail between New York and the west, the lines reaching the west shore of the Hudson river, opposite the city, encounter a serious obstacle in the high ridge that extends north and south for a long distance a mile or two back of the river, a mountain of rock, Bergen Hill. The tracks of the Pennsylvania Railroad—the line which was built and for years operated by the New Jersey Railroad & Transportation Company—run through a deep cut at Marion, about two miles west from the river front, known today as Shanley's cut; the Erie and the Delaware, Lackawanna & Western get through the mountain by means of tunnels, and the Central of New Jersey passes around the south end of the ridge, through Bayonne. To most of the present generation all of these routes are old institutions; but from an article in the Erie Railroad Employees' Magazine, by John S. Bell, vice-president of the Morristown & Erie Railroad, it appears that at one time or another all of the roads named, as well as the Lehigh Valley, reached the Hudson river over the Shanley's cut route. Mr. Bell says:

"I find that many railroad men never heard of the old Bergen cut, so long used by the Erie Railroad. It was through this cut, after the passenger terminal at Piermont was abandoned, that the trains of the Erie Railroad reached New York, or rather the west side of the Hudson river opposite New York. All Erie passenger trains reached the Hudson river through this cut until April, 1861. This cut was made, in the construction of the New Jersey Railroad & Transportation Company's line, in the early thirties. That road extended to New Brunswick, 31 miles; where passengers transferred to the Camden & Amboy, which took them to Trenton, whence they went to Philadelphia over the Philadelphia & Trenton. In the early days there was a transfer by horse power both in Philadelphia and in Baltimore on the route to Washington.

"Before the consolidations which we know in the present day the companies running trains through the Bergen cut were the New York & Erie (now the Erie), the Northern Railroad of New Jersey, the Morris & Essex, the Central of New Jersey, the Hackensack & New York and the New York, Susquehanna & Western. [All lines from the west, except the Central of New Jersey, have connections one with another west of the Bergen Hill.] The only one of the roads named which did not at one time or another run trains through the cut with their own locomotives was the Central of New Jersey, which delivered its cars to the New Jersey Railroad & Transportation Company at Elizabeth. The trains of the Morris & Essex, in the early fifties, were coupled to the New Jersey Railroad trains at the foot of Centre street, Newark. The Morris & Essex afterward left this line, and in 1863 made a contract with the Erie; this line was used until 1876, when the Morris & Essex began using its own tunnel to the Hoboken terminus.

"The Erie Railroad ran through the cut from 1853 until 1861, when its own tunnel was completed. The Northern of New Jersey began running through the Erie tunnel in 1869. The New York, Susquehanna & Western continued using the Pennsylvania terminus for a number of years after coming under the control of the Erie, but about three years ago began using the Erie terminus. The Lehigh Valley, which now uses the terminus of the Central of New Jersey, connecting with the line of that road a few miles out, used the Pennsylvania terminus (and the Pennsylvania tracks from Newark) from the time of the completion of its New York line, until about one year ago."

The West Shore, which is comparatively young—only about 30 years old—has its terminus at Weehawken two or three miles up the river, but it ran a few trains to the Pennsylvania terminal, through the Bergen cut, until about four years ago. The Pennsylvania itself, which now runs substantially all its through passenger trains to and from Thirty-second street, New York City, passing under both the Bergen ridge and the Hudson river by its tunnel, has left its Jersey City passenger terminal comparatively deserted, and the Bergen cut enters on another chapter of its history. But, though the Jersey City passenger terminal has lost its importance the cut continues to be the channel for two main currents of traffic, namely, freight, including much express freight, to the Hudson river terminals between Park place, Newark, and Church street, New York city, which run through the Hudson & Manhattan tunnel.

Mr. Bell estimates that when all the roads entering Jersey City ran their trains through the cut the total number of passenger trains daily, out and in, did not exceed 100. At the present time he estimates that all of the roads, including the West Shore and those that reach New York through the tunnels under the river, have a total of over 1,300 trains a day.

The Erie and some of the other roads in the early days had tracks of 6 feet gage and the tracks through the cut had three rails. The broad gage engines had smokestacks painted black, while the standard gage engines had stacks painted red. All were wood burners. On the New Jersey Railroad all trains used the left hand track; and a single short blast of the whistle meant, not to put on the brakes, but to let them off; and in those days the whistle signal meant something, for the air brake had not been invented. Before the Civil War the time required for a passenger journey from Jersey City to Washington was twelve hours, and the single fare was $10. At present the price of a roundtrip ticket is $10, and the journey, one way, is made in five hours.

Railway Telegraph Superintendents

The thirty-fourth annual meeting of the Association of Railway Telegraph Superintendents will be held at the Powers Hotel, Rochester, N. Y., June 22, 23, 24 and 25. There will be an informal assembly in the hotel on Monday evening, the 21st. Among the subjects scheduled for discussion at the business meetings are: Primary versus dry battery for transmission on telephone lines; Screened cable conductors; Censorship of railway messages; Interference from high tension power lines.

United Yardmasters' Association

The program for the convention of the United Yardmasters' Association, to be held in Seattle from June 15 to 19, inclusive, provides for business sessions on June 15, 16, 17 and 19, with various entertainment features. The program includes papers by J. J. McCullough, superintendent of the Puget Sound division of the Northern Pacific on "Rough Handling of Freight"; G. H. Hunt, freight claim agent of the Chicago Great Western on the same subject; R. M. Calkins, general traffic manager of the Chicago, Milwaukee & St. Paul on "Duties of the Yardmaster Toward the Public"; J. M. Daly, former general superintendent of transportation of the Illinois Central, on the subject of "Per Diem"; A. J. Hillman, general agent of the Chicago, Milwaukee & St. Paul, on "Yard and Terminal Work"; C. S. Price, general yardmaster of the Great Northern at Seattle, on "Rough Handling of Cars." Each paper is to be followed by general discussion.

Railway Real Estate Association

This is the name of an association which has been formed by officers of a number of prominent roads and the purpose of which is perhaps sufficiently explained by the title, indicating the department to which these gentlemen belong.

From a statement issued by Frank C. Irvine, secretary, Pittsburgh, Pa., it appears that the association has been organized to comprise within its membership all officers, and their staffs, of the railways of America, Canada, Mexico and Cuba directly concerned in the various activities pertaining to the land of their respective corporations. Provision is made for the formation of sections, as "Tax Division," "Agricultural Division" and "Right of Way Division." The first meeting of the association is scheduled to be held in Chicago, October 13 next.

A constitution has been adopted; and, acting on the provisional organization, the following officers have been chosen: President, F. P. Crandon (C. & N. W.); first vice-president, J. D. McCubbin (B. & O.); second vice-president, B. A. McAllaster (Sou. Pac.); secretary, Frank C. Irvine (Pennsylvania Lines); treasurer, James G. Armstrong (W.-P. T.).

The following roads are represented in the roll of charter members of the association: Algoma Central & Hudson Bay; Baltimore & Ohio; Bessemer & Lake Erie; Buffalo Rochester & Pittsburgh; Canadian Pacific; Chesapeake & Ohio; Chicago, Burlington & Quincy; Chicago Great Western; Chicago, Rock Island & Pacific; Chicago & North Western; Cincinnati, Ham-

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF APRIL, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. wit last year
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans-portation.	Miscel-laneous.	General.	Total.			
Alabama & Vicksburg	143	$78,164	$26,030	$114,853	$17,513	$29,202	$4,146	$43,472	$1,938	$5,506	$101,776	$13,077	$8,750	$4,327	—$9,72
Atchison, Topeka & Santa Fe	8,514	5,447,109	2,011,851	8,130,063	1,117,474	1,361,085	203,058	2,272,119	.....	156,093	5,101,535	3,028,529	397,180	2,630,270	—161,37
Baltimore & Ohio Chicago Terminal	79	.....	488	114,167	9,532	15,261	749	47,498	1,302	4,323	77,372	36,795	17,653	18,841	22,01
Belt Ry. Co. of Chicago	24	.....	.....	233,269	15,904	23,313	700	79,384	.....	5,833	125,134	108,135	13,304	94,830	3,56
Bingham & Garfield	27	128,202	3,063	131,666	13,709	16,290	1,018	17,835	57	1,619	50,527	81,139	6,688	74,451	—17,43
Birmingham Southern	43	33,727	592	50,597	7,228	10,852	883	20,910	.....	3,197	43,069	7,528	2,063	5,464	—15,42
Boston & Maine	2,302	2,294,800	1,159,559	3,815,972	632,613	501,662	37,326	1,630,077	14,923	85,553	2,902,153	913,818	163,016	750,802	110,63
Buffalo & Susquehanna R. R. Corporation	253	104,409	6,009	113,665	18,973	41,188	967	34,323	.....	5,558	101,009	12,657	2,600	10,057	46,35
Buffalo & Susquehanna Railway	91	12,529	5,378	20,078	4,297	6,099	413	11,033	7	2,294	24,143	—4,065	1,600	—5,665	2,64
Buffalo, Rochester & Pittsburgh	586	589,770	82,307	698,729	94,840	152,529	11,037	247,956	923	21,194	528,479	170,250	20,000	149,970	210,68
Chesapeake & Ohio Lines	2,372	2,885,196	431,651	3,525,308	423,792	712,586	51,039	1,078,693	17,727	72,086	2,353,685	1,171,623	115,009	1,056,537	251,47
Chicago & Alton	1,033	685,314	281,295	1,063,634	156,745	339,466	36,093	409,557	9,137	31,771	982,768	80,866	43,021	37,745	—3,54
Chicago & North Western	8,108	3,757,825	1,480,651	5,884,995	643,360	1,000,722	100,517	2,266,459	49,910	148,090	4,206,767	1,678,228	375,000	1,302,685	169,11
Chicago Great Western	1,427	698,197	225,637	1,021,046	180,570	217,955	46,346	399,045	7,883	26,832	878,242	142,804	47,150	95,571	—66,63
Chicago, Indianapolis & Louisville	618	373,128	141,214	559,689	67,601	68,553	22,151	195,380	Cr. —1	16,355	370,026	189,663	27,279	162,314	92,68
Chicago, Milwaukee & St. Paul	10,071	4,892,937	1,261,011	6,877,038	775,748	1,174,022	130,644	2,792,665	51,474	153,262	4,935,563	1,941,475	385,438	1,554,303	—230,37
Chicago, Peoria & St. Louis	255	94,925	18,281	121,407	22,596	26,775	5,845	52,905	.....	5,374	113,496	7,912	5,700	2,212	16,78
Chicago, Rock Island & Gulf	477	137,087	42,703	199,111	27,774	36,274	9,537	86,887	1,925	7,928	170,326	28,785	8,094	20,656	—14,93
Chicago, St. Paul, Minneapolis & Omaha	1,753	816,662	356,207	1,286,660	85,971	203,194	28,503	496,174	14,084	36,839	864,290	422,370	76,102	346,045	65,69
Cincinnati, Hamilton & Dayton	1,003	559,055	104,735	739,773	146,764	183,546	18,209	325,074	3,039	40,599	717,039	22,734	34,616	—11,890	—5,34
Cincinnati, New Orleans & Texas Pacific	337	641,068	112,818	804,842	72,057	166,423	21,423	249,603	7,300	18,701	534,363	270,479	31,000	239,435	29,13
Cleveland, Cincinnati, Chic. & St. Louis	2,381	1,931,302	596,829	2,786,677	379,378	400,093	68,299	1,139,311	23,106	70,728	2,076,963	709,714	128,000	580,784	605,47
Colorado & Southern	1,089	423,521	102,749	575,819	78,226	148,998	8,935	185,927	3,575	21,316	446,976	128,843	35,000	93,834	—7,62
Cumberland Valley	164	186,654	49,194	246,375	47,896	29,464	4,308	74,688	867	8,690	165,912	80,463	5,794	74,668	—41,56
Delaware & Hudson Co.—R. R. Dept.	881	1,730,982	190,939	2,056,513	134,780	270,367	25,179	647,646	10,588	67,099	1,155,668	900,845	58,500	842,345	—148,96
Delaware, Lackawanna & Western	959	2,778,394	616,719	3,757,256	392,129	599,129	75,145	1,128,831	27,731	72,683	2,259,982	1,497,273	186,600	1,310,516	279,47
Detroit & Mackinac	490	63,602	22,552	91,254	11,979	17,654	1,909	31,435	.....	2,900	65,877	25,377	7,616	17,761	—12,04
Duluth, Missabe & Northern	369	256,232	25,919	287,315	52,812	69,447	2,004	70,487	1,682	9,061	205,492	81,823	14,407	67,416	284,39
El Paso & Southwestern Co.	1,027	504,567	112,636	661,468	94,739	88,115	19,110	169,414	6,211	23,814	401,402	260,066	34,889	225,177	—106,19
Gulf & Ship Island	308	113,426	22,002	145,516	18,118	30,629	2,997	34,640	308	6,502	93,194	52,321	7,566	44,727	18,36
Illinois Central	4,767	3,323,410	946,576	4,655,279	777,871	1,111,231	101,995	1,735,465	28,443	125,953	3,862,177	793,103	254,400	535,452	75,39
Indiana Harbor Belt	110	.....	.....	274,869	36,784	27,126	2,778	107,330	.....	7,375	181,394	93,475	8,080	85,364	34,26
International & Great Northern	1,159	450,653	108,593	610,757	118,586	95,858	20,622	307,659	2,575	29,889	575,189	35,568	40,000	—5,042	—33,64
Kanawha & Michigan	177	190,601	25,791	223,256	28,199	45,953	3,098	64,013	3	5,686	146,952	76,303	11,360	64,942	—1,92
Lehigh & New England	296	248,377	1,085	260,425	37,864	34,174	2,722	59,530	.....	5,647	139,937	120,487	5,104	115,383	9,72
Lehigh Valley	1,443	3,278,619	280,235	3,782,270	307,755	641,676	88,405	1,268,737	9,987	73,248	2,388,818	1,393,452	142,500	1,250,470	310,13
Long Island	398	360,289	533,255	1,013,241	136,796	123,974	10,005	432,716	6,658	30,800	740,949	272,292	78,014	193,761	9,79
Maine Central	1,219	566,711	232,352	858,788	116,719	134,313	10,701	314,476	2,381	28,774	607,363	251,425	53,087	198,315	5,79
Missouri, Oklahoma & Gulf	334	62,787	14,789	80,895	16,677	40,745	4,421	39,902	110	13,257	115,112	—34,217	5,128	—39,361	—19,48
Mobile & Ohio	1,122	776,657	86,318	914,628	83,107	165,732	32,885	332,111	2,410	29,372	645,618	269,010	33,953	234,913	54,88
Nashville, Chattanooga & St. Louis	1,231	658,270	186,643	928,931	175,410	179,427	46,706	349,977	7,315	31,168	789,941	138,990	26,000	112,715	—82,74
New Orleans & North Eastern	204	224,800	40,242	291,398	29,967	67,527	10,961	96,978	5,581	11,423	222,437	68,961	15,000	53,961	2,68
New Orleans Great Northern	283	104,676	18,726	134,745	18,594	22,105	1,502	39,706	137	5,829	87,873	46,872	3,020	43,851	—15,32
New Orleans, Mobile & Chicago	403	125,050	19,393	152,775	23,293	21,052	4,481	52,437	Cr. —4	7,219	108,478	44,297	6,401	37,801	—1,23
New Orleans, Texas & Mexico	286	77,263	23,824	108,743	19,629	23,937	2,363	50,999	.....	10,571	107,499	1,244	1,502	—317	15,98
New York, Chicago & St. Louis	568	819,022	95,065	950,894	95,248	192,924	51,014	441,532	5,072	21,415	807,205	143,689	40,000	103,688	57,76
New York, Ontario & Western	568	554,657	83,868	749,971	94,391	126,975	8,360	287,633	.....	15,942	533,302	216,670	20,000	196,653	49,34
Norfolk Southern	900	256,411	68,400	344,087	45,195	50,167	7,039	141,757	78	18,633	262,869	81,218	9,976	71,238	81,31
Northern Pacific	6,498	3,297,136	955,811	4,682,890	744,862	499,152	106,488	1,406,522	69,470	102,312	2,874,857	1,808,033	377,700	1,429,230	59,90
Pennsylvania *Company*	1,757	3,101,533	741,443	4,226,248	631,235	835,474	76,163	1,552,907	32,074	111,607	3,239,461	986,787	257,143	729,413	210,76
Pennsylvania *Railroad*	4,512	10,828,130	2,998,655	15,267,950	1,956,845	3,103,935	185,981	5,367,579	210,156	448,073	11,272,570	3,995,379	637,618	3,353,529	120,56
Philadelphia, Baltimore & Washington	717	848,021	708,545	1,743,884	252,116	330,080	25,399	696,286	25	51,008	1,354,914	388,971	53,883	335,072	—2,84
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	2,228,209	592,013	3,162,308	462,826	649,645	63,350	1,149,024	24,671	86,525	2,436,041	726,267	154,571	571,103	220,84
St. Joseph & Grand Island	258	89,137	22,101	119,806	24,969	24,722	4,363	43,339	.....	4,831	102,224	17,582	7,620	9,852	25,97
St. Louis & San Francisco	4,749	2,343,813	685,489	3,241,533	503,298	491,248	68,293	1,080,990	.....	90,844	2,217,966	1,023,567	100,860	921,115	577,20
St. Louis, Brownsville & Mexico	548	141,056	51,925	208,134	32,028	18,458	5,735	67,918	.....	10,795	134,778	73,356	6,500	66,788	—10,52
San Pedro, Los Angeles & Salt Lake	1,132	550,206	217,662	863,979	56,428	125,876	33,848	252,533	17,103	18,234	504,021	359,957	46,031	313,863	58,99
Seaboard	3,119	1,344,485	410,830	1,971,192	188,546	279,844	59,208	674,556	10,146	51,990	1,264,289	706,903	86,046	620,403	—50,75
Southern	7,022	3,620,908	1,134,393	5,212,784	702,956	807,056	164,940	1,840,512	30,731	160,180	3,693,563	1,519,222	217,205	1,300,143	104,12
Southern Pacific	6,517	4,493,133	2,417,519	7,744,558	984,406	1,257,231	188,188	2,513,691	156,642	213,165	5,277,196	2,467,363	340,925	2,125,302	—379,22
Union R. R. of Baltimore	9	111,256	23,312	135,933	15,154	.....	.....	4,583	.....	2,558	22,295	113,637	5,825	107,812	4,30
Union R. R. of Pennsylvania	31	.....	.....	243,009	46,217	85,315	197	122,642	.....	4,275	258,645	—14,736	5,301	—20,037	32,86
Vicksburg, Shreveport & Pacific	171	69,222	29,850	112,072	19,106	27,935	3,578	41,294	1,826	5,093	98,832	13,240	8,100	5,140	—24,73
West Jersey & Seashore	356	176,247	267,244	487,300	98,450	82,383	11,219	215,332	2,028	14,814	424,226	63,074	28,640	34,403	—61,56
Western Maryland	661	688,965	68,246	793,259	102,593	137,208	19,805	250,535	5,202	18,178	534,347	258,912	26,500	232,412	206,68
Wheeling & Lake Erie	459	340,119	36,223	414,802	51,441	84,134	10,914	175,463	1,117	13,041	336,110	78,693	31,207	47,485	7,55
Yazoo & Mississippi Valley	1,382	742,316	154,332	951,116	159,032	134,542	17,393	338,542	1,417	25,498	673,917	277,199	51,000	226,118	127,17

Delaware & Hudson; Duluth & Iron Range; Erie; Georgia Southern & Florida; Grand Rapids & Indiana; Hocking Valley; Lake Erie & Western; Long Island; Louisville & Nashville; Michigan Central; Mobile & Ohio; Nashville, Chattanooga & St. Louis; New York Central; New York Westchester & Boston; Oregon Short Line; Pennsylvania Lines West of Pittsburgh; Pere Marquette; Pittsburg, Shawmut & Northern; Pittsburgh & Lake Erie; San Pedro, Los Angeles & Salt Lake; Southern; Southern Pacific; Toledo; St. Louis & Western; Toledo & Ohio Central; Wabash-Pittsburgh Terminal; West Side Belt; Wheeling & Lake Erie; Vandalia.

The enrollment fee is $5 and annual membership dues $3.

MEETINGS AND CONVENTIONS

The following list gives the names of secretories, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday of each month, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlauta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Traffic News

The Southern Pacific announces that it has booked an average of one special train for every other day between now and the first of October to the Panama-Pacific Exposition at San Francisco.

The steamboat Steel City, which has just been put in service on the Illinois river and Mississippi river by the Chicago, St. Louis & Gulf Transportation Company, reached New Orleans on June 6, on its first trip, which is to be the beginning of a regular service.

The New York State Public Service Commission, Second district, has authorized the Long Island Railroad to equalize commutation ticket rates on the basis of four mills a mile; which will cause a small increase in monthly tickets between New York and points east of Bayport and Holtsville.

The lower house of the Illinois legislature has passed, on second reading, an amendment to the senate bill permitting the exchange of newspaper advertising for railroad transportation and to permit the issuance of passes to members of the general assembly. The bill was advanced to a third reading.

The midnight passenger trains between St. Louis and Kansas City, which were discontinued by several roads in January, 1914, were restored on June 1, by the Missouri Pacific and the Wabash, and on June 6, by the Chicago & Alton and the Chicago, Burlington & Quincy. Trains leave each city shortly before midnight and arrive at the other city early the next morning.

The Chicago, Milwaukee & St. Paul has announced that on June 20 it will put in service a new train to the Pacific coast via the Union Pacific and Southern Pacific to San Francisco. The train will be known as the "San Francisco Limited," and will leave Chicago at 9:35 p. m. On the same day a new train, the "Denver Special" will be put on between Chicago and Colorado.

A new passenger train between Chicago and California will be put in service on Saturday, June 19, by the Chicago & North Western, Union Pacific and Southern Pacific. The train will leave Chicago daily at 10:30 a. m., arriving at San Francisco at 9:30 a. m. the third day; and the eastbound train will leave San Francisco at 10:20 a. m., arriving at Chicago at 11:00 a. m. the third day.

A. O. Eberhart, former governor of Minnesota, has been elected president of the newly-organized River Terminal Association, with headquarters at St. Louis, Mo. As chairman of the executive committee of the association he has stated in a report that the construction of river terminals will be undertaken in at least 15 towns of the Mississippi valley during the present year.

The Pennsylvania and the Philadelphia & Reading both have reduced, from $75 to $62.50, the price of 150-trip tickets between Philadelphia and Atlantic City, Cape May and other points on the south Jersey coast. It appears that from Camden, N. J., across the river from Philadelphia, the rate for these tickets is $60, which rate could not be advanced because of the disapproval of the New Jersey Public Utilities Commission; and now because of the facility with which Philadelphia passengers can cross the river and avail themselves of the intrastate rate, the railroads have concluded to reduce the interstate rate. The distance from Camden to Atlantic City is 59 miles.

Freight Traffic Manager C. E. Perkins, of the Missouri Pacific, has notified station agents to refuse to allow consignees of bulk freight to peddle goods out of cars at destination. The use of cars as salesrooms, for the disposal of apples and other freight, has become too common to be tolerated; and the practice is now forbidden not only on account of considerations of economy, but also because of the possibility of bodily accident to persons doing business in, on or around freight cars. If a consignee does not unload his freight promptly within the free time agents are instructed to have the goods unloaded into public warehouses.

The lines operating from Key West to Chicago have made some good records recently on special trainload movements of Cuban pineapples. The cars are loaded in Havana and thence carried to Key West on the car ferry of the Florida East Coast. From Key West to Chicago the special trains are run over the Florida East Coast, the Atlantic Coast Line, the Central of Georgia, the Nashville, Chattanooga & St. Louis and the Illinois Central. The distance is 1,767 miles and four trains have been run through in an average time from Key West to Chicago of 86 hours. The fastest run was 81 hours, which, for the distance, made an average running time of 21.8 miles an hour, including stops.

Panama Canal Traffic in April

The Canal Record reports the total quantity of freight going through the Panama Canal in April as 522,841 tons; eastbound, 285,457 tons, and westbound, 237,384 tons. The total in March, the heaviest month on record, was 635,057 tons. Other interesting facts in the statement are the following:

Tolls in April	$442,415
Tolls since opening, net	$3,274,566
Commodities in April—	
Cacao from South America, tons	6,446
Canned fish from Washington, Oregon and California, tons.	5,544
Coal, tons	14,126
Copper from South America, tons	5,766
Flour from New York, tons	1,000
Flour from Puget Sound, tons	14,407
Gasoline, tons	6,462
Total westbound United States coasting trade, tons	68,271
Total New York to South and Central America, tons	22,515
Total New York to China, etc., tons	23,873
Total Europe to California, etc., tons	3,893
Total United States coastwise, eastward, tons	27,438
Total South America to Europe, tons	6,482
Total South America to New York, tons	3,544
Nitrates from South America, tons	68,027
Refined petroleum, Atlantic ports to Hawaii, China, etc., tons	22,297
Sugar, Hawaii to New York, tons	31,687

The average loading of all the vessels passing through the canal since its opening has been 5,156 tons.

New Railway Link Between Servia and Roumania.—It is reported from Rome that for several weeks past thousands of workmen have been engaged on the construction of a railway line between Negotin in Servia and Severinu in Roumania. This line, which is nearing completion, will link up the Roumanian railway system with Salonika. Russia and Roumania will then be able to receive supplies direct from Salonika, and send their cereals to other parts of Europe.

Discovery of Oxygen.—The discovery of oxygen is generally credited to Dr. Joseph Priestly, an English clergyman and scientist. The date, August 1, 1774, is commemorated as the birthday of modern chemistry. At about the same time two others made the same discovery: Scheel, a Swedish apothecary, who called it "fire air"; and Lavoisier, a French chemist, who called it oxygen, meaning "acid former." To Lavoisier is due the credit for the true explanation of combustion.—*Power.*

The Bagdad Railway.—The future of the near East is obviously a matter of the greatest practical interest to Russia, which is thus directly interested in the Bagdad Railway. A committee formed under the auspices of the "Society of Slavonic Reciprocation" has been studying this matter, and has recently made a report. The committee urges that under the terms of peace the Turkish Black Sea coast should belong to Russia, and that the Bagdad Railway, as regards both the sections already constructed and the concession for the building of the remainder, should be taken from Germany. At first, it will be desirable for the railway to continue to be operated and developed under the joint administration of England, France and Russia, while the selection of new lines and the final determination of the route of trunk and subsidiary lines must depend not so much upon political interests as has hitherto been the case, but on the economic interests of the three allied powers. The report recommends that, from the standpoint of Russian commercial interests, the roundabout route from Biredjik to Bagdad, chosen by the Germans for strategic reasons, should be straightened out in the form of a line on the right bank of the Euphrates, which happens to be the British plan. It is obvious that the Bagdad Railway, whose commercial and military importance is being much more generally appreciated than was formerly the case, will in the near future become a political factor of much importance.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Iron Pipe Found Reasonable

City of Charlotte, N. C., et al. v. Southern Railway Company et al. Opinion by the commission:

Rates on cast-iron pipe in carloads from East Radford and Lynchburg, Va., and Anniston, Ala., to Charlotte, N. C., and Rock Hill, S. C., not found to have been unreasonable. Fourth section applications named granted in part and denied in part. (34 I. C. C., 128.)

Spokane Lumber Rates Reduced

Wilson-Leuthold Lumber Company et al. v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Hall:

Rate of 20 cents per 100 lb. for the transportation of lumber in carloads from Spokane, Wash., to Butte, Mont., over the Northern Pacific and the Chicago, Milwaukee & St. Paul, found unreasonable. Reasonable maximum rate (17½ cents) prescribed for the future. (34 I. C. C., 146.)

Rates on Shingles to Points in Iowa

Board of Railroad Commissioners of Iowa v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The commission finds that the present rates on cedar shingles from points in Oregon, Washington, Idaho and Montana to points in Iowa are discriminatory, and fourth section applications seeking authority to charge lower rates on this commodity from these points of origin named to Chicago and St. Louis than to intermediate points are denied. (34 I. C. C., 111.)

Westbound Transcontinental Refrigeration Charges

Opinion by the commission:

The commission finds that the carriers have not justified proposed new refrigeration charges on perishable commodities iced by the shipper and delivered to the carrier with specific notice not to re-ice in transit. Certain proposed increased charges per car for the re-icing in transit of perishable commodities shipped from Missouri river territory to the north Pacific coast, Spokane and Montana territories are, however, found to be justified. (34 I. C. C., 140.)

The Tap Line Case

Opinion by Commissioner Harlan:

The commission finds that joint rates on hardwood lumber from mills located on the Louisiana & Pine Bluff at Huttig, Ark., in excess of the rates on the same commodity from the station at Huttig on the rails of the St. Louis, Iron Mountain & Southern are unreasonable and discriminatory. The Louisiana & Pine Bluff is a subsidiary of the Frost-Johnson Lumber Company. The complainant is charged three cents a 100 lb. for the switching of the product of its mill to the Iron Mountain, a distance of but a few hundred feet to one connection and of less than three miles to another connection. (34 I. C. C., 116.)

Rates from Trebein and Leesburg, Ohio

Dewey Brothers Company v. Pittsburgh, Cincinnati, Chicago & St. Louis, et al. Opinion by the commission:

The commission finds that the maintenance of lower rates on grain and grain products from Trebein and Leesburg, Ohio, to Norfolk, Va., than to intermediate points west of and including Bluefield, W. Va., is not justified, and relief from the provisions of the fourth section of the act is denied. The rates from these points of origin to main-line points on the Norfolk & Western west of and including Bluefield are held unreasonable to the extent that they respectively exceed 15.4 and 14.9 cents per 100 lb. The rates to branch line points on the Norfolk & Western, both east and west of Bluefield are not shown to be unreasonable. (34 I. C. C., 135.)

The Illinois Public Utilities Commission has issued a decision holding that the "jitney bus" is to be considered as a public utility, and that proprietors must incorporate and seek certificates before operating.

The Illinois Public Utilities Commission held a hearing on Monday on the application of the Chicago & Milwaukee Electric Railroad for permission to increase its passenger fares from about 1.40 cents a mile to 1.75 cents.

The Colorado Public Utilities Commission has issued an order requiring railroads to file with the commission copies of their working time schedules, insofar as they affect the movement of passenger trains, and all changes therein at least five days before their effective date. It is also ordered that if any change is made in the time of arrival or departure of regular passenger trains, such information shall be posted in each station at least five days before the effective date. Notice to the commission is also required of the removal or abandonment of any station or agency at least ten days before the effective date.

PERSONNEL OF COMMISSIONS

William M. Brown, of Bangor, has been appointed chief inspector for the Public Utilities Commission of Maine, the appointment to take effect July 3. For seventeen years, up to 1912, Mr. Brown was superintendent or general superintendent of the Bangor & Aroostook. He was graduated from Bowdoin College in 1881 as civil engineer, and was engaged in the location and construction of several railroads in Maine between 1882 and 1895.

COURT NEWS

The judges of the United States district court at Detroit have declined to issue a temporary injunction at the request of the Ann Arbor, restraining the state of Michigan from enforcing the two-cent passenger fare law.

In the Federal Court at St. Louis, Mo., June 1, the Davidson Brothers Company of Des Moines, Ia., pleaded guilty to an indictment charging the presentation of fraudulent claims for damages to freight. Davidson Brothers are wholesale fruit dealers, and the offenses occurred in 1912.

Discrimination in Delivery from Spur Track

Under the Texas statute, defining and prohibiting unjust discrimination on the part of any railroad, the Court of Civil Appeals holds that a road, by refusing to deliver to one doing business on its spur track shipments from localities or persons not served by its own line, but by connecting lines, works an unlawful discrimination against such localities or persons that may be enjoined.—M. K. & T. v. Seeger (Tex.), 175 S. W., 713.

Texas Blacklisting Statute Held Unconstitutional

Following the decision of the Texas Supreme Court in St. Louis Southwestern v. Griffin, 171 S. W., 703, the Texas Court of Civil Appeals holds that the Texas blacklisting statute, requiring railroad companies to furnish discharged employees with a statement of the cause of their discharge, and to furnish employees voluntarily leaving the service with a statement to that effect showing whether their services were satisfactory, is unconstitutional. Galveston, H. & S. A. v. State (Tex.), 175, S. W., 1096.

Right to Relief from Passenger Service on Branch Lines

The North Dakota Supreme Court in a case against the "Soo Line," holds that in determining whether a railroad shall be granted relief under the North Dakota statute from maintaining a separate daily passenger service on a branch, the earnings and cost of operation of the branch line service must be determined as nearly as possible; and where it plainly appears that the cost of operating the branch line with separate daily passenger service installed greatly exceeded the road's revenues derivable from the operation of the branch line, the road is prima facie within the statutory exception, and prima facie is entitled to be permitroad cannot be compelled to operate a separate daily passenger service on a particular branch line at a great loss, and be compelled to make up such loss from its main line revenues. The intention of the statute is that the revenues from branch lines shall justify a daily passenger service independent of whether the road as a whole within the state is returning a fair dividend on its investment. In the present case the evidence showed that the Crosby-Berthold line of another company—the Great Northern—furnishes ample passenger service for four-fifths of the length of this line. It was held that a separate passenger service should not be forced for the convenience alone of the town of Ambrose and vicinity, when to do so would cause an additional annual expenditure of $14,000, added to a loss already sustained under mixed train service, the revenues being inadequate to meet even the expenses of a mixed train service. Minneapolis, St. P. & S. S. M. v. State Board (N. Dak.), 152 N. E., 513.

Exchange of Passes—Liability

The Indiana Appellate Court holds that passes exchanged between two interurban railroads for the use of their officers are supported by a valid "consideration," i. e., some right, interest or profit accruing to one party, or some detriment, inconvenience, loss, or responsibility given, suffered or undertaken by the other, and the stipulation for nonliability indorsed thereon cannot be enforced. Fort Wayne & Wabash Valley Traction Co. v. Justus (Ind.), 108 N. E., 754.

Safety Gates—Stop, Look, and Listen Rule

The Pennsylvania Supreme Court holds that, while safety gates are for the protection of the public, they do not absolve the public from exercising proper care to protect themselves. An automobile approached a crossing from the west, traveling 20 miles an hour, when it was 20 or 25 ft. from the crossing, the safety gates of which were raised. At that distance the chauffeur first saw a locomotive on the track, traveling 20 miles an hour. He made no effort to reduce his speed or stop the machine until he saw the engine. His machine was struck when it was at a standstill with its front part over the first rail of the northbound track. He was held to be guilty of contributory negligence barring recovery in not observing the stop, look, and listen rule. This rule has been enforced by the Pennsylvania courts since the decision in Pennsylvania Co. v. Beale, 73 Pa. 504, in 1873, and failure of a traveler to observe it is not mere evidence of negligence for the jury, but negligence per se and to be so declared by the court. Earle v. Reading (Pa.), 93 Atl., 1001.

Air Brakes—Switching Operations

Following the federal court's decision in United States v. Erie, C. C. A., 212 Fed. 853, where the question of the compulsory use of air brake equipment in switching operations was elaborately considered, the Pennsylvania Supreme Court holds that the safety appliance act does not compel the air coupling of cars in switching movements. Whalley v. Reading (Pa.), 93, Atl., 1016.

United States Steel Corporation Not Condemned

The United States Circuit Court of Appeals, at Trenton, N. J., June 3, handed down a decision refusing the application of the government for an injunction against the United States Steel Corporation as an organization maintained in violation of the anti-trust law. The decision, by Judge Buffington, is concurred in by Judges McPherson, Hunt and Woolley. Though unanimous in their decision, not all the members of the court are in complete accord as to the steps by which the result is reached.

As against the government the court refused to dissolve the corporation, holding that in acquiring its foreign and home trade the concern did not violate the Sherman anti-trust act; and it refused all the injunctions prayed for by the Department of Justice.

As against the Steel Corporation the court held that the committee meetings participated in by 95 per cent of the steel trade of the country, including the Steel Corporation, subsequent to the famous Gary dinners of eight or nine years ago, were unlawful combinations to control prices, but as these meetings had stopped before the government filed its complaint, in October,

1911, the judges held that there was no occasion for an injunction.

The opinion of the court suggests that such practices lie within the province of the new Federal Trade Commission, but adds that if their repetition is apprehended the court will on motion of the government retain jurisdiction of the case to deal with this feature.

Judge Buffington declares that the keynote of the entire opinion is "that this case, a proceeding under the Sherman anti-trust law, is largely one of business facts. . . . The real test of monopoly is not the size of that which is acquired, but the trade power of that which is not acquired. . . . If mere size were the test of monopoly and trade restraint, we have not one but half a dozen unlawful monopolies in the large department stores of a single city."

The court found nothing wrong in the Steel Corporation acquiring the Tennessee Coal & Iron Company during the financial panic in 1907. The output of the Tennessee Coal & Iron Company at the time was only 1.7 per cent of the country's total output; up to that time it had not been a business success; its principal product—rails—was made at a loss; its ultimate success was doubtful and involved a further outlay of $25,000,000, and the purchase of the Tennessee property, as well as that of several other steel concerns earlier in the history of the big corporation, was made in fair business course and was "the honest exertion of one's right to contract for one's benefit, unaccompanied by a wrongful motive to injure others."

With regard to Andrew Carnegie, who, the government charged, was a party to the "unlawful combination," and "took the bonds of the corporation with all the infirmities attaching to such participation," the court found that there is no proof that he accepted any other relation in the formation of the Steel Corporation than that of seller of his stocks and bonds.

On the filing of a formal decree the government will probably take an appeal to the Supreme Court.

Advance New York Suburban Fares Sustained

The New York State Court of Appeals on June 8 affirmed the decision of the Supreme Court, Appellate Division, handed down in January, 1914, approving an increase of fares, between New York City and points in Westchester county, made by the New York Central in 1910. The decision of the lower court was reported in the *Railway Age Gazette* January 30, 1914, pages 221 and 249. By this action the courts have reversed the decision of the Public Service Commission, second district, which had held that the very low rates formerly in effect should be continued as a matter of public policy; this conclusion, in an opinion by Chairman Stevens, having been reached in spite of the fact that no evidence was found showing the higher rates to be unreasonable in themselves.

The present decision is by Judge Hiscock, who says:

"The naked fact that a railroad has established and continued a rate for a limited time does not justify the conclusion that it was profitable. It may have been established at an unprofitable figure as a result of miscalculation, or because of compelling competition or of a policy which was willing to endure temporary losses in the hope that there might ultimately be developed a profitable traffic.

"In the second place, even if we should assume that these rates when established in 1907 were compensatory, the presumption did not follow that this condition and result would indefinitely continue."

The question what general policy should be adopted in developing suburban trade was one to be decided by the road and not by the state. The methods and rates which it would apply to the development of any policy were subjects for regulation, but the question whether the welfare of the road would be best subserved by one policy or another was a subject to be decided by the officers and stockholders of the corporation.

In April, 1914, the legislature passed a bill, applying both to the New York Central and to the New York, New Haven & Hartford (which has a similar suit pending) reducing the fares, in accordance with the view of the Public Service Commission; but this bill was vetoed by Governor Glynn, who, referring to the fact that the suit had been appealed to the higher court, declared that legislation to forestall a decision of the court was wholly unjustifiable.

The present decision foreshadows a similar conclusion in the New Haven road's case.

Railway Officers

Executive, Financial, Legal and Accounting

T. Cox has been appointed acting auditor of the Pacific & Idaho Northern, with headquarters at New Meadows, Idaho, succeeding H. W. Davies.

Samuel C. Stickney, assistant general manager of the Erie at New York, has been appointed assistant to vice-president of the Erie, the Chicago & Erie, the New York, Susquehanna & Western and the New Jersey & New York. Jason C. Tucker, assistant to general manager at New York, has been appointed assistant to vice-president, and John D. Cummin, assistant to general manager at New York, has been appointed assistant to vice president. All with headquarters at New York. The positions of assistant general manager and assistant to the general manager are discontinued. (See Operating Officers.)

John D. Cummin, whose appointment as assistant to the vice-president of the Erie has already been announced, was born October 11, 1870, at Babylon, New York. After a common school education he began railroad work on July 1, 1887, with the Long Island. Up to July 31, 1897, he held various positions under the general roadmaster, chief engineer and general superintendent, and for six of these years was in charge of work train service. From 1897 to 1901 he was out of railroad work, being superintendent of a news company. From 1901 to February, 1905, he was clerk and then chief clerk to the general superintendent, later the general manager, and later the vice-president of the Erie. From March to December, 1905, he was general agent of the Bath & Hammondsport Railroad and the Lake Keuka Navigation Company. From 1906 to August, 1909, he was assistant to the receiver of the Cincinnati, Hamilton & Dayton and Pere Marquette. In September, 1909, Mr. Cummin was appointed special agent in the vice-president's office of the Erie, and in January, 1914, assistant to the general manager.

Operating

T. E. Jamison has been appointed trainmaster of the Chicago division of the Baltimore & Ohio, with office at Garrett, Ind., succeeding D. F. Stevens, promoted.

O. C. Bishop has been appointed superintendent of sleeping and dining cars and news service of the Canadian Northern, western lines, with headquarters at Winnipeg, Man. J. M. Grieve has been appointed assistant superintendent of sleeping and dining cars and news service, with headquarters at Winnipeg, Man.

J. E. Snedeker, superintendent of the Central Kansas division of the Missouri Pacific-Iron Mountain System, has had his jurisdiction extended over the Colorado division, with headquarters at Osawatomie, Kan. A. J. Alexander, superintendent of the Colorado division, has been appointed assistant superintendent of the Horace district of the Colorado division, with headquarters at Pueblo, Colo. T. W. Collins has had his jurisdiction extended over the Hoisington district, with headquarters at Hoisington, Kan. R. E. Cahill has been appointed assistant superintendent of the Northern Kansas division, with headquarters at Concordia, Kan. The offices of assistant superintendent of the Kansas City and Northwestern district and the Leavenworth branch and of trainmaster of the Northern Kansas division have been discontinued.

Frederic B. Lincoln, general superintendent of the Erie and subsidiary lines east of Salamanca, at New York, has been appointed general manager of the Lines East of Buffalo and Salamanca, with office at New York. William A. Baldwin, assistant general superintendent at New York has been appointed general superintendent of Lines East of Buffalo and Salamanca, with office at New York. John B. Dickson, assistant general manager at Cleveland, Ohio, has been appointed general superintendent of Lines West of Buffalo and Salamanca, with office at Cleveland. George W. Kirtley, superintendent of transportation at New York, has been appointed general superintendent of transportation, and the offices of assistant general superintendent, Lines East, assistant general manager, Lines West, and superintendent of transportation, have been discontinued.

intendent of the Canadian Government Railways, with headquarters at Moncton, N. B., has already been announced in these columns was born on February 23, 1874, at Toronto, Ont., and was educated in the public schools and at Collegiate Institute, Lindsay, Ont. He began railway work in May, 1890, with the Grand Trunk and served as call boy and apprentice at Lindsay, until November, 1891, then as apprentice, locomotive fitter and machinist at Point St. Charles. In September, 1896, he entered the service of the Canadian Pacific as clerk in the chief despatcher's office, and subsequently served as chief clerk in the superintendent's office, also in the general superintendent's office, and as car service agent until March, 1903. He was then passenger car distributor in the car service department at Montreal, until September, 1907, when he was appointed assistant superintendent of the Toronto Terminals. The following July he was appointed superintendent of District No. 1, Ontario division at Toronto, Ont., and in February, 1909, was transferred to London as superintendent of District No. 2. From March, 1911, to February, 1913, he was superintendent of District No. 1, Eastern division at Farnham, Que., and then to June, 1914, was superintendent of the Montreal Terminals. He was then appointed superintendent at Montreal of District No. 3, Eastern division, remaining in that position until May, 1915, when he left the service of the Canadian Pacific to go to the Canadian Government Railways as general superintendent of the Intercolonial, the Prince Edward Island and the National Transcontinental east of Quebec, with headquarters at Moncton, N. B.

J. K. McNeillie

Frederic Bowen Lincoln, who has been appointed general manager of the Erie Lines East of Buffalo and Salamanca, with office at New York City, was born in October, 1867, at New York, and was educated in the public schools and at New York University. He began railway work on May 20, 1887, in the enginering department of the Erie, and to June, 1892, was consecutively rodman, transitman and assistant engineer. He was then, for over three years, assistant engineer of the Allegheny and Susquehanna divisions, and from November, 1895, to May, 1897, was trainmaster of the Toby branch, in charge of maintenance and operation of the same road. In May, 1897, he became agent of the Erie at Salamanca, N. Y., and from December, 1898, to March, 1902, was superintendent of the Tioga division of the same road and superintendent of the Blossburg Coal Company. He was then, to October, 1903, general manager of the Buffalo & Susquehanna Coal & Coke Company, and from October, 1903, to the following February was special agent for the vice-president and general manager of the Erie. In February, 1904, he was appointed superintendent of the Susquehanna division of the Delaware &

F. B. Lincoln

a short time he was superintendent of construction of the Delaware & Eastern. From October, 1905, to March, 1906, he was superintendent of construction of the O'Rourke Engineering Construction Company, New York, engaged on the New York Central & Hudson River terminal work, at Forty-second street, New York. On March 15, 1906, he became assistant to the receiver of the Pittsburg, Shawmut & Northern; in January, 1914, he was appointed general superintendent of the Erie grand division of the Erie, and now becomes general manager of the Lines East of Buffalo and Salamanca of the same road.

M. A. Mulligan, whose appointment as superintendent of the New York division of the Lehigh Valley has been previously announced in these columns, began railway work on that road as water boy for a track gang. He was later brakeman, conductor and then fireman. He left the Lehigh Valley to take a position as fireman on the Erie, and previous to 1910 filled the positions of yardmaster, and later general yardmaster of the New York terminals of the Erie. In December, 1910, he returned to the Lehigh Valley as general yardmaster of the New York division, and later was made trainmaster of that division. Some months ago he was appointed general yard inspector, making a study of the condition of all the larger yards on the system. He has now been appointed superintendent of the New York division, as noted above.

M. A. Mulligan

Traffic

F. B. McIlvaine has been appointed district freight claim agent of the Michigan Central, with headquarters at Chicago.

Engineering and Rolling Stock

T. L. Landers has been appointed resident engineer of the Intercolonial, with office at Truro, Nova Scotia.

W. H. Keller, assistant master mechanic of the Baltimore & Ohio Southwestern, at Cincinnati, Ohio, has been appointed master mechanic of the Indiana division, with headquarters at Cincinnati.

E. W. McGarvey has been appointed assistant supervisor of the Philadelphia division of the Eastern Pennsylvania grand division of the Pennsylvania Railroad, succeeding J. R. Scarlett, transferred.

John Ernest Lloyd, assistant division engineer of the Baltimore & Ohio, at Garrett, Ind., has been appointed division engineer, with headquarters at Cleveland, Ohio, succeeding A. A. Jackson, resigned.

B. B. Milner has been appointed engineer of motive power of the New York Central, in charge of locomotive design and construction, and the relation of locomotive standards to operation, with headquarters at New York.

Lee Highley, chief engineer of the Pacific & Idaho Northern, having resigned, the office of chief engineer is abolished for the time being. All correspondence regarding the engineering department should be addressed to the general manager.

E. N. Layfield, formerly chief engineer of the Chicago Terminal Transfer Railway, and more recently a consulting engineer at Chicago, has been appointed assistant secretary and editor of publications of the Western Society of Engineers, Chicago.

souri, Kansas & Texas at Sedalia, Mo., has been appointed general superintendent of the car department, with office at Dennison, Tex. William Walker, general foreman of the Sedalia shops succeeds Mr. Alquist.

A. F. Dorley, whose appointment as engineer of maintenance of way of the eastern district of the Missouri Pacific-Iron Mountain System, with headquarters at St. Louis, Mo., has already been announced, was born on April 8, 1875, at Lancaster, Pa. He was graduated from Mt. St. Mary's College, Emmitsburg, Md., in 1893, with the degree of A. B., and from Notre Dame University, South Bend, Ind., in 1900, with the degree of C. E. He entered railway service on June 21, 1900, and was rodman for the Baltimore & Ohio Southwestern until February 1, 1901, when he became assistant engineer of the Cleveland, Cincinnati, Chicago & St. Louis, at Indianapolis, Ind. From February 1, 1902, to April 1, 1903, he was assistant engineer of the Baltimore & Ohio Southwestern, at Chillicothe, Ohio. He was then made assistant division engineer at Washington, Ind., which position he held until April 1, 1906, when he came to the Missouri Pacific-Iron Mountain System as assistant engineer. From July 15, 1906, to December 10, 1910, he was consecutively division engineer at Kansas City, Mo., Osawatomie, Kan., and Omaha, Neb. On December 10, 1910, he was appointed engineer of water service, with office at St. Louis, Mo., and on April 1, 1914, was appointed principal assistant engineer, with headquarters at St. Louis, from which position he is now promoted.

A. F. Dorley

Purchasing

A. E. Hutchinson has been appointed general purchasing agent of the Oregon Short Line, with headquarters at Salt Lake City, Utah, succeeding G. H. Robinson, who has been appointed general storekeeper at Pocatello, Idaho, succeeding T. A. Martin, promoted.

OBITUARY

N. A. Waldron, general storekeeper of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., died in St. Louis, Mo., on May 30.

E. N. Brown, assistant superintendent of the Baltimore & Ohio Southwestern, at Chillicothe, Ohio, died in that city May 25, at the age of 46 years.

H. W. Cowan, chief engineer of the Colorado & Southern, whose death on May 29, at his home in Denver, Col., has already been announced, was born on April 27, 1862, at Bath, Me. After graduating from the Worcester Polytechnic Institute he entered railway service, and from 1883 to 1886 he was topographer and draftsman for the Winona, Alma & Northern. From June, 1886, to September, 1888, he was draftsman and topographer for the Colorado Railway, and from September, 1888, to February, 1894, was assistant engineer of the Colorado division of the Union Pacific. He was then appointed resident engineer of the Union Pacific, Denver & Gulf and the Denver, Leadville & Gunnison railways, at Denver, Col. In January, 1898, he was appointed chief engineer of the Colorado & Southern, successor to the Union Pacific, Denver & Gulf and Denver, Leadville & Gunnison Railways, and in January, 1907, was also appointed consulting engineer of the Colorado & Southern, and was later appointed chief engineer.

Equipment and Supplies

LOCOMOTIVE BUILDING

The Denver & Salt Lake has ordered eight Mikado type locomotives from the Lima Locomotive Corporation.

The New York, Ontario & Western has ordered 12 Santa Fe type locomotives, cylinders 28 by 32 in., driving wheels 57 in., total weight in working order 360,000 lb., from the American Locomotive Company.

CAR BUILDING

The Lehigh Valley is making inquiries for twenty 50-ft. steel underframe milk cars.

The International & Great Northern is negotiating for 1,000 cars, with the Mt. Vernon Car Company.

The Norfolk & Western has ordered 10 coaches from the Harlan & Hollingsworth Corporation, and 12 baggage and express cars and 2 postal cars from the American Car & Foundry Company.

IRON AND STEEL

The Chesapeake & Ohio Northern has placed an order for 2,000 tons of bridge material.

The Lehigh Valley has ordered 100 tons of steel from the American Bridge Company, for a turntable.

The Louisville, Henderson & St. Louis has ordered 3,000 tons of rails from the Illinois Steel Company.

The Chesapeake & Ohio has ordered 2,100 tons of bridge material from the Virginia Bridge & Iron Company.

The Virginian Railway has ordered 240 tons of bridge material from the Virginian Bridge & Iron Works.

The Lehigh Valley has ordered 2,000 tons of steel from the American Bridge Company for train shed and grade crossing work.

The Chicago, Milwaukee & St. Paul has awarded a contract for 359 tons of steel for a bridge at Tacoma, Wash., to the American Bridge Company.

The St. Louis & San Francisco has been authorized by Judge Sanborn in the Federal Court to spend $800,000 for rails for replacements on various portions of the system.

The Chicago, Indianapolis & Louisville has ordered 3,000 tons of rails from the Illinois Steel Company. This order was prematurely reported in our issue of May 7.

The Pennsylvania Lines West has ordered 300 tons of steel for elevated track work at Fort Wayne, Ind., from the Riter-Conley Manufacturing Company, Leetsdale, Pa.

The Pennsylvania Lines East and West of Pittsburgh has placed orders for 155,500 tons of rails. The orders call for 118,000 tons of 100-lb. rail and 37,500 tons of 125-lb. rail. An order for 12,000 tons had previously been placed, so that the present order makes the total Pennsylvania rail orders for the present year 167,500 tons.

MACHINERY AND TOOLS

The Missouri Pacific-Iron Mountain System has purchased four wood-working tools for its repair and machine shops at Pueblo, Colo.

The Gulf, Colorado & Santa Fe contemplates the purchase of the following new machinery at its shops at Cleburne, Tex.: One 4-ft. 8-in. by 8-ft. sash and door clamp; one 15-hp. power motor; one 22-in. by 12-ft. engine lathe; one ⅛-in. to 3½-in. twist drill wet grinder; one 4-in. pipe threading machine and one 28-in. rigid turret lathe. New machinery contemplated at Galveston, Tex., consists of one 24-in. crank shaper and one 26-in. by 14-ft. engine lathe.

Supply Trade News

The Union Twist Drill Company, Athol, Mass., is reported to have received a large order for rifles.

The Standard Underground Cable Company has begun the erection of an addition at Perth Amboy, N. J., to be used for drawing brass wire and copper tubing.

At a special meeting of the stockholders of the Burd High Compression Ring Company, Rockford, Ill., held on May 19, it was unanimously voted to increase the capital stock from $50,000 to $200,000. It was announced that the additional capital was voted because of large contracts which the company has been receiving and for the purpose of adding to equipment and enlarging the business.

C. H. Morse, Sr., the retiring president of Fairbanks, Morse & Company, who is being succeeded by his son, C. H. Morse, Jr., as has already been announced, was born in St. Johnsbury, Vt., in September, 1833. He began his business career at the age of 17, when he became clerk in the office of E. & F. Fairbanks & Co., scale manufacturers. In 1862 he became a member of the firm of Fairbanks, Greenleaf & Company, successors to E. & F. Fairbanks & Co. In 1872 the firm of Fairbanks, Morse & Company was established, Mr. Morse, Sr., being elected president, which position he held until May 19, when he resigned.

C. H. Morse, Sr.

J. B. Evans, recently with the General Railway Signal Company of Canada, Ltd., and formerly with the General Railway Signal Company, Rochester, N. Y., has been appointed general manager of the National Concrete Machinery Company, Madison, Wis. This company manufactures machinery for the production of concrete fence posts, and has a number of plants located on several of the large railways.

A. S. Hill, who was for a number of years at the head of Wm. E. Hill & Co., Kalamazoo, Mich., manufacturers of heavy saw mill machinery, has become connected with the American Saw Mill Machinery Company, Hackettstown, N. J., as the manager of the heavy saw mill department. It is the intention of the American Saw Mill Machinery Company to greatly amplify their line of heavy duty machinery under the supervision, designs and patents of Mr. Hill.

Six representatives of the Russian government, Maximillian Groten, Michael Bronikovfky, Michael Jurin, Nicolai Kemmer, Victor Kofhkin and Aready Martynoff arrived in New York last Friday on the Norwegian-American liner Bergensfjord for the purpose of making a tour of the United States and Canada to inspect the supplies, including railroad equipment and other material, recently ordered by the government. The commission of six inspectors will spend two weeks in New York, after which they will visit various manufacturing centers. They expect to stay on this continent about six months.

The Baldwin Locomotive Works is reported to have entered into a contract with the Remington Arms & Ammunition Company, whereby the locomotive company will turn over to the ammunition company certain new shops, the construction of which was recently started at Eddystone, for the manufacture of 1,500,000 rifles on an order from the Russian government. The ammunition company, according to the reports, will make the each rifle made, and at the completion of the order will turn the plant and equipment, valued at $1,500,000 over to the locomotive company, whereby the latter will have made $3,000,000 on the contract.

The business of the Wells Light Manufacturing Company, Jersey City, N. J., has been acquired by the Alexander Milburn Company, Baltimore, Md., manufacturers of high power portable lights and oxy-acetylene welding apparatus. Repair parts for Wells lights will be manufactured and supplied in the future by the Alexander Milburn Company from its Baltimore factory, and complete Wells oil lights will also be furnished where desired, in conjunction with the standard Milburn acetylene lights. The manufacture of Wells oil preheating burner outfits will be continued by the company and sold in connection with Milburn oxy-acetylene apparatus. The Wells lights and Wells preheating devices have been on the market for about 20 years, and have occupied a leading place among oil-burning equipment of their kind.

C. H. Morse, Jr., who has been elected president of Fairbanks, Morse & Company, succeeding his father, C. H. Morse, Sr., as has already been announced, is 41 years old. He was graduated from the University of Michigan in 1895, as a mechanical engineer. He first entered one of the Fairbanks, Morse & Company shops in order to get a practical knowledge of the building of gas engines, pumps, etc. He has been president of the Fairbanks, Morse Manufacturing Company, Beloit, Wis., in charge of manufacturing, for 10 years, which position he still holds. He has also been a director of Fairbanks, Morse & Company, Chicago, for 15 years, a director of Fairbanks, Morse Elecal Manufacturing Company, Indianapolis, Ind., for eight years. Eight years ago Mr. Morse was also elected a director of the Canadian Fairbanks, Morse Company for eight years.

C. H. Morse, Jr.

TRADE PUBLICATIONS

BUILDING CONSTRUCTION.—H. Edsil Barr, mechanical engineer, Erie, Pa., has issued a booklet describing his system of construction for warehouses, factories and industrial buildings. This form of construction, for which great economy is claimed, consists of concrete foundation, structural steel framework and brick pilasters with large window areas equipped with steel sash.

INSULATORS.—A recently issued 12-page pamphlet by the Brookfield Glass Company, New York, gives a brief list of insulators and insulator pins forming a part of its line of these products. Complete dimensions and specifications are given for each item. A more complete list of the products of this company is contained in its bulletin No. 56, which will be supplied upon request.

CHIMNEYS.—The Weber Chimney Company, Chicago, has issued a 48-page booklet describing its reinforced concrete chimneys and showing a large number of chimneys completed and in course of construction. It also contains a list of places where Weber chimneys have been erected throughout the United States and Canada with dimensions, and contains Kent's table of chimney sizes for steam boilers.

AIR COMPRESSORS.—Bulletin No. 34M, dated March, 1915, and issued by the Chicago Pneumatic Tool Company, describes the class O Chicago pneumatic steam and power driven compressors. The bulletin contains 36 pages, including detailed illustrations of the various parts of these compressors, as well as indicator diagrams showing the results obtainable by their use. Tables are included giving the principal data for the various sizes.

Steel Company, Pittsburgh, formerly the Des Moines Bridge & Iron Company, has issued a booklet describing its exhibit at the Panama-Pacific International Exposition, San Francisco. This booklet also contains a number of photographs and descriptions of installations of tanks for railway and other purposes. A list of tank installations with capacity and height is included.

Steel Reinforcement.—"Hy-Rib" is the title of a 144-page book issued by the Trussed Concrete Steel Company, Youngstown, Ohio, which contains a large amount of data showing the use of this steel sheathing in building constructions of various kinds. The book is well illustrated with a large number of photographs and drawings of representative structures in which this material has been incorporated, and should be of interest to the engineer and architect.

Heat Insulation.—A four-page folder recently issued by the Armstrong Cork & Insulation Company, Pittsburgh, Pa., deals with that company's high pressure covering for use on high pressure and superheated steam lines, boilers and other heater surfaces. This material is made up of a special form of silica of a minute cellular construction mixed with asbestos. Owing to the cellular nature of the silicious material it is said to be an exceptionally good heat insulator.

Speed Reducing Gear.—Catalog A of the Turbo-Gear Company, Baltimore, Md., is devoted to the Turbo reducing gear recently developed by this company for high ratio speed reduction. This gear consists of a stationary annular gear, a pinion cut integral with the high speed shaft, between which operate the intermediate gears, the shafts of which are secured to the cast steel close feed members. All the gears are of a double helical type and are enclosed in a cast iron housing.

Locomotive Stokers.—The Locomotive Stoker Company, Schenectady, N. Y., in its catalogue No. 14-B, issued in April, 1915, has compiled a list of locomotives to which the Street stoker has been applied. The catalogue is a neatly arranged booklet of some 50 pages, containing full-page illustrations of the locomotive classes, the principal dimensions, the number stoker fired in each case being shown on pages facing the illustrations. The catalogue brings out the fact that at the present time there are in service over 600 locomotives fired by Street stokers.

Sectional Steel Buildings.—A loose-leaf catalog recently issued by the C. D. Pruden Company, Baltimore, Md., is devoted to the line of portable and permanent sectional steel buildings designed and manufactured by this company. These buildings include garages, cottages and a variety of portable buildings suitable for construction camp and other temporary purposes. The buildings are fireproof and may be amply lighted and ventilated. Standard sizes are carried in stock for immediate shipment.

Intercolonial Railway of Canada.—The passenger department of the Canadian Government Railways has recently issued three exceedingly attractive folders relative to the scenic and other attractions of travel on the Intercolonial and the Prince Edward Island Railways. These booklets are entitled respectively; La Baie de Chaleur, Bras d'Or Lakes (Cape Breton), and "Abegweit." All three contain much interesting information and are well illustrated. The last, "Abegweit," deals with Prince Edward Island. It terms that island a "million acre farm," and says that although it does not now have a population as large as many Canadian cities, it could, nevertheless, on its 1,398,000 acres, support a population of over two million people. A fourth booklet, also of recent issue, names the 1915 summer excursion fares.

South African Notes.—The board of the South African Railways in a recent report says that during the past five years 1,446 miles of railway have been added to the South African system, representing an increase of over 20 per cent. The mileage at the end of last year was 8,486. In addition there are 647 miles of lines operated, but not owned by the administration. In 1910 the train mileage was 23,580,846, as against 29,701,991 in 1914, an increase of 6,121,345 train miles, or 25.9 per cent. There were under construction on December 31 last 973 miles of railway, the construction of all the lines sanctioned by Parliament having been started.

Railway Construction

Alabama Great Southern.—The new double track between Cuba, Ala., and Toomsuba, Miss., eight miles, has just been placed in service on the Alabama Great Southern. This track is to be used jointly by trains of the Alabama Great Southern and the Southern Railway.

Carolina, Greeneville & Northern (Electric).—Contractors have started work near Rader, Tenn., it is said, on this line. The plans call for building from Kingsport, Tenn., southwest, to Newport, about 75 miles, and there will be five steel bridges on the line. The company has under consideration the question of building an extension from Kingsport, east to Bristol, also an extension from Newport west to Knoxville. H. S. Reed, president, 205 Grant building, Los Angeles, Cal., and F. A. H. Kelly, chief engineer, Greeneville, Tenn. (January 19, p. 350).

Charleston Interurban.—This company has secured $750,000 through a sale of notes, it is said, and the proceeds are to be used for building the projected extension of the Kanawha Valley Traction from Charleston, W. Va., southeast via Marmet, Paint Creek, Cabin Creek, Coalburg and Handley to Montgomery, about 25 miles. Track has already been laid on about two miles. (March 12, p. 493.)

Kent Coal & Railway Company.—This company has been incorporated in New Brunswick, to build from Rexton, N. B., southwest to a point on the Intercolonial between Kent Junction and Adamsville, thence via Chipman to Minto, about 80 miles; also to build from Rexton to Richibucto Head. Inches & Hazen, solicitors, Fredericton, N. B. (April 23, p. 914.)

McConnellsburg & Ft. Loudon (Electric).—An officer writes that a contract has been let to Bennett & Smith, Greensburg, Pa., for the grading, track laying, etc., on the line from McConnellsburg, Pa., east to Ft. Loudon, 11 miles, and work is now under way. E. J. Post, president, McConnellsburg, Pa. (May 21, p. 1099.)

Meriden, New Britain & Hartford (Electric).—Work is to be started at once, it is said, on a line between Meriden, Conn., and Hartford, about 20 miles. Mayor D. J. Donovan, Meriden, is said to be interested.

North Carolina Traction.—An officer writes that this company will let contracts July 1 for building the projected line from High Point, N. C., via Winston-Salem to Christiansburg, Va., a distance of 137 miles. The work calls for the handling of about 300,000 cu. yd. of earth and about 63,000 cu. yd. of rock. There will be two steel bridges and a 21,897 ft. trestle and one 600 ft. tunnel. The company expects to develop a traffic in tobacco, timber and coal. B. D. Hammond, Box 21, Station A, Boston, Mass., is president.

Salt Lake & Utah (Electric).—This company, it is said, will open the line now under construction from Provo, Utah, to Springfield in July, and plans are under consideration for the immediate construction of the proposed extension to Payson.

Texas Roads.—The construction of a railroad from Dallas, Tex., northwest to Wichita Falls, is contemplated by A. A. Green, Jr., H. D. Lindsley and others. A tap line will first be built between Denton on the Missouri, Kansas & Texas of Texas, and Krum on the Gulf, Colorado & Santa Fe, and trackage rights will be secured over the Missouri, Kansas & Texas of Texas between Denton and Dallas.

Waycross & Western.—This company is considering the building of an extension from Milltown, Ga., its present southern terminus, to Ray's Mill, where a connection will be made with the Georgia & Florida.

West Virginia Roads (Electric).—According to press reports plans are being made to build an electric line between Fayette, W. Va., on the Chesapeake & Ohio and Beckley, about 35 miles. H. G. Scott, Charleston, W. Va., is said to be interested.

CHICAGO, ILL.—The Atchison, Topeka & Santa Fe has applied to the city council for the vacation of several streets and alleys to permit the construction of its proposed fruit terminal, located about one mile from the center of population of the city, between Sixteenth street, Wentworth avenue, Archer avenue, Twenty-second street and Grove street, along the south branch of the Chicago river. It is proposed to construct a banana warehouse, a fruit auction house and a large cold storage warehouse. In a letter to the local industries committee of the city council, President Ripley says of the plan that facilities will be open to the general shipping public and also will be made available to other carriers entering the city for the handling of perishable freight at the usual charge for such service, thereby enabling the receiver, if he so desires, to concentrate his business at one place.

CHICAGO, ILL.—The Chicago & North Western is having plans prepared for a new four-story office building to cost about $250,000, at the northeast corner of Ravenswood Park and Lawrence avenue, to accommodate some of the offices of the accounting department which are now located in the company's main office building downtown.

CHICAGO, ILL.—The Union Station Company, Chicago, has awarded contracts for the Monroe street bridge substructure to the Fitzsimons-Connell Dredge & Dock Company, Chicago, and for the superstructure to the Kettler-Elliot Erection Company, Chicago.

KANSAS CITY, MO.—The Chicago, Burlington & Quincy will replace its present bridge at this place with a double decked structure. The Union Bridge & Construction Company has been awarded the contract for the substructure.

KIOWA, KANS.—The Atchison, Topeka & Santa Fe is constructing a passenger depot at this place. It will be brick with stucco finish and tile roof. Swanson & Sons, Topeka, Kan., have been awarded the contract. The estimated cost of the depot is $18,000, and the track changes will amount to about $10,000.

PHOENIXVILLE, PA.—The Pennsylvania Railroad has asked bids on a concrete arch bridge at Campbell's Crossing, west of Frick's lock. The bridge is to consist of seven 84-ft. concrete arches for double track to take the place of the single-track four-span bridge now being used.

ST. PAUL, MINN.—The Chicago, St. Paul, Minneapolis & Omaha has awarded a contract to the Milwaukee Bridge Company, Milwaukee, Wis., for the superstructure of a counter balanced swing span 260 ft. long, with the long arm 175 ft. long. This is a bridge used jointly with the Chicago, Milwaukee & St. Paul, at St. Paul, over the Mississippi river. The contract for the deck plate girder spans was let some time ago. H. Rettinghouse, St. Paul, Minn., is chief engineer of the Chicago, St. Paul, Minneapolis & Omaha.

RAILWAY CONSTRUCTION IN SWEDEN.—A new railroad connection has been proposed between Goteborg and the province of Ostergotland, Sweden, on the Baltic. The connection will be made over an existing line from Goteborg via Boras, the cotton manufacturing center, to Halldarp. From Halldarp two new lines have been surveyed to Sommen, in Ostergotland. The two proposed lines coincide on the west side between Halldarp and Hoppebo, and on the east side between Sommen and Ostena. Between Hoppebo and Ostena one survey, known as the Jonkoping line, runs along the southern bank of Lake Vettern and through the town of Husqvarna and connects with Jonkoping, two important iron manufacturing centers. The other survey, the Tenhult line, runs through Lekeryd and Tenhult. The Jonkoping line, 88 miles in length, would cost $4,448,800 to build, or $935,320, more than the Tenhult line, because the grades are steeper and a narrow-gage line from Kojnoping to Gripenberg would have to be purchased and reconstructed. Either route would shorten the existing connection between Goteborg and the province of Ostergotland by about 30 miles. At present work is in progress to eliminate several sharp curves on the line from Goteborg to Boras, at an estimated cost of $804,000.

Railway Financial News

ERIE.—The Wall Street Journal says that the directors of the Erie have decided to furnish the stockholders with full information concerning the company's coal properties. An inventory will shortly be made of these properties and the results put before the stockholders.

MISSOURI PACIFIC.—It is said that the reorganization plan contemplates the consolidation of the Missouri Pacific proper and the St. Louis, Iron Mountain & Southern, and the probable elimination of the St. Louis, Iron Mountain & Southern stock, which stock is now held by the Missouri Pacific. An issue of preferred stock may be made, to be exchanged for collateral trust bonds which are now secured by a like amount of St. Louis, Iron Mountain & Southern stock; and a stock assessment of $30 per share may be made, for which consenting stockholders will be given new preferred stock.

NATIONAL RAILWAYS OF MEXICO.—As announced in these columns last week the $28,322,660 due June 1, including the principal of two year notes and interest maturities has not been paid. A formal announcement by the company says that owing to the continuance of the disturbing conditions in Mexico, it has been impossible for the company to make any arrangements for the payment of these obligations at this time. The operation of the property of the company is out of its hands. Holders of maturing obligations are asked to await the return to it of properties belonging to the system and the restoration of business to the Mexican nation, so that "the government and the company may be placed in a position to duly deal with the subject."

NEW YORK, NEW HAVEN & HARTFORD.—See President Elliott's statement in regard to the New Haven situation printed elsewhere in this issue.

PENNSYLVANIA.—The leasing of all the property and franchises of the Pennsylvania & Atlantic to the Pennsylvania Railroad has been approved by the New Jersey Board of Public Utilities Commissioners. The lease was dated April 14, 1915, and provided that it may be terminated at any time upon 60 days' notice in writing from either party.

WABASH.—It has been announced that more than 90 per cent of the $40,600,000 first refunding and extension mortgage bonds have been deposited under the reorganization plan, and the time for the deposit of these bonds has been extended to July 3.

OPENING OF THE MONT D'OR TUNNEL TO SWITZERLAND.—A new railway link between France, Switzerland and Italy—the Frasne-Vallorbe Railway, including the Mont d'Or tunnel through the Jura—was opened for traffic on Sunday, May 15, without any ceremony, the only railway officers present on the occasion being those of the Paris-Lyons-Mediteranean Company and the Swiss Federal Railways. Work has begun in September, 1910, and was expected to be completed in May, 1914, but was seriously delayed mainly by water-bursts in the tunnel, and also by the difficulty of obtaining a solid foundation for the embankment near Frasne. The original estimate for line and tunnel was $7,400,000, but the actual cost was about $6,437,250 a mile. The new line is about 15 miles in length, 13½ miles of which is in France and 1½ miles in Switzerland. It branches off from the Dijon-Pontarlier line at Frasne, and penetrates the Mont d'Or by a tunnel 6,670 yards long, joining the Pontarlier-Lausanne line at Vallorbe. By avoiding the circuitous route via Pontarlier the new line shortens the distance between Paris and Lausanne by nearly 10 miles, while other improvements have resulted in a gain of from 45 to 60 minutes in the journey between the same points, with a consequent quickening of the Paris-Simplon-Milan service. The curves of the new line are favorable for speed, and, in winter, the tunnels and pine forests are a protection against snowstorms. Vallorbe has become a customs station, and has been entirely remodeled, so that trains can now enter and leave without the engines having to be uncoupled and reversed.

Railway Age Gazette

DAILY EDITION

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

It has been generally believed that there is little definite knowledge as to what actually takes place in the sheets and staybolts of a locomotive firebox, but the statements made by George L. Fowler in his discussion of the committee report on locomotive boilers on Thursday morning indicates that we know infinitely less than we thought we did. It appears from Mr. Fowler's investigations that the staybolts are always moving and always under stress; in fact, that they are practically subjected to the conditions of a vibratory testing machine. The effect of the rigid staybolt and the advantage of the flexible staybolt is indicated from the relative movement of the sheets, which is only half as great with the rigid as with the flexible bolt. The investigation also brought out some definite evidence of the cooling effect of the opening of the fire door, and the change in the movement of the tubes after the throttle is opened is one of the many astonishing features brought out in the investigation. The continuation of this experimental work with the improved apparatus which has been developed should bring out some valuable information as to just what is taking place in the firebox structure when the locomotive is working.

Movement of Firebox Sheets

Thin Fires for Stoker Engines

engines. The committee stated that there is sometimes a tendency to carry a fire that is too thin. A thick fire on a stoker engine and a thick fire on a hand-fired engine are two different things and must not be confused by those who have not had extended experience with stoker-fired engines. The operating conditions and the grade of fuel will govern the depth of fire. Where the use of the throttle is intermittent, it can be readily seen that a thin fire, which would require constant stoking to keep it alive, would tend to keep the pop open. On the other hand, with a heavier fire, it would be possible to maintain full pressure without continually feeding coal when the throttle is not open. One of the good features of the stoker is the thin fire it can carry, thus insuring more perfect combustion. But the conditions will determine the correct depth.

A Committee Report Well Presented

The Committee on Revision of Standards and Recommended Practice has received many congratulations on the splendid manner in which its report was presented on Wednesday morning. With its several appendices the report covered 26 pages. So skillfully did the chairman touch on the vital points, hardly using an unnecessary word, that the presentation was made in a few moments and yet the import of the recommendations was thoroughly grasped by all those who were interested. The report also conforms to the suggestions made to the Committee on Specifications by President Gaines that the standard specifications be not too rigid, but that they call for a fair grade of material which will prove satisfactory for general use. This will be less expensive than where each road has different requirements, some of them of a very special nature. The commitee has also kept in touch with other associations, and particularly with the American Society of Testing Materials, with the idea of having uniform specifications.

Superheat and Compounding

In the topical discussion on compounding superheater locomotives the point was brought out that the application of superheaters to compound locomotives and the compounding of superheater locomotives are entirely different matters, the results from which are not necessarily of equal benefit in increasing efficiency. The fact that considerable increase in efficiency may result from the application of superheaters to existing compound locomotives does not argue that the compound feature contributes the same share to the combined result, as indicated by the improvements which may be effected by its application to saturated steam locomotives. Theoretically, however, there seems to be little doubt that the compounding of superheater locomotives may effect an appreciable saving in fuel. This is clearly indicated by the results of the European tests referred to by Lawford H. Fry in opening the topical discussion on Wednesday morning. Undoubtedly similar results could be obtained in this country, but not with the standards of mainatenance now obtaining. The relative value of labor and fuel in European countries, and especially in France and Germany, where the compound superheater locomotive is finding its greatest use, is such that refinements in design intended to increase fuel economy are practicable, which would fail in this country because of the excessive cost of maintenance. The relatively high value of fuel in relation to the cost of labor in Europe as compared with this country, is the basis for the difference in practice existing between the two continents. In calling attention to

demanding increased attention, the cost of labor is also constantly increasing, and the advisability of the use of compounding in connection with superheated steam is unlikely to receive serious attention in this country until existing conditions have been greatly changed.

American and European Locomotive Design

In the refinements which have been and are being made in locomotive design in America, the designers, whether they know it or not, are to a considerable extent following the lines which European designers have followed for years. The restricted loading and clearance limits with which the railways of Europe have to contend forced their mechanical engineers to many expedients in order to reduce the weight of the frames and running parts to a minimum, the saving thus made being employed in increasing boiler capacity. The American designer did not adopt such methods until he was forced to it by the dimensions which American locomotives had reached; but the increasing use of heat-treated and special steels to increase strength and reduce weight is in direct line with European practice. That this development of the American locomotive will continue is certain and it would be well for those responsible for locomotive design to familiarize themselves with European practice, with a view to its adaption to our conditions.

Matters Worthy of Attention

President Gaines, in his opening address, asked some questions concerning motive power matters on which further emphasis may well be placed. Do we know when a new locomotive is placed in service whether its increased weight, capacity and cost are justified? There is too much designing and placing in service of locomotives without enough consideration being given to their suitability for the service in which they are to be used. Is the operating department kept informed of the results of investigations, if such investigations are made, into the means of obtaining the best results from locomotives on the road? This question is not difficult to answer. Such investigations are made infrequently and when made are too often of a nature which does not produce results that are worth keeping on record. How many operating department officers know in detail the savings effected by improvements in locomotives? Yet the operating officer is keenly interested in anything that affects the cost of conducting the operation. Again, how often are subordinates supplied systematically with information so that they may analyze the results of their work and endeavor to make reductions in expenses? These are only a few important items. They will suggest others to anyone taking the time to give them the consideration which they deserve, and are commended to the careful attention of motive power officers.

Cost of Hiring and Discharging Men

An investigation of the employment and discharge of all classes of employees at a number of factories disclosed the fact that of all those engaged during the year 1912 about 73 per cent. were new employees, never having worked in that particular factory previously. Managers stated that in their opinion the amount of money wasted in engaging and discharging employees in large numbers ranged from $30 to $150 per employee. The author of the investigation concludes that the apparently unnecessary engagement of 22,225 employees within one year in the factories investigated involved an economic loss of $774,139, which means that the cost of train-

methods for taking care of new employees, effective systems of apprenticeship and specialized training, and the regulation of commercial requirements so as to secure a fairly uniform production throughout the year. The effect of an efficient apprentice system in helping to correct such conditions is readily recognized, but the last suggested remedy is extremely difficult of application even in commercial establishments. When we consider the possibilities of its application to railway repair shops, the difficulties are, of course, greatly increased. Traffic conditions require the employment of every available unit of power at certain seasons of the year, while at others many locomotives are kept idle. The conditions at the large repair shops of necessity hinge to a great extent on this, but it seems probable that some improvement could be made in the assignment of locomotives for repairs so as to reduce the fluctuation in the amount of work throughout the year. If any marked improvement were to be made, it would require a careful study of all conditions and co-operation between departments; however, a study of the foregoing figures cannot but be of interest to mechanical department officers, and it is evident that any improvement which will tend toward reducing the number of men who are hired and discharged during the course of the year can have a direct effect on the condition of the company's treasury.

LOCOMOTIVE FUEL ECONOMY

THE problem of fuel economy, with all its ramifications, is without doubt one of the biggest questions with which the mechanical department has to contend. It includes the proper method of firing, the operation of the locomotive, its maintenance and desgin, and the use of fuel saving devices. Each one of these items is a large problem in itself and it would be impracticable to cover the entire subject in one committee report. This year the committee has, very wisely, confined itself to covering thoroughly one phase of the problem—instructions for enginemen and firemen—and has touched lightly on the other important items. These instructions are the first ever published by this association and are presented in a simple and concise manner so as to be readily understood by the engine crews.

Another problem concerning which but little detailed study has been made recently by this association, is that of the drafting of locomotives, this to include the progress of the air and gases from outside of the ash pan to the top of the stack. In a committee report at the recent Fuel Convention, M. C. M. Hatch, of the Delaware, Lackawanna & Western, showed a wide variation in the practices of the railways regarding ash pan opening, finding a difference of from 15.1 to 5.78 per cent in the ratio of air opening in the ash pan to the grate area. He found a difference of from 25.8 to 49.6 per cent in the ratio of air openings in the grate to the grate area. He also found that there is no one front-end arrangement in general use nor a general conforming to the Master Mechanics' Association's recommendation for proportioning the front end. Another feature, as brought out in the discussion by Lawford H. Fry, is that of the firebox volume. With the high volatile coal this is a most important feature. It is well known that the loss of available heat by incomplete combustion is very large and without sufficient firebox volume this will occur.

The effect of improper maintenance on the coal pile, in addition to the imperfect operation of the locomotive, should also receive consideration. Leaks in the flues, packing and front-end all contribute to the wasting of fuel. Worn pins in the valve gear, and improperly maintained bearings on both the cars and locomotives are also a drain on the fuel. These are but few of the many possible problems for a committee on fuel economy to consider.

9.30 A. M. to 1.30 P. M.

Individual Paper on:

Variable Exhausts by J. Snowden Bell.

Discussion of reports on:

Joint meetings with M. C. B. Association.

Revision of air-brake and train signal instructions.

Train resistance and tonnage rating.

Locomotive counterbalancing.

Maintenance and operation of electrical equipment.

Forging specifications.

Boiler washing.

Dimensions of flange and screw couplings for injectors.

Subjects.

Resolutions, correspondence, etc.

Unfinished business.

Election of officers, closing exercises.

Adjournment.

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.00 P. M.—*Carnival Dance.* Special Feature, "Charlie Chaplin Fox Trot," Miss E. M. Kegel and Mr. Frank Carlin. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS

The eighth semi-annual meeting of the Association of Railway Electrical Engineers will be held as usual at the Hotel Dennis, Atlantic City, on June 14. The meeting will be called to order at 9 a. m. and the various committees will present reports of progress.

ROLLER CHAIRS FOR DANCES

The announcement of the Transportation Committee that roller chairs would be provided free from 8.30 p. m. to 10 p. m., to both of the informal dances on the Pier refers only to the functions held last evening and to be held next Tuesday evening. Roller chairs will not be furnished free to the other informal dances.!

WHERE THE VAUDEVILLE SHOW WILL BE HELD

The vaudeville show on Saturday evening will be held in the Auditorium over Exhibition Hall on the Pier. Probably a good many people do not know just how to reach the auditorium. The way to get to it is to pass through the court and through Exhibtion Hall and up the incline. At the top of the incline members of the entertainment committee will be stationed to direct the crowd where to go.

TRANSPORTATION TO THE GOLF CLUB

The Entertainment Committee has arranged with the Bergdoll Taxicab Co. for special rates to and from the Sea View Golf Club a charge of $5.00 being made for six passengers each way. Machines will be parked at the Marlborough-Blenheim, Traymore and Chalfonte hotels for the convenience of those attending or participating in the golf tournament on Sunday, or machines may be ordered at any time by phoning the taxicab company, phone 600.

INFORMAL DANCE

The informal dance which was held on the Million Dollar Pier last night proved to be a most delightful affair and was very largely attended. The program was rendered by the Don Richardson Orchestra. Miss Betty Lee, who was announced to sing folk songs, has found it is impossble to render these to advantage because of the poor acoustic prop- of J. F. A. Comstedt, chairman; M. G. Baker, W. K. Krepps, G. E. Ryder, D. E. Sawyer, T. K. Dunbar, R. J. Faure, R. H. Gwaltney, A. B. Wegener and W. H. Bentley.

PURDUE UNIVERSITY DINNER

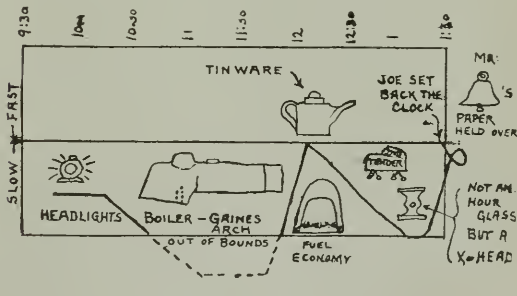
The annual convention Purdue Dinner will be held at 6.30 Saturday evening at the Shelburne. All Purdue men are requested to attend. Those who have not already signified their intention of attending should leave their names with Prof. L. E. Endsley, E. E. Silk or at the *Railway Age Gazette* booth, in order that proper arrangements may be made.

CORNELL DINNER

The annual dinner of the Cornell men attending the conventions will be held at Barney's to-night at 7.30 o'clock. All Cornell men who have not already signified their intention of being present are requested to register to-day at the booth of the Chicago-Cleveland Car Roofing Company, Space No. 506. The guest of honor at the dinner will be Professor Dexter S. Kimball, professor of mechanical engineering of Sibley College at Cornell.

YESTERDAY'S SESSION

We are indebted to Joe Taylor for the accompanying diagram, showing graphically the progress which was made at yesterday's meeting. It really needs no explanation.



COMPARATIVE REGISTRATION FIGURES

Below are given the registration figures for the first day of the conventions for the past four years. The figures for this year should be compared with those for 1913, as the M. M and M. C. B. conventions alternate from year to year in coming first.

	1912.	1913.	1914.	1915.
Members M. M. and M. C. B.	263	374	466	367
Special Guests	169	141	182	135
R. R. Ladies	211	222	200	163
Supply Ladies	164	221	350	163
Supply Men	1149	1264	1169	892
Totals	1956	2222	2367	1720

While there is a substantial decline in the figure for total registration, an analysis of the figures is encouraging rather than discouraging. From the standpoint of all concerned the attendance for railway men is the most important factor and it will be noted that the number of railway men registered the first day was only seven less than in 1913 and was much larger than in 1912. The heavy decline in the total registration is due to the reduction in the numbers of ladies and of representatives of supply companies here, the number of ladies who registered the first day being 119 less than in 1913 and the number of representatives of supply concerns 372 less. The relatively large registration of railway men shows that their interest in the conventions and the exhibit remains as keen as ever.

President Gaines called the meeting to order at 9.50 a. m. Thursday. The secretary read the reports of the auditing committee and the certified public accountants, which on motion were received and approved.

At the suggestion of D. F. Crawford, chairman of the Committee on Locomotive Headlights, who was unable to be present, the privileges of the floor were extended to J. L. Minick, who presented the report.

LOCOMOTIVE HEADLIGHTS

In connection with the incandescent lamp headlight, the committee feels that the following standards should be adopted in order to direct the development of this type of headlight.

Voltage.—The voltage of the system should be fixed at 6 volts, for the following reasons:

1. This voltage will permit the use of standard 6-volt automobile lamps in the cab, markers, etc. Lamps in the 25-34 volt class, of the proper candle-power for this service, are not now made, and they will be difficult to develop.

2. This voltage will permit the use of incandescent lamps having the strongest possible filament of the most rugged construction. A complete line of 6 and 7 volt lamps has been manufactured for some years past for automobile service. No new sizes need be developed for locomotive service, except that the size and form of filament winding in the headlight lamp will have to be changed slightly to give the proper distribution of light.

3. This voltage will permit the use of a small storage battery on the locomotive, if so desired. Sufficient space is not now available on steam locomotives for 32-volt storage batteries.

4. This voltage can be obtained from a small turbo-generator as readily as any other voltage.

Candle-power.—The Columbus tests show that an incandescent lamp of approximately 50 mean horizontal candle-power will give sufficient light to meet the recommended maximum requirements of 3000 apparent beam candle-power. Concentrated filament tungsten lamps are now regularly manufactured in candle-powers

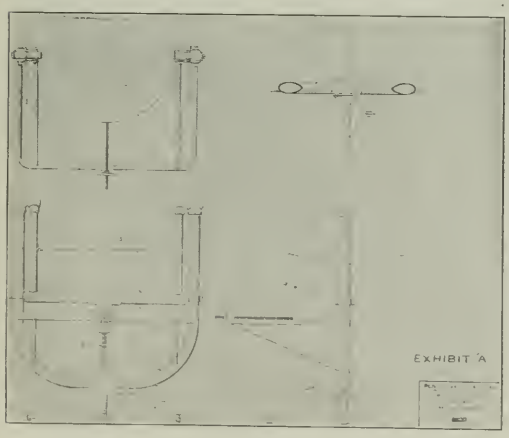


Fig. 1.—Photometer Table for Testing Locomotive Headlights

of 50, 100 and 160 at 6 and 7 volts, for headlight service. The two larger sizes are not deemed necessary by the committee. The committee recommends for use in the headlight a 50 candle-power, 7 volt, G-20 clear bulb, Edison screw base (style 100), loop-back tungsten filament, multiple burning, headlight lamp. (In case gas-filled lamps are used, the filament winding should be of such form and shape as to correspond closely with the form and shape of filament used in the lamp above described, and "gas-filled" must be specified when ordering.)

For use in the cab, markers, etc., the committee recommends a six candle-power, 7 volt, G-10 clear bulb, double-contact bayonet candelabra base (style 1000), tungsten filament, multiple burning lamp.

Standard bayonet double-contact sockets are recommended for bayonet base lamps. Standard Edison screw sockets, equipped with Benjamin lamp grip, or equivalent, are recommended for use with the headlight lamp.

When metal reflectors are used, the minimum nominal diameter

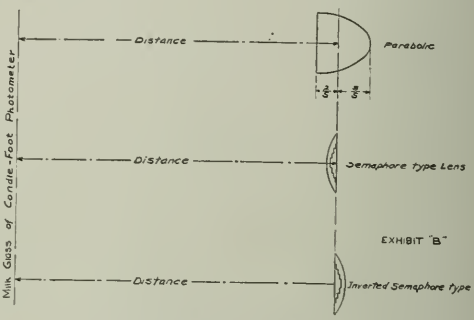


Fig. 2.—Method of Measuring Distance Between Milk Glass and Reflectors and Lenses

should not be less than 16 in. When parabolic glass reflectors or semaphore type lenses are used, the minimum nominal diameter should not be less than 12 in.

Method of Photometering.—A photometer table, constructed entirely of metal, has been developed, being so designed that it may be readily handled or moved about, and may be set up in

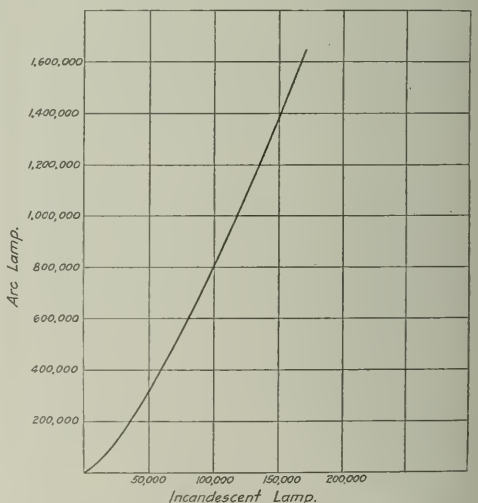


Fig. 3.—Ratio of Values of Arc and Incandescent Lamp Headlights

any location where sufficient floor space is available. This table is shown in Fig. 1. It consists of a platform (*A*) on which the headlight is mounted. This platform (*A*) is adjusted vertically by a screw (*B*) until the axis of the headlight corresponds with the point (*C*). The platform (*A*) and its adjusting-screw (*B*) are supported by a cradle (*D*), swinging in a vertical plane above a horizontal axis through the point (*C*), the whole being supported by a U-frame (*E*) of steel tubing. The U-frame is in turn supported by and rotated horizontally on a metal base (*F*),

may be rotated about three degrees in either direction for finding the optical axis of the headlight. The scale (*G*) indicated the vertical angle and the scale (*H*) the horizontal angle through which the headlight is rotated. Both of these scales should be provided with verniers for accurate reading.

Space not less than 9 ft. wide by 9 ft. high and 30 or more ft. in length, depending upon the type of headlight to be photometered, must be provided and enclosed on all sides with light, tight material. Heavy canvas or oilcloth may be used for this purpose, and all interior surfaces must be painted dull black to avoid reflection. A candle-foot photometer is mounted at one end and the headlight table at the other end of the room. Between these a series of at least three canvas screens, painted dull black on both sides, should be attached to the ceiling, floors and walls. A hole approximately 1 ft. square should be cut in each screen on the axis of the headlight. The candle-foot photometer is mounted outside the photometer room, the milk-glass tube pro-

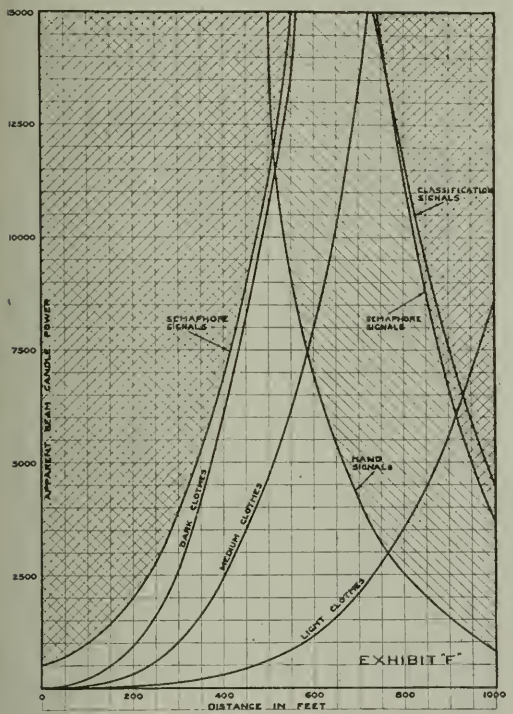


Fig. 4.—Dangerous Conditions for Various Apparent Beam Candle Powers.—The cross-sectioned space represents the danger zone

jecting through the end wall on the horizontal axis of the headlight.

The headlight should be set up at the following distances from the milk glass of the candle-foot photometer, depending upon the apparent beam candle-power of the headlight, as follows:

Apparent beam candle-power of headlight.	Distance of headlight from milk glass of candle-foot photometer.
1000 or less	15 ft.
1000 to 10,000	25 ft.
Above 10,000	50 ft.

The method of measuring this distance for parabolic reflectors, semaphore type of lenses, or inverted semaphore type of lenses is shown in Fig. 2. Readings are taken by rotating the headlight, both vertically and horizontally, to throw on the milk glass of the candle-foot photometer those rays of light corresponding to the reading stations recommended in last year's report.

As a matter of general information the committee has added Figs. 3 and 4. Fig. 3 is based upon the Columbus tests, and

light of 800,000 apparent beam candle-power may be seen just as readily with an incandescent-lamp headlight of only 100,000 apparent beam candle-power.

Fig. 4 is also based on the Columbus tests. All of the curves indicating dangerous conditions, as referred to in last year's report, have been reduced to a common scale and plotted on one sheet. The cross-sectioned space is the "danger" zone and the clear space is the "clear" zone. In selecting a safe headlight it is evident that its apparent beam candle-power value must lie within the clear space.

The Sixty-third Congress passed an amendment to the Locomotive Boiler Inspection Bill regarding the inspection of locomotives and tenders, including "all parts and appurtenances thereof." It is evident from the foregoing that this subject will be active for several years to come. For this reason the committee feels that it should be continued so as to collect for ready reference any new information that may develop or conduct any tests that may be desired.

The report is signed by:—D. F. Crawford (Penna. Lines), Chairman; M. H. Flynn (M. C.); C. H. Rae (L. & N.); F. A. Torrey (C., B. & Q.); H. T. Bentley (C. & N. W.); M. K. Barnum (B. & O.), and Henry Bartlett (B. & M.).

DISCUSSION

President Gaines: Have you tried the application of the incandescent lamp to the old arc outfits in any of your tests?

J. L. Minick: The equipment used consisted entirely of new reflectors. They were made up by several manufacturing concerns and we did not try the adaptation of incandescent lamps to reflectors which had formerly been used with arcs. We did use incandescent lamps with certain reflectors formerly used with oil. We got very reasonable candle powers. The Pennsylvania 16-in. reflector has quite large openings in the side for illuminating the locomotive numerals. The holes for the oil lamp are also very large. It was found that by closing first only the numeral holes the candle power of the headlight could be increased approximately 50 per cent, and by closing up the two holes used for the chimney it could be increased approximately 100 per cent by using an incandescent lamp.

J. L. Minick: There are about 2,000,000 six-volt starting and lighting generators used in automobile service. There are a great many turbo-generators of somewhat larger size used. They will vary anywhere from 500 to 600 watts up to 1,000 watts and apparently from the steam end these are working satisfactorily. It remains, therefore, to get a smaller turbine to drive the six-volt generator intended for use with the incandescent lamp, which does not require as much power as the arc light headlight. It is purely a matter of reducing the size of the turbine slightly. The difficulty in this lies in getting the steam nozzle small enough to deliver just the right amount of steam.

W. E. Dunham (C. & N. W.): In noting the number of states that now require the fifteen hundred candle power lamp, it would seem that there are a great many equipments now in use which it would not be desirable to throw away. In changing to the six-volt equipment and abandoning our thirty-volt equipment, it will be difficult to win the support of those who handle the pocketbooks of the railroads. We have been experimenting on the Northwestern with incandescent lamps of the 25 to 34-volt class and we are able to get good lamps and good results without changing the generators or any other part of our present equipment on the locomotive.

M. K. Barnum (B. & O.): It is quite probable that a plan could be worked out by which the present equipment can still be used in connection with lower voltage if they desire to do that, and if they do not desire to do that, there is nothing to prevent their continuing the present equipments as they are.

J. L. Minick: The statement of the committee is not to the effect that there are no thirty-two volt headlight lamps made. The statement is made that lamps of the proper candle power for use in the cab and as markers of the 25-34 volt class are not made. There is a series of incandescent lamps made for headlight service which correspond exactly to the size given for the six-volt lamps, that is 50, 100 and 160 candle power, and they can be substituted for the present arc light headlight equipment, but when it comes to cab lights and marker lights, you will either have to have special lamps made up or use lamps which are too large and consume too much power.

E. W. Pratt (C. & N. W.): We are buying for cab lights and markers 32-volt lamps, which cost 11 cents each. These are about 25-watt lamps.

J. L. Minick: That is equivalent to about 20 candle power, and not more than five or eight candle power is necessary. Five or eight candle power cab lights in the proper reflector will give as good results.

the incandescent light headlight in place of the arc light headlight. I would like to ask if these standard headlights can be rewound to six volts.

J. L. Minick: It would probably cost no more to buy the six volt equipment, than it would to go to the expense of rewinding the other.

J. A. Pilcher (N. & W.): Could not the cab lights and auxiliaries be run in series using low voltage lamps and in this way keep down the power?

J. L. Minick: That is possible.

J. H. Davis (B. & O.): If the committee's recommendations are accepted, how are we to comply with the law where it states that 1500 candle power, unreflected, shall be furnished? The maximum candle power of the lamps specified for six volts is 160 candle power.

C. E. Fuller (U. P.): It is presumed that there will be a federal law governing headlights, and in that case the best legal advice we have is that it will automatically wipe out all state laws. We now have such law, but there have been no requirements framed under it. We presume that when these requirements are framed they will be Federal requirements, so that all the railroads in the United States will be operating under the same requirements.

W. H. V. Rosing (St. L. & S. F.): We use the same kind and style of lamps in cabs as we do in train lighting, and it seems to me that the locomotive and the passenger train ought to be considered together. By using the same lamps in both engine and train, even though the higher voltage might be more expensive on the locomotive, that might be offset by not having to carry a separate stock of lamps at points where repairs would be required.

The committee was continued for another year.

DESIGN, CONSTRUCTION AND INSPECTION OF LOCOMOTIVE BOILERS

During the past year the committee has made a complete investigation of the methods in vogue for figuring stresses in locomotive boilers. The replies from 44 roads indicate that in some essential details, such as figuring efficiency of seams, there was no variation in methods, while in other details there was at times

C. E. Fuller
Chairman, Committee on Design, Construction and Inspection of Locomotive Boilers

a wide variance of assumptions. The following rules for determining stresses in locomotive boilers are presented as Recommended Practice:

RULES FOR DETERMINING STRESSES IN LOCOMOTIVE BOILERS.

Longitudinal Barrel Seams and Patches.

(a) In figuring net section of plate, use the actual diameter of rivet hole.

(b) In figuring rivet shear, use the actual diameter of the rivet after driven.

(c) In figuring stress in plate and shear in rivet, in case the barrel is not cylindrical where it joins the firebox wrapper sheet, use the maximum diameter. Surfaces subject to bending action

(d) When boiler shells are cut to apply steam domes or manholes, the amount of metal in the flange and liner shall be equal in strength to the metal removed. When a separate flange is used at the base of the dome, the entire net area of it shall be assumed as reinforcement. Where the dome sheet is flanged direct to the shell of the boilers, a vertical distance of 2 in. from the base of the flange shall be assumed as reinforcement, using the net area after the rivet holes are deducted and using 28,500 lb. tensile strength per square inch as the ultimate strength, if the dome sheet is welded vertically.

Longitudinal Gusset Braces and Flat Surfaces.

(a) In figuring stress in diagonal braces, allowance for the angularity of the brace shall be made.

(b) The sectional area of the brace and the strength of the attachment of the brace to the shell shall both be investigated and the lowest net strength shall be used.

(c) In determining the strength of the gusset braces for supporting the back head and tube sheets, use 100 per cent of the rivet-bearing area, 80 per cent of the rivet shear area and 90 per cent of the gusset plate area, measured at right angles to the longest edge of the gusset sheet, and of the three, select the minimum value.

(d) The calculation of stress in gusset braces shall cover both the section of the plate and the strength of fasteners, and the lowest net strength shall be used.

(e) In figuring flat stayed surfaces, such as back heads, the boundary of the unsupported flat surface shall be located at a distance equal to the outside radius of the flange measured from inside of the shell.

(f) No supporting value shall be assigned to the stiffness of flat plates on flat surfaces, as it is too small to be of material value.

(g) Reinforcing plates, such as back head liners, shall not be figured as having any staying or supporting value, but shall merely be considered as mechanical reinforcements for various attachments, such as longitudinal stays, staybolts, etc.

(h) The distance beyond the outer row of flues on tube sheets, assumed to be self-supporting, shall be 2 in.

(i) In calculating the area to be stayed on the front tube sheet, the area of the dry pipe hole shall be deducted.

(k) Tee irons or other members, when used subject to bending, shall be calculated without addition for the strength of the plate, and the stress in such beam and its abutments must not exceed 12,500 lb. per sq. in. The spacing of the rivets over the supported surface shall be in conformity with that specified for staybolts. No allowance for value of such beams shall be made in calculating the total area of longitudinal braces that may be attached thereto.

(l) Where there are a number of diagonal stays supporting a flat surface, such as the back head or front tube sheet, the proportion of area allotted to each brace shall be as follows: Divide the entire net area to be stayed by the entire net area of braces. If it is felt that any individual brace is so segregated as to receive more than its fair proportion of the load, it shall be investigated separately as to the area which it supports.

(m) Patches when applied to the barrel of a boiler shall be designed with longitudinal and circumferential seams at least equal in strength to the main longitudinal and circumferential barrel seams. Patches may be applied to flat stayed surfaces with properly designed single-riveted seams without impairing the strength of the sheet.

Staybolts—Radial Stays and Crown Bar Bolts.

(a) In figuring the net area of staybolts to obtain the stress, the area of the tell-tale hole shall be deducted.

(b) When figuring the area at the root of the thread, the area must depend upon the type of thread used, namely, United States V or Whitworth threads, as the case may be.

(c) In determining the area for figuring stress on staybolts, the area of one staybolt shall be deducted from the rectangular area included between any four staybolts.

(d) In boilers with crown bars supported on firebox side sheets and sling stays, the sling stays shall be considered as carrying the entire load.

The report is signed by: C. E. Fuller (U. P.), Chairman; M. K Barnum (B. & O.); J. Snowden Bell; C. B. Young (C., B. & Q.); D. R. MacBain (N. Y. C.); A. W. Gibbs (Penn.), and R. E. Smith (A. C. L.).

DISCUSSION

J. Snowden Bell: In justice to the committee and particularly to the chairman there should be a brief explanation made to the Convention of the brevity of the report and its failure to deal with the question of the design of locomotive boilers.

chanical Engineers appointed to formulate a code of specifications for the construction of steam boilers and other pressure vessels, which naturally included air-brake reservoirs, gas tanks, etc. That committee published and sent out a preliminary report. We also learned that they proposed to send copies of that report to the legislatures of seven different states, even before it had been approved by the society, with a view to guiding legislation. There were a great many very objectionable provisions in it regarding the factor of safety of pressure vessels other than steam boilers and stationary boilers, a large number of which are used by railroads. We deemed it to be most important to endeavor to obtain a modification of such of those provisions as were detrimental to the railroads and we met with this committee. There were four different meetings devoted entirely to a consideration of the proposed code.

There was also correspondence with the committee on the relation of railway operation to legislation, with which our committee was closely in touch. We succeeded in obtaining modification of the report, the first draft of which has been revised three times; and this morning I saw the fourth revision. We have not obtained all we wanted, but great improvement has been made upon the original drafts of the report.

J. A. Pilcher (N. & W.): It seems to me that item (i) in the report is wrong, because the pressure coming on the pipe itself is finally delivered on the front sheet around its circumference.

M. H. Haig (A. T. & S. F.): A great many of the boiler parts have already been figured, but there are still more to be figured. It is necessary from time to time to train men for calculating of the parts in reinforcing and maintaining boilers, and while the men responsible for the correct reports check them very carefully, their work must be supplemented by those trained to do the original figuring. Therefore I feel that the simpler these reports and explanations are, the greater their usefulness. Item (a) under Longitudinal Gusset Braces and Flat Surfaces I presume includes a bar brace or diagonal brace as well as the gusset. I think it would be well if this could be explained still further, to show just how that angularity is taken care of for the benefit of those who do the work. Referring to item (e) under the same heading, I would like to suggest that the unsupported flat surface be located a distance equal to the outside radius of the flange plus one inch. I think the additional area is well taken care of by the curve surface.

G. L. Fowler: A year ago when the report of this committee was presented it was announced that there were to be some investigations made during the year that might be of interest to the convention at this time. The results are tentative and I do not want them to be considered in the slightest as demonstrations. They are merely indications of what is happening in the locomotive fire box, and as the construction of the box is to a great extent dependent upon these conditions they are presented to you.

The object of the investigation was to determine the relative amount of movement between the two sheets of the side water leg of a locomotive fire box by which the amount of deflection of the staybolts might be determined. In addition to that we made an approximate determination of the temperatures of the two sides of the inside sheet. Of course the work at the start was entirely without any precedent. I had absolutely nothing to go by and it was a mere matter of guess as to where we were going to land. The credit for this work is due to D. R. MacBain, Superintendent Motive Power and Rolling Stock, New York Central. He supplied the two boilers for the purpose, with new fireboxes especially constructed. The fire-boxes had the grates about eight feet long and five feet wide. One firebox had a complete installation of one-inch rigid staybolts put in in the usual manner; the other had a complete installation of Tate flexible staybolts throughout. The first bolts tested were the top row at the front, just below the crown sheet. My apparatus was so designed that there was no lost motion in it and it was of such a character that I could multiply the motion between the outside and inside sheets indefinitely, using a radiating mirror and a reflected light. I started in one evening (the work was all done at night) and told the fireman to get up steam and to pay no attention to me. I wanted round house practice. I waited about twenty minutes and went to my apparatus to get a reading. I found that whereas my divided beam of light that carried the motion on the outside was there, the other one had absolutely disappeared. It was finally located off about five or six feet, so far away that the reading was useless. The next night I moved my instrument up closer to get the light beam under control, and then surprises began. That I may be understood in speaking of the expanding of the sheet downward, backward and forward movement, means that the inside sheet moves down or back or forward relatively to and expansion within a minute of the time the lighted waste was thrown in to light the fire. A curious thing about the performance was that they almost invariably went in the unexpected direction. The front corner of the sheet, instead of going up and forward, as we would expect with the heat applied, went down and back. It did not go much more than .001 in. and then it started up. It was a constant movement throughout the whole proceeding. At the end of about twenty minutes it had reached its maximum forward movement. Then as the steam began to rise it went up, and while we had steam pressure on it kept moving, coming down back practically to its original position when the boiler was blown down. This was the case in all of the investigations.

In our tests we carried 200 lb. pressure, which would be raised in from 55 minutes to 1½ hours, then the pressure was held, with both pipes blowing, for about 15 min., after which the fire was dumped and the pressure blown down through the blowers in the stack. When that was not enough I opened the controller. The pressure was reduced about one point per minute, so that it took about three hours to drop the steam pressure; and in no instance did the boiler come back to its original position until the steam pressure was all drawn. In some cases it did not come quite back. In making the comparison between a flexibly and rigidly stay boiler the amount of movement of the upper corner at the front end of the flexibly stay boiler in comparison with the rigidly stay boiler was as 31 to 13. That is, the maximum deflection for the stay bolt of a flexibly stayed boiler was .031 in., for a rigidly stayed boiler it was .013 in. Going to the back end of the same row of bolts the movement was toward the back, but practically the same. We then came to the middle bolt in the center of the boiler where we would expect to find the neutral zone of no motion; but it is only an instantaneous neutral zone. It is varying from front to back and up and down all the time, but the limitations of the movement with the flexibly and rigidly stayed boiler was very marked. The total horizontal motion of the rigid bolt was about .026 in.; the total movement of the flexible bolt was about .042 in., about twice as much. That the rigidly stayed boiler only moves about half as far as the flexibly stayed boiler represents a fair average of the results obtained. I found on the middle row of bolts and as I came farther down, a phenomenon that at first was difficult to explain. The first movement of the inner sheet was down and the downward movement increased as we approached the mud ring. My apparatus was so designed as to measure the apparent movement of the two sheets, so if there were a buckling of the sheets there might apparently be a very decided downward movement when there was none at all; but of course there was a bending of the sheet or of the stay. I have redesigned the apparatus to eliminate this weakness, and am pleased to say that the facilities will be afforded this fall to go into the same two boilers again with an apparatus that will measure not only the actual relative movement of the two, but any buckling that may occur in the inside sheet.

As far as we have gone we have determined that the staybolt is in constant motion during the entire time the boiler is hot; that it is always bent when it is under stress, and that the maximum deflection of the bolt occurs before any pressure appears on the gage. In addition I put gages in the throat sheet, in the roof sheet and in the back head, to measure the in and out movement between these sheets, and the back tube sheet, the crown sheet and the back sheet in the fire box. The indications from the throat sheet and the back head were not very consistent, but the consistency of the movement of the crown sheet to the roof sheet was remarkable. The very instant the fire is kindled and begins to throw out any heat the crown sheet begins to go up relatively to the roof sheet. It goes up quite rapidly until the first indication of pressure appears, when it begins to drop, and in almost every instance it dropped well below its normal position when we had reached full steam pressure. In addition an attempt was made to get at the relative movement of the back tube sheet to the shell. There was a washout plug located about three or four inches ahead of the back tube sheet. The apparatus was connected to a tube through this hole. Whether the motion of the tube was entirely transferred to the tube sheet, I cannot say, but indications are that it was. The moment that we built our fire the tube began to move back. We took the valves out of the engine, so that the throttle could be opened and the fire driven for about half an hour with the throttle wide open. When getting up steam, that tube moved back with very great steadiness, but the instant the throttle was opened the movement became very rapid and

and came back into its original position again at the time of reaching the steam pressure. When I was measuring in that front staybolt I said that the first movement of the sheet was to the rear. At the end of ten minutes after the fire had been built the sheet had moved back .002 in. When the apparatus was attached to the tube it also moved back .002 of an inch, showing that probably the first backward movement of the sheet was due to a direct thrust from the tubes.

We also made an attempt to get at the temperatures of the two sides of the sheet. That was done with ordinary thermocouples. I went up over the top of the arch for the first investigation. There conditions were found to be what I would consider normal: the temperature of the water side was a little above the water temperature. On the other side it was about 750 deg. F. The apparatus was next moved back towards the end of the fire-box and during the early parts of getting up steam conditions were normal. When pressure was up, however, I found that the fire side of the sheet was about 50 deg. F. colder than the water side. My first conclusion was that the apparatus was out of order until attention was called to the smoke tube holes at the side. The apparatus was located about six inches ahead of the back smoke tube hole. This was plugged, and in less than two minutes the temperature was up where it ought to be. The cold air coming through the tube, flowing along on the side of the sheet, had cooled the sheet locally until it was below the water temperature. The apparatus was then located back of the fire door. It was possible instantly to tell when the fire door was opened, from the cooling of the sheet. The cool air coming in from the smoke tubes and chilling the sheets explains the cracking which is apt to occur around these holes, and the effect of the opening of the fire door is a good argument for the use of mechanical stokers.

E. W. Pratt: I would like to ask Mr. Fowler whether the boilers tested had wide fire-boxes with straight side sheets, or narrow fire-boxes with O. G. curves, and whether sloping heads or straight heads?

Geo. L. Fowler: They were wide fire-box boilers with sloping sides and slightly sloping crown sheets.

(The report of the committee was accepted and the recommendations will be submitted to letter ballot.)

STANDARDIZATION OF TINWARE

The committee has carefully reviewed the report submitted one year ago and has made some corrections, though no important changes in the details of any of the articles submitted at that time have been made. It has corresponded with a number of the leading railroads, secured blue-prints of the tinware they are using in their various departments, and has incorporated in its report items that it feels would be of general interest. The committee, in preparing this report, has received some very valuable suggestions from the Storekeepers' Committee, the manufacturers of tin plate, and some of the manufacturers of tinware.

The committee can not hope to present dimensions that have not adopted a standard, and while the committee has studied principally the method of construction and the material to be used, it has also selected the dimensions that in its judgment will be most suitable for the service for which each article will be used.

In the prints submitted the committee has endeavored to cover every detail, making parts interchangeable where this is practical. It will be noted that the joints are double-seamed and the detail of the seam is carefully outlined. Fig. 1 gives the description and name of the joints used in the construction of this tinware. The material is specified, standard kettle ears are used, handles are wired for stiffness and the diameter of the wire is in proportion to the capacity of the article, the can tops are interchangeable in groups, and the spouts are carefully braced to withstand rough service. The following is a brief description of each part recommended:

M. D. Franey
Chairman, Committee on Standardization of Tinware

Fig. 2 is a one-pound emery can, with a small opening which directs the emery onto the spot where it is required. There is a remarkable saving in the amount of emery used with a can of this type.

Fig. 3 is a typical funnel which in sizes of one pint, one quart and one gallon should take care of all requirements in the mechanical department.

Fig. 4 is a typical measure which may be made in one pint,

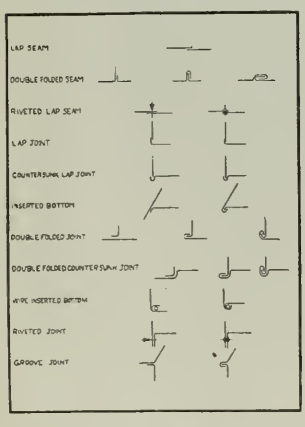


Fig. 1—Typical Seams and Joints

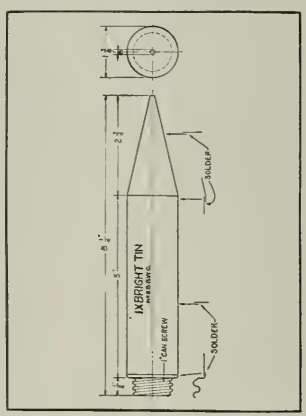


Fig. 2—One Pound Emery Can

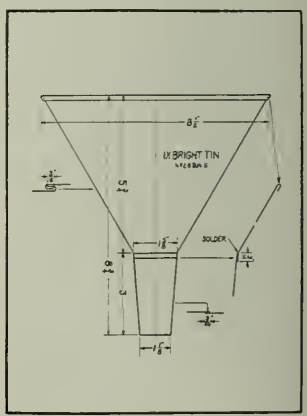


Fig. 3—One Gallon Funnel

diameter 5 5-16 in.; and for the one gallon size, a depth of 6 15-32 in. and a diameter of 6¾ in. The dimensions of the pint measure are shown in Fig. 4.

Fig. 5 is a plain and economical form of coal hod.

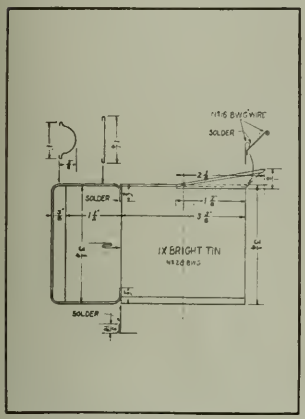


Fig. 4—One Pint Measure

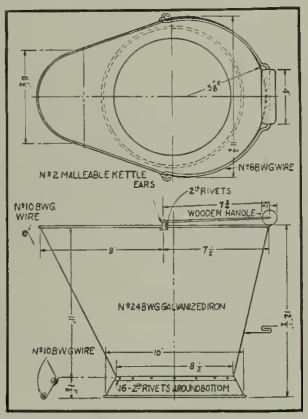


Fig. 5—Coal Hod

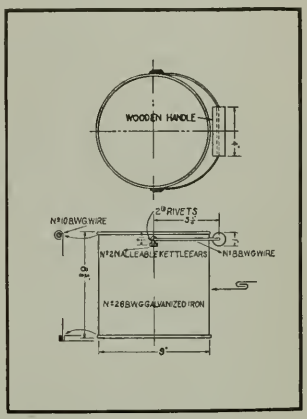


Fig. 6—Two Gallon Pail

Fig. 6 is a two-gallon pail. A four-gallon pail may be made similar to this with the depth of 10¼ in. and a diameter of 10¾ in.

Fig. 7 is a two-gallon journal oil can with a removable brass tip so that the size of the hole may be varied as required. The use of this oil can is not recommended in engine houses.

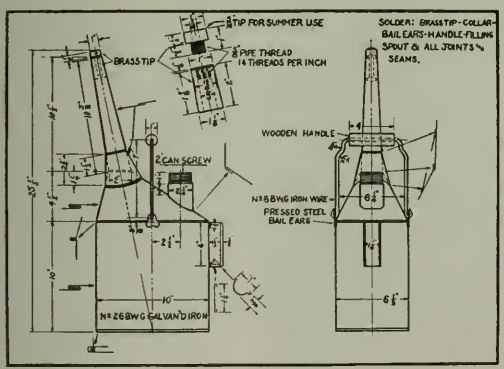


Fig. 7—Two Gallon Journal Oil Can

(Note.—The report also included illustrations of the articles submitted last year by the committee with a few minor changes and other lesser important articles—Editor.)

The report is signed by:—M. D. Franey (N. Y. C.), chairman; J. C. Mengel (Penn.); W. C. Hayes (Erie); G. S. Goodwin (C. R. I. & P.), and W. O. Moody (I. C.).

SUPERHEATER LOCOMOTIVES

[In view of lack of new material concerning superheater locomotives the committee did not present any written report. It submitted however the results of further tests made by the Pennsylvania Railroad on its Class E 6s engines as published in the P. R. R. pamphlet No. 27 with a recommendation that it be incorporated in the proceedings. This recommendation was adopted.—Editor]

That design of a locomotive boiler and firebox, together with the appurtenances, which will permit of the largest possible amount of evaporation from a given amount of combustible burned, has the maximum efficiency, and is, therefore, the best boiler from the standpoint of fuel economy. Greater attention is being given to the design of boilers, fireboxes, grates, ash pans and front ends than ever before, as all of these parts are interdependent and should bear a definite relation for the best results, and are influenced by the nature of the fuel available.

A study of certain ratios in locomotives constructed within the past 2 years, and in others built 10 or 12 years ago, shows the trend of locomotive design in those respects which have the greatest influence on fuel consumption and steaming capacity. The data shown below are the averages for a large number of bituminous and anthracite burning locomotives of the 4-6-2, 4-6-0, 2-8-0 and 0-6-0 types.

1.—Bituminous.

Type of Locomotive.	Ratio Total Evaporative Heating Surface to Grate Area. 1913	1903	Ratio Firebox Heating Surface to Total Evaporative Heating Surface. 1913	1903
4–6–2	65.9	70.9	6.4	5.4
4–6–0	52.3	62.8	7.8	6.5
2–8–0	53.3	60.1	6.7	5.7
0–6–0	53.0	71.8	8.3	6.0
Average	56.1	66.4	7.3	5.9
Per cent. change	Dec. 15.5 per cent.		Inc. 23.7 per cent.	

2.—Anthracite.

4–6–0	30.0	34.8	8.0	6.5
2–8–0	31.1	37.9	8.3	6.1
Average	30.5	36.3	8.1	6.3
Per cent. change	Dec. 16 per cent.		Inc. 28.5 per cent.	

The changes in these ratios are, without doubt, steps in the right direction.

The advantage of large heating surfaces and large grate areas in increasing the evaporation from a unit amount of fuel consumption over that from a similar locomotive with smaller heating surfaces and grate area, is clearly shown by an evaporation test recently conducted at the Pennsylvania Railroad testing plant at Altoona, between a Consolidation type and a Mikado type locomotive. The principal dimensions of the two locomotives and a summary of the data follow:

Principal Dimensions.

Item.	Consolidation.	Mikado.	Per Cent. Increase Favor of Mikado.
Cylinders	24 by 28 in.	27 by 30 in.	.....
Drivers	62 in.	62 in.	.....
Boiler pressure	205 lb.	205 lb.	.....
Smallest diameter of boiler	76¾ in.	76⅝ in.	.....
Length of flues and tubes	15 ft. 0 in.	19 ft. 0 in.	.....
Heating surface, flues and tubes	2 841.2 sq. ft.	3 746.8 sq. ft.	.....

Heating surface, total.....	4 201.5 sq. ft.	5 766.3 sq. ft.	37.2
Grate Area	55.1 sq. ft.	70.0 sq. ft.	27.1
Weight on drivers.....	219 900 lb.	235 800 lb.	.....
Total weight of engine.....	249 599 lb.	315 600 lb.	.....
Total tractive power.....	42 661 lb.	57 850 lb.	.....

SUMMARY OF TEST DATA.

Dry Coal Fired Per Hour, Lb.	Water Evaporated Per Hour, Lb. Consolidation.	Mikado.	Per Cent. Increase Favor of Mikado.
2 000	17 000	17 000	0.0
4 000	27 000	30 000	11.1
6 000	32 500	43 000	32.3
8 000	34 500	52 500	52.2

These figures clearly show the advantage of the large heating surface and large grate area, and that the economy increases with a decrease in the rate of combustion.

The above testing-plant figures are verified by the results obtained from a road test on the Chicago & North Western, reported in the *Railway Age Gazette* of January 15, 1915, pages 93-94. The locomotives compared were of the Consolidation and Mikado types, each equipped with superheater and brick arch.

Taking advantage of the opportunity afforded by locomotives with trailing trucks to increase the size of firebox and grate area over those proportions in locomotives without trailing trucks, affords a valuable means for reducing the fuel consumption on a ton-mile basis.

The design of exhaust nozzles to suit the various conditions, and as a factor in fuel economy, is very important. A number of roads have experimented with special types of nozzles, and claim a considerable saving in fuel as a result. The committee feels that the subject presents a fertile field for future investigation, due to changed conditions since previous reports were made.

The practice regarding the amount of air opening in ash pans varies between wide limits, ranging from 3 to 18 per cent of the gate area for bituminous and from 10 to 33 per cent for anthracite locomotives. These figures include all classes of service. The importance of air openings through the ash pan should not be overlooked, and it would be well to establish definitely the minimum opening in the ash pan as a percentage of the grate area. From the best data that the committee has been able to obtain thus far, it appears that this should not be below 12 per cent for locomotives having 70 sq. ft. of grate area, and this percentage should be increased with smaller grate areas.

The almost general application of superheaters and brick arches, not only to new locomotives, but also to many older ones, should not be lost sight of in this connection, as both are important factors in fuel economy and smoke reduction. The practice of welding flues into the back flue sheet is a step in fuel economy, because leaks in the firebox are reduced and the fire does not have to be drawn so frequently for repairs. Care should be taken in the design of all future locomotives to have the boiler capacity at least equal to, and, if possible, somewhat in excess of, the maximum power requirements of the cylinders.

SUPERHEATER LOCOMOTIVES.

When properly maintained and efficiently operated, the superheater is by far the most valuable mechanical aid to fuel economy ever applied to locomotives. By its use savings of 20 to 25 per cent in coal and water are obtainable in actual service. But if maintenance is neglected and careless handling of the device in service is permitted, the superheater may become almost useless, as far as performing its regular function is concerned. The question of superheater operation is extremely vital to the subject of fuel economy, and should be given careful consideration.

The method of handling the throttle on superheater locomotives is of more importance than is generally realized. The best results are secured by the use of a full throttle opening, with reverse lever control as far as service conditions will permit, the exceptions being, when starting a train, when using a very small quantity of steam while running at high speed on low grade or level track, and when drifting.

There are several conditions which will tend to reduce the amount of superheat added to the steam while passing through the superheater, some of which indicate improper inspection and maintenance, while others are within the control of the enginemen. The principal causes of loss of efficiency in the superheater are as follows:

1. When water is carried at too high a level in the boiler, priming is apt to result. When this occurs, water is carried over into the superheater and the water has to be evaporated.

2. If the fire is in poor condition, due to improper or excessive firing, or to holes in the fuel bed, there is bound to be a drop front end, will impair the efficiency of the superheater.

It would appear that to insure obtaining the best results from the superheater, a temperature indicator showing the degree of superheat is desirable. Among those who have had experience with such pyrometers is quite a difference of opinion regarding their value as an aid to the enginemen in improving locomotive operation. Of those replying to the questions relative to experience with pyrometers on superheater locomotives nine replies were unfavorable to the use of the pyrometer, except perhaps for tests or for limited application for educational purposes, and six replies were entirely favorable to the application of the pyrometer to all superheater locomotives.

On the road with which the chairman of this committee is connected, some experimenting has been done with the pyrometer, both in regular road service and on tests. It was observed that the enginemen were very enthusiastic over the results obtained with the device, and, as a rule, the fireman watched the pyrometer gage much more closely than he did the steam gage. In spite of its apparent delicacy of construction and adjustment, the instrument maintained its setting quite accurately. While the committee is not prepared to say that the cost of applying pyrometers generally would be justified by the savings resulting from their use, the device is not without merit, and, as an educational feature, the cost of a few applications would undoubtedly be amply repaid.

INSTRUCTIONS FOR ENGINEMEN AND FIREMEN.

In order to obtain the best operating efficiency and the greatest amount of fuel economy, careful attention to two fundamentals is absolutely essential. The design of locomotives must be such that economy is obtainable, and the enginemen and firemen must receive suitable instruction in order that the desired economies can be realized.

Foregoing portions of the report cover, in a general way, those factors of locomotive design which have the greatest influence on fuel economy. [The committee also presented a standard Manual of Instructions for Enginemen and Firemen, which embodied all the essential points of efficient locomotive operation, and at the same time was brief and free from technical data.—Editor.]

The report is signed by:—Wm. Schlafge (Erie), Chairman; W. H. Flynn (M. C.); D. M. Perine (Penn.); Robert Quayle (C. & N. W.); S. G. Thomson (P. & R.), and D. J. Redding (P. & L. E.).

DISCUSSION

C. D. Young (Penn.): The committee has covered the ground of instructions to the road employes in a very complete and concise way. I move that this part of the report go to the association for letter ballot for adoption as recommended practice. It might be well for the executive committee to consider the advisability of publishing this portion of the report in some small booklet form, so that these copies could be procured by the small roads who do not care to have more elaborate instruction, and distributed to their road foremen and to the men.

(The motion was carried.)

D. J. Redding (P. & L. E.): I hope that the manufacturers of pyrometers may be able to bring out in the near future some pyrometer which will record its performance over the entire trip and which will be of sufficiently rugged design that it will be satisfactory for locomotive service. The committee speaks of starting the lubricator at least fifteen minutes before leaving time. I think that could be made clearer.

Lawford H. Fry (Baldwin Loco. Works): There is one point I think might be brought out in connection with the ratios given of fire-box heating surface to grate area, and total heating surface to grate area, and that is the volume of the fire-box. The value of the volume is indicated where it says "When bituminous coal is applied to the fire the volatile or gaseous matter is expelled, and, if properly mixed with air and heated to a sufficient temperature in the fire-box, the mixture will ignite." Both space and time are necessary for the ignition, and it is necessary to give proper volume as proper grate area. If we analyze the figures we see that the fire-box heating surface per square foot of grate area which is a rough measure of the volume of the box per square foot of grate area, to be 11.3 in 1903, and was reduced to 7.7 in 1913 for the bituminous locomotives, indicating that with the increasing sizes of the locomotives it is more difficult to keep up the fire-box volume. While it has become more difficult, the fact that it is desirable to keep up the volume, I think should not be lost sight of.

Mr. Schlafge: It was not the intention of the committee to draft hard and fast rules, because we know that that would

we have got to meet these conditions as they come up, and I am a great believer in system. To me a system, be it ever so bad, is better than no system at all.

C. F. Baker: I think much more attention ought to be paid to the area of the air openings in the ash pans. I would suggest that either this committee or another committee make further investigation and report at the next convention on the proper area of air openings in locomotive ash pans.

SYMPATHY FOR MR. FOSTER

O. M. Foster, master mechanic of the New York Central at Collinwood, Ohio, recently lost his wife and daughter, and was badly injured himself, in an automobile accident. A motion was carried at yesterday's meeting conveying the sympathy of the M. M. Association to Mr. Foster.

UNIVERSITY OF VERMONT ALUMNI

Members of the University of Vermont Alumni held an informal luncheon at the Marlborough-Blenheim on Thursday. Those present were: H. B. Oatley, Locomotive Superheater Co.; M. C. Robbins, general manager of the Iron Age; H. H. Marsh, Railway Age Gazette, and G. M. Leach, Atlantic City Electric Co.

SOME FACTS ABOUT THE GOLF TOURNAMENT

Certain points regarding the golf tournament do not seem to be generally understood. One of the most important of these is that while there will be two contests, an 18-hole Medal Play handicap and an 18-hole Kickers' handicap, it will be necessary to play only 18 holes in order to take part in both of them. In other words, the player may enter both contests and have his score for 18 holes, if he plays only this many, apply in each of them.

First, second and third prizes will be awarded in each contest, the prizes all being sterling silver loving cups. The playing may be done at any time on Sunday. In case of ties in either contest, additional rounds will be played by those who are tied on either Monday or Tuesday of next week. Each participant in the tournament will have the privilege of selecting his own handicap in the Kickers' contest and the winning score will be the lowest between 71 and 76. All scores under or over these amounts will be disqualified. The Medal Play handicap awards will be based on the regular handicaps and resulting net scores of the players.

The following persons have entered the tournament up to the present time:

H. C. May	La Fayette Country Club
Charles A. Schroyer	Westward Ho
H. H. Kerr	Westmoreland
John B. Wright	Edgewood Country Club
C. C. Castle	Rockland Country Club
B. A. Hegeman	Rockland Country Club
N. E. Chilcoat	Edgewood
T. W. Williams	Baltusrol
F. M. Nellis	Belmont Springs
W. K. Krepps	Wykagyl
R. C. Vilas	Glenview
Merrill G. Baker	Unattached
L. F. Deming	Whitemarsh
W. O. Kellogg	Woodbury Country Club
C. A. Raymond	Unattached
B. Pratt	Calumet
B. V. H. Johnson	Glen Echo
George E. Howard	Glen Echo
George T. Cooke	Englewood
J. S. Seeley	Calumet
J. E. Buker	Calumet
C. F. Palmer	Algonquin
Samuel O. Dunn	Westmoreland
Harold N. Scott	Chicago Golf
J. G. Tawse	Calumet
L. R. Dewey	Calumet
Prescott Dudley	Chicago Golf
Edw. E. Silk	Unattached
C. B. Field	Evanston
G. H. Musgrave	Commonwealth
H. M. Perry	Jackson Park
C. J. Olmstead	Unattached
S. G. Downs	Unattached
C. C. Farmer	Unattached
E. Quincy	Salesbury
H. R. Newlean	Jackson Park
L. E. Jones	Belmont
B. P. Flory	Orange Co.
D. R. MacBain	Shaker Heights

Vote of thanks to Ernest Shackelford, manager of the Pier, for the thorough manner in which he has co-operated with the committee in its work. Never before has there been so little difficulty in keeping the public off the Pier, notwithstanding the innovation of excluding outsiders for all five nights instead of only two, as in former years.

ADDITIONAL MASTER MECHANICS' REGISTRATION

Allen, C. W., Shelburne.
Allen, G. S., P. & R.; Pennhurst.
Arter, W. D., Supvr. Apprent; N. Y. C.; Traymore.
Arden, D. D., Sav. & States B.; M. M.; Baltimore.
Ayers, A. R., Prin. Asst. Engr.; N. Y. C.; Blenheim.
Best, W. N., Marlborough.
Bingaman, C. A., A. E. M. P.; P. & R.; Albemarle.
Blunt, James G., Amer. Loco. Co.; Traymore.
Bowles, C. K.; M. M.; Tidewater & West.; Monticello.
Burton, T. D., Blenheim.
Bussing, G. H., S. M. P.; Mex. No. West; Haddon Hall.
Butler, F. A., M. M.; Boston & Albany; Alamac.
Brazier, F. W., S. R. S.; N. Y. C.; Blenheim.
Cooper, F. T., Hobart & Allfree Co.; Dennis.
Dillon, S. J., M. M.; P. R. R.
Ewald, Wm., S. M. P.; Cumb. & Pa.; Ebbit House.
Fitz Simmons, E. S., Mech Supt.; Erie; Blenheim.
Fry, L. H., Supt. of Product, Stand. Steel Wks.; Shelburne.
Freeman, L. D., Supt. Shops, S. A. L.
Gill, C A., G. M. M.; B. & O.; Holmhurst.
Gordon, H. D., Jenkins Bros.; Blenheim.
Gray, B. H., S. M. P.; N. O. M. & C.; Traymore.
Coddington, H. W., Engr. Tests, N. & W.
Harrington, H. H., M. M.; Erie; Dennis.
Hoke, H. A., Asst. Engr. M. E. Dpt.; P. R. R.; Dennis.
Irvin, I. B., Gen. For.; P. S. & N.; Lexington.
Kendig, R. B., Ch. M. E.; N. Y. C.; Blenheim.
Lanza, G., Conslt. Engr.; Dennis.
Laux, J. P., M. M.; L. V.; Arlington.
McManamy, John, M. M.; Haddon Hall.
Meade, P. J., M. M.; A. C. L.; Chalfonte.
Milliken, Jas., S. M. P.; P. B. & W.; Brighton.
Montgomery, Wm., M. M.; C. of N. J.
Moses, F. K., M. M.; B. & O.; Lexington.
Montgomery, Chas., M. E.; P. M.; Dennis.
Muhlfield, J. E., Conslt Engr.; Blenheim.
Murray, F. H., M. M.; Erie; Alamac.
Murray, E. A., M. M.; C. & O.; Blenheim.
Murray, E. A., M. M.; C. & O.; Blenheim.
Mullinix, S. W., Supt. Shops, Rock Island; Dennis.
Pattison, R. C., M. E.; W. & L. E.; Chalfonte.
Pickard, F. C., M. M.; D., L. & W.; Traymore.
Quereau, C. H., Supt. Elec. Eq.; N. Y. C.; Blenheim.
Ralston, J. A., M. E.; U. P.; Dennis.
Reagan, F. H., Supt. Shops; D., L. & W.; Blenheim.
Riley, S. B., Gen. For.; West Mary.; Haddon Hall.
Rummey, T., Dennis.
Shull, G. F., M. M.; C. C. & O.; Traymore.
Smock, F. A., M. M.; P. R. R.
Snyder, W. H., M. M.; N. Y. S. & W.; Alamac.
Stuart, Charles M., M. M.; P. & R.; Pennhurst.
Street, Clement F., Loco. Stoker Co.; Blenheim.
Stewart, A. F., M. M.; C. & O.; Traymore.
Thomson, H. R., M. M.; Newb. & S. S.; De Ville.
Thibaut, Geo., M. M.; Erie; Lexington.
Trout, W. S., Gen. For.; West. Mary.; Holland.
Turner, Amos; M. M.; L. V.; Arlington.
Warnock, H. R., S. M. P.; West. Mary.; Traymore.
Webster, H. D., M. E.; B. & L. E.; Traymore.
Wiggins, C. H.; S. M. P.; B. & M.; Blenheim.

ADDITIONAL MASTER CAR BUILDERS' REGISTRATION

Brazier, F. W., S. R. S.; N. Y. C.; Blenheim.
Bussing, G. H., S. M. P.; Mex. No. West.; Haddon Hall.
Coddington, H. W., Engr. Tests; N. & W.; Traymore.
Ewald, Wm., S. M. P.; Cumb. & Pa.; Ebbit.
Fitz Simmons, E. S., Mech. Supt.; Erie, Blenheim.
Gray, B. H., S. M. P.; N. O. M. & C.; Traymore.
Grewe, H. F., M. M.; W-P. Term; Sterling.
Hogsett, J. W., Ch. Joint Car Insp.; Chalfonte.
Irvin, I. B., Gen. For.; P. S. & N.; Lexington.
Kendig, R. B., Ch. M. E.; N. Y. C.; Blenheim.
Laux, J. P., M. M.; L. V.; Arlington.
Milliken, James, S. M. P.; P. B. & W.; Brighton
Muhlfield, J. E., Consult. Engr.; Blenheim.

Waldo, B. M., Ch. Interc. Insp.; Chalfonte.

ADDITIONAL SPECIAL GUESTS

Arnold, Harry M., Clerk, P. & R.
Benz, Robt., For.; P. R. R.
Bicler, H. C., Asst. Supt.; P. R. R.; Seaside.
Bower, T. T., Asst. Efficiency Engr.; B. & O.; Dennis.
Brown, George, P. R. R.
Brown, Jas. R., Ch. Cl. Traf. Dept.; B. & O.; Dennis.
Bugg, B. L., Asst. Gen. Mgr.; A. B. & A.; Blenheim.
Campbell, J., M. M.; L. V.; Traymore.
Chaffee, W. D., M. M.; N. Y. C.; Dennis.
Copeland, T. T., Rd. For. of Eng.; Union; Dennis.
Culver, C. N., For.; C. of N. J.
Dampman, W. M., For. Eng. House, P. & R.; Clarion.
Davis, G. L., Gen. Mgr.; Pond Creek Coal Co.; Seaside.
Dugan, G. A., For. Round House, P. & R.
Eldridge, Geo. P., P. & R.
Endy, Wm., Str. Keeper, P. & R.
Entrekin, Thos., Str. Keeper, P. & R.
Engard, Albert C., U. S. Navy; Bothwell.
Farrington, R. J., Gen. Piece Wk. For.; P. & R.
Farrington, A. R., Insp. Piece Wk.; P. & R.; Strand.
Fleming, H. L., Gen. For.; B. & O.; Brevoort.
Frazee, Wm. H., P. R. R.; Colonial.
Gilhausen, F. R., Gen For.; B. & O.; Lexington.
Grooten, M., M. E.; Imperial Russian Rys.; Brighton.
Gramm, Rush, Engineer, B. & O.; Lyric.
Guinand, H. W., Insp. Material, P. R. R.
Haines, W. S., M. M.; Erie; Continental.
Heinbach, W. F., For.; P. & R.; Larchmont.
Hewitt, E. F., Gen. For.; P. R. R.
Hill, Jno. P., Gen. Stork.; W. J. & S.
Holliday, James, Shop For.; A. C. L.; Monticello.
Howe, L. C., A. B. Insp.; P. & R.
Hunter, J. F., Asst. Supvr.; W. J. & S.
Hukill, H. O., Retired Pur. Agt.; Brighton.
Huston, F. T., A. M. M.; Penna. Lines; Dennis.
Joyce, Michael, Engineer, P. R. R.
Kauffman, G. B., Pass. Agent, Atl. City Ry.; Grand Atlantic.
Kilborn, J. E., Pur. Agt.; Rutland; Blenheim.
King, John H., Ch. Clerk, N. Y., O. & W.; Phillips House.
Kulp, C. J., Treas.; L. V.
Lane, R. H., Insp. Test Dept.; Southern.
Linvill, J. M., Engineer, N. Y. C.; Sterling.
Little, D. A., For.; P. R. R.; Rudolf.
MacAlpine, J. D., Trav. Acct.; N. Y. C.
Mayer, F. A., Gen. Mast. B. M.; Southern; Pennhurst.
Markland, W. H., Gen. Shop Insp.; P. R. R.
Mull, Russell H., P. & R.; Sterling.
Murphy, J. W., For.; Boston & Albany; Schlitz.
Munick, J. L., For. Office Mech. Engr.; P. R. R.; Dennis.
McGowan, G. W., Gen. For.; S. P.; Lexington.
Nelson, W. G., Jr.; Equip. Insp.; P. R. R.
Neale, F. A., Gen. For.; C. of N. J.; Pennhurst.
Ogilvie, James, Mech. Expert, Board of Ry. Coms.; Alamac.
Poole, E. P., Supvr. Loco. Piece Wk.; B. & O.; Strathaven.
Rankin, W. E., For.; P. & R.; Bothwell.
Rice, Wm. L., Gen. For.; P. & R.; Monticello.
Rhoads, J. J., Supt.; P. R. R.
Rhodes, R. S., N. Y. C.; Runnymeade.
Riedinger, L. P., Gen. For.; P. R. R.
Rohrback, M. P., For. Round House, P. R. R.; Continental.
Russell, R. B., Gen. For.; P. & R.; Osburne.
Schofield, W. B., Asst. to Pres.; D. & H.; Blenheim.
Schechter, L. H., Ch. Engr.; Russia Loco. & Mach. Corp.; Blenheim.
Schum, H. S., For. Round House, P. R. R.; Continental.
Shepp, D. F., P. & R.
Smith, R. M., Asst. Rd. For. Engs.; P. R. R.
Smith, M. E., Sig. Engr., D., L. & W.; Shelburne.
Smith, W. M., For. Round House, P. & R.; Whittle.
Strauss, I. H., Secy. to S. M. P.; C. & O.; Shelburne.
Stull, H. W., Gen. For.; P. & R.; Dennis.
Stewart, M. D., For. Erect. Shop; So.; Monticello.
Talbot, F. J.; Ch. to Mech. Supt.; Erie; Chalfonte.
Vought, H. D., Secy.; N. Y. C.; R. R. Clubs; Blenheim.
Vorhees, T. C., Jr.; Asst. to Prest.; P. & R.; Traymore.
Walsh, C. E., Asst. to Pur. Agt.; Penna. Lines; Brighton.
Wilt, W. L., Ch. Cl. to S. M. P.; Penna. Lines.
Wilson, J. M., Gen. For.; P. & R.; Miller's Cottage.
Wilson, Wm. C., P. & R.; Miller's Cottage.
Winterstein, John, Loco. Insp.; I. C. C.; Arlington.
Zeigler, C. J., Ch. Electr.; Fla. East Coast; Dennis.

Conventionalities

B. W. Mudge is evidently out for blood in the golf tournament. He has wired Junior for his favorite "putter."

W. H. Forsyth, general manager of the Curtain Supply Company, has been detained, but is expected to arrive in Atlantic City on Saturday.

W. H. Wilkinson, of the Pressed Steel Car Company, was feeling pretty glum until he learned that his side partner, Jack Turner, would sure be here on Sunday.

E. L. Grimm, Chief Draftsman, Northern Pacific

The Hunt-Spiller sextette, under the leadership of Walter B. Leach, certainly look good in their holdovers. Wonderful what a little sponging and pressing will do!

H. Rauch, general foreman of the New York Central at Avis, Pa., is leaving Friday night to attend a flag raising at the Avis shops. The celebrated apprentice band will give a concert.

Left to Right—H. E. Passmore, Grip Nut Company, and Willard Kells, Asst. S. M. P., Atlantic Coast Line

Owing to business reasons and sickness some members of the entertainment committee are unable to be here. In consequence the chairman, George R. Carr, is obliged to do an unexpectedly large part of the work. It is another case

tirely equal to the task.

Hugh Montgomery is not with the Bangor & Aroostook as indicated in yesterday's *Daily*, but as his many friends know is superintendent motive power and rolling stock of the Rutland.

Left to Right—J. C. Little, Mechanical Engineer, C. & N. W., and S. A. Boone, General Chairman, Brotherhood of Locomotive Firemen, C. & N. W.

George Thibaut, recently appointed master mechanic of the Erie at Port Jervis, is attending the convention for the first time. He was formerly general foreman at Susquehanna.

Frank Huffsmith, formerly superintendent motive power of the International and Great Northern, sends greetings to his

Left to Right—H. M. Brown, Shop Supt.; J. R. Gould, S. M. P.; and H. C. Gillespie, Master Mechanic (All of the C. & O.)

friends at Atlantic City and says that Palestine (Texas) now has the best of hotel accommodations.

The *Atlantic City Review* says, "A Massachusetts farmer claims to have a horse with a wooden leg. The Greeks once presented the Trojans with a horse which had four of them." He must have hit the sawdust trail and stopped to graze on the way.

A large railroad in the west finding its files cumbered with letters that were long-winded and full of circumlocution issued an order, commanding brevity. The first fruit of this was a

G. W. Lillie, mechanical superintendent, second district, Chicago, Rock Island & Pacific, located at Topeka, Kan., is accompanied by Mrs. Lillie. He reports a bumper wheat crop in his district and believes that if the weather remains favorable it will surpass the excellent crop of last year.

George S. Goodwin, mechanical engineer, Chicago, Rock Island & Pacific, who so clearly established the value of a

F. P. Pfahler, Inspector I. C. C., and His Son Fred

locomotive at the Western Railway Club last winter, is here for the M. M. convention. Mr. Goodwin was elected a member of the executive committee of the club at its last meeting.

Frank H. Harrison, of W. L. Brubaker & Bros., was added to the enrollment committee to take the place of Dick Sawyer who could not attend the convention. The change was made at the last moment, which accounts for Mr. Harrison's name not appearing as a member of the committee in Wednesday's daily.

G. T. Depue, Shop Superintendent, Erie

F. W. Kiesel, Jr., assistant mechanical engineer of the Pennsylvania, says that the Pacific type locomotive, Class K-4-s, which was exhibited at last year's conventions, is in service on the Pittsburgh division and giving excellent results. No more of these locomotives have as yet been built, however, as it has been found that the engines of the Atlan-

are now in service and more are under construction at the Juniata shops.

George M. Basford has had a practical demonstration of the value of the bonus system, which has dispelled any skepticism he may have had on that point. He finds that everything depends on the size of the bonus, but says it

Grant W. Lillie, Mechanical Supt., Rock Island Lines

was really worth a dollar to have Howard Gray dress for dinner in six minutes. Gray says he can beat even this record if there is sufficient incentive.

J. F. De Voy, assistant superintendent motive power, Chicago, Milwaukee & St. Paul, will be greatly missed this year, especially on account of his severe illness. He underwent a major operation some time ago that evidently was not entirely successful, as he was again operated on last week. A. E. Manchester reports, however, that he is getting along very nicely and he fully expects a reasonably early recovery.

getting up at 5 o'clock every morning to let it out, after which he starts to work in his garden. In spite of all measures which he has taken he still continues to be an early riser at Atlantic City.

C. E. Postlethwaite, of the Pressed Steel Car Company, is a graduate of the Altoona (Pa.) High School, class of 1883. On his way to Atlantic City he stopped off at his old home town to attend a reception and entertainment in honor of Miss Linda E. Hooper, who had decided to retire after having taught in the school for 43 years. Interest in the affair was heightened by the fact that it was also a reunion of classes, every class since 1879 having been represented by former pupils.

The quotation "B. A. F. Y. D. F.," used in an advertisement in *The Daily* by his friend Bert Waycott, had been puzzling Harry Frost for some hours when he finally appealed to our copy service department for a translation. Not having written the advertisement; and not being familiar with the language that his friend might use in trying to induce a railway man to buy a Fulcrum, we pleaded ignorance, but suggested that perhaps it was something that needed an injection of formaldehyde.

W. D. Arter, who was supervisor of apprentices of the New York Central & Hudson River, now the New York Central east of Buffalo, has had his jurisdiction extended over the lines west of Buffalo which formerly made up the Lake Shore & Michigan Southern and the Chicago, Indiana & Southern. This adds about 225 apprentices to those under Mr. Arter's jurisdiction, 125 of these being at Collinwood, 75 at Elkhart and 25 at Gibson. This makes the total number of apprentices on the New York Central 510.

William Schlafge, general mechanical superintendent of the Erie, is justly proud of the size of the contingent from that road at the convention this year. Besides Mr. Schlafge, there are included, E. S. Fitzsimmons, mechanical superintendent at New York; C. James, mechanical superintendent at Cleveland; W. C. Hayes, superintendent of locomotive operation, New York; R. B. Watson, engineer of tests, Meadville, Pa.; W. S.

Left to Right—M. W. Hassett, M. M.; J. G. Parsons, Supt. Shops; C. H. Hogan, Asst. S. M. P.; and A. J. Fries, Asst. S. M. P. (all of the N. Y. C.) and Fred Riegler, Machine Foreman, W. & L. E.

Blackburn, apprentice instructor at Dunmore, Pa. All of the division master mechanics but three are at the convention, those present being F. H. Murray, Jersey City; W. H. Snyder, Stroudsburg, Pa.; W. S. Haines, Dunmore, Pa.; G. Thibaut, Port Jervis, N. Y.; H. H. Harrington, Susquehanna, Pa.; L. R. Laizure, Hornell, N. Y.; George Depue, Galion, Ohio; and J. Borden, Cleveland. All of the car shop superintendents will be here next week for the Master Car Builders' convention.

C. H. Andrus, Master Mechanic, Pennsylvania Railroad

Habit and custom play queer tricks on us. The editors of this paper are accustomed to dictating their copy. When working on *The Daily* they write most of it with pen or pencil; and sometimes, in the hurry of work, the untrained and unruly pens and pencils play queer tricks. Yesterday, one of them, while the man holding it was not looking, concluded a sentence regarding the fact that Mrs. Burton W. Mudge and son, Burton, Jr., were not at the conventions this year with the statement, "Mrs. Mudge decided to stay at

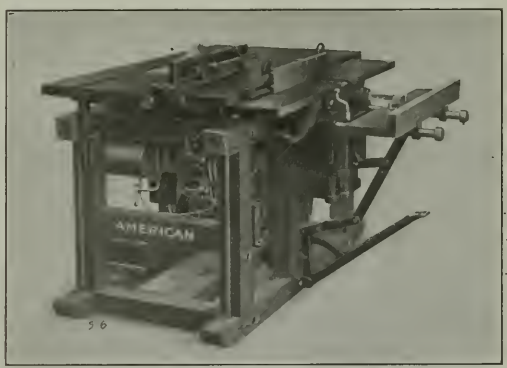
W. T. Kuhn, Supt. Motive Power, T. H. & B.

home with it." Needless to say, we were referring to Burton, Jr., in that sentence, and no one who knows that interesting young gentleman would think of referring to him in such an impolite way. This conventionality also is being written with a pencil. Do you see any "bugs" in it? We don't. If there are any, they are due to bad eyes and an ungovernable pencil. Meantime, we apologize to Burton, Jr.

A self-contained variety wood worker is on exhibition which will meet the requirements of many outlying car repair points where a variety of jobs are occasionally met with but where a completely equipped mill is not justified. The machine is self-contained; the frame being built up of seasoned hardwood, well bolted together, and contains either a complete gasolene engine outfit or an electric motor. It consists of a combined rip and cut-off saw bench with a boring attachment, a hollow chisel mortiser and a jig saw attachment. It also includes a six-inch jointer and dado head.

The top is a 54 in. by 30 in. iron casting accurately planed and strongly hinged to the rear of the frame. It is readily raised and lowered by a hand screw and may be firmly clamped in any position. It is independent of the jointer table, neither interfering with the other. The jointer has a steel cutter head fitted with two six-inch knives and slotted on two sides to receive matcher bits or molding cutters for working a large variety of shapes. The tables are 7½ in. wide by 43 in. long and are adjustable to any desired position. The jointer head is removable to permit the use of a sander drum.

The hollow chisel mortiser will work bits from ⅜ in. to ¾ in. The mortiser table has a vertical adjustment of 3½



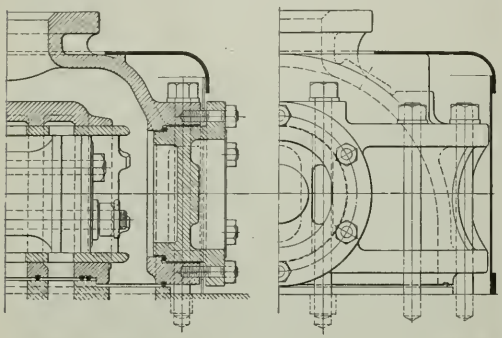
Self-Contained Engine or Motor-Driven Variety Wood Worker

in. and a travel of 4 in. in line with the spindle. It is provided with a foot pedal for feeding the work to the bit and a coil spring for the return motion. By removing the mortising chisel and substituting a regular boring bit the mortiser may also be used as a boring machine.

This wood worker is built by the American Saw Mill Machinery Company, Hackettstown, N. J., and a motor-driven machine may be seen in operation at the booth of this company. The floor space required is 54 in. by 54 in. and the machine has a total height of 36 in. The arbor takes saws with a one-inch hole up to an outside diameter of 16 in. which is the largest that can be used. Without an engine the machine weighs 850 lb., the engine increasing this weight to 1,150 lb.; with a 5-hp. motor the total weight is 1,250 lb.

THE PART OF THE ORLEANS RAILWAY IN PROTECTING PARIS.—The Orleans Company last fall had to undertake the supplying of part of the entrenched camp round Paris. Up to September 30, it carried into the capital and its environs 117,000 tons of various commodities, 66 tons of forage, 107,000 beeves, and 211,000 sheep and pigs, while it had also to carry concurrently the daily supplies of men, horses, food and ammunition to the army and to bring back the wounded and prisoners from the front.

iting a universal valve chest for use in applying piston valves to slide valve cylinders, which has been altered to make possible the removal of the valve without disturbing the valve

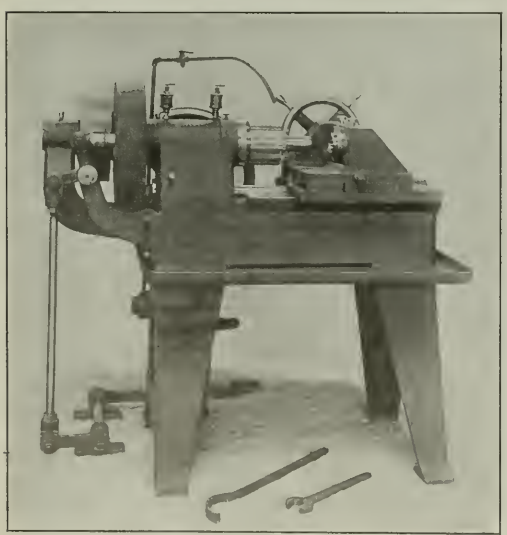


Universal Valve Chest with Front Head for Removing the Valve

chest itself. As originally built the front of the chest was provided with a hole large enough to allow the use of a wrench on the valve stem nut, this being closed with a plug, or a relief valve. The new type has a large opening in the front wall through which the valve may be removed, this being closed by a deep head secured with six studs.

EXPANDING AND BEADING MACHINE FOR INJECTOR PIPE COUPLINGS

From a careful analysis of injector steam pipe failures it has been found that over 50 per cent are due to coupling sleeves failing. Recent reports of the federal bureau of

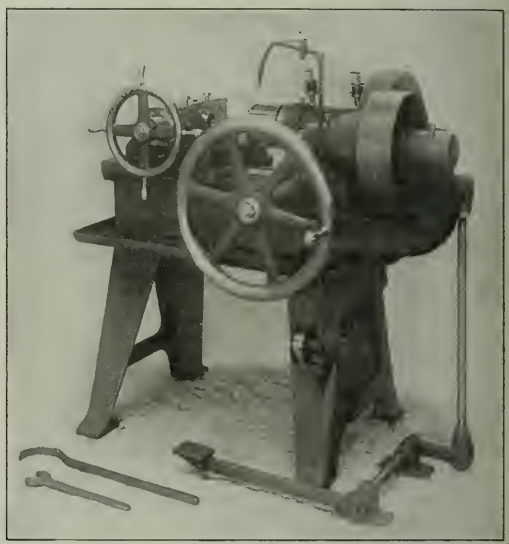


Rear View of the Expanding and Beading Machine

locomotive boiler inspection show that these failures continue to be one of the most frequent causes of serious accident and are the only ones which show an increase during

ures and is being used to some extent. The rolled and beaded joint eliminates the necessity for brazing and the consequent danger of injuring the pipe due to overheating. Defects in workmanship are readily discovered in such a joint, while the condition of a brazed joint is a matter of uncertainty and defective joints are often placed in service.

The expanding and beading machine, illustrated herewith, is similar to the machine described in a paper on Dimensions for Range and Screw Couplings for Injectors, read before the American Railway Master Mechanics' Association last year, by O. M. Foster, master mechanic, New York Central, but differs in the method of control. It is designed for rapid and economical application of coupling sleeves to copper pipe ranging from one inch to three inches in diameter and will handle pipes having short U or S bends. The



Operating Side of the Expanding and Beading Machine

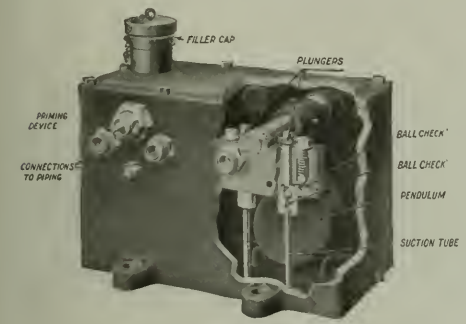
time required to apply a sleeve is claimed to be much less than that required for brazing, with the additional advantage that the finished connection is much safer.

The pipe is clamped in a movable chuck, with its end facing a roller expander attached to the spindle of the machine. After placing the coupling sleeve over the end of the pipe the chuck is moved forward by means of a hand wheel and screw feed until the expander enters the pipe. The rollers are then expanded by means of a conveniently located foot pedal; the end of the pipe is beaded by a further forward movement of the stock. The beading tools are interchangeable for the ball and socket members of the coupling.

As regularly furnished this machine is adapted for either belt or motor drive. The regular equipment includes a countershaft, wrenches and one set of chuck jaws and tools for applying sleeves to one size pipe. Tools for additional sizes are furnished extra. The floor space occupied is 3 ft. by 4 ft. and the machine weighs 1,650 lbs. A metal cutting power saw may be had as an attachment to the expanding and beading machine for cutting off and squaring the ends of the pipe. The expanding and beading machine is being exhibited at the booth of H. G. Hammett, Troy, N. Y.

A flange oiler fed by an automatic pendulum pump has been developed by the Detroit Lubricator Company, Detroit, Michigan. It consists of an oil tank or reservoir and the feed nozzles on the flanges; the tank contains the pumping mechanism and is connected to the feed nozzles by the necessary piping, in which are placed the regulating valves and check valves which control the flow of oil to the flanges.

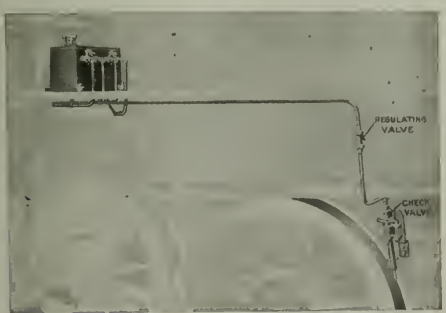
The tank may be placed in any convenient location and is so installed that the pendulums swing in a plane at right angles with the engine frame or boiler. Any swinging motion or rolling on curves, or lateral motion of any kind,



Broken Section of the Oil Tank Showing Details of the Pendulum Pump

causes the pump to operate. The oiler shown has four feeds and the tank contains two pumps, one for each two feed tubes. Each pump is operated by a pendulum which is sensitive to the slightest movement, any lateral motion of the locomotive causing it to swing. The pendulum shaft is pinned to a transverse rod, the ends of which engage the two plungers, and its swinging results in alternate up and down strokes of the plungers in the pumping unit.

On the up-stroke of a plunger oil is drawn up past a ball check; on the down-stroke it closes the passage into the



Force Feed Flange Oiler with Automatic Pendulum Pump

suction tube and oil is forced past another ball check into the pipe leading to the feed nozzle. Another check valve is located in the pipe line just above the feed nozzle. This is held to its seat by a spring which does not release until a predetermined pressure is reached in the pipe line, when it recedes from its seat and permits the oil to flow down the feed nozzle and onto the flange. After the pump is once in operation and as long as there is oil in the tank this pressure between the ball check in the pumps and the check valve above the feed nozzles is constantly maintained, consequently flanges.

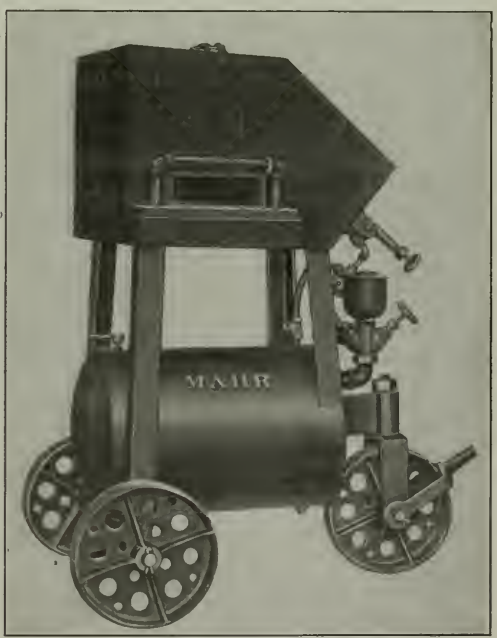
In order that the pump may supply oil to the flanges immediately after being installed a priming device is provided by means of which the pendulum shaft may be oscillated from the outside of the tank. It consists of a small rod extending through the side of the tank on the center line of the shaft. A tongue on the inner end of this rod engages a groove in the end of the shaft, the parts being normally held apart by a coilspring.

The regulating valves are installed in the pipe lines just above the feed nozzles and are within easy reach. Each valve controls the amount of oil that is fed to the flange and is regulated by the operator to meet the particular requirements of each individual installation. This device installed on a working model may be seen in operation at the Detroit Lubricator Company's exhibit.

PORTABLE RIVET FORGE

The portable rivet forge shown in the illustration has recently been added to the line of the Mahr Manufacturing Company, Minneapolis, Minn., and is included in its exhibit on the pier. The furnace is provided with combustion and heating spaces, so arranged that a minimum amount of scaling of the rivets takes place. It is built up of steel and all corners are welded; there is a removable cover on the upper inclined surface. It is lined with standard fire brick, the interior being readily accessible for this work.

The burner is designed to use crude oil, tailings, distillate or kerosene oil and operates on any air pressure from 10 lb. up to 125 lb. per sq. in. The tank which has a capacity

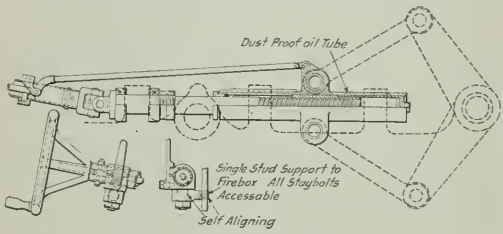


Portable Rivet Forge with Welded Frame

of 18 gal. is provided with a filling funnel and an oil measuring gage. It is welded to the frame by which the furnace is supported and forms a part of the truck frame. The wheels have wide tires to facilitate handling the outfit when using it about repair tracks. A chain is attached to the hood of the forge for use in moving it about the shop with a crane.

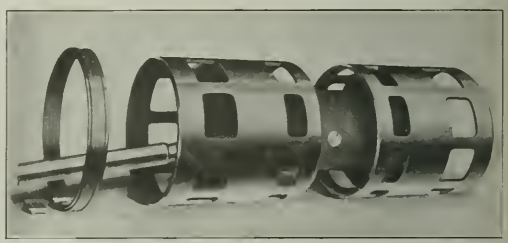
The Pyle-National Electric Headlight Company, Chicago, has in operation at its exhibit a full-sized model of the Young locomotive valve gear, including piston valves of an unusually light design, and a screw reverse gear designed to meet the special requirements of this valve gear. This valve gear was introduced about two years ago,* the most notable feature of the motion produced being the long travel of the valve. Several changes have since been made in the method of transmitting the motion across the engine.

The motion in this gear is derived entirely from the cross-



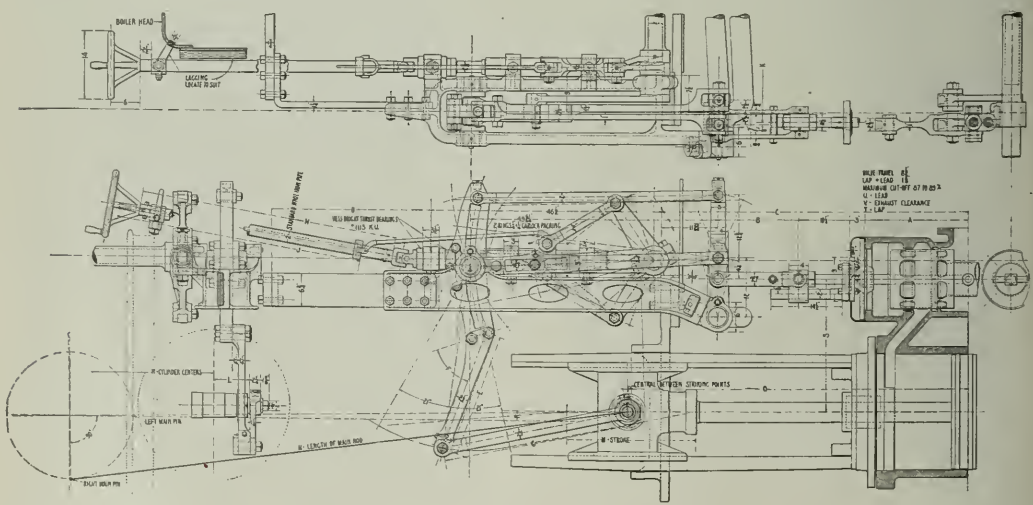
Details of the Screw Reverse Gear

head connections and the 90-deg. movement necessary for the main travel of the valve is obtained by means of a pair of interlacing rockers, concentrically mounted, each with a bearing on the other rocker at one end and in the valve-gear frame at the other end. As shown in the drawing, these rockers transmit the variable component of the motion from the crosshead and link on one side of the engine to the lap and lead lever on the other. Each link thus swings in unison with its own crosshead and the lap and lead, or fixed component of the motion for each valve is taken from the top



Young Piston Valve with Knuckle Joint Stem Connection

tudinally in the supporting block, which is split on one side, and to it is attached a hand-operated lever, by which it may be clamped to secure the rod in any desired position. The cut-off is thus unaffected by the expansion of the boiler. A graduated cab indicator projects through the center of the



Young Valve Gear and Screw Reverse Gear

of the link on its side of the engine. The link block is made with integral trunions, which make possible a reduction in the size of the block as well as in the size and weight of the link.

A maximum valve travel of 8½ in. is obtained with this gear, with a total angle of oscillation for the link of only 42 deg. The entire weight of the gear on both sides of the total, their weight being 1,484 lb.

The reverse gear is of the screw type, and is supported directly on the valve gear frame. The screw is immersed in a dust-proof oil tube, within which the nut is so secured that it may be readily removed for renewal. A packing gland in the end of the tube provides for the movement of the tube on the rod without the loss of oil or the entrance of dust. The operating rod is of pipe, and is universally jointed to the screw. The hand wheel support is a block pivotally secured to a single stud tapped into the side or corner of the firebox. This provides a universal adjustment for readily maintaining the operating rod in perfect alignment, and leaves the staybolts accessible. The rod is free to move longi-

hand wheel, which shows the exact cut-off of the gear in any position.

The piston valves used with this gear reverse the usual packing ring arrangement. The valve is a light cylinder, cast in one piece, and of uniform thickness throughout. The ends are of a hollow, cylindrical form, somewhat resembling the bushings applied to the usual type of valve chamber. The rings are stationary and are recessed into the walls

*For a description of the original gear, see the *Railway Age Gazette, Mechanical Edition*, January, 1914, page 43.

them. The operation is thus similar to that of a plug valve, and the weight of the valve is materially reduced by the elimination of the bull rings and followers necessary with a ring-packed valve.

Another feature of interest in the construction of this valve is the method of making the valve stem connection. The end of the valve stem is provided with a knuckle, which is secured to the center of the valve spool by a fitted pin. It is thus possible for the valve to properly align itself regardless of the alignment of the stem, and a source of much unequal wear to the valve and the packing rings is thus eliminated.

These valves weigh but 100 lb. each. The long travel of the valve obtainable with the Young gear permits the use of a valve of comparatively small diameter without sacrifice of steam admission area. The valves in this case are 12 in. in diameter, which, in itself, effects a reduction, this being still further increased by the construction of the valve.

DEVICE TO PREVENT LADDERS FROM SLIPPING

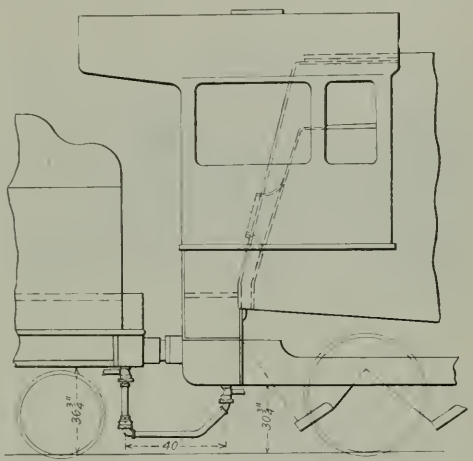
A hinged shoe for application to the bottom of ladder string pieces has been devised by the American Mason Safety Tread Company, New York, to reduce the danger of accidents caused by the slipping of the ladders on the floor. The bottom of the shoe, which comes in contact with the floor, is faced with a coarse carborundum grit which possesses exceptional gripping qualities and is claimed to hold

Ladder Shoes to Prevent Slipping

firmly even to the smoothest of concrete or steel floors. The shoes, it will be noticed, are swiveled to the ends of the ladder string pieces, thus permitting the base of the shoes to lie flat against the floor regardless of the angle at which the ladder is placed. This device is being exhibited at the booth of the manufacturer.

ROLLED STEEL PISTONS.—Included in the exhibit of the Carnegie Steel Company, Pittsburgh, Pa., are a number of rolled steel sections of various kinds manufactured at its Slick works. Among these are two styles of forged and rolled steel pistons for locomotive cylinders, which are of especial interest at the present time because of the increasing tendency toward the reduction in weight of reciprocating parts.

The Barco Brass & Joint Company, Chicago, is exhibiting this year a flexible water connection for use between engine and tender, which was recently redesigned to reduce the number of nipples and pipe fittings required in setting it up. As now designed, it permits a combination of the swivel and angular motion of the ball, and all of the joints are hung in a vertical position, so that the ball tends to maintain a full bearing against the surface on the gaskets by gravity.



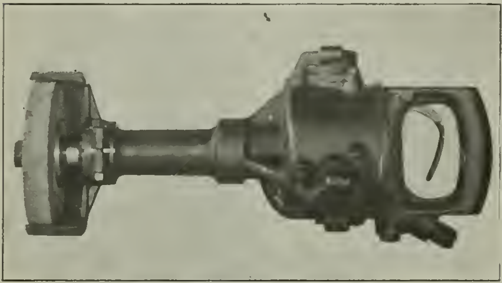
Flexible Water Connection with Vertical Members

The entire connection is suspended by bolts from plates under the engine and tender, to which the joints are attached by means of integral flanges. The long leverage of the horizontal connection prevents any severe thrust or shock being transmitted to the joints due to the vertical motion between the engine and tender. An angle ball is used on the engine end in order that the pipe may not revolve around the axis of its own thread, thus obviating the danger of its coming unscrewed, which would exist if a straight ball were used with an elbow and vertical pipe connection. A patent has been applied for.

LOHMANNIZED BOILER TUBES.—Several specimens of Lohmannized boiler tubes are on exhibit at the booth of the Parkesburg Iron Company, Parksburg, Pa. These tubes have been subjected to a pickling process in a special chemical bath after which they were dipped in a lead and antimony alloy. This process gives to the metal an alloy coating which cannot be physicially separated and experimentally has proven impervious to the action of acid and alkaline solutions; nor has it developed any electrolytical affect which might be detrimental to other parts of the boiler. These tubes are intended for use in feedwater heaters and condensers where excessive corrosion takes place.

WHEEL PRESS AND LOCOMOTIVE GAGES.—General improvements have been made in the devices exhibited by the Ashton Valve Company, Boston, Mass. Among these is a wheel press recording gage, which is furnished with a glass pen of the capillary style. This makes a very fine line and produces a satisfactory record. The gage is also furnished with ruled record charts, which are an improvement over the plain paper records previously used. A steam gage is also being shown which is provided with a white porcelain enamel dial. Each dial is graduated to conform to the individual movement in the gage in order to insure accuracy.

pneumatic grinder, in the design of which simplicity and accessibility of the parts has been carefully considered. In order to eliminate unnecessary parts the valve is made part of the crank shaft and all valve motion parts are thus dispensed with. The handle is secured to the cyclinder casing by six cap screws the removal of which exposes the entire interior for inspection. The motor is designed especially for grinding work and runs in an oil bath. The cylinders



Portable Pneumatic Grinder

are made separate from the casing to facilitate replacement. Ample provision for wear on the exposed corners of the cylinders is provided for by pads and as they become worn the cylinders may be interchanged thus bringing the pads on the opposite sides into use. The exhaust is covered with an adjustable deflector. The grinder is being exhibited by the Ingersoll-Rand Company, New York, and many of the details, including the piston and connecting rod connections, are of the standard type embodied in the line of "Little David" pneumatic tools manufactured by this company.

CARBON-VANADIUM FORGING STEEL

To meet the need of greater strength in material for locomotive axles and forgings, the railroads have turned to heat-treated carbon and heat-treated alloy steels. One obstacle to the adoption of heat-treated forgings, however, is the lack of equipment for heat-treatment in most railroad shops. This operates particularly in repair work where for any reason the forging has to be locally heated, thereby destroying the effect of the heat-treatment.

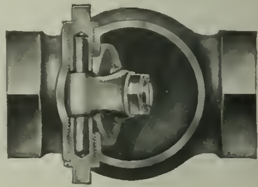
Many motive power men and producers of locomotive forgings believe that it is extremely desirable to obtain a steel of moderate cost that, without heat-treatment other than annealing to toughen and refine the grain, will have physical properties equal to those specified for heat-treated carbon steel forgings. With the reduction in the cost of vanadium that has taken place during the last year the American Vanadium Company resumed the investigation and study of the application of vanadium to simple carbon forging steels, which was dropped about 12 years ago on account of the high price of vanadium. At that time some tests were made on the effect of vanadium in simple carbon steels and a very considerable increase in strength was found to result. The effect of vanadium on alloy steels such as chrome steels was, however, so much greater that development proceeded with these steels rather than the simple carbon steels.

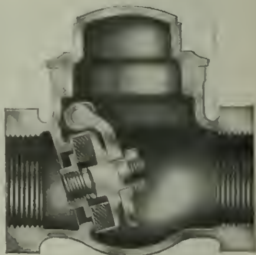
As the result of its latest investigations this company has developed a type of simple carbon-vanadium steel which is said to meet all the requirements specified for heat-treated carbon steel forgings, without heat-treatment other than annealing, these results being obtained from steel of lower carbon content than is generally required to obtain the speci- be heated uniformly to a temperature of 1,425 deg. to 1,475 deg. F. and then removed from the furnace to cool in air, protected from strong drafts and rain or snow.

Still better results can be obtained by annealing, as this material may be subjected to heat-treatment with results which are said to approximate those obtained from more expensive alloy steels. The treatment consists of first heating to a temperature of about 1,600 deg. F. and quenching in oil. The forgings should then be drawn back to about 1,100 deg. or 1,150 deg. F.

SWING CHECK VALVE

A check valve offering a full opening free from obstruction and with practically no pocket at the bottom of the body has been added to the line of Jenkins Bros., New York, and is on exhibit at their booth. This valve is fitted with a renewable disc and is supplied with either a semi-hard composition especially adapted for hot water service in boiler feed lines and returns, or with a soft pliable composition for use with cold water or air.





Swing Check Valve

By referring to the illustration it will be seen that the hanger pin is carried and held in place by two long plugs inserted in the sides of the body, and has a long bearing both in the plugs and in the hanger. By unscrewing the cap and plugs the hanger pin may be removed and the disc and hanger lifted out of the valve. The bodies are made for either screwed or flanged connections in sizes from ¼ in. to 3 in. inclusive and the valves are perfectly adapted for use in either horizontal or vertical positions.

Horizontal Boring, Drilling and Milling Machine.—A new model horizontal boring, drilling and milling machine is being exhibited by the Lucas Machine Tool Company, Cleveland, Ohio. This machine differs from the previous model only in size and capacity. The spindle has been made larger and the total traverse increased from 48 in. to 52 in. The vertical capacity has been increased 6 in. to a total of 30½ in. and the platen has been increased in width. It now has six T-slots instead of four as formerly.

Metallic Packing Material.—The Lubricating Metal Company, 2 Rector Street, New York, is exhibiting a bearing metal and metallic packing, which are being introduced in railroad service after nine years of successful use in rolling mills, cement plants and general bearing and packing work. It is claimed that this material, known as Noheet metal, has an elastic limit of 10,000 lb. per sq. in. as against about 6,500 lb. per sq. in. for genuine babbitt and lower for other metals, and a tensile strength of 13,500 lb. per sq. in. As it contains no antimony, copper or spelter it has a uniform testure and is claimed not to score shafting or rods. It has a low coefficient of friction and, on account of its natural lubricating properties, is said to require less oil than other bearing metals.

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

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The training of enginemen is a serious problem on all railways. If it is to be done properly it requires patience, tact and a knowledge of human nature on the part of the man in charge. Such a man cannot be chosen at random; he must be selected only after a careful appraisal of the qualifications of all likely candidates. The road foreman needs all the qualifications of the successful educator: his duties include the hiring and training of men whose work intrusts them with the care of many human lives, and to satisfactorily perform such duties he must be of the proper temperament, otherwise he may do more harm than good. The right kind of man as road foreman, given absolute charge of the hiring of firemen and the training of both firemen and enginemen, and held responsible for the development of the highest class of men, can produce remarkably gratifying results.

Qualifications of a Road Foreman

The convention of the Master Mechanics' Association which closed yesterday was unusually successful. The reports seem to be more carefully prepared, particularly with a view to conciseness, and there are a number of them which reflect more than ordinary credit on the members of the committees. Three of those deserving of special mention are the reports on Fuel Economy and Locomotive Counterbalancing and Boiler as they might have been, but on the other hand the members seemed, for the most part, to know pretty well what they wished to say, and said it without consuming too much of the convention's time. The individual paper on Variable Exhausts will prove a valuable addition to the proceedings of the association. The topical discussions were selected with evident care and it was unfortunate that there was not time to go into a full discussion of all of them, as they were timely and worthy of very careful attention on the part of the entire membership.

A Successful Convention

Almost any one can prepare an elaborate chart showing a system of organization, but the ability to prepare it does not make the organization effective in practice. To be most effective an organization requires at its head a man who will deal with it as would the father of a family. We recently heard it said that the reason for the success of a certain superintendent of motive power lies mainly in his ability to choose men of reliability, and then let them see by his actions that he is not afraid to place confidence in them. His predecessor was disliked and had not the confidence of his subordinates because he did not place confidence in them, but employed a number of officers who acted practically as spies. No man can expect to build up an effective and efficient organization by such methods. The man who places confidence in those whom he appoints as subordinate officers and shows them that he is interested in their success, can feel sure of their co-operating with him and furthering his efforts at all times.

Treatment of Subordinates

Anyone who travels frequently is familiar with the comment of passengers on the rough handling of some of our passenger trains, especially at starting. With the very long and heavy trains, now so common in fast through service, it is often impossible for an engineman to get under way without taking the slack at least once, so that many of the annoying shocks are almost, if not quite, unavoidable, at least under present conditions. However, there is some of this rough handling that is inexcusable, particularly in the case of the shorter trains. Many enginemen are careless in judging their stops at stations, bringing the train up with a final brake application that is likely to throw passengers off their feet. In a large measure, the correction of this abuse lies in the hands of the road foreman of engines. Carelessness due to lack of supervision is directly responsible in many instances and the road foreman has it in his power to promote a better feeling among the road's patrons by giving closer attention to the instruction of the enginemen under his jurisdiction.

Rough Handling of Passenger Trains

ELECTION OF R. S. M. A. EXECUTIVE MEMBERS

THE Railway Supply Manufacturers' Association is a business organization. Therefore, sound business principles should govern in the choice of its officers. The district meetings will be held today for the election of four members of the executive committee. As a business proposition, the only thing which should be considered in determining the selection of these executive committee men is their fitness to contribute their share toward making the work of the association as efficient as possible. The executive committee appoints the chairmen of the various committees; they, in turn, appoint the members. In order that the work of the association may be kept going properly, the members of the exhibit, entertainment, enrollment and other committees must devote much time and energy to their duties. Therefore, they should be

tions, for election to the executive committee, and should, therefore, be elected to it. Furthermore, if good timber is put on the executive committee, it will follow that this committee will afford the best material from which to select the higher offices of the association.

In other words, good business suggests that, as far as practicable, civil service rules be followed, and that those who render the best service on the subordinate committees be promoted to the committee chairmenships and to membership on the executive committee; and that, in turn, those who give the best service on the executive committee be given the honor, opportunity and responsibility of the vice-presidency and the presidency. There is always danger of politics working in, and over-riding, business considerations in the affairs of the Railway Supply Manufacturers' Association. This always will do harm. When the members cast their votes today for executive members, they should remember that the application of sound business principles will always promote the efficiency of the organization, while the intrusion of politics will always interfere with its efficiency.

LIGHT RECIPROCATING PARTS

THE committee on counterbalancing deserves a great deal of credit for the high character of the report presented at Friday morning's session. The tables which accompanied the report of those which appeared with the series of articles on Reciprocating and Revolving Parts, by H. A. F. Campbell, now appearing in the *Railway Age Gazette, Mechanical Edition*, to which reference was made in the report of the committee, give convincing proof of what is common practice and of what can be done, in the way of reducing the weight of reciprocating parts. The column showing the piston load carried per pound of weight of reciprocating parts is eloquent of the poor practice which has been so commonly employed, but it will be seen from these tables that the desirability of having these parts as light as they could be made was realized by some roads many years ago and consistent efforts made ever since to keep their weight to a minimum in new power. If this report were to accomplish nothing else it should be the means of setting some of our mechanical engineers thinking along the right lines.

The evidence submitted by officers of the Pennsylvania as to the service of the heat treated parts used in their latest locomotive designs disposes in a convincing manner of the idea that lightness and strength cannot be combined, and when we consider the weights now being carried on single driving axles, we cannot but agree with the committee in the statement that the lighter the reciprocating parts can be made the better the results which will be obtained. The racking and disturbing effects of improperly balanced locomotives traveling at high speed were clearly brought out by S. G. Thomson, superintendent of motive power and rolling equipment of the Philadelphia & Reading, and chairman of the committee, in his closing remarks, and we agree thoroughly with him in his reasoning that cost should be left out of consideration in any efforts to obtain the lightest possible parts, at least for locomotives in high speed passenger service, as any extra cost will very soon be absorbed by the decrease in maintenance expenditure. The work of producing improved materials for accomplishing just such purposes is receiving greater impetus every day and there is no reason why the same degree of refinement should not be obtained in locomotive practice as is now the case in automobile construction.

Undoubtedly careful attention must be given to the matter of heat treating when this process is employed for improving the quality of steel, as the very best material is absolutely necessary when reciprocating parts are made as light as those design, construction and operation that are going to require much greater care in the future than they have ever before received. Mr. Thomson's concluding statement of the text of the committee's report is a good one—make the reciprocating parts as light as possible and the undesirable counterbalancing effects will be reduced to a minimum.

COST OF CONDUCTING TRANSPORTATION

MECHANICAL department men are usually keenly alive to the necessity for keeping expenses at the lowest possible point, but they are not always interested as much as they should be in the matter of expenses outside their immediate department. Practices in the motive power department have a direct bearing on the cost of conducting transportation. Motive power that will haul the greatest tonnage with the least amount of expense for fuel and upkeep is, of course, one of the principal factors in reducing transportation expenses. If a careful study is made of the conditions of operation when deciding on new power, it will be found that the after-effects in the way of reduced expenses due to increased tonnage and reduction in the overtime of train crews amply justifies the time and money spent in making such a study. Overtime has become a prominent factor in increasing wage expenditures, and the question of supplying engines that will get maximum tonnage trains over the road within the time limit, ought to be given an important place in considerations pertaining to new locomotives or alterations to old ones.

The time which it is necessary to hold a locomotive out of service at terminals is of vital importance to the operating department and depends to a great extent on the equipment of engine houses, the suitability of their arrangement for the quick and easy movement of locomotives without interfering with one another, and the size of the force employed. One of the worst causes of delays at engine terminals is insufficient coaling and ash-handling facilities, causing locomotives to stand for long periods awaiting their turn for coaling and fire cleaning before entering the engine house so that actual repairs can be begun. Of course, an engine house foreman by the exercise of ingenuity and good judgment can do much to offset inferior equipment and poor location of a roundhouse, but he can use his ingenuity to much better advantage in a properly equipped plant, and the advantage in the movement of trains which results from the speedy return to service of locomotives after they arrive at a terminal, while beyond definite calculation, is very considerable. Careful attention to both back shop and roundhouse repairs has a direct bearing on the cost of conducting transportation. Slipshod methods in general repairs will invariably cause heavy running repairs and the greater the amount of such repairs the longer the locomotive must remain in the engine house between trips. Moreover, unless repairs are given the attention which they should have, engine failures will increase rapidly and the effect of an engine failure in demoralizing train movements is well known. It is difficult to imagine any saving which might be effected by skimping on running repairs, which could be claimed to justify even the most trivial engine failure.

Of course, the greatest portion of the cost of conducting transportation is chargeable to fuel and, while much has been said in these columns on this subject, it should not be amiss to call further attention to the great need of effecting every possible economy in fuel consumption. The kind of training which enginemen receive affects fuel consumption in a very direct way, and a lack of proper training also affects transportation expenses injuriously, because of improper locomotive handling.

Dollar Pier.

9.00 P. M.—Vaudeville Entertainment. Million Dollar Pier.

RAILWAY CLUB SECRETARIES

The annual meeting of the Society of Railway Club Secretaries will be held at 10 o'clock this morning in room 193 of the Blenheim.

DYNAMOMETER CAR

The Southern Railway is exhibiting its new dynamometer car at the track exhibit at Mississippi Avenue, two blocks south of the pier. The car is in working condition and contains a number of new and interesting features.

ATLANTIC CITY ROTARY CLUB

The Rotary Club of Atlantic City will hold its weekly luncheon at the Hotel Schlitz, Tuesday, June 15, at 1 P. M. James S. Murphy, city passenger agent of the Pennsylvania Railroad is chairman of the entertainment committee and will be glad to have any visiting Rotarian attend the luncheon.

TODAY IS R. S. M. A. ELECTION DAY

The annual meeting of the Railway Supply Manufacturers' Association, for the election of officers and the transaction of such other business as may be brought up for attention, will be held at 12 o'clock noon today in Convention Hall, Million Dollar Pier.

The voting for four members of the executive committee will be done in the room at the front of pier adjoining Mr. Conway's office. The polls will be open from 10 a. m. to 12 noon. The vacancies in the committee to be filled are: one from the first district, succeeding Fred. M. Nellis, of Boston; one from the second district, succeeding Oscar F. Ostby, of New York; one from the fourth district, succeeding J. C. Whitridge, of Columbus, Ohio, and one from the seventh district, succeeding S. M. Dolan, of St. Louis.

In both instances each member is entitled to one vote, residence of the voting delegate registered with the secretary will determine the district in which a proxy vote may be cast.

THE CARNIVAL DANCE

The carnival dance held last night proved a great success. A good deal of mystery seemed to be attached to this affair, in that it was a new feature on the program. In consequence, everybody came early so as not to miss anything—and the moment that Leader Richardson raised his baton at 9.30 things broke loose. At 10.30 the entertainment committee distributed 30,000 rolls of serpentine, rubber balloons and novelties and scores of paper hats and caps. Immediately the air was filled with a storm of streamers, formality was swept away and from then on the whole became as one big happy family on a picnic.

Thoughtful as ever of the pleasure of those attending, the dance committee interspersed old dreamy waltzes and lively two-steps with the more modern numbers so everyone could participate. Owing to the sudden illness of W. K. Krepps, chairman of the committee in charge, who was taken with tonsilitis Wednesday, A. B. Wegener took his place and was ably assisted by Langley Ingraham, J. F. A. Comstedt, C. D. Jenks, G. R. Berger, R. J. Faure, C. D. Eaton, C. C. Farmer, A. MacRae.

THE GOLF TOURNAMENT

The following persons have registered for the golf tournament, in addition to those mentioned in yesterday's Daily. Others desiring to enter may leave their names at the *Railway Age Gazette* space today or at the Sea View Club early tomorrow morning.

W. L. Allison	Hinsdale G. C.
George L. Bourne	Wykagyl
J. S. Coffin	Englewood
C. C. Elmer	Berkshire
C. E. Fuller, Jr.	At Omaha
W. W. Griswold	Highland Park
C. C. Hopkins	Shaker Heights
J. M. Keller	Algonquin
D. M. Knox	Jackson Park
J. D. Purcell	Westward Ho
Fred Schaff	Lawrence Pk.
G. W. Spear	Englewood
W. J. Tollerton	Ridge
Alex. Turner	Englewood
R. H. Weatherly	Englewood

Sea View Golf Club House Showing the New Wing at the Right

President Gaines called the meeting to order at 9.40 o'clock a. m.

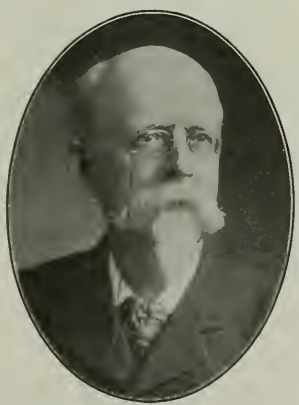
VARIABLE EXHAUSTS

By J. Snowden Bell.

[The author presented an interesting description of the various variable exhausts used from 1803 to the present time. From lack of space we are compelled to omit those invented prior to 1901.—Editor.]

The Olsen variable exhaust consists of two flexible "adjusting plates," the lower ends of which are fixed to a bridge piece in the exhaust nozzle, and which are spread outwardly, to reduce the discharge outlet, by an interposed transverse shaft, which is flattened centrally and operated by a rod. The plates are returned to their normal position, in which the maximum discharge outlet is given, by their own elasticity. This variable exhaust is shown in Fig. 1. In the construction shown, the discharge outlet is variable between a maximum area corresponding to a diameter of 6 in., and a minimum area corresponding to a diameter of 4½ in. This nozzle has been used on the Canadian Pacific and the Duluth & Iron Range but is not now in service.

Wallace & Kellogg Variable Exhaust, 1003.—This design is shown in Fig. 2. The front and rear sides or "doors" of the exhaust nozzle are hinged to it at their lower ends, and are simultaneously moved toward and from each other, to diminish or



J. Snowden Bell
Paper on Variable Exhausts

increase the area of discharge outlet, by a double grooved cam, which is rocked by an arm connected to the reverse lever. The grooves of the cam engage pins on the hinged "doors." This design was applied on the Pere Marquette and Duluth & Iron Range, and W. L. Kellogg reports that it was used for several years with very good results, and that tests with a dynamometer car proved that by its use the efficiency of the engine was increased and material saving in coal effected.

Baker Variable Exhaust, 1012.—Another variation of structure is shown in Fig. 3, from which it will be seen that the design consists of two co-acting "nozzle gates" or valves, which are pivoted to the top of the nozzle and are swung horizontally toward and from each other, with a consequent decrease or increase of discharge outlet area, by a transverse shaft, having right and left hand threads engaging threaded sleeves coupled to the nozzle gates. This variable exhaust was applied and used for about a year and a half on the St. Joseph & Grand Island, with the result which is stated as follows by C. E. Slayton, assistant superintendent:

"The adjustable feature worked well, that is, we were able to keep it in working order without any trouble. They did not effect saving enough to warrant us in applying them to more locomotives."

As was early recognized, and as is familiar to all who have had experience with variable exhausts, the greatest objection that has been developed in their operation is their liability to become gummed up and stuck fast by the action of foreign matter and the heat of the smokebox, unless frequently moved from one adjusted position to another, and if manually adjusted, such movement is liable to be, and generally has been, neglected. To overcome this objection, automatically adjustable appliances have been proposed, the Wallace & Kellogg appliance before described being an instance. This is connected to the reverse lever and is operated when the lever is moved.

While a number of the variable exhaust appliances before noted have been experimented with, and have, in some cases,

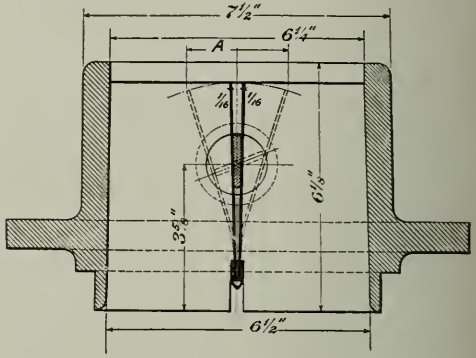


Fig. 1.—Olsen Variable Exhaust

been found to effect an economy in fuel, none of them has been considered to be sufficiently satisfactory or desirable to be retained in use. In Europe the early introduction of the variable exhaust has been followed by its general application, and it is understood by the writer to be standard to-day in the practice of leading French railroad systems, and probably also in other countries of Europe. A description and illustration of the latest type used on the Chemin de Fer du Nord, of France, have been furnished by Geo. Asselin, chief engineer of that road, and is presented as representative of the most approved design of present European practice. The following is quoted from Mr. Asselin's letter:

"The plan view of this device is shown in Fig. 4. The con-

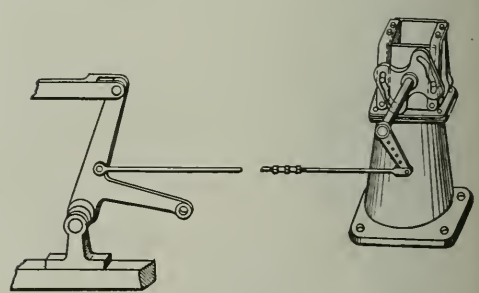


Fig. 2.—Wallace & Kellogg Variable Exhaust

traction of the exhaust is regulated by the height of the interior movable nozzle. The latter is controlled by a forged finger on the exhaust moving shaft, which extends across the smokebox in the ordinary manner. The engineman operates the movement by means of a hand-wheel and a screw; he has in sight a graduated scale which indicates to him the degree of contraction.

"From the point of view of ease of taking down and cleaning of the different parts, and of their perfect centering, this head has given entire satisfaction; but it was necessary to study the

less. It was, therefore, thought that it would be possible to avoid this imperfection by imparting a movement of rotation to the exhaust jet, in order to maintain the same degree of

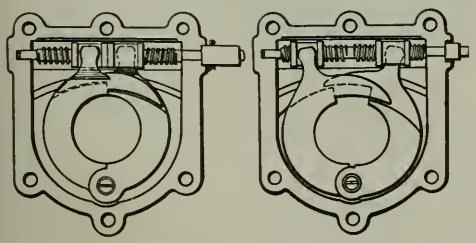


Fig. 3.—Baker Variable Exhaust

efficiency, whatever may be the degree of contraction of the exhaust. This end has been attained by the helicoidal wings.

"As a matter of fact, the exhaust jet expands as much more as the section of the exhaust head is more reduced, and, consequently, as the speed of the steam is greater. It follows that the gaseous column always completely fills the stack. Furthermore, this movement of rotation, due to the wings, augments the intimacy of the mixture of steam and hot gases, and communicates to it a greater quantity of live force. It has also been immediately recognized that, with equal section of passage of

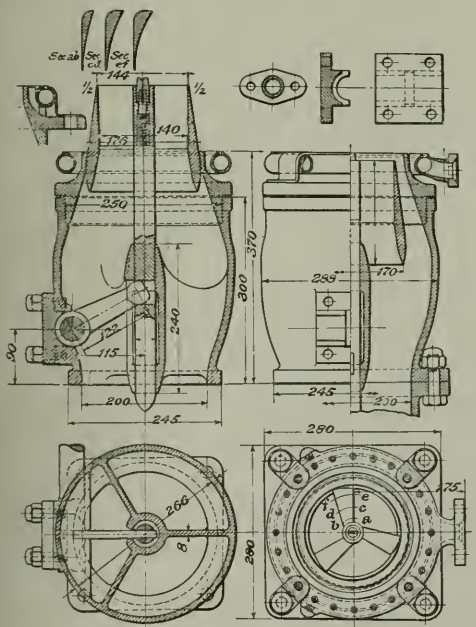


Fig. 4.—Latest Type of Variable Exhaust Used on the Chemin de Fer du Nord

the steam in the exhaust head, the draught was noticeably increased by this last arrangement.

"The character of the steam equally plays an important part in the question of the exhaust, and from the first application of superheating on the 'Atlantic' engines it has been recognized that it was necessary to choke the exhaust much more (nearly 15 per cent) to obtain the same useful effect. This new exhaust, giving at the same time a more intense vaporization and less back pressure, permits us to attain higher speeds by providing more facility for the management of the fire, or to augment the loads hauled by providing a more easy management of the power officers to the writer's inquiries, and the tenor of these replies is that its failure to be generally adopted in railroad service is largely, if not altogether, due to the fact that, under existing conditions, it does not seem possible to ensure it proper attention and protection from misuse on the part of engine crews.

The view of the writer as to the variable exhaust is to the same general effect as those of members of the Association and others who have expressed their ideas to the author, and he has brought this subject before the Association in the hope of sufficiently indicating its importance, to enlist the interest of the members and their consideration of the advisability of its development in their service. If this interest and consideration be given, there is no room for doubt that a variable exhaust can be produced, in which the requirements called for in the replies of the members would be fully complied with—that is to say, it would be "properly constructed," would be "automatically operable," and would be "fool-proof," because independent of the "human factor." Under the present conditions of railroad operation, the claims of this, as of every other appliance which is designed to operate in the direction of economy of fuel, merit a careful consideration on the part of motive power officers, and the standard of intelligence and ability of locomotive engineers at this time is so high that it would be unfair to them to believe that an appliance of such character, if approved by their superiors, would fail to receive fair and unprejudiced treatment in the operation of their locomotives.

DISCUSSION

C. A. Seley: While in the West recently I saw a device which Mr. Bell mentioned as having been developed by Mr. Mertscheimer, and that gentleman is quite enthusiastic over the device, believing, although not having made a scientific test of it, that he will save not pounds, but tons of coal.

D. R. MacBain, (N. Y. C.): I believe that until we get a variable exhaust that will work automatically, and almost humanly, we had better stick to a sure thing and make the nozzle large enough to keep the engine steaming and go along on that basis. The practical way at the present time to insure good locomotive service is to make the locomotive, when it is turned out of the shop, as nearly foolproof as it can be made, because if you depend on any person, other than the men who make the mechanical arrangements for you, you are going to lose on the proposition. My own personal experience has been that the thing to do is to make the nozzle as large as consistent and at the same time so design the nozzle so that the steam column will pass it without raking the sides of the stack in any direction. When you do that you allow space around the circumference of the steam column for the gases to be entrained and carried out. We have found that the exhaust steam left the top of the stack at a pressure of about five pounds. When you come to consider that you have five pounds pressure in a solid column of steam it is rather inconsistent to believe that any quantity of the front end gases are going to crowd themselves into that column of steam and be carried out, so what you have to figure on is a column of steam of great enough circumference to entrain a sufficient amount of gases per minute in order to create the desired draught. On the New York Central, west of Buffalo, out of many thousand locomotives operated our steam failures for the year 1914 were 46, and 146 failures were due to leaking.

W. E. Symons: The exhaust nozzles of locomotives, regardless of whether or not they are saturated steam, compound or superheater engines, is the medium that offers the back pressure to the pistons and therefore controls in a large measure the economical operation of the machine. It is a feature that should have been included in the field of investigation in the work of developing an economical machine. I have known of instances where an engine with but 25,000 lb. tractive power, equipped with a variable exhaust nozzle, could, by adjusting the nozzle, increase its power from 800 to 1,000 h. p. I have seen some statements made by one of the leading railroads of this country where the back pressure on certain engines was as much as 800 h. p.

JOINT MEETINGS

The Committee on Joint Meetings of the two associations presented a tentative program based on the work to be done at the 1915 Convention, to indicate how the two conventions could be held in one week. At the joint session which would be held on Wednesday, several reports which are common to both Associations were scheduled for discussion as follows: Safety Appliances; Revision of Standards and Recommended Practice;

not recommend that it be done, believing that much better results are obtained from these conventions by following the present plan of holding each convention separately.

The report is signed by:—J. F. De Voy, (C., M. & St. P.); C. E. Chambers, (C. of N. J.), and C. F. Giles, (L. & N.), Committee A. R. M. M. Assn., and R. W. Burnett, (C. P. R.); J. S. Lentz, (L. V.), and T. H. Goodnow, (C. & N. W.), Committee M. C. B. Assn.

TRAIN RESISTANCE AND TONNAGE RATING

The committee has, in accordance with instructions, endeavored to get additional information to enable it to submit a final report at this convention. While some information has been available, yet the committee desire additional data as to the comparison of the drawbar pull curve of superheater locomotives, as compared with that of saturated locomotives. Data is also desired as to the resistance of the ninety-ton cars now coming into use. The committee will be able to obtain the information desired and submit a final report to the Association in 1916, and would ask permission to carry over the final report to that time.

P. F. Smith, Jr. (Penn. Lines), chairman; W. E. Dunham (C. & N. W.); J. S. Sheafe (B. & O.); H. C. Manchester (D., L. & W.); C. E. Chambers (C. of N. J.); J. H. Manning (D. & H.), and Frank Zeleny (C., B. & Q.).

COUNTERBALANCING

The following report will consider only the counterbalancing of two-cylinder locomotives, the three and four cylinder locomotives being less of a problem on account of the reciprocating parts more or less balancing each other.

GENERALLY ACCEPTED RULES AND PRINCIPLES.

The reciprocating parts to be considered in counterbalancing are: The piston head, rod and nut; the cross-head, cross-head key, pin and nuts; approximately one-half the total weight of the main rod; arm and link fastened to cross-head for outside valve gear.

Each driving wheel should have sufficient weight added to counterbalance exactly the weight of its revolving parts, which

S. G. Thomson
Chairman, Committee on Locomotive Counterbalancing

are: Crank pin, crank-pin hub, and the proportion of the weight of the side rods attached to the pin. The main driving wheel should have added approximately one-half the total weight of the main rod, plus two-thirds the weight of the eccentric arm, considered acting at crank pin distance, for outside valve gear.

The overbalance which is used to counteract the desired portion of the weight of the reciprocating parts should be distributed as nearly equally as possible among all driving wheels, adding to it the weight of the revolving parts for each wheel.

Centrifugal and reciprocating forces are usually figured at a speed in miles per hour equal to the diameter of the driving its weight, and is at a maximum at the top and bottom position of the crank. This force is added to the static weight, in the lower position of the overbalance, and is opposed to this weight, in the upper position. Approximately one-fortieth of the static weight on a wheel will therefore give the weight of the reciprocating parts which could be balanced without causing the wheel to rise from the track at diameter-speed.

METHODS FOR DETERMINING THE AMOUNT OF OVERBALANCE.

The method most generally used for many years in counterbalancing locomotives has been to balance a portion of the total weight of the reciprocating parts, usually about two-thirds.

A second method, and the one recommended in the 1896-97 reports to the Master Mechanics' Association, is to leave unbalanced, on each side of the locomotive, a portion of the reciprocating parts equal to $\frac{1}{400}$ of the weight of the locomotive.

Neither of the above methods seems to give good results in all cases, and the committee presents another relationship which seems paramount to proper counterbalancing: The ratio of the total weight of the reciprocating parts on each side of the locomotive to the total weight of the locomotive in working order.

To show the necessity for this ratio, and to demonstrate the failure of the former rules when applied to locomotives with heavy reciprocating parts running at high speed, the committee made some tests on the Philadelphia & Reading, as shown in the accompanying table. These tests included a series of high-speed locomotives having very heavy reciprocating parts, equal to $\frac{1}{139}$ of the total weight of the locomotive.

One of this series of locomotives, No. 345, had 69 per cent of the reciprocating parts balanced, and was so rough at high speed that many parts of the locomotive were being continually shaken loose, thus disproving the rule requiring about two-thirds of the weight of the reciprocating parts to be balanced. This locomotive also had $\frac{1}{447}$ of its total weight unbalanced, which also disproves the second method of calculation.

Three more of these locomotives, Nos. 346, 341 and 347, were counterbalanced with 64 per cent, 55 per cent and 48 per cent, respectively, of the weight of their reciprocating parts balanced, which was $\frac{1}{385}$, $\frac{1}{308}$ and $\frac{1}{266}$ part, respectively, of their total weight unbalanced. The best riding of these locomotives was No. 341, with 55 per cent or a little more than half of the weight of its reciprocating parts balanced. But this locomotive had too much fore and aft motion at moderate speed, due to the very heavy reciprocating parts. This fore and aft motion, however, was largely absorbed at the higher speeds, and a considerable vibration, due to the vertical forces of the overbalance, took its place; showing that, with such heavy reciprocating parts, even as low a portion as 55 per cent was too much overbalance for high speed. No. 347, with 48 per cent balanced, was not so bad in its vibrations at high speed, but had an excessive fore and aft motion at the moderate speeds.

The test of No. 345, therefore, with 69 per cent of its heavy reciprocating parts balanced as mentioned above, shows that it is the overbalance which makes a locomotive rough at high speeds, rather than too great an amount of the weight of the reciprocating parts left unbalanced. In other words, the fore and aft or nosing effect of unbalanced reciprocating parts seems to become absorbed, in passing through the moderate speeds, and the overbalance then becomes the disturbing factor at the higher speeds in setting up excessive vibration.

Locomotives 342 and 301, having lighter reciprocating parts and with 72 per cent balanced, seem to be well proportioned to prevent fore and aft movement, but the large percentage of overbalance necessary to accomplish this makes them rough at very high speed.

It will be noted that locomotives 341 and 301, which ride very much the same at high speed, have $\frac{1}{308}$ and $\frac{1}{268}$ part, respectively, of their total weight unbalanced; showing that this method of calculation is not reliable for the higher speeds. It will be noted, also, that the dynamic augment for these two locomotives is about the same.

It would therefore seem, from the above results, that the riding of a locomotive at high speed can be greatly improved

*The dynamic augment varies with the stroke.
If W = overbalance or excess weight at stroke distance.

then	with	18-in.	stroke,	dynamic augment = 29.1 × W	at	diameter-speed.
then	with	20-in.	stroke,	dynamic augment = 32.3 × W	at	diameter-speed.
then	with	22-in.	stroke,	dynamic augment = 35.5 × W	at	diameter-speed.
then	with	24-in.	stroke,	dynamic augment = 38.5 × W	at	diameter-speed.
then	with	26-in.	stroke,	dynamic augment = 41.7 × W	at	diameter-speed.
then	with	28-in.	stroke,	dynamic augment = 44.9 × W	at	diameter-speed.
then	with	30-in.	stroke,	dynamic augment = 48.4 × W	at	diameter-speed.
then	with	32-in.	stroke,	dynamic augment = 51.7 × W	at	diameter-speed.
then	with	34-in.	stroke,	dynamic augment = 54.9 × W	at	diameter-speed.

cating parts can be left unbalanced, the counterbalancing of 345 was changed to 30 per cent balanced and 70 per cent unbalanced, which, for these very heavy reciprocating parts, represented excessive conditions, shown by the fact that as much as $\frac{1}{498}$ of the total weight of the locomotive was unbalanced, instead of $\frac{1}{400}$ as per the former rule. This locomotive had excessive fore and aft movement, too great for service even at low speed, but had no perceptible vibration due to vertical forces at high speed.

A second test was made with the 301, with 50 per cent of the weight of the reciprocating parts balanced, which was equal to $\frac{1}{341}$ part of the weight of the locomotive. This gave better results that any of the tests with locomotive having the heavier reciprocating parts.

We can conclude from the above tests that the lighter the reciprocating parts can be made, the better results will be obtained. We can also conclude, when counterbalancing for very

Therefore: 15,000 lb. dynamic weight is added to the 30,000 lb. static weight, giving a total of 45,000 lb. on the rail.

The dynamic augment may be expressed in percentage of the static weight on one driving wheel. These static weights, dynamic augments and percentage increases in weights are given as illustrations in connection with tests shown, where it will be seen that the percentage increase varies from 32 per cent to 72 per cent. The committee, however, believes that 50 per cent increase in the static weight on the driver at diameter-speed would represent good average practice, while much less than this percentage is greatly to be desired.

The committee concludes, therefore, that the secret of proper counterbalancing for any class of locomotive in any service is to reduce the weight of the reciprocating parts as far as possible.

Great benefit will be obtained if the railroads will determine the maximum load that they can carry on the rails, bridges, etc., and then reduce the weight of the reciprocating parts to a point

RESULTS OF COUNTERBALANCE TESTS ON THE PHILADELPHIA & READING.

Number	Type	Wheel	Weight of Engine	Weight of Recip. Parts	Recip. Wts. Wt. of Eng.	Reciprocating Parts Balanced Weight	Balanced %	Unbalanced Weight	Unbalanced %	Unbal. Wt. Wt. of Eng.	Static Weight per Wheel	Dynamic Augment per Wheel	% Inc. Weight @ M.P.H.	Remarks
345	4-4-2	80″	224000	1616	$\frac{1}{139}$	1115	69	501	31	$\frac{1}{447}$	32250	23500	72	Very Rough at High Speed
345	4-4-2	80″	224000	1616	$\frac{1}{138}$	485	30	1131	70	$\frac{1}{198}$	32250	10220	32	Excessive Fore and Aft
345	4-4-2	80″	224000	1521	$\frac{1}{147}$	760	50	761	50	$\frac{1}{294}$	32250	16027	49.7	Fore and Aft Fairly Rough at High Speed
346	4-4-2	80″	224000	1616	$\frac{1}{139}$	1034	64	582	36	$\frac{1}{385}$	32250	21800	67	Rough at High Speed
341	4-4-2	80″	224000	1616	$\frac{1}{139}$	888	55	728	45	$\frac{1}{308}$	32250	18750	58	Good Average Rough at High Speed
347	4-4-2	80″	224000	1616	$\frac{1}{139}$	773	48	843	52	$\frac{1}{266}$	32250	16350	50	Fore and Aft Fair at High Speed
342	4-4-2	86″	222500	1370	$\frac{1}{164}$	985	72	385	28	$\frac{1}{578}$	31750	18425	58	Good Average Slightly Rough at High Speed
301	4-4-2	80″	217000	1273	$\frac{1}{170}$	916	72	357	28	$\frac{1}{608}$	30500	19300	63	Good at Low Slightly Rough at High Speed
301	4-4-2	80″	217000	1273	$\frac{1}{170}$	636	50	637	50	$\frac{1}{341}$	30500	13426	44	Good Average Good at High Speed

Plate 1

high speed, that a larger portion of reciprocating weights can be left unbalanced than has been the practice.

CONCLUSIONS.

A simple counterbalancing rule expressed in general terms, which should give good average results when applied to any class of locomotives in any service, might be stated as follows: Keep the total weight of the reciprocating parts on each side of the locomotive below $\frac{1}{400}$ part of the total weight of the locomotive in working order, and then balance one-half the weight of the reciprocating parts.

The above general rule is based upon diameter-speed, and should keep the dynamic augment well within the limits of good practice. Where the normal speed is regularly considerably below the diameter-speed, it may be desirable to increase the proportion of the reciprocating weights to be balanced, to as much as 60 per cent or 65 per cent.

Another counterbalancing rule is, to set an arbitrary percentage which the dynamic force of the overbalance will be allowed to increase the static weight; for example:

If it is desired that the dynamic force of the overbalance at diameter-speed should not increase the static weight on a wheel more than 50 per cent, calculation could be made as follows:

4-4-2 type locomotive with 26-in. stroke.
Given: Static weight on one wheel = 30,000 lb.
To find: Maximum permissible weight of reciprocating parts to be balanced in one wheel = W.

$$W = \frac{\text{50 per cent static weight on one wheel} \times .312}{\text{Crank radius in inches.}}$$

$$W = \frac{15{,}000 \times .312}{13} = 360 \text{ lb.}$$

Therefore: The total reciprocating weight to be balanced on one side of this locomotive would be 720 lb. And with 50 per cent of the total reciprocating parts balanced on one side, the total weight of these parts must be designed to weigh 1440 lb.

where the dynamic augment of the parts balanced will be only a small proportion of this maximum allowed load.

Special designs of piston heads, cross-heads, hollow piston rods, and the use of high-grade materials, including heat-treated carbon and alloy steel, aluminum, etc., make it possible to construct very light parts, the expense of which will be many times justified by the consequent saving in repairs to equipment and track, as well as the saving due to the increase in tractive power of the locomotives. With a refinement of design along these lines, it is altogether possible to construct reciprocating parts approaching in lightness $\frac{1}{240}$ part of the total weight of the locomotive in working order, instead of $\frac{1}{160}$ part as expressed in the previously mentioned general rule representing a fair average. With an increased tendency toward these very light parts, the percentage of narts balanced or unbalanced becomes less and less a factor. Greater efficiency is thus given to the locomotive, in that more and more of the weight allowable on the rail will be used in starting and pulling the train.

The committee wishes to acknowledge its indebtedness to members of this Association, and others, who have furnished data; to the *Railway Age Gazette*, for the use of data contained in an article published therein by H. A. F. Campbell; and to George R. Henderson, who kindly offered his services to the committee; all of which assisted greatly in the preparation of this report.

The report is signed by:—S. G. Thomson, (P. & R.) Chairman; S. M. Vauclain, (Bald. Loco. Wks.); F. J. Cole, (A. L. Co.); John Purcell, (A. T. & S. F.); W. H. V. Rosing, (S. L. & S. F.); O. C. Cromwell, (B. & O.), and T. W. Heintzleman, (So. Pac.).

DISCUSSION

M. H. Haig, (A. T. & S. F.): Much of the information in the report bears on the reduction of weight of the reciprocating parts. Reference to light parts makes the strength of material a pertinent factor in the discussion of this

same time prevent engine failures requires that the material must be durable. Reference was made to the light parts in the locomotives built in 1914. Some locomotives built in that year have already had some of their parts break, and it would be interesting if we could find out to what extent there have already been breakages of the parts of some of the other engines, no doubt investigated by this committee. Many locomotives delivered by the builders are required to be re-counterbalanced after they have reached the various railroads. I know it to be a fact that some locomotives which have been re-counterbalanced according to the two-thirds method have given much more satisfactory results after having been re-counterbalanced according to that method. Because of my experience along that line it does occur to me that balancing only one-half of the weight of the reciprocating parts is too little.

William Elmer (Penn.): The committee recommends the application of the counterbalance at a point directly opposite the crankpin. It is my understanding that in some quarters it is the practice to slightly advance the counterbalance, so that it is not at a point directly opposite the crankpin.

C. D. Young (Penn.): We have a large number of high speed passenger engines in which the relation of the weight of the locomotive to the weight of the reciprocating parts is 230. In order to obtain as high a figure of the weight of the locomotive to the weight of the reciprocating parts, I believe it is necessary to heat treat the reciprocating parts. On these engines the piston rods are hollow, the pistons are rolled steel, the cross heads are made light by the use of electric cast steel, there is a hollow crankpin, and the lever is attached directly to the crankpin, with the union member attached. These have been in service now almost two years and we have not received in our department a record of any broken parts so far. There is a great deal of lightening accomplished by design, of course, in that hollow rods and pins are used, and a design of crosshead was used which was very light for its bearing area. I believe that the members can very safely lighten up the parts both by design and material, if the material is closely supervised when it is being treated.

J. E. Pilcher (N. & W.): I have in mind an investigation I made some years back of a peculiar knock that occurred on an engine in which the reciprocating parts were very heavy. In making the investigation the curve of the piston load was plotted from indicator cards, a definite speed and a corresponding pressure curve for the reciprocating parts was laid out, and we discovered for the first three inches in the stroke at that particular speed, the crankpin was pulling the reciprocator parts. That is, the curves crossed at 3 in. of travel. That illustrates the effects of the very heavy reciprocating parts and the necessity for reduction. Of course that is an example of how not to do it.

Mr. Thomson: I think any type of locomotive today could be designed without spending very much money in refinements and stick to the 1-180th part of the locomotive for the total weight of the parts, but the committee thought, to be very conservative in that matter, they would simply figure it 1-160th, to represent good average conditions. The figures vary on freight built locomotives, built before 1904, from 203 down to 144, and after 1904 from 199 to 134. Now, anybody building a freight locomotive with the reciprocating parts weighing 1-134th part of the locomotive is going to have trouble regardless of how much they balance it. Those figures will not require exceptionally light parts and the use of very high grade material. When you get up to 1-240 then you do have to use high grade, heat treated material, and have to resort to the very best designs. But I believe it can be done, and done very profitably to the railroads.

I do not think the matter of heat treated parts or the cost should have entered our heads, because it is a matter of a few dollars, and it will pay for itself the first two or three years you bring it into the shop. The contention about our not being able to get results with heat treated steel and the refinement of parts I do not think should be considered. In regard to the knock that some people will find in an engine, this is not always due to the counterbalancing. There are a great many other things that make an engine rough, besides faulty counterbalance. If the weights are less, the engine will be very rough, and the higher the speed the worse it will be. The question of preadmission and cushioning the parts are all very pertinent to the subject, and it resolves itself back again to the point that the important thing is to make your parts light—that seems to be the fundamental text of the report this year.

ary 1, 1913. Summarized, it shows electrification on parts of 14 steam railroads, to the extent of 591.3 route miles, including 1761.65 miles of track.

All of the members of the committee making this report are responsible for the maintenance of electric equipment on steam railroads and four of them acquired their experience in the steam motive power department. In general, the committee considers that experience in maintaining steam equipment is the best possible training for the new responsibilities, about the only additional requirement being an ability to understand and use intelligently the necessary electrical terms. This is not difficult.

A study of the plans of shops designed and built by two steam railroads especially for the maintenance of their electric equipment shows that they are equally well adapted to the repairs of either steam or electric equipment; and of the tools used almost all are necessary for the maintenance of steam equipment alone. This should convince the most skeptical that no master mechanic who is successfully maintaining steam rolling stock need hesitate to undertake the maintenance of electric equipment.

In connection with the experience with electrification, the following list shows the additional tools which were found neces-

C. H. Quereau
Chairman, Committee on Maintenance and Operation of Electrical Equipment

sary for handling the electric equipment at one shop which was originally equipped only for the maintenance of steam equipment:

One 190-ton portable hydraulic press for removing crank pins from discs, and discs from motor shafts.

A hook for lifting the front end of the locomotive.

A lifting beam for motors. It is necessary to have a lifting beam for removing and replacing motors.

A lifting beam for removing and replacing cabs.

A special chuck for boring jack shaft and motor bearings.

A tension device for re-bending armatures. The armatures are all bended on a driving wheel lathe, and this machine is placed conveniently in order to maintain a constant tension on the banding wire, the tension being indicated on a scale in pounds.

An insulation testing transformer consisting of a 3-kw. transformer mounted on a truck with voltmeters for testing from 200 to 6000 volts, and is used for testing armatures and fields for grounds.

A cradle for holding armatures after removing them from the locomotives when it is not necessary to work upon them.

A feature worthy of note in connection with the maintenance of steam and electrical equipment will be found in the comparatively small machine tools and light cranes installed in electric locomotive repair shops. The reason for this is the relative lightness of the individual parts of the electric locomotives. Another feature is that, on the average, the age of the employees in an electric equipment shop is less than in a steam equipment shop. One reason for this is that the maintenance of electric equipment on steam roads is a comparatively new business, and has been in existence too short a time to have employees grow old in the service.

One might easily assume it is essential the workmen have a rather extensive electrical training, and it is true that a mainte-

road repair shops.

There is this characteristic difference between steam and electric equipment. With steam locomotives it takes about five minutes to locate a defect and from a day to a week to make repairs; with electric equipment it takes an hour or two to locate the cause of the trouble and from five minutes to a day to repair the defect.

At the time of introduction of electric operation on any railroad, the usual plan is to qualify the regular steam locomotive engineers and firemen for service on the electric locomotives. A few days' instruction by a qualified traveling engineer and a few trips over the road under his supervision are sufficient. To those without the experience, this statement may appear fanciful, but as a matter of fact it may be accepted without question.

A little consideration will convince even the most skeptical that a knowledge of the Book of Rules, the significance of signals and train orders, experience in handling the air brakes and an intimate knowledge of the territory constitute at least nine-tenths of the qualifications of an efficient engineman. These are

under three headings: "Man Failures," "Electrical and Mechanical." The headings "Electrical" and "Mechanical" are self-explanatory. The other heading "Man Failures" is intended to cover failures of equipment which are due to the men operating it.

The report is signed by:—C. H. Quereau (N. Y. C.), Chairman; G. C. Bishop, (L. I.); G. W. Wildin, (N. Y., N. H. & H.); J. H. Davis, (B. & O.), and R. D. Hawkins, (G. N.).

DISCUSSION

G. W. Wildin (N. Y. N. H. & H.): We think we have about the best electrical repair shop in the United States for electric locomotives. Of course, there is in our shop some very peculiar machinery designed especially for the peculiar equipment we have on that road—I presume we have the most complicated electrical equipment there is in the United States—and for that reason perhaps we do not make as many miles per detention as some of our neighbors, but you must realize that we have both the alternating and direct current equipment to contend with, and we have more trouble in the changing over from

Table I

PRINCIPAL STEAM ROAD ELECTRIFICATIONS IN AMERICA

NAME OF ROAD AND SECTION ELECTRIFIED	Began Elec. Operation	Length of Route, Miles	Length of Track, Miles	System of Electrification	Number Locos.	Car Equipment	
						Motors	Trail
B. & O., Baltimore, Md., Baltimore Tunnels...	1895	3 75	8 4	675 V. D. C.	9	.....	.....
Long Island Ry	1905	84 42	208 51	600 V. D. C.	.....	474	78
New York Central, Harmon, New York..	1906	54	255	600 V. D. C	63	192	19
New York, New Haven & Hartford R. R., N. Y., New Haven	1908	99 61	537 94	Single Phase 11,000 V. 25 Cyc. 600 V. D. C., N. Y. C.	100	74	79
Grand Trunk Ry., St. Clair Tunnel Co., Pt. Huron, Mich., St. Clair Tunnel	1908	4	12	Single Phase 3300 V. 25 Cyc.	3 Units	.....	.....
Great Northern R. R., Cascade Tunnel, Washington..	1909	4	10	Three Phase, 6600 V. 25 Cyc.	4	.....	.....
Michigan Central, Detroit River Tunnel, Detroit, Mich..	1910	4.4	25 7	600 V. D. C.	10	.....	.....
Penn. Tunnel & Term. R. R., P. R. R. into N. Y. City	1910	19 9	98 6	600 V. D. C.	68	68	.....
B. & M. R. R., No. Adams, Mass., Hoosac Tunnel..	1911	7 92	22	Single Phase, 11,000 V. 25 Cyc.	5	.....	.....
Butte, Anaconda & Pacific R. R., Butte-Anaconda, Mont	1913	30	90 5	2400 V. D. C.	19 Frt., 2 P	.....	.....
Norfolk & Western R. R., Bluefield-Elkhorn, W. Va	Bldg. 1914	30	75	Split Phase, 11,000 V. 25 Cyc., A. C.	12	.....	.....
Canadian Northern, Montreal, Can.	Bldg. 1914	9	25	2400 V. D. C.	6	8	.....
Pennsylvania R. R., Philadelphia to Paoli	Bldg. 1914	20 3	93	11,000 V. A. C.	.....	93	.....
C. M. & St. P.	Bldg. 1915	220	300	3000 V. D. C.	21	.....	.....

Abbreviations: V.—Volts. D. C.—Direct Current. A. C.—Alternating Current.

the same for electric and steam operation. The operation of electric equipment is much simpler than for steam locomotives. The motorman does not have his vision blinded or confused by smoke or steam, coal dust or ashes; his attention is not distracted by watching the steam gage or water glass, or instructing his fireman in his duties, nor is he bothered by balking injectors, ash pans or leaky flues. There are, of course, no stops for coal and water and there need be no long wait between trains for cleaning fires or ash pans.

Numerous statistics relating to electrically operated roads have been published, including the cost of labor and material expended in repairs, and to the efficiency of the apparatus and the maintenance methods as shown by the number of delays. Several of these statements use as a basis for judging the efficiency of the equipment and its maintenance the unit "Miles per Detention," and also the unit "Miles per Minute Detention," but the majority of the statements published do not show the former item. For the operating officials the unit "Miles per Minute Detention" is of decided value, but this is not the proper basis on which to judge the efficiency of the apparatus nor of the force that maintains it, because the length of the delay is affected in most cases more by operating conditions than by the nature of the failure originally causing it.

alternating current to direct current than in any other one particular feature of our operation, which would not happen if we had either system pure and simple. For the benefit of the steam men who have not had any more electrical experience than I had when I took hold of the New Haven system eight years ago, when it was just in the infancy of the electrification, I will say that we have seen many bugs picked out of that system, and we have been good missionaries for the rest of the steam lines which have got to come to electrification in some sense or another, and I will say that those men who are going up against electrification in these days are not justified in approaching the subject with that fear and trembling which was common some years ago. There is no reason why a man who is used to putting together two pieces of steel should not be able to put together two pieces of copper and put them back just as he found them before—there is no great complication to it, and it is merely a matter of keeping the apparatus in working order.

We should first define what is going to be a detention. There is no use in saying we shall have so many miles per detention, unless we define whether the detention is to be one minute, two minutes, or five minutes as the period. Mr. Quereau has already, apparently, adopted two minutes as the period. Another man who

The committee feels that the following table expresses the maximum fiber stresses which should be used in heat-treated carbon and alloy steel materials for forgings, and therefore presents it to the Association as information, suggesting that it be submitted as Recommended Practice:

	Heat-Treated Carbon.		Alloy.	
	Tension and Compression.	Bending.	Tension and Compression.	Bending.
Main and parallel rods.....	10 000	14 000	12 000	17 000
Piston rods	11 000	15 000	13 500	18 000
Driving axles	.....	20 000	.....	24 000
Crank pins	.....	17 000	.....	20 000

The committee prepared a specification for alloy steel forgings of the chrome-nickel type. After consideration of the criticisms of this specification, and of the quenched and tempered carbon steel and alloy steel (chrome-vanadium type) specifications, the committee recommends the following:

(a) That the present standard specifications for quenched and tempered carbon steel axles, shafts and other forgings for locomotives and cars, be modified in accordance with the proposed specifications for quenched and tempered carbon steel forgings as submitted in Exhibit *A*. This in order to harmonize this specification with our alloy steel specifications and also include a recommended proof test.

(b) That the present specifications for alloy steel forgings, be modified as submitted in Exhibit *B*. This change consists

C. D. Young
Chairman, Committee on Forging Specifications

in adding to the present alloy steel specifications for chrome-vanadium, a chrome-nickel alloy and also a recommended proof test.

The report is signed by:—C. D. Young (Penn.), Chairman; A. H. Fetters (U. P.); H. B. MacFarland (A., T. & S. F.); J. R. Onderdonk (B. & O.); H. E. Smith (N. Y. C.); J. W. Taylor (Sec.), and Frank Zeleny (C., B. & Q.).

The principal difference between Exhibit *A* of the committee's report and the specifications referred to are in the chemical composition and the proof test. The chemical composition presented by the committee follows:

Chemical Composition.—The steel shall conform to the following requirements as to chemical composition.

Carbon	First class	0.38 —0.52 per cent.
	Second class	0.45 —0.60 per cent.
Manganese		0.40 —0.70 per cent.
Phosphorus		not over 0.05 per cent.
Sulphur		not over 0.05 per cent.

A paragraph was added under proof tests as follows:

(b) A recommended test for axles, shafts and similar forgings is as follows: Place the forging upon supports 3 ft. apart mounted on an M. C. B. drop test machine. The forging should then be struck two blows by a tup weighing either 1640 or 2240 lb. falling from heights proportioned according to the follcenter in inches.

Diameter of Shaft at center, inches.	Height of drop in feet. 1640-lb. tup.	2240-lb. tup.
5	1 ft. 3 in.	0 ft. 11 in.
5½	1 ft. 8 in.	1 ft. 3 in.
6	2 ft. 2 in.	1 ft. 7 in.
6½	2 ft. 9 in.	2 ft. 0 in.
7	3 ft. 5 in.	2 ft. 6 in.
7½	4 ft. 3 in.	3 ft. 1 in.
8	5 ft. 1 in.	3 ft. 9 in.
8½	6 ft. 2 in.	4 ft. 6 in.
9	7 ft. 3 in.	5 ft. 4 in.
9½	8 ft. 7 in.	6 ft. 3 in.
10	10 ft. 0 in.	7 ft. 4 in.
10½	11 ft. 7 in.	8 ft. 5 in.
11	13 ft. 4 in.	9 ft. 9 in.
11½	15 ft. 3 in.	11 ft. 3 in.
12	17 ft. 3 in.	12 ft. 7 in.
12½	19 ft. 5 in.	14 ft. 3 in.
13	22 ft. 0 in.	16 ft. 0 in.
13½	24 ft. 7 in.	18 ft. 0 in.
14	27 ft. 5 in.	20 ft. 0 in.
14½	30 ft. 6 in.	22 ft. 3 in.
15	33 ft. 9 in.	24 ft. 8 in.

NOTE.—The above heights are to the nearest inch.

The changes presented in Exhibit *B* are likewise in the chemical composition and in addition to the proof tests. The chemical composition is as follows:

Chemical Composition.—The steel shall conform to the following requirements as to chemical composition.

	Chrome Nickel.	Chrome Vanadium.
Carbon	0.28—0.42 per cent.	0.28—0.42 per cent.
Manganese	0.40—0.70 per cent.	0.40—0.70 per cent.
Silicon	0.10—0.30 per cent.	.....
Phosphorus, not over.....	0.05 per cent.	0.05 per cent.
Sulphur, not over.....	0.05 per cent.	0.05 per cent.
Chromium	0.60—1.00 per cent.	0.75—1.25 per cent.
Nickel	1.00—1.50 per cent.	.....
Vanadium, not under.....	.....	0.15 per cent.

[The addition to the proof tests is the same as given in Exhibit *A*.—Editor.]

DISCUSSION

C. D. Young: I move that the recommendations of the committee be submitted to letter ballot as recommended practice.

(The motion was carried.)

A. R. Ayers (N. Y. C.): Under Class *A* in the specifications for alloy steel forgings the committee includes piston rods which are subject to requirements of 10,000 lb. per square inch, less than axles, crank pins, etc. My recollection is that that was worded that way in the original alloy steel specifications, and was later corrected, so as to put piston rods in Class *B*, to get the benefit of the heavier requirements. It is not evident why piston rods should not be subject to just as good treatment as axles, and I would ask if there would be any objection to putting piston rods under Class *B*, with axles?

C. D. Young: Class *B* says "and other forgings." It was the thought of the committee, I believe, at the time this was discussed, that it might be well to keep piston rods, especially those which are hollow bored and forged, under Class *A*, and if desired they could be included as "other forgings" under Class *B*. I see no objection in specifically mentioning piston rods in both classes—the classes must take care of themselves by the expression of what they are supposed to cover.

BOILER WASHING

The committee in its endeavor to ascertain the general practice of washing locomotive boilers sent out a letter requesting answers to 20 questions. From 118 letters sent out replies were received from 93, representing 51,294 locomotives. The information received is summarized as follows:

2. Miles Made between Wash-outs.—9760 engines make less than 500 miles. 11,283 engines make over 500 and less than 1000 miles. 8312 engines make over 1000 and less than 1500 miles. 20,472 engines make over 1500 miles. 2467 not replying or unable to furnish information. The passenger locomotives make 30 per cent greater mileage between wash-outs than freight engines.

3. Water Changes.—Only about 5 per cent of the roads in the country practice changing water in the boilers.

4. Blowing Out at Terminals.—About 15 per cent practice some regular system of blowing boilers at terminals. About 35 per cent of the engines are blown out regularly and systematically while on the road to remove mud or sludge that may have accumulated in the boiler, and to prevent foaming.

5. Wash-out Holes in Boilers.—The maximum number of wash-out plugs reported in a boiler was 52, with a minimum of ten, or an average on all modern power of 32.

cold water.

7. Boiler Washing Pressure.—The average boiler washing pressure at the pump or line was 96 lb. and about 72 lb. at the nozzle.

8. Hot Water System for Washing Boilers.—Hot water systems were reported as being used on 54 roads, 13 being the maximum number reported on any one road. Some report using injector to heat washing and filling water.

9. Reduction of Water on Account of Hot Water Plants.—The use of hot water for boiler washing plants shows an average reduction in the amount of water used of 3427 gal. or 36 per cent, some roads reporting as much as 9000 gal.

10. Reduction in Amount of Time on Account of Hot Water Plants.—A reduction in time of 1 hr. and 54 min., or 42 per cent.

11. Saving of Fuel on Account of Hot Water Plants.—A saving in fuel of 897 lb., or 36 per cent.

12. Improvement in Performance of Firebox Sheets, Stays, etc., on Account of Hot Water Plants.—All roads except one report a great reduction in boiler troubles, especially as to cracked sheets, leaky stays, etc., or an average reduction in these troubles of 34 per cent.

13. Water-treating Plants.—Thirty-one roads report using water-softening plants at wayside tanks.

14. Treating Water in Engine Tanks.—Forty-five roads report using chemicals in engine tenders, 19 using soda ash and 26 boiler compound.

15. Treatment to Prevent Incrustation.—Seventy-six roads

John Purcell
Chairman, Committee on Boiler Washing

report using boiler compound, soda ash and other chemicals, to prevent incrustation.

16. Treatment to Prevent Foaming.—Twenty-nine roads report using boiler compound or other chemicals to prevent foaming.

17. Treatment to Prevent Corrosion and Pitting.—Very few roads specifically treat water to prevent corrosion, but water treatment as explained in answers to Questions 13, 14 and 15, often prevents corrosion of sheets, flues, etc.

18. Increased Repairs to Packing, Cylinders, etc., Due to Water Treatment.—Seven roads report water treatment increasing repairs to valves and packing, due principally to boiler foaming. Others report no increase in repairs.

19. Increased Mileage Due to Water Treatment.—All roads using water-softening plants report great increase in mileage between flue setting and boiler repairs, some roads reporting as high as 300 per cent. An average increase in mileage of over 100 per cent is given.

20. Experience in Handling Mechanical Water Purifiers.—None of the roads report using mechanical water purifiers. Some report as having experimented in the past, but not using same at the present time.

Rules.—Sixteen of the roads report having regular rules governing the washing of boilers, and the majority report that they comply simply with the Interstate Commerce Commission's instructions as to washing boilers.

In further explanation of the above answers, washing boilers

In explanation of answer to Question 4 in reference to blowing out, while some roads have regular systematic methods of blowing out boilers at terminals, the majority seem to leave it entirely with the engine crew. It has been demonstrated on two or three roads using water which foams badly that with the intelligent use of anti-foaming boiler compound and a liberal use of blow-off cocks, a locomotive could be run 2000 miles or more without foaming trouble. Better results are obtained if the boiler is blown out while not using steam, or after engine has been standing a while.

As to Question 6, the cost of washing boilers, as stated, this question was evidently misunderstood. With the large modern boilers where engines are thoroughly washed, it is evident from this report that this can not be thoroughly done for less than $3.50, where cold water is used, both for cooling down and washing out, and where scraper is used and loose scale removed.

Question 14. Treatment of water in engine tanks.—This practice is more prevalent on divisions where they have one or two bad water stations, the other water on the division being good. All the roads report a great improvement in boiler maintenance where water softening is practiced, either in wayside tanks or where chemicals are used in the engine tenders.

Owing to the great difference in conditions under which locomotives are operated it is felt that the subject can be successfully treated only in a general way, and the following method of washing boilers is given at this time as being a good general practice:

METHOD OF WASHING BOILERS.

Frequency of Washing.—All locomotives in service must have boilers washed at least once every thirty days, or more frequently if conditions require.

Cooling Boilers.—Boilers should be thoroughly cooled before being washed, except at points where improved hot water washout systems are installed. When boilers are cooled in the natural way without the use of water, the steam should be blown off, but the water must be retained above the top of the crown sheet and the boiler allowed to stand until the temperature of the steel in the firebox is reduced to about 90 deg., or so that it feels cool to the hand; then the water is drawn off and the boiler washed. When the engine can not be spared from service sufficiently long for it to be cooled in this manner before washing, proceed as follows:

Use of Injector for Cooling Boilers.—When there is sufficient steam pressure, start the injector and fill the boiler with water until the steam pressure will no longer work the injector. Then connect water-pressure hose to feed pipe between the engine and tender and fill the boiler full, allowing the remaining steam pressure to blow through the syphon cock or some other outlet at the top of the boiler. Open blow-off cock and allow the water to escape, but not faster than it is forced in through the check, so as to keep the boiler completely filled until the temperature of the steel in the firebox is reduced to about 90 deg.; then remove all plugs and allow the boiler to empty itself.

How to Wash a Boiler.—Remove all wash-out plugs. Begin washing through the holes on the side of the boiler opposite the front end of the crown sheet. Wash the top of the crown sheet at the front end, using Nozzle No. 1 or 2. Then use Nozzles 3 and 4 to wash between the rows of crown bars and bolts at right angles to the nozzle, directing the stream toward the back end of the crown sheet. After washing through the holes near front end of the crown sheet, use the holes in their respective order toward the back of the crown sheet. The object of this method is to work the mud and scale from the crown sheet toward the side and back legs of the boiler and prevent depositing it on the back ends of the flues.

Washing Crown Sheet.—Next wash the crown sheet from the boiler head, using Nozzles 1 and 3 or 6. When Nos. 3 or 6 are employed, the swivel connection with the hose should be used and the nozzle should be inserted to the front end of the crown sheet and slowly drawn back and revolved at the same time, so as to wash the top of the boiler and all the radial stays or bolts as well as the crown sheet.

Washing Flues.—Wash the back end of the flues through the holes in the connection sheet, using Nozzles Nos. 1, 5 and 6, and revolve them by means of a swivel connection when the curved nozzles are used. The same nozzles are to be used and the same system followed when washing any part of the flues or feed-water heater flues.

Washing Back Head Water Spaces.—Wash the water space between the back head and the firebox door sheet through the holes in the back head with Nozzle No. 6, being careful to remove all scale and mud above and below the fire-door hole.

Washing Arch Tubes.—Arch tubes must be washed and scraped

liable to pull out or explode. Therefore a locomotive should not be allowed to leave a terminal with dirty arch tubes, and all concerned are instructed to strictly comply with the rule.

NOTE.—The condition of an arch tube as to scale on the water side can readily be determined by the presence of clinker adhering on the fire side.

Washing Side-sheet Water Spaces.—Now return to the holes on the side of the boiler opposite the crown sheet, using Nozzles 5 and 6, and revolve them so as to thoroughly wash down the side sheets and staybolts, making sure that all spaces on the side of the firebox are clear of mud and scale. Then wash through the holes near the check valves near the front end of the boiler, using Nozzles 1 and 5 or 6, with a swivel connection.

Washing Barrel or Boiler.—Then wash through the hole in the bottom of the barrel of the boiler near the rear end, and wash toward the front end. If the engine has no mud drum, wash toward the throat sheet with Nozzles 5 or 6. Then use the straight nozzle directly against the flues, reaching as great a space as possible in all directions. Then use the bent nozzle through the front hole in the bottom of the barrel, and also the straight nozzle in same manner as above, until certain that the flues and spaces between the flues and the barrel are as clean as it is possible to make them.

Washing Mud Ring.—Then use Nozzles Nos. 5 and 6 in the side and corner holes of the water legs, revolving them thoroughly to clean the side sheets, and finally clean off all scale and mud from the mud ring by means of straight nozzles in the corner holes.

Inspection after Washing.—It must not be assumed that because clear water runs from the holes that the boiler is cleaned, but all spaces must be examined carefully with a rod and light, and, if necessary, use a pick, steel scraper or other tools, to remove accumulated scale.

Filling Boilers.—When cooling and filling boilers, they must be filled through the injector check. The injector steam pipe valve at the fountain must be closed. Filling up boilers through blow-off cocks will not be permitted except at hot water boiler washing plants and when hot water is being used.

Fig. 1 shows the nozzles referred to above. Experience shows that wash-out nozzles should be smooth and constructed so as to throw a solid stream out of a 5/8-in hole with 100 lb. pressure back of it for a distance of 10 or 12 ft., which gives a very effective washing force. The aim is to have 100 lb. pressure at the nozzle, which can usually be had by having 125 lb. at the pump; this varies somewhat according to pipe lines. Fig. 2 shows a scraper and an oil and electric inspection torches.

Fe hot water wash-out plants. Their figures show, with the cold water wash-out system (not including overhead charges), a cost of $4.42 to handle a modern locomotive boiler; this includes cooling from 100 lb. steam pressure, emptying, washing, filling, firing up and raising the steam pressure to 100 lbs., also the cost of water and fuel. It requires not less than 5 hours' time for the operation, while with the hot water system a boiler can be emptied, washed, filled, fired up and steam raised to 100 lb. pressure for $3.01, including the cost of water and fuel. A saving of $1.41, and a reduction in time of about 1½ hours for each engine.

The operation of changing water in a boiler with the cold water plants costs $3.54, with the hot water plants $2.13, a water change being only 88 cents cheaper than a wash-out with either system. The following is a detailed statement of the various items involved:

COST OF BOILER WASHING, COLD WATER WASHING SYSTEM.

A modern boiler, 100 lb. steam; 4 in. of water in glass.

Cooling to 90 deg. F., cooling water 57 deg. F., 9000 gal. at 4 cents per 1000 gal.	$0.36
Time cooling and draining boiler 2 ft. 30 in. at 20 cents per hr., one man	.50
Removing and replacing plugs, two men, 30 min., 40 cents per hr.	.20
Washing boiler, two men, 1 hr., at 40 cents per hr.	.40
Water used washing boiler, 3000 gal. at 4 cents per M. gal.	.12
Water used filling boiler, 4000 gal. at 4 cents per M. gal.	.16
Time filling boiler, 45 min., 1 man at 20 cents per hr.	.15
Laying fire bed, 1000 lb. coal, 10 cents per 100 lb.	1.00
Additional fuel to raise steam to 100 lb. boiler pressure, 1100 lb.	1.10
Time of fire builder, 45 min.	.15
Add 20 per cent. to time of men for changing tools from engine to engine	.28
Total	$4.42

COST OF BOILER WASHING, HOT WATER WASH-OUT SYSTEM.

A modern boiler, 100 lb. steam; 4 in. of water in glass.

Blowing steam and water out of boiler, one man, 1 hr.	$0.20
Removing and replacing plugs, two men, 30 min., 40 cents per hr.	.20
Washing boiler, two men, 1 hr at 40 cents per hr.	.40
Water used washing boiler, 3000 gal., 4 cents per M. gal.	.12
Water used filling boiler, 4000 gal., 4 cents per M. gal.	.16
Time filling boiler, 45 min., one man at 20 cents per hr.	.15
Laying fire bed, 1000 lb. coal, 10 cents per hundred	1.00
Additional fuel to raise steam to 100 lb. boiler pressure, 500 lb. at 10 cents per 100 lb.	.50
Time of fire builder, 30 min., at 20 cents per hr.	.10
Add 20 per cent. to time of men for changing tools from engine to engine	.18
Total	$3.01

The saving in water and fuel of the hot water over the cold water system depends on how well the hot water plant is oper-

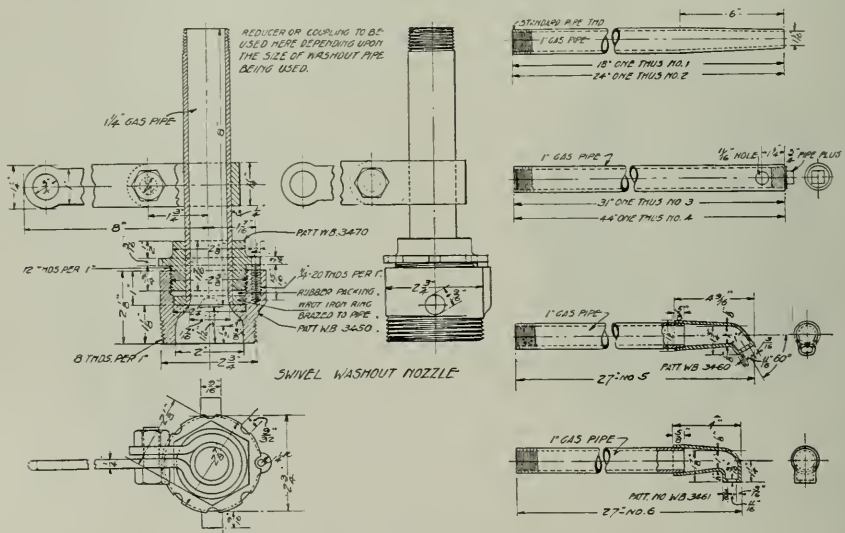


Fig. 1.—Nozzles for Washing Locomotive Boilers

water as much hotter as it can be obtained without the use of live steam. Reservoirs of ample capacity should be provided to conserve heat which may be collected from various sources, other than that blown out by locomotives and which can profitably be applied in heating the washing or filling water for locomotive boilers.

The Central of Georgia reports making some tests on cost saving and time saving on boiler washing with hot water washout systems as compared with cold water. These tests were followed up accurately by the testing engineer, with watch, actual weights on fuel, and actual consumption of water by use of meter. The saving in boiler maintenance and repairs, as well as flue and firebox failures on the line of road, shows a decided improvement when engines are washed with the mechanical hot water system as compared with cold water system. For instance, on this road, with average water conditions, since installing hot water washing outfit the life of the flues has been practically doubled. The life of fireboxes, staybolts and boiler sheets shows a material improvement. Failures on account of leaky flues and fireboxes have been practically eliminated, and, last but not least, the mileage of engines between wash-outs has been doubled. Under these circumstances the saving in boiler and flue repairs is, conservatively, $200 per locomotive per year, with the hot water system as compared with cold water. In the bad water districts these figures would show considerable increase. With the outfit at the Macon engine-house piped to 17 pits, it is necessary to only wash out two engines per day to show an actual money saving on the investment of 5.7 per cent. An outfit for average small enginehouse could be installed for $7500.

ing, min.	25	25½	27
Total number of engines filled	174	222	223
Average temperature of filling water, degrees	210	207¼	211
Average time taken per engine in filling, min.	26	24⅓	24¾
Total number of engines fired up	189	217	218
Average time taken per engine in firing up to 100 lb. steam, min.	46	43	41
Average extra consumption of water per boiler washed out, gal.	No record.	1753⅓	1732⅔

The condition under which these tests were made require that all the blow-off water from the locomotive boilers be utilized again for washing and refilling. This plant has been in service one year and no live steam has ever been used for heating water. The cost of boiler washing with this system is approximately as follows:

AVERAGE COST OF BOILER WASHING—HOT WATER SYSTEM.

Blowing steam and water out of boiler	1 man, 15 min.	@ $0.22	$0.055
Remove and replace plugs	2 men, 30 min.	@ .22	.220
Washing boiler	2 men, ½ hr. ea.	@ .22	.220
Water used washing boilers	1 500 gal.	@ .08	.120
Water used filling boiler	No charge.		
Time filling boiler	1 man, 30 min.	@ .22	.110
Laying fire bed, 1 000 lb. coal (Bit.)		@ 2.00 net	1 000
Additional fuel to raise steam to 100 lb. pressure 500 lb. (Bit.)		@ 2.00 net	.500
Time of fire builder	1 man, 45 min.	@ .175 hr.	.131
			$2.356

This road reports that this plant is very economical and that nothing has been spent for repairs to the plant during the past year. The plant has a total water capacity of 60,000 gal., 30,000

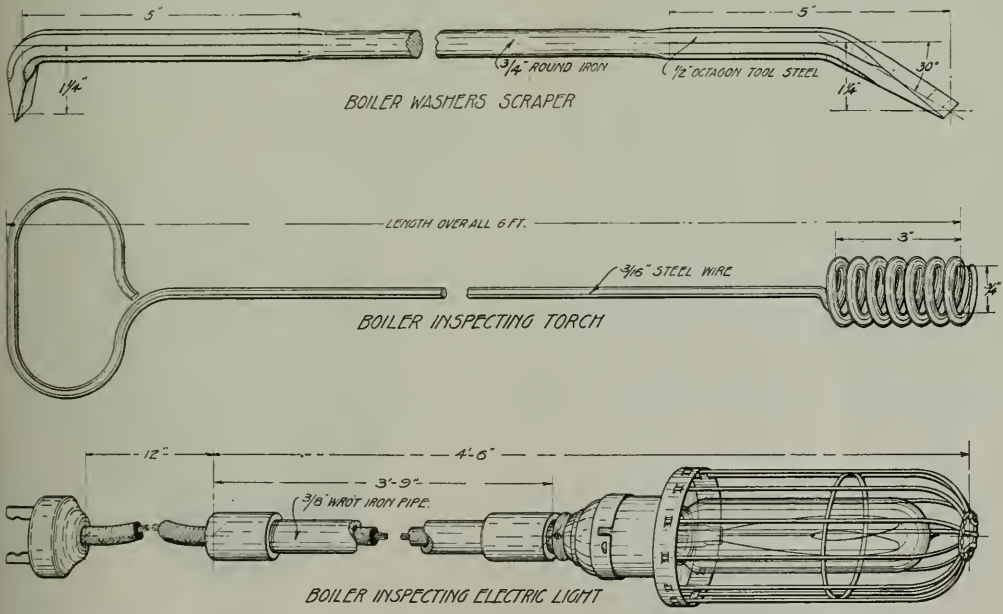


Fig. 2.—Scraper and Inspection Torches for Washing Boilers

There is in operation at the Communipaw roundhouse, of the Central Railroad of New Jersey, at Jersey City, N. J., a Winter's boiler wash-out plant. The plant consists of two standard 3-in. cypress tanks, one submerged within the other. The outside tank forms the hot well in which the locomotives are blown off; the inside tank contains the water for refilling. The following data indicate results of tests made at this plant from September 1, 1914, to November 30, 1914:

	Sept. 1 to 30.	Oct. 1 to 31.	Nov. 1 to 30.
Total number of engines put through plant for any purpose	202	228	226
Total number of engines blown down	179	203	197
Average steam pressure per engine on boiler at time of blowing down, lbs.	103	110	108

gal. of which is in the hot well, 18,000 gal. in the refilling tank, and 12,000 gal. in the cold water storage.

[A copy of the instructions for washing boilers as used by the Pennsylvania Lines was also included.—Editor.]

WATER TREATMENT TO PREVENT INCRUSTATION.

The Santa Fe, which has more water softening plants in operation than any other road, reported: The Santa Fe went into the water treatment in the latter part of 1903, since that time 115 water treating plants have been established. The lowest incrustants before treatment in any water treated is 16.6 gr. per gal. The highest incrustants before treatment is 80.9 gr. per gal. The average cost of water treatment on the Santa Fa is 3¼ cents per 1000 gal. The average amount of incrustants in all waters before

The incrusting matter in boiler waters consists almost entirely of carbonates of lime and magnesia and sulphates of lime and magnesia. The carbonates require treatment with hydrated lime and the sulphates require soda ash. Any system of water softening to be effective must work within certain prescribed limits, such as automatic means of proportioning the correct amount of chemicals to the water should be provided. The water should have not less than four hours' time in which to complete the reaction and settle out the precipitates.

There are two general classes of water softening plants on the market: one known as the "Continuous" and the other as the "Intermittent" system. There are advantages in both systems, but on the whole it is considered that the Continuous system is preferable on account of requiring less floor-space and also less labor and fuel charges for the additional pumping.

There are a number of factors which should be considered when deciding whether or not to build a water softening plant. As a rule little is gained by putting up a single plant here and there over the division. Treatment of only a small fraction of the waters can not possibly result in the preventing of the formation of all scale, and these plants always get the blame for any foaming troubles which arise on that division, whether justly or not.

Soda ash applied in an engine tender has this disadvantage that the water in the engine's tender becomes partly treated and will, with high sulphate, throw down its solids at a reasonably low temperature, and in many cases the temperature of the injector is sufficient to do this and the result is rapid incrustation of injector, injector parts, and connections, and increase of injector troubles. This tender treatment is therefore a very poor substitute for water softening plants, but will to a certain extent relieve the situation on those branch lines where the waters are only moderately hard.

It would be profitable, where much water is used, to treat it when the incrusting solids exceed 12 grains per gallon. This is especially desirable where treated waters may be on both sides of untreated water tanks, for the reason that the incrusting solids in the untreated water, after they are precipitated, greatly add to the sludge and aggravate foaming conditions.

The beneficial results of following water treatment may be approximately shown by the increase in flue mileage between failures on the Santa Fe since the beginning of water treatment in 1903. The mileage between flue failures on the Santa Fe System on account of leaking for the last eight months in 1903 was 17,557 miles. This has shown a steady increase until for the first eight months for 1914 the mileage per flue failure was 168,624 miles.

It is safe to say that water treatment has in many cases increased the life of fireboxes 300 per cent, it being considered that the improvement in the flue performance represents very largely a correspondingly improved performance in firebox sheets.

The report is signed by:—John Purcell (A., T. & S. F.), Chairman; W. H. Fetner (C. of Ga.); J. C. Little (C. & N. W.); W. P. Carroll (N. Y. C.); G. W. Rink (C. of N. J.); E. S. Fitzsimmons (Erie), and G. E. Sisco (Penn. Lines).

DISCUSSION.

W. E. Dunham (C. & N. W.): For those of us who have to deal with particularly bad water conditions, it hardly seems as if it would be necessary to outline a set of rules, as presented here, but that is the fact, and not very long ago we outlined a set of rules very similar to these, and the results obtained from being systematic and thorough in your washing out of boilers, even though you are not equipped with the latest and most expensive requirements of hot water washout plants and all of such details, are all well worth while. I have usually specified that the roundhouse foreman of either the day or night force should inspect the boiler after it was washed out, and by doing that we have been able to eliminate flue failures and fire-box failures where we had them before, and had lots of them. There is only one variation which I found necessary from the plan here outlined, and that is under our local conditions we have found it very necessary to wash from the front of the boiler back through the flues first, and then follow the procedure practically as Mr. Purcell has outlined it here. We have a very heavy accumulation of mud and scale, and we believe it is advisable to get that off of the flues first, and then we finish up with that the last. In other words, we give our flues a double washing, you might say, and we find it pays exceedingly.

D. R. MacBain (N. Y. C.): The importance of good washing out I do not believe would be questioned by any person, excepting it was some superintendent or trainmaster who Association as a text, and I wish to say further that following it in the finest detail outlined you will not be going too far so far as the interest of the company is concerned. I move that the paper be accepted as read, and be submitted to letter ballot as recommended practice

Mr. Dunham: References are made to certain nozzles in the report. If the wording of the outline could be changed so that the nozzles would be designated as a "right angled nozzle" or a "straight nozzle" or something of that kind, it would be of little more general use than the detail shown here. With that change I would second Mr. MacBain's motion.

Mr. MacBain: That is agreeable.

(The motion was carried.)

O. C. Wright (Penna. Lines): I would like to call attention to the boiler inspection electric light. It is shown with a brass socket connected to wrought iron pipe. We have had some experience with a similar inspection light and found that on account of the fact that the lamp was subjected to moisture and mechanical abuse it was almost impossible to keep it free from ground, which makes it a very unpleasant as well as a rather dangerous lamp to handle. We have designed and are using a lamp of very similar construction to this, with a porcelain socket sealed in and attached to a fibre tube. We have gotten very good results from this lamp.

FLANGE AND SCREW COUPLINGS FOR INJECTORS

The committee has endeavored to decide upon standards for flange and screw couplings which can be adopted for locomotive service with the least inconvenience and expense to railroads and manufacturers.

Form and Dimensions of Threads.—Analysis of the statements of the roads which communicated with the committee and co-operation with the injector manufacturers led to the conclusion that a pitch of 10 threads per inch could be adopted as a future common standard with the least expense to all concerned. It was decided that a thread adopted as standard should interchange with either a sharp V-thread or with the U. S. standard thread. A modified form of the U. S. thread will meet this requirement and is suggested as the proposed standard. The form and dimen-

M. H. Haig
Chairman, Committee on Dimensions of Flange and Screw Couplings for Injectors

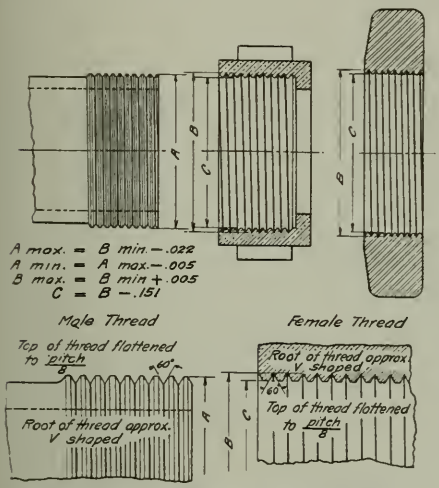
sions of this proposed thread are shown in Fig. 1. These threads are proposed for all injector connections, including the overflow, as well as for all couplings used throughout the injector piping system, whether of the nut or flange type.

Coupling Nuts and Sleeves.—As a result of investigation it is believed that certain sizes of nuts can be selected as standard for certain sizes of iron and copper pipe. On the same principle it is believed that certain sizes of sleeves (collars or tail pieces) can be adopted as standard for use with definite sizes of nuts and pipes. The proposed standard dimensions of these coupling nuts and sleeves are shown in Fig. 2. The proposed standard forms of the nuts and sleeves are shown in Fig. 3.

It is proposed that each manufacturer shall continue the size of

improper handling and to provide against nuts being stretched by tightening or cracked by pounding, the proposed standards include dimensions for greater thickness throughout than found common in past practice. It is proposed that the outside of injector coupling nuts shall be left rough, except in the grooves.

In planning proposed standard dimensions for sleeves, various sizes were considered by which it might be possible to make the sleeves thicker. Making the sleeves thicker than in the past would increase their diameter. This in turn would require a greater diameter of nuts used with given sizes of pipe. Such increases in diameter of nuts would prevent interchangeability with previous equipment where interchangeability between proposed standards and much old equipment would otherwise be possible. With the possible exception of the sleeve for 1½-in. copper pipe it is believed that the sleeves shown for use with copper pipes are of reasonable thickness. Injectors on locomotives in present railroad service are seldom, if ever, equipped with 1½-in. copper pipe. This size, in all probability, will gradually become obsolete. The committee, therefore, does not regard it as of sufficient importance to justify any radical change.



PIPE SIZE INCHES		NOMINAL SIZE OF THREAD INCHES	THDS PER INCH	OUTSIDE DIAMETER OF FLATTENED MALE THD "A"		OUTSIDE DIA OF SHARP "V" IN FEMALE THD "B"	
IRON	COPPER			MAXIMUM INCHES	MINIMUM INCHES	MAXIMUM INCHES	MINIMUM INCHES
1		1 7/8"	10	1.728	1.723	1.755	1.750
1¼	1⅜	2"	10	1.971	1.966	1.998	1.993
1½	1⅝	2 3/8"	10	2.375	2.370	2.402	2.397
1¾	1¾	2 13/16"	10	2.796	2.791	2.823	2.818
2"	2	3	0	3.009	3.004	3.036	3.031
2"	2¼	3	10	3.009	3.004	3.036	3.031
2½	2⅝"	3⅝	10	3.488	3.483	3.515	3.510
3	2⅝, 3⅛	4⅛	10	4.103	4.098	4.130	4.125

Fig. 1.—Proposed Standard Form and Dimensions of Threads for Injector Couplings. Ten Threads per Inch.

Application of Coupling Sleeves.—The committee favors copper pipe extending throughout the full length of the sleeve under all conditions. When the pipe is brazed, its end should be belled out to fill the chamfer shown at upper end of each sleeve for copper pipe in Fig. 1. This application is shown by Fig. 4. Under no circumstances should a sleeve be counterbored for a portion of its length and a copper pipe fitted into this short counterbore and brazed. Another practice to be avoided is that of brazing a short ring on the end of a copper pipe instead of applying a proper sleeve.

A collar 1¼ in. long is considered of ample length with either a mechanical joint or brazing. It is not probable that a longer surface will be thoroughly brazed throughout its entire surface.

The sleeves for use with iron pipes as shown in Fig. 1 are considered of reasonable thickness. It will be observed that the pitch shown in Fig. 2 and the sleeves used with flange couplings

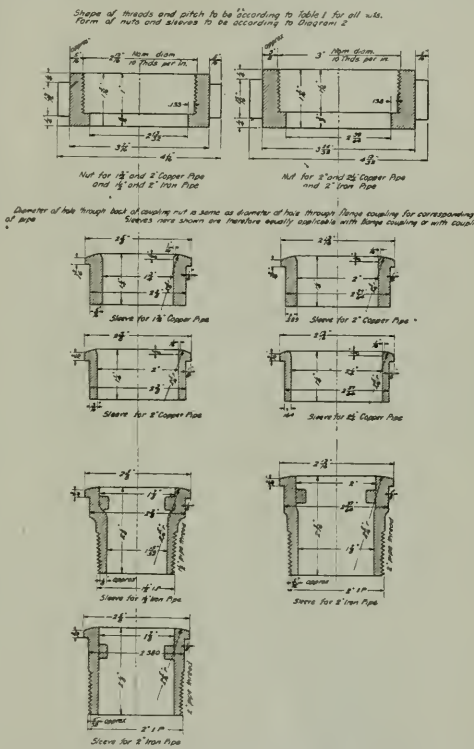


Fig. 2.—Proposed Standard Dimensions of Injector Coupling Nuts and Sleeves

should conform to the dimensions shown in Fig. 1 for the respective sizes of pipe. The dimensions of flange couplings of the different manufacturers have been compared and considered with the dimensions of connections submitted by the various railroads.

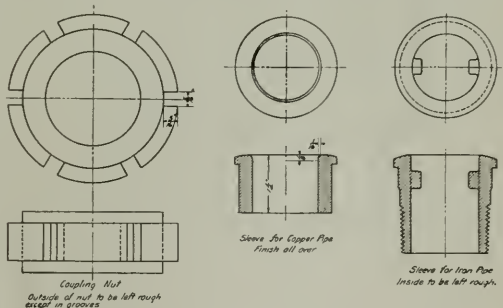


Fig. 3.—Proposed Standard Forms of Coupling Nuts and Sleeves

This investigation has led to the proposed standard form and dimensions of flange couplings shown, Fig. 5. To provide against any possible weakness due to blow holes, porous metal or other defects in cast steel, it is recommended to make the flanges

of forged steel. It is believed that the little additional cost of drop forgings will be justified.

Typical examples were shown of mechanical joints now in service on a few roads to which equipment of dimensions shown in Fig. 5 are applicable with the pipe secured by beading over the end or by brazing. The hole through the flange is of the same diameter as the hole through the coupling nut, and, consequently, fits the same sleeve for a given size of pipe.

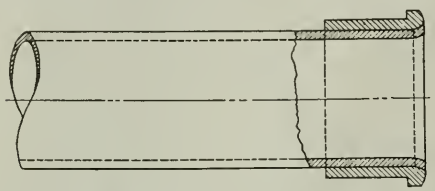
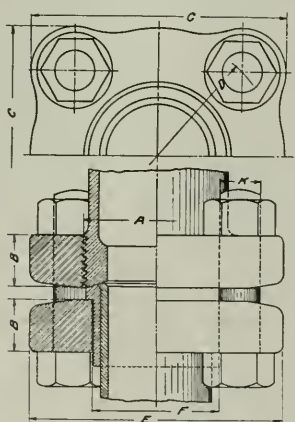


Fig. 4.—Proper Application of Sleeve to Copper Pipe with Brazed Joint

Brazed and Mechanical Joints.—The replies made by the roads to the committee's questions, as well as the prints submitted, indicate a very general use of the brass spanner nut. The most common practice is to braze a brass sleeve to a copper pipe and to screw a brass sleeve to the iron pipe. Of the 36 roads communicating with the committee, 31 report using brazed joints only and 5 report using some joints that are not brazed. Among the 31 are 2 roads which chamfer the end of the sleeve and expand or bell the end of pipe into the chamfer. This supplements the



Material in Flange — Forged Steel

PIPE SIZE INCHES IRON	PIPE SIZE INCHES COPPER	NUMBER OF THREADS PER INCH	NOMINAL DIAMETER OF THREADS INCHES	B INCHES	C INCHES	D INCHES	E INCHES	F INCHES	K INCHES
1¼	1⅜	10	2	3/16	3 5/16	3 5/16	3 5/16	1 3/32	5/8
1½	1⅝	10	2 3/16	1/8	3 5/8	3 5/8	3 5/8	2 5/32	5/8
1 15/16	2 1/16	10	2 7/16	3/16	4 1/4	4	4 1/4	2 23/32	5/8
2	2 1/4	10	3	1/8	4 1/2	4 1/4	4 1/2	2 27/32	5/8
2½	2 5/8	10	3 5/8	5/16	5 1/8	5	5 1/8	3 3/32	5/8
3	2 7/8 3 1/8	10	4 1/8	5/16	5 5/8	5 3/8	5 5/8	3 5/32	3/4

Dimension F of flange coupling is same as diameter of hole through coupling nut for corresponding size of pipe, shown by diagram 1
Sleeves secured by beading over end of pipe are of the same dimensions as those secured by brazing. Equipment of above dimensions are, therefore, applicable with either method of securing pipe.

Fig. 5.—Proposed Standard Form and Dimensions for Injector Flange Couplings

brazing and the roads using it report this practice as quite satisfactory.

The 5 roads which report joints without brazing, extend end of pipe through nipple and bead over the end of pipe so that it forms a ball joint. As to comparison between the brazed and mechanical joints, most of the roads are noncommittal, having had no experience with the mechanical joint. Several of these roads state very definitely that the brazed joints are thoroughly satisfactory and have led to no complaint. With regard to recommending mechanical joints as standard, nine roads definitely vote "no" and two "yes."

Flange Connection as Compared with Spanner Nut.—Twenty-four roads reply definitely "No" to the question as to whether the flange connection is favored in preference to the spanner nut. A road using spanner nuts in connection with lifting injectors and the flange connection with non-lifting injectors, reports both as satisfactory where used. Another comment is worthy of quoting in full: "Have never used flange connection. While it is possible the flange connection would not be as subject to leaks as a coupling nut and nipple, these joints are broken so many times that the ease with which the coupling nut connection can be taken apart we believe outweighs any advantage to be gained with the flange."

Material in Coupling Nuts and Sleeves.—Spanner nuts and sleeves are commonly made of brass. A number of compositions, some more or less alike, were reported by various railroads. The following composition impresses the committee as a satisfactory mixture:

Copper	84 to 86 per cent.
Zinc	4 to 6 per cent.
Tin	4 to 6 per cent.
Lead	4 to 6 per cent.

Spelter.—In brazing, the usual practice of spelter with borax flux is commonly followed. A mixture of fifty per cent copper and fifty per cent zinc seems to be the most commonly used.

Brazing by Oxy-acetylene Process.—A shop of one road reported doing all brazing by the oxy-acetylene process. The reply is quoted, in part, as follows: "Since adopting this practice we have had very good success with it; in fact, have not had one joint leak where it was brazed, and we do not find that it oxidizes the zinc in the brass or causes joint to become porous. We find it saves a great deal of time. In fact, we can braze pipes by this method in five to eight minutes which would otherwise take thirty minutes with charcoal fire. In the eight months that we have been using this process we have not had one failure."

Application of Injector Equipment.—The water feed or suction pipe in particular should be thoroughly clamped. Injectors should be properly bolted to stiff brackets. Steam pipes should be bent with easy curves and the bends should not be abrupt. It is necessary that due allowance be made for expansion and contraction and it is the opinion of the committee that a bend approaching a reverse curve meets requirements most satisfactorily. The bends in the pipe should be on a radius of at least from 10 in. to 14 in.

Lever Starting Valve Support.—It is recommended that the lever starting valve of non-lifting injectors be clamped to the boiler and that the valve body be designed with a lug to facilitate this. To support valves not already provided with such lugs, a rigid clamp should be secured to the steam pipe immediately below the starting valve and one just above the starting valve.

Use of Standards.—If the standards proposed by this committee are to be adopted, the votes deciding this should be cast with the idea of applying future injectors and couplings accordingly. If the question is voted on in the affirmative without intending to use the standards, it will be better to reject them.

The report is signed by:—M. H. Haig (A. T. & S. F.), Chairman; T. F. Barton (D., L. & W.); S. B. Andrews (S. A. L.); W. H. Winterrowd (C. P. R.), and B. F. Kuhn (N. Y. C.).

DISCUSSION.

Mr. Haig (Chairman): The preparation of a set of standards naturally incurs more or less inconvenience and expense. It was therefore the effort of the Committee to decide upon standards which would result in the smallest amount of expense, hardship or inconvenience upon the railroads or the manufacturers. The manufacturers were invited to co-operate with the committee and were urged to be present at all meetings. Representatives of some manufacturers attended all the meetings.

J. Strickland Knease (Wm. Seller & Sons): I acted as chairman of the committee of manufacturers to discuss this subject and it was considered from the same point of view as your committee, with the idea of reducing the number of threads to the minimum, and at the same time obtain the strongest form which would be of service. Certain recommendations which were made by the manufacturers committee were not accepted. The principal one to which I wish to call your attention is the pitch of thread. It further desired to reduce the variety of coupling nut thread and pitches as much as possible, each manufacturer willingly sacrificing his own design if he considered it obselete. I would therefore ask consideration of certain recommendations in Mr. Haig's report with which I do not agree, stating that my opinion is supported by two large manufacturing companies who also have had wide experience along these lines.

In regard to coupling nuts: Your committee advocates a uniform pitch of ten threads per inch. The manufacturers' committee thinks it preferable to increase the pitch with the diameter of the nut within certain limits, on account of the difficulty of properly fitting fine threads with large diameters, and the danger of crossing the threads when the nuts are partially worn. For these reasons the manufacturers' committee recommends and is prepared to supply nuts and branches threaded eight per inch for all diameters, 3 inches and above, in accordance with standard nuts in use on railroads since 1876.

Your committee accepted the recommendation of the manufacturers' committee covering the special shape of thread. The writer brought this form of thread to the attention of the association in the discussion of Mr. Foster's paper last June, which was designed in 1890, and has been used ever since and corresponds almost exactly to the standards. The manufacturers' committee also think that your committee has made the coupling nuts unusually heavy. There is sufficient metal now in the nut if properly designed. If cast with the mixture given in the committee's report, an eight per inch nut for 2½ inch iron pipe will stand a strain of 30,000 to 35,000 lbs. before yielding at the collar. It would be therefore entirely unnecessary to increase the thickness or width of the nut, especially as the increasing cost of copper, tin and zinc would add materially to the expense. Another detail is the radius of the ball joint. I should say without going into detail that the ball joint as designed is rather flatter than the accepted standards, and both standards are proving entirely satisfactory. The general practice of the foreign roads, especially the English, is to use much more conical joints than we do.

As to brazing unions, I would say that the form of brazing ring has been re-designed. Some roads prefer the brazed connection in order to meet the improved form of brazing ring. Your committee recommends a counter bore of the brazing ring itself. The committee of manufacturers made tests of the brazed union which show that the cause of failure was due to lack of penetration of the brazing material between the copper pipe and the ring. For that reason they recommend a counter bore of the rings to a point within its head and the bevelling of the lower face to permit slight flanging of the copper pipe toward the ball joint. This counter bore leaves a space of about 1/64 in. on each side to permit the brazing material to run down to the collar of the brazing ring, adding materially to the strength of the joint. The breaking strength of the joint runs from 17,000 to 22,000 lb.

The Vice-President: Mr. Haig, would your committee like to have another year with the Manufacturers' Association to present something that we could go on as recommended practice?

Mr. Haig: Mr. Knease's presenting his remarks as the representative of the Manufacturers' Committee was somewhat of a surprise to me, for the reason that I do not understand his statements to agree with those of individual representatives who have discussed this matter with me.

I think that the matter which Mr. Knease presented to-day would have been to much better advantage presented at the meetings at which he was urged to be present.

The tables which he presents were thoroughly investigated and discussed by the railroad men, as well as by the representatives of manufacturers, and it was agreed that his old standards would not be as satisfactory as those which the reports from the railroads indicated to be the more common.

S. G. Thomson (P. & R.): It does not seem to me, mechanically, that ten threads is right for a ⅜ in. pipe, if it is right for a 3 in. pipe. Of course you can make the threads heavy enough to prevent trouble, but we have had a great deal of trouble from fine threads on large pipe. It seems to me that there ought to be some division, say ten threads up to 2 inches, and eight threads above. I move that this committee be continued and come together and give us another report next year.

(The motion was carried.)

SUBJECTS

The Committee on Subjects for the 1916 meeting of the Association submits the following report:

That the present standing committees be continued.

That the following subjects be assigned to special committees:

1. Equalization of long locomotives, so as to secure the most effective guiding from the trucks, both leading and trailing.
2. Best practice and type of tender truck for passenger locomotives. Has a swing truck any advantage over a rigid truck?
3. Reciprocating and revolving weights. Committee to report on possibilities of lightening.
4. Transmission of electric power from motors to driving wheels of electric locomotives. Committee to report on the progress in this direction.
5. Use of pyrometers on superheater locomotives.
6. Piston valves, rings and bushings. Best material and sizes, with particular reference to superheated steam.
7. Metal pilot designs.
8. Modernizing existing locomotives, which can then remain in service for ten or fifteen years.

That the following subjects be assigned for topical discussions:

1. Advantages, if any, of compounding superheater locomotives.
2. Side bearings on tenders.
3. Tender derailments: Causes and remedies.
4. Road instruction for enginemen and firemen.
5. Crosshead design.

The report is signed by:—A. W. Gibbs (Penn.), chairman; D. R. MacBain (N. Y. C.), and C. E. Fuller (U. P.).

The report of the committee was received and each subject was referred to the incoming committee.

CONCLUDING EXERCISES

The following officers were elected for the ensuing year: President, E. W. Pratt (C. & N. W.); first vice-president, William Schlafge (Erie); second vice-president, F. H. Clark (B. & O.); third vice-president, W. J. Tollerton (C. R. I. & P.); treasurer, Angus Sinclair. The following executive members were elected: C. H. Hogan, (N. Y. C.); J. F. De Voy, (C. M. & St. P.) and J. T. Wallis, (Penn.).

W. E. Symons, in presenting retiring-president Gaines with a past-president's badge said:

The year which has just closed, the fiscal year of this association, has been a very trying one to all railway companies, by reason of questions of economy, valuation and various other matters with which railway officers have to deal, and placing heavy burdens on the leaders of the motive power departments of our railways and upon officers of associations like this who have to devise ways and means for reaching these economies. Our retiring President, Mr. Gaines, has been no exception to the rule in this respect, and his activities have only reflected honor and credit to himself. It has been customary on past occasions to present the retiring president with a jewel indicating the degree of esteem and affection in which the members of the Association hold him as a man, as an engineer, as an executive officer, and as a citizen, and on this particular occasion the duty of making the presentation of this jewel has fallen upon me.

I take great pleasure, Mr. Gaines, in presenting to you the past president's badge, which you receive as the retiring president of this association, and to say to you that it embodies in part our estimation of you as an executive officer, as an engineer and as a railway man, and our esteem and consideration for you as a citizen. I have also noted with much pain and sympathy your present slight physical indisposition, but we hope, and I feel justified in saying to you, that if the affectionate regard in which you are held by the members of this Association has any curative properties, you will be almost immediately restored to your perfect good health, and that we will have the benefit of your wise counsels in years to come.

SAFETY WATER GLASS COCK

A newly developed water glass cock is being exhibited by the Sargent Company, Chicago, which automatically drains the water from the glass when either or both top and bottom cocks are closed. With the ordinary type of cocks used on water glasses, it is possible to trap water in the glass by inadvertently closing both cocks, the indication of a false water level being thereby made possible. Should either one of the cocks be closed or should they be only partially open a similar dangerous condition is produced.

The new water glass cock is designed to prevent occurrence of these conditions. It contains a double seated valve, one side of which controls the passage from the boiler to the glass, and the other side a passage from the glass to the atmosphere. When the boiler passage is closed the outlet is open, and vice versa. Should either valve be open at the boiler connection while the other is closed the pressure will cause a flow through the glass and thence out through the open cock. When both boiler connections are closed the glass will drain through the lower cock. The arrangement is such that it is necessary to fully open both valves in order to close the passage from the glass to the atmosphere, and it is impossible to operate with cracked valves, as is frequently done when ordinary cocks are used.

COMPARATIVE REGISTRATION FIGURES

In studying the following figures of registration to Friday morning it must be remembered that, so far as railroad men are concerned, the numbers for this year should be compared with those of 1913 and 1911, when M. M. Association met first. Compared with 1913 their is a falling off of 16 in railroad men (members and special guests), but a very considerable falling off—368—in the number of supply men.

	1911.	1912.	1913.	1914.	1915.
Members M. M. and M. C. B....	562	294	459	506	448
Special Guests.....	251	378	235	249	230
R. R. Ladies.....	387	238	289	237	233
Supply Ladies.....	325	186	236	234	188
Supply Men.....	1469	1297	1405	1275	1037
Totals	2319	2293	2644	2501	2136

ADDITIONAL MASTER MECHANICS' REGISTRATION

Bosworth, W. M., M. E.: L. & N.
Byron, A. W., M. M.; P. R. R.
Caracristi, V. Z., Consit. Engr.; Blenheim.
Chidley, Joseph, A. S. M. P.; N. Y. C.; Blenheim.
Conniff, P.; Shop Supt.; B. & O.; Craig Hall.
Crawford, C. H., A. E. Mech. Dept.; N. C. & St. L.; Blenheim.
Cromwell, O. C., M. E.; B. & O.; Runnymede
Durham, H. P., S. M. P.; Tehauntepec Nat.; Westminster.
Gallaway, A. K., M. M.; B. & O.; Dennis.
Gardner, Henry, Chalfonte.
Gelhausen, F. R., Gen. For.; B. & O.; Lexington.
Gillis, H. A., Seaside.
Hill, Rufus, M. M.; P. R. R.
Jackson, O. S., Gen. Supt.; C. T. H. & S. E.; Blenheim.
Macbeth, H. A., S. M. P.; N. Y. C. & St. L.; Traymore.
Marsh, F. E., A. M. M.; P. R. R.
Miller, T. E., M. M.; B. & O.; Haddon Hall.
Oviatt, H. C., A. M. S., N. Y., N. H. & H.; Blenheim.
Thomas, I. B., S. M. P.; P. R. R.; Brighton.
Walsh, J. F., M. E.; Galena Signal Oil Co.; Chalfonte.

ADDITIONAL MASTER CAR BUILDERS' REGISTRATION

Calkins, A. E., A. S. H. S.; N. Y. C.; Traymore.
Chamberlain, J. T., Ex-Pres.; Alamac.
Chidley, Joseph, A. S. M. P. & R. S.; N. Y. C.; Blenheim.
Covert, M. F., A. M. C. B.; Swift Refr. Trans. Co.; Traymore.
Crawford, C. H., A. E. Mech. Dept.; N. C. & St. L.; Blenheim.
Cromwell, O. C., M. E.; B. & O.; Runnymede.
Fox, Geo. P., Gen. For.; N. Y. C.; Pennhurst.
Gillespie, W., M. C. B.; Cent. Vt.; Schlitz.
Hill, Rufus, M. M.; P. R. R.
Jackson, O. S., Gen. Supt.; C. T. H. & S. E.; Blenheim.
Macbeth, H. A., S. M. P.; N. Y. C. & St. L.
Meyers, H. E., M. M.; L. V.; Dennis.
Osman, H. L., S. C. D.; Morris & Co. Refr. Lines, Traymore.
Sasser, J. W., S. M. P.; Norfolk So.; Sterling.
Shackford, J. M., Ch. Draftsman, D., L. & W.; Blenheim.
Thomas, F. H., V. P.; Bellefonte Cent.; Stalton.
Thomas, I. B., S. M. P.; N. Centl.; Brighton.
Walsh, J. F., Chalfonte.
Young, J. P., Gen. For.; Mo. Pac.; Alamac.

ADDITIONAL SPECIAL GUESTS

Anderson, Harry A., Special Agent, P. R. R.
Anderson, J. B., Ch. Cl.; P. R. R.; Runnymede.
Barton, Ed. O., Gen. For.; P., B. & W.; Shelburne.
Bardo, C. L., Gen. Mgr., N. Y., N. H. & H.; Blenheim.
Bateman, Frank B., Atlantic City Ry.
Bates, John J., Foreman, P. & R.
Beatty, J. B., Ch. Cl.; P. R. R.; Dunlop.
Beck, I. H., For. Air Brake; C. of N. J.
Borcia, E., Engineer, Roumanian Government; Blenheim.
Boyer, John O., Rd. For. of Engs.; P. & R.
Burns, R. C., Insp.; P. R. R.; Haddon Hall.
Callahan, A. E., Gen. Tool Insp.; Erie; Alamac.
Carter, G. H., Gen. For., P. & R.; Norwood.
Cornwell, D., Prest.; Wash. Georgetown Nav. Co.; Blenheim.
Cotton, Wm. A., Ch. Cl. to G. M. S.; Erie; Blenheim.
Cloward, T. T., Gen. For.; P., B. & W.; Chalfonte.
Crawford, M. R., For.; C. of N. J.; Louvan.
Cromwell, E. G., Insp. M. P.; B. & O.; Lexington.
Davis, G. L., Gen. For.; C. of N. J.
Deems, W. A., M. M.; B. & O.; Haddon Hall.
Detro, A. E.; Gen. For.; C. of N. J.; Traymore.
Demarest, G. L., Gen. For.; C. of N. J.; Dennis.
Doarnberger, J. A., Mast. Boiler Maker; N. & W.; Dennis.
Dodds, T. D., Secy. to S. M. P.; B. & O.; Holmhurst.
Duncan, J. H., P. & R.; Chester Inn.
Eliot, H. H., A. M. M.; P., B. & W.; Chalfonte.
England, Albert C., U. S. Navy; Bothwell.
Faber, George F., Gen. Supt.; P. R. R.
French, Ernest L., Gang For.; P. R. R.; Devonshire.
Carey, W. S., Sten. Office G. S. M. P.; Penn. Lines.
Gearhart, J. F., Gen. For.; P. R. R.; Dunlop.
Gettys, H. L., Mech. Insp.; N. & W.; Traymore.
Goodman, J. D., For.; P. R. R.; Newfield.
Griswold, W. W., Pur. Agt., W. & L. E.; Blenheim.
Hogsett, J. W., Ch. Insp.; Chalfonte.
Holliday, Howard, Monticello.
Jackson, R. E., M. M.; Va.; Arlington.
Jones, L. M., Asst. to Gen. Mgr.; Norfolk So.; Blenheim.
Kemmer, Nicolai, M. E.; Imperial Russian Rys.; Brighton.
Kidd, C. M., Insp. Gen. A. B.; N. & W.; Traymore.
King, R. W., Gen. Mgr.; Wash.-Va.; Haddon Hall.
Koch, C. B., Gen. For.; P. R. R.; Traymore.
Loughery, M. C., P. & R.
Lowther, H. F., Asst. P. A.; D. L. & W.; Craig Hall.
MacWhorter, Harlan, Atlantic City Ry.
Mahoney, J. E., Gen. Stork.; Norfolk So.; Blenheim.
Mayer, F. A., Gen Mast. B. M.; So.; Pennhurst.
McGinty, Geo. G., Secy.; I. C. C.; Haddon Hall.
Meason, H. M., Gen. For.; P. R. R.
Nagle, Benj. J., Gen. For.; P. & R.; Newfield.
Nagle, Geo. W., Gen. For.; P. & R.; Newfield.
Nation, James D., Trav. Engr.; P. R. R.
Perkinson, T. F., A. M. M.; B. & O. R. R.
Pilcher, Wm., Jr., N. & W.; Dennis.
Plummer, A. M., For. P. W. R. Sta.; W. J. & S.
Phetteplace, L. H., Gen. Mgr.; C. C. & O.; Traymore.
Rhett, E. M., Elec. Engr.; C. of Ga.; Chelsea.
Rives, E. A., For.; Southern; Lexington.
Rommell, C., For. Eng. House, Atlantic City Ry.
Rosenberg, C. R., Insp.; P. R. R.
Rotenberry, H. T., P. & R.; Devonshire.
Salisbury, R. W., M. E.; T. & P.; Traymore.
Sandhas, H. L., A. B. Insp. & Instr.; C. of N. J.; Arlington.
Sampson, W. F., M. P. Insp.; P. R. R.
Schechter, L. M., Ch. Engr.; Russe Loco. Corp.; Blenheim.
Schramm, F. J., Ch. Cl. to S. M. P. & E.; D., L. & W.; Alamac.
Seiders, Irwin A., Insp. Fuel; P. R. R.
Seddon, E. F., For. Mach. Shop, P. & R.; Edson.
Sharpley, J. E., Chf. Elecn.; Va.; Arlington.
Shannon, J. M. F., Clerk, P. R. R.; Dixie.
Shelton, F. M., Supt. Loco. Supplies, D., L. & W.; Alamac.
Stedd, Frank E., Supt.; L. V. C. Co.; Continental.
Stephens, J. H., Supt. Shops; Wash. Ry. & Elec. Co.
Stocker, Louis, Ch. Cl. to M. M.; P. R. R.
Stratton, G. E., Insp. Pass. Equip.; P. R. R.; Blenheim.
Sullivan, J. P., Gen. For.; C. of N. J.
Temple, J. S., Insp. Gen. Pc. Wk., B. & O.; Haddon Hall.
Torback, F. S., Gen. For.; B. & O.; Wittel.
Voorhees, T. C., P. & R.; Traymore.
Westley, J. S., Gen. For.; P. & R.; Blenheim.
Wilson, C. L., I. C. C.; Arlington.
White, Geo., Store Kpr.; P. R. R.
Wightman, F. A., M. P. Insp.; P. R. R.; Dennis.
Wood, P. O., Supt. Loco. Perf.; St. L. & S. F.; Traymore.

W. V. TURNER'S LATEST IMPROVEMENT IN BRAKING EQUIPMENT

Walter V. Turner, chief engineer, Westinghouse Air Brake Company, is attending the conventions this year. His most recent contribution to the art of transportation is the variable load brake and the variable road accelerator for electrically operated cars. The equipment of the New York Municipal Railway Corporation is provided with these features, which, with the electro-pneumatic brake, has permitted obtaining a capacity over four times as great as compared with the ordinary electric trains operated with the perfected air brakes. Mr. Turner has recently been made a fellow of the Royal Society of Arts in England.

MOTOR CARS IN INDIA.—Motor cars are extensively used in India, there being about 2000 in Calcutta and 1000 in Bombay. Values of exports of cars to India in the fiscal year 1913-14 are stated as follows: Motor cars, $3,680,855; motor-cycles, $346,490; motor wagons, $185,165; parts and accessories, $761,257. The United Kingdom leads in these items with the United States second.

Conventionalities

Harry Coddington, engineer of tests of the Norfolk & Western, was delayed two days in reaching the convention, because of the arrival of a little girl at his home.

C. W. Cross is accompanied by his son, who has just finished his special apprenticeship course at the Elkhart, Ind., shops of the New York Central. The trip is in the nature of a reward for the good record he has made.

The new cane sported yesterday by E. W. Kavanagh, of Ryerson & Son, attracted considerable attention. It was supplied at the expense of J. B. Warren, who fell down badly on a little matter of figures.

Frederic Schaefer, who recently organized the Schaefer Equipment Company, is attending the convention in the interests of his new company. Mr. D. Schaefer was formerly connected with the Summers Steel Car Co.

John Carroll (B. & O.) Admiring His Own Work

Henry Gardner, well known because of his work in the development of the modern apprenticeship system and improved shop organization, has Mrs. Gardner and his seven-year-old daughter, Elizabeth, with him this year.

The M. M. and M. C. B. Associations have established a reputation as the star orange juice consumers. The lady at the drinking fountain at the entrance to the Blenheim says her heaviest business of the year is during these conventions.

Mrs. Walter H. Bentley was detained at home this year on account of an operation performed about a month ago. She is convalescing rapidly and desires to be remembered to the many friends she made at the 1914, her first convention.

C. L. Bardo, general manager of the New York, New Haven & Hartford, is one of the convention visitors who are taking much interest in the exhibits. Needless to say, now that he is here, he intends to play in the golf tournament on Sunday.

Jack High is located just across the aisle from Herman Ball. Ed. Walker in passing by spoke to both of them. Contrary to his usual habit, he was quite dignified and used their last names. "My goodness," said an elderly lady who was passing at the time, "I didn't realize that they had 'highballs' on the pier."

Frank J. Barry, M. M., N. Y. O. & W.

George B. McGinty, secretary of the Interstate Commerce Commission, and a party of the locomotive boiler inspectors of the commission are here for the conventions. The party includes, Frank McNanamy, chief inspector; G. P. Robinson and A. Pack, assistant chief inspectors, and Inspector Scudder, Milwaukee; Boltwood, Denver; Adair, St. Louis; McNanamy, Grand Rapids; Wilson, Memphis; Wintersteen, Philadelphia, and Phfaeler, Washington. Next week seven of the commission's safety appliance inspectors will arrive to attend the Master Car Builders' convention. They will be headed, as usual, by

M. K. Barnum, S. M. P., B. & O., Had Put Some "Pep" Into It

Chief Inspector H. W. Belnap. Mr. McGinty is this year accompanied to the conventions for the first time by Mrs. McGinty. He expects to remain at least until Monday. .

It is remarkable how quickly the Lake Shore crowd have become accustomed to the new order of things. Not a single

T. F. Barton, M. M., D. L. & W., and Mrs. Barton

one of them stirred when President Gaines called for some one from the Lake Shore to give certain data as to conditions on that road. When M. D. Franey was singled out he started off in this fashion: "Speaking for the fourth district of the New York Central, etc."

Among those here is E. Borcea, of Roumania. In normal times he is a railway man, being identified with the construction department of the Roumania Government Railways. Recently, however, he was transferred to the War Office and is in this

J. J. Carey, M. M., Texas & Pacific

country with a captain of artillery looking into the possibilities of getting munitions of war. This is Mr. Borcea's second convention, he having attended in 1913.

C. W. Beaver, manager hoist department, Yale & Towne Manufacturing Company, who recently returned from a business trip to Cuba, reports that business there is in a very flourishing condition, the principal contributing cause being the demand for sugar. So long as the European war lasts the beet sugar output of the East will be very small. It is probably this increased demand upon the sugar market of Cuba that has made it necessary for the Havana Central to go into the market for 600 freight cars and 10 cabooses.

George A. Post narrated an incident the other night which he says explains several things. He is to be the orator this year at the commencement exercises of a small academy from which he graduated a greater or less number of years ago. When the announcement was made that he was to speak, the editor

C. S. Adams, Asst. Gen. For., New York Central

of a local paper, who was the editor of it also at the time he graduated, and who is a quite venerable gentleman now, sent Mr. Post a copy of an academy entertainment program in which the latter had a part years ago. In this entertainment several of the students took the part of animals, one being a dog,

C. C. Elmes, Assistant Engineer Motive Power, Philadelphia & Reading, at the end of a drive

another a cat and "Georgie" Post being a goat. "I wrote him in reply," said Mr. Post, "thanking him for recalling this entertainment to me and adding that the fact that I began to take that part so early explained many things in my subsequent career."

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

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Car Inspectors

In considering the qualifications of a man for the position of car inspector, it should be borne in mind that the duties of an inspector in a terminal yard differ somewhat from those of one on interchange work. A terminal inspector must be qualified to determine whether or not the cars which he inspects are defective in any way, and what repairs are necessary to place them in such a condition that they will be safe to run. On interchange work, besides these qualifications, an inspector requires a much more detailed and thorough knowledge of the M. C. B. rules of interchange and of the law governing the application of safety appliance details. He must also determine the serviceability of a car which is about to be interchanged and pass upon the matter of car clearances. From a consideration of the foregoing it would seem that the terminal yard inspector is, from his experience, the man best fitted to develop into an interchange inspector.

How Would It Work?

The report of the Committee on Boiler Washing, which was referred to letter ballot for adoption as recommended practice, is deserving of special note and is of such a valuable nature that it will not detract from it to use it as an example of what might be done under the plan of reorganization for all the mechanical associations, suggested by President Gaines in his opening address. In brief, this subject could have been referred by the supreme executive committee to what is now the Master Boilermakers' Association for action on matters of detail. After receiving the thorough attention of this branch of the combined associations, the findings of the committee, as modified in the convention, could be referred to the higher association for action on matters which could not be settled satisfactorily by the previous committee, and for final action in the adoption of standards. As previously stated, we use this merely as an example to point out the possibilities of such a combination as President Gaines suggested.

The 36-Foot Box Car

Why was the American Railway Association box car made 36 ft. long? This is a question that was asked recently and which we have heard repeated on a number of occasions. An example of the difficulty that arises because of the 36-ft. length is afforded by the experience of a road in the southwest which has to haul many cars of this dimension empty in one direction because lumber manufacturers refuse to load them, the reason being that much of the material shipped is in 18-ft. lengths, which run two or three inches over length, the result being that it is impossible to load two lengths in a 36-ft. car. This is true of other commodities besides lumber. Would it not be advisable to adopt 40 ft or possibly 40 ft. 6 in. for the inside length of box cars and eliminate the 36-ft. dimension for the future? There is no question that this would result in an increase in revenue-ton-miles for the freight equipmtnt on a number of roads.

Maintenance of Car Journals

It has been demonstrated that in order to obtain the best results in fuel economy the co-operation of all the departments of a railroad is absolutely necessary. The car department is in a position to very materially aid in this respect. Hot-boxes have always been a live issue and they are now being eliminated to a very large extent. It must not be forgotten, however, that a poorly maintained journal will have a very marked effect on the tonnage an engine can handle, which, of course, means increased fuel consumption per ton-mile. Tests have shown that the power required to haul one car dry or scantily lubricated would be sufficient to haul six or eight cars properly lubricated. Thus it will be seen that if the journals are not in the proper condition it may mean a difference of 10 or 15 cars per train. Journals in this condition will not necessarily cause a hot-box and it is therefore difficult to detect them. The only way in which the problem may be satisfactorily handled is in having adequate inspections and a corps of car inspectors and maintainers that will do their work thoroughly and conscientiously.

Steam Railway Men and Electrical Operation

Electrical engineers have on more than one occasion made the statement that a man, to be successful in the electrical operation of railways, must be trained in the electrical field. The report of the Master Mechanics' Association committee on Maintenance and Operation of Electrical Equipment and the discussion of the report, brought out evidence which distinctly refutes this. G. W. Wildin, mechanical superintendent of the New York, New Haven & Hartford, a road which has gone through all the trials and tribulations of pioneer electrification, is emphatic in his opinion that the best results from electrified steam railways are to be obtained by the employment of men already trained in the operation of a railroad by steam locomotives. There is no great mystery about electrical apparatus and it must be conceded that whether the motive power be steam, gas or electricity, the equipment is all based on mechanical principles. It is probably advisable to have consulting engineers on the mechanical department

staff to deal with matters which are distinctly electrical, but as far as the matters of operation and maintenance in general are concerned they require only the common sense and knowledge of railway conditions, with which any successful mechanical department man is equipped. Such roads as the New Haven, the New York Central and the Pennsylvania, which were among the first to employ electric traction to any extent, have gone through the pioneer stages of electrical operation, and their experience in matters of this kind should be of much more value to the roads now beginning or contemplating electrification than the opinions of electrical engineers who, no matter how competent they may be as electrical engineers, are seldom thoroughly trained as railroad men.

With the Exhibitors

The exhibitors are, of course, anxious to get the attention of the railway men and explain the merits of their devices to them: On the other hand the railroad men are just as desirous of getting in touch with and studying devices which they have reason to believe will help them solve their problems and get better results. It is interesting to note how systematically some of the roads are making use of the opportunity of examining and studying devices and equipment which is on exhibition. In one case the exhibit was first given a general survey by individual members of a delegation and then all of them went together to study those devices which specially appealed to the individual members of the party. In other cases visitors have come with instructions to specially examine and report on certain items or to make a written report on features which they had examined and believe would relieve certain troublesome conditions. Probably at no meeting of the year can so many experts be found together, who are available for consultation and who are only too glad to give advice. Simon-pure railway supply salesmen have in many cases been entirely displaced by sales engineers or engineering experts. Not the least of the advantages of attendance at the convention is the privilege of meeting and consulting with these men.

Variable Load Brakes for Freight Cars

The legal difficulty which the Virginian Railway experienced recently in the handling of long freight trains with the hand brake has once more accentuated the demand for the variable load brake. As stated in an article published in the *Railway Age Gazette* of May 14, page 1018, the United States Circuit Court of Appeals, Fourth District, has held that the use of hand brakes in the operation of trains is contrary to law. This decision is of special importance to those roads operating on heavy grades. Walter V. Turner, chief engineer of the Westinghouse Air Brake Company, in a paper before the Railway Club of Pittsburgh has shown that in order to handle long trains on heavy grades satisfactorily it is necessary to either increase the brake pipe pressure beyond practical limits, to use enough empty cars to furnish the necessary additional braking force, or to reduce the speed, the train tonnage, or the weight and capacity of the cars to a safe minimum. The empty and load brake will make these precautions unnecessary and not only permit of satisfactory operation of all trains on grades, and by giving safety and uniform brake operation, will permit of materially increasing the road capacity both for grade and level work. With the application of this type of brake, a more uniform braking force is obtained throughout the train. For example, assuming an empty car of 54,000 lb. which, when loaded, will weigh 208,000 lb. and braked empty to give 60 per cent nominal braking force, only 15.6 per cent braking force is obtained on the loaded car with the standard brake equipment, whereas with the empty and load brake 40 per cent braking force will be obtained. It will be seen that the difference between the braking force of the loaded and empty cars equipped with the standard brake is much greater than when they are equipped with the empty and load brakes. This greatly reducing the damage to lading and equipment as well as making safe the operation of all trains on all grades. In addition to making it possible to better operate the trains, it will be found possible to materially increase the length of these trains, tests having shown that 7,700 tons can be safely handled.

DEFECTIVE BOX CARS

THERE is a saying to the effect that "success is the result of keeping everlasting at it." We have "kept at" several car department matters for some years in order to point out where improvements can be made, and whether or not our efforts have been of any assistance in accomplishing it, there is no doubt that improvement has been made along these particular lines. Some of these matters, however, are susceptible of still further improvement and some are as yet a long distance from perfection.

The condition of box car roofs, while considerably improved over what it was a few years ago, is still far from satisfactory in many cases. The smallest leak in a roof is likely to let enough water through to cause damage to the lading to an extent that will result in much labor for the claim department and the loss of a considerable sum of money to the company, while there is always the danger of an incensed shipper turning his business over to another road because of such an occurrence. Leaky roofs are taken care of on at least one railway by an inspection system which includes passing the cars under a specially devised sprinkler after the roof has been repaired.

In studying the prevention of damage to and loss of the contents of cars, the side doors naturally come into prominence. Like the roof situation, the box car side door has been greatly improved during the past two or three years, but there is still need of continued effort to place this part in a condition that will decrease the trouble from loss and damage as well as the danger of doors side-swiping passenger trains on double track. Careful attention should be given to bottom door guides and locking facilities; it is still common to see cars fitted with wooden door stops held in place with only two small bolts. In some cases the use of a steel door has been resorted to and, while it has received some very severe criticism, the results obtained from it in the matter of protection to lading are gratifying.

Much more attention could well be given to the inspection of the methods of loading box cars. Not all shippers know that the Master Car Builders' Association has formulated a set of rules for loading all classes of cars, and if the fact that there are such rules were brought to their attention in the right way, there is little doubt that they would endeavor to conform to them for their own sake if not for the railways, and both would benefit thereby. Local freight agents should familiarize themselves with the more important requirements and thus be of assistance to the shipper in getting the shipments properly placed in the cars and effectively blocked in place. A practice that is worthy of mention in this connection is that of a large eastern road which has obtained very satisfactory results from the appointment of a committee consisting of representatives from the traffic department, the operating department and the mechanical department, to confer with the shippers, inspectors and traffic department men in improving loading conditions. The matters to which we have called attention are a few which need constant attention and while, as previously stated, we have referred to them on many occasions before, we feel that too much attention cannot be given to them.

PROGRAM FOR THE WEEK

MASTER CAR BUILDERS' CONVENTION

MONDAY, JUNE 14, 1915

Address by the President	9.30 A. M. to 10.30 A. M.
Reading of the minutes of the 1914 Convention	10.30 A. M. to 10.35 A. M.
Report of secretary and treasurer	10.35 A. M. to 10.50 A. M.
Assessment and announcement of annual dues; appointment of committees on correspondence, resolutions, obituaries, etc.	10.50 A. M. to 11.00 A. M.
Election of auditing committee	11.00 A. M. to 11.05 A. M.
Unfinished business	11.05 A. M. to 11.10 A. M.
New business	11.10 A. M. to 11.20 A. M.
Discussions of reports on:	
Nominations	11.20 A. M. to 11.30 A. M.
Revision of standards and recommended practice	11.30 A. M. to 12.00 M.
Train brake and signal equipment	12.00 M. to 12.30 P. M.
Brake shoe and brake beam equipment	12.30 P. M. to 1.00 P. M.
Car wheels	1.00 P. M. to 1.30 P. M.

AFTERNOON SESSION—3.00 O'CLOCK P. M.

The Executive Committee decided that it would be best to have a session devoted exclusively to a discussion of the revision of the Rules of Interchange and that it form a part of the proceedings.

At this session the following reports of committees will be considered:

1. Arbitration Committee.
2. Revision of prices for labor and material.
3. Settlement prices for reinforced wooden cars.
4. Compensation for car repairs.

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.00 P. M.—*Social Gathering and Informal Dance.* Special Feature, Costume Recital, Miss Betty Lee. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

TUESDAY JUNE 15, 1915

Discussion of reports on:	
Couplers	9.30 A. M. to 10.30 A. M.
Safety appliances	10.30 A. M. to 10.45 A. M.
Rules for loading materials	10.45 A. M. to 11.00 A. M.
Overhead inspection	11.00 A. M. to 11.10 A. M.
Interline inspection	11.10 A. M. to 11.25 A. M.
Car construction	11.25 A. M. to 12.00 M.
Specifications and tests for materials	12.00 M. to 12.30 P. M.
Tank cars	12.30 P. M. to 12.45 P. M.
Individual paper—What is the value of a patent? By Mr. Paul Synnestvedt	12.45 P. M. to 1.30 P. M.

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall, Million-Dollar Pier.

9.30 P. M.—*Informal Dance.* Special Feature. Costume Recital, Miss Betty Lee. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

WEDNESDAY JUNE 16, 1915

Discussion of reports on:	
Train lighting and equipment	9.30 A. M. to 10.00 A. M.
Car trucks	10.00 A. M. to 10.30 A. M.
Draft gear	10.30 A. M. to 10.45 A. M.
Joint meeting with A. R. M. M. Assn.	10.45 A. M. to 11.00 A. M.
Individual paper—Impact between freight cars in switching service. By Prof. L. E. Endsley	11.00 A. M. to 11.30 A. M.
Topical discussion:	
Air brake maintenance	11.30 A. M. to 11.45 A. M.
Unfinished business; Reports of Committees on Correspondence, Resolutions and such other committees as may be named during the convention	11.45 A. M. to 12.00 M.
Election of officers	12.00 M. to 1.30 P. M.

FIRST AID PRECAUTIONS

In case of accident a nurse or interne will be found at a desk in the end of Machinery Hall nearest the Boardwalk. First aid supplies will be available and in case of serious injury arrangements may be made for prompt expert service.

PRESIDENT CRAWFORD HONORED

Few, if any, motive power men have ever been able to boast of having a Doctor's degree. In fact, at the moment, we do not remember a single one. This unusual distinction was conferred on D. F. Crawford, president of the M. C. B. Association, and general superintendent motive power of the Pennsylvania Lines west of Pittsburgh, last week by the State University of Kentucky. He received the degree of Doctor of Engineering and was also initiated into TAU BETA PI, the honorary engineering or scientific society. It was this that prevented his attendance at the Master Mechanics' convention last week.

$6,000,000 RUSSIAN ORDER

The following item dated Philadelphia, June 12, is taken from the New York Times of yesterday:

"The Baldwin Locomotive Works has received a cable order from the Russian Government for 250 locomotives to be built before the close of the year.

"The order, which approximates $6,000,000, is one of the largest ever booked by the Baldwin Company, and means that the concern's big plants in this city and Eddystone, will be worked to capacity for months.

"Alba B. Johnson, president of the Baldwin Company, confirmed the receipt of the order. It was declared that the orders placed with the Baldwin Company by the Allies now foot up to more than $20,000,000."

ANNUAL MEETING OF THE R. S. M. A.

The annual meeting of the Railway Supply Manufacturers' Association was held in the Convention Hall at twelve o'clock Saturday.

President Johnson referred briefly to the work necessary to make the association a success. He regretted that the attendance of the supply men was below that of last year but said that there was enough money in the treasury to meet all obligations. He expressed his appreciation of the support of the executive committee, by whose co-operation and work he had been enabled to practically eliminate all "kicks" this year. The only serious complaint was the lighting in the Exhibition Hall the first two days due to generator trouble, which, of course, could not be foreseen.

Of exhibit space, 70,538 square feet were taken this year as against 82,218 in 1914—a decrease of about 14 per cent.

The following officers were elected for the year 1915-1916: President, Oscar F. Ostby; vice-president, Edmund H. Walker; Members of the Executive Committee: First District, J. G. Platt,

Hunt-Spiller Manufacturing Corporation; Second District, C. D. Eaton, American Car & Foundry Company; Fourth District, John F. Schurch, Damascus Brake Beam Company; Seventh District, C. B. Cass, Westinghouse Air Brake Co.

The new president in expressing his appreciation of the honor conferred upon him, stated that it would be his endeavor to work at all times for the good of the association; that he wanted the support of and suggestions from the members and as their servant would do what was wanted for the best interests of all.

A hearty and unanimous vote of thanks was given to the retiring officers.

CHICAGO & NORTH WESTERN CLUB

A large number of the members of the Chicago & North Western Club, which was formed at the convention last year, held an informal meeting on the porch of the Shelburne on Saturday evening at 8.30 o'clock. There were about 18 members present, presided over by H. T. Bentley. After a short meeting, in which Mr. Bentley spoke to the members and extended the best wishes of Mr. Quayle, who unfortunately could not get to the conventions this year, the members attended the vaudeville show at the Hippodrome. R. B. Moore, superintendent of motive power of the Denver & Rio Grande, was indisposed and could not attend the meeting. John P. Neff was appointed a committee of one to extend the sympathy of the club to him.

REGISTRATION FIGURES

The number of railroad members registered at the conventions, as shown by the third enrollment book, issued on Saturday morning, is only three less than for 1913. While it is 53 less than the number registered for the same period last year, it must be remembered that the Master Car Builders' Association met first last year and that the attendance at that convention is ordinarily larger than for the Master Mechanics' convention, so that as far as railroad men are concerned the record is a most gratifying one. As noted in the comments on the registration for the first two days, the principal falling off as compared with two years ago is in the number of supply men, there being exactly 400 less this year than in 1913.

COMPARATIVE REGISTRATION—THE THIRD ENROLLMENT LIST FOR 1911-12-13-14-15.

	1911	1912	1913	1914	1915
Members M. M. and M. C. B.	612	303	489	539	486
Special Guests	331	365	373	360	299
R. R Ladies	401	256	345	269	264
Supply Ladies	355	208	282	254	208
Supply Men	1572	1408	1516	1349	1116
Totals	3271	2540	3005	2771	2373

RAILWAY CLUB SECRETARIES' ANNUAL MEETING

At the annual meeting of the Society of Railway Club Secretaries, held Saturday morning at the Marlborough-Blenheim, Chairman J. B. Anderson, of the Railway Club of Pittsburgh, presided. Other members present were New York Railroad Club and Central Railway Club, Harry D. Vought; Canadian Railway Club, James Powell, Montreal; Richmond, Va. Club, F. O. Robinson; Southern and Southwestern Club, A. J. Merrill, Atlanta. B. W. Frauenthal of the St. Louis Club wired regrets, being detained by official railroad engagements.

A report was received that the organization of the Society of Technical Associations Secretaries had been completed with Mr. Vought as president and Bradley Stoughton of the Society of Mining Engineers as secretary-treasurer.

The advisability of amalgamating with this new society was discussed and held over for another year, the society to be satisfied with recognition as one of several groups organizations.

Advices were received of new railroad clubs which will be invited to unite with the Society of Club Secretaries.

Since the last meeting more than 7,000 copies of the Index of Subjects published by the society have been distributed to

ENROLLMENT COMMITTEE

Top Row, Left to Right—L. D. Mitchell (Detroit Graphite Co.), F. N. Bard (Barco Brass & Joint Co.), H. G. Thompson (Edison Storage Battery Co.), C. W. Beaver (Yale & Tower Mfg. Co.), and C. H. Gayetty (Quaker City Rubber Co.)

Bottom Row—W. J. Fleming, Jr. (Automatic Ventilator Co.), F. E. Harrison (W. L. Brubaker & Bro.), F. H. Smith (Gold Car Heating & Lighting Co), H. A. Brown, Chairman (Pocket List of Railroad Officials), G. A. Barden (Chicago Pnuematic Tool Co.), T. D. Starr (Wm. C. Robinson & Son Co.), J. A. Stevens (F. W. DeVoe & C. T. Raynolds Co.), and R. F. Moon (Westinghouse Electric & Mfg. Co.).

members of the railway clubs and educational institutions.

Much time was given to the consideration of methods and practices of the various clubs, as a result of which each secretary received advantageous information for future use.

Officers elected for the ensuing year are: Chairman, A. J. Merrill, Atlanta; vice chairman, W. E. Cade, Jr., Boston; secretary-treasurer, Harry D. Vought, New York.

TRACK EXHIBIT

The exhibit on the Philadelphia & Reading tracks near the Boardwalk includes, beside the Philadelphia & Reading 4-4-4 type locomotive, which was described in the *Daily Railway Age Gazette* of June 9, a Gilman-Taylor dump car, a Southern Railway dynamometer car, an Erie Railroad hopper car, and a convertible general service or ballast car.

The Gilman-Taylor car is exhibited by the Goodwin Car Company and is an air dump and air replacing ballast car for either center or side dump. It has a capacity of 100,000 lb. and weighs 53,000 lb. The Southern Railway dynamometer car is one which has recently been added to the testing equipment of that road and is exhibited by the Burr Company, Chicago. The Erie hopper car is fitted with Barber double action trucks. It is 40 ft. 6 in. long, and has a capacity of 2,646 cu. ft., or 140,000 lb., while the weight is 60,700 lb. The convertible general service or ballast car is exhibited by the Enterprise Railway Equipment Company and has a capacity of 100,000 lb. and a weight of 49,800.

W. J. TOLLERTON

W. J. Tollerton, who was elected third vice-president of the Master Mechanics' Association at its closing session last Friday, made a splendid record in testifying in the arbitration proceedings in the Western engineers' and firemen's wage controversy in Chicago last spring. Under the most difficult conditions, he set forth clearly the railroad side of the case and made a most enviable record. The association undoubtedly made a wise selection in honoring him with a position on its official staff.

Mr. Tollerton was born in St. Paul, Minn., in 1870, and was educated in the public and high schools of that city. He entered the service of the St. Paul & Duluth, now part of the Northern Pacific, as a machinist apprentice and subsequently became a fireman on the Chicago, St. Paul, Minneapolis & Omaha. From 1890 to 1896 he was foreman and then general foreman on the Union Pacific; he then became master mechanic on the Utah division of the Oregon Short Line; in 1903 he was made master mechanic of the Idaho, Utah and Montana division of that road, with headquarters at Pocatello, Idaho. From July, 1906, to April, 1907, he was superintendent of motive power of the Chicago, Rock Island & Pacific in charge of the lines west of the Mississippi River, with headquarters at Topeka, Kans. From April, 1907, to May, 1912, he was assistant general superintendent of motive power of the Rock Island Lines, with headquarters at Chicago. For the following eight months he was mechanical superintendent of the Rock Island Lines and on January 1, 1913, was made general mechanical superintendent, which position he now holds.

THE VAUDEVILLE ENTERTAINMENT

There was a goodly crowd out Saturday night to attend the vaudeville entertainment in the Hippodrome. George Carr, chairman of the entertainment committee, and his associates had worked hard in preparing for the event in order to insure an enjoyable evening to all. Everything would have moved like clockwork had it not been for the inexcusable blunder of some of the pier people in handling the moving picture feature. Through the courtesy of D. F. Crawford, general superintendent of motive power, Pennsylvania Lines West, an intensely interesting film was obtained of the moving of the Muskegon River bridge, a detailed description of which appeared in the *Railway Age Gazette* some weeks ago. Henry Ford, head of the Ford Motor Company, supplied a film story of his wonderful plant, which showed graphically every step in making an automobile from the raw material to the finished machine. Arrangements had been made with the pier people to place their regular machine operator at the disposal of the committee. Instead, however, they supplied an old machine, which proved to have a cracked gear and broke down entirely, making a fizzle of this part of the program and unfortunately throwing a damper on things until George Carr came to the rescue and started the vaudeville acts. These were furnished by Francis Rockefeller King direct from the B. F. Keith circuit.

The vaudeville program was opened by Natalie and Ferrari in a whirlwind dancing specialty, followed by Nonette, the gypsy violinist, who was easily the hit of the evening. Her sweet voice and wonderful handling of the instrument won her audience, who would gladly have kept her there all evening, as evidenced by their applause. Claude Golden executed some difficult card tricks and was followed by the inimitable Charlie Case, the man who talks about his father. The closing performance was by Horace Wright and Rene Dietrich, whose happy melange of high-class and popular songs placed a finishing touch to a well-planned program.

Mr. King had sent to New York for the last film of that prince of comedians, Charlie Chaplin, which unfortunately could not be shown on account of the disabled machine. Both the films furnished by Mr. Crawford, of the Pennsylvania, and Mr. Ford will be shown Monday evening in the ballroom on the pier. Don Richardson furnished the music, which, needless to say, was appreciated. The committee in charge was C. W. Floyd Coffin, chairman; W. K. Krepps, J. P. Landreth, R. J. Faure, J. F. Forney, C. D. Eaton, G. E. Ryder.

TENTH ANNUAL CORNELL DINNER

Cornell alumni at the conventions held their tenth annual dinner at Barnay's on Saturday evening. This meeting was particularly enjoyed by the 30 present because of the stereopticon views of the University and the description of the recent changes given by Professor Kimball, who came to Atlantic City for this meeting. He discussed informally the methods and objects of the faculty, particularly that of Sibley College of Engineering, and made clear its real desire for close, active cooperation with the alumni. After the discussion of the newer courses of study now being offered and the expanding practical research work undertaken in the laboratories, views of the present campus were thrown on the screen. These pictures were a revelation to most of the older graduates, and showed them that the university as they knew it ten or fifteen years ago is now but a small section of the whole. The new dormitories now under construction through the energies of Mr. Bolt, and the new athletic field and the armory, which is to be the largest in the country, aroused enthusiasm.

It appears that there are now over 5000 students, of which 500 are women, enrolled in regular four year courses. This excludes all summer and short time students. The growth of the college of agriculture, both in equipment, buildings and students has been remarkable. The college of engineering also has shown a healthy growth when the fact that the entrance requirements are the highest in the country is understood.

A number of the usual regular attendants at these dinners were absent this year because of illness or reunions at Ithaca. F. F. Gaines and J. F. DeVoy were particularly missed. At the suggestion of President C. D. Young, a telegram of regret was dispatched to the latter.

Mr. W. L. Bliss, '90, United States Light and Heating Company, was elected president and Mr. A. S. Lewis, '02,

Chicago-Cleveland Car Roofing Company, was re-elected secretary for next year.

Those present included the following:

E. A. Averill, Standard Stoker Co., Inc.; A. R. Ayres, Principal Assistant Engineer, New York Central; F. N. Bard, Barco Brass and Joint Co.; W. L. Bliss, U. S. Light and Heating Co.; F. T. Connor, Carbon Steel Co.; R. S. Cooper, Independent Pneumatic Tool Co.; A. M. Darlow, Supt. Motive Power, Buffalo and Susquehanna; S. W. Edlund, Greenlaw Mfg. Co.; E. S. Foote, Cutler-Hammer Mfg. Co.; G. S. Goodwin, Mechanical Engineer, Rock Island Lines; M. H. Haig, Mechanical Engineer, Santa Fe; W. O. Kellogg, General Electric Co.; A. S. Lewis, Chicago-Cleveland Car Roofing Co.; C. F. Meyer, Landis Machine Co.; H. G. Macdonald, Standard Steel Car Co.; Ralph McCarty, Alleghany Steel Co.; J. N. Mowery, Keystone Equipment Co.; J. C. Nulsen, American Malleable Casting Assn.; F. H. Philbrick, Midvale Steel Co.; G. A. Post, Jr., Standard Coupler Co.; W. G. Ransom, Bettendorf Co.; W. E. Ricketson, Mechanical Engineer, Big Four; G. W. Ristine, Jr., Pressed Steel Car Co.; H. A. Rodgers, Woven Steel Hose and Rubber Co.; L. H. Snyder, Joseph Dixon Crucible Co.; F. M. Whyte, Hutchins Car Roofing Co.; C. D. Young, Engineer of Tests, Pennsylvania, and Halsted Little, Princeton 1910, Detroit Twist Drill Co., and Mr. John Thomas, of the Standard Paint Co. of New York.

THE GOLF TOURNAMENT

The second annual golf tournament in connection with the conventions took place at the Sea View Golf Club yesterday. The tournament consisted of an 18-hole medal play handicap and an 18-hole kicker's handicap. Three prizes were to have been awarded in each contest, but there were ties in each, and in consequence the awards were not made. The various ties may be played off on Monday or Tuesday, but the entertainment committee would greatly prefer to have them played off Monday afternoon in order that the prizes may be awarded at the informal dance Monday night.

Four players were tied for the low net score in the medal play handicap. These, with their scores, were as follows: George A. Post, Jr., 98-26-72; C. R. Naylor, 103-31-72; Charles Fair, 104-32-72; D. R. MacBain, 108-36-72.

The players tied in the kicker's handicap for first prize are G. L. Bourne and R. H. Weatherly, net 71; for second prize, H. M. Perry, C. H. Williams, B. P. Flory, A. L. McNeill, J. D. Purcell, W. L. Allison, net 74; for third prize, F. L. Connable, W. J. Tollerton, R. C. Vilas, W. L. Conwell, S. W. Sergeant, net 75.

The lowest gross scores of the day were those of J. K. Bole, 80-0-80, and Charles Ripley, 86-10-76. Other low gross scores were made by S. W. Sergeant, 84; D. F. Mallory, 87; E. Quincy, 88; J. R. Prentiss, 89; G. C. Hopkins, 89; R .C. Vilas, 90; G. H. Musgrave, 90.

The weather for the tournament was perfect, except that at about 3:30 o'clock a light rain began to fall. The total number of entries was 124.

The committee in direct charge of the tournament deserves great commendation. It consisted of D. E. Sawyer, chairman; M. G. Baker, B. A. Clements, H. N. Scott, and F. H. Thompson. Chairman George R. Carr of the entertainment committee also worked very hard and effectively to make the affair a success.

The scores of the players in detail were as follows:

Name.	Gross.	Medal Play Handicap.	Net.	Kickers' Handicap.	Net.
T. W. Aishton	104	22	82	26	78
W. R. Alcorn	118	32	86	34	84
W. L. Allison	106	32	74	32	74
A. R. Ayres	116	32	84	40	76
C. L. Bardo	95	14	82	20	76
M. K. Barnum	113	27	86	41	72
C. D. Barret	133	33	100	36	97
W. F. Bauer	...	32	...	60	..
Bertram Berry	106	16	90	25	81
J. K. Bole	80	0	80	6	74
Geo. L. Bourne	121	32	89	50	71
G. R. Boyce	114	32	82	36	78
J. E. Buker	137	32	105	40	97

Going From the Club House to the First Tee

Name.	Gross.	Medal Play Handicap.	Net.	Kickers' Handicap.	Net.
C. A. Bieder	111	32	79	38	73
L. O. Cameron	101	25	76	30	71
J. T. Carrol	120	32	88	34	86
D. J. Carson	114	22	92	27	87
C. C. Castle	141	32	109	80	61
Jos. Chidley	111	32	79	31	80
H. E. Chilcoat	98	7	91	17	81
J. S. Coffin	107	22	85	26	81
W. W. Coleman	...	32	...	45	..
F. L. Connable	93	12	81	18	75
W. L. Conwell	93	15	78	18	75
Geo. T. Cooke	132	32	100	42	90
G. J. Costello	97	20	77	25	72
T. C. DeRossett	92	12	80	15	78
John Dixon	118	32	86	36	82
C. C. Elmes	129	36	93	41	88
B. F. Ernst	108	25	83	32	76
Chas. Fair	104	32	72	40	64
C. B. Field	93	5	88	14	79
B. P. Flory	118	36	82	44	74
H. A. Giles	99	14	85	17	82
T. H. Goodnow	126	36	90	40	86
W. W. Griswald	115	36	79	45	70
H. S. Hammond	111	28	83	27	84
C. A. Hardy	118	22	96	45	73
C. B. Harris	92	12	80	19	73
R. T. Hatch	118	22	96	35	83
Geo. E. Howard	116	32	84	35	81
O. C. Hayward	113	32	81	Out of Kickers, took no handicap.	
B. A. Hegeman	150	32	118	80	70
H. A. Hegeman	132	24	108	25	107
G. C. Hopkins	89	12	77	12	77
Clayton Ingraham	91	5	86	13	78
W. L. Jeffries, Jr.	115	30	85	42	73
B. T. Jellison	113	27	86	40	73
B. V. H. Johnson	114	22	92	30	84
L. E. Jones	117	32	85	35	82
J. M. Keller	136	32	104	45	91
T. D. Kelley	95	12	83	18	77
W. O. Kellog	140	32	108	40	100
D. F. Mallory	87	6	81	11	76
D. M. Knox	132	32	100	40	92
W. G. Krausen	135	32	103	45	90
W. T. Kyle	...	28	...	35	..
D. R. McBain	108	36	72	30	78
R. McCarty	127	32	95	40	87
J. E. McCauley	112	27	85	27	85
A. L. McNeill	104	20	84	30	74
A. McRae	114	28	86	37	77
H. C. May	105	26	79	28	77
Burton W. Mudge	105	22	83	26	79
G. H. Musgrave	90	8	82	18	72
C. R. Naylor	103	31	72	26	77
F. M. Nellis	127	32	95	41	86
G. A. Nichol	101	26	75	35	66
E. F. Oates	99	7	92	12	87
H. L. Osman	113	18	95	30	83
A. E. Ostrander	134	32	102	43	91
W. H. Patterson	104	12	92	20	84
H. M. Perry	114	25	89	40	74
G. A. Post, Jr.	98	26	72	30	68
J. R. Prentis	89	9	80	17	72
J. D. Purcell	104	27	77	30	74
E. Quincy	88	14	74	16	72
P. M. Ripley	117	22	95	21	96
Chas. Ripley	86	10	76	7	79
F. Schaff	121	32	89	42	79
S. W. Sergeant	84	4	80	9	75
Chas. A. Schroyer	111	31	80	26	85
G. E. Scott	100	17	83	27	73

JUST BEFORE THE BATTLE, MOTHER!

Top Row, Left to Right—L. O. Cameron, R. F. Carr, B. P. Flory, Alex. Turner. Second Row, C. T. Donahue, D. R. MacBain, M. K. Barnum, J. S. Coffin, B. W. Mudge. Bottom Row, J. D. Purcell, J. T. Carroll, Clement Street and E. H. Walker.

Name.	Gross.	Play Handi-cap.	Net.	Kickers' Handi-cap.	Net.
H. N. Scott	93	9	84	12	81
J. S. Seeley	116	32	84	40	76
E. Shassburger	110	26	84	30	80
J. S. Sheafe	127	36	91	45	82
E. E. Silk	125	32	93	37	88
A. H. Sisson	...	22	...	25	..
G. F. Slaughter	117	28	89	32	85
G. W. Spear	118	32	86	41	77
C. F. Street	107	24	83	26	81
L. E. Thomas	106	18	88	27	79
H. G. Thompson	...	17	..	30	..
H. J. Tierney	149	36	113	70	79
W. J. Tolferton	118	36	82	43	75
Alex. Turner	115	28	87	30	85
R. C. Vilas	90	5	85	15	75
E. H. Walker	117	24	93	45	72
Wm. Wampler	103	26	77	30	73
N. M. Wilson	99	13	81	15	84
R. H. Weatherly	106	28	78	35	71
J. V. Wescott	105	30	75	40	65
Earl Wheeler	98	7	91	16	82
F. H. Whitney	135	32	102	40	95
D. T. Williams	130	32	98	50	80
C. H. Williams	94	10	84	20	74
L. A. Williams	118	32	86	46	72
T. W. Williams	101	25	76	28	73
W. L. Wilt	106	30	76	30	76
R. H. Wyld	98	14	84	18	80
C. H. Young	105	17	88	21	84

THE PURDUE DINNER

The Purdue graduates in attendance at this year's convention, enjoyed their customary get-together dinner Saturday evening, at the Shelburne. Notwithstanding the fact of its being an "off" year, the Purdue boys are very proud of the representation they have been able to muster by virtue of their connection with railway mechanical affairs. Among those registered to date and otherwise known to be present, are the following:

C. D. Barrett, Pennsylvania R. R., Williamsport, Pa.; B. F. Bilsland, General Electric Co., Chicago; J. T. Carroll, Baltimore & Ohio R. R., Baltimore Md.; E. G. Chenoweth Chicago, Rock Island & Pacific Ry., Chicago; H. W. Coddington, Norfolk & Western Ry., Roanoke, Va.; E. E. Chapman, A. T. & S. F. Ry., Topeka, Kan.; Chas. Ducas, Jacobs-Shupert Locomotive Firebox Co., New York; L. E. Endsley, University of Pittsburgh, Pittsburgh, Pa.; F. B. Ernst, American Steel Foundries, Chicago; E. L. Grimm, Northern Pacific Ry., St. Paul, Minn.; N. E. Gee, Pennsylvania R. R., Altoona, Pa.; E. E. Greist, Pennsylvania Lines West, Ft. Wayne, Ind.; R. J. Himmelwright, American Arch Co., New York; H. A. Hoke, Pennsylvania R. R., Altoona, Pa.; J. M. Henry, Pennsylvania R. R., Pittsburgh, Pa.; Tabor Hamilton, Pennsylvania Lines East, Chambersburg, Pa.; F. T. Huston, Pennsylvania Lines West, Ft. Wayne, Ind.; Fred Hartman, General Electric Co., New York; J. H. Jaschka, National Malleable Castings Co., San Francisco; J. R. Jackson, A. T. & S. F. Ry., Topeka, Kan.; D. M. Knox, American Car & Foundry, Chicago; J. M. Lammedee, *Railway Review* Chicago; "Bud" Leet, Pennsylvania R. R., West Philadelphia, Pa.; Fred Mathews, Standard Railway Equipment Co., Chicago; B. B. Milner, New York Central R. R., New York; R. R. Mitchell, Crocker-Wheeler Co., Ampere, N. J.; J. R. Mitchell, H. W. Miner Co., Chicago; Sam. Morgan, B. M. Jones Co., Inc., Boston, Mass.; J. E. Muhlfeld, Consulting Engineer, New York; H. C. May, Monon Route, La Fayette, Ind.; J. P. Neff, American Arch Co., New York; C. D. Porter, Pennsylvania R. R., Altoona, Pa.; A. K. Reading, The Bettendorf Co., Davenport, Ia.; G. P. Robinson, Interstate Commerce Commission, Washington, D. C.; W. L. Robinson, Baltimore & Ohio R. R., Baltimore, Md.; E. E. Silk, The Bettendorf Co., Chicago; F. A. Schaff, Locomotive Superheater Co., New York; A. G. Vogt, Pennsylvania R. R., Altoona, Pa.; A. O. Van Dervoort, H. G. Hammet Co., Troy, N. Y.; R. B. Watson, Erie R. R., Meadville, Pa.; Prof. L. W. Wallace, Purdue University, La Fayette, Ind.; J. C. Whitridge, Buckeye Steel Castings Co., Columbus, O.; O. C. Wright, Pennsylvania Lines West, Ft. Wayne, Ind.

AS OTHERS SEE US

If the daily newspapers are no more accurate in reporting other things than they are in telling their readers of what happens in Atlantic City during the mechanical conventions we are fearful of the consequences. It has been suggested by some of the officers of one of the associations that it might be advisable to have a press committee to censor the news and prevent the correspondents sending out such misleading and distorted information.

The following, for instance, is taken from the *New York Times* of Saturday morning:

> Failure of the Committee on Resolutions to offer any possible changes in the present system of railroading created no little surprise at the closing session today of the Master Mechanics' Association.
>
> Not even one variation was mentioned, although recommendations were made favoring electrical equipment, as the committee members concede the days of steam railways are numbered.

The first paragraph is absolutely unintelligible to those who are familiar with the work of the Master Mechanics' Association. How the correspondent got his material for the second paragraph from Mr. Quereau's splendid report on electrification is a question.

Apparently the article which was published in the *Atlantic City Review* on the same morning is not intended to be serious, but it throws an interesting side light on some of the phases of the exhibition which have attracted the attention of outsiders. The article which appeared on the first pages is signed Peggy Prattle and is headed, "Car Builders' Convention—Why Exhibits Have Unique Interest for Both Sexes." Near the end of the column we find these words:

> They also had all kinds of novelties such as apple corers, knife sharpeners, siphon corks and table sweepers,—just the things to win a woman's heart and make her happy.
>
> After all, isn't this the main object of the Master Mechanics and Master Car Builders Convention? The nicest girl in the world is usually the inspiration for all the fine things an American man accomplishes.

ADDITIONAL MASTER CAR BUILDERS' REGISTRATION

Acker, Charles L., M. M.; Toledo Terminal; Armstrong.
Alter, William, Shop Supt.; Erie; Pennhurst.
Andrewcetti, Jos. A., Asst. Elec. Engr.; C. & N. W.; Dennis.
Andrews, S. B., M. E.; Seaboard Air Line; Shelburne.
Ayers, A. H., Prin. Asst. Engr.; N. Y. C.; Blenheim.
Barrett, R. W., M. C. B.; N. & S.; Lexington.
Beaghen, Thos., M. C. B.; Union Tank Line; Traymore.
Beaumont, H. A., G. F. C. S.; B. & O.; Dennis.
Boyer, Chas. E., Genl. Car Inspt.; P. R. R.; Runnymede.
Carson, G. E., D. M. C. B.; N. Y. C.; Dennis.
Case, S. T., Special Inspector; N. Y. C.; Pennhurst.
Caton, S. W., G. C. I.; Western Maryland; Monticello.
Chamberlin, Eugene, Manager Clearing House; N. Y. C.; Blenheim.
Chenowith, E. G., M. E.; Rock Island; Chalfonte.
Coleman, James, S. C. D.; Grand Trunk; Traymore.
Corinth, A. B.; G. I.; A. C. L.; Dennis.
Craig, James, C. D.; B. & M.; Chelsea.
Crawford, D. F., G. S. M. P.; Penna. Lines.
Crone, S. A., Ex Prest.; Dennis.
Demarest, H. N., G. C. I.; P. R. R.; St. Arita Apts.
Deyat, Frank, A. C. F.; N. Y. C.; Pennhurst.
Everett, Ira, G. C. I.; L. V.; Dennis.
Felton, Henry, Pres.; Union Trunk Line; Traymore.
Finegan, L. E., Supt. of Shops; B. & O.; Blenheim.
Fritts, J. C., M. C. B.; D., L. & W.; Traymore.
Gardner, G. C., G. M. F. P.; P. R. R.; Blenheim.
Gernert, Henry, F. C. D.; C. R. R. of N. J.; Edison.
Gorrell, W. T., M. C. B.; P. & R.; Monticello.
Givins, E. F., M. E.; P. S. & N.; Overbrook.
Goodnow, T. H., A. S. C. D.; C. & N. W.; Blenheim.
Hall, W. H., C. C. I.; C. R. R. of N. J.; Arlington.
Harvey, H. H., G. C. F.; C., B. & Q.; Traymore.
Hasbridge, R. B., S. C. D.; P. & R.; Dennis.
Hendry, John, M. C. B.; Grand Trunk; Traymore.
Hennessey, J. J., M. C. B.; C., M. & St. P.; Chalfonte.

Hensen, E. W., Elec. Engr.; I. C.; Dennis.
Hessenbruch, T. E., Gen. Insp.; P. & R.; Haddon Hall.
Hogarth, Wm., Cuhady Refr. & Tank Lines; Chalfonte.
Kalbaugh, I. N., S. M. P.; Coal & Coke; Seaside.
Lentz, John S., M. C. B.; L. V.; Dennis.
Lynn, Samuel, M. C. B.; P. & L. E.; Pennhurst.
Manchester, H. C., S. M. P.; D., L. & W.; Traymore.
McGary, Alex., Supt. Car Ltg.; N. Y. C.; Alamac.
McMullen, John, M. S.; Eric; Traymore.
McMunn, W. R., Gen. Car Inspector; N. Y. C.; Shelburne.
Mehan, Jas. E., A. M. C. B.; C., M. & St. P.; Overbrook.
Miller, E. T., G. C. I.; B. & M.; Chelsea.
Munroe, J. T., Shop Supt.; Erie; Pennhurst.
Murrian, W. S., S. M. P.; Southern; Shelburne.
Mussey, Wm. H., A. E. M. F.; Long Island; Runnymede.
O'Brien, J. J., S. C. D.; St. Louis Merchants' Bridge Term.; Pennhurst.
Parks, O. J., C. C. I.; Penna. Lines; Traymore.
Peiffer, Charles E., G. C. I.; B. R. & P.; Brighton.
Prendergast, A. P., S. M.; T. & P.; Chelsea.
Prendergast, A. P., S. M.; T. & P.; Chelsea.
Richardson, W. P., M. E.; P. & L. E.; Pennhurst.
Rockfellow, W. E.; Gen'l Car Foreman; N. Y. C.; Pennhurst.
Robertson, E. J., Supt. Car. Dept.; M., St. P. & S. S. M.; Traymore.
Russum, T. H., Supt. Pass. Car Dept.; B. & O.; Dennis.
Sandman, A. G., Chief Drafts., M. P. Dept.; B. & O.; Haddon Hall.
Schrader, J. R., Gen. Foreman; N. Y. C.; Dennis.
Seeger, J. C., Shop Supt.; L. V.
Seifert, S. P., Supt. Car Dept.; N. & W.; Shelburne.
Selloy, Sam H., G. F. C. D.; B. & A.; Pennhurst.
Shearer, R. D., A. D. G. F.; N. Y. C.; Arlington.
Simms, H. A., Trav. Car Insp.
Sitterly, W. H., General Car Inspector; P. R. R.; Blenheim.
Sloan, J. R., Eng. Elec. Car Lighting; P. R. R.; Dennis.
Smith, A. E., A. M. C. B.; Union Tank Line; Traymore.
Smith, Benjamin T., General Foreman; W. J. & S.
Smith, R. E., C. S. M. P.; A. C. L.; Chelsea.
Stark, F. H., General Supt.; Chalfonte.
Swanson, Charles H., Supt. Car Shops; A., T. & S. F.
Systrom, K. F., Chief Draftsman; Grand Trunk; Traymore.
Thiele, Charles F., General Car Inspector; Penna. Lines; Traymore.
Thompson, W. O., M. C. B.; N. Y. C.; Blenheim.
Treleaven, Thomas A., M. C. B.; Grand Trunk.
Van Buren, C. W., Master Car Builder; C. P. R.
Westervelt, Jos., M. C. B.; N. Y. C.; Minneapolis Cottage.
Wilson, James W., Chief Jt. Inspt.; N. Y. C.; Monticello.
Wilson, E. D., Genl. Car Inspt.; P. & R.; Monticello.
Zweibel, C. A., Supv. C. R.; A. C. L.; Chalfonte.

ADDITIONAL MASTER MECHANICS' REGISTRATION

Allison, W. L., West. Sales Mgr.; American Arch Co.; Blenheim.
Chamberlin, E., Manager Clearing House; N. Y. C.; Blenheim.
Crawford, D. F., G. S. M. P.; Penn. Lines; Brighton.
Crosby, R. M., Gen. M. M.; No. Pac.; Dennis.
Finegan, L. E., Supt. Shops; Blenheim.
Gardner, G. C., G. F. M. P.; P. R. R.; Blenheim.
Givins, E. F., M. E.; P. S. & N.; Overbrook.
Kalbaugh, I. N., S. M. P.; Coal & Coke; Seaside.
Kirkpatrick, James, M. M.; B. & O.; Lexington.
Maher, P., Blenheim.
Manchester, Henry C., S. M. P.; D., L. & W.; Traymore.
Murrian, W. S., S. M. P.; Southern; Shelburne.
Prendergast, A. P., S. M.; T. & P.; Chelsea.
Riegel, S. S., M. E.; D., L. & W.; Lexington.
Sandman, A. G., Chief Drafts., M. P. Dept.; B. & O.; Haddon Hall.
Sinnott, William, M. M.; B. & O.
Smith, R. E., G. S. M. P.; S. C. L.; Chelsea.
Thompson, W. O., M. C. B.; N. Y. C.; Blenheim.
Wall, George L., V. P.; Lima Loco. Corporation; Brighton.
Werst, C. W., Supt. Works; Lima Loco. & Mch. Co.; Blenheim.

ADDITIONAL SPECIAL GUESTS

Baird, B. H., Car Draftsman, So. Pac.; Strand.
Baldwin, C. D., Pur. Agent; Bangor & Aroostook; Traymore.
Barstow, Wm. A., Asst. to Pres.; Union Tank Lines.
Bateman, Frank, Director, Atlantic City Ry.
Baumbush, A. J., General Foreman; N. Y. C.
Berg, J. V., Clerk; N. Y. C.; Pennhurst.
Bigelow, C. H., Chief Mech. Engr., Millville Trac. Co.
Broderick, J. T., Ch. Cl. to V. P.; B. & O.; Brighton.
Brooke, J. C., Gen. For.; B. & O.; Tabor Inn.
Busse, F. W., Chief Clerk to Gen'l S. M. P.; B. & O.; Strand.
Butterworth, J. A., Asst. to Pur. Agt.; So.; Blenheim.
Clark, J. C., For. Boiler Maker; P. & R.
Clark, W. A., Supvr.; P. R. R.; Bathwell.
Craig, J. M., Supt. Elec. Car Lighting; P. R. R.; Shelburne.
Creach, J. B., Havana Rys.; Shelburne.
Danbach, C. O., Supt.; B. & O.; Sterling.
Deyo, Leib, Chief Order Clerk; N. Y. C.; Blenheim.
Donaghue, C. H., Gen. Foreman; N. Y. C.; Pennhurst.
Dunlap, W. J., Storekeeper; B. & O.; Emmett.
Flannagan, Harry, M. C. B. Clerk; Great Northern.
Gainy, J. J., M. C. B.; Q. & C.; Chalfonte.
Geoghegan, T. T., Mech. Engineer; C. N. O. & T. P.; Chalfonte.
Gority, John, Gen. For.; P. R. R.; Traymore.
Gustin, W. M., C. C. I.; Ban. & Aroos.; Haddon Hall.
Hale, Arthur, Chairman Com. on Relations; Brighton.
Hale, Arthur, Genl. Agent; Amer. Ry. Assn.; Brighton.
Hall, John M., Interstate Commerce Com.
Hayes, J. C., M. C. B. Bill Clerk; N. Y. C.; Pennhurst.
Henry, H. B., Asst. to Dir. of Pur.; So. Pac.; Chelsea.
Heyden, Thos. Vander, Draftsman; P. R. R.; Shelburne.
Hutchison, W. M., Vice President; Union Tank Line; Traymore.
Kapp, J. B., Asst. M. M.; P. R. R.; Ardmore.
Keirn, Wm. H., Supt. Car. Lighting; P. R. R.; Shelburne.
Keyes, J. A., Mechan. Dept.; Southern; Netherlands.
Kimmett, A. D., M. M.; Lackawanna & Wyoming R. R.
Ladd, G. T., Penna. Lines; Brighton.
Lacy, H. S., Storek.
Livingston, Ralph, Gen. For.; B. & O.; New Willard.
Long, M. A., Asst. to Ch. Engr.; B. & O.; Dennis.
Lowe, V. J., For. Car Shop; P. & R.; Somerset.
Lyman, C. J., Insp. Pc. Wk.; B. & O.; Tabor Inn.
Martz, M. E., Gen. For.; B. & O.; Lexington.
Maurer, W. R., M. E.; N. Y., N. H. & H.; Haddon Hall.
McCracken, J. T., Mast. Paint., Interb.; Alamac.
Milner, B. B., Engineer Motive Power; N. Y. C.; Chalfonte.
Mionand, R. R., New York Railways Co.; Shelburne.
Montague, W. T., Genl. Foreman; P. R. R.; Traymore.
Moses, Edwin P., Chief Car Draftsman; N. Y. C.; New England.
Murray, J. J., Secretary; N. Y. C.; Pennhurst.
Nutt, A. S., Brighton.
O'Brien, J. J., Supt. Car Dept.; Term. of St. L.; Pennhurst.
Page, S. D., Gen. Car For.; Ban. & Aroos.; Haddon Hall.
Parsell, W. O., Asst. Storek.; P. R. R.
Pipka, Frank J., Foreman; P. R. R.; Columbia Place.
Portner, W. H., Supt. Shops, Q. & C.; Silverside.
Prendergast, J. F., M. M.; East Broad Top R. R.; Chalfonte.
Ramsdell, T. M., M. C. B.; O. W. R. R. & N.; Chalfonte.
Ripley, P. M., Asst. to V. P., El. P. & So. W.; Blenheim.
Robinson, W. L., Supervisor Fuel Consumption; B. & O.; New Chatham.
Scatchard, H., Gen. Storek.; N. & W.; Traymore.
Schmidt, F. W., Loco. Draftsman; S. P.; Devonshire.
Seiders, J. P., For. Black.; P. R. R.; Albemarle.
Sexton, R. E., C. E.; Panama R. R.; Alamac.
Shand, A. C., Ch. Engr.; P. R. R.; Haddon Hall.
Sinnott, William, M. M.; B. & O.
Skilling, John K., Special Acct.; B. & O.; Haddon Hall.
Smith, J. A. B., Rear Admiral U. S. Navy.
Smith, J. J., Gang For.; B. & O; Willard.
Sprong, J. W., Pur. Agt.; D. & H.; Traymore.
Stevens, Mr. Edward, P. R. R.; St. Arita Apts.
Strohmer, J. F., Secy. to Gen. M. M.; B. & O.; Wellsboro.
Thomas, F. W., Supt of Sigs.; A., T. & S. F.; Traymore.
Thomas, F. E., Bellefonte Cent.; Stanton.
Van Gundy, C. P., Ch. Chem.; Test. Dept.; B. & O.; Craig Hall.
Wall, Geo. L., V. Pres.; Lima Loco. Corporation; Brighton.
Weist, Charles W., Supt.; Baldwin Locomotive Works; Blenheim.
Wertz, Cyrus, Mast. Paint.; P. & R.; Risley.
Willson, S. M., Chalfonte.
Woodward, J. A., P. W. Insp.; B. & O.; Willard.
Zimmerman, G. W., Gen. Foreman Car Shops; P. & R.; Somerset.

FOREIGN VESSELS ADMITTED TO AMERICAN REGISTRY.—The total number of foreign-built vessels admitted to American registry under the act of August 18, 1914, up to April 17 was 137 with a gross tonnage of 489,508. The number of sailing, steam and unrigged vessels built in the United States in March was 111, of 24,538 gross tonnage.

Conventionalities

George W. Rink, mechanical engineer of the Central Railroad of New Jersey, has just been honored with an appointment in the Railway Committee of the American Society of Mechanical Engineers.

H. T. Bentley has during the past year joined the ranks of "grandfathers," being automatically appointed through the birth of Margaret Oadams Bentley, the daughter of Mr. and Mrs. Walter H. Bentley.

Daniel Brady is attending his forty-second consecutive convention, the first one he attended being held in New York City in 1875. In those days most of the railroad men brought their families with them.

For a little chap Hiram Hammett, of Troy, is surely holding down some pretty big jobs. A month ago he was elected president of the Chamber of Commerce and Troy is already beginning to loom up larger on the map.

C. F. Quincy (Q. & C. Co.), Keeping His Eye on the Ball

Stanley Bullard, vice president of the Bullard Machine Tool Company, will not be at the conventions this year. He recently underwent a serious operation, from which we can with pleasure report that he is recovering very nicely.

August W. L. Hartbauer, formerly of the railway sales-organization of the McCord Manufacturing Company of Detroit, Mich., has been promoted to the position of superintendent of the automobile radiator, gasket lubricator and railway appliances department.

O. C. Cromwell, mechanical engineer of the Baltimore & Ohio, had quite a serious operation for appendicitis several months ago, from which he has hardly yet fully recovered. He is looking fine, however, and expects shortly to get back on the job.

Mrs. J. W. Fogg, who has been a regular attendent at the conventions will not be here this year on account of the illness of her father, Reverend Dr. Kennedy Marshall. Her many friends hoped to see her here with her 4-year old daughter Elizabeth Mary.

Arthur J. Merrill, Secretary, Southern & Southwestern Railway Club, and Mrs. Merrill

W. L. Robinson, supervisor of fuel consumption of the Baltimore & Ohio, has been attending the conventions for twelve years. This time he was only able to get away long enough to spend Sunday on the Pier, it being necessary to hurry back to attend a monthly meeting of the operating officers.

S. P. Bush, Buckeye Steel Castings Co., at the Top of His Drive

Our friend, Stephen C. Mason, of the McConway & Torley Co., was a little late in getting here, and the cigars have not yet arrived; but he took the time to call at the *Daily* office the first thing Saturday morning and leave a copy of his prescription for eternal youth. It reads, "don't worry!"

Left to Right—Jas. J. Connors, Asst. Supt. Motive Power, C. M. & St. P., and J. W. Fogg

E. L. Chollman, of the Southern Locomotive Valve Gear Company, says that throughout the south and southwest there is an undercurrent of optimism, a feeling that business is on the upclimb, and that the railroads are gradually beginning to feel the impetus of new business and renewed confidence.

D. R. McBain's Club Was Faster than the Camera

Oscar P. Wilkins, master painter, Norfolk & Western, past president of the Master Car & Locomotive Painters' Association is attending the M. C. B. convention. He reports very prosperous times on the N. & W. Since the first of March the Roanoke shops have been operating full force and full time.

Chairman George R. Carr, of the entertainment committee, is sorry because Mrs. Carr is not able to be with him at the conventions, but he is perfectly satisfied with the cause of her absence. That cause is that they have at their home a little daughter who is now only three months old. The young lady, who has been named Katherine, is getting along finely.

S. S. Riegel, mechanical engineer of the Delaware, Lackawanna and Western, reports that dynamometer car tests are being made of the Pacific type locomotive equipped with his water tube firebox. A second engine fitted with one of these fireboxes will be delivered to the road by the American Locomotive Company within the next two or three weeks.

"There is something wrong about this war order business," says W. W. Melcher, of the Mass. Mohair Plush Company. "All other railway equipment companies seem to be so favored as to stand in the very path of many easy orders from Europe, but not the mohair plush trade. Blankets—even corduroy—has been in demand by the armies abroad. The

E. H. Bankard, Purchasing Agent, B. & O., Makes a Practice Stroke!

war order plays about mohair plush like fitful lightning but never hits.

Through the inadvertent (?) burning of Scott's garage in Chicago last week, the mechanical fraternity of the Central West suffered the loss of one of the most famous monuments thus far known to this horseless age; the suffering being the more acute on account of the wide-spread common interest (?) held in this machine. A stick of "Polarized" is said to have short circuited the pilot light. Fortunately there was no insurance.

Word has just been received from William V. Dee, of the G. Drouve Company, Bridgeport, Conn., that he will not be at the convention this year. Will Dee was for so many years identified with these conventions, first in the capacity of a staff member of the *Daily* and later in his present connection, that his friends are many. All regret to learn that his physician has ordered him to take a month's vacation in order to rebuild an overworked system.

L. M. Schechter, chief engineer and commercial manager of the Russia Locomotive & Machine Company, Kharkoff, Russia, is a visitor at the conventions. Mr. Schechter is in the United States for the purpose of studying American rail-

way mechanical conditions and equipment and purchasing machine tools. He says that largely because of the conditions arising from the war in Europe, the trade relationship between Russia and the United States is likely to be much closer in the future than it has been.

The Pittsburgh & Lake Erie men all have their families with them this year. Dave Redding, master mechanic, is accompanied by his wife and his niece, Miss E. G. Leonard. His son Robert is also helping at the enrollment booth. Sam

C. W. Cross and His Son Who Has Just Finished His Special Apprenticeship Course on the N. Y. C. at Elkhart

Lynn, master car builder, has Mrs. Lynn and his daughter with him. W. P. Richardson, mechanical engineer, is accompanied by his wife and seven-year-old daughter, Alice. Mrs. Redding and Mrs. Lynn have attended several conventions, but this is the first one for Mrs. Richardson.

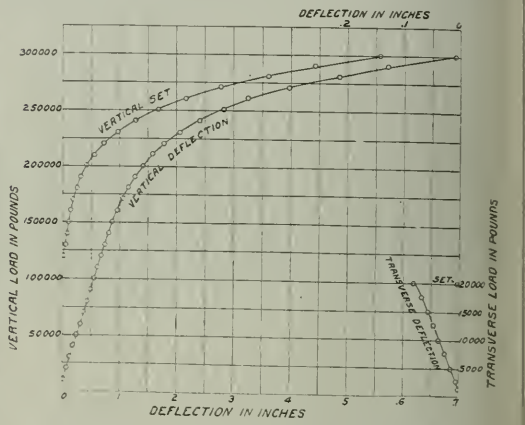
The entertainment committee deserves to be especially commended for the plans it made for the carnival dance on Friday night and the great success with which it carried them

L. A. Richardson, Mech. Supt., First District, C. R. I. & P. and Mrs. Richardson

out. Probably no entertainment feature in connection with the conventions was ever more enjoyed. Furthermore, as economy is the keynote of everything done in the railway and railway supply businesses these days, it is worth while to mention the fact that this function was remarkably inexpensive. The total amount which the committee spent for it did not exceed $75. In spite of this, the scene after the serpentine balloons and paper hats and caps had been distributed was as attractive as the entire party was merry.

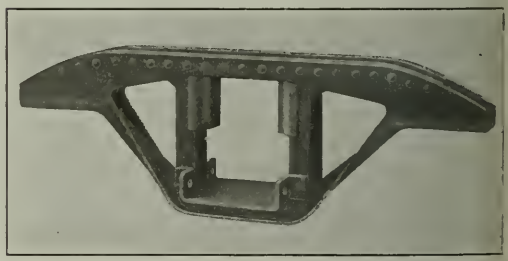
FORGED STEEL TRUCK SIDE FRAME

The Allegheny Steel Company, Pittsburgh, presents this year a new forged steel truck side frame of interesting design. The illustrations give a very clear idea of its construction. It is made up of three pressed steel members riveted together. The compression and tension members are pressed from one piece, and the columns and spring seat support from another. The third piece is a channel stiffener riveted to the top member as indicated in the illustrations. Bolster



Deflection and Set Tests on Forsyth Forged Steel Truck Side Frame

wearing strips are riveted to each column and a spring plank support is riveted to the bottom member of the frame. The weight of the frame is approximately 480 lb. It was designed and patented by W. D. Forsyth to meet the requirements of the high capacity cars. From tests made by Professor L. E. Endsley, of the University of Pittsburgh, it was found that with a vertical load of 68,500 lb. and a transverse load of 9,000 lb. the maximum stress obtained at any one section was 13,500 lb. This occurred at three points in the



Forsyth Forged Steel Truck Side Frame

frame. The deflection and set of the frame was taken in increments of 10,000 lb. up to 320,000 lb., after which the frame was loaded to destruction, the maximum load being 473,000 lb. The results of these tests are shown in the accompanying curve. It will be noted that for a load of 150,000 lb. the deflection was .09 in. and the set .01 in.

FLEXIBLE CONNECTIONS.—In the article describing the flexible connections made by the Barco Brass & Joint Company, published in the *Daily*, of June 11, page 1285, it was indicated that these joints were used exclusively for water lines. Their principal uses are in steam, air and oil lines, the use on water lines being limited.

MALLEABLE IRON EXHIBIT

The National Malleable Castings Association is exhibiting a number of malleable iron castings made from a mixture said to produce a metal which is similar to mild steel in many of its physical characteristics. The association is made up of about 30 manufacturers of malleable castings for the purpose of improving the quality of their product and of conducting an educational campaign as to the possibilities of this material. The mixture exhibited has recently been developed after about two years of research work.

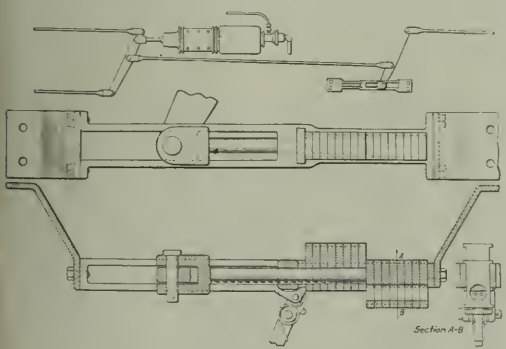
Malleable Iron Wedges Tested Under a Drop Hammer

The illustration shows the result of subjecting wedges of this material to a drop hammer test, indicating its toughness. It is claimed that malleable sections may be produced with a thickness as great as two inches and the material may be machined without detriment to its physical qualities. Micro-photographs are included in the exhibit showing the structure of the metal at all stages of its manufacture.

SLACK ADJUSTER FOR BRAKE EQUIPMENT

To provide a convenient means of manually taking up the slack and adjusting the piston travel on foundation brake gears the device shown in the illustration has been developed and is being exhibited by the H. W. Johns-Manville Company, New York. As shown it is applied to the fixed end of the floating lever but is equally adapted for use on any other part of the brake gear where piston travel may be adjusted from one point.

The frame of the device, which is attached to the car body,



Freight Car Slack Adjuster

has a four-bar section at one end and a two-bar section at the other. The four bars serve as guides for the jaw connection on the end of the thrust rod, to which the end of the floating lever is pinned. Between the two bars, which open vertically, are placed a number of blocks or shims, the lower ends of which are provided with holes for the passage of the thrust rod. These are retained between the bars by means of flanges at the top and bottom but have a considerable amount of vertical play. The thrust rod is fitted with ratchet teeth on its under side, these being engaged by a lever-operated pawl.

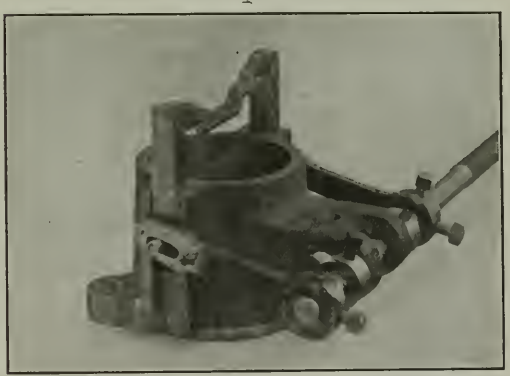
When assembled the thrust rod passes through a guide in the frame and thence through the shims which are raised to their upper position to bring the holes in line. To take up slack it is only necessary to move the thrust rod ahead by means of the lever and ratchet until one or more of the shims is free from the end of the rod, when they will drop down and close the opening for the rod.

This device makes it unnecessary to crawl under the truck and take up the slack by removing the cotter keys and shifting the lever from hole to hole in the brake rod jaw. By providing a means of taking up the slack at one conveniently located point under the car it is expected to result in more uniform attention to proper adjustment of the slack and consequently in more uniform piston travel.

VARIABLE EXHAUST NOZZLE

In discussing J. Snowden Bell's paper on Variable Exhausts, presented during the Friday morning session of the American Railway Master Mechanics' Association convention, C. A. Seley referred to a variable exhaust nozzle developed by F. Mertsheimer, superintendent motive power and car department of the Kansas City, Mexico & Orient. This device is in use on a number of engines, some of which have been equipped since September, 1914.

The nozzle is cast with lugs on one side through which is run a shaft which extends out through the left side of the smokebox. A stepped bridge 7-16 in. wide is guided in vertical slots on the outside of the nozzle. This is con-



Variable Exhaust Nozzle in Use on the Kansas City, Mexico & Orient

nected to the shaft by arms which raise or lower it as the shaft is turned. An arm one the end of the shaft outside of the smokebox is connected to the operating lever in the cab by a reach rod. In its lower position the bridge extends down into the nozzle and it may be raised to a clear height of 1⅜ in. above the top of the nozzle.

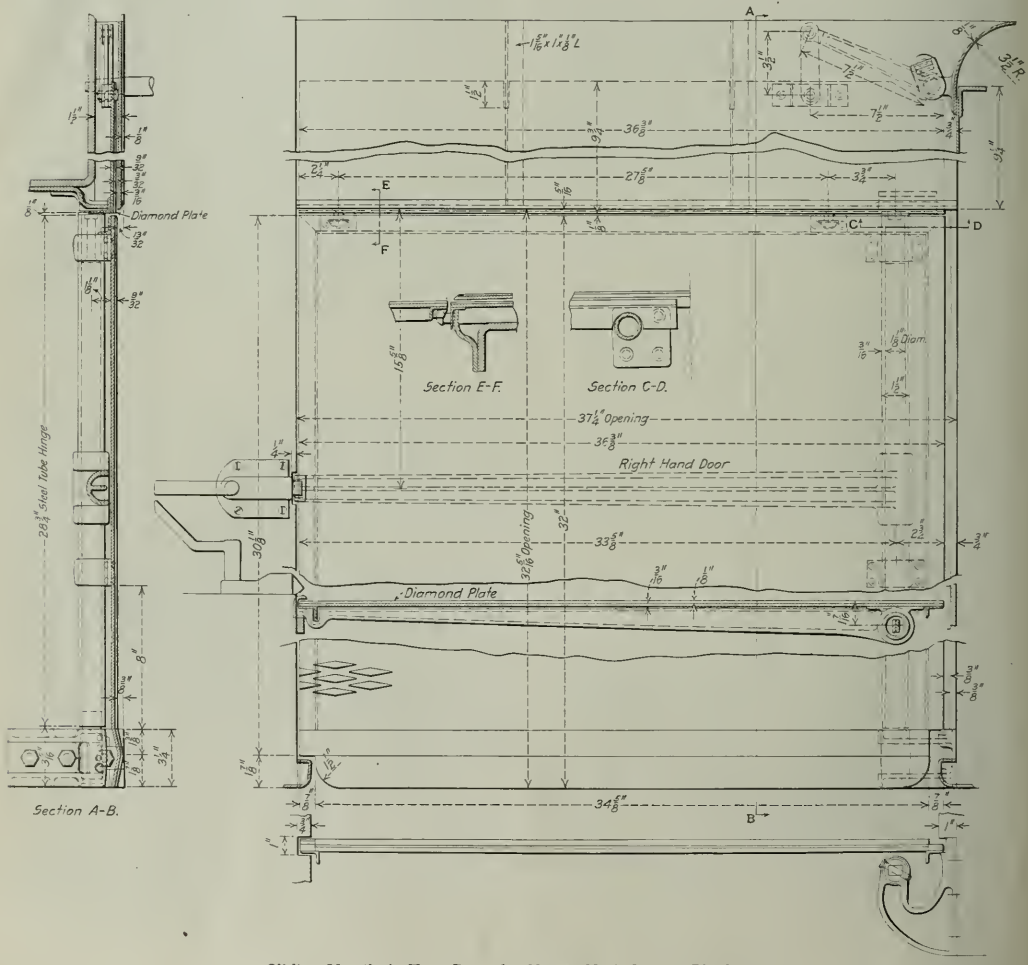
In applying it to nozzles which have been running with round nozzles, unbridged, the new nozzles are made ⅛ in. larger than the old ones. Where the old tips are bridged the new ones are made ⅛ in. smaller than those replaced. This results in a larger opening when the movable bridge is raised in either case. Considerable saving in coal is said to have followed the application of these nozzles and it has eliminated steam failures. Their use has also effected considerable reduction in the amount of fire cleaning required on the road and at terminals. The device has been patented by Mr. Mertsheimer.

SLIDING VESTIBULE TRAP DOOR

The trap door shown in the illustration is designd to slide laterally beyond the side of the car when discharging and taking on passengers at high station platforms. There is usually a dangerous gap between the side of the car and the edge of such platforms and the purpose of this trap is to insure safety at such points.

Aside from the sliding feature the door operates in the usual manner. It is pivoted on a hinged tube which contains the torsional spring bar, and near the center of which is placed a stationary arm of malleable iron. This bar extends entirely across the under side of the door and is turned up at the end to form the latch plate. The door itself is free to slide on the hinge tube and is operated by a mast and handle located near the end door post. The mast is connected by a lever and link to a slide plate located under the car platform and to which the trap door is attached when closed. By turning the operating handle the slide is forced outward and in turn moves the door which slides through slots provided in the vestibule door casing. When it is extended beyond the side of the car the slots in the casing prevent the trap door from being opened.

This device is now in service on a number of cars and is manufactured by the O. M. Edwards Company, Inc., Syracuse, N. Y., in whose exhibit it may be seen.

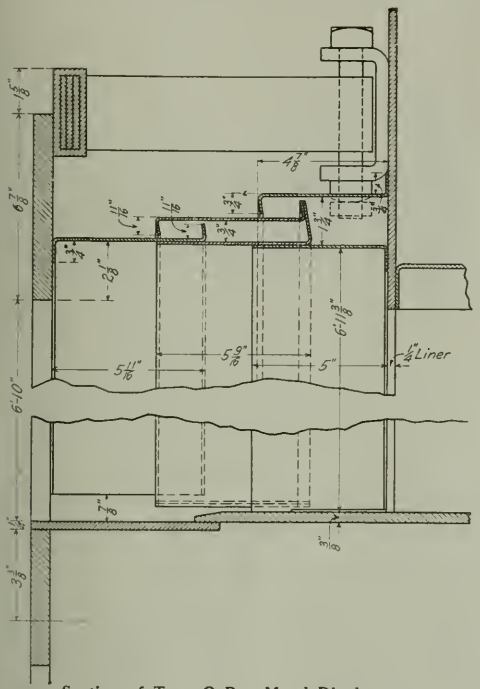


Sliding Vestibule Trap Door for Use at High Station Platforms

LONG TRAVEL FRICTION DRAFT GEAR.—A friction draft gear having a travel of 3¼ in. has been designed by the Gould Coupler Company, New York, and is being exhibited at the booth of this company during the convention. The design is such that the gear will go into the recommended M. C. B. pocket space and the friction elements are the same as in the gear having 2½ in. travel. Owing to the increased travel, however, it was impossible to use coil springs for releasing the friction elements and the release rigging is made up of leaf springs which give the additional travel and also a high release capacity. In order to avoid confusion in taking apart and assembling the gear the release spring elements are assembled before being placed in the gear which is assembled complete in a casing of substantial design. This gear has a capacity of 300,000 lb.

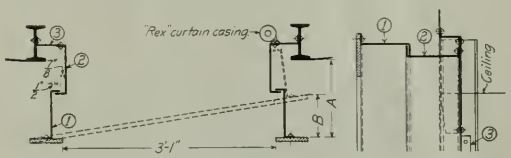
REX METAL DIAPHRAGMS

One of the interesting improvements in passenger train equipment that has just been placed on the market is the Rex metal diaphragms. The Curtain Supply Company, Chicago, has taken over the two-piece diaphragms known as type *L. S.*, and the



Section of Type Q Rex Metal Diaphragm

three-piece diaphragm, known as type *Q*. Both these diaphragms have been in successful operation on the Lake Shore and Chicago, Burlington & Quincy, respectively. By referring to the illustration shown herewith the construction of both types may be readily understood. They perform all the functions of the present diaphragms, being fireproof, waterproof, dustproof, flexible and may be applied to all types of existing equipment presenting no difficulties in being used in connection with equipment provided with the old diaphragms. In addition, their chief characteristic is their substantial construction. There is no question but they will outlive the present duck diaphragms and it is expected that they will last for the life of the car.



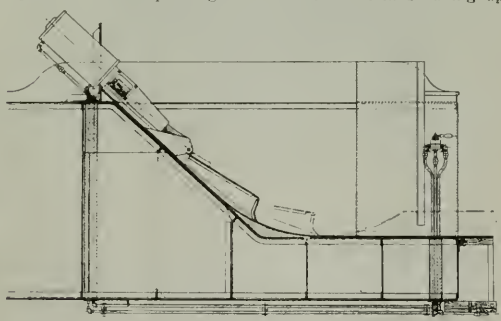
Section of Type L. S. Rex Metal Diaphragm

The *Q* type lends itself particularly to application to existing equipment, as it can be applied with no alteration to the end construction. The *L. S.* type in some cases will require slight alterations in the vestibule end post. On new equipment either may be applied with equal facility. Both types of diaphragms are supported in the customary manner.

Type Q and Type L. S. Rex Metallic Diaphragms

LOCOMOTIVE COAL PUSHER

A coal pusher designed for application to the tenders of existing locomotives with a minimum amount of attention, is being exhibited by the Locomotive Stoker Company, Schenectady, N. Y. The cylinder is mounted on a sheet placed over the back and bottom coal pit sheets and covering the original shovel sheet. Secured to this sheet are two steel bars which form the guides for the crosshead. A shield casting extends down over the piston rod, which is thus entirely covered, an extension on the crosshead moving up into the shield when the pusher is in its upper position. The crosshead extends across the coal pit and is designed to form a pushing shoulder to assist in breaking up



Sectional View of Tender With Coal Pusher and Elevated Shovel Plate

and moving the coal forward. To it is hinged an apron which forms the main pushing member.

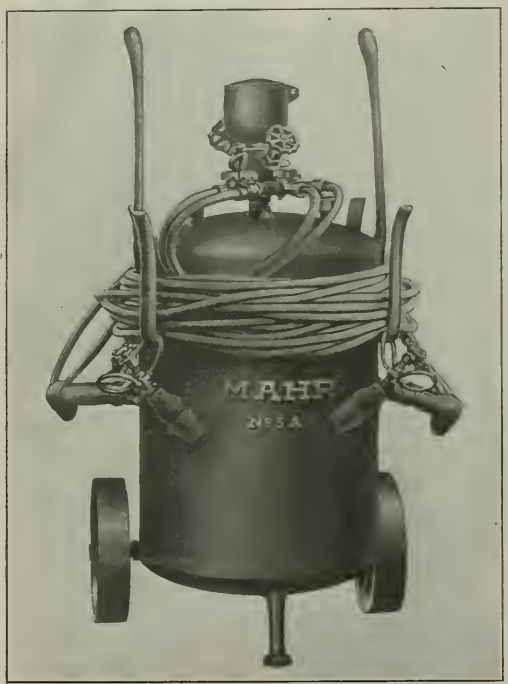
The pusher, being located under the coal pile, tends to break up the entire body of coal should it be frozen, and works it forward to the shovel sheet in condition for handling. As shown in the illustration, the operating valve is located above the tender deck near the coal gates. It may be placed on the cylinder, however, and be operated by a lever and reach rod. The tank sheets are subjected to no additional stresses due to the operation of the coal pusher because the entire equipment is a unit assembled on the sheet covering the bottom and back of the coal pit.

A raised shovel sheet is shown in broken lines on the drawing, the purpose of which is to raise the coal to the level of the fire door.

PAINT BURNER

The paint burning outfit, illustrated herewith, is designed to use kerosene as fuel. The usual method of burning paint is with gasolene and the introduction of the kerosene burning equipment is for the purpose of reducing the danger involved in the use of gasolene as fuel about the paint shop.

The torches of the outfit operate on the atomizing principle and require cleaning less frequently than would torches of the generating type due to the formation of carbon in the generating tubes and small gas outlets. The torches are



Kerosene Paint Burner

light and conveniently arranged for handling and the size of flame may be readily varied by the operator to meet the requirements of the work. The equipment is designed to operate with any air pressure from 10 lb. to 125 lb. per sq. in. An outfit, consisting of two torches and a fuel tank, is on exhibit at the booth of the Mahr Manufacturing Company, Minneapolis, Minn.

LIGHTING FEATURE OF THE BABCOCK WATER GLASS GUARD.—Changes in the design of the Babcock water glass guard have been made during the past year which have considerably increased the serviceability of this device. In general design it consists of two parts—the back, which includes the ends and packing glands and is provided with an outlet at the bottom for steam and broken glass; and the removable front, which contains the sight glasses. The change of greatest importance consists in the redesign of the front casing to include a narrow slot at the apex of the angle between the sight glasses in front of which the gage lamp is placed. The light thus admitted thoroughly illuminates the interior of the guard and clearly indicates the water level in the gage glass. This device is on exhibit at the booth of the American Car and Ship Hardware Manufacturing Company, New Castle, Pa.

CLOSE QUARTER DRILL

A recently designed drill for use in close quarters is shown in the illustration. It is being exhibited by the Ingersoll-Rand Company, New York. The motor is of the three-cylinder type, controlled by a valve of the same design as used in the regular line of "Little David" drills, manufactured by this company. The valve is geared to the crank shaft, which obtains its motion from three rocking levers con-

Drill for Use in Confined Spaces

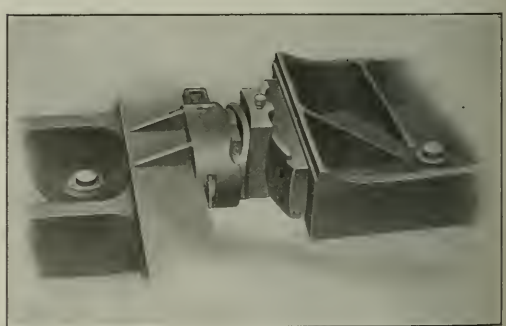
necting the pistons to the drill spindle. As may be seen in the photograph, the throttle is located in the handle.

The design of this drill is simple and rugged and it is adapted to all work in confined spaces. It has few parts, and is therefore easy to overhaul and assemble. The movement of the spindle is steady and the motor is claimed to require one-fifth less air than others of a similar type.

RADIAL BUFFER

A radial buffer is being exhibited by the Economy Devices Corporation, New York, which has been designed to provide for all movement between the engine and tender whether vertical, horizontal or rolling. It is made in two types, one in which the tender buffer is provided with twin springs for taking up the slack and the other in which a wedge is used, the latter being shown in the illustration.

The essential features of this buffing device consist of a chafing plate on the tender, having a vertical cylindrical surface, a spherical chafing plate on the engine and a floating block one side of which is spherically curved to conform to the engine chafing plate and the other radially curved to



Radial Buffer Having Universal Movement

conform to the chafing plate on the tender. Vertical movements are taken care of between the surface of the tender chafing plate and the floating block; horizontal movements by the sliding of both chafing plates on the surfaces of the floating block, and rolling movements between the surfaces of the floating block and the spherical chafing plate. All parts are cast steel with specially treated wearing surfaces.

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

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M. C. B. Rules of Interchange

The suggestion of President Crawford that the Interchange Rules remain in force for at least two years before being materially changed, is one that will be appreciated by every car inspector and car foreman who has to use them. At best, it is difficult to get an interpretation of the rules that will be satisfactory to all. When rules are changed it takes several months for the inspectors throughout the country to become thoroughly familiar with them and interpret them correctly. By allowing them to remain in effect for a longer time, the troubles due to these misunderstandings will be minimized and for a year at least cars should be interchanged with a great deal less difficulty than at the present time. Various car associations have realized this and have refused this year to offer any suggestions to the arbitration committee in the hope that this committee would not make any radical changes in the present rules.

M. C. B. Association and the Minor Organizations

President Crawford, in his address, made a good suggestion regarding an arrangement whereby the Master Car Builders' Association could be kept in closer touch with the minor car organizations. A suggestion has been advanced several times to the effect that a representative of the M. C. B. Association should attend the Chief Interchange Inspectors and Car Foremen's Association Conventions to assist the members of that association in placing correct interpretations on the M. C. B. Rules of Interchange. That association meets for the sole purpose of establishing among its members a uniform understanding of the rules. In numerous cases it has been found that what they conceived to be the right interpretation was not in accordance with what the arbitration committee intended. This makes it necessary to undue a lot of work, as these opinions are spread through the entire country. With a representative of the Arbitration Committee at the meetings the liability to misunderstandings would be greatly reduced.

Scrap Lumber From Box Cars

The opportunity of making use of scrap lumber from dismantled cars and bridges is not always given proper consideration. With the increasing cost of lumber it presents a field of endeavor that can be made very remunerative. The Chicago, Burlington & Quincy has gone into a study of this problem extensively. At a recent meeting of the Western Railway Club, William Queenan, assistant shop superintendent at Aurora, Ill., stated that from 700 dismantled cars about $15,000 worth of lumber, rated at $14. per 1,000 ft., was reclaimed at a total cost of between $11,000 and $12,000. This lumber is used for repairs and as excessive amounts accumulate, the lumber is used in the construction of new stock cars, at a very great saving. They even find it expedient to remove the nails from all good sheathing, finding many uses to which it may be placed. The ingenious car man will be able to find many uses for lumber that is now thrown away. As useless as scrap lumber may superficially appear, the possibilities for its reworking have been demonstrated and those roads that have not investigated the matter will be surprised to find what can be done with it.

Increased Freight Car Mileage

One of the most important points brought out in President Crawford's address is that of the necessity for increasing the mileage of freight cars. This is a matter which does not concern merely the car department, but the entire railway organization, bearing as it does so directly on both earnings and expenses. Operating officers are particularly interested in this subject and, as stated in the address, in order to obtain the greatest practicable mileage per car per year, concerted efforts should be made. The suggestion regarding elimination as quickly as possible of such rules of the various associations as tend to hinder a prompt car movement, is also a good one. It is, of course, not intended to urge the running of cars that are not in an altogether safe condition, but much can be done to facilitate movement and at the same time give proper attention to repairs. This is a point which should be carefully weighed in deciding on new equipment. The officers who object so strenuously to the expenditure of an extra dollar on any special device on or special construction of freight cars, should bear in mind that the cheap, flimsy car is bound to be on the repair tracks more than the car which is substantially built, and that a car undergoing repairs is not earning money for the company.

STEEL PASSENGER CARS

WHEN we published the article on the Steel Passenger Train Car Situation in the *Railway Age Gazette* of November 21, 1913, our records showed that on January 1 of that year that there were 7,271 all-steel passenger cars in service, 3,296 steel underframe cars and 46,926 wooden cars. A statement just issued by the Special Committee on Relations of Railway Operation to Legislation shows that on December 31, 1914, two years later, there were in service 12,900 steel, 5,700 steel underframe and 43,512 wooden passenger train cars. The figures are not strictly comparable because those for January 1, 1913, cover roads owning 57,493 passenger-train cars and operating 227,754 miles, while the more recent figures cover roads having 62,112 passenger equipment vehicles and operating 245,721 miles. During the past six years the percentage of all-steel passenger cars built has increased from 26 to 74.6, while the percentage of steel underframe cars built has changed from 14.8 to 20.9 per cent

The older wooden cars are being retired steadily, so that the percentage of steel and steel underframe cars will increase rapidly within the next few years. Wooden cars to the number of 1,048 were retired during the calendar year 1914. It is estimated that to replace the present wooden cars will cost approximately $560,000,000.

Legislation to require railroads to build nothing but steel or steel underframe cars and to retire the wooden cars within a given period has been advocated for several years, but Congress has never taken any definite action. There would now appear to be no need for such action, as the roads have practically discontinued the building of wooden passenger-train cars and such cars as are now in service will be retired as they become worn out or obsolete. At the rate at which the change is now going on the larger proportion of the roads will have all the steel cars needed in high speed and heavy traffic within a comparatively short time; in fact, many of them are now in this condition.

What our legislators will have to guard against is taking any action which will put the railroads to unnecessary heavy expenditures in changing equipment, when better results can be obtained by using the same money to provide other things which will contribute more effectively to the prevention of accidents and to the safety of the passengers and employees.

IMPROPER CHARGES FOR CAR REPAIRS

"IT is quite possible that some few car owners deliberately charge for repairs not made, possibly not with the consent of the higher officers, but through the over-zealousness of some of the minor officers who are endeavoring to make a record for low cost of maintenance," is a statement made by a prominent car department officer.

This is a very good answer to the insinuations that have been made regarding the charging for fictitious repairs to foreign equipment. Whether the officers know or do not know that there are irregularities practiced by their subordinates in the repairing of foreign equipment something must be done to correct the evil. The trouble probably lies with the "over-zealous" minor officers and while some may follow questionable methods "to make a record for low cost of maintenance," the majority are guilty of malicious negligence. In other words, some find it easier to make "pencil repairs" than to do the actual work.

In order to overcome this, some mechanical officers have suggested that an inspection bureau be formed to operate under the jurisdiction of the M. C. B. Association, the inspectors being sent to different parts of the country to investigate the practices of the various roads. It would appear that a bureau of this kind would be unwieldy, would increase the work of the association and, unless the number of inspectors was very large, the desired results could not be obtained. Another suggestion that appears to have much more merit is that each road establish its own system of inspection. Such a system is already in effect on some few roads with very good success. With inspectors reporting direct to headquarters, the heads of the mechanical departments can be kept fully informed as to the conditions and govern themselves accordingly. The inspectors being continually on the road, jumping from place to place, will be in a position to make what might be termed "surprise inspections." Then those local inspectors who have been in the habit of making "pencil repairs," not knowing when such inspections are to be made, will be more careful to see that the work is done properly and that all the repairs for which bills are to be rendered are actually made. When it is known that their superiors are determined to have the work properly done and that they will not tolerate any irregularities there cannot help but be a marked improvement.

Had this practice been followed in past years, there would have been far less cause for the above noted insinuations. Many disputes would not have arisen and a large amount of ill-feeling now existing between the roads regarding repair bills would not have been engendered. With the present rules requiring that all foreign cars be maintained in the same serviceable condition as home cars, the work on foreign equipment has naturally increased and with it the opportunities for a larger number of irregularities. It, therefore, cannot be too strongly urged that every road institute its own system of inspection with a view of determining whether or not the local inspectors are maliciously billing for repairs to foreign cars not actually made. Where this is found to exist, prompt and drastic measures should be taken.

LOSS AND DAMAGE TO FREIGHT

SIXTEEN dollars paid out for loss and damage to freight for every $1,000 of gross freight revenue is a large percentage, and yet it is not an unusual one and is probably not far from the average for all of the roads in this country. A considerable portion of this loss and damage can be traced directly or indirectly to defective equipment. On two roads where campaigns of education have been waged to reduce loss and damage to a minimum it has been found possible to bring the figure down to $10 for every $1,000 of gross freight revenue. While the campaigns on both of the roads in question were conducted in such a way as to secure the interest and co-operation of every man who could be at all helpful, and this meant pretty nearly every man in the organization, and while the greater part of the saving was not due to improved equipment, yet that item has been a not unimportant factor in securing better results.

In one case the officer in charge of car design is known to have kept closely in touch with the performance of all of the cars in service as regards the protection of the lading against leakage, pilfering and the elements. He spent much time in keeping in intimate touch with the practical men of the car department and therefore knew almost as much as they did as to where the cars were weak and where they could be improved to advantage. On another road the general manager became interested in studying this phase of the problem and the next order of cars contained features which had never before been used on that road. True, they cost more, but after several years' experience the officer in question is certain that this was one of the best investments that he has ever made.

The trouble has been in too many cases that those who were responsible for the design or purchase of the cars, or who were interested in the cost of conducting transportation, did not really know where the trouble was and how to go about remedying it. One road has achieved excellent results by developing a loss and damage prevention movement similar to the safety first campaigns. Division and general committees have been appointed and to these committees every man in the organization feels that he can make suggestions or call attention to abuses, knowing that the information will not be used for purposes of discipline but to improve conditions and remove abuses.

To reduce and eliminate as far as practicable the losses due to damaged and stolen freight the supervising officers must know in detail just what is responsible for causing the damage. It is not right that the car repairman should think only of getting the work done and the cars off his hands and out of the terminal, but he should make sure that the work which he has done will not prove defective and allow freight to be damaged. The operating man, when damage is done, should insist on knowing the exact causes so that steps may be taken to prevent a reoccurrence. The mechanical department officers, and particularly those in the car department, should do everything in their power to have the men understand fully just what they can do to help improve the loss and damage record so far as it concerns defective equipment. As suggested by President Crawford, in his address, much can be also done in this respect by giving more attention to proper loading and the bracing of the loading. In addition to this car department employees are often in a position to notice abuses or wrong practices outside of their immediate department which they should be urged to report, not with the idea of spying on anybody, but of correcting abuses.

TODAY'S PROGRAM

TUESDAY JUNE 15, 1915

Discussion of reports on:

Couplers	9.30 A. M. to 10.30 A. M.
Safety appliances	10.30 A. M. to 10.45 A. M.
Rules for loading materials	10.45 A. M. to 11.00 A. M.
Overhead inspection	11.00 A. M. to 11.10 A. M.
Interline inspection	11.10 A. M. to 11.25 A. M.
Car construction	11.25 A. M. to 12.00 M.
Specifications and tests for materials	12.00 M. to 12.30 P. M.
Tank cars	12.30 P. M. to 12.45 P. M.
Individual paper—What is the value of a patent? By Mr. Paul Synnestvedt	12.45 P. M. to 1.30 P. M.

ENTERTAINMENT

10.30 A. M.—*Orchestral Band Concert.* Entrance Hall. Million-Dollar Pier.

3.30 P. M.—*Orchestral Band Concert.* Entrance Hall. Million-Dollar Pier.

9.30 P. M.—*Informal Dance.* Special Feature. Costume Recital. Miss Betty Lee. Ball Room, Million-Dollar Pier. Don Richardson Orchestra.

LOST

Badges 2722 and 3580 have been lost and if found should be returned to Secretary Conway.

ANOTHER CARNIVAL DANCE TO-NIGHT

The Carnival dance on Friday night proved so spontaneously successful that Chairman Carr of the entertainment committee has decided to repeat this feature to-night. The hall will be strung with twine as before so that the paper streamers when thrown will hang in festoons. While a special order has been placed for a large assortment of rubber novelties, such as balloons which when blown up and thrown burst like a bomb. One of the special features of the evening will be afforded by Miss E. M. Kegel and Frank Caslin who will give an exhibition of all the late dances on roller skates.

Miss Betty Lee will sing several songs and the Don Richardson orchestra will furnish all music. This is sure to be the "big" night, so do not fail to come early prepared to enter whole heartedly in the frolic.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS

The eighth semi-annual meeting of the Association of Railway Electrical Engineers was held at the Hotel Dennis, Atlantic City, June 14. President H. C. Meloy, New York Central Lines, made a brief address welcoming the association to the city. The secretary-treasurer reported a membership of 500, with a cash balance of $418.91 in the treasury. Progress reports of various committees were presented. The committee on Standardization of Cranes, Turntables and Transfer Tables reported that it was taking under consideration the standardization of motors to be used for these purposes.

The Committee on Compressed Air is to make an investigation of the power used for driving compressors and the abuse of the use of compressed air in shops. The Committee on Train Lighting Lamps is working towards a standardization of the various lamps now used with a view to decreasing the number. It is also making an investigation as to the proper method of rating lamps. The Committee on Standards is working with the M. C. B. Committee on Train Lighting. The Committee on Conduit Specifications reported that tests were being made on the Pennsylvania Railroad which would be available for the committee when completed. A number of minor changes have been made in the Specifications of Wires and Cables and the work of the committee is being broadened out to include specifications for wires to carry

TRANSPORTATION COMMITTEE

Top Row, Left to Right—L. S. Hungerford, Jr. (Peerless Rubber Mfg. Co.); R. W. Benson (American Flexible Bolt Co.); T. P. O'Brian (O. M. Edwards Co.); H. Chamberlain (Transportation Utilities Co.); A. L. McNeill (Central Electric Co.); J. T. Anthony (American Arch Co.); J. L. Randolph (Economy Devices Corporation); A. N. Dugan (Bronze Metal Co.); C. C. Schumaker (The Carborundum Co.).

Bottom Row—R. P. Cooley (Chicago Car Heating Co.); W. Anderson (Pantasote Co.); George T. Cooke, Chairman (Chicago Car Heating Co.); D. L. Clement (Pratt & Lambert); A. S. Lewis (Chicago-Cleveland Car Roofing Co.), and E. A. Averill (Standard Stoker Co.).

25,000 volts. The shop practice committee is to report at the annual convention on electricity vs. compressed air for portable tools, electrical furnaces for hardening tools and electro-magnets and magnetic chucks. The Committee on Illumination will report on yard elimination in classification yards.

A BUSY DELEGATION

The ten representatives from the Santa Fe have been making a most profitable and systematic inspection of the exhibits. The delegation is headed by John Purcell, assistant to vice president, the other members being Maham H. Haig, mechanical engineer; Charles T. Ripley, general mechanical inspector; H. B. MacFarland, engineer of tests; J. H. McGoff, mechanical superintendent; J. E. McQuillan, mechanical superintendent; Frank W. Thomas, superintendent of apprentices; Albert McRae, editor of the Stanta Fe Magazine; M. Robinson, master mechanic, and J. E. Symons, master mechanic. These officers were in attendance at all of the sessions of the Master Mechanics' Association, two of them taking an important part in the proceedings in the capacity of committee chairmen, Mr. Purcell being at the head of the Committee on Boiler Washing and Mr. Haig chairman of the Committee on Dimensions of Flange and Screw Couplings for Injectors.

Mr. Purcell had given his lieutenants instructions to do all the scouting among the exhibits necessary to pick out anything in which the Santa Fe might be interested before Saturday, and to make a note of it. On Saturday morning the entire delegation visited all of the exhibits which had been thus reported and held a joint discussion on the merits of the various devices. In this way a decision was reached as to the advisability of making further investigation and more was accomplished in a few hours than could have been done in a considerable period if it had been necessary for the members to study these devices from such information as they might obtain from other sources and advise among themselves by correspondence or discussion when they did not actually have the devices before them.

Mr. Thomas came east in advance of the rest of the party and attended the annual meeting of the National Association of Corporation Schools, which was held at Worcester, Mass. He is delighted with the progress which has been made by this association and says that the convention last week was the best which has yet been held. Several of the railroads have representatives in this association and seem to agree with Mr. Thomas in his estimate of its work.

GOLF ATOP OF THE TRAYMORE

One stunt was pulled off yesterday evening at 6.30 o'clock which was not on the program of the entertainment committee. This was a golf driving contest from the top of the Traymore hotel, the object being to see who could drive a ball farthest out to sea. Those who entered the contest were D. R. MacBain, superintendent of motive power of the New York Central-west of Buffalo; S. P. Bush, president of the Buckeye Steel Castings Company; and Clement F. Street, vice president of the Locomotive Stoker Company. Mr. Bush was the winner of the contest. Each contestant drove four balls, and two of those of Mr. Bush went far out to sea, so far, in fact, that they nearly "beaned" the judges who had gone out in a life saving boat to a distance which was assumed to be safe.

The judges were George R. Carr, Chairman of the Entertainment Committee, and Samuel O. Dunn. They were accompanied to sea by J. Will Johnson, president of the Railway Supply Manufacturers' Association; and the boat was propelled and controlled in its wayward course by two sturdy members of the Atlantic City Life Saving Crew.

The tee on which this novel driving contest was held was a wooden platform which had been improvised on the roof of the Traymore just in front of the front dome. This platform was about 150 feet above the ground, and was so narrow that when the players followed through, their clubs swung out over an aching void reaching clear down to the Boardwalk below. There are some golf courses in this country with tees at the top of pretty high hills, but this is undoubtedly one of the highest tees ever played from.

Mr. Street drove the first, and all his balls sailed out over the Boardwalk, and went pretty far to sea. Mr. MacBain, unfortunately, was not well equipped with a club. He is a "southpaw," and, as his clubs were not at his hotel, it was necessary to borrow one for him. The only thing that could be gotten was a cheap, light brassie, which was obtained from a store on the Boardwalk, and it did not have the right "feel" in his hands. However, he got his balls well away from the tee, considering the difficulties under which he labored.

Mr. Bush drove just as if he had been playing his own course; and that means that his two longest drives would have covered 250 yards on any good course.

While the players were performing on the roof, Mr. Johnson and the judges were having an exciting experience of their own. Mr. Carr took his seat in the bow of the boat and Messrs. Johnson and Dunn sat in the stern. The sea was a little rough, and every time a roller came in it pitched Mr. Carr's end of the boat clear out of the water. In the midst of the proceedings, which means right when the occupants of the boat were most intently watching the doings on the Traymore's roof, a big wave rolled up unexpectedly, deluged Mr. Carr from his hat to his shoes, and then spread itself out neatly and evenly over the rest of the party. The only ones who enjoyed this feature of the game were the life-savers. They had on bathing suits!

The judges picked up the two balls driven out to sea by Mr. Bush, and brought them in to him as souvenirs.

COMPARATIVE REGISTRATION FIGURES

The following table gives the number of persons registered at the conventions at the end of the fourth day for the years 1911-15, inclusive:

	1911	1912	1913	1914	1915
Members, M. C. B. and M. M.	712	445	575	631	592
Special Guests	757	449	495	451	381
Railroad Ladies	699	329	426	352	344
Supply Ladies	399	218	282	272	224
Supply Men	1684	1446	1574	1403	1178
Totals	4251	2887	3352	3109	2719

It will be noted that the number of members of the M. C. B. and M. M. Associations registered this year was greater than up to the same time in either 1912 or 1913. The total number of all persons registered is the smallest in any year in the period, but this is due mainly to the reduction in the number of supply men here. In view of the general conditions prevailing, the registration of railway men shows an encouraging maintenance of their interest in the proceedings of the associations and in related convention matters.

ROCK ISLAND APPOINTMENTS

M. B. McPartland has been appointed master mechanic at Goodland, Kan., vice E. F. Tegtmeyer resigned. Richard Reiter, general foreman at Valley Junction, Iowa, has been appointed general foreman at Chicago. W. Abbington, general foreman at Trenton, Mo., has been transferred to Valley Junction. John Fitzgerald, roundhouse foreman at Chicago, has been appointed general foreman at Trenton, Mo. Wm. Glenn, assistant roundhouse foreman at Chicago, has been promoted to roundhouse foreman, and Frank Maher from Little Rock, Ark., has been promoted to assistant roundhouse foreman at Chicago.

Master Car Builders' Association Proceedings

Reports on Standards, Brake and Signal Equipment, Car Wheels, Revision of Prices and Compensation for Repairs

The first session of the forty-ninth annual convention of the Master Car Builders' Association was held in the Greek Temple on Young's Million-Dollar Pier, Atlantic City, N. J., on Monday, June 14, 1915.

The president, D. F. Crawford, of the Pennsylvania Lines West of Pittsburgh, called the meeting to order at 9.50 A. M. Prayer was offered by Rev. Newton N. Cadwell, of the Olivet Presbyterian Church, of Atlantic City.

PRESIDENT'S ADDRESS

A splendid exhibit of railway appliances, skillfully and tastefully arranged for our inspection, has again been prepared by the members of the Railway Supplymen's Association, and it is suggested in order to acknowledge our appreciation of the time, effort and expense incident to its preparation, that all take advantage of the opportunity to become familiar with the various devices which, while primarily designed for railway use, are ultimately for the public good. For after all it is the public that benefits the most from improvements in the means of transportation and the details of its instruments.

D. F. Crawford
President, M. C. B. Association

The problems involved in the construction, operation, maintenance, interchange and accounting for the use and repairs of cars, seem each year to become more complicated. Notwithstanding the excellent,—yes almost wonderful work accomplished by the Master Car Builders' Association, there remains much to be done, and much that can only be accomplished by more closely co-ordinating the work and rules of the several associations having to deal with the different phases of car construction and operation. We should seek to establish closer relations with the American Railway Association, the Association of Transportation and Car Accounting Officers, and American Railway Accounting Officers' Association, not only for the purpose of a better understanding of the requirements of these bodies, but to avoid duplication of investigations and conflict of rules or regulations. Concerted effort must be made to obtain the largest practicable mileage per car per year, with proper regard for the safety of operation, and to eliminate as rapidly as may seem proper, any rules which unnecessarily hinder the prompt movement and interchange of cars. Any method which would expedite, with efficient safeguards, the movement of freight cars, would be welcomed by those responsible for the financial results of railway operation, as well as by the operating officers. To inaugurate and give impetus to consideration of this subject it might be suggested that this association express formally to these kindred bodies, and all others interested, our desire to confer with them.

Bearing in mind the increasing complexity of the many points included in the construction, maintenance and interchange of cars, it would seem imperative that the members of this association observe more closely the proceedings of such voluntary bodies as the Air Brake Association, Car Foremen's Association, Interchange Inspectors' Association, and similar associations, in which, from time to time, are discussed questions regarding cars and their use, to the end that information promulgated by them may not be regarded as authoritative insofar as it may conflict in any degree with a strict interpretation of the Master Car Builders' rules.

There is in this suggestion no intent to deprecate or criticize the work of these industrious, capable and energetic associations, but it is highly desirable to avoid conflicting views, as well as to conserve the full benefit of the time and labor of these associations for the railways which employ their representatives. Would it not be advisable for one of the existing committees, or a special committee of this association, to review their proceedings and advise if it will not be possible to make their work more co-operative and consequently more valuable to all.

Since the passage of the amended Safety Appliance Acts in 1910 there has been no important Federal legislation regarding railway cars, but in several of the States, in addition to laws regarding the construction of cabin cars, legislation in which cars or car condition is involved has been considered. In some instances, when proposed laws to limit the length of freight trains, either by measurement or number of cars, were under discussion, much prominence was given to isolated cases of air-brake failures, and, as is too often the case, no mention was made of the fact that every day thousands of trains are handled without any semblance of air-brake troubles. Undoubtedly improvement in maintenance of the air-brake apparatus, coupled with more skillful operation of the device, would have reduced the number of so-called failures, and it is thought that this subject is of sufficient importance to warrant its discussion at one of the sessions of this meeting.

Although already referred to by my predecessors, the subject of the proper application and maintenance of safety appliances is of such importance that it seems desirable to again bring it before you, and to urge that all give careful consideration to the establishment of adequate supervision and inspection of these appliances to insure, as far as may be possible, their compliance with the several laws relating thereto.

It is not my intention to refer to the committee reports in detail or to anticipate their presentation by attempting to summarize the conclusions. I do, however, wish to present to you some comments on the subjects assigned to, and the work before some of the committees.

The Arbitration Committee, in addition to the consideration of several cases put before them for decision, bears a heavy burden in the formulation and revision of the Rules of Interchange, and during the past year has devoted much attention to the study of the questions submitted to them regarding the code of rules, and to the preparation of the interpretations which have been promulgated to all of the members. Since the publication of the Code of Interchange Rules, effective October 1, 1914, this committee has prepared answers to about 150 questions.

This means that to cover 113 pages of the rules, we now have before us 50 pages of interpretations which, while intended to conduce to a better understanding of the rules, are likely to cause confusion in the minds of those who, when consulting the code, fail to carefully scan the interpretations. That it is necessary to interpret the rules is apparent from the number of questions that have been addressed to the secretary, but from even a casual inspection of the questions it is apparent that by a little study many almost trivial questions would be avoided, and that in several instances the inquiries covered points which warranted submission of briefs for bona fide arbitration.

Undoubtedly the number of questions will decrease as the information already available gradually clears up any vagueness in the code, but with the realization that members of this committee are busy men, the labor imposed upon them should be reduced, by the members refraining from placing before them items of small importance and of rare occurrence.

In connection with the report of this committee, and the many interpretations already given to you, it would appear to be advisable to arrange to re-codify the Rules of Interchange, embodying as far as possible, the several points of the interpretations.

In view of the large amount of work imposed upon the Arbitration Committee perhaps it would be advisable to appoint a special committee to assist in the suggested re-arrangement of the rules. When it is considered that 60,000 copies of the code are distributed each year, and that the majority of these are placed in the hands of men who, in addition to the enforcement of the rules, must inspect the cars, the desirability of fixed instructions is apparent. I would, therefore, recommend that most serious consideration be given to the idea of having the Interchange Rules remain in force for two years at least, instead of making material changes at each annual convention.

The motto of our Committee on the Revision of Standards should be, and apparently is, "Hasten Slowly," for they have succeeded in keeping the standards and practices in accord with the development of the art, and have met changing conditions without radical departure from principles long established. My hope is that ere long we may see many more of the parts involved in car construction, and indeed the designs for the entire car, turned over to this committee for the same thoughtful consideration that has been given the standards and practices already adopted.

The importance of proper maintenance of air brakes has already been referred to, and it might be well for the Committee on Train Brake and Signal Equipment to give this point some attention, in addition to making a careful study of the brake equipment for passenger cars, a subject well worthy of thorough investigation. Would it be asking too much to have this committee review the proceedings of the Air Brake Association, and include in their report to our convention their recommendations regarding any points brought forward by those who are following the details of air brake operation and maintenance more closely than it is possible for us to undertake?

Failure of the members to adopt as standard the brake beam recommended by the Committee on Brake Shoe and Brake Beam Equipment, should not discourage the committee, but rather spur it to further efforts to present to the association such sufficiently impressive reasons as to cause the adoption of a standard beam at an early date. Think of the economy which could be realized, and the convenience it would be were all brake beams alike.

The achievement of a single standard coupler is drawing closer each year. Your committee having this subject before it is giving the most painstaking care to the development of a coupler which will not only be suitable for service conditions, but one that will assist in obtaining economy in maintenance and operation. The task set for this committee is not simple, and their efforts warrant the cordial support of the association.

The enforcement of the Loading Rules of the association is now quite generally insisted upon, and it has resulted in expedited movement of traffic and decreasing claims for loss

D. R. MacBain
Vice-President, M. C. B. Association

R. W. Burnett
Vice-President, M. C. B. Association

and damage to lading. Opportunity still exists for further development and extension of these rules, as the railways paid in 1914 claims amounting to $32,375,617.55, a material proportion of which might have been saved had the shipment been properly packed and secured.

Unfortunately, there appears to be a tendency on the part of some members of the association to minimize the fact that the contour of car wheels should bear some relation to the limiting dimensions of rails, frogs, cross-overs and switches on which they are used. Wheels not conforming to the standards of this association, or the limits set by the American Railway Association, have been placed in service, without awaiting the results of the investigation now under way by your Car Wheel Committee, working jointly with a committee of the American Railway Engineering Association. While there is no question as to the desirability of taking advantage of every real improvement offered, it would seem to be the part of wisdom to defer the introduction of wheels differing from those approved by the association until such time as they can be adopted by all, their manufacture becoming effective at a given date, as has been done several times in the past. The data regarding wheel breakages and other wheel defects, now being collected by the committee, will surely give accurate information upon which to base recommendations as to whether changes in our standard designs are necessary.

The work of the Committee on Car Construction is of such importance that detail reference to it is desirable. Among other items there is submitted specifications for car doors, which should serve as an excellent guide in designing new doors, and assist in preparing designs for the modification and strengthening of existing doors and their fastenings.

A very complete analysis of the principles involved in the design of draft gear attachments is given, which should prove of value to roads designing new cars, as well as for consideration in the adoption of methods for improving cars now in service.

In submitting to you tentative designs of a standard M. C. B. box car, the committee has performed most commendable work, and with the co-operation of the members, by heeding the request of the committee for complete criticisms by December 1, 1915, it should be possible to have the designs sufficiently complete to submit them to our next convention for adoption as a recommended practice.

That the Master Car Builders' Association should have complete specifications for all materials that enter into the construction of cars, there is no doubt. Therefore, the work of this committee should receive the support of the members, who, by insisting that materials meeting the requirements of the M. C. B. specifications be used to the fullest extent, will assist in evolving correct specifications.

For the present, at least, the adoption of a standard truck for freight cars is really of more moment than the adoption of a standard car, and to that end the labors of this committee should be directed to harmonizing the conflicting points in design, and thus hasten the general use of a single design.

It is to be regretted that the pedestal type of truck has been introduced for freight car service. This type of truck, while it may have many points in its favor, requires a journal box differing from the M. C. B. standard, thus compelling all roads to increase the kind and quantity of stock material carried or to accept the less desirable horn of the dilemma, and delay the movement of the car until non-standard material may be obtained from the car owner.

The Committee on Prices for Labor and Material still has before it many points for consideration, and their burden will be increased should this convention look with favor on the recommendations regarding compensation for car repairs. Apparently it would be of great assistance to the committee to have assigned to it members representing the refrigerator and tank car lines, as the labor and material required for such cars differ materially from those ordinarily used by the railways. I would, therefore, suggest that the Executive Committee give consideration to the appointment of such members to this committee for the coming year.

The salient features of train lighting and equipment seem

C. E. Chambers
Vice-President, M. C. B. Association

J. S. Lentz
Treasurer, M. C. B. Association

to have been fairly well established through the efforts of the committee, and it is desirable to have the benefits of their supervision over the subject, so that future extension may be in line with, instead of contrary to, simplicity in taking care of the cars of various companies at joint terminals and through line connections, where such exist.

When rules regarding the construction and equipment of tank cars were first promulgated by the association, much objection was made to them and their enforcement. I wonder if we all fully realize what the work of this committee has meant in added safety of transportation. Notwithstanding the tremendous increase in the amount of inflammable and explosive liquids transported since the inception of the committee, the number of fires and the effect of such fires, have been much reduced. During 1914, with the remarkable movement of gasolene brought about by the growing use of motor vehicles, but 80 accidents occurred. While perhaps the work already accomplished has lessened the labors of the committee, it is recommended that such a committee be continued, and if advantageous, to have its sphere extended to assisting the Bureau of Explosives in its work.

In giving considertion to the settlement prices for reinforced wooden cars, I might caution you that any prices determined upon apply only to cars destroyed away from the owner's line, and care should be exercised that our rules are not complicated with many technicalities in endeavoring to cover circumstances which, at most, are of but rare occurrence.

The study of draft gear is of the utmost importance, as with couplers of increased strength it is quite likely breakage will occur in other parts of the car unless draft gear of adequate capacity is provided, and the committee should be continued until it has submitted, for adoption, requirements as to dimensions and capacity for both spring and friction draft gear.

The attention of the members is directed to difficulties experienced by your several committees in obtaining replies to their circulars of inquiry. It is expected that every member will reply fully and promptly to every circular received. Without replies from a large majority of the members it is quite possible that the committees may be misled and spend much time in making reports, which will not be acceptable to the convention. The high standard of the work already done by this association should be the incentive to all to contribute prompt and accurate information to the committees.

During our convention of 1909, in a topical discussion on "The Abuse of the M. C. B. Repair Card," the following statement was made:

"The repair card unfortunately makes possible the misuse, which there can be no doubt is often indulged in. Prominent railways quite frequently render bills for defects which seem unreasonable on their face, etc."

Following this discussion resolutions were adopted calling on the members to file with the Executive Committee any evidence tending to show misuse of the repair card. The subject was referred to at the 1910 convention, and again at the 1912 convention. Notwithstanding repetition of the requests of the Executive Committee for evidence, but one definite case was brought to their attention. While six years have elapsed since this subject was first brought to your attention it is apparent, from communications which I have recently received, that the efforts of the Executive Committee have not succeeded in eliminating improper billing. Although I do not believe, for one moment, that the alleged improper practices are at all widespread, or that they are indulged in with the consent or knowledge of the officers of the railways, there is sufficient ground to warrant the association taking cognizance of the conditions.

It has been intimated to me that our rules should be revised to take care of this situation, but I have been unable to determine how any additional legislation would prevent anyone who wanted to do so, from making a bill for repairs not made, especially if the car was too far from the owner's line to admit of checking. There is no doubt that the cause for a large proportion of the improper bills may be traced to the misunderstanding of the rules by the inspectors, repairmen and bill clerks. However, I do not think this association should rest when criticism is even possible; therefore, I would recommend:

1.—That suitable resolutions be approved by the convention and forwarded to each of the adherents to the Rules of Interchange.

2.—That the Executive Committee renew their requests for evidence of improper billing.

3.—That a special committee be appointed or the Arbitration Committee be authorized to confer with the proper committee of the American Railway Accountants' Association, to formulate, if possible, methods which will permit of more accurate accounting for car repairs.

4.—That the American Railway Accounting Officers' Association be requested to give consideration, at the earliest possible date, to adopting a rule requiring that all bills for repairs to cars be rendered within 90 days from the date of making repairs.

5.—That each member of this association will take such steps as will insure those having to do with repairing of cars and billing for such repairs on their lines, being fully instructed as to the meaning and limitations of the rules.

As accounting for the repairs of cars is closely interwoven with the Rules of Interchange, and on nearly all railways one or more men have become quite familiar with the rules of the association, and many times the services of men with such knowledge would be of value on our committees, it is suggested that consideration be given to the revision of the constitution to make chief motive power clerks, motive power accountants and M. C. B. bill clerks, or similar employees, eligible for membership.

At the present time the constitution requires that only such private car lines as may own 1,000 cars or over may have a representative member in the association. In order to have full representation I would suggest that the constitution be so changed as to permit private car lines operating 500 cars or over, to name one representative member.

For the future work of the association three items seem to me to stand out prominently:

1.—Standardization of equipment. Much indeed has been accomplished, but up to the present time attention has been largely devoted to dimensions and details. Of course, each detail decided upon gives promise of ultimately reaching a conclusion on the larger problem, but is not now the time for this association to agree on standard freight car trucks, standard box, stock, refrigerator, hopper, gondola and flat cars? We all remember the letter written by E. P. Ripley, president of the Atchison, Topeka & Santa Fe on this subject, which was read at the convention last year. Can we not, by concerted efforts, adopt standards which will make unnecessary such stimulation?

2.—Simplification of the Rules of Interchange. One has but to read in the report of the Arbitration Committee the suggestions they receive as to changes in the rules, to fully realize how much has already been accomplished in this direction, but I trust they will harden their hearts and make even less changes than they have in the past. The members can assist them very much indeed by confining their recommendations for changes to those items only which are frequently involved.

3.—Co-operation with the American Railway Association in expediting the movement of cars.

The expenses of the Association approximate 9-10 of one cent per car per year, including salaries, rent, printing (which is a large item) and all other items, and when we consider all that is accomplished by this very small expenditure, it is indeed remarkable.

Of course, this amount does not include the amount expended by the railways for experiments made by them, or for the time and expenses of those engaged in M. C. B. work, but even if this were added it would be found that the Master Car Builders' Association has given to the railways and the public a very large return on a small investment.

At times it is desirable for the Association to undertake certain tests, such as those on brake shoes, brake beams, etc., but recently the available funds have not been sufficient to permit such work. To meet this condition it is suggested that when funds for such work are desirable, the question of an assessment for the purpose be submitted to letter ballot of the representative members of the association. An assessment of 1 or 2 cents per car would sufficiently provide for the majority of the work undertaken.

ASSOCIATION BUSINESS

Secretary Taylor presented his report, which showed that the present number of active members is 429, representative members 502, associate members 13, life members 19, making a total of 891 members. During the year 66 additional roads and private car lines have become subscribers to the rules of interchange. The report of the treasurer, showed a balance on hand of $627.91. The reports of the secretary and treasurer were referred to an auditing committee consisting of J. M. Borrowdale, I. C.; W. C. A. Henry, Penn. Lines; and T. J. Burns, M. C.

The Secretary: At a meeting of the executive committee held last evening, it was decided to recommend that the due of active members be fixed at $5 a year, and that of representative members at $7 a year.

(The recommendations of the executive committee were confirmed by the Association.)

The executive committee proposed an amendment to the

constitution intended to make more explicit the voting power of active members. This will lie over till next year before being voted on.

REPORT OF THE COMMITTEE ON NOMINATIONS

The committee suggested the following: For President: D. R. MacBain, S. M. P. & R. S., N. Y. C. Lines West; For First Vice-President: R. W. Burnett; For Second Vice-President: C. E. Chambers, S. M. P., C. R. R. of N. J.; For Third Vice-President: T. W. Demarest, S. M. P., Pa. Lines West—N. W. System; For Treasurer: J. S. Lentz, M. C. B., Lehigh Valley R. R.; For Executive Members: C. E. Fuller, S. M. P., Union Pacific R. R.; F. E. Gaines, S. M. P., Central of Georgia; I. S. Downing, G. M. C. B., C. C. C. & St. L. Ry.

The balloting will take place on Wednesday morning.

REVISION OF STANDARDS AND RECOMMENDED PRACTICE

After due consideration of present Standards and Recommended Practices of the Association, together with replies from members to the Circular of Inquiry, also requests involving Standards presented through the secretary, the committee submits the following report:

[EDITOR'S NOTE:—In abstracting the report we have left out several items referring to corrections on the drawing plates which the committee concurred in and referred to the secretary for action; also several paragraphs referring to suggestions which did not meet with the approval of the Committee or were of minor importance and were referred to other Committees or otherwise disposed of.]

JOURNAL BOX AND DETAILS. (Standard)

Pages 634-637

For Journals, 3¾ by 7 in. Sheet M. C. B. 3.
For Journals, 4¼ by 8 in. Sheet M. C. B. 6.
For Journals, 5 by 9 in. Sheet M. C. B. 9.
For Journals, 5½ by 10 in. Sheet M. C. B. 12
For Journals, 6 by 11 in. Sheet M. C. B. 12-C.

A member suggests that journal box wedges be provided with hole through front flange of wedge for all sizes of journals to facilitate removal of wedge by use of packing hook. The Committee concurs in this recommendation.

T. H. Goodnow
Chairman, Committee on Revision of Standards and Recommended Practice

MARKING OF FREIGHT EQUIPMENT CARS. (Standard)

Page 761. Sheet M. C. B. 26-A

The Committee wishes to renew the recommendations to the 1914 Convention, at which time revised Sheet M. C. B. 26-A

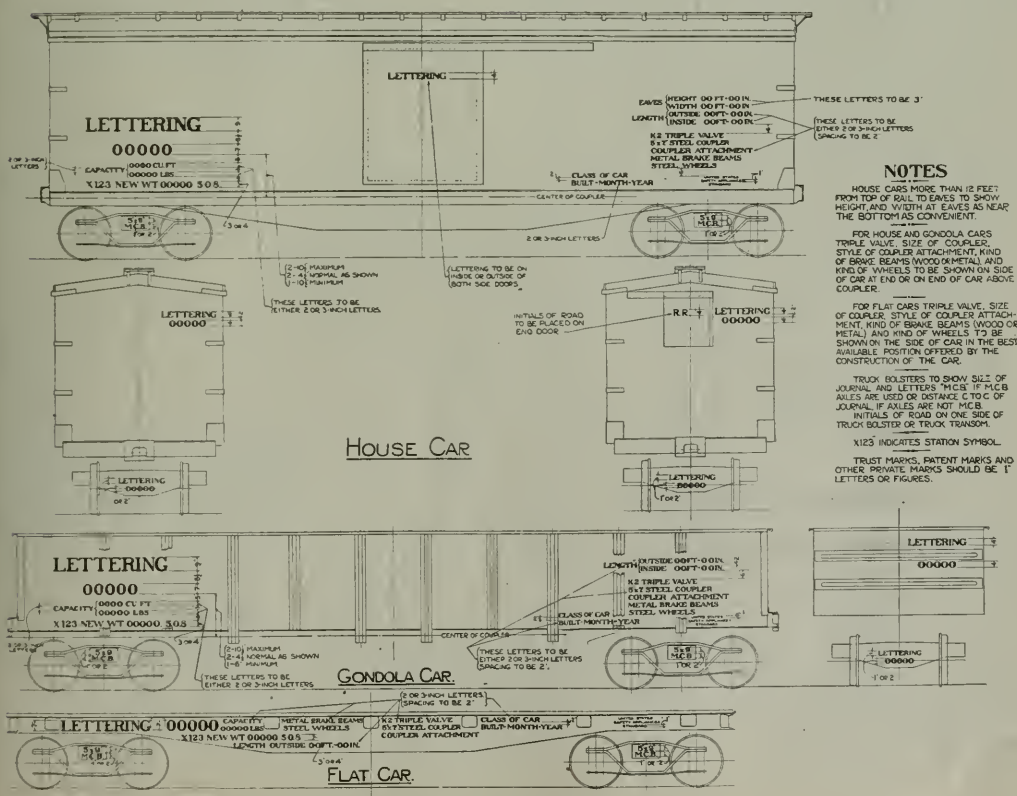


Fig. 1.—M. C. B. Standard Marking of Freight Cars

(see Fig. 1) was presented, and was lost by letter ballot, and again presents same, with the exception of the omission of the stenciling of light weight on end of car.

LINING FOR OUTSIDE-FRAMED CARS. (Recommended Practice)
Page 759. Sheet M. C. B.—F

Through the secretary, communication was received from W. J. McBride, president of the Haskell & Barker Car Company, regarding the desirability of standardizing lining for outside-framed box cars.

Since the adoption of 1¼-in. lining in 1913 as Recommended Practice, the committee believes that it is desirable with future built cars to adopt the additional sizes shown in Fig. 2 as Recommended Practice.

SPRINGS AND SPRING CAPS FOR FREIGHT-CAR TRUCKS. (Recommended Practice)
Page 877. Sheets M. C. B.—H and H-1

The committee recommends that springs and spring caps, as shown on Sheets H and H-1, be advanced to Standard.

STEAM HOSE COUPLINGS. (Recommended Practice)
Page 873. Sheet M. C. B.—Q-1

A member calls attention to the difficulty in interlocking of the different makes of steam heat couplers due to the guard arm not being long enough, or too low, to provide a bearing for some of the types of locks that are being used, and suggests changing of the present M. C. B. design to provide for the guard arm being of sufficient length and height to make all of the coupler locks effective.

The committee concurs, and recommends the appointment of a special committee to go into this matter, taking it up with the coupler manufacturers with a view of adopting a Standard M. C. B. coupler.

PLATFORM SAFETY CHAINS. (Recommended Practice)
Page 758

Several members suggest safety chains as one of the desirable standards for the interchange of passenger equipment. The committee concurs, and in view of the changes in passenger equipment since the adoption of the present Recommended Practice, suggests that this be referred to a special committee for investigation and report, and to include all appurtenances on end of car below platform.

DEFINITIONS AND DESIGNATING LETTERS OF GENERAL SERVICE—FREIGHT EQUIPMENT. (Recommended Practice)
Page 887

Through the secretary, request was received from Arthur Hale, general agent of the American Railway Association, for change in the description of "XI" box car, insulated, as follows: "A box car having walls, floor and roof insulated, not equipped with ice bunkers or ice baskets. This car ordinarily used for transporting vegetables, freight, etc." The committee concurs in this recommendation.

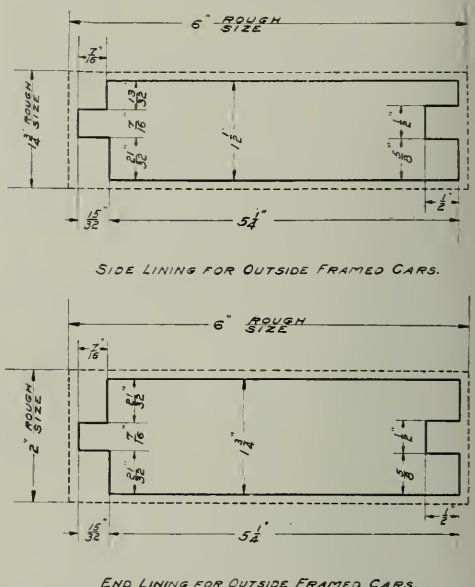


Fig. 2.—Recommended Lining for Outside Framed Box Cars

NEW SUBJECTS

A member suggests that a standard height from rail to top of platform buffer for passenger cars be established, this to be

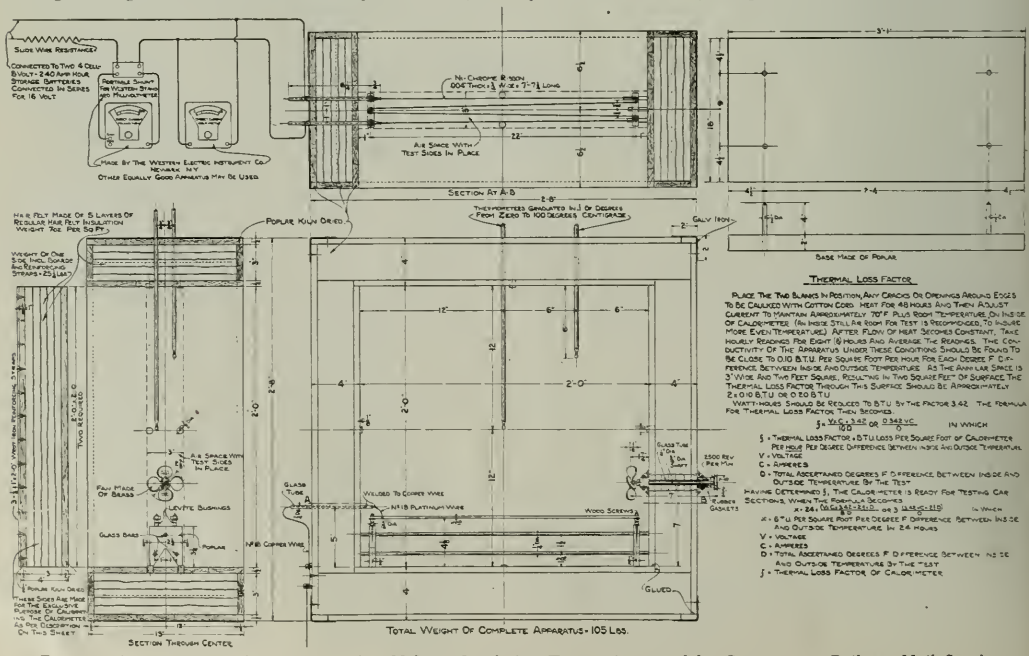


Fig. 3.—Arrangement of Apparatus for Making Insulation Tests—Approved by Government Railway Mail Service

nominally 51 in. The committee concurs in this recommendation.

A member suggests that the method of making insulation tests, together with description of testing machine as approved by the Government Railway Mail Service, be incorporated in the M. C. B. Proceedings as follows:

"SECTION 23.—INSULATION.—(a) The car shall be insulated throughout, including floors, sides, ends and roof (except pier panels), with material of such a nature that it can be securely fastened so as to withstand the vibration incident to railway service. The insulating material must be such that it will not support combustion, will not absorb moisture beyond its own weight, and when wet, will not become corrosive.

"(b) Side and end wall and roof insulating material shall be securely fastened. Where the nature of the material permits, it shall be cemented; and also mechanically clipped if necessary for proper support. Floor insulation shall extend the entire distance between side walls either in one full width or in sections fitted between floor supports and be secured in place.

"(c) The construction of side and end walls and roof of car shall be such as to avoid or reduce to a minimum continuous metal connection from outside to the inside of the car.

"(d) To insure maximum of insulating and sound-deadening efficiency, the construction at the junction of side and end walls and floor shall be such as to prevent the circulation of air through the side and end walls or through the floor or into the car.

"(e) The thermal efficiency of the materials in side and end walls, in roof and in floor, must be such that a test duplicate section through walls, roof or floor (duplicate with the exception of framing members such as posts, braces, carlines or stringers which are to be omitted), will not transmit, when subjected to the test hereinafter described, more than the following amount of heat per square foot of surface in twenty-four (24) hours for each degree Fahr. difference in temperature between the inside and outside walls of the section.

"For side walls, end walls and roof.....8 B. t. u.
"For floor .....7 B. t. u.

"The method of testing shall be as follows:

"A calorimeter, as illustrated in Fig. 3 and described in R. M. S. drawing, Sheet 18, shall be used in all tests. It shall be carefully constructed and of the materials indicated and before used must be standardized for its thermal loss factor. The sections to be tested shall truly represent the materials as used and disposed in the car.

"The heat must be supplied by direct electric current of constant voltage, measured by standardized instruments. The difference between inside and outside temperatures must be held as nearly seventy degrees Fahr. as possible. Readings of temperature and current shall not be recorded until forty-eight hours after heat is turned on and test begins, in order to insure thorough heat saturation of calorimeter and test sections. The duration of actual test shall be eight (8) hours, during which time temperature and electric readings shall be made and recorded each hour or more frequently, if considered necessary. The average of all readings thus recorded shall be taken as the final result. All differences regarding results which may arise between the Postoffice Department and the railroad companies affected shall be referred to the United States Bureau of Standards for decision."

The committee concurs in this recommendation.

The following suggestions were received in answer to the Circular of Inquiry No. 18, but in the opinion of the committee were not directly involved in the interchangeability of passenger cars and are, therefore, mentioned in this report with no further recommendation except to bring them to the attention of the Association in the event that it should be felt that further consideration should be given, and in that case to be referred to special committees: Emergency tool equipment. Retainer valve location. Standard requirements for brake beams similar to requirements for freight cars. Hand brake pawl and shaft and a uniform percentage of braking power and a fixed basis for figuring this. Coupler shanks on passenger cars. Standard dimensions for diaphragm face plates. Uniformity between wood and steel passenger equipment as to the height of the door threshold above the platform. Distance from face of buffer to pulling face of coupler to be not less than 25/8 in.

The report is signed by:—T. H. Goodnow (C. & N. W.), chairman; W. H. V. Rosing (St. L. & S. F.); C. E. Fuller (U. P.); A. R. Ayers (N. Y. C.); O. C. Cromwell (B. & O.); O. J Parks (Penn. Lines), and R. E. Smith (A. C. L.).

In presenting the report the chairman, T. H. Goodnow, C. & N. W., said: That since the report was closed one or two communications had been received which should be mentioned and acted on. One was a letter from Mr. J. T. Wallis, general superintendent motive power, Pennsylvania Railroad, stating that manufacturers of drop forged wedges of the M. C. B. type, have recently called attention to the fact that these wedges could be made at less expense if the arc recess on each side bearing face were omitted. The omission of these recesses gives greater bearing surface, and, therefore, less wear between parts in contact, aside from permitting cheaper manufacture. The letter recommended that the M. C. B. drawings of all journal box wedges and bearings be revised, omitting the arc shaped recesses where the wedges and journal bearings abut against the sides of the journal box.

The other letter was from R. B. Kendig, chief mechanical engineer, New York Central, and requested that a recommendation favoring the location of the uncoupling lever of passenger equipment on the left-hand side facing the car, be submitted to letter ballot.

DISCUSSION

R. L. Kleine (Penna. R. R.): Under Marking of Freight Equipment Cars, the committee recommends the omission of light-weight stencilling on end of cars. The committee on car service rules of the American Railway Association, in their Rule No. 11-A, state all freight cars shall be light weight stencilled, and shall be marked in accordance with M. C. B. rules. Light weight marking is a transportation matter and I believe before this is submitted to letter ballot the committee on standards should have a conference with the proper committee of the American Railway Association to determine what they desire.

T. H. Goodnow: The committee felt that the present standard of the Association was not in accordance with present practice, and that if the standard practice were brought up to date, it would probably accomplish some results and get roads more in line in the stencilling of their equipment.

J. J. Hennessey (C. M. & St. P.): This question was pretty thoroughly discussed before the Convention a year ago. The concensus of opinion was that the lettering on the end of cars was unnecessary. It delayed the weighing of cars. It entailed a great deal of expense that was not really considered necessary, and I believe it is only on rare occasion when the lettering on the end of cars is made use of. It seems to me that the matter in its present form is all right. The customary way of weighing is to push a train of cars over the scale, and stencil them on the side. If you are going to put the weight on the end of the car, you have to hold up the train while you put men in between the cars to do the necessary stencilling. We will not derive from it any benefit commensurate with the expense incurred.

C. E. Chambers (C. of N. J.): Regardless of the expense we will still be required to stencil the light weight on the end of the cars. There are a good many things we would like not to do, but some other department requires that they be done.

T. H. Goodnow: The light weight on the end of the car is optional at the present time. While it was shown in the standards, it was not carried out by many of the railroads. If the recommendation should carry by letter ballot as it stands it would still leave the matter optional with the railroads. Those stencilling would continue to do so, and those who do not now stencil would not do so.

F. H. Brazier (N. Y. C.): The lettering is entirely uncalled for and unnecessary. I do not think that we should ask the men to go between the cars for this purpose as it is an unsafe practice.

(The recommendation regarding the stencilling of light weight on the ends of cars was referred to letter ballot without conference with the American Railway Association.)

The President: Is it your intention to sumbit a supplementary report in regard to stencilling light weight and capacity on tank cars, item No. 160?

T. H. Goodnow: As a result of action since this report was printed that will be necessary. It will come up at the arbitration committee meeting and in sending it to letter ballot, will be changed in accordance with whatever action is taken by the convention at that meeting.

The President: What is your suggestion as to the two communications received?

T. H. Goodnow: Had Mr. Wallis' communication in regard to the journal bearing wedges, been in the hands of the committee at the time the report was considered, it would have embodied it in the report and presented for letter ballot. If the convention will approve, we will include it in our letter ballot, and then it can be acted on by the members. The matter of uncoupling levers has not been discussed by the committee, and the different roads vary in their opinion on that matter. It is a subject which should go to the standards committee for consideration.

F. W. Brazier (N. Y. C.): It seems singular that the Master Car Builders' Association has one location for the uncoupling lever for freight service, and another for pas-

senger service. The New York Central, in the case of its passenger equipment, had all the uncoupling levers changed from right to left. We are having trouble with our lines running west, because in the case of some roads the uncoupling lever remains on the right, and ours is on the left. In some cases we are compelled to put on a double uncoupling arrangement, which is an unnecessary expense.

T. H. Goodnow: The federal regulations regarding uncoupling levers do not require the change as far as passenger equipment is concerned. It is only a question of where a passenger car is handled deadhead in a freight train. Mr. Brazier says he has made the change and the western roads have not. If this was a matter of interchange, and it was brought up by Mr. Brazier on that understanding, I would be willing to agree with him.

F. F. Gaines (C. of Ga.): We have a lot of trouble from having uncoupling levers on the right side. If you have all of them on the left side you can run mixed trains. I think it would be better to make the left side standard.

D. R. MacBain (N. Y. C.): The question is—are we going to have single or double uncoupling levers on our passenger equipment? We have to run passenger equipment cars from New York to San Francisco over the eastern and western roads, and we have all of our equipment left hand so that we may deadhead our equipment at times in freight trains. It is a question of having one standard on the left side, or forcing the railroads to put a standard uncoupling lever for freight cars on the left side, and another one for passenger cars on the right side, which means a double arrangement with all the incidental complications arising therefrom.

G. W. Wildin (N. Y., N. H. & H.): The New Haven has a heavy passenger equipment, and we went to considerable expense to fit all our equipment with uncutting levers on the left side to conform with the federal regulations when deadheading passenger cars in freight trains. I agree that we should have one standard in this respect.

(A motion was made and carried that the committee include a recommendation in favor of adopting the left side as the standard location of passenger car uncoupling levers, to be submitted to letter ballot.)

TRAIN BRAKE AND SIGNAL EQUIPMENT

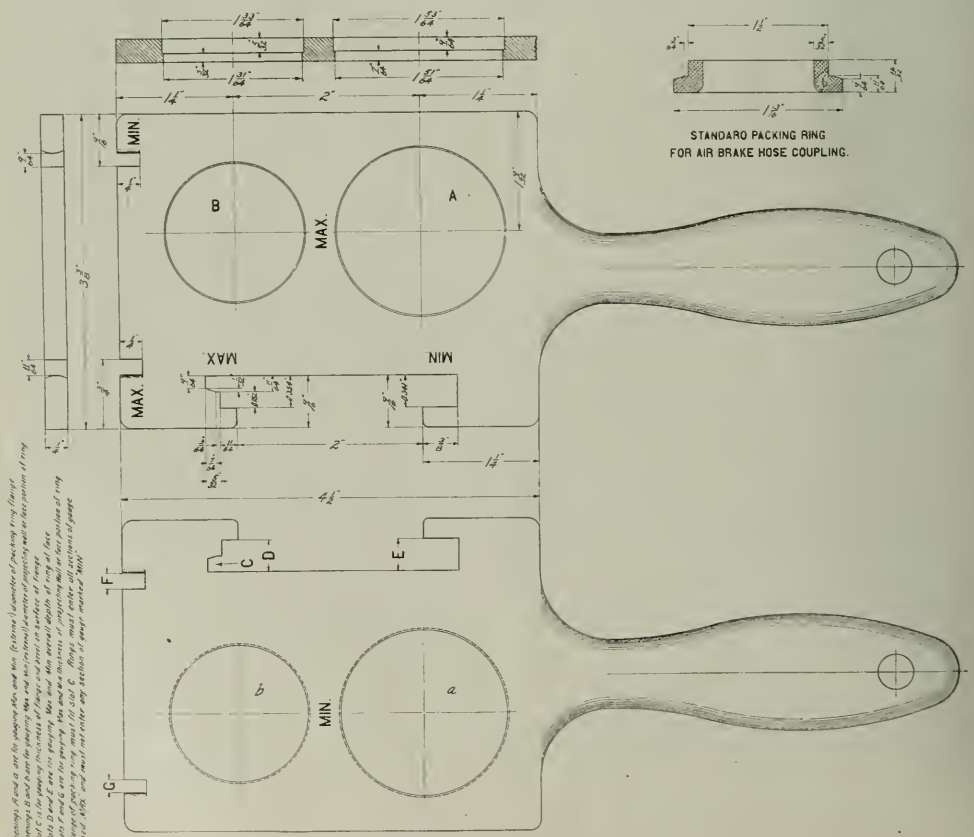
The following subjects have been considered by the committee, and are presented for such action as the Association deems fitting.

SLIDING BRAKE PIPE HANGER

Effort has been made to produce a design of gage for use in determining the end locations of brake and signal pipes to fix them in their proper relations to all other parts of car ends so as to permit of the required lateral and vertical movement, with sliding or swinging hangers, without interference. It has been found, however, almost impossible to construct a gage of this character that would be universally applicable on account of the wide range of varying conditions, and the committee believes that the designs of sliding and swinging hangers already illustrated in the 1913 and 1914 reports supply ideas that will enable any road to apply a satisfactory sliding or swinging device to its cars to allow the required movement of brake and signal pipes, necessary to prevent hose parting on curves, each road to make the necessary modifications in the design of hangers selected to suit its own peculiar conditions.

TYPE OF CONDUCTOR'S VALVE TO EMPLOY

In the 1914 report of this committee the B-3-A type of conductor's valve was recommended for adoption. The recommendation was submitted to letter ballot and was defeated by a



Gage for Air Brake Hose Coupling Packing Ring

very close margin. The committee has decided to bring this matter before the Association for reconsideration.

CLASP TRUCK BRAKE FOR PASSENGER EQUIPMENT CARS.

To date there are in service about 2500 sets of truck clasp brakes in use on modern passenger car equipment on about a dozen leading railroads of the country. So far as your committee has been able to learn this type of rigging is maintaining its claims for reduced brake shoe wear per given number of foot-pounds of brake work done, for reduced number of hot journals in so far as the brake may be responsible for them, for smoother riding of car during time of brake action and for remarkable low cost of maintenance both with respect to the parts of the rigging itself and to the cost of brake shoe renewal, while the stopping efficiency is about 20 per cent greater than the single shoe arrangement. Where the wheel load is approximately 12,000 lb., clasp brakes should be applied.

The committee recommends, therefore, that truck clasp brakes be applied to all four-wheel truck passenger cars weighing 96,000 lb. or over, and to all six-wheel passenger cars weighing 136,000 lb. or over.

HAND BRAKES FOR HEAVY PASSENGER CARS

This subject has engaged the attention of the committee during the past year, but so far no design of hand brake gear examined seems to be entirely satisfactory. What is needed in a hand-brake rigging for heavy cars is one that will take up quickly

R. B. Kendig
Chairman, Committee on Train Brake and Signal Equipment

all slack in the brake chain and bring the shoes in contact with the wheels—this part of the operation can be performed with comparatively low leverage; then when the shoes are in contact with the wheels, means for easily increasing the leverage sufficiently to permit of the average man producing the required brake force, this increased leverage to come into play when the shoe movement is practically little or nothing.

The question of whether it would not be better to divide the hand brake so as to have it operate on a single truck has arisen and in the judgment of the committee there is much to recommend serious consideration of this plan, since it permits of a reduction in the total leverage and enables the operator to apply the brake on the single trucks with an effectiveness in excess of what is obtainable where the brake operates on both trucks, and what is very important, this effectiveness is obtained in much less time.

HOSE COUPLING GASKET GAGE

The committee has examined several designs of hose-coupling gasket gages for use in determining whether gaskets are of proper dimensions or not, with the result that the one illustrated herewith is recommended for general use. This gage has the advantage of being made all in one piece making it convenient for use, and gaskets conforming to its limits will be satisfactory so far as dimensions are concerned, for service.

The report is signed by:—R. B. Kendig (N. Y. C.), chairman; B. P. Flory (N. Y., O. & W.); J. M. Henry (Penn.); R. B. Rasbridge (P. & R.); L. P. Streeter (I. C.); A. J. Cota (C., B. & Q.), and W. J. Hartman (C., R. I. & P.).

(It was noted that the items on the conductor's valve, clasp truck brakes and hose coupling gasket gage be submitted to letter ballot as recommended practice.)

BRAKE SHOE AND BRAKE BEAM EQUIPMENT

The committee has devoted its entire attention this year to the subject of brake beams, the work on brake shoes having been completed for the present at least. The committee, however, submits a resume of the tests so far made on brake shoes for the years 1906 to 1914, inclusive, as showing the data which underlie the specifications of this Association at present in force.

BRAKE SHOES.

During the years 1906 to 1914, a considerable number of brake shoes of different materials and construction have been tested

C. H. Benjamin
Chairman, Committee on Brake Shoe and Brake Beam Equipment

on the Master Car Builders' machine at Purdue University. Determinations have been made of the average coefficient of friction, the rise in the coefficient of friction of the average coefficient of friction, the rise in the coefficient of friction at the

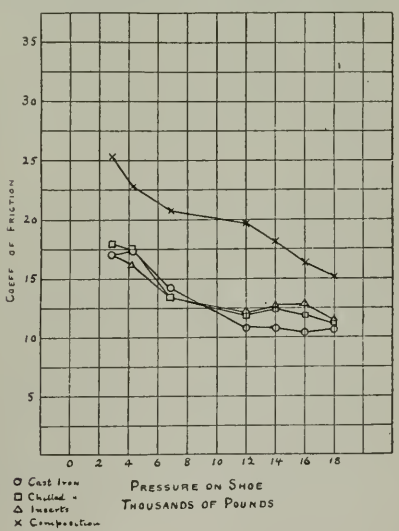


Fig. 1.—Mean Coefficient of Friction (in per cent) of Brake Shoes on Steel Tired Wheels at 65 M. P. H.

end of the run, and the loss of weight of the shoe in comparison with the number of foot-pounds of work done. The shoes have been tested at various speeds ranging from 20 to 80 miles per

hour, and under pressures of application varying from 1080 lb. to 2000 lb.

The materials have been classified as follows:

a. Plain cast iron such as can be easily drilled.

b. Chilled cast iron where the surface has been partially or wholly hardened by chilling.

c. Cast iron shoes with inserts of harder material.

d. Shoes having a cast iron shell filled with a comparatively soft composition as in the Pittsburg shoe.

The readings for each group have been averaged and these averages plotted as shown in the accompanying plates. Figs. 1, 2 and 3 show the variation in mean coefficient of friction while Figs. 4 and 5 show the loss of weight compared with the number of foot-pounds of work done.

Conclusion.—It is apparent from Figs. 1, 2 and 3 that the coefficient of friction diminishes as the pressure on the shoe is increased, but that for pressures from 12,000 to 18,000 lb., inclusive, the difference is slight. It is furthermore apparent that pressures in excess of 18,000 lb. are not economical.

Reference to Fig. 2 shows that the coefficient of friction at high speeds is very much less than at moderate speeds, the average coefficient at 80 m. p. h. being less than 10 per cent. or less than one-half the corresponding average at 40 m. p. h.

The coefficient of friction of filled or composition shoes is in

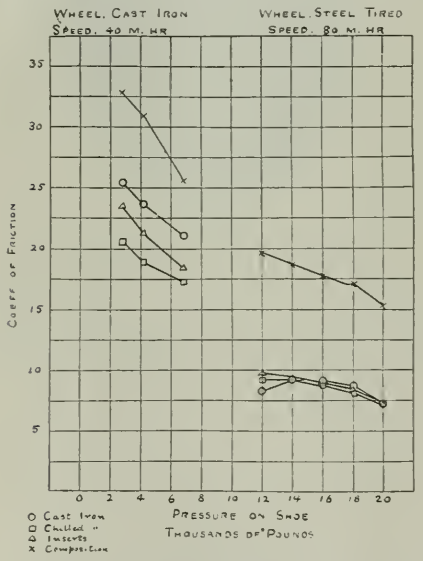


Fig. 2.—Mean Coefficient of Friction (in per cent) of Brake Shoes on Cast Iron and Steel Tired Wheels at 40 and 80 M. P. H., Respectively

all cases considerably greater than the average for the other three groups, being from 50 to 100 per cent. in excess.

It is apparent from Figs. 4 and 5 that general conclusions can not safely be drawn as to the effect of speed and pressure on the loss of weight, except that pressures in excess of 18,000 lb. cause an abnormal loss.

An inspection of the results show marked discrepancies in the loss of weight of two shoes of the same material under similar conditions, and that it can not with certainty be predicted whether the loss of weight will be greater or less as the pressure is increased. The general trend of the lines, however, indicates an increasing loss of weight with increase of pressure and speed. In other words, as these two factors increase, the wear of the shoe compared with the work done in stopping the wheel increases. On the whole, the tests indicated in the tables justify the specifications of the Association as at present in force.

BRAKE BEAMS.

Last year this committee recommended that a new method of procedure for testing No. 2 brake beams should be adopted to take the place of those given in the M. C. B. Proceedings for 1913, page 854. This recommendation was approved by the convention and made the subject of letter ballot. It received a majority of the votes cast but lacked a few votes of the necessary two-thirds. The committee believes that this was due to a misapprehension and desires to state that the proposed test is no more severe than that at present in use but is much more

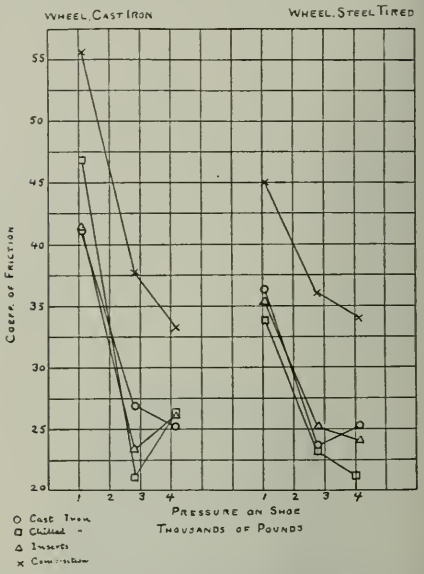


Fig. 3.—Mean Coefficient of Friction (in per cent) of Brake Shoes on Cast Iron and Steel Tired Wheels at 20 M. P. H.

in line with accepted practice in the matter of testing units and structures.

Frequent communications have come to this committee calling

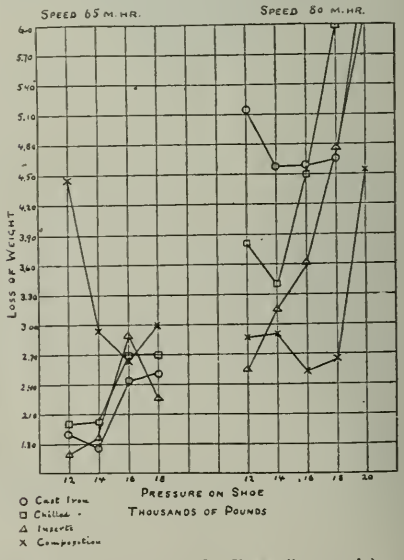


Fig. 4.—Loss of Weight of Brake Shoes (in pounds) on Steel Tired Wheels at 65 and 80 M. P. H., Respectively

attention to the fact that there should be some notation and specifications for beams heavier than the No. 2. After carefully considering these communications and the various weights of

beam in common use, the committee has decided to recommend a classification of beams heavier than No. 2 to be known as No. 3, 4, etc. To properly determine the class in which such beams belong, the committee recommends the following specifications for testing to be substituted for the specifications and tests for Nos. 1 and 2 brake beams as given in the M. C. B. Proceedings for 1913, page 854:

Initial Load.—Apply on initial load corresponding to the number of the beam, as in the second column of the accompanying table, then reduce to zero. Apply a load of 500 lb. and reset the deflection instrument to zero.

Test Load.—Apply a test load corresponding to the number of the beam, as in the second column of the accompanying table, and under this load measure the deflection, which is desired to be 1-16 in. or 0.0625, but should not exceed 0.07 in.

Test for Set Load.—The beam must then be loaded to the load shown in the third column of the table after which the permanent set shall not exceed 0.01 in.

Total Deflection Test.—The brake beam should stand a total motion of the head of the machine of not less than 2 in. without failure at any point.

Number of Beam.	Deflection Load.	Set Load.	Ratio.
1	6 500	14 000	47
2	12 000	24 000	50
3	18 000	30 000	60
4	24 000	36 000	66.7
5	30 000	42 000	71.2
6	36 000	48 000	75

It will be noted that in each case the test load corresponds with the working load of the beam and that these loads, with

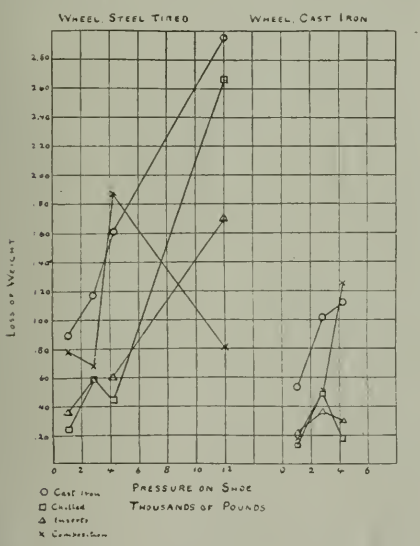


Fig. 5.—Loss of Weight of Brake Shoes (in pounds) on Steel Tired and Cast Iron Wheels at 20 M. P. H.

the exception of the No. 1 beam, vary at intervals of 6000 lb. Further, that the set load will correspond practically to the elastic limit of the material.

The last column of the table shows the ratio existing between the two loads. The proper values of the set load have been determined from experiments made at the testing laboratory of the Pennsylvania Railroad at Altoona by C. D. Young of the committee and are shown in Fig. 6.

Attention was called in the report of the committee last year to the desirability of some further specifications concerning the weight of struts and other elements of the beam. The committee at that time reported that specifying minimum weight would not solve the difficulty but that some specifications detailing the sizes of the heads and struts should be determined. The committee recommends that tests be undertaken by the Association next year and would ask for instructions on this point.

The committee has received some criticism of the 500-lb. initial load in the proposed specifications, it being claimed that in the case of light nonadjustable beams such a load might influence the acceptance or rejection of the beam. To settle this point, C. D. Young of the committee tested several beams of this character, using the 50-lb. initial load and the 500-lb. load. The results of these tests show that this criticism is unfounded.

The committee urges that a load of at least 500 lb. is necessary with the class of machines generally used for testing brake beams in order to take up the lost motion in the machine and in the beam itself and that it is so small compared with the working load of the beam as not to influence the results otherwise. The committee further recommends that in testing beams which

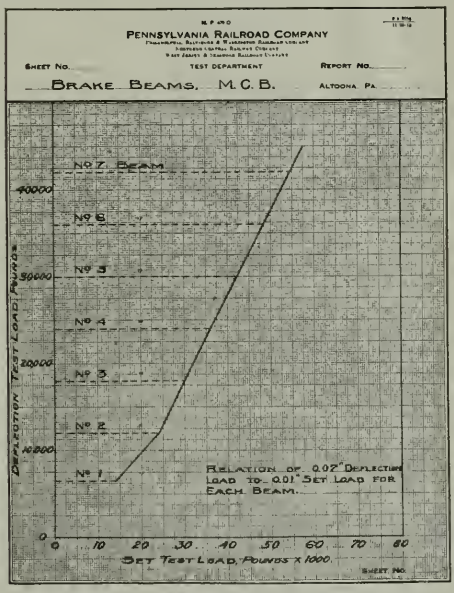


Fig. 6.—Relation of 0.07 in Deflection Load to 0.01 in Set Load for Various Size Brake Beams

have adjustable heads, the heads should be removed before the beam is tested so as to avoid unnecessary lost motion during the test.

The report is signed by:—Prof. C. H. Benjamin (Purdee Univ.), chairman; C. D. Young (Penn.); R. B. Kendig (N. Y. C.); J. F. DeVoy (C. M. & St. P.), and C. B. Young (C. B. & Q.).

DISCUSSION

Prof. C. H. Benjamin (Chairman): I wish to emphasize the desirability at the present time of testing brake beams with the operation of strain gage so as to determine the exact stresses present in different kinds of beams at different loads. Our test at present simply show the strength of the beam as a whole. What we desire to know is what is the strength of the units or elements of which the beam is made up, and that at the present time can be very readily done.

J. J. Tatum (B. & O.): If a minimum weight is not set for a brake beam, how long can we expect a brake beam that gives the test required when new, to maintain the required strength in service? These beams due to deterioration result in a sectional area of metal vastly reducing. The question is: Are we going to have a brake beam in service a justifiable length of time in accordance with its cost, if we do not apply a minimum weight? Just recently I have checked a number of beams and find beams of the same manufacturer, the same style, materially reduced in sectional area. That beam when tested new will give the desired results but after having been in service, due to deterioration we have not gotten the results required by the test. How is that going to be taken care of?

C. D. Young (Penna.): I think that is largely a question of the manufacturer making the beam to meet the test at the time the test is made; when he reduces the section he raises the carbon in the tension member to meet the test. I believe, however, that the committee should have more information than

they have at the present time before they could establish a minimum weight of beam. The committee has through its recommendations, offered to the association at two different times what they consider to be a satisfactory No. 2 beam, and on letter ballot that beam has been rejected by the association, although the committee has not been able to get any definite information from those voting against the beam why they voted unfavorably to it. The beam is probably heavier than the majority of the No. 2 brake beams which are purchased in the market today as No. 2 brake beams. The committee felt that there should be some factor of safety above that required in the test when new. If we were to establish a minimum weight with the information which we now have available, I am afraid that the weight would be so high that the members, in view of what they are purchasing, would not adopt it as recommended practice for the association. If we have a test or an investigation of this kind made we may be able to develop from that data a construction which will permit a beam that will meet specifications during a large portion of its life, and at a weight which is somewhere comparable with the present weight which we are buying in No. 2 brake beams. I believe it was the intention that this investigation cover a No. 2 brake beam only. We would be spending a lot of time on useless work to investigate the No. 1 beam, since so few of those beams are coming into use due to the requirement of the No. 2 beam on a 32,000 lb. light weight car.

J. J. Tatum: I hope every railroad considering this matter will give thorough attention to the required minimum sectional area and weight, so that when we do establish a brake beam we will have one which will stay in service a little while. Further, I would rather see one beam and not two beams. If we are going to have a standard coupler, why not have one standard brake beam so that we can repair anybody's car with the brake beams we have in stock?

D. R. MacBain: I have taken a great deal of interest in the report brought in by the committee on this very important subject, but I feel that the matter is not as well canvassed as it ought to be at the present time for the association to arrive at any definite conclusions as to what ought to constitute a brake beam in its entirety. A few months ago Mr. Chidley and I, being pressed from all official quarters on account of derailments we were having on our line, and other troubles caused by brake beams dropping down, etc., went out and spent a day in one of the important yards and noted incoming trains and outgoing trains. The result of our day's study of the situation was that ninety-five per cent of our brake beam trouble was in the brake shoe and in the brake head and the hanger. The situation seems to me to be more one of brake heads, brake shoes and brake hangers at the present time than anything else. We found that the loop hanger brake head was a very fruitful source of failure. We found that the cast iron brake shoe breaks off, leaving probably half a shoe on, and that on the next application of the brake out on a division the brake head is worn off on the toe. When the train gets in, probably the brake shoe is discovered by the switchman or inspector and replaced. A cast iron shoe put on such a head will usually break and go off altogether, and then the brake head wears down on the center or the loop that the pin goes through. The next time a new shoe is applied it promptly breaks in the middle. The loop hanger brake head is not strong enough. The loop hanger brake head breaks through the back, probably will not be noticed by the car inspector in making the ordinary inspection the car then goes through the yard and out on the division, and finally, under a severe application of the brake, will give way, causing a derailment or some lesser trouble. The next point is the brake shoe itself. This Association should go on record to the management of the railroads for a brake shoe which will not break under any of these slight disadvantages but will yield slightly to resist unequal pressure. Following this investigation, we issued instructions to all the important yards requiring the master car builders to send special men along with the inspectors to examine the trucks in every instance where we could do it without delaying an important train. If there was defective equipment on the brake rigging it was corrected. The result is that we have a miscellaneous assortment of brake heads, brake hangers, pins, etc., amounting to between 60 and 90 tons, taken off at three prominent yards on the New York Central, west of Buffalo. I wish to appeal to the members of this association to do something toward the end that after a while we may get out of service the thousands of defective heads, defective hangers and defective pins that are now causing the real trouble.

Prof. L. E. Endsley: I have tested in the last few years several brake beams with a Berry strain gage, and any beam that will stand the recommended specifications will not have the compression of tension members over-strained. The fact has been that a great many very light heads have been made in order to make the beam stand up under the specifications. Neither the strut nor the head will show any appreciable amount of stress when tested. The stress which comes on the head is due to something else. This association should make a minimum weight of head so that it will not break when a little extra strain is put on it, but as far as the tension and compression member is concerned there are thousands of beams that have plenty of metal in them to stand all the stress if the head remains in its designed position. The strut is another thing which, while not showing stress under the Berry strain gage, is often broken due to hanging the brake wrong or to the stress coming on at an angle rather than in the way it was designed, because of the brake shoe getting worn at one end. A special study of tests for the head of the brake beam is a very important thing for the association to take up.

J. J. Tatum: We have for the last three or four years very materially increased the sizes of our brake hangers and the brake heads have been improved. We find the same condition with reference to the struts and are now attending to the weaknesses that have developed in the tension and compression members.

H. C. Manchester (D. L. & W.): We are having with very undesirable frequency the dropping of brake beams, largely due to the hangers coming out of the recesses in the heads. These cause in many cases quite serious wrecks, and ordinarily more or less interference with the traffic. I come here with an urgent request from the management of the Lackawanna for this body to do everything possible to bring about an improvement in the design of brake hangers. I have written a letter to the Secretary containing recommendations and enclosing a blueprint showing a design of an improved head and hanger to meet this condition, from which we are having a hundred brake beams made. This is the worst small thing that we have to contend with every day in the year.

J. J. Hennessey: If there is one thing that the railroads need more than anything else at the present time it is a standard brake beam. I do not mean just one design, but a brake beam on which the heads and struts can be interchanged, so that you can remove one beam and put on another without changing the length of the brake rods. The difficulties that we are all complaining of arises because we have got too many different styles of hangers, too many different styles of brake beams, too many different styles of connections and fasteners.

Prof. Benjamin: Today we have certain methods of determining whether the brake beam as a whole is strong enough to do the work that is required of it, but we have no means of determining whether the individual elements are properly designed. All that the committee desires is permission to make such tests on beams which are now acceptable to the Association and are in use. No. 2 beams—as shall determine the stresses which come on the various elements of the beam. We will then be able to frame specifications which would meet the points here raised. In regard to the question of brake shoes we have found that those which were cracked sometimes gave better results than those which were whole. If you see fit to adopt a cast iron shoe with reinforced back, you will frequently get better results from your brake shoe after it is broken than before.

H. H. Harvey (C. B. & Q.): Where you have one case of beam trouble you have ten cases of brake hanger or brake hanger pin trouble. You may not believe that, but go out in the field and look it up and you will find that it is true. This Association cannot do any greater work this year than to do something on the whole brake matter.

C. D. Young: I am glad to hear the association talk the way they are this morning. About ten years ago I was on the brake beam committee. We recommended a standard brake beam and when it came before the association it was split up into all its parts. The members went back home and defeated what the committee had done at that time in attempting to make a standard brake beam, and got two or three standards. We have been sleeping at the switch long enough. We go to a great deal of pains to take care of our passenger car brake beams and break heads so they will be safe. These are also the cars that we pay most attention to in the matter of inspection.

When it comes to freight equipment which runs all over the United States and is inspected indifferently wherever it goes, we put on the poorest kind of equipment. The argument presented at the time I refer to was the fact that we had so many cars in service that to go to a standard brake beam would involve a lot of expense. I imagine we have spent more in the matter of wrecks and damages, thousands of times over, than it would have cost us to go a standard

brake beam at that time, and one that would have given us at least less than 15 per cent of the wrecks on our railroads.

F. W. Brazier: On our equipment we put a safety strap under everything, and that safety strap is strong enough so that if our hangers break, it will prevent the beam from going down and coming in contact with the rail.

Prof. Benjamin: The committee is perfectly willing to undertake the consideration of the method of holding the brake beam if the association tells us it is a part of our business, but heretofore we have not held that it was our right to meddle, in that it belonged to another committee.

H. C. Manchester: There are a lot of good brake beams on the market now if there was something to hold them up. That is what we do not have. I do not think we ought to spend any money on something to catch a beam, but the money should be spent on something to hold the beam up.

E. T. Millar (B. & M.): Too little attention is paid to the material that is put in the hanger. If we had some specifications for this material, it would enable us to get a material which would not crack at the corners where it is bent, and where it is practically impossible for the inspectors to see. I know of a number of cases where accidents and serious derailments involving a great deal of expense have occurred, due to a concealed crack in the corner of the loop hanger. There are a number of heads failing at the back part, on the inside, another place where, by ordinary inspection with the limited time that an inspector has to look over the train, it is practically impossible to detect the failure. Why should we not have the specifications for the head and the hanger?

F. F. Gaines: We have been riveting angle irons on the bottom of our shoes. We have not had a single case where they have come down and caused any trouble. It is not expensive; you can pick up old angle irons and T-irons and rivet them on, and they make a good job.

M. K. Barnum: The suggestion that we have one standard brake beam is entitled to very careful consideration. The difference between the two present standard beams is not very great and it is assumed that the requirements for the present standard beam are such as to allow for corrosion and deterioration of strength by natural wear. It may not be necessary to have a standard minimum weight adopted, but in looking over a great many second-hand brake beams I have been very much impressed with the amount of deterioration. I have seen a great many that I am sure were not one-half as strong as they were when new. If there is any doubt on the part of the committee as to their functions I would suggest that they be requested to cover the whole subject of the brake beam and its accessories.

O. D. Buzzell (A. T. & S. F.): I believe that most of our troubles can be eliminated by changing our hangers and enlarging them. Our brake heads in many cases are also weak and should be strengthened. I have occasion to see and examine a great many brake beam failures, and I assure you that trouble is with the hangers and heads, more than with the brake beams.

C. E. Chambers (C. of N. J.): I want to voice my approval of the safety hanger. That is recommended practice, but a great many roads do not pretend to apply them. The Central Railroad of New Jersey is doing so. With a good safety hanger a great many derailments would be averted after the hanger is broken.

C. D. Young: I have listened to this discussion with pleasure because it confirms what the committee has been saying for about five years at each convention. The reason they did not say it so specifically this year is because they have been so generously turned down on the letter ballot. We have proposed a standard brake beam for recommended practice only, and when the question has been presented to letter ballot, if practically any member, who has stood on his feet here and advocated its adoption, had voted for it, it would have resulted in its adoption as recommended practice, the vote was so close.

In last year's committee report we pointed out that about 75 per cent of the defective brake beams found on their roads were removed on account of worn brake heads, indicating that if beams were properly hung and the locations for hanger holes and hanger brackets were standardized a large number of failures could be prevented. Failure of the compression and tension members is further shown to be due largely to poor fits between the heads and struts and the other members. In other words, it is apparent that a more careful standardization of brake beams would result in a much smaller percentage of failures and much less expense to the railway companies. That is practically what has been said this morning. We said this last year, as the final word, coming at the end of the report, and we hoped that when the question went to letter ballot as the No. 2 brake beam was then offered by the committee, as shown on sheet 17-B of the committee's report, there would be enough members who would place in service the beam reported as recommended practice design, so that we could get some experience. However, nothing was done.

A. R. Ayers (N. Y. C.): If the head continually wears on account of the shoe losing off; if the shoe loses off because it is a plain cast iron shoe, it would seem that some action should be taken to discontinue the use of plain cast iron shoes, which will fall off the heads if they crack; and they are pretty sure to crack. If the cast iron shoe gets heated it will warp so that it does not conform to the curvature of the wheel, taking a smaller radius than the curvature of the wheel, so that if pressure is applied to the brake shoe at the center it will crack. On the other hand, it may be that the lugs on the shoe which engage the head, and are keyed there, are twisted out of place; they are not very deep. I have seen among the brake shoes shown on the pier at these conventions shoes where the lug on the shoe, designed to keep the shoe parallel with the head, did not engage it fully. The only thing which kept the shoe on the head was the pressure of the flanges of the wheel. There was 1-16 in. clearance between the toes of the head at each end. The entire design was made with the idea that it shall be an easy matter to take off the old shoe and put on a new one, and it follows that it is a comparatively easy matter for the shoe to work off itself. It would seem that the present brake shoe design is of sufficient age to warrant a little investigation as to the possibility of making improvements.

With respect to the design of head submitted for recommended practice, by simply having the bottom lug on that head so that it stands back a little further, the head can be increased thirty per cent in strength. I believe that the committee should give special attention to the fastening of the shoe to the head and small details which have been standard practice for a number of years and which according to present indications require some revision.

H. C. Manchester (D., L. & W.): I move that the matter of improved brake hangers be made a part of the work of the Brake Beam Committee, or that a special committee be appointed to investigate and report on brake hangers.

The President: The Association has a special committee on car trucks. Is there any objection to having that committee study the brake beam?

H. C. Manchester: No, I just want to have some committee study the design of the brake hanger.

A. R. Ayers: I would like to suggest that the Car Truck Committee can take care of almost any modification of the upper end of the hanger that is desired, but the most difficult end of the hanger to take care of is that at the brake head. I move that the question of a proper brake hanger be referred to the Brake Beam Committee, because it would not be possible to do much with the hanger without encroaching on the work of the Brake Beam Committee.

The President: Would not the Brake Beam Committee be under the same difficulty as regards fixing the top of the hanger? Perhaps it would be well to refer it to those committees jointly.

A. R. Ayers: I believe the two committees would have no difficulty in taking care of anything necessary.

O. C. Cromwell (B. & O.): I believe most of the trouble with the brake beams is the question of suspension, and I suggest that the committee give some attention to the third point of suspension. I think it is important to keep the shoe parallel to the tread of the wheel and to give that proper consideration will, in my opinion, eliminate some of the troubles. We avoided many failures in connection with third suspension, and we also got after the brake beam hanger, particularly with respect to its attachment to the column. We resorted to the use of a threaded bolt with a cotter in addition, and in addition to that we made our hangers ⅞ in. in diameter, and give a good lateral fillet between the horizontal and vertical members of the lug. We have little trouble from cracking in the corners when this arrangement is used. I think the question of the third suspension of the brake hanger is important, so as to keep the shoe parallel with the head.

T. H. Goodnow: I endorse the point Mr. Ayers brought out as to getting a bearing of the lug where it fits into the recess of the head. Some years ago we had considerable trouble on the Lake Shore with broken brake heads in passenger service, and that trouble was cured by changing the lug and filling up the recess, so we did not get any spring in the head when the brakes were applied.

With respect to the inspection of the brake beams to determine whether the proper beam is on the car, most roads feel that the car inspector can do that. I, for one, do not believe he can, considering the way the beams are marked at the present time. The inside hung beam is prac-

tically the common standard now with one or two beams, and if we increase to six beams, as this report would indicate, the car owner is going to protect his car by having his inspectors find out what kind of a beam is on the car; and at night, with an inside hung brake, and with the marking on the fulcrum or strut, it cannot be done. The marking must be on the outside, where it can be seen in the ordinary construction of the car.

D. R. MacBain: I move that this matter be referred to the incoming Executive Committee for consideration and atcion.

F. F. Gaines: I wish to ask a question about having only two beams.

T. H. Goodnow: The committee recommends six beams.

The President: Your idea is also to refer that point to the Executive Committee?

D. R. MacBain: Yes.

The President: Doctor Benjamin, is it your idea that the change on page 16, with regard to specifications, be referred to letter ballot?

Professor Benjamin: Yes.

(The motion made by Mr. MacBain was seconded, put to vote and carried.)

E. W. Pratt: How does the matter stand as to the committee's recommendation regarding the use of strain gage? Is that to be handled by the Executive Committee?

The President: Yes.

CAR WHEELS

This report is largely in the nature of a progress report, as it has been impossible to complete in time for this report various investigations of wheel design that are now under way. A circular of inquiry was sent out by this committee, requesting the members to furnish full information in regard to broken wheels. A total of 33 railroads and one private car line, all members of this Association replied, the companies in question representing an ownership of 1,297,909 cars. While some few replies were received promptly, the majority were so late in coming in as to preclude the possibility of completing an investigation and arriving at joint conclusion with the committee of the American Railway Engineering Association in time for this report.

Three tabulations of the reports received, covering cast-iron

W. C. A. Henry
Chairman, Committee on Car Wheels

wheels having broken and cracked plates, have been prepared, as follows:

Table I.—This tabulation shows the number of wheels having cracked and broken plates, of 625, 675 and 725 lb. weight, respectively, and separated as between refrigerator, box and all other cars.

Table II.—This tabulation shows the number of wheels of each of the three different weights, separated as between refrigerator, box and all other classes of equipment, and grouped by gross weights of car and lading.

These tabulations present one very striking feature, namely, the high percentage of wheels removed from refrigerator cars. By referring to Fig. 1 it will be seen that of 904 625-lb. M. C. B. wheels reported as being cracked and broken in the plate, 575, or 63.6 per cent., were under refrigerator cars. There is no question but that the failure of wheels under this class of equipment is out of all proportion to the number of cars. Attention is called to the large number of 625-lb. wheels that failed under refrigerator cars of a gross weight of 105,000 lb. or more, which weight is considerably in excess of that supposed to be carried by these wheels. It is not believed, however, that this overloading will entirely explain the situation.

According to present M. C. B. practice, cars are braked to 60 per cent. of their light weight, based upon 50 lb. pressure. The result of this condition is that a refrigerator car of 60,000 lb capacity, weighing 44,000 lb., equipped with wheels of 625 lb. weight, will have a braking power, in many instances, equal to

WEIGHT OF WHEEL	NUMBER OF PLATES								TOTAL			
	CRACKED				BROKEN							
	Refr.	Box	All Other	Total.	Refr	Box.	All Other	Total	Refr	Box	All Other	Total.
625	556	236	72	864	19	14	7	40	575	250	79	904
675	33	414	199	646		4	1	5	33	418	200	651
725	3	118	517	638		6	3	9	3	124	520	647

Table I.—Number of Wheels Having Cracked and Broken Plates Reported

or greater than a car of 100,000 lb. capacity weighing 40,000 lb. and equipped with 725-lb. wheels. For example: Take the two cases just cited: the refrigerator car will have a gross weight of 110,000 lb., with a brake pressure of 26,400 lb., which is 60 per cent. of the light weight and 24 per cent. of the loaded weight. The other car will have a brake pressure of 24,000 lb., which is also 60 per cent. of the light weight of the car, and but 16 per cent. of the loaded weight, and which at the same time is 2400 lb. less than the brake pressure of the 60,000 lb. capacity refrigerator car.

If it is true that heating due to the action of the brakes is

GROSS WEIGHT OF CAR	WEIGHT OF WHEEL											
	625				675				725			
	Refr	Box	All Other	Total	Refr.	Box	All Other	Total	Refr	Box	All Other	Total
90 000 and under	6	1	11	18		2		2				
Over 90 000 to 95 000	12	11	12	35	2			2				
Over 95 000 to 100 000	7	97	23	127		1	3	4				
Over 100 000 to 105 000	10	75	11	96		1		1				
Over 105 000 to 110 000	123	31	1	155	6	2	1	9				
Over 110 000 to 115 000	336	15		351	12			12				
Over 115 000 to 120 000	21	4	3	28	1	2	8	11			2	2
Over 120 000 to 125 000	2			2	2	73	40	115		4	3	7
Over 125 000 to 130 000		3		3	1	268	46	315		4	3	7
Over 130 000 to 135 000	1		2	3		33	64	97		1		1
Over 135 000 to 140 000					6	21	11	38		5		5
Over 140 000 to 145 000					1	8		9			10	10
Over 145 000 to 150 000							3	3		1	321	322
Over 150 000 to 155 000							2	2		76	65	141
Over 155 000 to 160 000									2	29	60	91
Over 160 000 to 165 000			1	1					1		10	11
Over 165 000 to 170 000											39	39
Over 170 000 to 175 000										1		1
Over 175 000												
Unknown	57	13	15	85	2	7	22	31		3	7	10

Table II.—Tabulation of Wheels Having Cracked and Broken Plates Reported

largely responsible for this trouble, it is only to be expected that under this condition the number of failures of 625-lb. wheels under this class of equipment is going to be large.

Attention of the Association is again called to recommendations made in previous reports, that wheels of the proper size be used, especially under refrigerator-car equipment, as at the present time many cars are running with lighter wheels than are proper, in accordance with the standards of this association.

The report is signed by:—W. C. A. Henry (Penn.), chairman; A. E. Manchester (C., M. & St. P.); R. W. Burnett (C. P. R.); R. L. Ettinger (So. Ry.); O. C. Cromwell (B. & O.), and J. A. Pilcher (N. & W.).

As there was no discussion, the report was received, will be printed, and the secretary will arrange for making the curves as suggested by the committee.

The meeting then adjourned.

REVISION OF THE RULES OF INTERCHANGE

During the last few years there has been quite an undercurrent of feeling that the rules should not be revised so often, that their period of effectiveness should extend over a longer period of time. The St. Louis Ry. Club recommends that no changes be made in the rules, and the Chief Joint Interchange Inspectors at a recent meeting took similar action, and, to a certain extent, the committee coincides with this feeling. While Rule 124 provides that the Arbitration Committee shall ask for suggestions of changes, amendments and additions to these rules prior to each convention, the fact that so many interpretations had been rendered, and the feeling of letting the rules alone for a year or two, led the committee to refrain from asking

for such suggestions this year. Naturally enough, in any set of rules some changes are necessary to conform with changed conditions, and during the year a good many suggestions have been received, which have been incorporated in this report, with the recommendations of the committee. Your committee would recommend that in so far as the interpretations rendered during the year are concerned, they be not incorporated in the body of the rule, but that they be printed on the opposite page in the rule book to the rule itself. It is thought that the rules and the interpretations are now thoroughly understood, and their incorporation into the rules may lead to further misunderstandings, which may be avoided by keeping them separate.

[Following are the more important suggested changes in the rules.—EDITOR.]

Rule 1.—It must be understood that Rule 1, as written to-day, simply calls to the attention of handling companies that the details of repairs to foreign cars on their lines should be maintained in the same general condition as it maintains its own cars, whether the defects are billable against the owner or not.

Rule 2.—To conform to A. R. A. Car Service Rule 15a, the committee would recommend the following:

Rule 2 F.—The following defects must be repaired while car is under load:

1. Defective wheels and axles under all cars
2. All other truck defects on home cars.
3. All other truck defects on foreign cars, except metal bolsters, metal truck sides and metal spring planks; also excepting

J. J. Hennessey
Chairman, Committee on Arbitration

non-M. C. B. standard journal boxes and contained parts in cases where the M. C. B. standard is not a proper substitute.

4. Defective outside wooden end sills on all cars.
5. Defective body center plate or body center-plate bolts, except where such center plate is cast integral on bolster of home cars.
6. Renewal of roof boards of outside wooden roofs, and of inside metal roofs, where such renewal does not exceed 25 per cent. of the roof boards, and where purlines, rafters, ridge pole, side and end plates are in good condition, on all cars.
7. Side doors, where lading is properly loaded as required by the Loading Rules, on all cars.
8. Missing or defective side doors where requiring no protection; end doors, roof doors and hatch covers, on all cars.

F. C. Schultz suggests adding to the last three paragraphs of this rule, after the word "carded," the words "on both sides of car." The committee approved of this suggestion.

Rule 3.—The committee recommends that section (d) be divided into two paragraphs, as follows:

Cars built after October 1, 1915, with axles other than M. C. B. standard, will not be accepted in interchange.

Cars built after October 1, 1916, with journal bearings other than M. C. B. standard, will not be accepted in interchange.

The committee proposes the appointment of a special committee to consider a redesign of the M. C. B. journal bearings and wedges, with the view that the bearings and wedges, as finally redesigned, may be used without conflicting with any patented devices.

The Chicago Car Formen's Assn. suggests advancing the date of effectiveness to October 1, 1916. The committee approves of this suggestion.

Rule 8.—The Central Railway Club and the Railway Club of Pittsburgh suggest that this rule be changed to read:

"Billing repair card shall be made in duplicate, the original to be known as the billing repair card and the duplicate to be known as the record repair card, and to be of the form shown on pages 107, 108, 109 and 110, all items of repairs to be in handwriting.

"Note.—Use of present forms, if not conforming to recommended forms, may be continued until stock is exhausted."

Wording of rule to cover a new form which has been recommended for a wheel and axle billing repair card (copy shown herewith), which form should be shown on pages 109 and 110.

The committee approves of this suggestion.

Rule 21.—The Pittsburgh and Central Railway Clubs suggest adding the following in Section (a), after the word "roof" in last line, changing the period to semicolon:

"or for the cost of applying temporary hand-railings to, or boarding over the opening on, empty well-hole cars."

The committee approves of this suggestion.

Rule 30.—Rule 30 will be revised to correspond with the revision adopted by the Amrican Railway Association.

Rule 33.—The Pittsburgh Railway Club, Central Railway Club and Niagara Frontier Carmen's Association suggest that rule be removed from bracket and changed to read:

"Owners will not be responsible for the expense of repairing or replacing ladders, handholds, sill steps, brake shafts, brake wheels, ratchet wheels, brake pawls, ratchet and pawl plates, upper brake-shaft bracket, brake-step board and brackets, brake-shaft casting where same is used to secure brake shaft to roof of car, brake-chain bolt when in connection with repairs to brake shaft; also, any bolts, rivets, nuts or keys used in securing the above parts, whether or not in connection with other repairs."

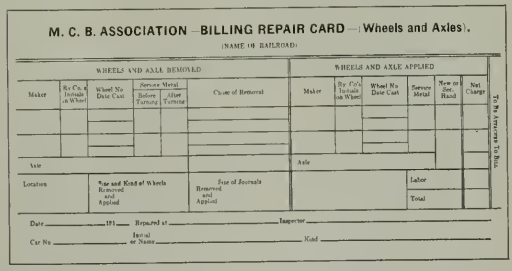
For the reason that the rule has been revised to include all of the detail parts that have been included in the Arbitration Committee's interpretation of this rule in Circular No. 9, and will avoid any future misunderstanding of the rule.

The Arbitration Committee reconsiders its suggestion in Circular No. 9, with reference to the elimination of prices for straightening handholds, sill steps, brake shafts, etc., and would recommend that these items be retained for uniformity in charges in cases of cars damaged at industries located on handling line, cars loaded up and shipped home, or cars damaged on the handling road by the crew of another road.

Rule 40.—The committee recommends the elimination of this rule.

Rule 42.—The committee recommends that the first paragraph of the note following this rule remain as at present; that the second paragraph be eliminated and the following substituted:

"In the case of four or more longitudinal sills requiring renewal or splicing, if the repairs of each of such sills are due



M. C. B. ASSOCIATION—BILLING REPAIR CARD—(Wheels and Axles).

(NAME OF RAILROAD)

WHEELS AND AXLE REMOVED

Maker	By Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal: Before Turning	Service Metal: After Turning	Cause of Removal
Axle					
Location		Size and Kind of Wheels Removed and Applied			Size of Journals Removed and Applied

WHEELS AND AXLE APPLIED

Maker	By Co's Initials on Wheel	Wheel No. Date Cast	Service Metal	New or Second Hand	Net Charge
Axle					
				Labor	
				Total	

Date _____ 191__ Repaired at _____ Inspector _____

Car No. _____ Initial or Name _____ Kind _____

New Form for Billing Repairs to Wheels and Axles. A Duplicate to be Used Entitled "Record Repair Card" and to be Retained by Party Making Repairs

to decay or elongated bolt holes, the car shall be held and joint-inspection statement forwarded to owner, who shall promptly authorize repairs at his expense, or destruction of car. In this case, any sill decayed and cracked, or decayed and broken, must be considered as a broken sill."

Rule 52.—The committee suggests the following additional sentence be added: "The use of drive screws is not permissible."

Rule 54.—The committee recommends the removal of this rule from the bracket, and change to read: "Car owners are not responsible for damage to any part of the brake apparatus caused by unfair usage, derailment or accident that requires repairs or renewal."

Rule 60.—The Pittsburgh Railway Club and the Central Rail-

way Club suggest that, following the word "tested" in second line, the addition of "Or dirt collectors not cleaned."

The committee approves this suggestion.

Rule 68.—The committee recommends that the rule read: "Flat sliding; cast iron, cast steel, wrought steel or steel-tired wheels; if the spot is 2½ in. or over in length, or if there are two or more adjoining spots, each 2 in. or over in length, the same responsibility to apply to mate wheel, regardless of length of slid spot.

"A separate defect card to be furnished in the case of wrought-steel or steel-tired wheels."

Rule 88.—F. H. Clark suggests that the repair card be changed so that repairing road will be required to designate on repair card the repairs they have made, and whether any of the repairs made were wrong repairs and whether or not defect card was attached to car for such wrong repairs.

The committee does not approve of the suggestion stating that if the spirit of Rule 88 were following out this matter will be taken care of. There is no more guarantee that the parts repaired will be noted on the repair card than the present rule provides.

Rule 94.—The committee recommends an addition to this rule as follows: "except as follows: In the case of repairs covered by defect card, if the owner changes the original standard of parts so involved, the charge must be no greater than if original design had been followed.

"If owner elects to dismantle the body or trucks, or both, charge may be made for such material as would have been required for the repairs covered by the defect card, but no labor shall be charged in such case, except in so far as labor is already included in M. C. B. prices for material."

Rule 95.—The committee recommends that the paragraph read: "Couplers, including yokes, springs, followers, and friction draft gears complete, when lost with the coupler."

Rule 96.—The Pittsburgh and Central Railway Clubs suggest the following: Eliminate second paragraph of this rule and, also, the form shown on page 109, as this form is not generally used and is not desirable, for the reason that all necessary information in connection with renewal of wheels and axles should be shown on a special billing repair card for wheels and axles, which is recommended and covered by proper reference in proposed revision of Rule 8.

The committee approves of the suggestion.

Rule 99.—The committee recommends an addition to this rule reading:

"When axle is removed on account of owner's defects on wheel, and the journal has increased in length more than 3/8 in., or the collar is worn to less than 5-16 in., or the diameter of the journal is not at least 1/8 in. greater than the limiting diameters given in Rule 86, the axle shall be considered as scrap and credit allowed accordingly."

Rule 108.—The committee recommends the following change in this rule:

"No labor to be charged for the inspection of cars, testing or adjusting of angle cocks or tightening unions.

"No charge to be made for the material or labor of lubrication."

Rule 120.—The committee recommends that the rule be changed to read:

"Where the labor cost of repairs exceeds 10 per cent. of the base price of car body, as given in Rule 116, such car shall be jointly inspected by handling line and a representative of car owner or of a disinterested line (whichever can be most conveniently obtained), and form furnished as shown on page 105, showing all defects found on car and an estimated total cost of the repairs. Upon receipt of this information, owner must either authorize destruction or repairs. In the latter case owner must forward to handling company necessary plans and specifications for such repairs.

"If owner authorizes destruction, handling line shall allow credit for all material at M. C. B. scrap prices, less labor cost of destruction.

"The base price of car body under Rule 116, as referred to above, not to include value of air brakes, or other additions for special items as referred to in Rule 116."

Rule 122.—The Pittsburgh and the Central Railway Clubs suggest the following: Add an additional sentence after the word "line" in the last line, as follows:

"A separate bill, with copy of freight or express bill attached, should be rendered for the freight or express charges, showing reference to bill covering repairs.

The committee approves this suggestion.

PASSENGER CAR RULES

Rule 4.—The Canadian Railway Club suggests a new paragraph reading:

"Billing repair cards shall be furnished in all cases where repairs have been made."

The committee approves of this suggestion.

Rule 10.—The Pittsburgh and the Central Railway Clubs suggest that in paragraph (a), after the word "inches." in third line from bottom, add the words, "or having seamy journals, fillets in back shoulder worn out, the length of journal increased ½ in. over standard length, or collars broken off or worn to ¼ in. or less under fair usage."

The committee approves of this suggestion.

The report is signed by:—Jos. W. Taylor, secretary.

DISCUSSION.

The Secretary: At the meeting of the Arbitration Committee last evening they received a communication from the American Railway Association requesting that the light weight be marked in tank cars. It is therefore recommended that Rule 3 be changed as follows:

Rule 3.—Add a new section, Section O, reading as follows:

"After October 1, 1917, tank cars not stencilled with light weight and capacity in pounds, will not be accepted in interchange."

Rule 86, page 48, first paragraph after the tables: Omit the words "except tank cars." in the first line. Also add at the end of the rule a note reading as follows: "Attention is called to Section O of Rule 3, regarding limit of time for light weights and capacity on tank cars."

Another communication has been received from the American Railway Association in the form of a resolution adopted by the Committee on Relations between Railroads, at its meeting held in Chicago on April 12, which reads as follows:

"Resolved, that the Master Car Builders' Association be advised that the National Railways of Mexico (including the Mexican Central Railway and the Mexican International Railroad) have been suspended from the Per Diem Rules Agreement and that this suspension has resulted in making the delivering road responsible for the per diem accruing on the cars while on the National Railways of Mexico, and that it be suggested that the Master Car Builders' Association investigate the situation and take such action as is necessary to protect the owners of the cars delivered to the National Railways of Mexico."

Recommendation is made that an addition be added to rule 113 as follows:

Rule 113—Add: "When a car owned or controlled by a railway company is damaged or destroyed on the tracks of a road which is not member of the per diem rules agreement of the American Railway Association, the road responsible for the per diem while in possession of the non-subscriber shall be responsible to the owners for the damage or destruction."

John S. Lentz (L. V.): I move that the report of the Arbitration Committee be accepted and their recommendations approved.

M. K. Barnum: I second the motion.

R. L. Kleine, (Penna.): There are discrepancies in the Arbitration Committee's report as compared with the report of the Committee on Prices, and before that motion is put I believe that part ought to be cleared up.

J. J. Hennessey, (Chairman): For the last several years where there was a discrepancy in prices between the Arbitration and the Price Committees, it has always been understood that the recommendation of the Price Committee prevails.

Mr. Kleine: According to one of the decisions, the Arbitration Committee does not prohibit the welding of arch bars on cars in interchange, claiming that they do not have sufficient information as to the accidents involved. I might say that it is absolutely dangerous to weld arch bars. It has been prohibited by nearly all the roads. I would like to see that provision cut out.

Mr. Hennessey: The welding of arch bars has been allowed by the rules for a great many years. We have added onto the rules this year, as you will note, a great deal of repairs that can be made without transfer of loads. While I agree with Mr. Kleine that an arch bar may be poorly welded, I will say that an arch bar properly welded is not dangerous. I believe it would be perfectly safe to allow the rules to remain as they have been for that great number of years, and not tie up cars at isolated points.

Mr. Kleine: Mr. Hennessey is incorrect in the statement that the M. C. B. Rules of Interchange have ever permitted the welding of arch bars. I would refer him to Rule 107. That does not mean the welding of arch bars, Mr. Hennessey. It has never meant that. It means the straightening of arch bars. I say it is an absolutely dangerous practice, and I have a list of cars here that have had arch bars welded and that have caused accidents. I move that that particular reference be omitted.

A. La Mar (Penn.): I second the motion.

Mr. Hennessey: I will have to disagree with Mr. Kleine,

with all due respect to the attention he has paid. The rules have allowed welding of arch bars for I don't know how many years.

F. W. Brazier: If we are going to cut out arch bars, we will have to cut out truss rods, tie rods, and everything else. I think that the rule as it is running is all right, and the Arbitration Committee felt that way and they wanted to help out the old equipment.

Mr. Kleine: We have had wrecks on that account. We have absolutely issued instructions against this practice years back, and so have other railroads, and I do not think it is a parallel case to bring up at this time the welding of a truss rod as compared with an arch bar.

Mr. Hennessey: Don't forget this thing. The traffic department is insistent on the moving of freight, and you are going to put a terrible block in the quick moving of freight at outlying points.

G. W. Wildin (N. Y., N. H. & H.): I agree with Mr. Hennessey that a properly welded arch bar is all right, but if he is doing this in the interest of the little small outlying points, he is going to get a large car welded improperly; and I say Mr. Kleine's contention is all right on the lines of safety.

M. K. Barnum (B. & O.): I would like to ask Mr. Kleine if his record shows that any more arch bars broke, welded, than those that were not welded.

Mr. Kleine: Yes, sir.

Mr. Barnum: What percentage, please?

Mr. Kleine: I have not got the percentage, but the one that caused the serious wrecks and where we had the arch bars examined afterwards, we found it was due to the welded arch bars; and in a number of cases tank cars were involved, involving inflammable liquors.

J. J. O'Brien (Term. of St. L.): In the terminals at St. Louis we handle between 12,000 and 15,000 cars in 24 hours, and I am frank to say that in a number of years I have not heard of an accident being attributed to a welded arch bar.

(Mr. Kleine's motion was put and lost.)

The Chairman: The original motion will now be put before you, the motion to accept the report of the Arbitration Committee.

(The motion was put and carried.)

PRICES FOR LABOR AND MATERIAL

The committee in this year's report has brought the passenger car price rules up to the same standard as the freight car prices. Below is given an abstract of the more important recommendations of the committee, for the changes in price rules, both freight and passenger cars, that will make them conform more nearly to the proper cost for both labor and material:

	Scrap.
One axle, 50 000 lb. or under	$1.65
One axle, 60 000 lb.	2.00
One axle, 80 000 lb.	3.00
One axle, 100 000 lb.	3.70
One axle, 140 000 lb.	4.50

Add the following paragraph on page 53 following the Table of Prices:

The following average scrap credit prices must be allowed for wheels removed from dismantled cars, under the provisions of Rule No. 120:

	Scrap.
One cast iron wheel, 50 000 lb. capacity or under	$2.75
One cast iron wheel, 60 000 lb. capacity	2.90
One cast iron wheel, 80 000 lb. capacity	4.75
One cast iron wheel, 100 000 lb. capacity	4.75

Substitute the following paragraph for the first full paragraph on page 54:

The price for new wrought steel wheels shall be based on the scrap value of $4.50 for metal inside the condemning limit (which is ¼ in. above the limit groove), plus $0.625 for each 1/16-in. of 1½-in. service metal (on radius of tread), in connection with standard full flange contour, also base of limit groove not less than 29½ in. in diameter. In no case shall a charge or credit for service metal be made in excess of 1½ in.

Rule 102—Page 61.—Add an additional paragraph as follows:

In computing charges for lumber, if finished length of the piece in odd inches is under 6 in., the half foot will be allowed for rough length; if 6 in. or over, the even foot will be allowed. Finished thickness, if under 1 in., consider as 1 in. rough; if 1 in. or over, but under 1½ in., consider as 1¾ in. rough; 1½ in. or over, but under 2 in., consider as 2 in. rough; and upward on corresponding scale. The same scale to apply to width, except for matched sheathing, roofing, lining and flooring, which shall be charged according to M. C. B. specifications for rough width. The total amount of each item may be charged in even feet B. M.; if fractional amount is less than ½ ft., it should be dropped.

Rule 116—Page 88.—Change the price of 8-in. air brake, as shown in first paragraph of this rule from $27.50 to $10.

Page 90.—Under head of "Bodies for 8-wheel cars, steel," change Item 1 to read:

Box, wooden body, metal underframe, 30 tons capacity, 36 ft. 6 in. or over, but less than 40 ft. over end sills...$825.

Change Item 2 to read:

Box, wooden body, metal underframe, 30 tons capacity, 36 ft. long or over, but less than 38 ft. 6 in., over end sills .....$740.

Change Item 3 to read:

Box, wooden body, metal underframe, 30 tons capacity and over, 40 ft. long or over, but less than 46 ft., over end sills .....$850.

Change Item 4 to read:

Box, wooden body, metal underframe, 30 tons capacity and over, 36 ft. long, over end sills.....$725.

Change Item 5 to read:

Box, wooden body, metal underframe, 40 tons capacity and over, but less than 50 tons capacity, 36 ft. long and over, but less than 38 ft. long, over end sills.....$730.

Change Item 6 to read:

Box, wooden body, metal, underframe, 40 tons capacity, but less than 50 tons capacity, 38 ft. long but less than 40 ft long, over end sills.....$775.

Change Item 7 to read:

Box, wooden body, metal underframe, 40 tons capacity, but less than 50 tons capacity, 40 ft. long or over, but less than 46 ft. over end sills.....$800.

Eliminate Items Nos. 8, 9, 10 and 11 and substitute the following:

Box, all-steel, any capacity or length.....$0.0325 per lb.

Eliminate Items 12, 13, 14, 15 and 16 and substitute the following:

Flat, wooden floor, metal underframe, any capacity or length .....$0.0325 " "

Eliminate Items 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32, 43 and 44 and substitute the following:

Gondola, all steel, any capacity or length, having either solid, drop or hopper bottom or self-clearing by floor dropping on side.....$0.0325 " "

Eliminate Item 33.

Eliminate Items 35, 36, 37, 38, 40, 41 and 42 and substitute the following:

Hopper, all-steel (including coke cars), self-clearing, any capacity or length.....$0.0325 " "

Items 45 and 46 should be made to follow other items covering gondola cars.

Insert the following item after Item 37:

Stock, wooden body, metal underframe, 30 tons capacity, 36 ft. long or over, over end sill.....$775.

Rule 117—Page 94.—Change second paragraph of this rule to read:

In the case of all-steel car bodies or car bodies with steel underframes and steel superstructure frames, the depreciation shall be figured at 5 per cent per annum. Steel superstructure frame car indicates a car having the side and end uprights, braces and plates riveted together.

Change third paragraph to read:

In the case of car bodies with steel underframes and wooden superstructure the depreciation shall be figured at 5½ per cent per annum, with the exception of steel underframe flat cars having wooden floors, which shall be figured at 5 per cent per annum.

Page 95.—Change last paragraph of this rule to read:

The amounts $10 and $35 for air brakes shall not be subject to any depreciation.

Page 135.—Add a new paragraph under the 4th paragraph, reading: On electrical head end lighting system of passenger equipment trains, a charge of 40 cents shall be made for the use of electrical equipment for each 100 miles car is run. The charge does not include cost of coal and attendant. (Expense of attendant may be added if furnished and charged for on mileage basis.)

The report is signed by:—F. H. Clark (B. & O.), chairman; H. H. Harvey (C., B. & Q.); C. E. Carson (N. Y. C.); C. F. Theile (P. C. C. & St. L.); Ira Everett (L. V.); C. C. Swanson (A., T. & S. F.), and Sam'l Lynn (P. & L. E.).

(The report was approved.)

COMPENSATION FOR CAR REPAIRS

The committee on the subject of Compensation for Car Repairs was instructed to give consideration to the following items:

First:—Is it desirable to make an allowance for overhead charges incident to the repairs of cars?

Second:—If so what items should be included therein?

Third:—What ratio should such overhead charges bear to the labor cost?

The conclusions of the committee regarding each of these subdivisions of the subject are:

First:—That it is proper that those making repairs to cars should be fully reimbursed for the actual expense incurred by them, including what are generally referred to as overhead charges.

Second:—That there should be added to the direct labor cost an allowance for the expenditures made for:

DIRECT SUPERVISION.—This item includes the proper proportion of the wages of foremen, assistant foremen, gang foremen, clerks, etc., chargeable to the actual repairing of freight cars. Amounts paid all other men whose time is properly chargeable to freight-car repairs, excepting those engaged in the manufacture of stock material.

SHOP EXPENSES.—The proportion assignable to the actual repairing of freight cars, the expenditures for general employees, power, heating, lighting, shop supplies, and incidental expenses connected with shop operation.

SHOP SWITCHING.—As provided for by the authorized accounting system.

SUPERINTENDENCE.—The proportion properly chargeable to freight-car repairs of the salary and expenses of the general superintendents motive power, mechanical superintendents, master car builders, superintendents motive power, master mechanics, etc.

USE OF FACILITIES.—To include interest on the investment, depreciation, maintenance, insurance and taxes on that part of the plant or plants used for the repairing of freight cars.

Attention is directed to the fact that the allowances mentioned above should be carefully segregated so that the allowances applicable to the repairs of cars, and those applicable to the manufacture of material, should be separate and distinct. As for material, an especially determined allowance, including an adequate amount for storehouse expenses, is required.

Third:—The ratio that such overhead charges should bear to the labor cost.

To determine as accurately as practicable what allowance should be made for the items mentioned above, the committee assigned the task of assembling the necessary data to the subcommittee named below:

W. L. Wilt, chief motive power clerk, Penna. Lines West, chairman.
J. H. Connor, chief motive power clerk, Union Pacific.
Wm. McMunn, general car inspector, N. Y. C.
F. H. Swerengen, M. C. B. Streets Western Stable Car Line.
E. E. Jette, M. C. B., Morris & Company.
W. A. Guy, assistant general car inspector, Penna. Lines West.

The experience of all of these gentlemen is such as to especially qualify them for the work required. After considerable study this subcommittee prepared a list of questions, which, after approval by the committee was submitted to the association, as Circular No. 8.

Owing to the large amount of work required to compile the necessary data, and the short time available to complete the report, it was decided to request the information for the month of November, 1914, only.

Replies were received from 58 railroads, owning 1,618,675 cars, and 11 private car lines, owning 52,102 cars. Summarizing the replies gives the amounts expended as follows:

		Average per Hour.
Direct labor, 8,019,862 hours	$2,226,750.85	27.7c
Direct supervision	303,294.00	
Total	$2,530,044.85	
or the average expenditure per hour of direct labor for labor and direct supervision		31.5c
The proportion of shop expenses, shop switching and superintendence allotted to the repairing of freight cars amounted to $758,182.66, or for each hour of direct labor		9.4c
That is, for 8,019,862 hours direct labor there was expended:		
Direct labor	$2,226,750.85	
Direct supervision	303,294.00	
Shop expense, shop switching and superintendence	758,182.66	
Total	$3,288,227.51	or 41.0c

Consequently, as the average hourly payment for direct labor was 27.7c per hour, and for direct labor and all supervision was 41.0c per hour, an allotment of 48 per cent. must be added to the hourly payment for direct labor to fully reimburse those repairing freight cars, without any allowance for the use of facilities, such as interest on the investment, depreciation, taxes and insurance on, and maintenance of, shops, repair tracks, etc.

While the committee made inquiry as to the proper allowance that should be made for the use of facilities, the wide divergence in the replies received indicates that precise data are not available, and it is therefore deemed desirable to postpone consideration of this point until more correct information may be obtained; perhaps until the valuation of railway properties now in progress indicates a more definite line of procedure.

It is important to note that all of the data given above refers only to what may be called shop repairs; that is, where the use of facilities is involved, as the committee is of the opinion that such light repairs as are ordinarily made in classification yards or on the line may be more satisfactorily covered by fixed prices, as is now the practice in application of air-brake hose, etc.

The committee recommends:

First:—That the prices for individual items of work performed, as now embodied in the Code of Rules of Interchange of Cars, be based on the average time required to perform each operation. That to simplify calculation and accounting a rate of 28 cents per hour be used as representing the average hourly cost for direct labor, adding to this amount 12 cents per hour as meeting the requirements for overhead charges. The reduction in the total hourly charge from 41 cents to 40 cents reduces the overhead rate from 48 per cent to 44.4 per cent, and is felt advisable, due to the fact that the month of November, for which the figures were obtained, might not generally be considered as a representative month.

Second:—That fixed prices, including labor and material, be determined and listed separately for such items as: Application of cotter keys, knuckle pins, knuckles, air hose, safety appliances, brake shoes, and kindred repairs such as are ordinarily done in classification yards. These fixed prices to apply whether the work is performed in the classification yards, shops or repair yards.

Third:—That this report, with the approval of the convention, be referred to the Committee on Prices for Labor and Material, with such instructions as may be necessary to make effective the above recommendations.

This report is signed by: D. F. Crawford, chairman (Penna. Lines); F. F. Gaines (C. of Ga.); M. K. Barnum (B. & O.); C. E. Fuller (U. P.); C. F. Giles (L. & N.); Thomas Beaghan (U. T. L.); H. L. Osman (Morris & Co.), and M. F. Covert (Swift Ref. Trans. Co.).

T. W. Demarest, (Penna. Lines): I move that the recommendation of the Committee be adopted by the Association and the report in turn referred to the Price Committee for their consideration during the coming year.

(The motion was carried.)

SETTLEMENT PRICES FOR REINFORCED WOODEN CARS.

After the committee was constituted its scope was enlarged to include the subject of depreciation in relation to settlements for cars destroyed on foreign roads. The principal question involved is to determine what measure of repairs and the character of additions and betterments which so increase the strength, utility and value of a unit of equipment that fairly justify a complete depreciation cut-off. The committee, therefore, had two distinct problems before it and they are discussed separately.

J. McMullen
Chairman, Committee on Settlement Prices for Reinforced Wooden Cars

Settlement Prices.—To get the proper perspective of this problem it is necessary to keep steadily in view the essential fact that the basic, arbitrary prices now provided in the rules for wooden cars are quite liberal; hence, before it may be adjudged fairly that any particular part of a car or an appliance, even though

obviously an improvement over wooden construction, merits a special price as a betterment, it should be determined whether the basal price does not cover, reasonably, any difference in value that such part or appliance bears over the type of construction upon which the basic prices were determined. Having this fully in mind, the committee is of the opinion that the following items should be added to the present basic prices for car bodies when so equipped.

It is recommended that the wording of the last paragraph of Rule 116, on page 89, and the first paragraph on page 90, be changed to make the language uniform with that of the new matter proposed by the committee, and that the second and third paragraphs of this rule, on page 90, be omitted entirely. Following the second paragraph from the bottom of page 89, the committee submits the following revision and additions to Rule 116:

The prices for car bodies contained in the foregoing schedule are exclusive of the following items, the prices of which may be added when a car is so equipped:

(a) Double-deck stock cars, per car.....$25.

(b) Metal body bolsters; also composite body bolsters in which the metal members are at least 8 in. in depth and have an aggregate minimum sectional area of 16 sq. in., provided car is 60,000 lb. capacity or over and so stenciled, and has trucks with journals 4¼ in. or over when new, per car....$30.

(c) Center sills or continuous metal draft members shall be figured per lineal foot per member, according to depth and weight as follows and including draft lugs riveted on, or cast integral on cast-steel extensions. (Where such cast-steel extensions are used, the metal center sills or continuous metal draft members to which they are attached must be figured full length of car.)

Eight in. in depth and not less than 18 lb. per ft.....	$0.90
Nine or ten in. in depth and not less than 20 lb. per ft....	1.10
Twelve in. in depth and not less than 25 lb. per ft.....	1.30
Fifteen in. or over in depth and not less than 33 lb. per ft..	1.50

(d) Cover plate used on metal center sills or continuous metal draft members, per lineal foot of the sills actually covered, whether plate is applied on top or bottom, or both, or in part on top and in part on bottom.....This price shall not apply to what is commonly known as tie plates, regardless of dimensions ..... .65

(e) Metal draft arms extending 24 in. or more back from center line of body bolster, including draft lugs, whether riveted on or cast integral, per car. 65.

(f) Friction draft gears, per car..... 25.

(g) Metal needle beams, when used in conjunction with metal center sills or continuous metal draft members, per car..... 10.

(h) All-steel ends of the corrugated type, per car..... 40.

(i) Where allowances as above are based upon length, fractional parts of a foot in the aggregate length shall be counted as one foot, if one-half or greater; if less than one-half, they shall be dropped.

NOTE.—Paragraphs (a), (f) and (h) to apply to all cars so equipped.

Depreciation.—On the question of depreciation to be figured on rebuilt cars, the committee, after carefully reviewing the question from various angles, found it was unable to come to any conclusion, or to arrive at any workable basis upon which all could agree It asks that this question, together with the general provisions in Rule 117 limiting depreciation to 60 per cent of value new and covering the rate per cent of depreciation, be carried forward in the work of the ensuing year.

The report is signed by:—J. McMullen (Erie), chairman; H. G. Griffin (C. P. R.); T. J. Burns (M. C.); J. E. Mehan (C., M. & St. P.); H. H. Harvey (C., B. & Q.); C. N. Swanson (A., T. & S. F.); F. F. Gaines (C. of G.).

DISCUSSION

J. J. Tatum (B. & O.): There are some items of cost in this report which would very much affect our road if they are adopted. Reducing the allowance for the metal body bolster from $40 to $30 will result in bringing the cost of the improvements which we have applied to our cars below the figure which they cost us. In place of being an encouragement for the improvement of equipment, it will rather lead us to wear out our cars as they were originally built. We paid between $120 and $130 for a center sill for our equipment with the bolster built integral. The present M. C. B. price is $80, plus $40, which is about what we pay for these articles but these changed figures will very materially reduce it. I move that the matter be referred to letter ballot.

M. K. Barnum (B. & O.): If the report is to be passed on as a whole I would like to second Mr. Tatum's motion.

T. J. Burns (M. C.): As you are probably aware, the committee has had a good deal of work to do. One phase of the work was to look after the settlement price, which had to do with rule 116, and the other phase of the work assigned to the committee was to figure the question of depreciation on rebuilt cars. In the matter of rule 116 I feel we could safely refer that to letter ballot, but on the question of depreciation, I feel that the committee has come back to the convention in a sense empty-handed. I would suggest on that phase of the work, that the committee be continued along this line, and the membership of the committee enlarged. I should suggest a representative committee of about ten be appointed and see if they cannot come back next year with some practical proposition on this matter. In speaking of the underframe, in order to protect the car owner, it occurred to the committee after the paper was written, that possibly there should be included in this report, and submitted with the report to letter ballot, a proposition that would provide for the returning of the underframe to the owner of the car, at his option. That would protect the car owner until such time as we can arrive at some conclusion as to what we shall do with the rebuilt car. The committee's idea of a rebuilt car is a car taken to the shop, and given a new underframe and steel ends and brought up to modern requirements. I think the best way to handle this report would be to submit it to letter ballot as a whole, and add a paragraph, providing it is agreeable, covering the return of the underframe to the owner of the car at his option.

Mr. Tatum: I make an amendment to my motion that each item of the report be submitted to letter ballot separately.

Mr. Barnum: It seems to me that it would be desirable to take the suggestion under the heading "Depreciation," and to have the committee continued and instructed to make further study of that question by itself.

T. H. Goodnow. (C. & N. W.): It would be better for Mr. Tatum, even if he is not getting what he feels is his whole due, to accept what the committee offers for the year, and then get the increase next year. Hundreds of thousands of cars are now being reinforced, and settled for on their original cost, and it is a question if that part of the Committee's report has not been overlooked where they refer to the basic prices under the rules established at the present time.

Mr. Tatum: I do not think we should make a rule unless we make it as near right as we can when we start.

J. J. Hennessey (C. M. & St. P.): In my opinion there is only one class of cars that will be really barred from receiving the benefit that this report today covers, and that is the class of cars that have the steel casting two feet back of the body bolster, extending that distance back. The cars that Mr. Tatum and Mr. Goodnow speak about, that have metal center sills should be settled for, not on the basis of the original cost of the car, but they should be settled for on the basis of the cost of the car as it exists, what is allowed in the rules of the present time for metal center sills only, and then the depreciation will have to be figured from the time the car was originally built, so really the only thing that seems to me to be before the Convention is the question of the cars that are equipped with the cast steel draft arm, not the continuous sills.

Mr. DeGraff (Erie): There is a decided difference of opinion as to what the question involved is. Mr. Hennessey says it is confined to the cast steel extension. The present rules do not provide for a large part of the reinforcing of old equipment that is being done today in this country. We are reinforcing between 6,000 and 7,000 of our cars, and we are doing it in a way that we would not get any return, as the rules stand today. We are reinforcing 1,800 of our cars for which the rules do not provide one additional cent of compensation, and these cars are as good as the average steel underframe car, or all steel construction today. Now the present provision was put into rule 116, without referring it to letter ballot, obviously for the purpose of protecting car owners who were reconstructing their equipment in order to stand modern traffic conditions, the conditions the cars must stand up under today. I agree with Mr. Goodnow that this is not the time to refer this to letter ballot. There is no especial damage done if we pass upon this today. It will not be irreparable. If Mr. Tatum does not get exactly what is coming to him, in the end it will balance itself up. We cannot attempt to amend the rules of interchange on the basis of what the effect will be on one railroad. We have a bigger mission here, Mr. Chairman, and that is to protect the railroad interests of the United States, and I will include Canada and Mexico.

Mr. Hennessey: I want to make a correction to my previous statement, and refer to one thing that is not covered.

and that is the all-steel end. That I should have included in my previous remarks.

H. H. Harvey (C. B. & Q.): I do not think Mr. Tatum figured his car costs up right. He gives $120 as the cost of the reinforcing of the car, $80 for the sills and $40 for the bolsters. He will find he will get a whole lot more in the committee's present recommended prices than he gets under the present prices—those which are now in vogue. The committee did not try to cut down any compensation, but to even up the matter between the railroads. If Mr. Tatum will figure the center sills on the foot price given in the report he will find that he will get more than $80. The price is regulated per foot per member. Under the present rule, a man putting metal draft arms on, he does not get anything for it. If he puts on friction draft gear, he gets nothing for that. If he puts metal ends in, there is nothing for that. In fact, all he gets is for his steel center sills and body bolsters, and I think it will be a mistake to put this thing off for another year.

Mr. Barnum: I suggest before the report is sent out that the items referred to by Mr. Harvey be made to read 18 lb. per foot per member. Otherwise I think it is likely to be misunderstood.

D. R. MacBain, (N. Y. C.): The majority of the equipment in the country today is not up to the standard necessary for safe and successful and economic operation. That is one point we should consider. The next point is to consider the means of getting the equipment to that point of efficiency. If we stop progress by any laws passed by this organization, that is to say, if we legislate against anything that any road is trying to do to bring the equipment up to its proper efficiency, we are doing the wrong thing. The road I am connected with has in the past 6 or 7 years equipped some 35,000 or 40,000 cars with steel center sills, steel ends, and various other improvements which bring the car up to a better state of efficiency than it was the day it was built. If one of these cars of ours is destroyed on a foreign road, it seems to me a matter of equity that it should be considered exactly the same as though a farmer borrowed my thousand dollar wagon and broke it, and the only fair thing for him to do would be to buy me a new wagon in its place.

F. W. Brazier (N. Y. C.): All we ask is that we be paid for our betterments which are put on the car. I see no harm in the report going through. It is not business-like to destroy a car belonging to the New York Central, on which we have spent $400 or $500, and then, in the settlement, carry that car back twelve years to the time when it was originally built.

Mr. Burns: While the committee has provided for a charge to take care of the underframing, as the report stands now, all a man will get who puts the underframe on now will be the depreciated value of the underframe. That is why I suggested it might be possible for the owner to have the underframe returned.

C. F. Thiele (Penn Lines): How will you decide between two roads, where a car is destroyed, which is equipped with the underframe? How is the charge to be arrived at, $10, $12 or $18 per foot?

J. MacMullen (Erie): The committee bases its figures on the weight of the channel used together with the depth.

F. H. Stark (Montour): I move to amend the committee's report making an allowance of $36 instead of $30 for the metal body bolster. If we can compromise on this point, I believe that it is advisable to act now.

Mr. Goodnow: I happen to know something regarding the work of the committee, and believe that the prices they have established are as equitable to all as they can be at this time. It is possible in another year the prices will have to be changed, the same as any other prices are changed.

(The motion to submit the report to letter ballot was withdrawn.)

Mr. Goodnow: I move that the committee's report be approved and that the committee be continued to handle the question of depreciation as they ask.

(The motion was carried.)

AN EGYPTIAN RAILWAY BRIDGE.—A curious fact is reported with reference to a new combined road and railway bridge which was to have been erected at Emambagh in Egypt. The contract was placed with a firm which in turn placed the order for construction with a firm in Northern France. The bridge was constructed in the works, one span was shipped and has since been delivered in Egypt; then the Germans invaded France and captured the remainder of the spans. As they are not likely to give them up, work on the bridge is temporarily abandoned.

FOUND

A ladies' pin was found on the floor of the ball room on the pier last night. The loser can recover it by calling at the booth of the *Daily*.

PRIZE WINNERS IN THE KICKERS' CONTEST

The ties for first and second prizes in the Kickers' contest of the golf tournament were played off yesterday. George L. Bourne defeated R. H. Weatherly for the first prize, and the second prize was won by B. P. Flory, the others tied for it played with him being J. D. Purcell, W. L. Allison, and H. M. Perry.

THE DANCE LAST NIGHT

The opening dance for the Master Car Builders held last evening proved quite as successful as those held on the pier last week. The program was similar to that of last Wednesday night, being entirely informal, with Miss Betty Lee in costume recital and music by the Don Richardson Orchestra. During the day it was very warm, but long before 9.30 P. M., when the dancing commenced, it was evidenced that it would take more than heat to keep the crowd away. Owing to the fact that the entertainment committee did not use the orchestra on the pier Sunday, one hour's more music was provided, and was much more appreciated than would have been the case had the original schedule been followed. The committee in charge were Walter H. Bentley, chairman; W. K. Krepps, Burton W. Mudge, H. W. Scott, C. D. Eaton, A. B. Wegener, J. P. Landreth, J. F. A. Comstedt, W. W. Melcher, C. C. Farmer.

THE NUMBERS USED IN THE KICKERS' HANDICAP

It is not generally understood how the numbers used on Saturday as a basis for determining the results of the kicker's handicap contest in the golf tournament were arrived at. As was announced in advance, the players were allowed to choose any handicaps that they pleased and the winning net scores had to be between 71 and 76. After the players had gone out on the course, slips marked with the numbers from 71 to 76 were placed in a hat. They were then drawn out at random by George R. Carr, chairman of the Entertainment Committee, who picked up numbers 71, 74 and 75. This determined that players coming in with a net of 71 would be in line for the first prize; those coming in with a net of 74 for the second prize, and those with a net of 75 for the third prize. Through an oversight L. A. Cameron, who came in with a net of 71, was not included among those who were mentioned as having tied for the first prize. Mr. Cameron will play off the tie with G. L. Bourne and R. H. Weatherly.

R. S. M. A. COMMITTEE APPOINTMENTS

President-elect Ostby has named the following committees and committee chairmen for the coming year:

Hotel Committee, J. H. Kuhns, Republic Rubber Company, Chicago (chairman); P. J. Mitchell, Philip S. Justice & Company, Philadelphia, Pa.; C. D. Eaton, American Car & Foundry Company, New York.

Finance Committee, J. C. Currie, Nathan Manufacturing Company, New York (chairman); J. F. Schurch, Damascus Brake Beam Company, Cleveland, Ohio; C. E. Postlethwaite, Pressed Steel Car Company, Pittsburgh, Pa.

Badge Committee, Edmund H. Walker, Standard Coupler Company, New York (chairman); C. B. Cass, Westinghouse Air Brake Company, St. Louis, Mo.; J. P. Schurch, Damascus Brake Beam Company, Cleveland, Ohio.

Exhibit Committee, C. B. Yardley, Jr., Lubricating Metal Company, New York (chairman); George H. Porter, Western Electric Company, Chicago; J. G. Platt, Hunt-Spiller Manufacturing Corporation, Boston, Mass. A sub-committee on Lighting

and Power will be appointed to insure plenty of light and power.

By-Laws Committee, C. E. Postlethwaite, Pressed Steel Car Company, Pittsburgh (chairman); F. E. Beal, Magnus Company, Inc., Atlanta, Ga.; C. F. Elliott, American White Lead & Color Works, Detroit, Mich.

Entertainment Committee, Gilbert E. Ryder, Locomotive Superheater Company, New York (chairman).

Enrollment Committee, Charles W. Beaver, Yale & Towne Manufacturing Company, New York (chairman).

Transportation Committee, J. L. Randolph, Economy Devices Corporation, New York (chairman).

John D. Conway has been re-elected secretary and treasurer of the association.

ADDITIONAL MASTER CAR BUILDERS' REGISTRATION

Acker, C. B., General Car Foreman; P. S. & N.; Monticello.
Adams, H. T., G. C. F.; Wabash; Grand Atlantic.
Akans, Geo., M. M.; Southern; Traymore.
Andrus, Chas., Supt. Shops.; Mather Stock Car Co.
Barba, C. E., Asst. Engr.; Chalfonte.
Barnes, P. H., G. C. F.; B. & O.; Colonial.
Bartlett, Henry, G. M. S.; B. & M.
Benjamin, C. H., Dean Engineering; Purdue University; Haddon Hall.
Blair, H. A., D. M. C. B.; B. & O.
Borrowdale, J. M., S. C. D.; I. C.; Brighton.
Breyer, J. S., M. M.; Southern; Continental.
Brogan, James P., G. F.; D., L. & W.; Haddon Hall.
Burns, T. J., S. R. S.; Mich Cent.; Traymore.
Buzzell, O. D., G. F. C. D.; A., T. & S. F.; Chalfonte.
Carmer, J. H., G. F.; P., B. & W.; Traymore.
Charlton, George J., G. C. F.; D., L. & W.; Pennhurst.
Courson, J. F., G. F. Wall Shop; Seaside.
Cox, Millar F., A. S. M.; L. & N.; Chalfonte.
Cunningham, J. L., M. M.; P., B. & W.; Chalfonte.
Davis, M. J., A. E. M. P.; P. R. R.; Chalfonte.
Davis, W. H., M. E.; N. Y., O. & W.; Chalfonte.
Demarest, T. W., S. M. P.; Penna. Lines West; Brighton.
De Vilbiss, E. B., Asst. Eng. M. P.; Penna. Lines West; Brighton.
Dickinson, F. W., M. C. B.; B. L. & E. R. R.; Chalfonte.
Dobson, W. E., General Auditor; Cambria & Indiana; Dennis.
Donehue, Thos., Div. Gen. Car Fore.; N. Y. C.; Fredonia.
Eberle, Wm. F., G. F.; P. R. R.; Chalfonte.
Ewing, J. J., M. E.; C. & O.; Shelburne.
Ferguson, George M., Supt.; Lake Terra; Seaside.
Fox, Frank L., G. F. C. D.; P. M.; Traymore.
Fryer, C. V., G. F. C. D.; N. Y., O. & W.; Chalfonte.
Graff, F. M., S. A. M. D.; Erie.
Gray, Guy M., S. M. P.; B. L. & E.; Chalfonte.
Grove, P. L., M. M.; P. R. R.; Chalfonte.
Hagen, Charles, C. F. C. D. R. R.; W. & L. E.; Pennhurst.
Halbert, M. W., C. I. I.; American Assn. of R. R. Supts.; Haddon Hall.
Hammett, P. M., S. M. P.; Maine Central; Shelburne.
Harding, E. N., G. P. I.; I. C.; Alamac.
Henry, J. M., S. M. P.; P. R. R.; Chalfonte.
Johnson, J. O., Foreman Car Repairs; Southern; Fredonia.
Joughins, G. R., M. S.; Intercolonial; Chalfonte.
Kaderly, W. F., S. M. P.; G. S. & F.; Haddon Hall.
Kapp, W. F., S. S.; R. F. & P. Ry.; Blenheim.
Kent, F. S., C. C. I.; P. R. R.; Blenheim.
Kinter, D. H., G. F. C. D.; Monongahela; Watkins.
Kipp, A., G. C. I.; N. Y. O. & W.; Traymore.
Knox, W. J., M. M.; B. P. & P.; Traymore.
Lindstrom, C. A., Chief Engineer; P. A. & McK. R.; Chalfonte.
Looney, W. E., Car Foreman; M. O. & G. of Tex.; Haddon Hall.
Maddox, C. W., C. C. I.; C. & O.; Chalfonte.
McBride, B., M. M.; Southern; Dennis.
McCully, B. N., F. C. D.; N. Y., P. & N.; Haddon Hall.
McIlvaine, C. L., M. M.; N. Y., P. & N.; Brighton.
McKinsey, C. R., G. C. I.; P., B. & W.; Runnymede.
Mercur, R. E., T. M.; Westmoreland Coal Co.; Craig Hall.
Meredith, H. P., M. M.; P. R. R.; Brighton.
Miller, R. S., M. C. B.; N. Y. C. & St. L.; Traymore.
Milton, J. H., S. C. D.; Rock Island; Chalfonte.
Moseley, W. S., Mech. Engr.; C. C. & O.; Grand Atlantic.
Nordgerg, Albert, M. M.; P. & S.; Ralston.
O'Dea, P. J., General Inspr. Car Dept.; Pennhurst.
O'Donnell, T. J., Arbitrator; N. Y. C.; Pennhurst.
Orchard, J. H., F. C. D.; D. & H.; Bothwell.
Osmer, J. E., M. C. B.; M. & L. S.; Brighton.
Peterson, A. F., M. C. B.; Cold Blast Trans. Co.; Haddon Hall.
Pfafflin, Louis, M. M.; Indianapolis Union; Biscayne.
Porter, G. A., Supt. Transportation; Indian Refining Co.; Blenheim.
Ramsdell, T. M., M. C. B.; O. W. R. R. & N.; Chalfonte.
Reese, O. P., Asst. Eng. M. P.; Penna. Lines West; Brighton.
Richards, C. F., Chief Car Inspector; L. & H. R.
Rieckman, W. H., A. M. M.; B. & M.
Ripley, C. T., G. M. F.; A., T. & S. F.
Robbins, F. S., Asst. M. M.; P. R. R.
Rommell, Geo., M. M.; P. & R.; Continental.
Sasser, E. C., M. M.; Southern; Shelburne.
Schmoll, G. A., S. M. P.; B. & C.; Blenheim.
Senger, J. W., M. C. B.; N. Y. C.; Traymore.
Slayton, F. T., S. M. P.; Virginia; Arlington.
Small, J. W., S. M. P.; Tampa & Gulf Coast.
Smith, H. E., C. & E. T.; N. Y. C.; Haddon Hall.
Stoll, W. J., Chief Interchanged Inspector; Pennhurst.
Sumner, Eliot, M. M.; P. R. R.; Brighton.
Sweetman, E. M., M. M.; Southern; Traymore.
Tatum, J. J., S. F. C. D.; B. & O.; Chelsea.
Trapnell, F. W., Chief Interchange Inspector; Chalfonte.
Trumbull, A. G., M. S.; Erie; Chalfonte.
Vittum, J. E., Chief Joint Inspector; Colwin.
Way, E. S., Gen'l Foreman M. C. B. Clearing House.
White, H. J., G. C. F.; Can. Nor. Que.
Yergy, J. P., G. C. I.; P. R. R.

ADDITIONAL MASTER MECHANICS' REGISTRATION

Akans, Geo., M. M.; Southern; Traymore.
Anderson, J. A., M. M.; B. & O.
Beamer, Jas. A., M. M.; P. R. R.; Chalfonte.
Breyer, J. S., M. M.; Southern; Continental.
Burns, T. J., S. R. S.; Mich. Cent.; Traymore.
Cox, Millard F., A. S. M.; L. & N.; Chalfonte.
Davey, Thomas S., M. M.; N. Y., S. & W.; Bothwell.
Demarest, T. W., S. M. P.; Penna. Lines, West; Brighton.
Eliot, Sumner, M. M.; P. R. R.; Brighton.
Ewing, J. J., M. E.; C. & O.; Shelburne.
Gray, Guy M., S. M. P.; B. & L. E.; Chalfonte.
Hammett, P. M., S. M. P.; Maine Central; Shelburne.
Hess, Geo. F., S. M.; K. C. S.; Blenheim.
Hildreth, F. E., M. E.; Vandalia; Dennis.
Kaderly, W. F.; S. M. P.; G. S. & F.; Haddon Hall.
Kapp, W. F., S. S. & M.; R. F. & P.; Blenheim.
Kneass, Strickland L.; Wm. Sellers Co., Ltd.; Brighton.
Langton, Geo. H., M. M.; S. A. L.; Sterling.
McBride, B., M. M.; Southern, Dennis.
Mechling, J. E., M. M.; Vandalia; Haddon Hall.
Meredith, H. P., M. M.; P. R. R.; Brighton.
Moseley, W. S., Mech. Engr.; C. C. & O.; Grand Atlantic.
Rhuark, F. W., M. M.; B. & O.; Pennhurst.
Rieckman, W. H., A. M. M.; B. & M.
Slayton, F. T., S. M. P.; Virginia; Arlington.
Small, J. W., S. M. P.; S. A. L.
Smith, H. E., Chemist; N. Y. C.; Haddon Hall.
Smith, C. B., M. E.; B. & M.
Sweetman, E. M., M. M.; Southern; Traymore.
Trumbull, A. G., M. S.; Erie; Chalfonte.

ADDITIONAL SPECIAL GUESTS

Adams, H. A., Inter State Com.; Iroquois.
Allman, W. N., Draftsman; B. & O.; Arlington.
Almy, A. C., Commander; U. S. Navy; Craig Hall.
Anderson, J. A., M. M.; B. & O.; Chalfonte.
Atkinson, W. S., Purch. Agt.; K. C. S.; Blenheim.
Bachman, J. H., Air Brake Instructor; P. R. R.; Brighton.
Baldwin, T. C., M. M.; N. Y. C. & St. L.; Traymore.
Baker, Horace, Gen. Mgr.; C. N. O. & T. P.; Blenheim.
Baker, Robert.
Bayley, J. J., Master Mechanic; Southern; Dennis.
Beamer, Jas. A., M. M.; P. R. R.; Chalfonte.
Beaumont, C. A., Asst. P. W. Inspector; B. & O.; Elwood.
Bebout, G. W., Elec. & Shop Eng.; C. & O.; Chalfonte.
Belnap, H. W., I. C. C.; Inter State Com.; Iroquois.
Berger, A. N., Draughtsman Mech. Engineer's Office.
Broberg, Charles G., Conductor; P. & S.; Ralston.
Brong, J. E., Gen. Foreman; L. V.; Dennis.
Brown, W. C., Chief Clerk, Mech. Depart.; A. & S. F.; Traymore.
Burke, John, Virginian; Shelburne.
Burns, N. F., Special Inspector; N. Y. C.; Alamac.
Butterworth, E. A., Asst. Strk.; P. R. R.; Dunlop.
Cadwell, Rev. N. W.
Caley, G. H., Elec. Signal Supervisor; N. Y. O. & W.; Traymore.

Canfield, J. B., M. M.; Boston & Albany; Pennhurst.
Carson, Ray, Chief Clerk; C. N. O. & T. P.
Clark, F. D., Supt.; Cambria & Indiana; Dennis.
Coan, Michael, For. Car Inspec.; Sterling.
Conen, J. J., Foreman; B. & O.; Netherland.
Coutant, G. E., General Inspector; Wabash; Alamac.
Coutts, J. J., Inter State Com. Co.; Iroquois.
Cromwell, J. E., Spl. Inspector M. P. Dept.; B. & O.; Arlington.
Dailey, E. B., Asst. Dit. of Purchases; S. P.; Chelsea.
Davis, W. L., Foreman; P. R. R.; Arlington.
De Vilbiss, E. B., Asst. Eng. M. P.; Penna. Lines West; Brighton.
Dolson, F. L., Asst. M. M.; P. R. R.
Drawbaugh, E. L., Chief Car Inspector; Cumberland; Monticello.
Driscoll, F. E., Asst. to Pur. Agt.; Erie; Chelsea.
Ekling, E. G., Foreman; B. & M.
Ellis, W. M., For. Car Dept.; C. N. O. & T. P.
Ellsworth, G. M., Chief Motive Power Clerk; P. R. R.; Chalfonte.
Fry, B. F., Genl. Car Foreman; D. & R. G.; Haddon Hall.
Fosnot, G. N., Chief Clerk M. M.; C. V.; Chalfonte.
Fuller, E., M. M.; Southern; Monticello.
Gibboney, E. S., Foreman; Huntingdon & Broad Top Mountain; Howard.
Gilpin, G. G., Chief Draughtsman; C. B. & Q.; Chalfonte.
Grady, L. W., Freight Air Brake Insp.; W. J. & S. S.
Greathouse, Mr. L., Acting Gen. Car Inspector; Virginian; Arlington.
Hale, Arthur, Chairman Com. on Relations; Brighton.
Hampton, Kimber, Chief Joint Inspector; B. & O.; Larchmont.
Hauser, Percy, Foreman Office Mech. Engineer; P. R. R.
Hayes, T. C., Inter State Com. Co.; Iroquois.
Hengstler, David, For. Car Repairs; P. R. R.; Silverdale.
Henthorn, J. T., Insp. Test. Dept.; B. & O.; Brighton.
Hertzler, S. M., Special Engineer; P. R. R.; Lavyck.
Hildreth, F. F., M. E.; Vandalia; Dennis.
Hoffman, G. P., Gen. Car Foreman; B. & O.; Lexington.
Holder, J. A., General Boiler Insp.; S. A. L.; Islesworth.
Hooper, E. R., Clerk; Boston & Albany; Pennhurst.
Kemp, J. M. D., Mech. Shop Foreman; Western Maryland; Lexington.
Kern, William, Foreman M. P. Dept.; B. & O.; Strand.
King, W. C., Car Foreman; N. Y. C.; Craig Hall.
Kleine, Herbert J.; P. R. R.; Dennis.
Lacy, A. B., Pur. Agent; Virginia; Traymore.
Lance, C. C., Shop Engineer; S. A. L.
Langston, C. E., Clerk; S. A. L.; Monticello.
Langton, Geo. H. K., M. M.; S. A. L.; Sterling.
Lawson, Jas. A., Inter State Com. Co.; Iroquois.
Lehr, Harry W., General Foreman Pas. Car Insp. P. R. R.; Haddon Hall.
Leinbach, H. W., Elec. Eng.; W. & L. E.; Dennis.
Levee, George C., General Efficiency Eng.; D. & H.; Pennhurst.
Lynch, Geo., Chief Joint Trans.; Penna. Lines, West; Borton.
Mallingley, E. H., General Car Foreman; B. & O.
Marchant, Lewis, Mech. Eng. Office; P. R. R.; Haddon Hall.
Marsh, E. P., Gen. Foreman Pass. Car; C. & N. W.; Chalfonte.
McGill, A. M., Asst. S. P. M.; L. V.; Traymore.
McGrath, C. H., Ch. Clerk, Purchasing Dept.; S. P.; Traymore.
Mechling, J. E., M. M.; Vandalia; Haddon Hall.
Mendelhall, D. H., Gen. Foreman; Wheeling Term.; Norwood.
Morrison, E. D., Gen. For. M. P. Dept.; B. & O.; Lexington.
Myers, R. M., Chief Clerk, Office of Cons. Eng.; S. P.; Osborne.
Nelson, C. J., Foreman Car Dept.; C. & N. W.; Chalfonte.
Nusz, E. L., Mech. Inspector; B. & O.; Arlington.
O'Connor, D. J., Machinist & Engineer; A. B. & A.; Chalfonte.
Owens, W. H., Master Mechanic; Southern; Dennis.
Palmer, F. Edward, Commander; U. S. Navy; Craig Hall.
Parker, H. H., Master Mechanic; Seaboard; Sterling.
Patton, C. S., Master Mechanic; S. A. L.; Sterling.
Reed, T. L., Asst. Master Mechanic; Seaboard; Sterling.
Reese, O. P., Asst. Eng. M. P.; Penna. Lines West; Brighton.
Roberts, C. S., Inter State Com.; New Holland.
Rosser, H. S., Shop Supt.; S. A. L.; Sterling.
Ryan, J. M., Trav. Inspector; C. St. P. M. & O.; Chalfonte.
Schaffer, M. L., Foreman; P. R. R.; Dunlop.
Schilke, H. A., Battery Insp.; W. J. & S. S.
Spratt, T., Asst. P. A.; N. & W.; Traymore.
Staley, P. C., General Foreman; P. R. R.; Brighton.
Stanton, E., Chief Joint & Car Inspector; Norfolk & Portsmouth Belt Line.
Starritt, W. A., P. A.; C. C. & O.; Grand Atlantic.
Stewart, H. A., Supt.; Fruit Growers Express; Chalfonte.
Stoderberg, J. T., Draftsman; P. R. R.; Seaside.
Stork, W. A., General Foreman; L. V.; Lexington.
Stratton, R. T., Draftsman; P. R. R.; Seaside.
Swope, B. M., M. P. Inspector; P. R. R.; Seaside.
Trappe, W. C., Electrician; P. R. R.; Somerset.
Wallace, L. W., Ry. & Industrial Management; Providence University; Chalfonte.
Whitsett, W. B., Draftsman; B. & O.; Traymore.
Wiese, A. J., General Car Foreman; B. & O.
Wilbur, Rollin H., Vice President & General Manager; Lehigh & New England.
Wilder, C. D., Foreman Boiler Maker; B. & O.
Williamson, C. H., Draftsman, Office Chief Engineer; P. R. R.; Dennis.
Wink, L. R., Gen. Inspector; C. & N. W.; Chalfonte.
Witmer, C. K., M. M.; Westmoreland Coal Co.; Craig Hall.

THE McBARMMA GOLF LEAGUE

One of the most interesting organizations ever formed to afford a little recreation in connection with the hard work done by the railway men and railway supply men attending the mechanical conventions is the McBarmma Golf League. The league derives its name, of course, from the initials of the Master Car Builders' Association and the American Railway Master Mechanics' Association. It was organized at Saratoga on June 15, 1906. At that time golf had not become the popular pastime which it is now. It was played in this country by only a few as compared with the large number who now indulge in it. Its virtues as an exercise and a diversion had not become universally appreciated and all those who played it were regarded with some scepticism by the rest of mankind.

For that reason, in the early history of the McBarmma League its members slipped quietly out to the golf course on the Saturday between the conventions and slipped as quietly back again, and the fact that a tournament had raged all day was kept measurably quiet. But within recent years the social and medicinal qualities of golf have become more generally recognized all over the country. Almost everybody is playing it and those who have not begun to do so have begun to regard it with longing rather than suspicion. In consequence, the time has arrived to "expose" the McBarmma Golf League, give some of the facts in its history and for the first time publish the scores made and the prizes won in one of its tournaments.

The charter members of the league number 16. Its usual membership at present is about 30. Every one of its charter members is still living and ten of them took part in the McBarmma tournament last Saturday. These are E. H. Bankard, F. H. Clark, D. F. Mallory, C. F. Quincy, G. H. Sargent, R. F. Carr, F. V. Green, H. A. Gillis, S. P. Bush, and C. F. Street. The charter members who were not here are R. P. C. Sanderson, H. H. Vaughan, O. H. Cutler, T. H. Symington, D. D. Pendleton and F. Conklin.

At the club tournament last Saturday 18 holes were played in the morning and 18 in the afternoon, as usual. The scores made in the morning were as follows:

	Gross.	Handicap.	Net
C. F. Quincy	99	10	89
C. L. Bardo	93	6	87
F. H. Clark	105	14	91
C. F. Street	108	14	94
M. K. Barnum	118	18	100
R. F. Carr	92	12	80
D. R. McBain	105	18	87
J. T. Carroll	102	18	84
W. O. Wood	111	16	95
J. McNaughten	119	18	101
C. C. Elmes	123	24	99
J. L. Replogle	97	10	87
F. V. Green	124	30	94
H. A. Gillis	92	6	86
G. H. Sargent	122	18	104
W. C. Arp	115	14	101
E. O. Warner	92	10	82
D. F. Mallory	79	0	79
N. M. Garland	89	4	85

A. H. Sisson	93	9	84
W. L. Conwell	95	4	91
S. L. Knease	113	10	103
E. H. Bankard	102	14	88
W. D. Robb	114	24	90

The gold medal for the best gross score was won by D. F. Mallory, who shot a 79. The club handicap cup for the lowest net score was won by R. F. Carr, but passed to W. R. Warner because Mr. Carr won another prize during the day and under the rules of the club no player can be awarded two prizes in the same tournament. The handicap cup must be won by a player three times before he can keep it, and S. P. Bush is the only member who has ever succeeded in doing this.

On Saturday afternoon there was a tournament for class A and class B players. The scores in class A were as follows:

	Gross.	Handicap.	Net.
C. L. Bardo	96	4	92
R. F. Carr	90	12	78
D. R. McBain	106	18	88
J. T. Carroll	111	18	93
J. L. Replogle	94	10	84
H. A. Gillis	88	6	82
D. F. Mallory	99	0	99
A. H. Sisson	103	0	94
W. L. Conwell	93	4	89
E. O. Warner	103	10	93

The winner of the first prize was R. F. Carr, and the second went to H. H. Gillis.

The following were the scores in class B:

	Gross.	Handicap.	Net.
C. F. Quincy	109	10	99
F. H. Clark	107	14	93
C. F. Street	107	14	93
M. K. Barnum	107	18	89
W. O. Wood	101	16	85
C. C. Elmes	141	24	117
F. V. Green	124	30	94
G. H. Sargent	119	18	101
E. H. Bankard	118	14	104
W. C. Arp	111	14	97
S. L. Kneass	106	10	96
J. McNaughton	113	18	95
W. D. Robb	122	18	98

The first prize in this class was won by W. O. Wood, and the second by M. K. Barnum. The Carr handicap cup given by R. F. Carr was won by J. L. Replogle. The Sargent luck cup given by G. H. Sargent, was won by C. L. Bardo. This cup must be won three times in order to be retained. The prize in the approaching and putting contest was won by W. L. Conwell. Each member of the club has a goat medal for which they play during the year; and the man who comes in with the largest number of medals gets a prize. The goat prize was awarded to N. M. Garland, who came in with six medals.

The McBarmma Club had its annual dinner Saturday evening and the following officers were elected for the ensuing year: President, S. P. Bush; vice-president, C. L. Bardo; secretary-treasurer, C. F. Street.

At their dinners the members of the club sing various improvised songs appropriate to the occasion, and the following which was sung Saturday night to the tune of "Mr. Dooley," was a tribute to the directing spirits of the club:

Who is it rules with iron hand
McBarmma and its crew?
Who runs the show from soup to nuts?
Who tells us what to do?
We dare not say our soul's our own—
In fact we have no soul:
They swiped it from us when they swiped
The Jobs they now control.

'Tis Charlie Quincy, old Charlie Quincy,
Laying in cahoots with Clement Street:
Old Bill the Geezer and Julius Caesar,
They never saw the day they had them beat.

Conventionalities

F. H. Stark, general superintendent, Montour Railroad, is looking for information as to the desirability of using high or low steam pressure on some new locomotives which are in process of designing.

Stephen C. Mason, of the McConway & Torley Company, made another call at the office of the *Daily*, and left behind material

R. T. Jaynes, M. M., Lehigh & Hudson, and Mrs. Jaynes

evidence of the fact that the cigars got here all right. Many thanks, friend Mason!

The steel back gold dust twins, N. H. and T. C. Davis, made the rounds yesterday. They seemed lost without a brake beam or brake shoe exhibit; but they are thoroughly enjoying their temporary retirement from the railway field.

Jack High on the Left, A. E. Calkins, Assistant to Supt. Rolling Stock, N. Y. C., on the Right

G. W. Denyvan (Denny), of the Parkesburg Iron Company, has the distinction of having won the prize, a beautiful vanity box, at the dancing contest on the pier last Tuesday evening. (His was the lucky number that was drawn from the hat.)

F. C. Pickard, master mechanic of the Delaware, Lackawanna & Western at Buffalo, spent several days before coming to the convention riding the Pacific type locomotive with the Riegel

water tube firebox which is now being tested out with a dynamometer car.

Harry Frost left Sunday evening for Lawrenceville, N. J., to be with his son at the graduating exercises of the school at which the young man has been preparing for Princeton. It seems but yesterday when son Frost, then but a few years old, used to be known at the conventions as a "little freezer."

Albert MacRae, who, besides his other activities, is secretary of the Illinois Athletic Club in Chicago, has found that there are 35 railway and supply men attending the conventions who belong to this organization. Twenty-eight of them got together Monday and had a photograph taken out on the pier.

Through an error in the print shop the word "Miss" was made to read "Mrs." and it would appear from the photograph which was shown in the *Daily* of June 14, page 1318, that L. A. Richardson, mechanical superintendent of the first district, Chicago, Rock Island & Pacific, was accompanied by his wife rather than by his daughter, who is visiting the convention this year.

Of the two men killed on board the Metropolitan Line Steamer Bunker Hill on Sunday night, one, George H. Kendrick, was a supply man and left Atlantic City Sunday afternoon for home. He was the Boston representative of the Anchor Packing Company. This had been his first convention and his first trip to Atlantic City; and he went away determined to return next year and bring Mrs. Kendrick with him.

R. D. Smith, Supt. Motive Power & Rolling Stock, B. & A.

Owing to the demands of business B. A. Clements, of Worth Bros. Co., had to return to Chicago Sunday night. He will be much missed by the other members of the entertainment committee. "Burt" was chief assistant to chairman Sawyer of the golf committee in addition to being chairman in charge of the door at all entertainments and his thoughtful attentions to all and his hustling qualities did much toward insuring the success of the assignments given him.

H. W. Belnap, chief of the Division of Safety of the Interstate Commerce Commission, accompanied by five of the safety appliance inspectors of the commission, arrived yesterday to attend the conventions. The inspectors in the party include T. C. Hays, J. J. Coutts, James A. Lawson, Charles S. Roberts and Harry A. Adams. The government representatives will remain through the Car Builders' convention, and are interested visitors both in the convention hall and in the exhibits on the pier.

F. H. Clark, general superintendent of motive power of the Baltimore & Ohio, and Robert F. Carr, president of the Dearborn Drug & Chemical Company, left Sunday morning for Champaign, Ill. Mr. Clark is an alumnus of the University of Illinois, and goes to attend a reunion of the class in which he graduated. Mr. Carr also is an alumnus and goes to attend a meeting of the board of trustees of the university, of which he was elected a member by the voters of Illinois at the last state election.

The announcement in the New York papers of June 13 of the engagement of Miss Mildred Rhoades Whaley to Joseph Earle Sample is the culmination of a romance which began at the conventions in Atlantic City three years ago. Miss Whaley is a daughter of A. R. Whaley, vice-president of the New York, New Haven & Hartford, and was a visitor at the conventions in 1912. Mr. Sample is with the Hill Publishing Company, of New York, and was here also as a convention visitor. The young people met then for the first time.

Left to Right—J. F. Sheahan, S. M. P., and B. L. Bugg, Assistant General Manager, A. B. & A.

G. F. Laughlin, Gen. Supt., Armour Car Lines, and Mrs. Laughlin

Geo. L. Lord, manager of the railroad department of the West Disinfecting Company, New York, met with a serious accident on the pier while engaged in arranging the exhibit of his company last Tuesday. Owing to the collapse of a step ladder while hanging an electric sign, the latter dropped and struck Mr. Lord, wrenching his left knee and cracking one of the bones below the knee. Mr. Lord remained in attendance at the booth for several

days before the seriousness of his injuries was known. He is now confined to his room in the Chalfonte and H. E. Daniels, the company's western representative, reports that his condition is improving.

Yesterday morning the members of the enrollment committee presented their chairman, Harold A. Brown, with an unusually complete traveling case. Mr. Brown has been one of the loyal workers on that committee for four years, the last two of which he has been chairman. During that period his friends

H. R. Thomson, M. M., Newburg & South Shore

have not only greatly increased in number, but the quality of friendship has been strengthened because of his natural inclination and ability to be both accommodating and fair. The tangible expression of appreciation and respect shown him by his co-workers is something that will serve to remind him of the bright side of a task which, to say the least, has been confining.

Among the interested convention visitors on Saturday and Sunday were Mr. and Mrs. Edward Hungerford and Richard

R. J. Turnbull, Mech. Supt., Missouri Pacific

C. Ellsworth of New York City. Mr. Hungerford's name is doubtless familiar to many of the convention visitors, because he is probably the most widely read and authoritative writer of non-technical railway literature in this country. His articles and stories regarding railway matters have often appeared in the Saturday Evening Post, the Metropolitan Magazine, Munsey's, and other publications of general circulation, and he is the author of a very readable and valuable book entitled "The Modern Railroad." Mr. Hungerford has traveled widely in the United States and one of the results has been the production of a book entitled "The Personality of American Cities," which shows his familiarity with the life and atmosphere of almost every large place in the United States. He is, besides, the author of some short stories and two novels. He was formerly editor of the Erie Railroad Employee's Magazine, was subsequently publicity manager of the Brooklyn Rapid Transit Company, and is now advertising manager of Wells, Fargo & Co. and an editor of the Wells Fargo Messenger, which is a monthly paper published by this company. Mr. Ellsworth is widely known in the newspaper field, being editor of the Brooklyn Times. Mr. Hungerford and Mr. Ellsworth returned to New York Sunday, while Mr. Hungerford left for the West for an extended trip.

The Chicago Railway Equipment Company contingent, including President E. B. Leigh, Vice-Presidents F. T. De Long and C. H. Williams, Jr., and George N. Van Sweringen, arrived on Saturday and Sunday, but came by entirely different routes. Messrs. Lee and Williams came by train, while Messrs. De Long and Van Sweringen drove through from Chicago in the former's automobile. They took the road by way of Cleveland, Buffalo, Erie and New York City, leaving Chicago on Saturday, June 5, and reaching New York on Saturday, June 12.

John McMullen, Mechanical Superintendent, Erie

The maximum mileage in any hour made by them was in one when Mr. Van Sweringen was at the wheel, and was 27 miles. This is not a large maximum mileage, and yet they did not make less than 174 miles in any day, and in one day attained 212 miles. The nearest they came to having real trouble was about 40 miles from Atlantic City on the road from Lakewood. This was on Sunday evening when it was raining hard. Mr. De Long had just improvised a lunch, which they intended to eat whenever the spirit moved them, when he heard a sound like a peanut-stand whistle and felt one of his tires going down. He had his side curtains down and he immediately decided that he did not intend to get out in the rain to fix that tire. He therefore climbed over into the back seat, lighted a lantern, spread the lunch out on his knees, and they proceeded to eat lunch right there. By the time lunch was finished the rain had ceased and it was possible to fix the tire without any discomfort except that of getting out of the mud. There is some difference of opinion between Mr. De Long and Mr. Leigh as to how Mr. De Long's car is going back to Chicago. Mr. De Long expects it to return under its own power, with him as chauffeur, while Mr. Leigh opines that it will go back in a freight car. In any event Mr. De Long says that the trip down was fine.

CEILING FAN

The ceiling fan shown in the illustration is being exhibited by the Safety Car Heating & Lighting Company, New York. While the general features are similar to those embodied in the type of fan exhibited by this company last year, and briefly described on page 1403 of the June 13, *Daily Railway Age Gazette*, it has been redesigned so that the entire unit including the motor may be applied below the ceiling of the car. The previous type necessitated the cutting through the ceiling or roof of the car for its installation.

The parts are so arranged that the entire unit may be released from the ceiling plate and removed for inspection by pushing a button, which releases an automatic lock, and then slightly turning the lower portion of the fan towards the left. Electrical connections are made by a plug connector which may be readily removed or inserted. The brush boxes on the motor are conveniently located so that brushes may be replaced without disturbing any part of the fan.

Removable Ceiling Fan Unit

These fans are hung from the ceiling in the center of the car from 9 ft. to 12 ft. apart and can be had with lighting fixtures included on the frame of the fan, the combination fixtures being made for either one, two or four lights each. The current consumption of the fans when operating at maximum speed is 75 watts and by means of the revolving deflecting plates a well distributed circulation is provided.

MONROE CALCULATING MACHINE.—Among the recent developments for reducing the cost of handling all kinds of accounting work is a calculating machine manufactured by the Monroe Calculating Machine Company, Orange, N. J. One of the notable features is its simplicity; it has a much smaller number of parts than the usual type of adding machine. The operation is simple and may be readily mastered by an unskilled person in a few minutes. It handles percentage, pro-rating, extensions, engineering problems, estimating or any kind of accounting work, every calculation being made by direct methods. The crank is turned forward for addition or multiplication and backward for subtraction or division. The machine is being exhibited during the conventions this year.

IMPROVED REX CURTAIN ROLLERS

The Curtain Supply Company, Chicago, has recently applied to the Rex curtain rollers a sliding pawl to engage the ratchet in the end of the roller when it is desired to remove the roller from its fastenings. The illustration shows this attachment

Sliding Pawl Attachment for Rex Curtain Rollers

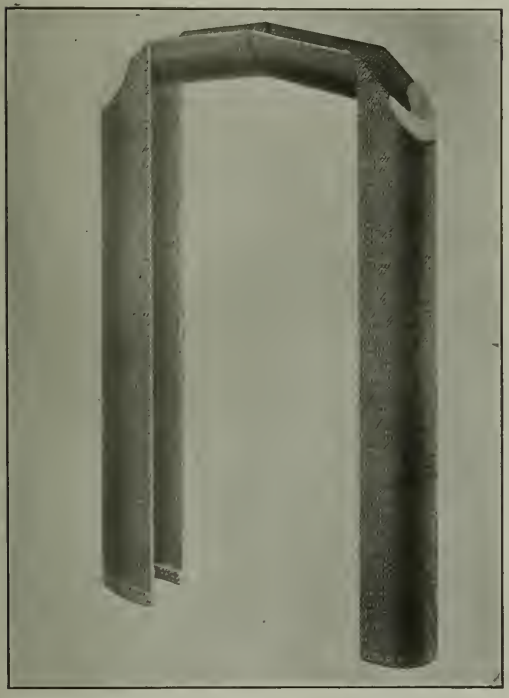
applied to a vestibule curtain roller. The improvement will be well appreciated by those who have had experience with the handling of curtain fixtures in the present day equipment.

NEW DESIGN OF GRATE BAR.—There is being shown at the exhibit space of Joseph T. Ryerson & Son a model of a locomotive grate which is the invention of S. D. Andrews, mechanical engineer of the Seaboard Air Line. The principal feature of this grate is the incorporation of wrought iron bars, which are placed in the mold and are cast in the grate. The purpose of these bars is to hold up the grate in case the cast iron is burned completely away, thus permitting the engine to get into a terminal without a failure. It also provides a grate which has greater strength in relation to the weight, with a consequent increase in the air openings.

FORGED AND ROLLED STEEL SPRING GEAR RIM.—Included in the exhibit of the forged and rolled steel sections manufactured by the Carnegie Steel Company at its slick works, is a gear rim for a recently developed type of spring gear transmission for electric cars. This transmission is in use on the Long Island and Pennsylvania Railroads, and also under consideration for use on the locomotives for the Chicago, Milwaukee & Puget Sound electrification. Its purpose is to provide a shock-absorbing medium between the motor and axle. This is accomplished by making the gear in two parts so arranged that the torque on the rim is transmitted to the hub through a system of coil springs secured to the hub. The entire transmission is thus relieved of the shocks due to lost motion between the pinion and gear teeth.

REVERSE UNIFOLD DIAPHRAGM

The Acme Supply Company, Chicago, is exhibiting a unifold diaphragm of a design which permits the use of one piece of belting in its manufacture without cutting or shaping at the corners. The top is of the usual U-shape, while the sides are of the reverse of this shape, the change in section being made by the reverse folds at the upper corners. The belting is reinforced at the corners where the turn is made with specially prepared chrome tan leather and the feet are turned up and stitched securely. Owing to the fact that the sides fold out instead of in any width of belting may be used



Unifold Diaphragm With Reverse Folds at the Corners

without encroaching on the passageway between the vestibules, and this design prevents the fold of the diaphragm chafing the vestibule curtains, and the construction is such that a large amount of expansion is permitted without straining the material.

The diaphragm is made of dyed or water-proofed and fireproofed belting and may be provided with an auxiliary asbestos woven belting fire-proof hood if desired. It is on exhibit at the booth of the Acme Supply Company.

SANITARY TOILET

The West Disinfecting Company, New York, is exhibiting a model of a sanitary toilet for use where sewer connections are not available. This toilet, known as the Sanitor, is of metal construction and consists of a case within which is a tank containing a chemical manufactured especially for this use. It is a powerful germicide and disintegrator. A vent pipe is carried from the toilet through the roof of the building. The model shows an application suitable for small railway stations and includes a baffle tank placed underground outside of the building.

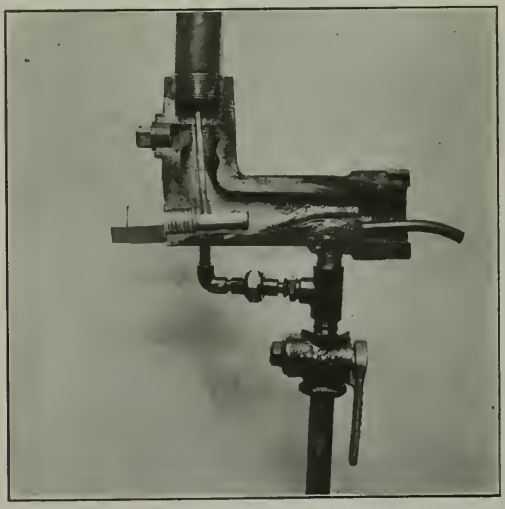
All organic matter is thoroughly treated with the chemical disintegrator and automatically flows from the toilet into the baffle tank. The overflow from this tank is said to be entirely sterile and odorless.

An application of the same principle is now being developed for use on passenger coaches.

LOCOMOTIVE SANDER

The White American Locomotive Sander Company, Inc., Roanoke, Va., is exhibiting a locomotive sanding device, which includes a means of clearing clogged sand pipes both above and below the points of its application. The device is shown in section, in the illustration, and is simple in construction.

The trap consists of an elbow casting through the wall of which the air nozzle is inserted. It is located at any convenient point in the sand pipe and the air nozzle may be adjusted to deliver any predetermined amount of sand. Another air connection is made to the trap from which lead two lines of small brass pipe, one extending up through the sand pipe to the dome and the other down into the delivery pipe below the trap. The end of the upper pipe is closed and a number of small holes are drilled through the walls at various points, at an angle which delivers the air downward. The other pipe is open at the end. Should the sand pipe be clogged below the trap, the admission of air to the auxiliary connection provides a strong downward blast which clears it without the necessity of leaving the



Self Cleaning Locomotive Sander

cab. Should the pipe be clogged above the trap, the upper branch of this connection will break up the body of wet sand and carry it down to the trap.

This device is being tested in service on three railroads. It is said to be giving good service, and to require practically no attention.

Malleable Iron Exhibit.—In an article in the June 14 issue of the *Daily Railway Age Gazette* describing an exhibit of malleable iron castings made from a recently developed mixture, the name of the exhibitor was given as the National Malleable Castings Association. This is incorrect, the name being the American Malleable Castings Association, with headquarters in the Penton Building, Cleveland, Ohio.

M. C. B. BILL MACHINE

Included in the exhibit of the Burroughs Adding Machine Company, Detroit, Mich., is a machine recently developed especially to print and add the items of M. C. B. bills which are made up from the billing repair cards. The machine has a 17-column keyboard which can be split into separate adding sections so as to handle the different items required for this kind of work with the greatest dispatch. It has special keys for fractions and is equipped with automatic cross tabulating, counter-control, and has injector and ejector devices for inserting and removing forms quickly and evenly. It is electrically operated.

With this machine the operator is said to be able to register 55 cars to the sheet, whereas by hand but 37 can usually be included on one sheet. The bill is footed automatically as the items are listed. On the Michigan Central, where this machine is in service, the following comparison of the daily output by hand and by machine was established:

By hand .....1200 cars per day of 8 hrs.
By machine .....1875 cars per day of 8 hrs.

On this basis one man with the M. C. B. billing machine will bill 14,852 more cars in 22 full working days of 8 hrs. each than one man can handle by hand, which is equivalent to a saving of 12 days per month for one man. On a salary basis of $75 per month this is equivalent to an average saving of $30 per month or $360 per year for one man working with the bill machine.

FLUSH BOX CAR DOOR

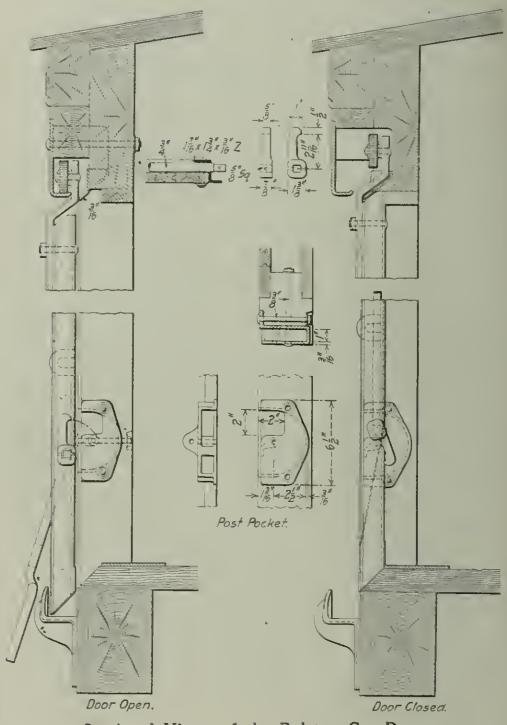
The box car door shown herewith has been designed to meet the requirements which, within the last two or three years, have come to be considered essential for satisfactory service. To adequately protect the lading the door must be storm, spark and burglar proof and to best meet these conditions a flush door is necessary.

The way in which the door is operated will be understood

Ohio Flush Car Door

by referring to the drawing showing sections of the door in the open and closed positions. The track on which the hangers operate is attached to the outside of a filler or water table which is bolted to the side plate and is so formed as to protect itself from the weather. In closing the door the top is first drawn inward and upward and is guided into the closed position by means of an oblique angle plate which enters between the diagonal portion of the door hanger and the top of the door.

The closing mechanism consists of a horizontal shaft inside the door, to each end of which a pawl is attached, these being located at either side of the door. The shaft is operated by means of a lever placed in a pocket near the center of the door. Malleable iron pockets are set into the door posts in line with the pawls, and in these are shoulders which serve as fulcrums against which the pawls operate in lifting and closing the door. The edges of the door are faced with Z-bars so placed that when the door



Sectional Views of the Ralston Car Door

is closed the outside edges of the Z-bars fit into rabbetted pockets in the door posts and completely cover the pawls and the malleable iron pockets which hold the door in position. The operating lever is locked by means of a staple and latch pin and when properly sealed it is impossible to open the door without first breaking the seal.

The door is claimed to work freely and smoothly and may be opened by simply removing the latch pin from the staple, which allows the door to drop down away from the car onto the track. It is known as the Ohio flush side door and is being exhibited at the booth of the Ralston Steel Car Company, Columbus, Ohio.

YOUNG VALVE GEAR.—In an article published in the June 11 issue of the *Railway Age Gazette, Daily Edition*, entitled Young Valve Gear, Reverse Gear and Valve, the following statement was made: "This valve gear was introduced about two years ago, the most notable feature of the motion produced being the long travel of the valve." While the principle underlying the design of both gears is the same, the above statement is misleading in that the two gears are not the same, being of entirely different construction and covered by separate patents.

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WE GUARANTEE that of this issue 10,011 copies were printed; that of those 10,011 copies 8,572 were mailed to regular paid subscribers to the Railway Age Gazette and the Railway Age Gazette, Mechanical Edition; 150 were provided for counter and news companies' sales; 189 were mailed to advertisers; 100 were provided for bound volumes, and 1,000 for distribution at Atlantic City.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

Car Wheel Failures

The report of the Committee on Car Wheels brought out the fact that of 904 625-lb. M. C. B. wheels reported as cracked and broken in the plate, 63.6 per cent were under refrigerator cars. A great many wheels of this size are used under cars which have a gross weight of over 100,000 lb. and, as pointed out by the committee, the overloading, combined with the high braking force, is probably the cause of so many failures under these cars. While the overloading is not entirely to blame, it probably has a good share in causing the failures, and the recommendation of the committee that wheels of the proper size should be used under refrigerator car equipment by all railways and private car companies, should be acted on. The interests of safety demand the employment of wheels of the proper dimensions under all freight cars.

Specifications and Tests of Materials

In presenting the report of the Committee on Specifications and Tests of Materials at Tuesday's session, C. D. Young, the chairman, called attention to the fact that should these specifications be adopted as recommended practice their later advancement to standard practice would depend entirely on the information derived from their actual use by the members. The point raised cannot be emphasized too strongly. There is too often a laxity on the part of the individual members of the association in putting into practice the recommendations which are adopted by the association. This is not only discouraging to the committees making the recommendations, but tends to burden the recommended practices of the association with what is dead matter judged by its practical effect. The preparation of the report of this committee has entailed a large amount of detailed investigation in an endeavor to provide the association with complete specifications for practically all material used in car construction, and it is especially worthy of the support of the members. The effectiveness of the work of the association depends on the use made of its committee reports.

Car Department and Increased Earnings

In a paper presented before the Car Foreman's Association of Chicago in May, 1913, C. J. Wymer, general car foreman of the Chicago & Western Indiana, urged the members to do what they could to get the car department on an equal footing with other departments of no greater importance. We have before pointed out that much of the very efficient work which has been done in the car department has been in spite of the discouraging treatment received from railway officers, rather than because of their encouragement. The car department is not always looked upon in the right light; in the majority of cases it is considered rather a necessary evil, but do the higher officers realize that by giving the car department a fair show it can produce wonderful results, not only in the way of reduced maintenance charges, but of increased earnings? The car department can do very much to facilitate car movement and increase the miles run per car per year.

The Report of the Coupler Committee

The vote of thanks to the Coupler Committee, which was adopted at Tuesday morning's session, is particularly appropriate. The work which this committee has done has been of the highest order throughout and the amount of labor involved must have been enormous. W. L. Kleine, the chairman of the committee, deserves special thanks, and the various manufacturers have been of great assistance to the committee by their hearty co-operation. There has seemed some fear on the part of a few railway men that the experimental couplers are too heavy, but it must be remembered that the strength of a coupler depends largely on the amount of metal in it and the committee has used every means of reducing the weight to the safe minimum, consistent with ample strength. Members should also bear in mind the requests and suggestions of the committee regarding the use of the experimental couplers. The committee believes that with proper co-operation it will be able to recommend a final standard coupler at the 1916 convention, and every member should take cognizance of the remarkable work of the coupler committee and make every effort to help it bring this about.

Box Car Doors

Considering the importance of the subject, the lack of discussion following the presentation of the report of the Committee on Car Construction is somewhat surprising. The subject is one which is growing in importance; in fact some of its phases are of immediate vital importance. The failure to discuss the section devoted to the design of a standard M. C. B. box car may be understood, since the details of the design presented can undoubtedly be better handled by the written discussion recommended by the committee. The lack of discussion on the section devoted to car doors and fastenings, however, is not so readily understood. The committee has now presented reports on this subject at two conventions, requesting a thorough discussion of its recommendations. Neither last year nor this year did the matter receive the attention which its importance would seem to warrant. The protection of

lading both from the weather and against theft depends on the effectiveness of the car door and its fastenings, and the endeavor of the committee to formulate specifications to meet the requirements ought to be of general interest.

Maintenance of Air Brakes

The expression, 100 per cent operative brakes, is in some ways misleading, as was pointed out in the committee report on this subject presented by George H. Wood, of the Santa Fe, before the Air Brake Association last month. While a train may be operated with 100 per cent operative brakes, the efficiency of these brakes may be very low. The only way in which it will be possible to maintain the air brakes in the proper condition will be to give them thorough inspection and insist on their proper maintenance. Many times cars will be found cut-out in trains for apparently no reason. All the train crews should be instructed to report every car cut-out and the reason therefor; these reports to be given to terminal repairmen as soon as the train arrives at its destination. Another method of keeping the brakes in good condition and thus preventing air brake failures is to establish dead lines at various points on the road. This has proved satisfactory on the Santa Fe. At certain points all cars with inoperative brakes are held and the brakes are put in first-class condition before they are allowed to proceed. The practice of testing the brakes on incoming trains cannot be emphasized too strongly. It is evident that if this is done the defective brakes can be found and repaired with less amount of dead time to the cars and their lading than when the inspections are made on the outgoing tracks. Careful supervision and inspection is absolutely necessary and in order that all repaired triple valves may be in first-class condition when placed on the cars, it has been strongly recommended that the testing of them be done by a competent inspector rather than by the man who cleans them, many cases having been found where stenciled triples have become inoperative before their limit of service had expired.

THE CONSOLIDATION PROBLEM

PRESIDENT GAINES, of the Master Mechanics' Association, in his presidential address, strongly advocated the consolidation of all of the railway mechanical associations to the extent at least of having a governing body direct and supervise the work of all of them to prevent duplication and useless expenditure of energy, to insure the adoption of uniform standards, and to bring their work to as high a practical efficiency as possible.

A study of the programs of the two conventions at Atlantic City this year throws an interesting side light on such a movement so far as it concerns the work of the Master Mechanics' and Master Car Builders' Associations. Of the sixty items on the two programs, ten are identical although, except for safety appliances and the question of holding joint meetings, these items are largely matters of routine business. Of the 60 items, however, 38, or 63 per cent, are matters which could well be considered in joint session, while there are only 22—15 on the Master Mechanics' Association program and 8 on that of the Master Car Builders' Association—which are not suitable for joint discussion.

Whether a governing body directs the work of the associations, or a general mechanical association is formed with different sections meeting together or separately as the conditions at the time may warrant, or the two major associations continue on as they are but hold their meetings in the same week with a joint session during the middle of the week, is a matter for discussion. There can be no question, however, as to the desirability or even necessity of taking some measure immediately to secure greater co-operation on the part of all of the railway mechanical organizations. This has been realized for a long time, and we have consistently advocated it in our columns. The minor mechanical associations are doing excellent work, and yet in the majority of cases they feel the need of more recognition from the larger associations and would undoubtedly be glad to work with them with the idea of going thoroughly into the details of those questions with which they are most familiar and making definite recommendations to the major associations for approval and adoption as recommended practice or standards.

The time is now ripe for action. The question has been debated pro and con for a number of years and there should be very little trouble in securing some definite action. It only needs the right man or men to get behind the move and bring it to fruition. Will this be done?

TWO SUCCESSFUL CONVENTIONS

SEVERAL reports of more than ordinary importance were presented at both of the conventions this year. If the discussions were not as long or as extensive as might have been expected in some cases, this was apparently due to the fact that the committees had done their work particularly well, rather than because of any lack of interest. The committee reports were also especially well presented by the chairman who, practically without exception, used good judgment in placing the vital points before the members and using the time allotted to them to the best advantage. The new meeting room made a big difference, allowing the members to be seated to better advantage than in the old hall, and providing a seating capacity sufficient to easily take care of all of the members in attendance at any one meeting. The acoustic properties are better than those of the long narrow room which was used last year.

While the exhibitions were fewer in number than last year, over 70,000 square feet of space was used. It is doubtful if any exhibit has shown more new or improved devices, and from an educational viewpoint it could hardly be surpassed. It would appear that the railway men appreciated this and made good use of the opportunity of studying those devices which seemed to give promise of helping them to solve their special problems. We have heard many comments about the thorough way in which certain individuals and groups examined the exhibits with this in view.

The entertainment features were delightful. Simplicity and informality governed and in a quiet way the members seemed to thoroughly enjoy themselves. The weather man helped the entertainment committee out, we have had a little fog, a bit of rain on Sunday, but generally speaking the days were clear and warm.

It has been said that the pier was a little quiet, with less rush and bustle than in previous years. It is true that the total attendance has fallen off some, due in large part to the business depression, but the falling off in the registration of railroad men is small. It must be remembered, too, that the tone of the associations has been gradually changing in recent years. The problems up for consideration have steadily grown bigger and bigger, and have demanded more searching and technical examination and study. The effect of this is noticeable and undoubtedly the added responsibility has had some effect on the meetings as a whole.

As in recent years the attendance of government representatives was large. The presence of George B. McGinty, secretary of the Interstate Commerce Commission; H. W. Belnap, chief of the division of safety, and Messrs. McManamy, Robinson and Pack of the department of locomotive boiler inspection, with a large number of inspectors from both the safety appliance and boiler departments cannot help but develop a closer co-operation and better understanding between the representatives of the government and the railways.

Taken all in all those who were in charge of the planning of and carrying out of the meetings can well afford to be proud of the outcome.

TODAY'S PROGRAM

WEDNESDAY JUNE 16, 1915

Discussion of reports on:	
Train lighting and equipment.....	9.30 A. M. to 10.00 A. M.
Car trucks	10.00 A. M. to 10.30 A. M.
Draft gear	10.30 A. M. to 10.45 A. M.
Joint meeting with A. R. M. M. Assn.	10.45 A. M. to 11.00 A. M.
Individual paper—Impact between freight cars in switching service. By Prof. L. E. Endsley	11.00 A. M. to 11.30 A. M.
Topical discussion:	
Air brake maintenance	11.30 A. M. to 11.45 A. M.
Unfinished business; Reports of Committees on Correspondence, Resolutions and such other committees as may be named during the convention	11.45 A. M. to 12.00 M.
Election of officers	12.00 M. to 1.30 P. M.

LOST

Badge 3584 has been lost. Finder will kindly return to Secretary Conway.

OBITUARIES

President Crawford has appointed committees to draw up obituaries for the following members who died during the past year. Active Members: P. P. Mirtz, Lake Shore & Michigan Southern; C. J. McMasters, Rutland Railroad; H. R. Payne, Union Tank Line; F. W. Chaffee, New York Central & Hudson River; H. C. Bossinger, Chesapeake & Ohio Representative Members. T. E. Adams, St. Louis Southwestern; A. Stewart, Southern Railway; E. C. Hawkins, Copper River Railway; S. D. Freshman, Sierra Railway of California; E. A. Miller, New York, Chicago & St. Louis; H. C. Millis, Western Live Stock Express. Life Members: J. P. Levan, Pennsylvania Railroad; B. Welsh, Southern Pacific, and C. Wicks, Cumberland Valley.

A HANDSOME PRESENT FOR CHAIRMAN CARR

On Monday evening, just before the informal dance on the Pier began, Chairman George R. Carr, of the entertainment committee, was lured to the porch of the booth of the Dearborn Chemical Company, of which he is vice-president. When he arrived he found the members of the entertainment committee assembled, and in a short address expressing the committee's pleasure in having worked with him, and its appreciation of the efficiency of his efforts, Gilbert E. Ryder, on behalf of the committee, presented Mr. Carr with a gold pocket knife with a gold and platinum chain. On one side of the knife is engraved Mr. Carr's name and on the other the words "Entertainment Committee M. M. and M. C. B. 1915." The present is a handsome one and is highly appreciated by its recipient.

PAST PRESIDENT'S BADGE FOR J. WILL JOHNSON

At the noon meeting yesterday of the executive committee of the Railway Supply Manufacturers' Association, C. B. Yardley, Jr., chairman of the badge committee, in a happy speech, presented on behalf of the committee to J. Will Johnson, the retiring president of the association, a past president's badge. This is the sixteenth past president's badge which has been presented on behalf of the association. Mr. Yardley paid high tribute to the hard and efficient work in various capacities which Mr. Johnson has done over a long period of years to

ENTERTAINMENT COMMITTEE

Top Row, Left to Right—Langley Ingraham (Yarnall Paint Co.); W. H. Bentley (Curtain Supply Co.); Wm. W. Melcher (Mass. Mohair Plush Co.); R. J. Faure (Commercial Acetylene Railway Light & Signal Co.); F. H. Thompson (Railway Age Gazette); G. E. Ryder (Locomotive Superheater Co.).

Second Row—C. C. Farmer (Westinghouse Air Brake Co.); D. E. Sawyer (Illinois Steel Co.); M. G. Baker (American Vanadium Co.); Albert MacRae (MacRae's Blue Book); J. F. Forney (Ralston Steel Car Co.).

Third Row—C. W. F. Coffin (Franklin Railway Supply Co.); W. K. Krepps (Crucible Steel Co.); G. R. Berger (Gould Coupler Co.); J. P. Landreth (Garlock Packing Co.).

Fourth Row—H. N. Scott (Griffin Wheel Co.); J. F. A. Comstedt (Atlas Automatic Jack Corporation); George R. Carr, Chairman (Dearborn Chemical Co.); A. B. Wegener (Camel Co.), and Burton W. Mudge (Burton W. Mudge & Co.).

make the undertakings of the Supply Association successful. He said in part:

"Your training in the way of the railroad man, having yourself gone through the life that knows no hours, whose requirements are sincerity, loyalty, perseverance and unfeeling devotion to duty, a willingness to surmount each difficulty with but one thought in view, has indeed fitted you for the duties you have so conscientiously and happily fulfilled. We trust that you will keep this badge as an emblem without price that represents the personality, friendship and good will of the association. I bespeak for this organization and for this committee the continuance of that interest in our welfare which has been so marked in the past, that often we may greet you and always count you as our friend."

FIFTH DAY'S REGISTRATION FIGURES

The registration figures up to Monday evening, the first day of the M. C. B. convention, and the fifth of the meetings of the two associations, make a very satisfactory showing regarding the attendance of railway men. The statistics, compared with those covering the same period of the immediately preceding four years, are as follows:

	1911	1912	1913	1914	1915
Members M. C. B. & M. M.	719	644	678	730	713
Special Guests	832	583	680	554	505
Railroad Ladies	705	437	505	433	403
Supply Ladies	385	223	308	287	232
Supply Men	1662	1516	1666	1484	1248
Total	4303	3404	3837	3488	3103

It will be seen that the registration of railway men has been only slightly smaller than in 1911 and 1914, and has been substantially larger than in 1912 or 1913. There has been a heavy decline in the registration of special guests since 1911, but this probably is almost entirely due to a reduction in the liberality with which these badges are handed out. Comparing with 1914, the reductions in the registration are as follows: Railway men, 17; special guests, 49; railroad ladies, 30; supply ladies, 55; supply men, 176; total reduction, 385.

The reduction in the registration of supply men is much smaller now than it was on the first day of the Master Mechanics' convention, owing to the fact that many concerns which are interested chiefly in the M. C. B. Convention did not have their representatives come until this week.

THE ASSOCIATIONS INDORSE PRESIDENT WILSON'S POLICY

The Master Car Builders' Association and the Railway Supply Manufacturers' Association yesterday took action indorsing President Wilson's policy in dealing with the Imperial German Government.

D. R. MacBain introduced at the meeting of the M. C. B. Association the following resolutions, which were adopted unanimously in a storm of applause, and ordered telegraphed to the president at Washington:

"The Master Car Builders' Association of America, comprising the mechanical officials of the railways of the United States, in session at Atlantic City, New Jersey, send you assurance of its enthusiastic approval of the notes despatched by you to the Imperial German Government, calling for the maintenance inviolate of all rights of American citizens on the high seas.

"Regardless of the political affiliations of its members, the Association, as one man, applauds the patriotism of your course and the wisdom of your utterances during this critical period of the progress of the dreadful European war.

"We profoundly sympathize with you in the heavy burden of responsibility you are bearing for your fellow-countrymen at this juncture so devotedly and courageously. At this time every American should stand heart and soul with our President."

When the executive committee of the Railway Supply Manufacturers' Association heard of the action taken, it drew up and sent to the M. C. B. Assocation the following communication:

Atlantic City, N. J., June 15th, 1915.

Mr. D. F. Crawford, President,
Master Car Builders' Association,
Atlantic City, New Jersey.

Dear Sir:

The Executive Committee of the Railway Supply Manufacturers' Association indorses with the same enthusiasm the resolution adopted by your association to be sent to the President of the United States, in reference to his notes to the Imperial German Government, and begs to have its indorsement included in your resolution.

Respectfully submitted,

J. WILL JOHNSON, *President,*
C. E. POSTLEWAITE,
F. M. NELLIS,
For the Executive Committee.

This communication was received and included in its minutes by the M. C. B. Association.

THE TRACTION STRIKE IN CHICAGO

The convention visitors from Chicago have been reading with interest the newspaper accounts of the strike of employees of all the elevated railways and surface street railway lines which has been declared in that city. The extremely large area which Chicago is spread out over and other conditions make such a strike there especially serious. It appears from the newspaper reports that on Monday, the first day of the strike, not a wheel turned on the surface lines and only a few trains ran on the elevated lines. One result was an enormous increase in the traffic handled by the steam suburban lines. The Illinois Central ordinarily handles 40,000 suburban passengers a day. The newspapers state that on Monday it handled 280,000. It is evident that while the strike lasts the steam railways will profit by it, but on the other hand the increase in the difficulties under which they operate will be something enormous because of the immense increase in the service which they will have to render without any proportionate increase in their facilities.

THE MUSIC THIS YEAR

The music on the Million Dollar Pier during the mornings and afternoons and for the informal dances in the evenings has excited considerable favorable comment and is probably the best ever had at the conventions. The orchestra is not as large as some of those employed in previous years, but this is not apparent in the volume or effect because of the ability of the individual players and the skillful way in which they are directed. The orchestra is known in New York City, where it has been playing for three years, as the Don Richardson Society Orchestra and makes a specialty of playing at private and club affairs only, probably doing more of this than any other orchestra.

Those who have enjoyed some of the Indian compositions will be interested in knowing that after leaving the University of North Carolina, Mr. Richardson traveled in the Far West and Mexico and spent considerable time at Yuma, where his uncle was stationed as the United States collector of customs. This gave him the opportunity of studying the customs and habits of the Yuma Indians, and his knowledge of their sacred sun dances, snake dances, rain dances, etc., undoubtedly inspired his Papoose Dance, Intermezzo, Cradle Songs and Indian Overture.

Mr. Richardson was the first to adapt the two well-known songs "A Perfect Day" and "Mighty Lak' a Rose" as hesitations in September, 1914. He has also published the Athene Waltz and the Zum one-step, both of which are extensively used throughout the country.

Master Car Builders' Association Proceedings

Reports on Couplers, Rules for Loading Materials, Car Construction, and Specifications and Tests for Materials

President Crawford called the Tuesday morning to order at 9.45. The report of the Auditing Committee was received and approved.

COUPLERS

The course of the committee during the past year was as follows:

A. Road Tests; continuation of the road-service tests on "Present" and "Experimental" types of couplers begun since the inception of this work.

B. Road Tests; results of the recommended road-service tests or trials of the *A* and *B* couplers by the members of the Association.

C. Dynamic and Static Tests.

D. Service Machine.

E. Angling and Coupling.

F. Jiggling or Lock-creeping.

ROAD TESTS

The road-service tests on "Present" (couplers in general use) and "Experimental" types of couplers inaugurated during the early investigation and development stage of the committee work were continued. Each coupler was given a letter designation, to represent the name or type of the coupler tested, as well as the manufacturer. Couplers Ta,

R. L. Kleine
Chairman, Committee on Couplers

Ua, Wa, Xa, Ya and Yc represent couplers of the present types in general service, such as Pitt, Sharon, Major, Simplex, Latrobe and Gould "Z," irrespectively, and couplers Tb, Xe, Yb, Yd, Yda and Ydb represent couplers of increased weight and strength in the development stage, termed "Experimental," a number of each of which were placed in service experimentally.

These road-service tests were conducted with couplers of "Present" type on freight cars, and with couplers of both present and the experimental design on freight locomotive tenders on the Pennsylvania Railroad. The freight car couplers were applied to 100,000-lb. capacity steel hopper cars in the coal trade between the bituminous mines in Western Pennsylvania and tidewater, a service comprising grade and flat country as well as hump-yard classification. The tender couplers were applied to 7000-gal. steel tenders in general heavy freight service on the Western Pennsylvania Division, between Altoona and Pittsburgh, which includes heavy-grade service.

These couplers were measured once every month, to determine their operation and ability to withstand service, and thus draw comparisons between the static and dynamic tests with road-service tests.

The road test of couplers on tenders in freight service develops in the shortest space of time the defects as well as the relative life of couplers. From the test results it was surprising to note the short life, before repairs are required, of couplers of the "present" type in this service, as well as the relatively longer life that is being obtained from the "experimental" couplers. The following couplers were tested:

Freight Tender Couplers:

3 Xa couplers (present type), applied July, 1912.
2 Xa couplers (present type), applied 3-26-13 and 4-3-13, respectively, to replace above Xa couplers removed.
3 Ya couplers (present type), applied July, 1912.
12 Tb couplers (experimental type), applied July, 1912.
6 Yb couplers (experimental type), applied August, 1912.
6 Yb couplers (experimental type), applied November, 1912.
6 Yd couplers (experimental type), applied August, 1912.
6 Yda couplers (experimental type), applied June, 1913.
6 Ydb couplers (experimental type), applied June, 1913.
1 Xe coupler (experimental type), applied February 21, 1913.

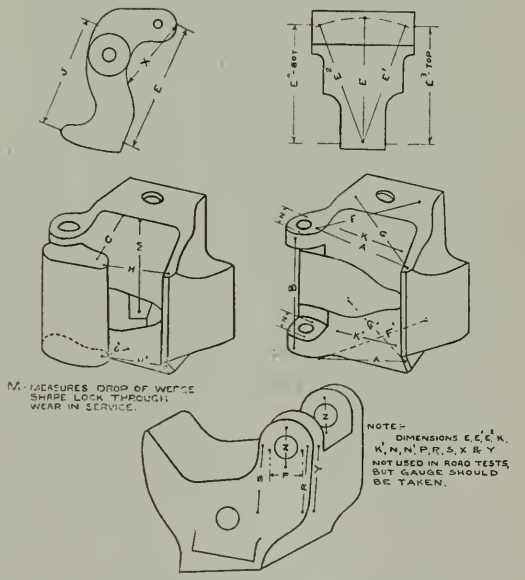


Fig. 1.—Tramming Points on M. C. B. Test Couplers

Freight Car Couplers:

2 Ta couplers (present type), applied July 28, 1912.
2 Ua couplers (present type), applied July 28, 1912.
2 Wa couplers (present type), applied July 28, 1912.
2 Xa couplers (present type), applied July 28, 1912.
2 Ya couplers (present type), applied July 28, 1912.
2 Yc couplers (present type), applied July 28, 1912.

The following table gives the "set" found at *C*, *H*, and *E* of various couplers in service on locomotive tenders:

Class	Type	Date Installed	Date of Last Test	C	C¹	H	H¹	E³	E⁴	Top Gage	Bottom Gage
Tb	Experimental	7-1-12	4-13-15	+ 24	+ 14	+ 24	+ 23	— 08	— 04	$51\frac{1}{32}$	$51\frac{3}{32}$
Yd	Experimental	8-1-12	3-14-15	— 04	+ 07	+ 04	— 09	— 06	— 06	$41\frac{29}{32}$	$49\frac{7}{16}$
Yda	Experimental	6-13-13	3-25-15	+ 15	+ 23	+ 30	+ 19	— 03	— 01	$47\frac{5}{8}$	$42\frac{7}{32}$
Ydb	Experimental	6-12-13	4-6-15	— 05	— 04	— 04	— 02	— 05	— 04	$45\frac{5}{8}$	$45\frac{5}{8}$
Ya	Present	7-8-12	4-16-15	+ 12	+ 11	+ 12	+ 15	+ 19	+ 10	5	$51\frac{1}{16}$

ROAD TESTS—*A* AND *B* COUPLERS

The road tests which are being conducted to develop the operation of the couplers in service as well as the breakages of

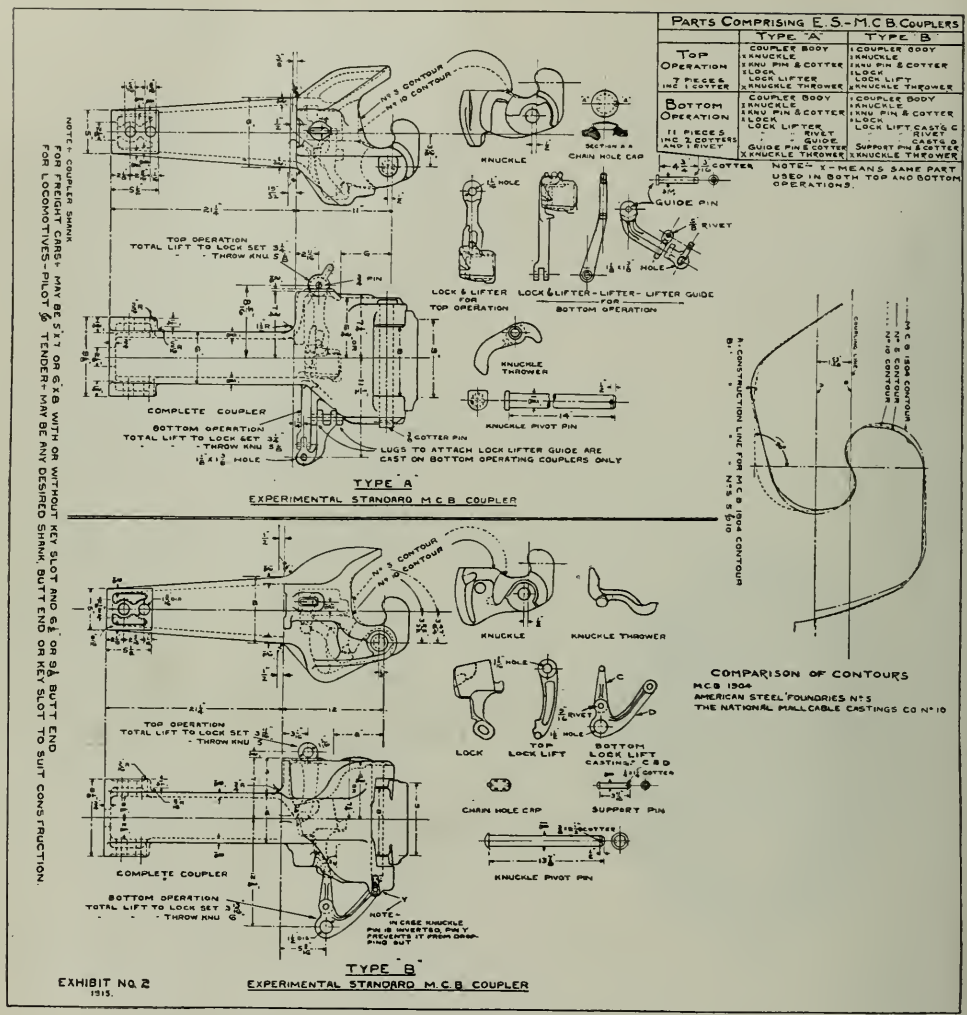


Fig. 2.—General Dimensions of M. C. B. Experimental Couplers, Types A and B

The following is a Summary of measurements, showing the permanent set at *C*, *H* and *E*, of 12 freight car couplers of the "present" type. They were applied July 28, 1912. Nine of the twelve couplers are still in service.

Coupler	Date	Time in Service	Set—Plus or Minus Inches—From Original Dimension						Gage	
			C	C^1	H	H^1	E^2	E^3	Top	Bot.
Ta	4-6-15	32 Mo. 10 Da.	+.28	+.24	+.05	+.16	+.06	+.05	4 3/16	4 7/16
Ta	4-6-15	32 Mo. 10 Da.	+.26	+.11	+.11	+.16	+.07	+.07	4 3/16	4 3/16
Ua	4-26-15	33 Mo.	+.35	+.37	+.17	+.36	+.17	+.13	5 1/16	5 1/16
Ua	10-17-14	26 Mo. 19 Da	+.20	+.12	+.02	+.07	+.15	+.13	5 3/16	5 1/16
Wa	3-22-15	31 Mo. 26 Da.	+.24	+.41	+.28	+.38	—.04	Lost	5 1/16	5 1/16
Wa	8-10-14	24 Mo. 13 Da.	+.23	+.33	+.18	+.34	—.07	+.17	4 3/16	4 1/8
Xa	3-22-15	31 Mo. 26 Da.	+.16	+.07	+.12	+.11	—.04	—.06	5	4 15/16
Xa	3-22-15	31 Mo. 26 Da.	+.20	+.20	+.12	+.15	+.03	+.03	4 1/8	5
Ya	9-28-14	26 Mo.	+.28	+.29	+.19	+.23	+.13	+.11	4 3/16	4 1/16
Ya	3-29-15	28 Mo. 28 Da.	+.30	+.34	+.22	+.37	+.09	+.11	4 1/16	5 1/16
Yc	4-13-15	32 Mo. 17 Da.	+.32	+.43	+.17	+.27	+.15	+.17	4 3/16	4 1/16
Yc	4-13-15	32 Mo. 17 Da.	+.44	+.45	+.18	+.41	+.13	+.24	5 3/32	5 1/16
Average		30 Mo. 11 Da.	+.272	+.280	+.153	+.251			4 31/32	4 31/32
			+.276		+.202				4 31/32	

couplers and parts, are of equal, if not greater, importance than the static and dynamic tests. Many of the existing couplers operated perfectly when first designed or placed in service, and will continue to do so until affected by wear and distortion of parts, and it has required in the past from two to three years' service to develop these conditions. The committee, therefore, can not impress too strongly upon the members of this Association the absolute necessity of not only placing a sufficient number of these experimental standard couplers in service from which to draw proper conclusion, but to follow up particularly

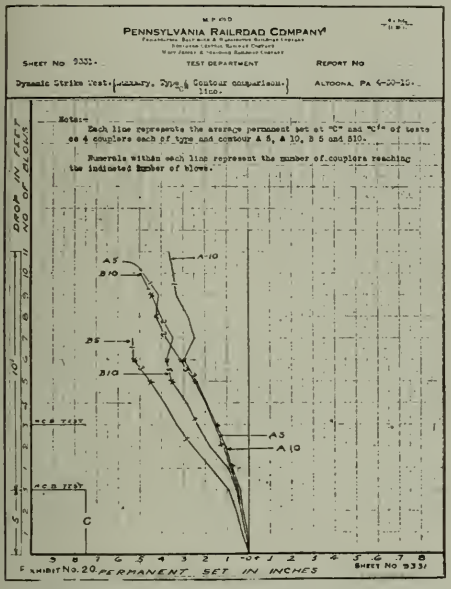


Fig. 3.—Set of *C* Line in Dynamic Strike Test

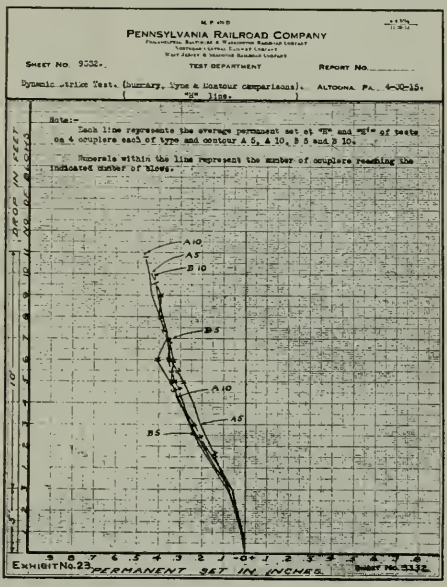


Fig. 4.—Set of *H* Line in Dynamic Strike Tests

the operation and what takes place under the conditions of wear and distortion.

Thus far the couplers have not been in service a sufficient length of time to determine all the weak points or the seriousness of the defects that have developed. This is also the consensus of opinion expressed in preliminary reports received from 32 railroads having these couplers in service.

There are now 3,713 experimental couplers in service as follows: 933 type A, contour No. 5; 793 type A, contour No. 10; 138 type A pilot couplers; 704 type B, contour No. 5; 1,001 type B, contour No. 10, and 144 type B pilot couplers.

The Pennsylvania Railroad placed 30 each of the Type A and B Experimental Standard M. C. B. couplers in road locomotive tender service during the early summer of 1914. These couplers had a 5 in. by 7 in. special shank and were applied to 7000-gal. capacity steel tenders, attached to Consolidation type freight locomotives of 46,290 lb. tractive effort, in general freight service on the Eastern and Western Pennsylvania Grand Division, between Philadelphia and Pittsburgh, which includes ordinary as well as heavy grade service. One coupler of each type and contour (total, 4) was applied to steel tenders attached to latest type passenger locomotives. Six couplers of each type and contour (total, 24) were laid off as per Fig. 1, the bar plates labeled and all parts plainly stenciled. Four of these couplers in each type and contour (total, 16), which had been laid off, were inspected and measured once every month. The remaining couplers (44) had all parts stenciled and were also inspected every month. Below is given the last measurement only of the couplers in the groups of A-5, A-10, B-5 and B-10 couplers, being measured regularly:

Type	Contour	Bar No.	Service	Date Applied	Date Last Tested	A	A1	C	C1	Measurements H	H1	G	G1	E2	E4	Repairs
A	5	757	Freight	7-3-14	4-9-15	0	—.01	+.04	+.03	+.08	+.05	+.03	+.02	+.04	—.02	None
A	5	758	Freight	7-2-14	4-7-15	—.06	—.01	+.11	+.02	—.02	+.04	0	+.01	—.06	+.01	None
A	5	756	Passenger	6-3-14	4-29-15	0	0	+.06	—.02	+.04	+.05	0	0	—.01	0	None
A	5	759	Freight	7-3-14	2-9-15	0	0	+.08	—.01	+.10	+.07	+.01	0	—.01	0	Shank bent
A	10	772	Freight	7-7-14	4-15-15	+.22	+.12	+.06	+.10	+.32	+.27	+.13	+.04	—.12	—.01	None
A	10	771	Passenger	6-29-14	4-7-15	—.06	—.04	+.08	0	—.01	+.05	+.01	+.02	—.02	—.01	None
A	10	773	Freight	7-3-14	12-4-14	0	0	+.08	+.06	+.06	+.11	0	0	—.02	—.01	Shank bent
A	10	774	Freight	7-7-14	3-1-15	+.11	—.06	—.03	—.07	+.13	—.03	+.10	+.03	—.10	—.05	None
B	5	728	Freight	5-28-14	4-7-15	+.08	+.15	+.17	+.15	+.25	+.31	+.06	+.08	—.01	+.01	None
B	5	726	Passenger	5-21-14	4-8-15	+.01	0	+.09	+.17	+.14	+.11	0	0	0	0	None
B	5	729	Freight	5-28-14	4-7-15	+.06	....	+.12	+.15	+.20	+.12	+.12	+.02	—.06	—.02	None
B	5	730	Freight	5-27-14	4-8-15	+.06	+.05	—.06	—.02	—.02	—.03	+.06	+.03	—.03	—.03	Knuckle cracked
B	10	742	Freight	5-27-14	4-8-15	+.13	+.01	+.05	+.23	+.24	+.16	+.09	0	—.01	+.01	None
B	10	741	Passenger	5-21-14	4-14-15	+.02	—.01	+.05	+.10	+.14	+.09	+.02	—.03	—.07	—.02	None
B	10	743	Freight	5-27-14	11-4-14	0	0	+.01	+.10	+.04	+.05	0	0	—.01	—.01	None
B	10	745	Freight	5-28-14	4-12-15	+.02	0	—.03	+.13	+.06	+.06	+.03	0	—.06	0	None

The following table gives a report in condensed form of the operation of the *A* and *B* couplers in locomotive service on the Pennsylvania Railroad up to May 1, 1915:

Item.	Coupler and Contour			
	A-5	A-10	B-5	B-10
.... Total number in service.....	57	57	57	13
.... Total number closely examined.....	39	38	38	13
1 Operate good	11	12	27	1
2 Operate fair	6	3	9	7
3 Operate fair, but do not throw satisfactorily	..	..	2	..
4 Operate fair, but throws knuckle poorly....	4	8	..	3
5 Operate poorly	..	..	..	2
6 Operate poorly; does not throw knuckle satisfactorily and lock jams knuckle.....	2	..	..	..
7 Operate poorly; does not throw knuckle satisfactorily and lock sticks between lock-set and full open position but disturbs when knuckle is pulled open.....	13	13	..	..
8 Operate poorly; does not throw knuckle satisfactorily and lock sticks between lock-set and full open position, from which the lock disturbs only occasionally	1	1	..	..
9 Throws knuckle poorly; knuckle thrower interferes with top wall of coupler head..	1	..	..	..
10 Lock sticks above lock-set position but disturbs, lock also jambs knuckle when closing	..	1	..	..
11 Operate poorly due to being tight between coupler ears	1	..	..	..

The defects on the P. R. R. on the type *A* couplers were more varied and numerous than were found on the *A* couplers

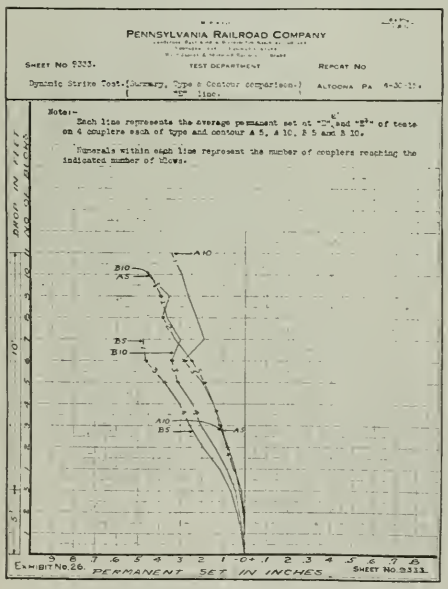


Fig. 5.—Set of *E* Line in Dynamic Strike Test

on the Norfolk & Western during the joint inspection, week of March 8, 1915.

At a joint inspection meeting of the Type *A* and *B* couplers in service on the Norfolk & Western by the committee and the coupler manufacturers H. W. Coddington of the N. & W. stated that road had the Types *A* and *B* couplers on the 750 60-ton steel gondola cars, as well as on the electric locomotives, and that the service being obtained from the couplers was very satisfactory. Mr. Coddington read a statement of couplers and separate knuckles removed to date from service, giving record of particulars in each case of the 33 couplers, 12 knuckles, 1 lock and lifter, and 1 knuckle thrower removed, as well as defects in some couplers still in service which do not yet warrant their removal. The N. & W. test department has examined one or more times the couplers on 607 of the 750 cars, and are very well satisfied with the service being obtained from them. Operation defects as yet minor in character have been found in both Types *A* and *B* couplers, but no trouble in operation has been reported by the transportation department.

It was found that practically all the couplers examined threw the knuckle open good. The principal defects found were as follows: Type *A* couplers, locks would stick in head above lock-set position in all but one examined; Type *B* couplers, lock fulcrum boss interferes with the front face in lifting lock, and the lock sticks in head above full open position. The interference of the fulcrum boss on the front of

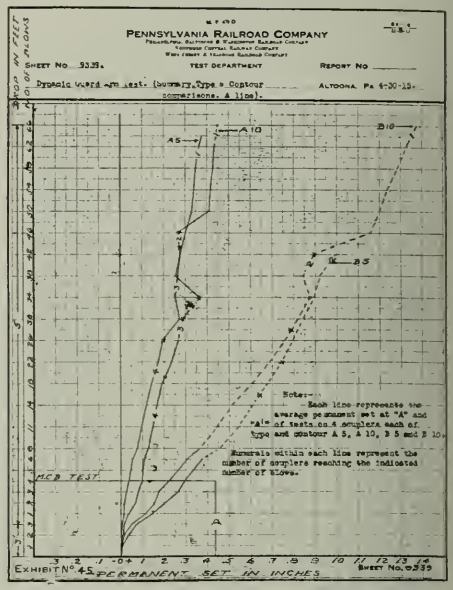


Fig. 6.—Set of *A* Line in Dynamic Guard Arm Test

the Type *B* lock with its pocket in front face of bar, when lifting lock, was only noticed on the couplers with the No. 5 contour. The cause of this is in part due to lack of clearance

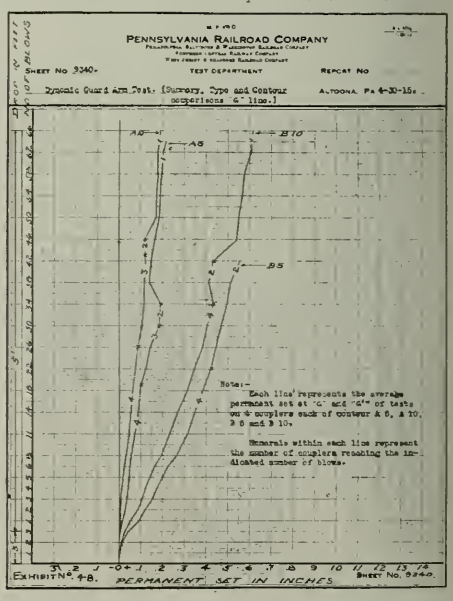


Fig. 7.—Set of *G* Line in Dynamic Guard Arm Test

and to the fact that the front face of bar over the pocket for the lock fulcrum on couplers of No. 5 contour is being dented inward somewhat, reducing the available clearance.

The sticking of the Type *B* lock above the locked position on couplers, with both the No. 5 and No. 10 contour lines, was brought about, in a few cases, by a quick jerk of the lever (the same as in service) in throwing the knuckle com-

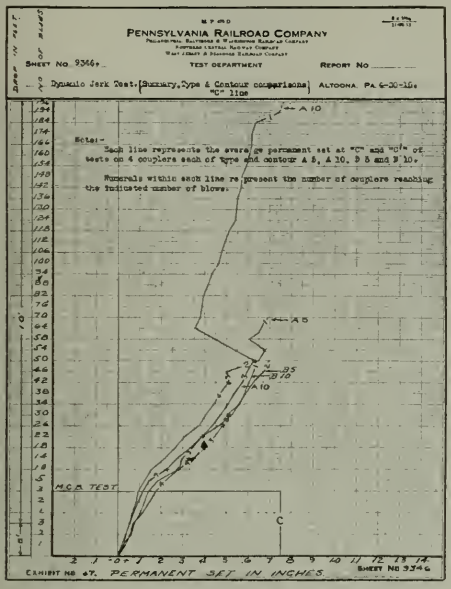


Fig. 8.—Set of *C* Line in Dynamic Jerk Test

pletely open; whereas, in the other cases where this was noted, it required repeated jerks of the uncoupling lever after the knuckle had been thrown to the full open position, and

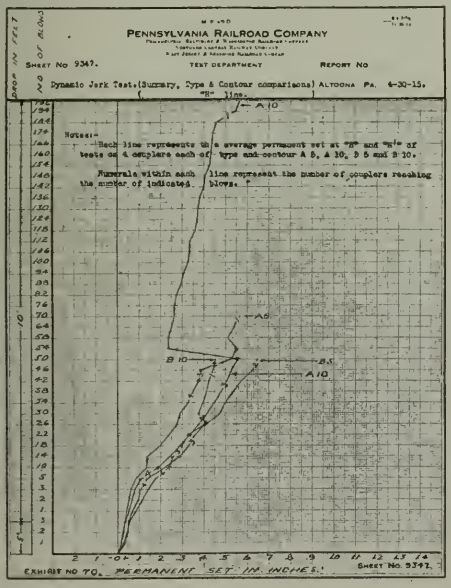


Fig. 9.—Set of *H* Line in Dynamic Jerk Test

bringing the uncoupling lever slowly to rest position, for if the lever was allowed to drop naturally, the lock would generally drop to the proper full open position. The cause of this sticking, as far as it was possible to determine, is due to insufficient clearances.

The following are some of the causes for removal of the experimental couplers on the Norfolk & Western: Type B-5—The knuckle was apparently bent inward about ½ in. and top of guard arm bent ⅜ in. Coupler inoperative on account of binding between lugs. No damage to car except striking plate bent inward ⅜ in. Conditions unknown.

Type B-5—Guard arm broken off at Lambert's Point. Conditions unknown. Guard arm broken off in making coupling at Lambert's Point. End sill plate bent ¾ in., carrier iron renewed and center sill bent out on knuckle side. Guard arm broken off at Lambert's Point. Reported no signs of rough handling.

Type A-10—Removed at Roanoke Shops account of hard blow on top of knuckle face and top lug causing binding between coupler lugs. Guard arm bent out ½ in. at top. Head crushed causing kicker to bind on trunnions making coupler inoperative. Shank bent 1¾ in. Vertical lock guide, knuckle side, broken. This occurred at Lambert's Point 5-23-14 in run-away with car 100069, but was reapplied to the car in error.

Type B-10—Bottom lug pulled from head. This occurred at Bluefield with report as apoeared to be due to rough handling.

Type B-5—Broke both lugs, breaking through mouth of

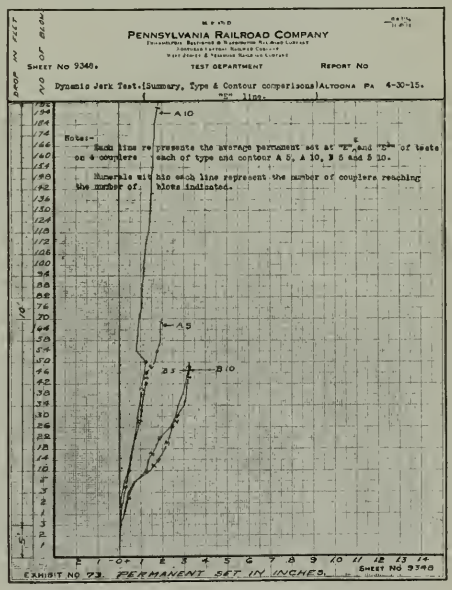


Fig. 10.—Set of *E* Line in Dynamic Jerk Test

bar; lugs and knuckle lost. Occurred west of Bluefield. Conditions unknown.

Type A-5—Burst head. Top wall cracked open forward of lifter hole and down inside of front top face. Marks as would be made by mating coupler guard arm on front face. Removed at Bluefield, car shows no signs of rough handling.

Type A-5—Top of head mashed in so the lock could not go up higher and let the knuckle throw. Also head cracked on inside from mouth of bar to top of head. Coupler does not seem to have had any unusually hard service.

Type B-10—Knuckle broke through pin hole on first car in train. Caused by 90 car west-bound train parting thirty cars back of locomotive and air went on in emergency at Walton, Va. Front half of knuckle lost. Knuckle broke through pin hole at Bluefield. Reported rough handling.

Reports were also received from other roads that are using the experimental couplers—[Editor].

In connection with the question of slack in the *A* and *B* couplers, of both Nos. 5 and 10 contour, an investigation was made on these couplers on an empty train of fifty Norfolk & Western 90-ton capacity steel gondola cars. The cars were all coupled and the train was coupled to a long train

of steel hopper cars loaded with coal, and brakes set on a number of the latter. The train of 50 N. & W. cars upon which the investigation was being conducted was then thoroughly stretched with a locomotive and brakes set on locomotive and several cars next to it, to insure the stretching. Each coupler was centrally punched on top of the head just back of the face and on the longitudinal center line of coupler and the distance trammed. The train was then bunched and the distance between the center-punched marks of each coupling above referred to was again trammed, the difference between this distance and the original distance as laid off with cars stretched being the slack per coupling. These cars and couplers had an average service of a little over nine months at time of these measurements.

The cars were equipped with the Sessions Friction Draft Gear (Type *K*), with the coupler horn originally set 1⅞ in. from the striking plate. The total slack in train consisting of 49 couplings, including couplers and drafts between buffed and stretched positions, was 26 ft. 10½ in., of which 4 ft. 8$^{9}/_{32}$ in. were in the couplers themselves. The following table is a summary of the results:

Number.	Couplings. Type Couplers and Contours Coupled.	Slack per Coupling. Minimum.	Average.	Maximum.
5	A-5 with A-5.....	1.062	1.156	1.281
2	B-5 with B-5.....	.969	.969	.969
5	A-10 with A-10.....	1.219	1.306	1.438
4	B-10 with B-10.....	1.000	1.156	1.281
3	A-5 with B-5.....	1.062	1.135	1.187

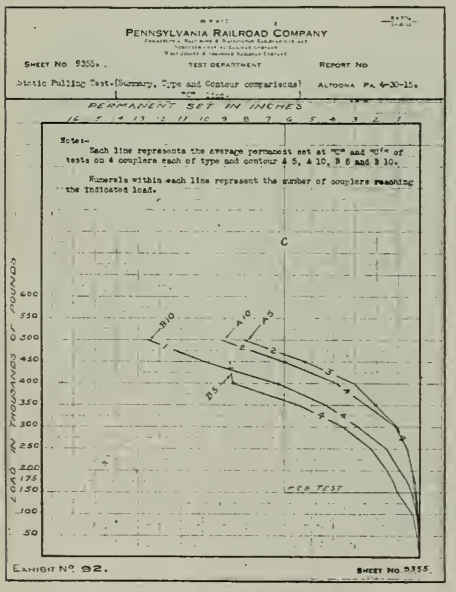


Fig. 11.—Set of *C* Line in Static Pulling Test

5	A-5 with A-10.....	1.062	1.187	1.344
4	B-5 with B-10.....	.875	.992	1.094
5	A-10 with B-10.....	1.187	1.319	1.375
9	A-5 with B-10.....	.937	1.093	1.250
7	B-5 with A-10.....	.844	1.076	1.250
10	No. 5 with No. 5.....	.....	1.112	.....
14	No. 10 with No. 10....	.....	1.268	.....
25	No. 5 with No. 10.....	.....	1.091	.....

DYNAMIC AND STATIC TESTS

The tests mentioned in report of last year as necessary to be made upon the Types *A* and *B* Experimental Standard M. C. B. couplers of both sizes of shank—5 in. by 7 in. and 6 in. by 8 in.—and both contours—Nos. 5 and 10—have been completed recently, and the results are shown in plotted form in Figs. 3 to 16 inclusive. The couplers were laid off the same as in previous tests, as per Fig. 1 and measured after each drop or increment of load. These tests were conducted by the Pennsylvania Railroad Company at Altoona, under the direct supervision of C. D. Young, Engineer of Tests, and the chairman of this committee.

SERVICE TESTING MACHINE—FINAL TESTS

As a result of the tests on the Types *A* and *B* couplers in the service test machine conducted during January and February, 1914, at the works of the American Steel Foundries at

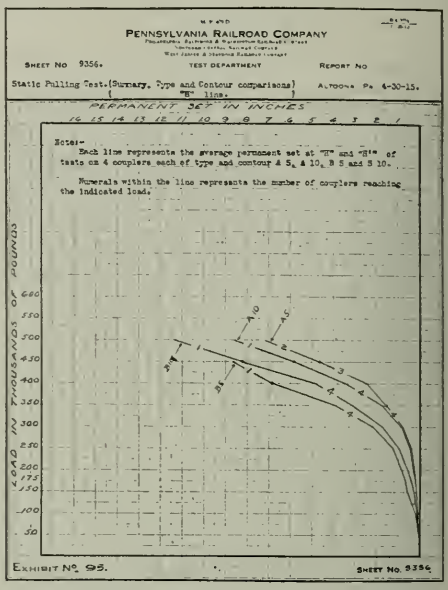


Fig. 12.—Set of *H* Line in Static Pulling Test

Alliance, Ohio, certain slight modifications in the details of the couplers were found desirable. The changes on the couplers were made by the respective manufacturers, and

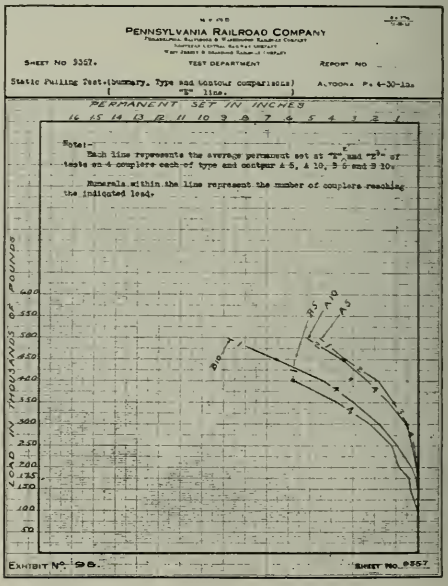


Fig. 13.—Set of *E* Line in Static Pulling Test

couplers embodying the modifications were tested on the same machine. Both types of couplers with the No. 5 contour lines were separately subjected to 30,000 cycles of the

machine, every cycle representing one each of the following operations, namely: Coupling, lock-setting, uncoupling, closing knuckle and throwing knuckle open. After completion of

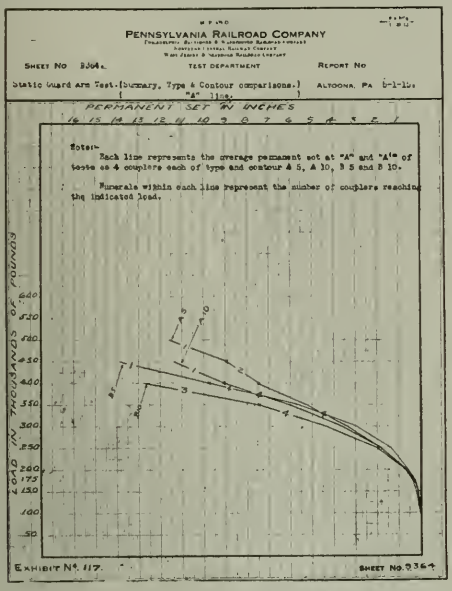


Fig. 14.—Set of *A* Line in Static Guard Arm Test

tests both types of couplers were in good operating condition, and, while during the test some minor defects of operation were noted, it was clearly established that the modifica-

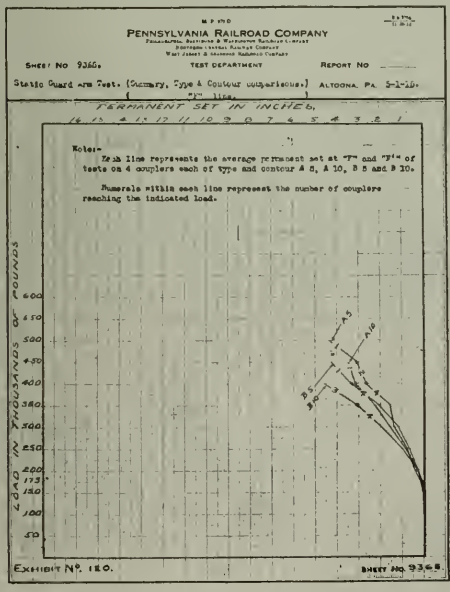


Fig. 15.—Set of *F* Line in Static Guard Arm Test

tions which had been made, as the results of the former tests, were beneficial to the extent of correcting most of the trouble previously experienced.

WEIGHT OF TYPES "A" AND "B" COUPLERS

The opinion has been voiced, although no specific objection has been made, that the weight of the Experimental Standard M. C. B. couplers is too great; and this subject has been seriously considered by the committee, as well as jointly between the committee and the coupler manufacturers, and from what can be learned, the objections that have been raised are commercial, based on the increased cost due to the increased weight, rather than any definite mechanical objection to the increased strength or weight. The breakage in the Experimental Standard M. C. B. couplers in service demonstrates conclusively that the strength of the coupler is not abnormal, and the tests prove that there is a maximum strength per pound of weight employed in the designs.

NEW EQUIPMENT TO BE DESIGNED TO ACCOMMODATE THE STANDARD COUPLER

The committee deems it advisable to call to the attention of the members the desirability of designing any new equipment—locomotives or cars—to accommodate the standard coupler. It has been found that a 6 in. by 8 in. shank is essential on the standard coupler, and, therefore, provision should be made for the same in all new or redesigned equipment, so that the standard coupler can be applied in repairs when finally adopted. In so far as locomotives and tenders

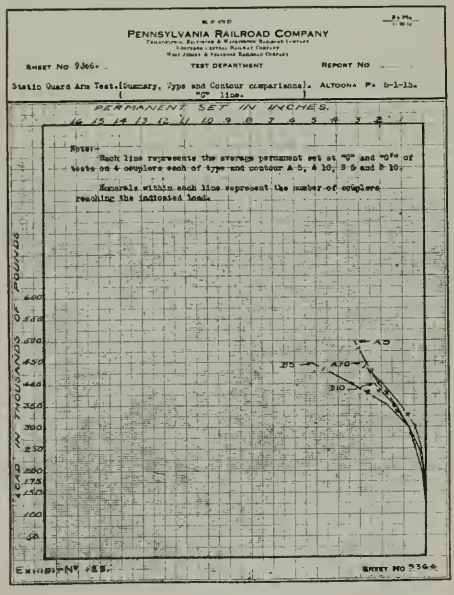


Fig. 16.—Set of *G* Line in Static Guard Arm Test

are concerned, it is economical to immediately apply the present Experimental Standard M. C. B. couplers, inasmuch as they are not interchanged, and obtain the saving resulting from the increased life of these couplers.

The report is signed by:—R. L. Kleine (Penna.), chairman; G. W. Wildin (N. Y., N. H. & H.); F. W. Brazier (N. Y. C.); F. H. Stark (Montour); J. F. De Voy (C., M. & St. P.); B. Julien (U. P.), and J. W. Small (S. A. L.).

DISCUSSION

F. W. Brazier (N. Y. C.): I cannot let this opportunity go by, although I am a member of the committee, without telling you gentlemen of the immense amount of work which has been done in getting up this report through the efforts of Mr. Wallis and Mr. Kleine, and the debt we owe to the Pennsylvania Railroad Company for the work it has undertaken in this direction. It is sometimes asked why the coupler should weigh approximately 400 lb. The committee would like to get it down to 100 lb. but in order to get strength you must have weight. Although these couplers will cost more, with the heavy engines now in use, and with the increased weight of equipment generally, it is necessary we should plan to put in new couplers, and I

hope to live long enough to see the railroads of this country agree on one standard form of coupler.

D. R. MacBain (N. Y. C.): I move that the convention extend to Mr. Kleine and his committee the thanks of the Association.

(The motion was carried.)

R. L. Kleine (Chairman): I thank you, gentlemen. I might say that the coupler manufacturers have worked equally hard with this committee in endeavoring to bring about one standard coupler.

The President: The privilege of the floor is extended to such representatives of the coupler manufacturers who may desire to speak.

R. E. Janney (Am. Steel Fdries): I would like to say that the coupler manufacturers have as much to thank your committee for, and probably more, than they have to thank us for.

S. P. Bush (Buckeye Steel Castings Co.): The coupler manufacturers are very much interested in this question. We are particularly interested in seeing the best coupler that can possibly be devised adopted as a standard. The question of weight is a very important consideration. In coming in contact with railroad representatives in different parts of the country we find that certain railroads feel that they do not need such a heavy coupler, and doubtless for their own local conditions that may be true. But a coupler has got to be considered in the light of the interchange service, and the future certainly must be considered in the matter. It is not unlikely that the average service of the next ten years is going to be increased in severity, so that if there are any objections to a coupler of the weight that has been suggested it would seem that the reasons ought to be fully set forth. From a manufacturer's standpoint we feel that as long as the association undertakes to adopt a standard it would be decidedly advantageous to have a single standard.

S. L. Smith (Nat'l Mall. Castings Co.): The committee seems to be very unanimous in its opinions, and I think they have found that the coupler manufacturers were willing to go along with them. When you get a standard coupler, it will be the result of the joint efforts of the Coupler Committee, and the majority at least, of the coupler manufacturers.

E. M. Grove (McConway & Torley): A number of years ago when the 100,000 lb. cars were first advocated, the small coupler was the standard all over the country. They were placed on these cars and in an air-brake test they went to pieces. Today the same conditions prevail with the larger cars, the larger locomotives, and the larger trains. We have got to meet the marked progress. You cannot buy 400 lb. of material at the same price that you can buy 300 lb. of material. I believe that in getting the additional strength, the additional weight, that the railways will be well repaid by the increased amount of service that they will get out of the couplers.

G. W. Wildin (N. Y., N. H. & H.): I move that it is the sense of this convention that the strength of the coupler and its resultant weight as presented by the Coupler Committee is necessary to provide for the proper strength and service in interchange.

M. K. Barnum (B. & O.): I second Mr. Wildin's motion. The B. & O. finds that the present coupler is not equal to requirements.

A. R. Ayers (N. Y. C.): In case of the heavy couplers being unsatisfactory to apply to existing cars, and in case the large coupler is adopted, what provision could be made in the way of adopting a shank on the proposed coupler that would fix existing cars, and in case you do use a small shank will it be an overbalanced coupler.

Mr. Kleine: The committee has recommended two shanks, the 5 in. by 7 in. shank for existing cars and the 6 in. by 8 in. shank for new cars. The 5 in. by 7 in. shank is just a little too weak for the head, but it is giving us very satisfactory service. We have asked, in new cars and in re-designing the present equipment, that room be left in the end sill for the 6 in. by 8 in. shank.

William Schlafge (Erie): We have equipped 200 cars with the couplers recommended by the Association. It was necessary to use the 5 in. by 7 in. shank, and so far we have not experienced any trouble whatever.

Mr. Janney: In regard to the weight, there is a limit beyond which the coupler cannot go, limiting dimensions having been placed upon the size of the head. It is not such a great increase, when you consider after this you have reached the limit. (Mr. Wildin's motion was put and carried.)

The discussion was closed.

D. R. MacBain, (N. Y. C.): I move that the incoming Executive Committee shall take as a text for its work during the next year the address of the president to this convention. I am sure that we have never had anything more directly in line with the cause we are pursuing than President Crawford's address delivered at the opening of this convention, and if this association, through its Executive Committee, will profit by the suggestions made by President Crawford, I feel that a great deal of good will result.

(The motion was seconded and carried.)

SAFETY APPLIANCES

The President: The next business is the report of the Committee on Safety Appliances. As chairman of the committee I beg to report to you that during the year which has elapsed nothing has come up which has warranted the holding of a meeting of the committee, and I therefore have nothing to report on this subject.

The report was accepted.

LOADING RULES

The committee calls special attention to the suggested addition to Rule 120, covering the loading of large blocks of stone. It spent considerable time with the stone shippers, in an endeavor to determine the best method of securing such stone containing 100 cu. ft. and upward, known as "mill block." A number of tests were made by dropping cars loaded with such stone against a draft of cars, the speed of the impact ranging from 3 to 6 m. p. h. It was shown that at a speed of about 4 m. p. h. the stone actually moved, although protected by standard end stakes. The committee, with the railroad representives present, have been convinced that the value of the present form of stake under such condition is limited.

In order to prove the value of cleating against side creeping, Mr. May, superintendent motive power of the Chicago, Indianapolis & Louisville, with representives from the stone quarries, made some observations in train service between Bloomington and Lafayette, Ind. Seventeen cars loaded with mill block were selected and accurate measurements were taken en route. It was conclusively shown that the stone did creep, both side and end wise. The committee is not unanimous in its approval of the suggested paragraph, there being one dissenting vote.

The committee recommends the following changes in the present M. C. B. Loading Rules:

Rule 12-*C*.—After the word "pockets," in the third line, change the rule to read, "by driving wedges in from the top of the pocket and securely nailing them to the stake."

Rule 15-*A*.—Has been changed to read as follows: "For loads carried on one bearing piece per car (with or without sliding pieces), located at or near center of car, the weight of lading must not exceed two-thirds the capacity of car carried on flat or low-side gondola cars of all-steel or steel underframe construction, or on flat or low-side gondola cars of wooden construction having more than two truss rods. On steel flat and steel drop-end gondola cars, constructed with fish-belly girders, the weight of the lading must not exceed three-quarters of the capacity of car."

Rule 15-*B*.—Has been changed to read as follows: "For loads carried on one bearing piece per car (with or without sliding pieces), located about equal distance from center of car and center of truck, the weight of lading must not exceed three-quarters of the capacity when carried on cars of all-steel or steel underframe construction, or on flat or low-side gondola cars of wooden construction having more than two truss rods."

Rule 15-*F*.—Omit.

Fig. 5.—Eliminate note reading as follows: "For logs, piling, props and telegraph poles, use 10 strands or 5 wrappings, Rule 57."

Rule 93.—After the word "iron" in sixth line insert "¼ in. by 6 in. for loads of 40,000 lb. or less, and ½ in. by 6 in. for loads over 40,000 lb."

Rule 98.—The last sentence should be changed to read as follows: "Rolling freight must be loaded longitudinally with car, and must be substantially chocked with side blocking in height equal to one-seventh (1/7) the diameter of rolls, provided that blocking of more than ten (10) in. in height will not be required. End blocking to be not less than four (4) in. in height."

Rule 98-*B*.—The committee would recommend the incorporation of a new rule 98-B, as follows: "Loose wheels and tires should preferably be loaded in gondola cars that do not have drop doors. Such material should not be loaded in gondola cars having drop doors in steel floors larger than the lading. When such material is loaded in gondola cars having doors in wooden floors larger than the lading, the entire door opening must be properly protected with boards of sufficient strength, securely nailed to the floor of the car to prevent shifting."

Rule 117-*C*., *Fig.* 61-*E*.—Should be inserted in the Code, also

added to Rule 117-C. This cut shows another manner of loading mining cars. (See Fig. 1).

Rule 120.—As a second paragraph of Rule 120 add the following:

"Mill block containing as much as 100 cu. ft., resting on channel or gabled surface not less than 25 sq. ft. or proportional for increased sizes must be so loaded that the weight of total lading will be uniformly distributed over the floor of the car, resting on a layer of sand, cinders or crushed stone, covering the entire bearing surface of the stone.

"Gondola cars are preferable for such shipments, but if flat cars are used, the lading must be placed at least 18 in. back of the end of the car. Each block of stone loaded lengthwise,

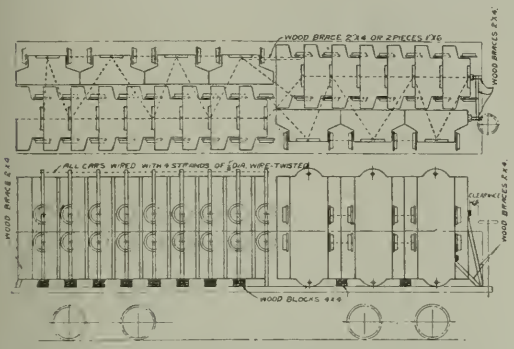


Fig. 1.—Manner of Loading Mining Cars in Gondola Cars

crosswise or obliquely must be protected against creeping by side and end cleats, securely nailed to the floor of the car with forty-penny nails. (When two blocks of stone are loaded parallel and close to each other, or wedged apart, they will be considered as one stone as to cleating.)

"If stone is placed lengthwise of the car and is 4 in. or closer to the side of the car, two standard side stakes 6 in. in height must be placed opposite such stone in lieu of cleats, on that side of the stone. Stone must not be loaded obliquely when it is possible to load it lengthwise or crosswise of the car.

"Cleats must consist of not less than 2 in. by 4 in. sound, straight-grained lumber, and extend at least three-quarters of the length or width of stone.

"If the 2-in. cleat does not have a full 1-in. vertical bearing

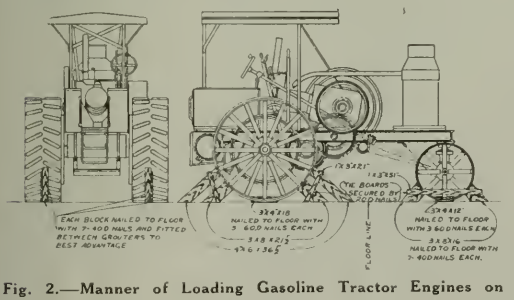


Fig. 2.—Manner of Loading Gasoline Tractor Engines on Flat Cars

for its full length against the edge of the stone, cleats may be built up to the requisite height, retaining the specific width."

Rule 121-*B*.—Add a new sentence to the end of the rule reading as follows: "Shipments of gasoline traction engines should be secured as per Fig. 64-G or 64-H." (See Fig. 2.)

Rule 124.—Should be changed to read as follows:

"Lading must be secured in closed cars so that it will not come in contact with side doors or roll or shift in transit, and must be so placed in car that there will not be more weight on one side of the car than the other.

"Lading of a character requiring protection to prevent it falling or rolling out at doorway, or coming in contact with door while in transit, must have the prescribed stripping across the door opening.

"Door strips must be nailed to the inside of door posts (never on the outside), and must not be less than 1 in. thick by 5 in. wide, straight-grained sound lumber, or their equivalent; or slab wood not less than 1½ in. thick at center; spaced sufficiently close to floor of car and to each other to prevent the lading from falling or rolling out of car or coming in contact with the door.

"When necessary to nail cleats or braces to lining of box cars having steel superstructure without exterior siding, the nails must not be driven entirely through the lining."

Rule 124-*A*.—Change to read: "Brick 15 in. or less in length loaded crosswise at doorway do not require door protection if built up as per Fig. 68-B, (See Fig. 3) and packed tight to prevent motion between bricks. Brick of any length loaded lengthwise at doorway must have door protection as per Fig. 68-C. Such brick should also be packed tight to prevent motion between each other."

Rule 126.—Should be changed to read as follows: "Barrel staves, fence posts, wooden billets, lath, tan bark and similar short wood should be loaded in accordance with Figs. 68 or 68-A. If the pieces are tapered, they must be loaded with tops and butts alternating. The material must be loaded longitudinally with car, except at door openings, where it must be placed crosswise. If loaded in accordance with Fig. 68, the doorway must be protected with strips extending across door opening, securely nailed on the inside of door posts. For the size of strips and manner of stripping doorway see Rule 124.

"If loaded in accordance with Fig. 68-A, the outer ends of staves or similar short material, whatever it may be, but of a length permitting two piles to be loaded end to end in doorway and still be at least 10 in. inside or door line, must rest on pieces

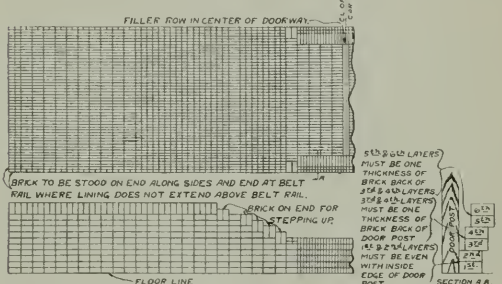


Fig. 3.—Manner of Loading Brick 15 inches or Less in Length Without Door Protection

not less than 4 in. thick and lengthwise of door openings, in order to make the pile incline toward center of car. This method makes the stripping of door opening unnecessary."

Rule 130.—Omit.

The report is signed by:—A. Kearney (N. & W.), chairman; L. H. Turner (P. & L. E.); J. M. Barrowdale (I. C.); G. H. Gilman (N. P.); Chas. N. Swanson (A. T. & S. F.); A. B. Corinth (A. C. L.), and R. L. Kleine (Penn.).

DISCUSSION

F. W. Brazier (N. Y. C.): Regarding the recommendation made with reference to changing Rule 124. We all know that we have a great deal of trouble with freight coming in contact with the doors under load. There is no way that any inspector can know or see what the condition of the lading is in a car that is sealed up. It is a traffic matter, and when we get home we should go to our managers and to our agents and see that they know the cars are loaded right. The thing is this: Will they live up to the rules? The rules are all right. It is a matter that the traffic department should be severely censured on. Under Rule 120 it says: "Cleats must consist of not less than 2 in. by 4 in." I hope there will not be any microscopic inspectors who will hold up a car because the cleats are 1⅞ in. by 3⅞ in. I would say that it should read "about 2 in. by 4 in." The doors on the equipment throughout the country are much improved, but there is still a good chance for those who are maintaining equipment to pay more attention to the door brackets, fastenings and to the hangers.

(It was voted that the recommendations of the committee be submitted to letter ballot.)

OVERHEAD INSPECTION OF BOX CARS

The committee explained in its last report that the result of its work had been turned over to the Committee on Relations between Railroads of the American Railway Association, with the advice that it was ready and desired to assist in any way their committee thought the work might be further pursued.

Few additional roads have done very much toward even trying out the proposed certificate of inspection card, although it was recommended by the American Railway Association. Those that are experimenting have found difficulty, it is reported, and quite naturally, on account of so few roads having taken up the proposed inspection. It may be unfortunate it has not received wider attention, if for nothing else than to ascertain its value or determine what, if any, alterations and modifications might be effected to make it more suitable, and possibly better accomplish the desired end, or possibly permit the working out of some entirely different direction for higher general efficiency. The Committee on Relations between Railroads of the American Railway Association will again urge that the card be given a trial.

The report is signed by:—A. Kearney (N. & W.), chairman; L. H. Turner (P. & L. E.); C. N. Swanson (A. T. & S. F.); J. M. Barrowdale (I. C.); G. H. Gilman (N. P.); A. B. Corinth (A. C. L.), and R. L. Kleine (Penn.).

DISCUSSION

C. N. Swanson (A., T. & S. F.): This is one of the most important subjects to come before this convention. You heard yesterday of the millions of dollars being paid out for loss and damage to freight. I believe that more attention should be paid to our house cars, on the initial loading line. We are in hopes that some action will be taken by the organizations higher up, insisting that more money be spent on our box cars to stop this unnecessary draining of our treasury.

INTERLINE LOADING.

As this subject reached this association through the Conference Committee of the American Railway Association, it has been concluded, after consultation with the latter committee, that doubtless the energies of the M. C. B. committee might be best utilized by assisting the committee of the American Railway Association. It was considered such a course would be most profitable, besides would be helpful toward a better understanding of the M. C. B. loading rules requirements, which have for their principle mainly the safe carriage of shipments; secondly, it should tend to harmonize related rules reached by the Classification Committee in the formulation of their schedules.

The report is signed by:—A. Kearney (N. & W.), chairman; L. H. Turner (P. & L. E.); C. N. Swanson (A. T. & S. F.); J. M. Barrowdale (I. C.); G. H. Gilman (N. P.); A. B. Corinth (A. C. L.), and R. L. Kleine (Penn.).

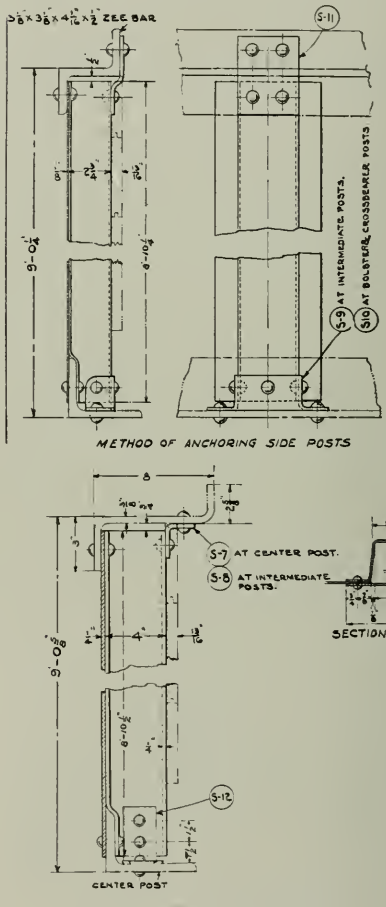
CAR CONSTRUCTION

During the past year the committee has given careful consideration to the various types of existing freight car designs, and has investigated current troubles and analyzed causes for such troubles. A large number of failures can be traced directly to weak center-sill construction and incorrect analyses of draft gear effect on center-sill construction. The committee

W. F. Kiesel, Jr.
Chairman, Committee on Car Construction

has, therefore, elaborated more than at first intended on the subject of draft attachments. In the following and in previous reports simple formulæ have been incorporated. The use of engineering formulæ to define fundamental requirements, without restricting types of design, is unavoidable. It must be understood that instructions governing specific designs or constructions may be based on these general formulæ by the engineering department of any road, without direct use of these formulæ, and which will be readily understood by those handling the interchange of cars.

At the 1914 convention your committee submitted a specification for box-car doors and fastenings, including a specification for reinforcing existing doors, a specification for complete new doors for existing cars, for new construction, and a revision of Sheet M. C. B. 30 embodying various improvements. The specification for complete new doors was referred to letter ballot and lost. The committee submits herewith another specification for box car doors, which is limited to new equipment



Method of Anchoring End and Side Posts

and which permits the use of top or bottom rollers, and which it is thought represents the minimum requirements that should be accepted for box car doors on new cars.

SPECIFICATION FOR BOX CAR OUTSIDE HUNG SIDE DOORS FOR NEW CARS

Doors may be either of wood or steel construction. If of wood construction, the wood frame and sheathing must be contained within a steel frame, riveted together at the corners and having at least one additional horizontal steel stiffener securely fastened at the ends to side members of steel frame.

Means must be provided for continuous weatherproofing and fireproofing around the top, bottom, front and back edges of the door when closed. The top of the door must be continuously supported against outward pressure, and this support must also form the weatherproofing.

Closed door stop must be of metal, preferably continuous from top to bottom of the door. If the continuous door stop does not support the door against outward pressure, such support must be provided by not less than two brackets with lips, equivalent to brackets shown on Sheet M. C. B. 30, and located as shown thereon.

Metal open door stops are recommended, one or more in number, equivalent in strength to the design shown on Revised Sheet M. C. B. 30, securely bolted to the belt rails or framing of the car with at least two ½-in. bolts or their equivalent. If wood open door stop is used, it should extend the entire height of the door and be reinforced by clip washers, or through bolts to prevent splitting.

The bottom of the door must be supported against outward pressure at not less than two points for any position of the door. If individual bottom door guides, fastened to the car body, are used, they must be as least four in number, one located adjacent to each door post, one in the middle of the doorway, and one between the back door post and the open door stop, approximately as shown on Revised Sheet M. C. B. 30, and similar in design, with particular reference to the height of the lip, which should be not less than 1¾ in.

If door hangers are fastened to the door with bolts, the design of the door fastenings must be such that with hangers broken or removed the door can not be removed from the car, except by removal of either the track, door guides, or door stops. When substantial hangers are riveted to steel doors, or to steel frames of wooden doors, with not less than four ⅞-in. rivets or their equivalent, this provision need not apply.

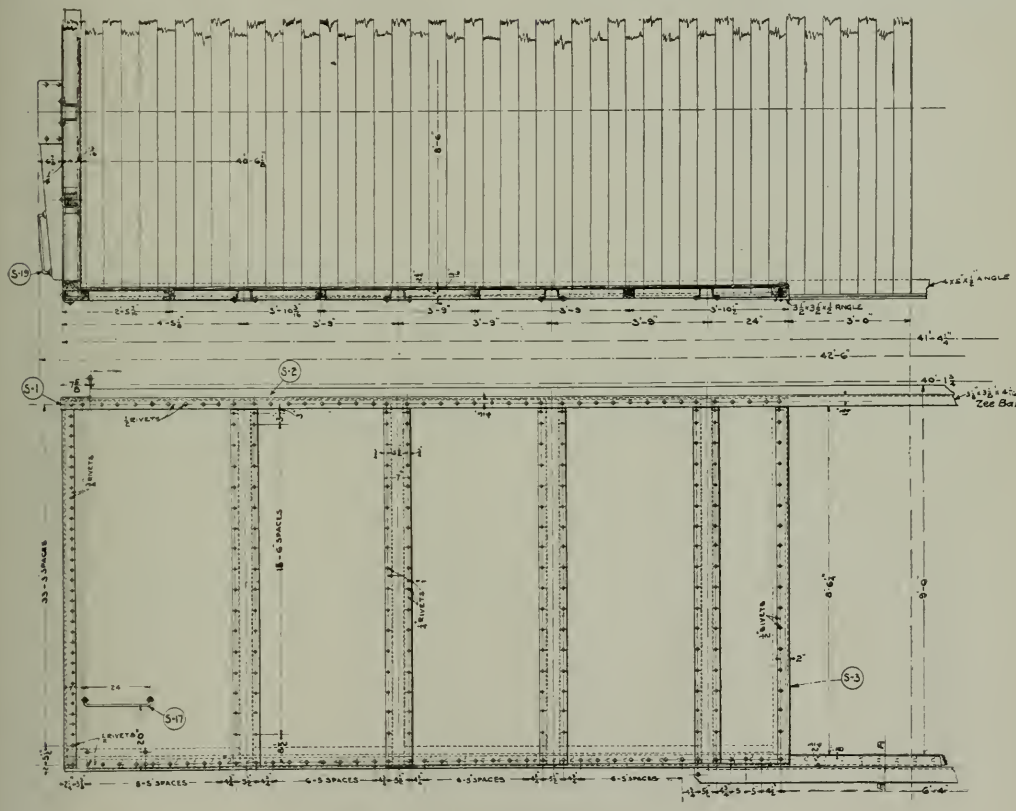
When hangers or rollers are fastened directly to the sheathing of wooden doors, bolts must be not less than ¾ in. in diameter, at least four in number for each hanger, and spaced not less than 4 in. apart horizontally and 5 in. vertically, hangers to be preferably located so the bolts will pass through two or more boards.

The door track may be located either above or below the door opening and the door supported so that under any service conditions there will be no binding of the door from vertical interference with the door guides or track. The upper door track, if used, must be continuous in one piece, strong enough so that it will not sag, and securely fastened to the car; proper flashing, if necessary, to be provided over the door track. If the door is supported at the bottom, means for keeping the supports in alignment must be provided.

For wooden doors, the door-hasp fastener must be at least 24 in. long, fastened with not less than five ⅞-in. bolts, with nuts on the inside of the door. The door-hasp fastener must be of such design that the hasp can not be removed without removing the bolts from the fastener. The door-hasp fastener must be secured to the steel frame of the door by at least one bolt or rivet. For steel doors, the door-hasp fastener must be riveted to the door.

Proper clearance must be provided so that ⅜ in. bulging of the side of the car will not interfere with the free movement of the door. Door mechanism must be so designed that in a closed position the door is drawn reasonably tight against the side of the car. It should be possible for one man to open or close the door readily from the ground without tools.

All of the above recommendations apply particularly to cars with 6 ft. door openings and single outside hung side doors, and in all cases where a particular construction is described, or specific dimensions are given, their equivalent will be acceptable.



Arrangement of Side and End Sheets, M. C. B. Standard Car

DRAFT GEAR

The report submitted in 1914 was rejected, and criticisms from various sources indicated that the restrictions recommended were considered insufficient to eliminate undesirable draft gears and to sufficiently reduce the excessive repairs now required for old equipment. In this report it has, therefore, been the object of the committee to formulate rules based on fundamental prin-

ciples and comparable with the strength of other parts of the car. This naturally involves reference to the center-sill construction. Many roads are at present modifying wooden cars, which make it desirable to have a guide for minimum strength requirements for reinforcement of existing wooden cars to fit them for some years further service. For such cars the following rules are submitted:

The draft attachments, including draft arms—if used, must be of metal, of either integral or riveted construction.

The strength value of the draft attachments and center-sill construction must be equivalent to at least 10 sq. in. of steel in tension and compression, 6¼ sq. in. of rivet-bearing area, and 12½ sq. in. in shear. The ratio of unit stress to end load must not exceed 0.15.

Metal draft arms applied to wooden center sills must extend at least 30 in. beyond the center line of the bolster, toward the center of the car, must be securely fastened to the bolster and the center sills, and where possible should butt against the compression members placed between the draft arms and needle beams and also between the needle beams. Hardwood or yellow pine center sills may be considered equivalent to steel in center-sill construction between bolsters if they have four times the specified unit values, namely, 40 sq. in. tension and compression area, and a ratio of unit stress to end load not exceeding 0.0375. Where wooden members are reinforced with metal (composite construction) either the steel or the wood must alone meet the strength requirements. Where the horn of the coupler is allowed to come in contact with the end sill, the latter must be provided with a striking plate of sufficient strength to resist its proportionate load without deformation.

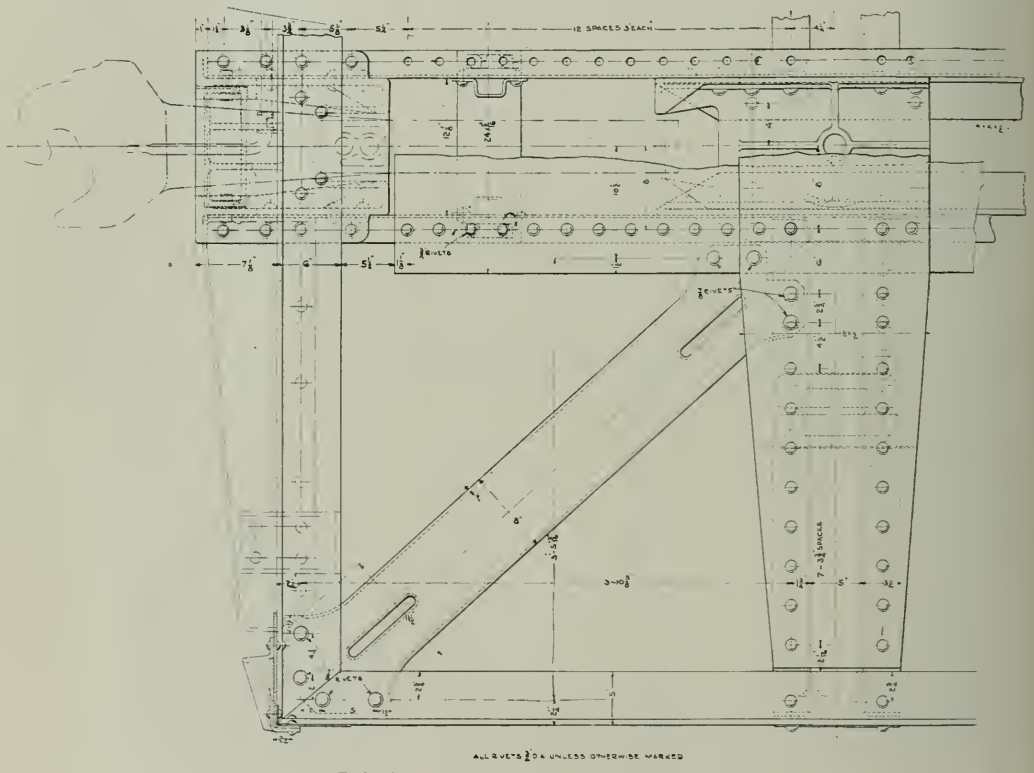
The intensity of end force is assured to be equivalent to 250,000 lb. static, which may be concentrated on the center line of the draft gear or distributed between the draft gear and end sill. The point of contact between the horn of the coupler and the striking plate is assumed to be 2 in. above the top of the coupler shank. For a shank 5 in. deep the distance from the center line of the draft gear to the assumed point of contact of the coupler horn is 4½ in. The proportion of end force acting on the striking plate is assumed to be 250,000 lb. less R, which is the resistance of the draft gear when the horn of the coupler touches the striking plate. Hence, when the coupler shank is 5 in. deep, and the horn of the coupler is allowed to touch the striking plate before the draft gear is solid, the end force of 250,000 lb. is effective on a line located a distance Y above the center line of draft gear,

$$Y = 4.5\left(1 - \frac{R}{250{,}000}\right)$$

It should be clearly understood that these rules are not intended to modify the recommendations made by this committee under heading "1a" for minimum strength of existing steel and steel underframe cars, and which were referred to the Arbitration Committee in 1914. Many existing wooden cars can be reinforced to come within "1a" requirements at little more expense than that necessary under the rules given above.

DESIGN OF A STANDARD M. C. B. BOX CAR

The committee submits a tentative design of a box car with the request that each member interested study it and send to the committee, before December 1, 1915, a letter—accompanied by sketches or drawings where necessary—giving recommendations for modifications; also expressions of preference of other details that can be used, or approval of materials and details shown in this design. The reason for the last request is to indicate to the committee whether the majority prefer the tentative design, or some change.



End Sill and Bolster; M. C. B. Standard Car

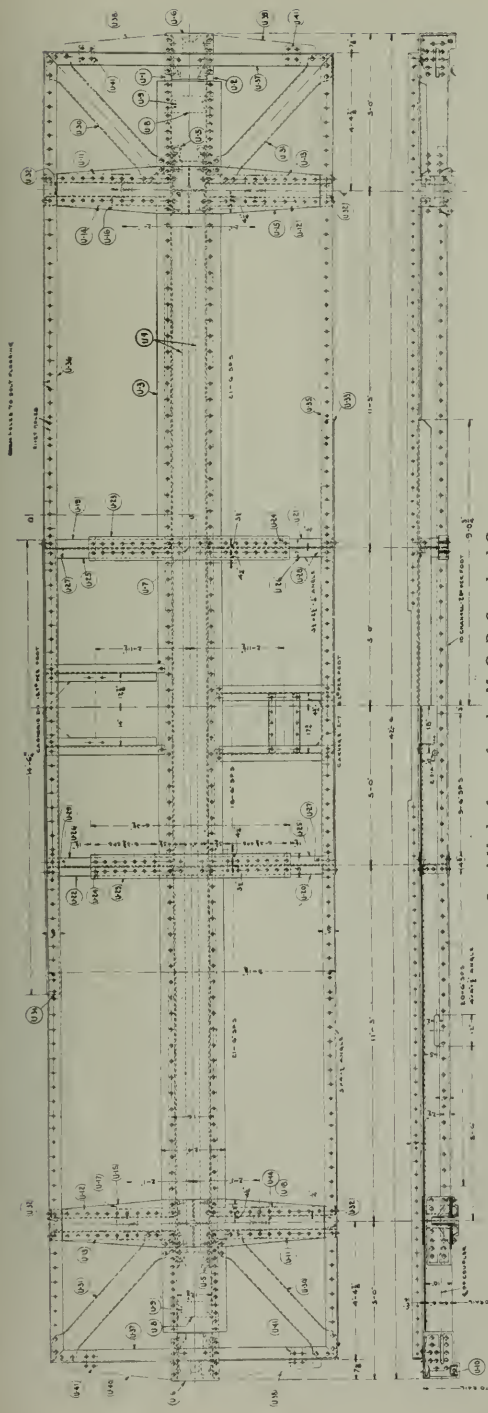
This tentative design is intended to cover the following:

Strength.—A small amount above the minimum requirements.

Weight and Cost.—The least that can be obtained per unit of strength.

Flexibility of Design.—To permit substitution of stronger parts or patented details interchangeable with those shown.

Type.—The committee selected the steel-sheathed type box car because it avoids loss of lading on account of shrinkage or damage to single courses of wood, because the smooth exterior



Steel Underframe for the M. C. B. Standard Car

reduces wind resistance, and because it permits the elimination of diagonal braces.

Underframe.—All parts thought to be unnecessary have been eliminated. As the side and end angles are a part of the side and end frames, the underframe consists of the center sill construction, two bolsters and two cross-bearers The cross-bearers transfer the load from the center sills to side frame. The bolster cover plate must be not less than ⅜ in. thick for 30-ton cars; 7/16 in. thick for 40-ton cars; and ½ in. thick for 50-ton cars. Rule 1B, adopted as Recommended Practice in 1914, requires that the center-sill construction shall have at least 24 sq in. section area, that the ratio of stress to end load shall not exceed 0.26, and that the length of the center and of the draft sill members between the braces shall not exceed 20d.

An analysis of the ends of center-sill construction follows:

The design is for the use of gears which do not permit the horn of the coupler to strike the end casting, and concentrate all end compression force on rear followers, but other gears are also applicable.

AREA:

Cover plate	24 in. by 5/16 in.	= 7.5	sq. in.
Two channels	2 in. by 5.88 in.	= 11.76	sq. in.
Two angles	2 in. by 3.75 in.	= 7.5	sq. in.
Total		26.76	sq. in.
Allowance for rivet holes in bending		1.3	
Net area for bending		25.46	sq. in.

NEUTRAL AXIS OF SECTION:

In this calculation the moments of areas are taken with reference to top line of cover plate.

Cover plate	7.5 sq. in. by	in.	= 1.17
Two channels	11.76 sq. in. by 5	in.	= 62.5
Two angles	7.5 sq. in. by 9.13	in.	= 68.47
Total Moments			132.14

$$\frac{\text{Total Moments}}{\text{Total Area}} = \frac{132.14}{26.76} = 4.938$$

which is the distance from top of cover plate to neutral axis.

MOMENT OF INERTIA OF SECTION:

Top cover plate	$(bh^3 \div 12)$	= .06
Top cover plate	(Ah^2)	= 160.43
Two channels	(I)	= 157.4
Two channels	(Ah^2)	= 1.65
Two angles	(I)	= 11.12
Two angles	(Ah^2)	= 131.74
Total		462.40

SECTION MODULUS (SM):

$$\text{For top fibers} \quad SM = \frac{462.4}{4.94} = 93.6$$

$$\text{For bottom fibers} \quad SM = \frac{462.4}{5.375} = 86.03$$

These calculations determine that

A = 26.76 sq. in.
X = 1.375 in.
SM at top fibers = 93.6
SM at bottom fibers = 86.03

Substituting these values in the formula $\frac{1}{A} + \frac{X}{SM}$, the ratio of stress to end load, when all of the end load is concentrated on the center line of coupler, is 0.05335, or less than .06. Similar calculations show that to meet the requirements the resultant line of the end force must not be less than 3 7/16 in. from the bottom line of the channels, and not less than 2½ in. from top line of channels. The center line of draft gear, which is the lowest possible line of end force, is 4 in. above bottom line of center-sill channels, and, therefore, well within the limits.

The end force through the horn of the coupler striking end casting may be assumed to act on a line 2 in. above the top line of the coupler shank, or for a shank 5 in. deep, 4½ in. above the center line of the coupler, which, in this case, is 1½ in. below the top line of the center-sill channels. The committee bases calculations on a total end force of 250,000 lb. From limitations determined above, this whole force may act on a line 3½ in. above the coupler center line, which determines that for this design the draft gear resistance, when the horn strikes the end sill, must be at least 19,500 lb., leaving 230,500 lb. acting on end casting. This in turn requires an effective area of center-sill construction of 22 sq. in. between the end sill and the rear follower. The tentative design has an effective area of only 11.76 sq. in. in compression, and 10.56 sq. in. in tension, requiring a draft gear resistance of at least 122,500 lb. when horn of coupler strikes the end casting. If this resistance is less, the ends of the channels must be reinforced accordingly.

The distance between the rear followers is 35 ft. 3¾ in., or less than twenty times the width of cover plate, which is 40 ft. The greatest length of bottom center-sill flanges, between anchors, is 125¼ in., or less than 20 in. by 6.74 in. = 138.8 in. The bottom

side angles are held in line by the floor boards, and the top side Z-bars are held in line by the roof. The minimum effective area of the center sills in tension is 10.56 sq. in., or 5.6 per cent. more than required by Rule No. 6. The draft attachments shown are of the type commonly used. Other attachments suitable for tandem or other gears can be readily substituted.

The flooring has been made 2⅜ in. thick, to avoid the use of intermediate sills. It is tongued and grooved, bolted to the center-sill cover plate and side angles, and all crevices, especially those between floor boards and side and end angles, are to be filled with melted bitumen, or other compound.

The brake arrangement shown differs from that now representing M. C. B. practice. This type has been selected because it does not vary the brake effect when cars pass around curves, and because the cylinder pressure acting on the live lever is counteracted by the strain on the dead lever, thus eliminating strain in the underframe braces. The old type brake can be readily substituted.

Side and End Framing.—The side sheets are ⅜ in. thick, and the side posts are U-shaped, uniform in section, except where offset for bottom angle, and do not necessarily require dies for their manufacture. The bottom angles and top Z-bars, forming lower and upper flanges, must be at least ⅜ in. thick for 30 tons, 7/16 in. for 40 ton, and ½ in. thick for 50 ton cars. The combined section modulus of all posts, on one side except corner posts, is 20.7.

The end sheets are ¼ in. thick, and the end posts are also U-shaped. The total section modulus of the end posts, not including corner posts, is 15.75. This covers requirements of rule in No. 2. The Z-shape of side and end plates permits ready application of any type of roof. If loose plate roofs are applied, the carlins should be a design that will brace the side plates both transversely and diagonally. Any type of carlin is satisfactory when solidly riveted roof is used.

Although the lining is shown for the full height of car, this may be partly or entirely eliminated. If the lining is entirely omitted the end posts should all have flangs riveted to the end sheet. The base of the door opening is flush and raised away from the side sheets of the car a distance of ⅜ in for 30 ton, 7/16 in. for 40 ton, and ½ in. for 50-ton cars.

General Remarks.—The tentative box-car design submitted has the following general dimensions:

Length of frame over striking casting	42 ft.	6 in.
Width over sheathing	9 ft.	1¾ in.
Length, inside	40 ft.	6⅛ in.
Width, inside	8 ft.	6 in.
Height, inside	9 ft.	
Height, from rail to bottom of bolster	2 ft.	6 in.
Height, from rail to floor	3 ft.	8½ in.
Height, from rail to top of running board	13 ft.	4½ in.
Height, from rail to top of brake staff	13 ft.	2 in.
Width, at eaves	9 ft.	2⅛ in.
Height, at eaves	12 ft.	5¾ in.
Side door opening		
Width	6 ft.	0 in.
Height	8 ft.	6½ in.
Cubic volume under carlins	3096 cubic feet.	

The examples of box cars now passing over the roads in America illustrate that it will be of inestimable advantage, at least to the smaller railroads, who do not design their own cars, to have an M. C. B. design representing a standard of minimum strength required. Manufacturers of roofs, doors, draft gear and other specialties can reduce cost of manufacture, and can make more real progress in quality, if their various types of roofs, doors, etc., are interchangeable.

It will be noted that the end-sill design is such that it can be omitted, if desired, without affecting the integrity of the car. The permissible variations due to capacity are few. The bolster plates, side angles, Z-bars, and facing angles for door posts, may be ⅜ in. thick for 30-ton cars, 7/16 in. thick for 40-ton cars, and ½ in. thick for 50-ton cars. All other parts of the car body are governed by conditions which admit of no reduction in area or weight, for cars of less than 50-ton capacity.

SHEARING VALUES OF STRUCTURAL, RIVET AND MILD STEEL

Many experiments to determine the shearing values of steel have been made, and values of the ratio of shearing strength to tensile strength, varying between 65 per cent. and 85 per cent. have been recorded. Woehler's researches led him to establish a ratio of 80 per cent. This figure was later confirmed by Baushinger, for shearing strength, provided the shear is in a plane perpendicular to the direction of rolling. This figure has been generally adopted, and the committee recommends that, in all calculations for strength of parts, the following rule shall govern:

The allowable stress per square inch, for iron or steel subject to shear in a plane perpendicular to the direction of rolling, shall not exceed 80 per cent. of the allowable stress per sq. in. for tension, in the direction of rolling.

The report is signed by:—W. F. Keisel, Jr. (Penn.), chairman; A. R. Ayers (N. Y. C.); S. G. Thompson (P. & R.); C. E Fuller (U. P.); E. G. Chenowith (C. R. I. & P.); J. C. Fritts, (D. L. & W.); T. M. Ramsdell (O-W. & Nav. Co.), and C. L. Meister (A. C. L.).

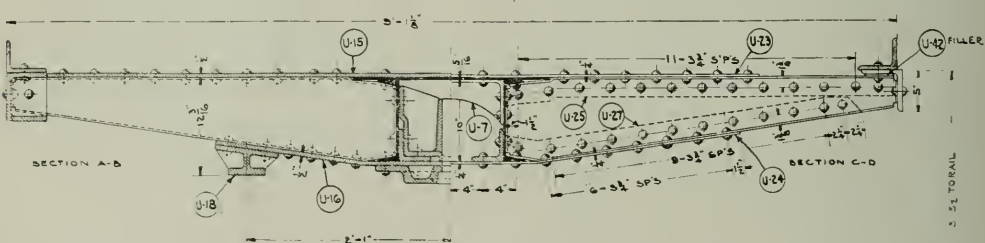
DISCUSSION

W. F. Keisel, Jr. (chairman): This week two communications were received which I think it would be well to read to the association. The committee has not taken action thereon, as we received one yesterday and one today.

[Both communications were received from the International Association of Railway Special Agents and Police—the following are abstracts from them.—Editor.]

The first communication contained the following:

"It has been established by a number of actual tests made by this association on cars of 30 different railroads, which



Cross Section of Steel Underframe for the M. C. B. Standard Car

had been in service from 2 to 8 years, and by experience gained in the investigation of a large number of claims and car robberies, that over 50 per cent of the box cars used in daily merchandise traffic can easily be entered without tampering with the seals, and without leaving any trace to indicate where or how robbery was committed.

"It was demonstrated that this condition is due to two faults in the construction of the car door. First the use of door brackets or guides 2 in. or less in height, which permit lifting the door over the rear bracket or guide with the aid of a small lever or brake shoe key so it can be pulled out sufficiently to allow the removal of packages of large dimensions. Second, the use of square head bolts in applying brackets, guides, rails and fastenings, on the outside of the door or car, and the failure to rivet bolts over the nuts or washers permits the removal of the brackets, guides or fastenings and the entering of the car without tampering with the seals and the replacing of these parts in such a way as to escape detection by ordinary examination.

"We find the first condition can be overcome by the use of a bracket or guide 2½ in. or more in height, which would be sufficient to allow for shrinkage in wood, the loss in rigidity and loosening of the hanger track, and still be high enough to prevent car being entered by the means above described.

"The second condition can be remedied by the use of round head bolts, riveted over nuts or washers on the inside of the door or sill which will prevent removal of the brackets, guides or fastenings by ordinary means."

The second communication stated, in part, as follows:

"A resolution was adopted by the International Association of Railway Special Agents and Police, based on many years experience and a report made by their committee on seals and fastenings to the effect that inasmuch as train crews and yard or seal clerks very seldom take a record of seals on

or note the condition of end doors on merchandise cars, which violation of the rules is supported to a considerable extent by the principle of 'Safety First' it is the sense of this Association that all end doors on cars now in use which require sealing be fastened permanently by means of a bolt ⅜ in. or more in thickness which should pass through end or side of the door about midway just above the fastenings and then through the car and be fastened on the inside by means of a nut which can be removed and replaced in case the car is to be loaded with a commodity necessitating the opening of the end door. This will obviate the necessity of sealing the end door as well as the taking a record of such seals.

"It is also suggested that in building new cars that end doors be eliminated when possible, and that when it is necessary to install them, that the fastenings be placed on the inside, and that they be so constructed as to cause the end door to lock automatically when it is closed, which will obviate the necessity for sealing.

"Quite a number of robberies are committed daily through the end openings, and, because of the failure of employes concerned to take a record of end door seals, it is practically impossible to determine point of robbery, which makes such thieves immune from capture."

The M. C. B. committee will go into the matter further with this Association.

A. B. Appler, (D. & H.): I would ask what the committee had in mind when applying the diagonal brace from center sill and bolster to the side sill and end sill, instead of applying it from the bolster and side sill toward the end sill and center sill. Just what is the minimum strength provided for in that arrangement.

Mr. Keisel: The reason for putting the diagonal brace that way was to concentrate any end shock on the center sill.

Mr. Appler: The thought in my mind was it might be more advantageous to brace the center sill than it would be to provide for the corner of the cars.

Mr. Keisel: The center sill is supposed to be strong enough to take any reasonable end shock the car receives. It has been found that by putting the brace on the car in that way, it saves a great deal of expense on repairs.

R. E. Smith, (A. C. L.): Has the committee considered the suitability of a steel sheathed car for warm climates and lines handling perishable products, vegetables and other shipments, that require ventilation and as cool a temperature as possible. Another thought is, what will be the effect on the life of the steel sheathed cars when such cars are devoted to the handling largely of commercial fertilizers which give off fumes of sulphuric acid which, combined with condensation on the steel sheathing, will subject them to rapid corrosion, due to the formation of dilute sulphuric acid.

Mr. Keisel: The committee did consider the question of such cars running in warm climates. For warm climates it is essential to line the car with wood, and it is also essential to ventilate it. If the car stands in the open sun the steel will absorb the heat from the rays of the sun, and though the outside temperature may be 90 deg., the steel may be 110, or 115 deg. Even though the car is merely a steel frame car, and not a steel sheathed car, the same thing obtains. Therefore, in order to keep down the temperature we will have to build an entirely wooden car. In regard to the sulphuric acid, we have the same conditions in coal cars. In the hopper bottom car it will be a matter of protecting it with paints, more or less impervious, and they should be impervious, if possible, to the action of the sulphuric acid.

G. F. Laughlin (Armour & Co.): I would ask the committee why it recommended that metal draft arms applied to wooden center sills extend 30 in. beyond the center line of the bolster. There are some types with 24 in. and 26 in., which give sufficient protection.

Mr. Keisel: The 30 in. referred to is an arbitrary figure. The support of the draught arm should be well beyond the center line of the bolster. Cars that have had 24 in. stood up quite well, but from what we saw of cars which had 30 in. beyond the center line of the bolster, the improvement was so great that we thought we ought to make that a minimum figure.

S. G. Thomson (P. & R.): Before this report is submitted to letter ballot, I want to call attention to several features regarding the draft gearing. The specification will show some radical departures from present practice, so that some members in reading it might think that if they voted for it they would have to immediately put it into effect. Take for instance 6a, which reads: "The draft attachments, including draft arms—if used, must be of metal, of either integral or riveted construction." That was put in to get rid of the old wooden draft arms which are giving us all of the trouble in the draft gear problem to-day. The committee thought seriously at one time in their conference, of including in the report a requirement that these specifications be compulsory for all cars in interchange after a certain number of years. However, there is no feature that brings out the actual time in which this method, if adopted by letter ballot as recommended practice, was to be put into effect; but the fact that the specification was approved would give everybody a chance to start, and possibly next year the committee would be in a position to say on what date the railroads of the country should agree for putting such a specification into use.

(It was voted to refer the specifications for box car outside hung side doors for new cars, the rules under draft gear, and recommendations concerning malleable cast iron and shearing values of structural, rivet and mild steel to letter ballot.)

SPECIFICATIONS AND TESTS FOR MATERIALS

The committee sent out for criticism Circular No. 14, containing the following proposed specifications, with the exception of those for Journal Bearings for Passenger and Freight Equipment Cars, which have been rewritten in line with criticisms received during the past year:

Structural Steel, Steel Plate and Steel Sheets for Passenger Equipment Cars.

Structural Steel, Steel Plate and Steel Sheets for Freight Equipment Cars.

Malleable-iron Castings for Passenger and Freight Equipment Cars.

Miscellaneous Steel Castings for Passenger and Freight Equipment Cars.

Journal Bearings for Passenger and Freight Equipment Cars.

Mild-steel Bars for Passenger and Freight Equipment Cars.

Rivet Steel and Rivets for Passenger and Freight Equipment Cars.

Galvanized Sheets for Passenger and Freight Equipment Cars.

All the criticisms, 22 roads replying, were considered by the committee, resulting in numerous changes and modifications in these specifications. The committee, therefore, recommends:

First: That these specifications (shown in Appendix B) be submitted to letter ballot as Recommended Practice.

Second: That the Specifications for Chain for Passenger and Freight Equipment Cars, Recommended Practice, be modified to include electric-welded chains. (These modifications are made with the idea of harmonizing the present chain specifications with the Iron and Steel Chain Specifications of the American Society for Testing Materials).

Third: That the following section be added under the subhead of "Physical Properties and Tests," in the present Specifications for Steam-heat Hose for Passenger Equipment Cars, Recommended Practice:

"*Digester Test.*—The digester shall consist of a cylinder containing dry saturated steam at a pressure of 45 lb. per sq. in. The hose shall be put into this digester and will remain there for 48 hours continuously. An examination of this section, after being submitted to the heat of the steam, should not disclose any blistering of the inner tube or any loosening of the tube from the fabric. Examination and test after heating, prescribed in the specifications, will be made as soon as possible after the specimen has cooled for 24 hours. The test will be made at a temperature of not less than 60 deg. F."

Fourth: That the label under Section 5 of the Specifications for Steam-heat Hose for Passenger Equipment Cars have added thereto, after the word "Road" the word "Steam," and after the date of manufacture, the Cars.

Fifth: That the changes shown in Appendix A be made in the Standard Specifications for Air-brake Hose for Passenger and Freight Equipment.

The changes in the air-brake hose specifications were made with the following objects in view:

(a) That the title of the present standard specifications include signal hose.

(b) Combining the Specifications and Tests for Woven and Combination Woven and Wrapped Air-brake Hose into the present Standard Specifications for Air-brake Hose.

(c) Eliminating Section 6, covering "Tensile Strength of Duck," which has proven unsatisfactory due to the difficulty in testing, and substituting therefor an addition to the requirements under "Bursting Test."

(d) Specifying the manner in which the thickness of the test specimen shall be measured and the instrument with which it shall be measured. This standardizes the practice of this Association with the Manufacturers' Association, United States Navy Department, and the Underwriters' Laboratories.

(e) Omit present Figure 1, page 672, 1914 Proceedings.

(f) A permissible variation as to location of label has been provided.

(g) The requirement of making tests within 90 days of date of shipment of material in the old specifications has been reduced to 60 days, as it is well to reduce this time as much as possible.

A test was conducted by the Canadian Pacific to determine if the present standard specifications amply protected the purchaser

against stiff hose under freezing conditions. This test has developed the fact that our present specifications, covering the tensile strength of the material in the tube is satisfactory, in so far as stiffness is concerned and, therefore, no changes are needed in the specifications to take care of this condition.

In addition to this work, the committee, with the Manufacturers' Association, still have in view the problem of a uniform test specimen, and although a large amount of work has been done upon this subject, progress only can be reported.

Prior to writing the present standard specifications an elaborate series of tests was started on various pieces of air-brake hose made in accordance with the ideas of the different manufacturers. This test is progressing and information is being accumulated.

It has been discovered that certain manufacturers' hose purchased under our standard specifications is showing rapid checking of the rubber in the cover after exposure to the weather. This matter is being made a subject of special investigation by the committee with the hope that something may be presented at the next meeting upon this subject.

The committee contemplates next year, in addition to the above, the following:

(a) Harmonizing of drop test for all sizes of axles under one weight of tup with the specification requirements of the American Society for Testing Materials.

(b) Taking under consideration and endeavoring to formulate Specifications for Recommended Practice, covering the following materials: Bolts and nuts, oxide of iron pigment, linseed oil, drier, paint vehicle, stencil paint.

(c) The committee is working with the manufacturers of insulating materials to the end that a standard method of testing this grade of material can be prescribed. Until this work can be completed it will be impossible to prepare a specification covering this grade of material.

The committee has received a communication from the chairman of the Coupler Committee, in which they recommend that the number of couplers required for test purposes on each lot of 1000 be reduced from a total of 13 to 8, by submitting but 5 instead of 10 couplers to the strike test. The committee, therefore, recommends that the specifications be reworded to incorporate this change.

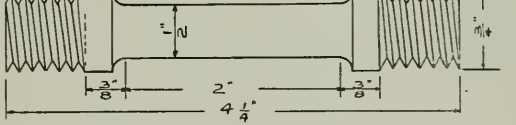


Fig. 1.—Test Specimen for Structural Steel, Steel Plate, and Miscellaneous Steel Castings

The report is signed by: C. D. Young (Penn.), chairman; J. J. Burch (N. & W.); A. Copony (G. T.); I. S. Downing (C. C. C. & St. L.); A. H. Fetters (U P.); H. B. MacFarland (A. T. & S. F.); J. R. Onderdonk (B. & O.); J. W. Taylor (Sec.); E. B. Tilt (C. P. R.), and Frank Zeleny (C. B. & Q.).

APPENDIX A

SPECIFICATIONS FOR AIR-BRAKE AND SIGNAL HOSE

1. Scope: These specifications supersede all previous specifications for Air-brake and Signal Hose, including that for "Woven and Combination Woven and Wrapped Air-brake Hose." Air-brake hose of the Woven and Combination Woven and Wrapped type shall meet all tests of these specifications, except that of friction, Section 4, on those constructions where friction can not be made.

Present Sections, 1, 2, 3, and 4 changed to Sections 2, 3, 4 and 5. Present Section 6 to be omitted. Present Figure 1 to be omitted.

8. Bursting Tests: Add to this paragraph the following: "After which the hydraulic pressure shall be increased to a minimum of 700 lb. per sq. in. without bursting, at the rate of not less than 100 or more than 200 lb. per five seconds."

9. Test Specimen: Add paragraph as follows: (b) "In measuring the thickness of the test specimen shown in Fig. 1 to determine the strength per square inch, a micrometer graduated to 0.001 in. having a shoe 0.24 to 0.26 in. in diameter, exerting a pressure of from 8 to 10 oz. on the test specimen shall be used."

Fig. 2 to be changed to Fig. 1.

14. Label: Change last sentence to read as follows: "This label shall be applied around the hose at a point 6 in. from the end, a variation of ½ in. either way will be permitted, and with the top of the lettering toward the center of the hose."

16. Rejection: Material which subsequently to above tests at the mills or elsewhere, and its acceptance or prior to being placed in service, develops weak spots or imperfections, or fails to pass any one of the tests herein required within sixty days from date of shipment, will be rejected and shall be replaced by the manufacturer at his own expense.

APPENDIX B

SPECIFICATIONS FOR STRUCTURAL STEEL, STEEL PLATE AND STEEL SHEETS FOR PASSENGER-EQUIPMENT CARS

I. MANUFACTURE

2. Process.—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

3. Chemical Composition.—The steel shall conform to the following requirements as to chemical composition:

Carbon, not over	0.25 per cent.
Manganese	Optional per cent.
Phosphorus, not over	0.05 per cent.
Sulphur, not over	0.05 per cent.

III. PHYSICAL PROPERTIES AND TESTS

6. Tension Tests.—(a) The material shall conform to the following requirements as to tensile properties:

	Structural Steel	Plates for Cold Flanging
Tensile strength, lb. per sq. in.	50 000—65 000	48 000—58 000
Yield point, min. lb. per sq. in.	0.5 tens. str.	0.5 tens. str.
Elongation in 8 in. min. per cent.	1 500 000	1 500 000
	Tens. str.	Tens. str.

(b) The yield point shall be determined by the drop of the beam of the testing machine.

7. Modification in Elongation.—(a) For material over ¾ in. in thickness, a deduction of 1 from the percentage of elongation specified in Section 6 (a) shall be made for each increase of ⅛ in. in thickness above ¾ in., to a minimum of 18 per cent.

(b) For material under 5-16 in. in thickness, a deduction of 2.5 from the percentage of elongation in 8 in., specified in Section 6 (a), shall be made for each decrease of 1-16 in. in thickness below 5-16 in.

8. Bend Test.—(a) The test specimen for structural steel shall bend cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material ¾ in. or under in thickness, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

(b) The test specimen for plates for cold flanging shall bend cold through 180 deg. flat on itself without cracking on the outside of the bent portion.

9. Test Specimens.—(a) Tension and bend test specimens shall be taken from the rolled material.

(b) Tension and bend test specimens, except as specified in Paragraph (c), shall be of the full thickness of material as rolled; and may be machined to the form and dimensions shown in Fig. 1, or with both edges parallel.

(c) Tension and bend test specimen for plates and bars over 1½ in. in thickness or diameter may be machined to a thickness or diameter of at least ¾ in. for a length of at least 9 in.

10. Number of Tests.—(a) One tension and one bend test shall be made from each melt; except that if material from one melt differs ⅜ in. or more in thickness, one tension and one bend test shall be made from both the thickest and the thinnest material rolled. Shapes less than 1 sq. in. in section need not be subjected to a tension test.

(b) If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

(c) If the percentage of elongation of any tension-test specimen is less than that specified in Section 6 (a), and any part of the fracture is outside the middle third of the gage length, as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAGE

11. Perimssible Variations.—The cross section or weight of each piece of steel shall not vary more than 2.5 per cent. from that specified; except in the case of sheared plates, which shall be covered by the following permissible variations to apply to single plates:

(a) *When Ordered to Weight.*—For plates 12½ lb. per sq. ft. or over:

Under 100 in. in width, 2.5 per cent. above or below the specified weight; 100 in. or over in width, 5 per cent. above or below the specified weight.

For plates under 12½ lb. per sq. ft.:

Under 75 in. in width, 2.5 per cent. above or below the specified weight.

75 to 99 in., inclusive, in width, 5 per cent. above or 3 per cent. below the specified weight.

100 in. in width or over, 10 per cent. above or 3 per cent. below the specified weight.

(b) *When Ordered to Gage.*—The thickness of each plate shall not vary more than 0.01 in. under that ordered.

An excess over the nominal weight corresponding to the dimensions on the order shall be allowed for each plate, if not more than that shown in the following table, 1 cu. in. of rolled steel being assumed to weigh 0.2833 lb.

Thickness Ordered, In.	Nominal Weight, Lb. per Sq. Ft.	Allowable Excess (Expressed as Percentage of Nominal Weight), for Width of Plates, as Follows:						
		Under 50 in.	50 in. to 70 in. excl.	70 in. or over.	Under 75 in.	75 in. to 100 in. excl.	100 in. to 115 in. excl.	115 in. or over.
1/4 to 5/16	5.10 to 6.37	10	15	20	. . .	. . .	. . .	. . .
5/16 to 3/8	6.37 to 7.65	8 5	12 5	17	. . .	. . .	. . .	. . .
3/8 to 1/2	7.65 to 10.20	7	10	15	. . .	. . .	. . .	. . .
1/2 . . .	10.20	.	.	.	10	14	18	. . .
5/8 . .	12.75	.	.	.	8	12	16	. . .
3/4 . . .	15.30	.	.	.	7	10	13	17
7/8 . . .	17.85	.	.	.	6	8	10	13
1 . . .	20.40	.	.	.	5	7	9	12
1 1/8 . .	22.95	.	.	.	4 5	6 5	8 5	11
1 1/4 . .	25.50	.	.	.	4	6	8	10
Over 1 1/4	. .	.	.	.	3 5	5	6 5	9

(c) A variation from the length ordered of ⅛ in. either way will be permitted for lengths 12 ft. and under and ¼ in. either way will be permitted for lengths over 12 ft.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR.]

SPECIFICATIONS FOR STRUCTURAL STEEL, STEEL PLATE AND STEEL SHEETS FOR FREIGHT-EQUIPMENT CARS

These specifications are the same as those for passenger equipment cars with the exception of the section on physical properties and tests, which is as follows:—[EDITOR].

III. PHYSICAL PROPERTIES AND TESTS

6. Bend Tests.—(a) The test specimen for structural steel shall bend cold through 180 deg. without fracture on the outside of the bent portion as follows: For material ¾ in. in thickness and under, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for thicknesses over 1¼ in. around a pin the diameter of which is equal to twice the thickness of the specimen.

(b) Angles ¾ in. or under in thickness shall open flat, and angles ½ in. or under in thickness shall bend shut, cold, without fracture.

NOTE.—The above tests may be made either by pressure or by blows.

(c) Bend test specimens shall be 1½ in. or over in width by the thickness of the material, with planed or milled edges.

7. Number of Tests.—At least one bend test for structural steel shall be made for each thickness from each melt, and shall be taken from the finished product.

SPECIFICATIONS FOR MALLEABLE-IRON CASTINGS FOR PASSENGER AND FREIGHT EQUIPMENT CARS

I. MANUFACTURE

1. Process.—Malleable-iron castings may be made by either the open-hearth, air furnace or electric furnace process.

2. Annealing.—Malleable castings shall be neither over nor under annealed.

II. PHYSICAL PROPERTIES AND TESTS

3. Tensile Test.—The tensile strength of the standard test bar shall not be less than 38,000 lb. per sq. in. with an elongation, measured in 2 in., of not less than five per cent.

4. Transverse Test.—The standard transverse test bar, tested cope side up and on supports 12 in. apart, with the load applied at the center shall show the following deflection:

900 lb. with 1.25 in. deflection in ½ in. specimen
1400 lb. with 1.00 in. deflection in ⅝ in. specimen
2000 lb. with 0.75 in. deflection in ¾ in. specimen

NOTE.—The test specimen shall be 14 in. long, 1 in. wide and either ½, ⅝ or ¾ in. thick, these thicknesses to be proportional to the thickness of the material which they represent.

7. Standard Test Bars.—All test bars shall be cast without chills, and with the ends left perfectly free in the molds, using heavy risers of sufficient height at each end to insure sound bars. Of the bars selected, two tensile and two transverse test bars shall be cast in one mold. Where the full heat goes into castings which are subject to specifications, two molds shall be poured within five minutes after tapping into the first ladle and two from the last iron of the melt. Molds shall be suitably stamped to insure identification of the bars, the bars being annealed with the castings. Where only a partial melt is required for work in hand, two molds shall be cast from the first ladle used and two after the required iron has been tapped.

(a) *Tensile Test Bars.*—The test bar as cast shown in Fig. 2 shall be used for all tensile tests.

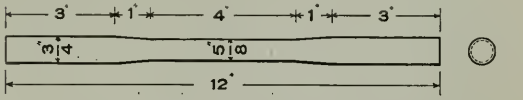


Fig. 2.—Test Specimen for Malleable Iron Castings

(b) *Transverse Test Bars.*—The purchaser and the manufacturer may agree upon a transverse test bar, as cast, the width of which shall be 1 in., the thickness ½ in., ⅝ in. or ¾ in., depending upon the thickness of the castings represented, and the length to be 14 in.

8. Number of Tests.—Of the test bars required for each melt, two shall be tested for tensile strength and elongation and two for transverse deflection; these bars shall be taken from the hottest and coldest parts of the annealing furnace.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR].

SPECIFICATIONS FOR MISCELLANEOUS STEEL CASTINGS FOR PASSENGER AND FREIGHT-EQUIPMENT CARS

I. MANUFACTURE

1. Process.—The steel may be made by the open-hearth, crucible or any other process approved by the purchaser.

2. Heat Treatment.—Castings shall be allowed to become cold, they shall then be uniformly reheated to the proper temperature to refine the grain (a group thus reheated being known as an annealing charge), and allowed to cool uniformly and slowly. If, in the opinion of the purchaser or his representative, a casting is not properly annealed, he may at his option require the casting to be reannealed.

II. CHEMICAL PROPERTIES AND TESTS

8. Chemical Composition.—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional per cent.
Manganese	Optional per cent.
Phosphorus, not over	0.05 per cent.
Sulphur, not over	0.05 per cent.

III. PHYSICAL PROPERTIES AND TESTS

6. Tension Tests.—The steel shall conform to the following minimum requirements as to tensile properties:

Tensile strength, lb. per sq. in.	60 000
*Elongation in 2 in., per cent.	1 400 000/tensile strength
Reduction of area, per cent,	30.

*Not under 22 per cent.

7. Alternative Tests to Destruction.—In the case of small or unimportant castings, a test to destruction on three castings from a lot may be substituted for the tension tests.

8. Test Specimens.—(a) Sufficient test bars, from which the test specimens required in Section 9 may be selected, shall be attached to castings weighing 500 lb. or over, when the design of the castings will permit. If the castings weigh less than 500 lb., or are of such a design that test bars cannot be attached, two test bars shall be cast to represent each melt; or the quality of the casting shall be determined by tests to destruction as specified in Section 7. All test bars shall be annealed with the castings they represent.

9. Number of Tests.—One tension test shall be made from each melt.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR.]

SPECIFICATIONS FOR JOURNAL BEARINGS FOR PASSENGER AND FREIGHT-EQUIPMENT CARS

1. Classification.—This specification will cover two grades of bearings and will be known as *A* and *B*.

I. CHEMICAL PROPERTIES AND TESTS

2. Composition of Shell.—The shell shall conform to the following requirements as to chemical composition:

SHELL	A.	B.
Lead	24.0 to 30.0 per cent.	8.0 to 16.0 per cent.
Tin, not less than	4.0 per cent.	7.0 per cent.
Zinc and other impurities, not over	3.0 per cent.	3.0 per cent.
Copper, not less than	65.0 per cent.	Not over 82.0 per cent.

3. Composition of Lining.—The lining metal shall conform to the following requirements as to chemical composition:

LINING	Up to ⅛ In.	⅛ In. and Over.
Lead	94.0 to 96.0 per cent.	Not over 88.0 per cent.
Antimony and Tin	3.0 to 5.0 per cent.	17.0 per cent.
Tin	0.50 to 1.5 per cent.	
Other impurities, not over	0.5 per cent.	0.75 per cent.

4. Analysis.—The sample for chemical analysis shall be taken from the shell and lining at three points along the fractured surface, described in Section 5, either by drilling or by using cuttings thus obtained, well mixed.

II. PHYSICAL PROPERTIES AND TESTS

5. Tests.—The finished bearing representing a lot for acceptance shall be broken along the center line of the bearing, without nicking, in order to ascertain the uniformity of the grain of the metal. When this fracture shows distinct signs of imperfect mixing, such as separation of component parts and dross or dirt spots, the lot shall be rejected.

6. Number of Tests.—Bearings shall be divided into lots of three hundred or less and one bearing shall be taken for test and chemical analysis from each lot.

III. PERMISSIBLE VARIATIONS IN GAGINGS

7. Gaging.—All bearings shall conform to gages and dimensions shown on drawings, and when linings are required they shall conform to the gages and dimensions for linings as shown on drawings.

IV. MARKING

8. Marking.—Each lot of three hundred or less shall bear a serial number, commencing with one at the beginning of the year and continuing consecutively until the end of the year, the year when cast, and the pattern number, legibly cast, by depressing the letters, on the sloping surface of the shoulder of the brass, and on the opposite sloping shoulder the railroad company's initials, M. C. B., and either "A" or "B," depending on the composition of the metal, and the figures to show the size of the journal bearing, and on the collar the manufacturer's name or trade-mark. All letters to be ¾ in. high, except the manufacturer's name or trade-mark which should be the width of the shoulder or collar. The above marking shall be in accordance with Fig. 3.

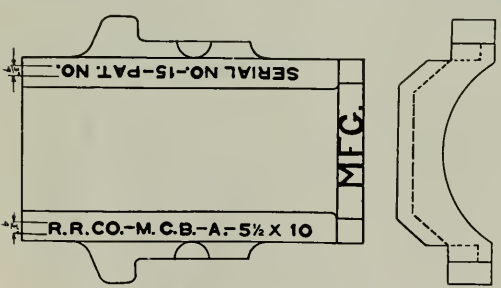


Fig. 3.—Marking for Journal Bearings

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR.]

SPECIFICATIONS FOR MILD STEEL BARS FOR PASSENGER AND FREIGHT-EQUIPMENT CARS

I. MANUFACTURE

2. Process.—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

3. Chemical Composition.—The steel shall conform to the following requirements as to chemical composition:

Carbon .....Optional per cent.
Manganese .....Optional per cent.
Phosphorus, not over.....0.05 per cent.
Sulphur, not over.....0.05 per cent.

*This material may be used when so desired for rivet steel.

III. PHYSICAL PROPERTIES AND TESTS

6. Tension Tests.—The steel shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in....50 000-65 000 for sizes smaller than 1 in flats and 2 in rounds.
Tensile strength, lb. per sq. in....50 000-60 000 for larger sizes.
Elongation in 8 in., per cent.....1 500 001 tensile strength.

7. Yield Point.—The yield point as determined by the drop of the beam of the testing machine shall be one-half the ultimate tensile strength.

8. Bend Test.—The test specimen for rounds, squares and hexagon bars shall bend cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material ¾ in. or under in thickness, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

9. Test Specimen.—Tension and bend-test specimens shall be of the full section of material as rolled, if possible; otherwise the specimen shall be machined from the material as rolled. The axis of the specimen shall be located at any point one-half the distance from the center to the surface of round bars, or from the center to the edge of flat bars, and shall be parallel to the axis of the bar.

10. Number of Tests.—(a) All bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

IV. PERMISSIBLE VARIATIONS IN GAGE

11. Permissible Variations.—(a) *Round Bars.*—Round bars shall conform to the limits as given in Table No. 1.

TABLE No. 1

NOMINAL DIAMETER OF STEEL IN.	Large Size End, In.	Small Size End, In.	Total Variation, In.
¼	0.2550	0.2450	0.010
5/16	0.3180	0.3070	0.011
⅜	0.3810	0.3690	0.012
7/16	0.4440	0.4310	0.013
½	0.5070	0.4930	0.014
9/16	0.5700	0.5550	0.015
⅝	0.6330	0.6170	0.016
¾	0.7585	0.7415	0.017
⅞	0.8840	0.8660	0.018
1	1.0095	0.9905	0.019
1⅛	1.1350	1.1150	0.020
1¼	1.2605	1.2395	0.021
1⅜	1.3860	1.3640	0.022
1½	1.5115	1.4885	0.023
1⅝	1.6370	1.6130	0.024
1¾	1.7625	1.7375	0.025
1⅞	1.8880	1.8620	0.026

Round steel 2 in. and over in diameter shall not be under size or more than 1/32 in. greater in diameter.

(b) *Flat Bars.*—Thickness shall not vary more than corresponding diameter for rounds; thus, 1 in. thick could vary from 0.9905 to 1.0095 in.

(1) Sizes under 3 in. wide shall not be more than 1/32 in. under or over size in width.

(2) Sizes 3 in. and over shall not be under size or more than 1/16 in. wider than ordered.

[NOTE.—Only the more important paragraphs of these specifications are printed here.—EDITOR.]

SPECIFICATIONS FOR RIVET STEEL AND RIVETS FOR PASSENGER AND FREIGHT-EQUIPMENT CARS

I. MANUFACTURE

1. Process.—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

2. Chemical Composition.—The steel shall conform to the following requirements as to chemical composition:

Carbon .....Optional per cent.
Manganese .....Optional per cent.
Phosphorus, not over.....0.05 per cent.
Sulphur, not over.....0.05 per cent.

5. Number of Samples for Chemical Analysis.—One bar from every 200 bars or less of each different size of section shall be taken, and a piece 2 ft. long shall be cut off and given the purchaser or his representative, or 10 rivets from every 100 kegs. These samples shall be used for check analysis by the purchaser.

III. PHYSICAL PROPERTIES AND TESTS

6. Tension Tests.—The bars shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in.....45 000-60 000
Elongation in 8 in., per cent.....1 500 000/tensile strength

7. Bend Tests.—The test specimen shall bend cold through 180 deg. flat on itself without cracking on the outside of the bent portion.

8. Test Specimens.—Tension and bend-test specimens shall be of the full-size section of bars as rolled.

9. Number of Tests.—(a) All bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

[Permissible variations are the same as those given in the specifications for mild-steel bars.—EDITOR.]

16. Bend Tests.—The rivet shank shall bend cold through 180 deg. flat on itself, without cracking on the outside of the bent portion.

17. Flattening Test.—Rivet heads shall be flattened down cold to a thickness of one-third, and when hot to a thickness of one-fourth, of the original diameter of the shank at the working heat when driving without splitting.

18. Number of Tests.—One of each of the above tests shall be made for each 100 kegs for each different size of rivets.

19. Size of Heads.—Standard rivet heads shall conform to the following:

Size Diameter, In.	Head.		Countersunk.	
	Height, In.	Diameter, In.	Depth, In.	Diameter, In.
1/2	3/4	7/8	1/4	2 3/32
5/8	29/64	1 1/16	5/16	1
3/4	17/32	1 1/4	3/8	1 3/16
7/8	39/64	1 7/16	7/16	1 3/8
1	11/16	1 5/8	1/2	1 9/16
1 1/8	49/64	1 13/16	9/16	1 3/4
1 1/4	27/32	2	5/8	1 15/16

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR.]

SPECIFICATIONS FOR GALVANIZED SHEETS FOR PASSENGER AND FREIGHT EQUIPMENT CARS

I. MANUFACTURE

1. Process.—The sheet material manufactured under this specification may be either a mild steel or iron made from puddled bars made wholly from pig iron, and shall be thoroughly cleaned before being coated.

II. PHYSICAL PROPERTIES AND TESTS

2. Bend Test.—Test specimen as described in Section 3 shall be subjected to the following tests:

(a) Test specimen shall bend double on itself around two thicknesses of the material tested and straightened, without showing any cracking or flaking of the galvanizing on either side of the test specimen.

(b) Test specimen of the base material shall bend twice in the same direction, first around a mandrel the diameter of which is equal to 15 gages of the material tested and straightened, and then bent flat on itself and straightened, without cracking of the specimen.

(c) Gages 26 and lighter shall double-lock seam without cracking of the sheet or galvanizing.

3. Test Specimen.—(a) Strips about 8 in. long and 2 in. wide shall be cut from the center of a sheet selected at random from each lot of 1000 sheets or less, and the average thickness or weight of the coating across this width shall be used.

(b) Corrugated sheets shall be flattened with a wooden maul before making the required tests.

IV. PERMISSIBLE VARIATIONS

6. Permissible Variations.—(a) The inspector shall weigh and check the measurements of one sheet in each 200 sheets in each order or shipment.

(b) A variation in weight of the finished sheet of 2½ per cent either way from that shown in the following table will be allowed.

*Gage No.	Thickness of Sheets, In.	Weight of Sheets per Sq. Ft., Oz.	Minimum Weight of Coating per Sq. Ft., Oz.	*Gage No.	Thickness of Sheets In.	Weight of Sheets per Sq. Ft., Oz.	Minimum Weight of Coating per Sq. Ft., Oz.
16	.0625	42.50	2.00	25	.021875	16.50	1.45
18	.0500	34.50	1.90	26	.01875	14.50	1.40
20	.03750	26.50	1.80	27	.017187	13.50	1.35
22	.03125	22.50	1.70	28	.015625	12.50	1.30
23	.028125	20.50	1.60	30	.0125	10.50	1.30
24	.0250	18.50	1.50				

*The above gage is of the finished sheet.

[NOTE:—Only the more important paragraphs of these specifications are printed here.—EDITOR.]

(The report will be submitted to the association by letter ballot for adoption as recommended practice.)

TANK CARS

The report was submitted by A. W. Gibbs, (Penna.) who said: As chairman of the Tank Car Committee, I have taken the responsibility of making no recommendations affecting the tank car specifications this year. This is not for the reason that the committee does not feel that certain changes should be made in the Specifications. After the meeting of the committee, however, complaint with respect to the 60 lb. test pressure required for cars carrying inflammables was made before the Interstate Commerce Commission by the National Petroleum Association and others, against the Pennsylvania Railroad and the Atchison, Topeka and Santa Fé directly, but, really, as stated in the complaint, against "railroads generally throughout the United States, too numerous to be made defendants." The complainants ask the commission to restrain the railroads from enforcing the requirements of the specification, and to find and put into effect such pressure test as it may find to be just and reasonable. If the complaint is sustained, it is probable that other requirements of the specifications may be attacked, and it may be necessary to change the whole specification. It is therefore felt that it would be unwise to make any change in the present specifications until it is known by the decision of the commission in this case whether they are to be reversed or modified by the commission.

A number of questions of tank car owners are now before the committee.

As regards the recommendation of the Arbitration Committee that the Tank Car Committee name a date after which tank cars not strictly complying with the M. C. B. Tank Car Specifications shall not be received in interchange, the committee recommends that this question be held in abeyance for one year, for the reasons already given for not taking any action concerning tank cars at this time.

THE LAMENT OF THE FOREIGN BAD-ORDER EMPTY CAR

At the opening of the afternoon session yesterday, when the rules of interchange were under consideration, Secretary Taylor read the following amusing anonymous poem with the above caption:

No one seems to care
How many moves I make;
No one seems to worry
At the circuitous routes I take.
No one sees me moving
From Maine to Californ—
And I get so tired and weary
I wish I never was born.
No one wants to fix me,
No one will spend a cent
To put me in good condition,
So I can earn the rent.
My owner will pay the money,
As soon as the work is done,
As soon as I'm fixed and ready
To go out on the road and run.

But it's always the same old story,
As I wander from road to road,
In search of a friendly fellow,
Who'll fix me up for a load.
"There's nothing allowed to repair you."
Is all they say at each place,
"We need all the money allowed us,
To keep our own cars in the race."
And so I just wander and wander,
O'er the face of the whole country wide,
With a "Bad Order—Return When Empty"
Carding upon my side.
Somebody ought to fix me,
I don't *want* to roam,
So if you can't spare the money,
Please, sir, *please* send me home.

THE DRIVING CONTEST IN PICTURES

The Daily published yesterday an account of the golf driving contest from the roof of the Hotel Traymore over the Boardwalk into the ocean which was participated in by D. R. MacBain, C. F. Street and S. P. Bush. While the driving was going on a photographer was stationed on the dome just back of the tee, but the pictures taken were not finished in time to be reproduced in yesterday's *Daily*. They are given herewith, and they probably illustrate the highest golf driving

George Carr and Will Johnson Just Before They Went to Sea

contest ever held in the history of the great Scotch game. The publicity agent of the hotel confides to us that the roof of the Traymore is the most elevated point on the Atlantic Coast south of the Statue of Liberty, and in the absence of evidence to the contrary we take his word for it.

The players can be very distinctly seen in the photographs. The judges are less fortunate. Even in the picture of them going to sea the familiar features of Will Johnson and George Carr cannot be recognized. In the other pictures the boat

The Judges Going to Sea

and its occupants are shown as a mere blur because when the camera was snapped the boat was doing gymnastic stunts as energetic as the army setting-up exercises.

We present a photograph taken of Messrs. Carr and Johnson just before they went aboard. We regret not to be able to present one of them just after they came ashore, for the contrast between Mr. Carr's clothes before and after a large

C. F. Street Showed Excellent Form

roller from mid-ocean had swamped him was striking. Everybody who has seen the picture of C. F. Street admires the

D. R. MacBain Driving—The Judges' Boat in the Distance To the Left of the Cross

excellent golf form he showed even though he did not get the distance attained by S. P. Bush.

S. P. Bush Winning the Driving Contest on the Traymore's Roof

ADDITIONAL MASTER CAR BUILDERS' REGISTRATION

Brown, F. S., M. E.; Erie R. R.
Bundy, C. L., G. F.; D. L. & W.; Haddon Hall.
Burch, J. J., D. C. I.; Nor. & West.; Rudolf.
Dillon, S. J., M. M.; P. R. R.; Pennhurst
Elliott, B. F., M. C. B.; Havana Central; Blenheim.
Gibbs, A. W., C. M. E.; P. R. R.; Chelsea.
James, Charles, Mech. Supt.; Ene.; Dennis.
Maginn, J. J., G. F. S.; Cin. Nor.; Arlington.
Martin, J. H., Supt. Car Service, Berwind White Coal Mining Co.
Mengel, J. C., M. M.; P. R. R.
Ott, William H., M. M.; P. R. R.; Chalfonte.
Quinn, C. H., A. E. M. P.; N. & W.
Shoemaker, C. A., General Supt.; German American Car Lines; Traymore.
Smith, Henry J., General Car Inspector; D. L. & W.; Monticello.
Smith, John E., M. M.; P. S. & N.; Monticello.
Spence, A. N., T. I.; Southern; Arlington.
Totten, E. C., D. G. C. F.; N. Y. C.; Pennhurst.

ADDITIONAL SPECIAL GUESTS

Battenhause, Wm., Gen. Car Foreman; B. & O.; Dennis.
Bernheisel, L. W., Supt. (Asst.) Car Service; Berwind-White Coal Mining Co.
Blake, F. H., M. P. Inspector; P. R. R.
Boltz, Fred. W., Traf. Mngr.; Nat. Petroleum Assn.; Blenheim.
Brown, B. S., Foreman Office Mech. Eng.; P. R. R.
Burr, H. S., Supt. Stores; Erie; Dennis.
Carmichael, N., Gen. Mgr.; Arizona & New Mexico Co.
Courtney, A. S., Asst. Machinist Foreman; Penna. Lines West; Dennis.
Flaherty, W. P., Round House Foreman; B. & O.
Forney, Ed. O., Asst. Examiner U. S. Patent Office; U. S. Government; Chalfonte.
Gallagher, F. S., Asst. Engineer; N. Y. C.; Blenheim.
Green C. B., Foreman Car Shops; P. R. R.
Griest, E. E., M. M.; Penna. Lines West; Dennis.
Haig, J. Frank, Reg. Clerk; P. R. R.
Hall, C. B., Inspector, Pur. Dept.; P. R. R.
Hightower, R. E., Commercial Agt.; Macon & Birmingham; Haddon Hall.
Holslag, C. J., Asst. Engr., Engrg. Dept.; N. Y. C.
Koch, Philip, Foreman Engine House; C. R. R. of N. J.
Ludlum, George, Eng.; P. R. R.
Mackey, W. C., Passenger Car Foreman; B. & O.; Chelsea.
Martin, H. B., Pur. Agent; Coal & Coke.
Martin, K. H., General Equipment Inspector; Southern; Fradonia.
Meloy, H. C., Elec. Eng.; N. Y. C.; Dennis.
Morningstar, Mr. E. E., Draftsman; B. & O.; Traymore.
Morris, J. C., Foreman Car Shops; Cumberland Valley; Monticello.
Patrain, B. F., Foreman Car Repairs; Southern; Elberon.
Patterson, G. W., Asst. Supt.; Penna. Lines West; North Villa.
Peterson, E. W., Clerk; Boston & Albany; Pennhurst.
Pfieffer, C. A., M. P. Inspector; P. R. R.; Arlington.
Renner, C. W., Asst. Genl. Foreman Shops.
Riley, Thomas E., Special Agent; P. R. R.
Roberts, A. L., Mech. Eng.; L. V.; Traymore.
Runkle, D. F., For. Car Shops; P. & R.; Somerset.
Schuyler, A. J., Gen. Car Inspector; Virginian; Arlington.
Sensenbach, C. A., Foreman Blacksmith Shop; P. R. R.; Wellsborough.
Shea, L. M., Lieut. U. S. N.; Chalfonte.
Sheedy, M. M., Inspector; P. R. R.
Sheen, John, M. C. B.; A. & W. P.; Lexington.
Smith, C. B., Mech. Engr.; B. & M.
Smith, E. W., Asst. M. M.; P. R. R.; Shelburne.
Spengler, E. A., Asst. Road For. of Engines; P. R. R.; Bowker.
Stadelman, J. H., Asst. Eng.; P., W. & W. R. R.
Stewart, Lewis, Foreman of Car Shop; P. R. R.
Sweeley, E. A., M. C. B.; S. A. L.; Chelsea.
Tapman, W. H., Inspector; B. & O.; Arlington.
Tenske, F. J., Foreman; P. R. R.; Lexington.
Thomas, John H., Engineman; C. R. R. of N. J.; Lyric.
Wayne, Albert G., Asst. Engine House Foreman; P. R. R.; Islesworth.
Weight, Geo. C., Foreman Car Dept.; P. R. R.; Colonial.
Wenzel, C. F., Foreman Freight Dept.; P. R. R.; Colonial.
Wescott, E. A., Consulting Engineer; Erie; Traymore.
Williamson, G. B., M. C. B. Inspector; B. & O.; Bouvier.
Woticky, C. B., Insp. Elec. Dept.; N. Y. C.
Williams, C. B., P. A.; C. R. R. of N. J.; Shelburne.
William, Frank, Supt. Car Shop; Westmoreland Coal Co.; Craig Hall.

THE WINNERS IN THE GOLF TOURNAMENT

The tie for the prizes in the medal handicap of the golf tournament was played off yesterday by D. R. MacBain, C. R. Naylor, and George A. Post, Jr. Mr. MacBain won the first prize with a score of 108-36-72; Mr. Naylor won the second with 108-31-77, and Mr. Post was third with 104-26-78.

The tie for the third prize in the kickers' handicap also was played off, the winner being W. J. Tollerton.

M. C. B. CARNIVAL DANCE

The M. C. B. Carnival Dance last night was in point of its success as well as in many other respects, a repetition of the carnival dance of last week. One of the features of the program was a skating act by Miss E. M. Kegel and Harry Walls. Miss Betty Lee also sang some of the best songs from her repertoire. The music was furnished by the Don Richardson orchestra.

The committee in charge of the dance included Langley Ingraham, chairman; Burton W. Mudge, J. F. Forney, H. W. Hegeman, G. R. Berger, D. E. Sawyer, W. H. Bentley and C. W. F. Coffin. The crowd was large and everybody seemed to have a very merry time.

LITTLE INTERVIEWS

Co-operation between the Interstate Commerce Commission and the railways was the keynote of an interview given yesterday by George B. McGinty, secretary of the commission, regarding the legislation recently enacted by Congress extending the regulatory authority of the commission over the entire locomotive. "It will be necessary," said Mr. McGinty, "to draw up rules and regulations for the application and administration of this legislation. We recognize the fact that this will not be an easy task and that if it is to be done satisfactorily it will be necessary for the representatives of the commission and of the railways to co-operate frankly and fully. The commission usually has received the close co-operation of the representatives of the carriers in the administration of the boiler inspection law, and I am sure that we will receive it in the application of broader provisions of the new law. The better the understanding reached and carried out, the more satisfactory the results would be for all concerned."

WILLIAM S. MORRIS DEAD

Word was received from Mrs. W. S. Morris, of Fort Wayne, that Mr. Morris died at 4 o'clock Tuesday morning. Mr. Morris is well known because of the interest that he took in the work of both the Master Car Builders' and Master Mechanics' Association; he was president of the latter in 1900-01. He was born March 4, 1857, at Chicago, and was educated in the public schools of that place and at the Cook County Normal School. He entered railway service in 1874 as a machinist apprentice on the Housatonic and at the completion of his apprenticeship worked as a journeyman machinist on that road and on the Wabash. In 1879 he became a locomotive fireman, later being advanced to the position of engineer and then becoming master mechanic of the Fort Wayne, Cincinnati & Louisville. In 1884 he went with the Missouri Pacific as master mechanic, but in 1886 returned to the Wabash as master mechanic of the eastern division. In 1889 he was made superintendent of motive power and rolling stock of the Chicago & West Michigan; Detroit, Lansing & Northern; and Saginaw Valley & St. Louis roads. From April, 1893, to June, 1902, he was superintendent of motive power of the Chesapeake & Ohio, leaving to take the position of mechanical superintendent on the Erie in June, 1902, and remaining in that position until April, 1904. For a short time he was in the supply business and then returned to the Chesapeake & Ohio remaining in the transportation department of that road for two or three years, after which he retired and has since been living in Fort Wayne, Ind.

Conventionalities

Amos Turner, master mechanic of the Lehigh Valley, who is attending the conventions, has been in the service of that road over 50 years. He is commonly known as the "Grand Old Man."

R. W. Burnett, vice-president of the M. C. B. Association, who until recently was with the Canadian Pacific, will not be at the convention. He is making an extensive western trip which will include a visit to the Panama Exposition.

Wm. Schlafge, Gen. Supt. of Motive Power, Erie Railway

Frank A. Barbey, of good old Boston town won't have as good an opportunity to distribute his American flags this year on June 17, Bunker Hill Day, as the conventions come earlier than usual. However, he wants us all to remember that that is the day Boston should be sacredly remembered.

Among the missing faces are those of O. C. Gayley, vice-president of the Pressed Steel Car Company, and J. F. MacEnulty, general manager of sales of the same concern. Mr. Gayley is of a retiring disposition and makes little noise, while Mr. MacEnulty is the reverse. By the law of averages, therefore, the hole in this year's din, made by their absence, is sufficiently large to be noticeable.

F. C. Pickard, master mechanic of the Lackawanna at Buffalo, brings word from his general foreman, W. W. Scott, who is president of the International Railway General Foremen's Association, that all of the reports for the annual meeting of that association are in hand and will shortly be issued in printed form so that the members will have plenty of time to study them over in advance of the meeting next July.

THE ARBITRATION COMMITTEE

Top Row, Left to Right—James Coleman, Supt. Car Dept., Grand Trunk; T. H. Goodnow, Asst. Supt. Car Dept., C. & N. W., and T. W. Demarest, Supt. Motive Power, Penna. Lines.

Bottom Row—J. J. Hennessey, M. C. B., C. M. & St. P., and F. W. Brazier, Supt. Rolling Stock, N. Y. C.

TWO PITTSBURGH & LAKE ERIE FAMILIES

Master Car Builder Sam Lynn, with Mrs. Lynn and Daughter on the Left, and Mechanical Engineer W. P. Richardson, with Wife and Daughter Alice on the Right

Charles A. Lindstrom, assistant to president of the Pressed Steel Car Company, is a grandfather, a little daughter having been born to Mr. and Mrs. Frank Cairns, of Toronto, on Sunday, June 6. Mrs. Cairns used to attend these conventions as Miss Charlotta Lindstrom, and was married last spring. Mr. Lindstrom's daughter Jean, also a regular conventionite, was married on June 8 to John Clark, of Clarksburg, Va. Mr. and Mrs. Clark wil live in Pittsburgh.

Some of the Thirty-Five Members of the Illinois Athletic Club Who Are in Attendance at the Convention

Top Row—W. H. Bentley, Will Miller, F. L. Barber. W. L. Allison, C. W. Floyd Coffin, C. J. Olmstead, L. D. Mitchell, C. J. Blatchford.

Second Row—William Anderson, C. C. Farmer, B. W. Mudge, B. Pratt, R. W. Benson, Frank O'Brian.

Third Row—Joe Brown, George H. Porter, W. J. Walsh, Albert MacRae, Claude Baker, John P. Landreth.

Bottom Row—Egbert H. Gold, Joe Buker, L. R. Phillips, S. W. Midgley, J. Will Johnson, Frank L. Johnson, W. M. Wilson, C. N. Thulin.

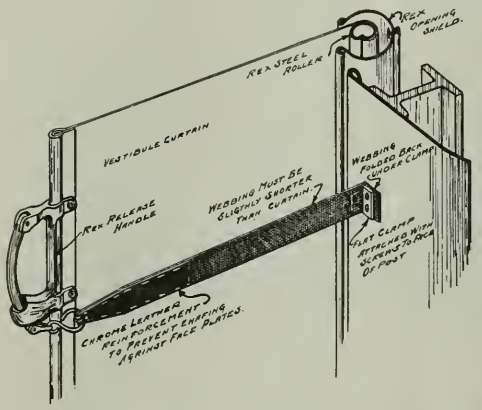
A GROUP OF CHIEF CAR INTERCHANGE INSPECTORS

Top Row, Left to Right—M. W. Halbert, W. J. Stoll, T. J. O'Donnell, B. M. Waldo.

Bottom Row—J. W. Hogsett, F. W. Tapnell, H. Boutet, W. R. McMunn.

IMPROVEMENTS TO REX DIAPHRAGM CURTAINS

The Curtain Supply Company, Chicago, is now arranging its vestibule curtains so that the webbing connected to the releasing handle is attached to the face of the post instead of to the roller, as has been formerly customary. This is done for the purpose of reducing the wear of the curtain due to webbing rubbing against it. The manner in which the releasing handle is connected to it is clearly shown in the illustration. The



Improved Arrangement for Tripping the Rex Releasing Handle

webbing is reinforced with chrome leather at the end where it rubs against the face plates. It has been found that most satisfactory results are obtained with this arrangement and that the life of the curtain is lengthened.

SOLID FORGED BRAKE BEAM FULCRUM

The illustration shows a forged brake beam fulcrum of a type which was originally developed by the Damascus Brake Beam Company, Cleveland, Ohio, for application to this company's own beams. This design is applicable to beams of channel

Forged Brake Beam Fulcrum for Channel Section Beams

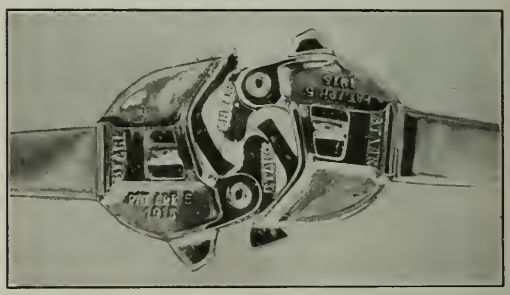
section and is clamped to the beam without the necessity of drilling holes through the latter. It is held in position by a single bolt which clamps the sides of the fulcrum against the outside of the channel. This and other types of solid forged fulcrums are on exhibit at the booth of the Damascus Brake Beam Company.

NEW RAILWAY LINES IN RUSSIA.—In connection with the proposed direct international railway communication, the Russian tariff committee proposes to construct direct lines connecting Archangel with Vologda, Petrograd, Moscow, Kief, Warsaw, Saratof, Kharkof, Odessa, Ekaterinoslav, Omsk, Riga and Reval, and through Archangel connecting with the ports of New York, Halifax, Liverpool and Glasgow.

AUTOMATIC COUPLER WITH MOVABLE GUARD ARM

A coupler designed to be automatic in its action under all conditions is being exhibited by the Stark Car Coupler Corporation, Washington, D. C. Present standard couplers will not couple when both knuckles are closed, and under certain conditions when only one knuckle is open. It is often necessary to run the risk of injury in adjusting the position of the couplers on moving cars to insure that the coupling will "make." The Stark coupler is provided with a movable guard arm which is free to open except when coupled. This provides sufficient opening between the side of the knuckle and the guard arm to permit closed knuckles to pass each other, thus insuring automatic action under all conditions.

The movable guard arm is pivoted against a shoulder in the coupler head. It is provided with a tail piece which conforms to the contour of the head when closed. When open this swings out from the face of the head and on coupling is forced back to the contour line by the knuckle of the adjoining coupler, by which it is held in the closed position.



Couplers with Movable Guard Arms Open

The design of this coupler offers several advantages aside from its automatic action. The most notable of these is the ability to renew all wearing parts. The guard arm is as readily replaced as the knuckle and the life of the head is thus greatly increased.

TURRET LATHE OPERATION.—The Warner & Swasey Co. have been demonstrating some interesting possibilities of the turret lathe at their exhibit. One example was on aeroplane motor cylinders which are being finished in 2½ hours as compared to 37 hours, the former time.

KELLEY COUPLER.—The Kelley Railway Appliance Company, Gradyville, Ga., is exhibiting a coupler which is arranged to permit unlocking when under load. The knuckle tail and the lock block have diagonal surfaces which eliminate the friction which must be overcome in lifting the lock. When locked the knuckle lock is prevented from working up by an additional locking device of small area which swings over the top of the main lock. The knuckle and head are designed to relieve the knuckle pin of strain when the coupler is closed.

FRICTION BUFFER—The Gould Coupler Company, New York, is exhibiting this year a recently developed friction buffer for heavy steel passenger equipment which has a total travel of 5 in. When free the buffer extends beyond the coupling line 2½ in., which is sufficient to insure that the buffers will not separate when the cars are coupled. A further travel of 2½ in. brings into action the friction draft gear which has a capacity ranging from 100,000 lb. to 150,000 lb. as may be desired. The friction elements are contained in a housing, making a complete unit, the principle of construction being the same as in all Gould draft gear. Two release springs are used to insure the release of the friction elements.

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Provide Good Car Repair Facilities

A great many of the engine houses on American railways were, up to a few years ago, poorly built, poorly equipped, and in general, places calculated to make the effective repairing of locomotives as difficult as possible. There has been a great improvement in these conditions within recent years, but there has not been a corresponding improvement in car repair yards. The old idea that the worst place in the yard will do for the "rip" tracks still holds in many places. We have in mind one case in particular in which the terminal has a new and modernly equipped engine house, while the car repair tracks are in a most inconvenient location, with the space between them not leveled off or planked, and the material stores a full half mile away. Such conditions as these prevent the prompt repairing of cars, cause friction between the mechanical and the operating departments, and increase expenses.

Impact Between Freight Cars

The individual paper on Impact Between Freight Cars in Switching Service, by Prof. L. E. Endsley, proved of very considerable interest to the convention and brought out a lively discussion. There seems, however, to be quite a little difference of opinion concerning the amount of such shocks, and judging from this and the curves presented in the paper, it would seem desirable to go further into the matter. It hardly seems possible that the enormous shocks indicated could be absorbed by present-day car construction; in fact, if such shocks were very frequent in service it would seem that there must be a great increase in the number of disabled cars. The investigation, however, is of extreme interest, and bearing so directly on the matter of efficient draft gear, the association acted wisely in referring the matter to a committee for further investigation.

Joint Car Repair Shops

The proposition of providing a joint car repair shop at large terminals for the purpose of making repairs to foreign equipment coming into these terminals, is a question of importance. The General Superintendent's Association, of Chicago, is now seriously considering a proposition of this kind. The establishment of a joint shop in the switching district of Chicago, located at the Stock Yards, is the plan it has in mind. By this means it will be possible to take defective cars coming into this district and repair them, making them available for loads. The switching of defective cars to the lines from which they were received will be eliminated, with the corresponding expense and a reduction in congestion of the switching lines. It has been estimated that 250 cars per day would need such repairs at the joint shops in Chicago, these to include both light and heavy repairs. Such shops would also increase the available car supply in the congested districts, thereby saving considerable money both in intermediate charges and per diem which accumulates while such cars are being moved back and forth.

The M. C. B. No. 2 Brake Beam

The M. C. B. Committee on Brake Shoe and Brake Beam Equipment has twice submitted to the association a recommendation for a standard No. 2 brake beam which it considered satisfactory for adoption as recommended practice. On both occasions the association refused to adopt the committee's recommendations, but, as stated on the floor of the convention on Monday, the committee was unable to obtain from those who objected to the beam any specific reasons for their action or any definite information which would help them in deciding on a design which would meet with general approval. Whatever the reasons for such action, it can scarcely be termed creditable to the association. If the members were not in agreement with the action of the committee they should have at least stated their reasons, giving the committee something to go on in continuing its work. As no specific information was obtainable after the recommendations had beeen rejected, there was, of course, nothing left for the committee to do but drop the matter; but this year the discussion in the convention brought out clearly that the brake beam as recommended previously by the committee is desirable.

Wooden Draft Arms

In the report of the Committee on Car Construction it was recommended that the draft attachments, including the draft arms, if used, must be of metal, of either integral or riveted construction S. G. Thomson, in explaining this, said that it was placed in the report to get rid of the old wooden draft arms which are causing so much of the trouble with the draft gear. The committee has considered the advisability of requiring the removal of all wooden draft arms from cars in interchange service by a certain date. It was decided, however, not to take any definite step at present, but the members would do well to carry out Mr. Thomson's suggestion. Wooden draft arms are a source of great trouble; the sooner they are dispensed with the better. Railways should take it upon themselves to remove them just as quickly as possible so

that if a date is finally set in which cars so equipped will not be received in interchange service, the number of cars left to be changed will not be so large that a remote date will be necessary. The members of the association have here an opportunity to be of great service to the railways in general without the compelling force of any association requirement.

Developing Car Foremen

Because of the large amount of work that is done piecework in the car department, and the employment in such work of unskilled and illiterate laborers, this department has suffered beyond some of the other branches of railway work. It is a trying problem under such conditions to obtain the right class of men for development into inspectors and foremen. The requirements of interchange make it necessary that car department officers be of a studious nature and capable of handling the large number of reports and statements which originate in such work. This requires men of more than ordinary intelligence and it is seldom that they can be procured or developed from the class of labor that is commonly employed in making car repairs. The position of car inspector is the most natural one from which to select a man to advance to the position of foreman, as an inspector must be thoroughly familiar with car repairs. It will, therefore, be necessary to develop some means of training men along these lines for later promotion to the minor official positions. An efficient apprenticeship system would seem to be the most logical means of accomplishing this and great care should then be taken in selecting the men for promotion to see that those chosen show promise of the proper qualifications.

SCIENTIFIC SELECTION OF MEN

WE commented in *The Daily* of June 9th on Professor Herman Schneider's paper before the National Association of Corporation Schools on the selection of men for given jobs. Long study, based on practical observations of an exceptional nature, has forced Professor Schneider to the conclusion that the only way of successfully selecting a man is by actual practical trial on the job. If the man fails, the reasons for the failure should make it possible to transfer him with some degree of assurance to a class of work for which he is better fitted. Assume for a moment, however, that Professor Schneider is wrong and that it is possible scientifically to select men by other means that require a less tedious and shorter examination or observation. What good would it do if the organization was such as not to make scientific use of the men after they were selected? How many organizations are now operated on such a basis that the officers know with any degree of accuracy whether they are getting the best efficiency from the men as individuals, or the organization as a whole? How many railway officers really know whether they are getting 50, 75 or 90 per cent efficiency from the department under their direction, whether it be a repair shop, a car repair yard, an engine terminal, or an office?

Instances are not by any means unusual where investigation has developed the fact that a department was working at 50 or 60 per cent efficiency. Better supervision, improved facilities, etc., may have been introduced which brought it up to 90 or 95 per cent efficiency. The point which we wish to make is that employers are not by any means making the best use of the men that they have, and until this is better understood there is little or no use of going to extremes in trying scientifically to select men. It is true that there may be certain highly specialized jobs which require men of a special type, but such jobs are comparatively few. On average jobs the average men available will do about as well in one class of work as another, within reasonable limits.

Our friends in certain of the European railway shops, realizing the necessity of trying the men out in a practical way, are handling this matter in a way which we can well afford to study with a view to improving our own practices. They study the apprentices while they are in training and find out just what classes of work they make the best records on and seem best adapted to. At the end of their apprenticeship they are assigned to certain departments on the basis of this data, which is a matter of record. For instance, if they are of what may be designated the mental type, there is little use of assigning them to manual work. A man with a highly nervous disposition will make a success of certain classes of work in the machine or erecting shop, but will have an extremely low efficiency on work which requires a steady plodder. Certain types of work require initiative; others do not call for this characteristic and can be filled by men who are good on routine work but helpless when it comes to developing new plans or methods.

It would seem that under present conditions we are not warranted in going much farther into the scientific selection and assignment of men than is done on these foreign roads. There is a field, however, which offers great possibilities, but which thus far has not been worked to any great extent by either our railroad or industrial managers; this is, that of more critical and logical study of the performance and possibilities of the men already in the service, and this study should extend from the very top to the bottom of the organization. No man should ever be promoted in a haphazard manner. Records should be available, and these can be easily kept and at a very low expense, showing in a rough but fairly accurate manner whether a man is good or bad in respect to those traits which affect his work and fit or unfit him for executive positions. When the time comes for promotion, it is not safe to look a man over and promote him on the basis of the impressions of the moment as to his fitness for the job, but simple records should be available as to his work and personality which will check this decision. These records should be revised from time to time so that the supervising officer will know whether a man is improving or not, and whether his immediate superior officer is developing him along proper lines. Such a system has been tried out with good practical results, and was fully described in the *American Engineer* of November, 1908.

If you do not have such records, why not? It is a comparatively easy and simple matter to install and maintain them, and the expense is practically negligible. The trouble is not so much to know how to do the thing as to get people to realize the necessity of so doing, or in other words, to wake them up to a matter of vital importance which is not now as generally appreciated as it should be. Until those in charge make every effort to study and analyze their men in this way, in order to get the maximum individual and collective efficiency from them, there is little use in wasting time in going to extremes in selecting the raw material which is taken into the organization at the bottom; and, moreover, if Professor Schneider's conclusion is correct, and the data which he presents leaves very little question as to its correctness, it is folly to try to find a shorter and less tedious method of selecting men than that of trying them out under actual working conditions. The essential thing is to first establish a management sufficiently scientific to make the best use of scientifically selected men, and this applies to shopmen or car repairmen selected for the greatest output; car inspectors selected for their ability and speed in doing their work, or engineers selected for reliability.

In addition, the railroads can well afford to establish employment bureaus to select the men along broad lines, looking into their records and making such examinations or inquiries as to insure the selection of clean, strong, capable men. Such a bureau should also look into the conditions of employment and questions connected therewith, but little more than this can be done under present conditions so far as the scientific selection is concerned.

Master Car Builders' Association Proceedings

Reports on Train Lighting; Car Trucks, and Draft Gear; Papers on Value of a Patent and Impact of Cars in Switching

President Crawford called the meeting to order Wednesday morning at 10 o'clock.

[The following individual paper was presented at the Tuesday meeting, but was not included in the yesterday's *Daily*.—EDITOR.]

WHAT IS THE VALUE OF A PATENT?

BY PAUL SYNNESTVEDT

That the value of a patent is often the subject of a wide divergence of opinion may be well illustrated by an incident which came to my notice a short while ago. In the case in question—which related to a refrigerator car structure—there had been an accounting ordered, after a finding of infringement, and the master appointed to take testimony on the accounting had handed in a report recommending a recovery totaling $663,000. This recommendation had come up for action before one of the district judges in the United States Court, who had come to the conclusion that, under the law as announced in the authorities, the right to recovery had not been established, and that, therefore, he could award only what is called "nominal damage," the amount being fixed at 6 cents.

When it is taken into account that in connection with the incident just related the master was acting on his understanding of facts formally made of record, and the widely variant conclusion of the judge was rendered by one of our most highly respected authorities on the same facts, it is clear that to fix the value of any given patent in an exact amount of dollars and cents is a very difficult thing to do. On the other hand, it can, I think, be fully maintained that there are elements bearing upon such a question which as to the principle involved may be clearly established.

VALUE OF A PATENT TO THE GENERAL PUBLIC

A patent is a benefit to the public because it is a reward peculiarly adapted to the nature of the service rendered, and adjusts itself with great nicety, so far as concerns the value of the reward or the patent itself, to the value of the service which the inventor has conferred. It is clear that if the invention is a new thing—and this is a necessary part of the assumption of the validity of the patent—then the grant to the inventor of the exclusive use of that new thing for a limited term has not taken from the public anything which it before possessed, but, in consideration of the limited monopoly, it has given to the public the benefit and knowledge of the invention, which is made of record and open to all to use after the expiration of the patent. Thus the right to secure an injunction under a patent becomes of value just in proportion exactly as the invention is of value. The difficulty that arises in estimating the value of any patent always comes in connection with a determination of the amount of damage recoverable for infringement which has taken place before the issue of injunction.

VALUE OF A PATENT TO THE PATENTEE CONSIDERED IN ITS COMMERCIAL ASPECTS

This value is really commensurate with the value to the general public; that is to say, the measure of value is the measure of utility of the invention itself; and it is largely from a failure to fully recognize this important point that the court decisions present such widely varying extremes in fixing the matter of damages. There are certain cases in which it has been made clear by the testimony that the entire value of the device sold was due to the fact that as a commercial article it included the patented invention; that is to say, that the article sold in accordance with the patent would have been entirely worthless without the invention. Such a situation obviously renders the patent of great value, as it then becomes the basis of the entire business. In other cases there may be but slight value attached, but sufficient to cause the patented article to sell at a slightly better price than other things available in the market of similar kind.

To the patentee himself a patent often has another value of a secondary character somewhat analogous to the commercial value of a trade-mark protection, because it may serve the purpose of helping a manufacturer to preserve some distinctive peculiarity in the appearance or character of his product.

Perhaps the most difficult situation under which to fix the distinct value of a patent arises where the invention defined in the patent, or the novel feature contributed to the art by such invention, constitutes but a part of some general structure embodying possibly a number of other inventions, all commonly sold in the trade as a whole article of commerce. Something of this situation existed in the refrigerator car case referred to. In that particular case the special features of invention had reference primarily to the use of a certain form of partition wall adjoining the ice chamber of the refrigerator car, and, of course, the car itself was made up of roof, sides, floor, doors, bolsters, trucks and brakes, all of which were included in the article as placed upon the market as a whole.

It is interesting to note that since the second decision was rendered the Court of Appeals for the Third Circuit, which heard the argument on this case some time ago, has rendered a decision in which it has taken ground intermediate between the master's recommendation of $663,000 and the lower court's award of 6 cents, and have calculated that the patentee is entitled to a recovery which apparently comes to a total of $41,000, this conclusion being based upon certain percentage calculations.

It appears from the Court of Appeals' decision that the car cost $914.38, without trucks, and that the profit thereon, after deducting material and labor and other manufacturing expense, was $171.74, which gave a proportion on the car which, expressed decimally, is 18.78 per cent., as a basis of calculating a profit assignable to any particular part of the cost of the car.

On some of the cars, amounting to several thousand, the testimony of one of the witnesses showed an average cost of the particular slotted partitions, which the court treats as constituting the special essence of the improvement, of $45. In the case of nearly 12,000 cars, it seems that the purchasers themselves furnished the partitions and the defendants in the suit had installed them when they built the cars. The view of this taken by the court seems to be that, while it is true that on these partitions defendants could not have made any profit, there was expended upon them a certain cost of labor in installing them, and on such cost of labor there should be calculated a proportional profit. It was calculated that such installation did not cost less for ordinary wages than $3 for each of the infringing partitions, and figuring from this, with the percentage basis of 18.78, there was derived a profit of something over 56 cents upon such labor of installing the partitions, and this on the cars on which such installation was made was calculated to produce a total of $6724.17. In view of all of which, taken from the report of the master in that part of his figures which were apparently approved by the Court of Appeals, it was found that the proper basis of recovery was the sum of the profits on the partitions made by the infringer and sold with the cars, such profit amounting to $34,623.74, and the profit on the labor involved in the installation of the other partitions, amounting to $6724.17, giving a total award against the infringer of $41,347.91.

By way of further explanation, it should perhaps be added that in determining the question of recoverable profits in any such accounting case, the figures are generally obtained by deducting from the net selling price the actual items of cost, including not only the labor and material involved in the construction, but also a certain percentage of overhead charges and selling expense, in some instances, and various other items entering into what is normally known as legitimate manufacturing cost.

On the other hand, because of certain peculiar rules which have become established in connection with accountings in patent suits, the profits which are found by the court to be the amount of recoverable judgment do not altogether correspond with the profits as they would be calculated in ordinary commercial usage. Thus, for example, while it is customary, in estimating the profits in these court proceedings, to deduct from the amount actually received for goods sold certain allowances for cost of material and actual labor expended, and certain other items, such as interest actually disbursed on money borrowed to carry on the infringing business, rental of buildings necessarily used in the manufacture, and certain salaries of parties who are paid employes, it has been held in many cases that no allowance will be made for the time and services of the infringing defend-

ant, or of either of the defendants, if the infringement is by a firm, even although legitimate salary has been paid. There are other cases in which the courts have refused to allow credit to the infringer for interest on capital invested in the general business, or the item of *insurance* even although this be upon the property actually employed in the infringement. Just what the reasoning may be which has justified some of the courts in allowing certain interest charges in some cases and refusing similar charges in others, and in altogether rejecting insurance expense, it is difficult to understand.

Another rule which it is important to bear in mind in this connection is that in most of the authorities the courts refuse to offset losses incurred in part of the infringing manufacture against profits on other infringing operations; that is to say, if for a certain period the infringing business was unprofitable, the loss can not be offset against profits made at another time. Thus, if the infringement extends through a series of years, the rule of most of the cases is that if losses be incurred in any one or more years, such losses can not be offset against profits made in other years.

Users of Infringed Patents.—Another feature that must be considered, in determining the commercial value of a patent to the patentee, is the hold which the patent gives him upon the infringing users after the validity of the patent has been sustained in court. It has been settled in various decisions, including cases in the U. S. Supreme Court, that the liability of an infringing *user* of a patented device is separate from the liability of the one who *made* and *sold* the device, and judgment against the maker or seller does not, in the absence of express stipulation, release the user of the infringing mechanism, and it is optional with the patentee, if he chooses to make settlement with the manufacturer without releasing the user and enforce his right to an injunction prohibiting any further use of the infringing apparatus by the purchaser. This is a matter of great importance to the railroad, because there is always present a danger that the issue of injunction against infringing apparatus may tie up their equipment; and it is on this account largely that, in cases where question arises, it is thought wise by many roads to insist upon the requirements of a bond to indemnify the road against damage in case of any interference with apparatus which is alleged to infringe outstanding patents.

Among the most interesting cases along this line which have come to my notice may be mentioned the case of the Westinghouse Air Brake Company vs. The Great Northern Railway, about fifteen or sixteen years ago, in which one of the judges of the U. S. Circuit Court, in an order which was afterward affirmed by the Court of Appeals in New York, issued a decree requiring the removal of air-brake triple valves which had been found to infringe the Westinghouse quick-action patents, from some thousands of cars, the order being modified slightly, however, to allow limited time to make the change because of the great inconvenience to the general public which would have been incurred had the equipment all been taken out of service at once.

In affirming this decision the Court of Appeals called special attention to the fact that, the railroad having had notice of infringement, it became a deliberate user of a large number of infringing triple valves, and had preferred to run the risk of an injunction rather than to change its equipment. In rendering the decision on appeal, the Court of Appeals referred back to an earlier case along similar lines, in which the Court said: "I can not in the decree do less than give the plaintiff his full right, and I can not bargain for him what he may choose or may not choose to do.' It does not lie with the infringer to say that the owner of the patent will be fully compensated by a money recovery, and ought to be satisfied thereby. It is for the latter to say whether he prefers an injunction or a money recovery, or both; and, at his option, he is at liberty, at final hearing, to waive an account and insist upon his injunction."

It is very interesting to observe the great changes which have taken place within a period of, say, about ten years in the matter of recovery of damages in patent cases. A few years ago, the question was brought up to the U. S. Supreme Court, in a suit known as Westinghouse vs. Wagner Electric Co. They held that where the patentee had shown there was commercial value in his patent, but that he was unable to segregate or separate that value from other values in the device of the infringer, that then the infringer, being the party in the wrong, should assume the burden of producing figures intended to show a basis for determining the question of recovery.

At the present time the tendency of the decisions in most of the courts seems to be to try and find a middle ground and apply more reasonable and moderate rules, and to base results somewhat upon what may be called the calculation and estimate method, supported, if necessary, by expert evidence as to values not deducible in actual dollars and cents in certain phases of the figures. Without expressing any opinion one way or the other as to the accuracy or correctness of the conclusion finally reached by the Court of Appeals in the Third Circuit, in the decision on the refrigerator-car case referred to, it is thought that the effort therein made by the court to find a reasonable ground upon which to stand and to avoid a position which would be too extreme one way or the other, is very strongly deserving of commendation.

It is clear that the award of excessive and confiscatory recoveries in cases of infringement would tend rather to decidedly discourage the progress of science and the useful arts by imposing penalties so heavy as to drive capital and enterprising managers out of the manufacturing industries.

VALUE OF A PATENT AS BETWEEN EMPLOYER AND EMPLOYE

Taking up for consideration next the question as to how to fix a value upon patented inventions of employes where they are made use of by the employer, and where generally developed by the employes in connection with their employment and in the regular course of duty, it is to be observed that the law herein establishes certain fundamentals, the first of which is that the making of a new invention under such circumstances does *not*, in the absence of special agreement, give the employer a right to entire ownership of such patent. It does, however, recognize in some cases what is called an implied license or shop right, giving the employer the privilege of *using* the invention within certain limitations dependent upon the facts of the particular case.

In order to avoid confusion and controversy, and to protect the rights and interests of both parties, some of the railroads in this country have considered the advisability of arranging definite written service agreements with employes such as are engaged in that class of work which would probably lead to the development of new improvements; and it is undoubtedly to the interest of both the railroad and the employe that such agreements be made upon a just and equitable basis, which reason dictates should leave the ownership of the patent within the hands of the employe, limted only by a license right in the road to use the invention upon its own lines and in its own service.

One advantage to the railroads in having new devices invented by their employes covered by letters patent under some such service agreement is that the taking out of such letters patent, which involves the making of record in the Patent Office at Washington a full disclosure of the invention itself in the specifications and drawings, is one of the surest and best means for protecting the railroads against claims that may be advanced by other inventors, who may secure patents either fraudulently or otherwise on such improvements.

Of course, the above analysis of the law and principles applicable to this matter of fixing a value upon letters patent might be extended indefinitely, but that is beyond the scope of a paper of this general character.

TRAIN LIGHTING

One of the most important items that the committee has under consideration in this year's report is the standardization of armature pulleys. The committee held a joint meeting with the committee on standards of the Association of Railway Electrical Engineers and with the representatives of the various axle dynamo manufacturing companies.

The committee recommends the following changes and additions to the present Recommended Practice:

That paragraph 12, under the caption, "Control and Protection of Parts," page 943, 1914 Proceedings, be changed so as to apply to wooden cars. Paragraph to read as follows: 'That on wooden cars, where axle dynamos are used, negative, positive and field shall be fused as close as possible to the dynamo and prior to the said leads either entering the conduits or being secured to the bottom of the car. The above fuses to be used for emergency service only, and to be at least 100 per cent above the capacity of the fuses on the switchboard protecting the same leads."

That a paragraph be added following paragraph 19, under the caption of "Batteries," page 944, 1914 Proceedings, to read as follows: "Battery boxes shall have the following minimum dimensions: Height in clear, 21½ in.; depth front to back, 2 ft. 1 in. Length of compartment to hold two standard double-compartment trays, 22⅝ in. Length of compartment to hold four standard double-compartment trays, 3 ft. 9¼ in."

That a paragraph be added following paragraph 28, under the caption "Axle Dynamos," page 945, 1914 Proceedings, reading as follows: "On all new and remodeled axle dynamos provided with ball or roller bearings, armature pulleys shall be in accordance with dimensions as shown in Fig. 1." This provides for either an 8 in. or 11 in. pulley.

That after this paragraph the following paragraph be added: "In all new or remodeled ball or roller bearing axle dynamos the details of the pulley end of the armature shaft shall be in accordance with the dimensions as shown in Fig. 2."

That following the paragraph recommended above an additional paragraph should be added, reading as follows: "On all sleeve-bearing generators having armature shaft less than 1⅝ in. in diameter at the inside end of the pulley fit, it is

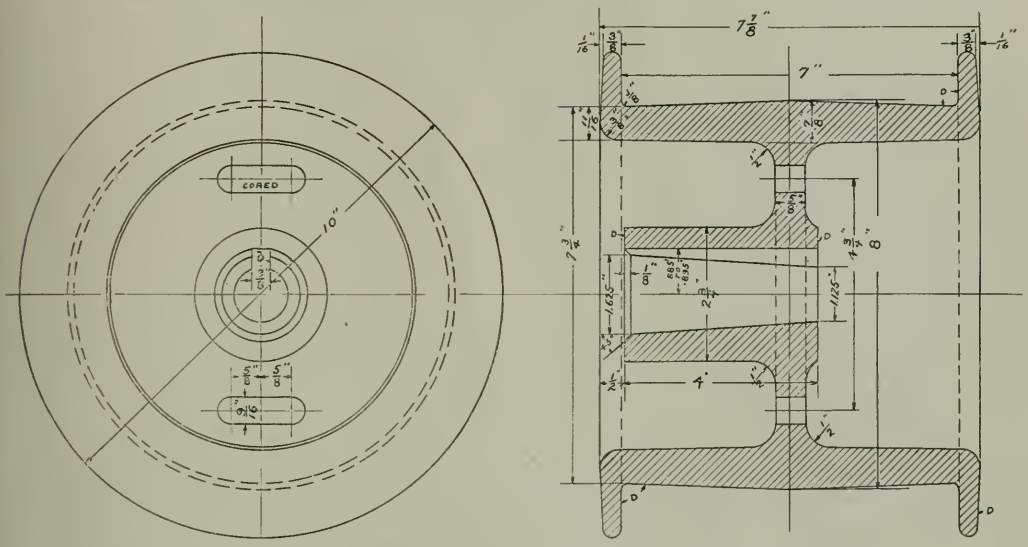

Fig. 1.—Armature Pulleys for Axle Lighting Systems

recommended that taper fit of ¾ in. in 12 in. be used; the inside dimension of the taper fit being 1½ in., with a length of 2½ in., measured on the axis of the shaft." The committee makes the foregoing recommendations in order to assist in the standardization of the armature pulleys on existing machines, it being necessary to establish a standard with smaller dimensions than the proposed standard for ball and roller bearing machines on account of the size of the shaft.

That following the above recommendation a paragraph should be added reading as follows: "On all future and remodeled ball and roller bearing axle dynamos, the roller or ball bearing in annular ball-bearing size used shall be that known as No. 412."

That paragraph 4, page 940, 1914 Proceedings, be changed to read as follows: "That in wiring cars for electric lighting, all the wire shall be run in conduits, and the conduit shall be so installed that the wires can be pulled in and pulled out of the conduit after the car is completed." The committee feels that the above recommendation is desirable in view of the present state of the art.

That paragraph 20, page 944, under the caption of "Axle Dynamos," the last sentence in this paragraph to be rewritten, omitting the word "perforated," paragraph then reading as follows: "The generator pulley should be flanged and crowned, and have a 7-in. face. The diameter of axle pulleys should preferably be 17 in. or 21 in.; the diameter of the generator pulley should preferably be 8 in. or 11 in."

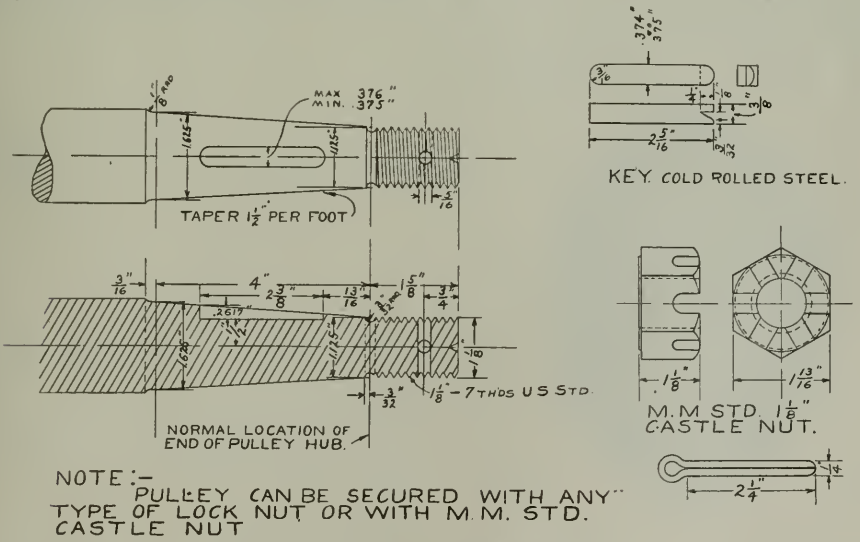

Fig. 2.—Pulley End of Armature Shaft

The committee recommends that the foregoing items be submitted to letter ballot separately.

The report is signed by:—T. R. Cook (Penn.), chairman; H. C. Meloy (N. Y. C.); Ward Barnum (L. & N.); D. J. Cartwright (L. V.); E. W. Jansen (I. C.); J. H. Davis (B. & O.), and C. H. Quinn (N. & W.).

(In the absence of the chairman the report was presented by H. C. Meloy, N. Y. C.)

DISCUSSION.

C. H. Quinn (N. & W.): As a member of the minority section of this committee, I would like to call your attention to the fact that in recommending 1½ in. taper in 12, statistics will show that at present there are more machines in service with a ¾ in. taper than with a 1½ in. taper. As a mechanical proposition it would be much easier to turn down 1½ in. taper to ¾ in. taper, than to increase from ¾ in. to 1½ in. I think the mechanical practice, as usually carried on in our machine shops for drill center and lathe center, more nearly fits the ¾ in. taper in 12. In a mechanical proposition of this kind I would be governed by the practice of tool builders and other men who have made a particular study of the item rather than to arbitrarily accept 1½ in. in 12. As I take the report it is a question of whether we shall vote on accepting the 1½ in. taper or nothing. I do not see any reference to the opportunity of accepting ¾ in. and it is not standard at the present time. There is now no standard.

G. W. Wildin (N. Y., N. H. & H.): I would like to ask if, in stipulating a minimum diameter of 8 in. for the armature shaft pulley, we are not cutting out certain manufacturers of high speed machines?

H. C. Meloy: The committee understood in talking with the various manufacturers that they would furnish any taper desired, or any pulley diameter desired, and the question of body suspension was not up at the time of the meeting. This only refers to truck suspension.

C. H. Quinn: Probably there will have to be taken under consideration in the next year's report, if this committee is continued, the diameter of pulley covering the body suspended machine. There seems to be a tendency for the standardization of dynamos in reference to speed and temperature. If we can bring about such a standard that will more or less settle the recommended practice for a body suspended machine. (It was voted to refer the report to letter ballot.)

CAR TRUCKS

At the last convention the recommendations of the committee were received and submitted to letter ballot.

The majority of the items which were rejected were defeated by a very small number of votes, and, in order to ascertain the objections of the members who voted in the negative, a communication was addressed to them to ascertain their specific

J. T. Wallis
Chairman, Committee on Car Trucks

objections, with a view of reconciling the differences as far as may be practicable. The replies received were given careful consideration, and as a result of this investigation, as well as further tests made and conferences with the manufacturers of cast-steel truck sides and bolsters, the committee presents the changes it recommends, under the respective headings.

SPECIFICATIONS AND TESTS OF CAST-STEEL SIDES

The committee modified the clause providing for a proof load test on each truck side to requiring a minimum of one frame from each melt, and not less than 2 per cent. of the total frames furnished to be subject to the proof test, resubmitting it as follows:

Under Article III, Physical Properties and Tests, after Section 10, Physical Properties, add new section for Proof Test, as follows:

Proof Test.—A minimum of one frame from each heat and not less than 2 per cent. of the total frames furnished shall be tested in a suitable machine to the loads shown in the table for different capacity car trucks.

Car Capacity.	Initial Load.	Load.	Maximum Deflection.	Maximum Set.
Lb.	Lb.	Lb.	In.	In.
80 000	20 000	110 000	0.15	0.01
100 000	25 000	135 000	0.15	0.01
140 000	35 000	175 000	0.15	0.01

After applying initial load, reduce load to 5000 lb. and set deflection instrument at zero; apply the requisite proof load and

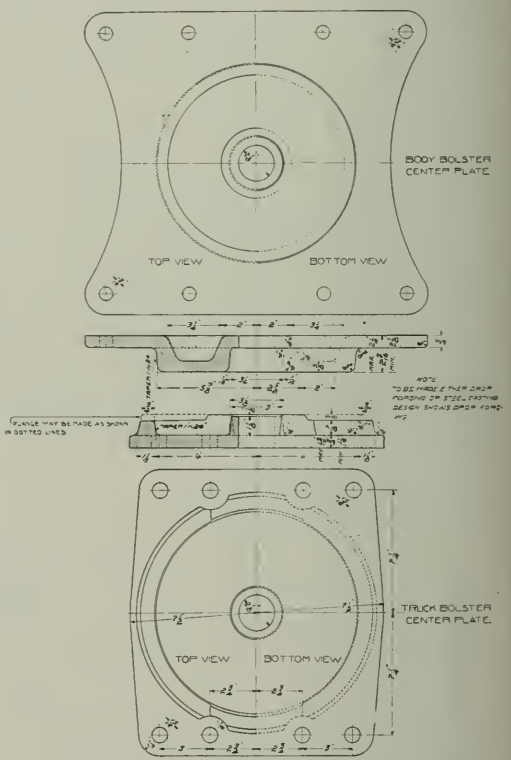

Fig. 2.—M. C. B. Standard Center Plates for 80,000, 100,000 and 140,000 Lbs. Capacity Freight Cars

measure deflection; reduce load to 5000 lb. and measure the set. Truck sides may be supported at each end, directly beneath the center line corresponding to center line of axle when side frame is in the truck and loaded at center of bolster opening midway between supports, or they may be supported in the center and loaded at the ends. The deflection and set shall be measured at the center line of spring seat.

The committee carefully reviewed the weights recommended last year, and had a large number of side frames for 100,000-lb. and 140,000-lb. capacity cars weighed and checked, and found the weights recommended last year practically correct. The same opportunity was not afforded on the side frames for 80,000-lb. capacity cars, and it is believed, therefore, that the limiting weights on the latter should be held in abeyance until the actual weights can be positively determined. For side frames for the 100,000-lb. and 140,000-lb. capacity cars the com-

mittee recommends that under Article IV, Weights, Section 13, Variation in Weights (new number 14), change to read as follows:

Limiting Weights.—Truck sides shall conform to the weights given in table. In case the castings have met all requirements except that of overweight, they may be accepted at the maximum allowable weight here specified:

Car Capacity. Lb.	Weights, Lb. Minimum.	Normal.	Maximum.
100 000	485	500	515
140 000	640	660	680

The present recommended practice covering rejection should be changed to conform with the change recommended in the proof test, and the committee therefore suggests the following modification:

Rejection.—In case the test pieces do not meet the specifications, all castings from the entire melt shall be rejected. If the side frame selected to represent a melt does not meet the proof test, then all the frames from that melt shall be subjected to the proof test, and any such frames failing to meet the test shall be rejected.

DESIGN OF CAST-STEEL BOLSTERS FOR 80,000, 100,000 AND 140,000 LB. CAPACITY CARS

The design of each of the above bolsters failed to be adopted by 117 votes. The main objection of the members who voted in the negative is that the detachable center-plate adds weight and that the trouble experienced with center-plate cast integral is not sufficient to warrant the added expense of the independent center-plate. As this feature does not in any way affect the interchangeability, the committee, upon further consideration, feels that this matter should be left optional with the car owner. This involves two designs of bolsters, slightly different in detail but both conforming to the limiting dimensions, and, therefore, interchangeable. [The committee presented drawings of both designs for adoption.—EDITOR.]

The question was also raised in regard to having insufficient support under the center-plate. This had been tested out, and no failures occurred with the design as presented.

Under Article III, Weights, change Section 13 to read as follows:

Limiting Weights.—Bolsters shall conform to the weights given in table which cover the bolster casting, either with center-plate cast integral or separate center-plate, and does not include side bearings, fulcrum castings, or other attachments. In case the castings have met all requirements except that of overweight, they may be accepted at the maximum allowable weight specified.

Car Capacity. Lb.	Weights, Lb. Minimum.	Normal.	Maximum.
80 000	600	710	730
100 000	750	775	800
140 000	970	1 000	1 030

(The above weights are tentative. Several bolsters have been ordered which will be carefully weighed and two tables will be substituted. One covering bolsters with separate center plates and the other covering center plates cast integral.)

PRESSED-STEEL TRUCK BOLSTERS FOR 80,000, 100,000 AND 140,000 LB. CAPACITY CARS. ALTERNATE STANDARD

The replies to the circular letter asking for specific objections to the pressed-steel bolsters presented by the committee to the last convention indicated that the members voting in the negative on the pressed-steel bolsters did so for the reason that they did not approve of certain details on the cast-steel bolsters. The committee suggests that the pressed-steel bolsters should be treated and considered as a separate problem. If a cast-steel bolster is preferred by a car owner, it should not affect the status of the pressed-steel bolster, and vice versa. The two proposed standards are interchangeable, but it is not to be assumed, nor is it the intention, to permit the substitution of one for the other in repairs; the idea in establishing the two standards is to give to car owners the choice of either a cast-steel or pressed-steel bolster of approved design. The committee tested four bolsters of each capacity, which met the tests in every respect. From these bolsters the average weight was computed. It was, therefore, recommended to submit to letter ballot the following:

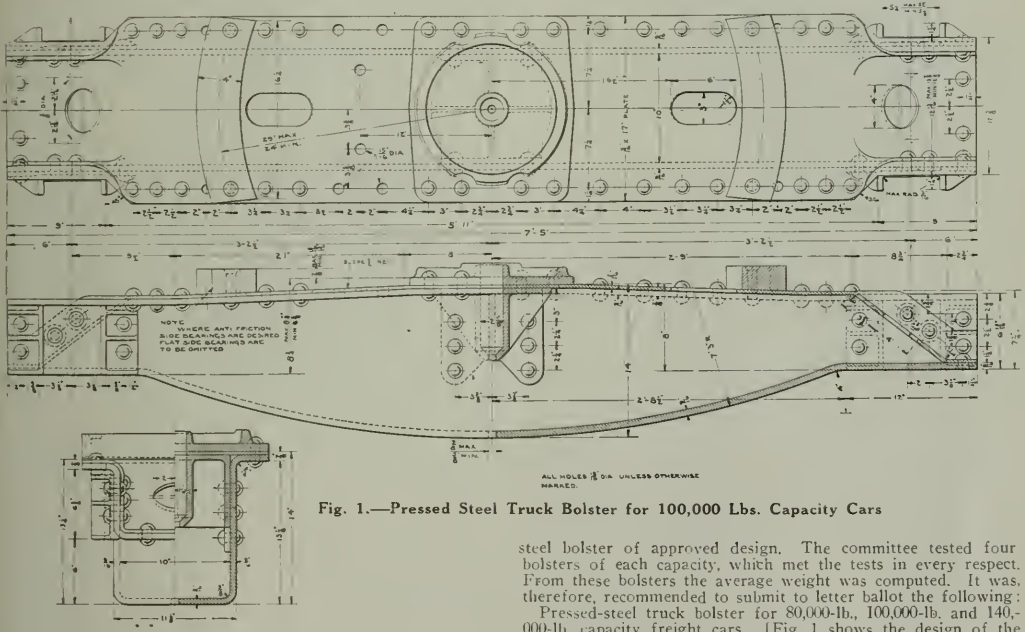

Fig. 1.—Pressed Steel Truck Bolster for 100,000 Lbs. Capacity Cars

Pressed-steel truck bolster for 80,000-lb., 100,000-lb. and 140,000-lb. capacity freight cars. [Fig. 1 shows the design of the bolster for 100,000-lb. capacity freight cars.—EDITOR.]

Specifications and Tests.—The steel should conform to the requirements of the M. C. B. specifications and tests for structural steel for freight cars.

Limiting Weights.—Bolsters, including center-plate and side bearings, shall conform to the weights given in table. In case the bolsters have met all requirements except that of overweight, they may be accepted at the maximum allowable weight here specified.

Car Capacity. Lb.	Weights, Lb. Minimum.	Normal.	Maximum.
80 000	775	795	815
100 000	840	865	890
140 000	1 110	1 140	1 170

SPREAD OF SIDE BEARINGS

It is customary and proper to assume that the height of center of gravity of a loaded car may reach 6 ft. above top of rail. It has also been determined from actual test that the height of center of gravity above top of rail occasionally reaches 7 ft. Following customary practice, based on height of center of grav-

ity of 6 ft., and making proper deduction for truck weight to determine height of center of gravity of loaded body alone above the level of the side bearings, it has been determined that the radial distance from center-plate to side bearing must be at least 24 in. (or 48 in. center to center of side bearings), in order to avoid overturning of body on side bearings before the whole car tends to overturn on the rail, the spread or gage of the rails being the accepted limiting feature. It is, therefore, recommended to submit to letter ballot the following: "That the side-bearing spacing, center to center of side bearing, be within the limits of 48 in. to 58 in., both inclusive, on the M. C. B. design of bolsters."

CENTER-PLATES AND GAGES FOR 80,000, 100,000 AND 140,000 LB. CAPACITY CARS

The change in center-plates failed to receive the necessary two-thirds vote by 118 votes. The main objections of those voting "no" are the height of ring on the outside of center-plate being too low and insufficient radial clearance between the male and female center-plates. The design has been changed, providing for a uniform height of flange of 1¼ in. on the outer ring of the female center-plates and the radial diameters changed so as to provide a total clearance of ¼ in. instead of ⅛ in., as at present, and preserving interchangeability with present M. C. B. standard center-plate. The center-plate shown in Fig. 2 was recommended for adoption as standard.

TRUCK SIDES WITH FEDESTAL TYPE JAW

It has been brought to the attention of your committee that there are in use a large number of cast-steel truck sides designed with a pedestal jaw, to keep the journal box in place, and doing away with the regular journal-box bolts, and a request has been made that the committee outline limiting dimensions for the pedestal jaw as an alternate for the present limiting dimensions of side frame adjacent to the journal box; also limiting dimensions for journal boxes used in connection with side frames having pedestal jaw.

The committee has made some preliminary investigations among the manufacturers and finds that the interchangeability of boxes presents a difficult problem. Before going into the question further the committee desires to ascertain by a letter-ballot vote whether, in the opinion of the members of the Association, the benefits to be derived from the pedestal-jaw design of side frame is sufficient to warrant establishing the additional standards, which involve carrying in stock the additional material necessary to make repairs to this type of side frames. Three of the four manufacturers advise that up to the present time 243,261 pedestal side frames have been placed in service.

In order to prepare for the adoption of limiting dimensions of pedestal opening and width of box, also for the width of pedestal jaw and corresponding width between pedestal slide on journal box, your committee has canvassed the situation and finds that the various manufacturers of cast steel truck sides with pedestal type jaw are at the present time turning out frames in which the dimensions above referred to for the various capacity cars are practically uniform. It is very desirable that these dimensions be maintained and would, therefore, suggest to the members who are now using the pedestal type of cast steel frame and those who may purchase any in the future that the limiting dimensions shown in the following table be specified.

CAPACITY OF TRUCK	TRUCK FRAME				JOURNAL BOX			
	Jaw Opening		Width of Pedestal		Jaw Opening		Width of Pedestal	
	Max. Ins.	Min. Ins.	Max. Ins.	Min. Ins.	Max. Ins.	Min. Ins.	Max. Ins.	Min. Ins.
40 Ton ...	$9\frac{5}{16}$	$9\frac{1}{16}$	$3\frac{5}{8}$	$3\frac{5}{16}$	9	$8\frac{15}{16}$	$3\frac{7}{8}$	$3\frac{13}{16}$
50 Ton ...	$9\frac{5}{16}$	$9\frac{1}{16}$	$3\frac{5}{8}$	$3\frac{5}{16}$	9	$8\frac{15}{16}$	$3\frac{7}{8}$	$3\frac{13}{16}$
70 Ton	$10\frac{1}{16}$	$10\frac{1}{16}$	$4\frac{1}{2}$	$4\frac{7}{16}$	$10\frac{1}{2}$	$10\frac{7}{16}$	$4\frac{1}{2}$	$4\frac{7}{16}$

The report is signed by:—J. T. Wallis (Penn.), chairman; E. W. Pratt (C. & N. W.); Jas. Coleman (G. T.); J. J. Tatum (B. & O.); Prof. E. C. Schmidt (Univ. of Ill.); L. C. Ord (C. P. R.); J. McMullin (Erie); A. R. Ayers (N. Y. C.), and E. G. Chenoweth (C., R. I. & P.).

The report was presented by A. R. Ayers, N. Y. C. Referring to the limiting weights of cast steel bolsters, he said: After the sample bolsters were received it was evident that it would be better to have two tables, one for integral center plate and another for bolsters with separate center plate, because the design with the integral center plate will be somewhat lighter. The committee will undertake to draw up two tables and include them in the report. Several bolsters of each design have been ordered, so that the weight can be checked carefully

DISCUSSION

C. F. Giles (L. & N.): What consideration has been given to the cast steel side frame with the box cast integral, and what bearing will the report have on that type of frame, if any?

A. R. Ayers: I do not think the conditions are such that we could incorporate that design if this should become standard. That is a special construction, it is only made by one manufacturer.

C. F. Giles: We have many thousands of cast steel truck bolsters in service throughout the country, and I do not know of a single case where they have a separate center casting. I am at a loss to know why the committee recommends such a design. We have had a wide experience with the bolster with the center cast integral, and it is entirely satisfactory. If a bolster with separate center casting is adopted it will complicate the situation in asking for bids, in the purchase of new equipment. We will have to add to the bolster with the separate center plate the difference between the cost of the integral bolster and that of a bolster with a separate center plate, which would add at least $5 or $6 to the cost of the car.

F. W. Brazier (N. Y. C.): My experience has been in favor of the bearing cast integral. With this type, however, you are bound to have wear, and in time there will be no way of replacing the center plate. Where the center plate is lipped over the side of the body bolster, and properly bolted, you will have a chance, if it wears out, to replace it.

R. L. Kleine: The report of the truck committee was lost in the letter ballot last year because some of the members preferred cast steel truck bolsters with the center plates integral. For that reason the committee give the members three options; the pressed steel bolster, the cast steel bolster with the center plate detachable, and the cast steel bolster with the center plate cast integral. They are interchangeable, in so far as dimensions go.

A. R. Ayers: The pedestal and truck is on the market, and there are several hundred thousands of them in service at the present time. The width of jaw and the width of the face of the jaw has been made uniform by all the manufacturers of this form of truck, although the box fastenings are different. There are apparently certain advantages for that form of truck in doing away with the journal box bolts. If they prove to be real advantages, this type of truck will find its place whether or not it is an M. C. B. standard. If the dimensions which are at the present time uniform can be maintained, the problem of adopting a single fastening for a box will be very much simplified and will be an entire possibility in the near future if the association desires to have such a single standard adopted, in which case it would only introduce an additional standard for each size of box.

C. F. Giles: We are using a pedestal style of truck very largely. The principal object was to do away with the journal box bolts which results in the bolts being battered up and having to be renewed. As far as the journal box fastening is concerned it is absolutely unnecessary except in case of a derailment.

(The report was referred to letter ballot.)

DRAFT EQUIPMENT

The accompanying table is made up from replies received to twenty questions sent out in a circular of inquiry for the purpose of finding out general practices and the general weaknesses of the present draft gear appliances.

Sixty per cent. of the total number of cars are of steel center sill construction and are equipped with friction draft gear from a minimum of 100,000 lb. to a maximum of 260,000 lb. capacity. The capacity of these cars varies from 80,000 to 120,000 lb. The question is involved whether the construction of a car is taken into consideration when a decision is being reached as to the capacity of the gear to be applied. It is evident that a draft gear of low capacity necessitates a better construction of car in order to take care of the shocks, which are meant to be absorbed by the gear.

Eighty per cent. of the total replies show preference for a friction draw gear on new equipment. Thirty-six per cent. of the replies express a preference for more coupler travel than the present standard of 2¾ in. between coupler horn and striking plate.

The matter of keeping up nuts on drawbar carry-iron bolts is a great source of trouble. Almost all who advise no trouble in that respect are using nut locks, while some of the largest roads are overcoming this trouble by placing these bolts in shear instead of in tension as has been the general practice.

The following is an abstract of the replies to the twenty questions sent out:

Number of freight cars involved (all types)	956,879
All steel center sills	340,862
All wood center sills	169,915
Wood sills and metal arms	68,111
Friction draft gear	453,725
Spring draft gear	497,874
Wooden cars equipped with higher capacity draft gears or reinforcement	741,018
Failures of drawbar yokes with semi-circular backs	Yes—290,924 / No —179,300
Failures of drawbar yokes with square backs and liner	Yes—618,409 / No —208,201
Drawbar yoke 1¼ in. rivets failing, high capacity gears	Yes—718,124 / No —155,887
Trouble with keys in place of rivets in yokes	Yes— 59,951 / No —320,276
Trouble with draft gears depending on rivets instead of yokes	Yes—182,139 / No —328,044
Friction draft gear preferred on new cars	772,219
Spring draft gears preferred on new cars	22,579
Number of recommendations for coupler travel on high capacity friction draft gears of over 2¾ in.	2 in. to 3 in.—19,983 2¼ in. to 3 in.—23,757 2½ in. to 3¾ in.— 4,159 2¾ in. to 3½ in.—18,387 3 in. to 3½ in.—31,669 3 in. to 3¾ in.—67,452
Difficulty in keeping up nuts on carry-iron bolts	Yes—672,272 / No —271,239
Speed limit on engines in switching service or cars in hump yards	Yes—241,928 / No —680,518

The report is signed by:—J. F. DeVoy (C. M. & St. P.), chairman; W. E. Dunham (C. & N. W.); E. A. Gilbert (So. Pac.); J. R. Onderdonk (B. & O.); A. R. Kipp (M. St. P. & S. S. M.); G. W. Rink (C. of N. J.), and P. F. Smith, Jr. (Penn. Lines).

J. F. De Voy
Chairman, Committee on Draft Gear

(In the absence of the chairman the report was presented by W. E. Dunham, who called attention to the apparent lack of information indicated by the replies to several of the questions in the committee's circular of inquiry and requested that the members make some detailed investigations for its benefit should it be continued for another year. (The recommendation of the committee that it be continued was referred to the executive committee.)

JOINT MEETINGS

[This report is a duplicate of that presented at the M. M. Association—see *Daily Railway Age Gazette* of June 12, 1915. —Ed.]

DISCUSSION.

M. K. Barnum (B. & O.): The committee has done considerable work that is very interesting, but it seems to me that it is possible to go a little further with the result of saving some duplication of work and some time for the convention, and I believe it is a subject worthy of further consideration. I move that the committee be continued and enlarged and requested to report at the next convention.

T. H. Goodnow: The committee was simply appointed to work up a program for the two associations, so in view of what Mr. Barnum says he might wish to enlarge the scope of the committee.

M. K. Barnum: I suggest that the committee be instructed to consider the subject in its broader aspect and make a report on such lines as it shall see fit.

(The motion was carried.)

IMPACT BETWEEN FREIGHT CARS IN SWITHCHING SERVICE

By Louis C. Endsley

Professor of Railway Mechanical Engineering University of Pittsburgh

The purpose of these experiments was to determine this force of impact by obtaining the acceleration of the car during the impact blow. The instrument used to obtain the acceleration of the car during the impact consists of a cylinder mounted on two supports. These supports also carry a rest upon which a slide moved. This slide had mounted in it a lead pencil. The slide was so constructed that it could be connected to the car by

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L. E. Endsley
Paper on Impact between Freight Cars in Switching Service

means of a rod. The cylinder could be driven at almost any desired speed by a motor, which received its current from a six-volt storage battery. The speed selected for these tests was 45 revolutions of the cylinder per minute. As the cylinder was 20 in. in circumference, this gave a speed for the paper of approximately 15 in. per second.

The tests were made with a string of eight or ten cars placed

WEIGHT OF CAR "B" 48000 LBS

VELOCITY OF CAR "A" IN FT PER SEC.	SPEED OF CAR "A" IN M.P.H. AT IMPACT	MAXIMUM VELOCITY OF CAR "B" IN FT PER SEC.	MAXIMUM SPEED OF CAR "B" IN M.P.H.	KINETIC ENERGY IN FOOT-POUNDS OF CAR "A"	MAXIMUM KINETIC ENERGY IN FOOT-POUNDS OF CAR "B"	MAXIMUM PRESSURE FROM ACCELERATION CURVE
I	II	III	IV	V	VI	VII
1.35	.92	.67	.46	1355	344	12,600
2.50	1.70	.97	.66	4650	718	30,200
2.86	1.95	1.07	.73	6090	860	32,800
3.57	2.43	1.64	1.12	9500	2030	41,500
3.90	2.66	1.81	1.23	11320	2480	66,750
4.48	3.06	1.99	1.36	14900	2990	60,400
5.00	3.41	2.48	1.69	18600	4640	90,600
5.00	3.41	2.30	1.57	18600	3990	81,750
6.00	4.09	2.90	1.98	26800	6350	107,000
7.15	4.87	3.49	2.48	38100	9200	129,500
8.12	5.54	3.30	2.25	49200	8150	158.500

Fig. 1—Table of Results on the Light Pennsylvania Cars

on a track that had just sufficient grade to keep a car in motion after it had been started and not enough to accelerate the car. The brakes on the last two cars on the down-grade end were set and a locomotive was coupled on the up-grade end and the slack was pushed in until just the draft-gear movement was left between each car. The end car was then disconnected and pulled up the track some distance, the chronograph having been

connected to the end car of those standing, the motor was then started and the drum allowed to revolve. The car that the engine had pulled up the track was pushed down the track with the engine disconnected. The car was then allowed to drift into the string of stationary cars. The speed of the moving car was determined by stop-watches, the time of the movement of the last 30 ft. being noted by two stop-watches. The velocity and acceleration of the first standing car was obtained from the record made on the cylinder of the chronograph. The above tests were made on Norfolk & Western 90-ton cars and Pennsylvania 55-ton cars, both kind of cars being tested light and loaded. The tests on the Norfolk & Western cars were made

WEIGHT OF CAR 'B' 60 000 LBS

VELOCITY OF CAR 'A' IN FT PER SEC	SPEED OF CAR 'A' IN M P H AT IMPACT	MAXIMUM VELOCITY OF CAR 'B' IN FT PER SEC	MAXIMUM SPEED OF CAR 'B' IN M.P.H.	KINETIC ENERGY IN FOOT-POUNDS OF CAR 'A'	MAXIMUM KINETIC ENERGY IN FOOT-POUNDS OF CAR 'B'	MAXIMUM PRESSURE FROM ACCELERATION CURVE.
I	II	III	IV	V	VI	VII
3.26	2.22	1.25	.85	9900	1460	101,000
4.62	3.15	2.62	1.78	19800	6400	164,000
5.00	3.41	2.37	1.61	23400	5240	128,800
5.26	3.59	2.77	1.88	25800	7150	181,500
5.56	3.79	2.72	1.85	28800	7000	141,000
6.00	4.09	3.32	2.26	33600	10300	184,500
6.25	4.26	3.33	2.27	36400	10400	204,000
6.25	4.26	3.39	2.31	36400	10700	198,500
7.50	5.12	3.16	2.15	52400	9300	222,000
7.90	5.39	4.46	3.04	58100	18600	313,000
8.83	6.02	4.94	3 36	72800	22700	468.000

Fig. 2—Table of Results on the Light Norfolk & Western Cars

at Roanoke, Va., and the test on the Pennsylvania cars was made at Conway, Pa.

For the purpose of distinguishing the different cars referred to in the paper, the moving car will be called *A*, the first car of those standing, *B*, the second standing car, *C*, the third standing car, *D*, etc.

The instrument was connected to car *B*, which was the first car in the cut of standing cars. It is a well-known law in physics that if you know the weight of a body and its acceleration, you can determine the force acting on the body. In each

WEIGHT OF CAR 'B' 143300 LBS.

VELOCITY OF CAR 'A' IN FT PER SEC	SPEED OF CAR 'A' IN M.P.H. AT IMPACT	MAXIMUM VELOCITY OF CAR 'B' IN FT PER SEC	MAXIMUM SPEED OF CAR 'B' IN M.P.H.	KINETIC ENERGY IN FOOT-POUNDS OF CAR 'A'	MAXIMUM KINETIC ENERGY IN FOOT-POUNDS OF CAR 'B'	MAXIMUM PRESSURE FROM ACCELERATION CURVE
I	II	III	IV	V	VI	VII
2.75	1.87	1 75	1.19	16,500	6,820	119,100
2.80	1.91	1.71	1.16	17,120	6,510	104,000
3.37	2.30	2.04	1.39	24,800	9,270	137,000
3.45	2.35	2.04	1.39	26,000	9,270	167,000
3.85	2 62	2.32	1.58	32,400	12,000	264,000
4.28	2.92	2.52	1.72	40,000	14,150	278,000
4.42	3.01	2 61	1.78	42,700	15,150	319,000
5.36	3.65	3.26	2.22	62,700	23,700	453,000
5.56	3.79	2.56	1.74	67,500	14.600	426,000
6.98	4.76	3.82	2.60	106,500	32.500	640.000

Fig. 3—Table of Results on the Loaded Pennsylvania Cars

case the weight of the car and load was known, and the acceleration was determined from the curve drawn on the drum. The speed of the drum being 15 in. per second, the velocity of the car was determined for each .01 of a second lapse of time and the difference in velocity for each .01 of a second would give the acceleration per hundredth of a second. As this was a very short space of time, the acceleration for each .01 of a second was assumed to be constant. This acceleration, as obtained from the drum, was reduced to feet per second per second and the following formula applied:

$$F = \frac{W}{g} a$$

in which F equals the force in pounds on the car, W equals the total weight of the car, g equals gravity taken as 32.2, a equals the acceleration in feet per second per second as taken from the curve drawn on the drum. There might be some question as to whether the trucks should be included in the weight of the car, but as in most cases the maximum force occurred after the car had moved approximately ¾ of an inch, it would seem that the trucks would be in motion by the time the car body had moved ¾ of an inch, so that the weight of the trucks was included in all results.

Results Obtained.—Figs. 1 and 2 give the results obtained on the light cars of the Pennsylvania and Norfolk & Western, respectively. Figs. 3 and 4 give the results obtained on the loaded cars. Column 1 of these tables gives the speed in feet per second as obtained by a stop-watch for the last 30 ft. of movement. Column 2 gives the calculated speed in miles per hour computed from the values in Column 1. Column 3 gives the maximum speed in feet per second obtained by car *B*, during the impact, this car being the first in the string of standing cars. Column 4 gives the maximum speed in miles per hour of car *B*. Column 5 gives the kinetic energy in foot-pounds of car *A* at the moment of impact. Column 6 gives the maximum

WEIGHT OF CAR 'B' 248000 LBS.

VELOCITY OF CAR 'A' IN FT. PER SEC.	SPEED OF CAR 'A' IN M.P.H AT IMPACT	MAXIMUM VELOCITY OF CAR 'B' IN FT PER SEC	MAXIMUM SPEED OF CAR 'B' IN M.P.H	KINETIC ENERGY IN FOOT-POUNDS OF CAR 'A'	MAXIMUM KINETIC ENERGY IN FOOT-POUNDS CAR 'B	MAXIMUM PRESSURE FROM ACCELERATION CURVE.
I	II	III	IV	V	VI	VII
2.46	1.68	.59	.40	23,300	1,340	110,000
3.41	2.33	1.24	.85	44,600	5,920	353.000
3.49	2.38	1.69	1.15	46,800	11,000	263,000
4.00	2.73	1.86	1.27	61,600	13,300	436,000
4.28	2.92	1.64	1.12	70,600	10,750	425,000
4.42	3.01	1.94	1.32	75,000	14,500	452,000
4.69	3.19	1.69	1.15	84,600	10,950	507,000
4.76	3.25	1.80	123	87,200	12,450	530,000
5.17	3.52	2.25	1.53	103,000	19.500	612,000
5.55	3.78	2.40	1.64	116,500	22,100	702.000
5.65	3.85	2.65	1.81	122,500	27.000	655.000
	CAR EQUIPPED WITH BUMPER BLOCKS					
3.66	2.50	1.82	1.20	51,600	13,600	389,000
3.70	2.52	1.80	123	52,500	12,450	398,000
3.89	2.65	1.96	134	58,100	14,830	359,000
4.28	2.92	2.15	1.46	70,500	17,300	500,000
4.62	3.15	2.61	1.77	82,000	26,200	487,500

Fig. 4—Table of Results on the Loaded Norfolk & Western Cars

kinetic energy in car *B* during the impact. This last value is obtained from the velocity curves recorded on the chronograph. Column 7 gives the maximum force in pounds as obtained from the maximum acceleration of car *B* during the impact. Fig. 5 shows the maximum force between the cars plotted against the speed in miles per hour of the moving car at the time of impact. That is, the results shown in Column 7 are plotted against those shown in Column 2 of each table. Fig. 6 shows the relation between the weight of the car and the maximum force in impact for speed of two, three and four miles per hour. The values here plotted were taken from the curve in Fig. 5. That is, the pressure at two miles per hour was taken off for each curve in Fig. 5 and likewise for speeds of three and four miles. By an examination of Fig. 5 it is apparent that the maximum force of impact is not directly proportional to the speed, as the curves that represent the average relation in all cases curve up as the speed of the moving car is increased. This, no doubt, is due to the fact that the kinetic energy of the moving car varies with the square of the velocity, and the force of impact would, no doubt, be also proportional to the square of the velocity if the end of each car was of sufficient strength to withstand the force without destroying it partly.

but as the force increases, some of the kinetic energy is used up in the destruction of the coupler, draft-gear connection and end-sill connection, from the horn of the coupler coming in contact with the end sills and other giving of the part. Of course, the draft gear absorbs some at each impact, but this is a constant after the draft gear once goes solid. The loss in each impact is well shown by a comparison of Columns 5 and 6, Column 5 giving the kinetic energy in the moving car and Column 6 the maximum kinetic energy in the first car. That is, the value in Column 6 would also represent the energy retained by the moving car, *A*, and by double the values in Column 6, and subtracting them from Column 5 the loss of kinetic energy for any impact can

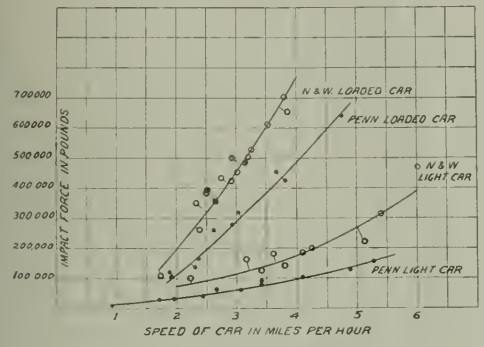


Fig. 5.—Values of Impact for Different Speeds

be determined. This loss in some cases amounts to as much as 70,000 foot-pounds of energy in one test on N. & W. cars. This can only be accounted for by the destruction of some part of the car. During the testing on the N. & W. cars a few impacts were made with the loaded cars that had bumper blocks on the ends of the car. The results are given at the bottom of Fig. 4. It will be seen that a larger per cent of the kinetic energy is transmitted to car *B* when the bumper blocks are on, and also the force between the cars is usually somewhat greater. The five points with a cross in the circle in Fig. 5 show the results on the N. & W. loaded cars equipped with bumper blocks. It will be seen that, with the exception of one point, all fall

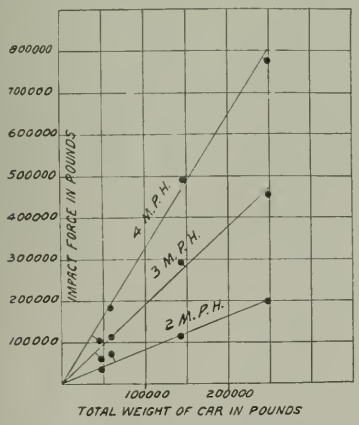


Fig. 6.—Relation of Weight of Car to Impact Force at 2, 3, and 4 M. P. H.

above the average curve. This is, no doubt, accounted for by the fact that the load is distributed over three points and thus a greater force was produced with less destruction than when the couplers and draft-gear connection received all the load. From a study of the value shown in Fig. 6, it will be seen that the maximum force of impact for any given speed is almost directly proportional to the weight of the cars in impact.

An interesting thing, which was plainly shown from the curves made on the chronograph, was the fact that the maximum force on car *B* occurred always before it had moved 1 in. Car *B* usually moved from 4 to 12 in. That is, the maximum force on car *B* occurred before any appreciable force was exerted between cars *B* and *C*, and the speed of car *B* was very slow before cars *C* and *D* had any pressure between them and car *B* was always stopped before the impact between cars *D* and *E* occurred. That is, the largest per cent of kinetic energy is taken out of the moving car in the impact between cars *A* and *B*, and the greatest damage would be done at this point. So as this force occurred before car *B* had moved 1 in., the damage to the end of the car would be just as great if only one car was standing as if a dozen were backing it up, provided there was at least 1 in. slack between the first and second cars of the standing ones. Of course, so far as the damage to the center sills at the center of the car, no doubt this damage would be greater if the cars were backed up by other cars. But these results given in this paper seem to indicate that there would be just as great a force between the cars if one car struck another car or struck a string of cars.

I wish to express my appreciation for the coöperation and assistance rendered in this work by the following men: Messrs. D. F. Crawford and T. R. Cook, of the Pennsylvania Lines West; W. H. Lewis, J. A. Pilcher and H. W. Coddington, of the Norfolk & Western R. R., and W. E. Larsen and C. O. Henry, senior students of the University of Pittsburgh.

DISCUSSION.

W. E. Symons: I would suggest the advisability of a more extended work of this character by Prof. Endsley and others who may be incorporated with him, and that the scope of the work not only be extended, but that such persons co-operate with the draft gear committee. It has been stated on excellent authority that 58 per cent to 60 per cent of our expenses of repairs to freight cars are due to buffing shocks which the draft gear did not absorb. This emphasizes the necessity of work in the direction of improving draft gear or minimizing the effect of the buffing shocks. It might also be emphasized that our freight equipment as a whole, representing an investment of possibly $1,800,000,000, is only in revenue earning service, or it only covers a productive period of about 25 per cent of its time, and possibly less, there being an unproductive period of at least 75 per cent. This fact also emphasizes the necessity of further research work and should be brought to the attention of the management of our railways to impress them with the importance of co-operating with the mechanical officers.

S. G. Thomson (P. & R.): We made a very interesting test that verifies Prof. Endsley's conclusions in regard to the standing car. We took two loaded coal cars, one with a through steel center sill, and the draught arms riveted solidly to the sill; the other one with a steel draft arm lipped tight over the bolster, making a very solid connection with the bolster. We took one car up the incline and left the other standing by itself. Both of them were wooden cars, loaded to about 60,000 lb. There was at least 2½ in. or 3 in. movement of the sills under the car. The through center sill construction gave a very perceptible movement. After the test was over we found it had cut practically every piece of flooring straight through the car. If you are going to the through sill in reinforcing cars, it is very important to tie that through sill to your bolster. If you do not do so you will probably do more damage to your car than if you had no reinforcement at all. Another conclusion that we rather drew from those tests is that, the weaker the draft gear, the less damage to the car. That sounds rather funny, but the weaker gear causes the whole car to absorb the shock and you don't get any tearing action. I think that the draft gear committee and the car construction committee ought to be given more study to the relation between the draft gear and the car construction.

C. E. Fuller: May I ask Mr. Thomson if this car had wooden end sills. You have just said the two center sills were reinforced. Were the two center sills fastened in any other way than than bolted to the wooden center sills?

S. G. Thomson: It was a through girder beam put between wooden center sills, and the draft members came right up solidly and were bolted to the cross bolster, making a fairly solid construction with the bolster, but the fact was that it was not lipped over the bolster. You could not make that construction quite solid enough without lipping over the bolster, which was a metal bolster.

Mr. Fuller: Was it riveted to the bolster?

Mr. Thomson: Yes, sir. The first shock sheared the rivets off and punched the bolts off. These were two 60,000 lb. cars, and the speed I think ranged between 8, 14 and 20 m. p. h. I think we took the cars each way and turned them around, and tried the other ends of the cars, and by the time we were through we had entirely practically

wrecked both cars, but we had gotten a great deal of information from it.

T. H. Goodnow: I would like to ask Professor Endsley if in slack tests, the cars were specially prepared for it? That is, was everything tightened up so that you would only have such slack as would exist in new construction. Taking cars as they ordinarily run, in 75 and 80 car trains, taking two engines, and bunching them, and stretching them, and then going through the same procedure again, we found that there was an average slack per car of 7 in. to 10 in. In the second test, if I remember right, of the 80 car train it ran anywhere from ten to twelve feet more than on the first test. With a train of cars that had just come from the shops that had had steel underframes applied to them, the average was only 2¾ in. to the car, or less than the total travel of both of your draft gears.

Prof. Endsley: I would say that the Norfolk & Western cars were under a year old, had been in service, and had shown that they had done some service, but everything was in good shape on the cars. The cars were pushed in so that any extra slack was not present. The Pennsylvania cars were also new cars, under two years old, but had seen some service, and had a travel of the draft gear before the horn struck of 2⅛ in. on one car and 2⅜ in. on the other. These were both solidly constructed cars, they were not wooden cars, and any comparison you make with the wooden car will be entirely different. On the Pennsylvania this work was done on cars of over 100,000 lb. capacity, weighing 48,800 lb. and having pressed center sills running entirely through. The N. & W. also had a continuous sill running through the car. They were pretty solidly constructed cars. Some of the couplers on the N. & W. cars have shanks that have been shortened up an inch in service. Now, it takes 800,000 lb. in a static machine to shorten the shank on the coupler one inch, this load to be applied in 35 seconds, running from 600,000 up, and back again.

Also some men have said to me here at this Convention that we could not take 800,000 lb. on these couplers. I had a 1,000,000 lb. on a static machine on four different couplers, that after releasing the load, you can open the knuckles with your hand, and take out the locks. These couplers will stand 1,00,000 lb. a good many times under impact. It will take some 50 blows of 800,000 lb. to shorten the shank up an inch

J. J. Tatum (B. & O.): When our presidents ask us "Why do you build cars that are so heavy? Why do you need this standard coupler you are speaking of, that is going to increase the cars in weight and cost? Why does the Committee on standard cars build the underframe so heavy? Why is it that our frictional draft gear does not hold up, that you recommend it would do better than the spring gear?" We can give them the answer to all of these questions right from this paper.

J. J. Hennessey (C. M. & St. P.): Regarding this shortening of one inch in the length of the coupler—did it take place in the horn of the coupler, or at the extreme end of the shank?

Prof. Endsley: In the shank from the head to the end of the coupler, without bending.

D. F. Crawford (Penn. Lines): In 1903 or 1904 we made some tests by dropping a car and a dynamometer car down grade of about 3 per cent against a string of standing cars. The speed was regulated by the distance that we allowed the cars to run down grade, and at that time it was found that the shock recorded by the dynamometer car was about 100,000 lb. per mile per hour up to 6 m. p. h., when the entire capacity of the dynamometer car, which was some 615,000 lb., was absorbed. Since making that experiment we have assumed that our cars must be prepared to stand an end shock of at least 250,000 lb. with comparatively small stresses. The cars that Prof. Endsley used on the Pennsylvania, and I know also on the N. & W., are cars of complete steel construction. It is not a question of underframes at all, but the entire car was of steel.

C. D. Young (Penn.): We have had in our department a large amount of experience in the recording of shocks of trains in service, and basing my views on what I have seen recorded as shocks and the resultant damage, it would seem to indicate to me that the impact force in pounds shown here is much higher than the true impact force that the material receives. Judging from these figures, it seems to me that they must be taken with some reserve. Of course, if you figure the fibre stress of center sill construction, figure the strength of the coupler in buffing under the drop or the pulling test of the coupler, and noting that the cars are struck very frequently at such a speed as 45 m. p. h. you would expect a much higher renewal rate than we actually get with these cars in service. It is possible, however, that there are some combinations of the service strains, as compared with the recorded data here, that do not make the figures comparable. It is interesting to note that the trend of the lines of the loaded cars toward a low speed of ⅛ m. p. h. or ¼ m. p. h. are not in the same direction—apparently they are crossing each other, and the loaded car at the low speed of one mile an hour receives less shock than an empty car at the same speed. That would hardly seem to be true, because the shock must be in some proportion to the mass.

Mr. Hennessey: I would ask Professor Endsley at what load the shank of the coupler commenced to compress or shorten up.

L. E. Endsley: The way the test was made, if you stop several times, you will get the coupler shortened by probably two inches. It took its first big move at about 450,000 lb.

Mr. Hennessey: Was that permanent?

Prof. Endsley: It would be permanent. In the case of the shank of the coupler to which we applied 800,000 lb., the coupler would go back .11 of an inch, that being the limit of elasticity in the metal due to its length.

R. L. Kleine (Penn. Lines): The tests which Prof. Endsley made were tests of distortion, leading to destruction. When you shorten a coupler up two inches, the coupler is destroyed. As previously stated in the coupler report, we are working within an elastic limit of material, not only in a compressive stress, but also in the pulling stress, as well as in shock.

Prof. Endsley: Of course, the time of applying the load will affect the total movement or total amount of distortion. It will take some 40 or 50 blows, instantaneous blows, of a drop hammer, of a duration of 1/300 of a second, to equal the same distortion you would get in a static machine in 35 seconds, but the total distortions, the distortions between a static load and a drop test load would be comparable if you could keep the load on any static a given time, and keep the drop test on a given equivalent time. As regards what Mr. Young says, do not imagine you get this load very often in service, because if you do, you are repairing cars. I was in a Pennsylvania yard and I was never able to measure over 3.5 to 4 miles an hour with their light cars, and many cars are switched at less than 2 miles an hour.

Mr. Kleine: Has Prof. Endsley made any tests to find out when permanent set first took place? I have taken the test figures Prof. Endsley furnished on the drop test, and also the figures that he obtained on the pulling test machine, and I might say that the permanent set is not comparable. The *C* dimension, for example, on the pulling test machine ran .02 of an inch at a load of 580,000 lb., and on the drop machine it ran .015 of an inch. There is a wide variation there.

Prof. Endsley: In answer to Mr. Kleine's statement regardings the *C* dimension I will explain that is the measurement from the nose of the knuckle to the head of the coupler. That dimension depends on a great many things, and I would not want it to be said that that was less than 0.1 in. every time, because that is a relation between the set of the knuckle, and not a distortion of metal. If it is pulling the nose out, your lock may be in one position one time and in another position another time. The comparison Mr. Kleine just made is not comparable. I grant in any individual test that the *C* dimension from the nose to the back of the coupler will vary in one direction or the other. If you will look at the report of the Coupler Committee, you will find that the line jumped back and forward, and is not comparable. In service it is an important dimension, but it is not indicated in the report as to whether it could stand overstrain or not, it merely tells us where the lock is, or how much dirt is behind the knuckle.

S. G. Thomson (P. & R.): I think the bug in the whole thing is the way you hold the object you are going to hit. Mr. Young's remarks that we ought to take with some reserve the strains we are getting in the draft gear, are pretty well taken. If we put the coupler up against a block of granite and then deliver such a blow as that, it would smash it all to pieces the first time. That is what we tried to develop in the test I spoke of before. The coupler and the draft gear and the sills themselves are all very flexible. I doubt very much whether you can deliver a blow to a coupler or more than 500,000 lb. on a car. I do not think you can hold it solidly enough to do it. The coupler will take part of the blow. It all depends on the way it is rigged up. If the rigging is so arranged that the butt of the coupler hits the bolster at the same time the horn hits the end sill, that is one condition in the coupler; if the rigging is arranged so you have a rigid and stiff draft gear that takes all the force, and the end sill does not get any of it, you will get another condition, but if the rigging is very light and weak, the less damage to the car and the horn takes all the force, and the steel car or wooden car takes the bumps. Mr. Crawford said his tests showed 100,000 lb. per mile. If that holds out in the test we made, running the car down a hill at 20 m. p. h., there is a force of 2,000,000 lb. This

test did not do much damage. But you can see if it was not a flexible and yielding attachment, that it would be like running up against a block of granite, and it would smash everything to pieces the first crack.

Prof. Endsley: The point made by Mr. Thomson is true, that the efficiency on the start is going to determine the final pressure you have, which will control the measurements. There is no doubt about that, but what I was talking about is a solidly constructed steel car, the car we are eventually going to use. Any comparisons made some years ago of different kinds of cars would not be comparable with these.

Prof. Endsley: As I stated in my paper there was lost in some impacts 70,000 ft lb. of work. We have draft gears on the market that will absorb 14,000 lb. In one impact on the N. & W., to show what damage can be done at 6.6 m. p. h. with a car light, nine journal boxes were broken, 5 on the standing car and 4 on the moving car.

James Coleman: Regarding the cars with which the experiments were made on the N. & W. and on the Pennsylvania, were they equipped with spring tension draft rigging, or friction draft rigging?

Prof. Endsley: On the Pennsylvania cars they were equipped with the Westinghouse gears and on the N. & W. they were equipped with the Session gears.

Mr. Barnum: I would like to amend my motion and add to it that a committee be appointed, with Prof. Endsley as Chairman, to pursue this investigation further.

Mr. Thomson: I believe the force of inertia is sufficient to do a great deal toward this permanent set, and as I said before, the blow that you can strike in holding a car loosely and the most rigid steel car that we can build, is not sufficient to strain the metal in the coupler possibly beyond 400,000 or 500,000 lb., as you cannot hold it solidly enough. I would like the Committee to determine how large a part inertia plays in this matter.

The President: I wish to make one statement—Mr. Thomson quoted my reference to 100,000 lb. per mile per hour. My knowledge of the subject quits at 6 miles per hour, and I cannot say whether he is correct in going above that figure.

(Mr. Barnum's motion as amended was carried.)

AIR BRAKE MAINTENANCE

F. W. Brazier (N. Y. C.): The maintenance of air brakes in first class serviceable condition has always been considered necessary in both passenger and freight service, but investigations of existing freight brake conditions show that they are far from satisfactory. On a 100-car freight train where a brake pipe leakage in excess of 2 lb. per minute exists, it will be found difficult to maintain through the whole brake pipe the uniform pressure necessary to produce uniform rate of deceleration for each car in the train during a brake application; yet such uniform rate of deceleration is required to control properly the motion of the train; hence, in the interest of safe and satisfactory train handling, and in the interest of economy both in time and in the quantity of air used, brake pipe leakage should be reduced to a minimum. The saving in fuel to be effected, as will appear from what follows, and to some extent the saving in wear in air brake hose, and on air compressors and locomotive boilers, should urge us to eliminate this leakage to the fullest extent possible.

Modern freight trains have become so long and the cars composing them so heavy that only the largest compressors are capable of supplying the air required to charge the brake apparatus in reasonable time. From numerous tests it has been shown that the most efficient air brake compressors consume approximately one pound of coal and require 7 lb. of steam for each 35 cu. ft. of free air compressed. The total volume to be charged for a 100 car freight train, all 10 in. brake equipment, is close to 180 cu. ft. A leakage of 4 lb. per minute from this volume—not an unusual amount met with at present in general service—means a loss of 48 cu. ft. of free air each minute, or 2880 cu. ft. each hour. Putting this in terms of coal and water it means an hourly waste of 82 lb. of coal and of 574 lb. of water, but added to this should be the wear on the locomotive boiler in producing the additional steam, and other air brake appurtenances. While 4 lb. leakage per minute has been used above for illustration, in a great many cases it will be found to be 5 or 6 lb., and in some cases it is so high that to apply the brakes all that is necessary is to lap the handle of the brake valve. The loss in coal will of course be directly proportional to the leakage in pounds. A conservative estimate of the coal consumed by the air compressor in supplying air for the average leakage in a 100 car train for 10 hours is from 860 to 1720 lb. It is worthy of note that on many freight trains about as much air is pumped through the system to supply leakage every five minutes as is required to make a full service application of the brakes.

From the foregoing it may be seen that it will cost us no more, if as much, to maintain our freight air brake apparatus practically tight, than it does to allow it to run in the present leaking condition. The cost of allowing the defects in the air system is probably not less than $1.50 for each 10 hours a 100 car train is in operation. In many cases it is much more. Other things, however, as well as a tight brake system require attention in order that the brake condition may be entirely satisfactory, and it will be necessary only to mention them, for the evil effects of continuing them in service and the remedies required to remove the objectionable features are obvious. They are: Excessive piston travel; safety chains missing; brake beam hangers and brake beams worn too thin; holes in brake levers worn oblong; interference of brake pistons with car timbers and beams; corroded brake pipes; angle cocks at improper angles, and handles missing; broken and leaky pressure retaining pipes; missing bolts and cotter keys; missing brake shoes, etc.

In connection with this subject it may be well to suggest that if the standard location of the angle cock back of the pulling face of the coupler was made 10 in. instead of 13 in., heavy strain on and pulling apart of those couplings in many cases would be avoided and also heavy leakage in those couplings. Once the freight air brake conditions are made satisfactory they can be maintained that way with very little additional labor over what is being expended at present in freight brake maintenance; while the economy effected, the improved brake operation resulting, and the freedom from accidents chargeable to air brakes that will follow the realization of the improved conditions leaves no reasonable excuse for the railroads of this country not acting as a unit to bring it about.

D. R. MacBain (N. Y. C.): It is a fact that we are having a great deal of trouble around the country on account of defective air brake equipment. One of the biggest troubles we are having is the air pipe matter.

W. O. Moody (Ill. Cent.): The elimination of leakage is largely the result of facilities at hand to discover the leaks before the engine is put on the train, and we have spent a considerable sum of money the past year in providing air plants so that we can determine the condition of the brakes before the road engine is put on; and wherever such installation has been made, very gratifying results have followed. A great many good roads are laboring under antique methods of testing triple valves; they have no improved facilities; time and money is spent to make tests that really do not amount to anything, and I think the matter of having proper facilities for testing triple valves is something which also should have attention. Various roads have air brake defect cards and have made efforts to put them in service. I should say on the whole the success of the efforts have been rather indifferent. If we could get train men to card the defects when they are observed, the inspectors would know what the trouble is and go right to that car and apply the necessary repairs, but it seems almost impossible to get that card in proper use.

J. J. Tatum (B. & O.): When the cars come on the shop track the levers should be checked to know that the proper lever is maintained on the truck as required by the braking power allowed the car.

ELECTION OF OFFICERS

The following officers were elected: President, D. R. MacBain, superintendent motive power and rolling stock, New York Central Lines West of Buffalo; first vice-president, R. W. Burnett; second vice-president, C. E. Chambers, superintendent motive power, Central Railroad of New Jersey; third vice-president, J. W. Demarest, superintendent motive power, Pennsylvania Lines West of Pittsburgh, Northwest System; treasurer, J. S. Lentz, master car builder, Lehigh Valley.

The following were elected members of the executive committee: C. E. Fuller, superintendent motive power and machinery, Union Pacific; F. F. Gaines, superintendent motive power, Central of Georgia; I. S. Downing, general master car builder, Cleveland, Chicago, Cincinnati & St. Louis.

The election of members for the nominating committee resulted in the selection of F. W. Brazier, superintendent rolling stock, New York Central Lines; J. J. Hennessey, master car builder, Chicago, Milwaukee & St. Paul; F. H. Clark, general superintendent motive power, Baltimore & Ohio; F. F. Gaines, superintendent motive power, Central of Georgia; and A. W. Gibbs, chief mechanical engineer, Pennsylvania Railroad.

W. M. Garstang, T. H. Orchard, J. E. Buker, E. W. Grieves and S. A. Crone were elected life members. Prof. L. W. Wallace was elected an associate member.

LOST

Lady's handbag containing watch with the initials L. K. D. and small amount of money. Please report or return to *Railway Age Gazette* office if found.

SIXTH DAY'S REGISTRATION FIGURES

The registration figures from the sixth enrollment book for the last four conventions are given in the following table. The figures for 1911 are not available, because there were only five enrollment books issued during that convention:

	1912	1913	1914	1915
Members M. C. B. and M. M.	668	700	758	731
Special Guests	684	724	612	541
Railroad Ladies	471	521	467	421
Supply Ladies	223	312	288	235
Supply Men	1523	1680	1497	1254
Total	3569	3937	3622	3182

A. B. APPLER—AN APPRECIATION

Evidently A. B. Appler, mechanical engineer of the Delaware & Hudson, occasionally finds it necessary to discuss matters of design with the Schenectady boys. At least we infer this from the following poem which was picked up on the Boardwalk:

Little Benny Appler is an energetic man,
He comes up to Schenectady just every time he can,
He talks each subject over from every point of view,
It's up to us to cover same in "notes of interview."

There are encyclopedias on which there are no flies,
And Noah Webster's Unabridged is quite a decent size,
But all these pond'rous volumes their "rep." for size would lose,
Should some syndicate but publish these "notes of interviews."

THE NEW VICE-PRESIDENT

At the closing session of the convention yesterday Thomas W. Demarest, superintendent of motive power of the Northwest System of the Pennsylvania Lines west of Pittsburgh, was elected a vice-president of the association. Mr. Demarest was born at Englewood, N. J., March 18, 1868, and was graduated from Stevens Institute of Technology in 1888. He entered railway service as a special apprentice in the shops of the Pittsburgh, Cincinnati & St. Louis at Columbus, Ohio, in 1889. On August 1, 1891, he was made assistant to the superintendent of motive power of that road, and for one year, 1896, was assistant to the master mechanic in charge of shops at Indianapolis, Ind. For the next two years he was general foreman of the locomotive department at that place, and in 1899 was made master mechanic at Logansport, Ind. From January 1, 1900, to July 1, 1903, he was superintendent of motive power of the same road. He was appointed to his present position in July, 1903.

PRESENTATION TO MR. CRAWFORD

At the closing session of the Master Car Builders' Association George A. Post presented the past president's badge to the retiring president, D. F. Crawford. He said in part:

"I come from the Court of Appreciation over which no crowned potentate bears sway, creating favorites without rhyme or reason to gratify caprice, or stripping of honors those who fall under the shadow of a fitful frown. My credentials are from a world power (habitat in the hearts of men) which sits in judgment upon the activities, motives and achievements of struggling mortals, eager to pay tribute to those who prove themselves worthy of reward.

"Young as I am, Mr. Crawford, I have witnessed your novitiate in engineering science; your masterful strides toward the goal of distinction in your chosen field of strenuous endeavor during the intervening years, and today I count myself singularly fortunate that I have been designated to call out publicly the station at which you have arrived *en-tour* where you are stopping only long enough for this appropriate decoration."

Conventionalities

J. F. Walsh, formerly superintendent of motive power of the Chesapeake & Ohio, Mrs. Walsh and daughter arrived Sunday and are stopping as usual at the Chalfonte Hotel. Mr. Walsh has recently recovered from a rather serious illness.

A visit from the "stork" necessitated W. H. Coyle, vice-president of the Franklin Railway Supply Company, remaining home for the early part of the conventions. He arrived today reporting the addition of a bouncing boy to his family. This is the second boy.

William St. John, of the Safety Car Heating and Lighting Company, was unable to attend this year's convention

President-Elect S. W. Pratt, of the M. C. B. Association, and Mrs. Pratt

because of illness. His many friends have missed him; and we join with them in wishing him many happy returns of his birthday, June 18.

J. Leonard Replogle, who left for New York yesterday afternoon, was made vice-president and general manager of sales of the American Vanadium Company on March 1 last and represented that concern instead of the Cambria Steel Company of which he had been vice-president and general manager of

sales and with which he had been identified for more than 26 years.

Charlie Storrs, manager of the railroad department of the Storrs Mica Company, was late in getting here. His tardiness is explained by the fact that he stopped off at Ithaca to attend

Left to Right—S. W. Mullinix, Supt. Shops, C. R. I. & P.; Fred W. Venton (Crane & Co.); J. C. Campbell (Chicago Pneumatic Tool Co.), and L. A. Richardson, Mech. Supt., C. R. I. & P.

his class reunion—something that he has been compelled to miss for several years past because it occurred simultaneously with the conventions.

Among those whom all enjoyed seeing at the conventions in years past, but who are not here this year, is H. J. Small, formerly superintendent of motive power of the Southern Pacific, who has retired, and is now interesting himself chiefly in the progress of his sons in business. T. W. Heintzelman, general superintendent of motive power of the Southern Pacific, expected to come to attend the conventions, but owing to important matters has found it impossible to come. J. F. Graham, superintendent of motive power of the Oregon-Washington Railway & Navigation Co., has not sufficiently recovered from his recent serious illness to make the trip, but his many friends will be glad to learn that he is improving and hopes to be in evidence next year. R. W. Burnett, who recently resigned as master car builder of the Canadian Pacific, has gone to San Francisco for a long

John A. Pilcher, Mechanical Engineer, Norfolk & Western, Wife and Son, William

needed rest, and more particularly with the hope that Mrs. Burnett's health will be improved.

The neat little pencils used at all the dances in connection with the conventions, except the Friday Carnival, were presented to the entertainment committee by the Joseph Dixon Crucible Company, who furnished about twenty-five gross of them. Inasmuch as the committee did not have a large fund to draw upon the gift was much appreciated.

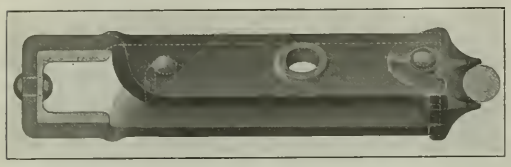
LARGELY SANTA FE OR EX-SANTA FE MEN

Top Row, Left to Right—P. M. Ripley (formerly on Santa Fe), Assistant to Vice-President, El Paso & Southwestern; Albert MacRae, Editor, Santa Fe Employees' Magazine; John P. Landreth, Garlock Packing Company, Chicago; Frank W. Thomas, Supervisor Apprentices, A. T. & S. F.; C. T. Ripley, General Mechanical Inspector, A. T. & S. F.

Bottom Row—M. H. Haig, Mechanical Engineer, A. T. & S. F.; J. H. McGoff, Mechanical Superintendent, A. T. & S. F.; W. L. Allison (Formerly Mechanical Engineer, A. T. & S. F.), Vice-President, American Arch Company; John Purcell, Assistant to Vice-President, A. T. & S. F.; J. E. McQuillen, Mechanical Superintendent, G. C. & S. F.

FORGED STEEL BRAKE BEAM STRUT

A recently developed forged steel strut for truss type brake beams is being exhibited by the Buffalo Brake Beam Company, 30 Pine Street, New York. The strut is a one-piece forging, terminating at the truss rod end in a pocketed steel casting, to the flanges of which it is securely riveted. It



Forged Strut for Brake Beams

is designed to secure greater reliability and strength than is usually possible with a casting and, as shown in the illustration, is simple of design and easy of application.

ALL-STEEL BOX CAR

At the space of the Bettendorf Company, of Bettendorf, Iowa, an all-steel box car is on exhibition which embodies a number of features of interest. The underframe and trucks are of the standard Bettendorf type of construction, all the principal dimensions being in accordance with the recommendations of the M. C. B. committee on car design.

The construction of the superstructure is generally similar to that of the Union Pacific automobile cars described in the *Railway Age Gazette, Mechanical Edition*, for February, 1915, page 73, and in the February 5 issue of the *Railway Age Gazette*. The side sheets are applied to the outside of the frame, however, while those of the Union Pacific cars were applied inside. These sheets are of $\frac{1}{8}$ in. steel cut in panels with the vertical edges flanged at right angles to the body of the sheets. The flanges of the adjoining sheets are riveted to the web of a Z-bar post from the inside of the car, thus producing an extremely smooth exterior.

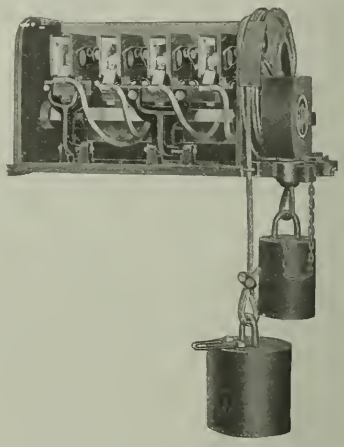
The whole car is wood lined throughout so that severe climatic conditions will not cause precipitation of moisture. The principal data and dimensions of the car are:

Capacity	100,000 lb.
Length inside	40 ft. 6 in.
Width inside	8 ft. 6 in.
Height inside	9 ft. 0 in.
Width of side door opening	6 ft 0 in.
Weight complete with lining	45,900 lb.
Weight of trucks complete	15,000 lb.

SAFETY LIMIT STOP FOR ELECTRIC CRANES

A device designed to automatically prevent over travel of crane hooks is shown in the illustration. It is being exhibited by the Electric Controller & Manufacturing Company, Cleveland, Ohio, and consists of a cast iron frame within which is a set of cam operated electric contacts which control the hoisting motor circuit. The frame is mounted on the top of the crane trolley, where it is accessible for inspection. The contacts are operated by a sheave and steel cable to the ends of which are attached weights of cast iron.

The operation is controlled by a shoulder attached to the crane hook. As the point of highest travel consistent with safety is approached this shoulder raises the lower weight,



Safety Limit Stop for Crane Hooks

and causes the sheave to rotate. The motor circuit is thus opened and a dynamic breaking circuit closed which brings the motor to rest within a hook travel of two inches, regardless of the load or the speed at which it is being hoisted. Lowering the hook permits the moving parts of the automatic stop to return to normal position without attention. The contacts are opened under the influence of a magnetic blow-out, and are protected by a sheet iron cover which may be readily removed for inspection.

Bettendorf Steel Box Car

Railway Age Gazette

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VOLUME 58 JUNE 18, 1915 NUMBER 25

Contents

MAINTENANCE OF WAY SECTION

*Illustrated.

It seems that the measure which has been pending in the Illinois legislature to limit the length of freight trains finally has been killed. It originally prohibited the railways from running trains of more than fifty cars. The roads conducted a vigorous campaign against this provision, both at Springfield and in the newspapers of the state. When the labor lobby saw the fifty-car bill could not be passed it substituted a measure limiting the length of trains to seventy-five cars. This at one time received 78 votes in the House, and it looked as if it might be passed; but when it came up for third reading it was defeated, 61 to 7. The labor lobby has introduced train-limit bills in nineteen states this year; and up to date it has been defeated in every state. The hardest fight for legislation of this kind was made in Illinois, and the final complete defeat of it there is a strong indication that it will never be possible to get it passed in another state.

Train Limit Bill Defeated

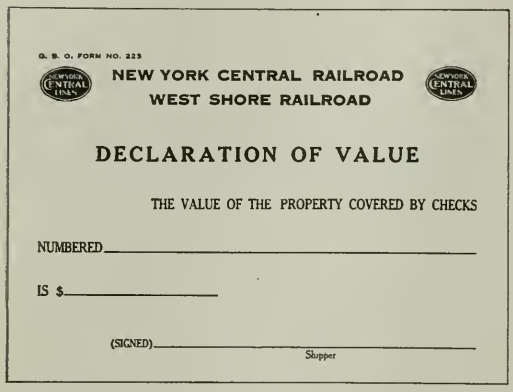
Station baggage men say that the "kickers" against declaring the value of their trunks are very few—as might, perhaps, be expected, when one considers that, after all, this declaration is only a reasonable application of the common law, long settled. If the passenger is well enough informed about the value of the property in his trunk to be able to make a reasonable estimate without stopping to calculate, he need be delayed not more than a minute. It is the railroad, rather than the passenger, who has cause for complaint; for at large stations, where, at best, many passengers will be slow, the checkers have had to be provided with considerable clerical assistance. The Interstate Commerce Commission's declaration about the crime of misstating value appears to have been the cause of a good deal of unnecessary comment. Indeed, the Washington correspondent of the New York World says that he has already been told, at the office of the commission, that a passenger is not bound to declare the full value of his property. As in any other form of insurance, he has a right to insure for less than full value. Jewelry salesmen say that their trunks, often worth several thousand dollars, are regularly insured by policies covering all risks, not only on the cars but at hotels and all places except the owner's store. It is not likely that the commission or the courts would compel double insurance. Making the value low, as a basis for insurance against loss, is a different thing from misstating it for the purpose of securing a reduced rate for transportation. The misdemeanor clause in the commission's report had in view, no doubt, such cases as declaring silk to be no more valuable than cotton, so as to secure a low freight rate. Freight rates are made higher on valuable goods, on the theory that the transportation is worth more to the owner; but in the baggage car the railroad is willing to carry the rich passenger's trunk and the poor passenger's at the same rate. If the owner of a trunk containing diamonds desires to have the carrier assume the large risk of the loss of that trunk, he is rightfully required to pay insurance; and if he prefers to bear a part of the risk himself, it is only reasonable to allow him to do so.

Insurance of Baggage

To write down the value of a piece of baggage and affix a signature to the statement need not take over half a minute; and not over a minute, even if one of the modern six-figure check numbers be added. But besides brevity there is a marked advantage in simplicity; and there are degrees of simplicity. The blank used by the New York Central is reproduced below, two-thirds actual height and width. The only things that detract from its simplicity are the printer's reference line and the two oval trade-marks; and if the advertising agent should claim that the trade-marks do not at all affect the passenger's eye or nerves, or mind, it would be difficult to dispute him. Examining the blanks of two other prominent roads, it will be found that they

Baggage Declaration Blanks

contain 11 and 17 lines, respectively, while yet they provide for no more information than is provided for here. It is natural enough to call a matter of this kind a trifle, hardly worth attention; but it is to be remembered that in transactions which are consummated in a few seconds, apparent trifles often count.


G. B. O. FORM NO. 223

NEW YORK CENTRAL RAILROAD
WEST SHORE RAILROAD

DECLARATION OF VALUE

THE VALUE OF THE PROPERTY COVERED BY CHECKS

NUMBERED_____

IS $_____

(SIGNED)_____
Shipper

Moreover, this declaration is a part of a contract. The passenger cannot afford to treat it as a trifle; and if time is to be saved it is worth while to keep out of sight everything that would tend, unnecessarily, to make him hesitate a second in signing the declaration.

Morris & Essex and the Lackawanna

The Morris & Essex forms the eastern end of the Delaware, Lackawanna & Western, running from Hoboken on the Hudson to Phillipsburg, N. J., and from Denville to West End Tunnel, 118 miles. It was chartered in 1835, and 50 odd miles of road opened in 1854, and completed to Phillipsburg in 1866. There is $15,000,000 stock outstanding, and the property was leased to the Delaware, Lackawanna & Western in 1868, in perpetuity. The lease provides that 7 per cent shall be paid on the stock by the Lackawanna, and that an additional 1 per cent, making 8 per cent in all, shall be paid when the gross earnings of the Morris & Essex have reached a certain figure. The Delaware, Lackawanna & Western owns comparatively little of the outstanding stock, most of it being owned by individuals, trust companies and estates. The Lackawanna has never paid more than 7 per cent to Morris & Essex stockholders. A committee has now been formed with the president of the Metropolitan Trust Company as chairman, which has brought suit against the Lackawanna, claiming that 8 per cent should have been paid for a number of years back. This committee is also asking proxies from stockholders, with the purpose of electing a board of directors not identified with the Delaware, Lackawanna & Western. As to whether or not the accounting should have shown gross earnings sufficient to compel the Lackawanna to pay 8 per cent is a question which will be decided when the trial takes place. The propriety, however, of an independent board of directors which will represent Morris & Essex stockholders' interests and not Delaware, Lackawanna & Western stockholders' interests appears to be hardly a matter that can be questioned. In this case the Morris & Essex stockholders' interests are directly opposite to those of the Lackawanna's. The Morris & Essex stockholders want as large a rental as possible, the Lackawanna as small a rental as possible. There is no question apparently of the management of the property which belongs to the Lackawanna in any case under the terms of the lease. It is one of those things where it would appear to be better practice for the leasor to have a wholly independent board of directors, than to have its own directors or officers acting in dual capacity where there is a possibility of diametrically opposed interests presenting questions for settlement. The trouble in this case is that there is no provision in the lease for paying the directors or for maintaining a separate office and bookkeeping force. This probably has been a fact which Lackawanna directors have used to justify to themselves their action. It will be particularly interesting to follow the attempt of the new committee to arouse stockholders to the situation and the success or lack of success which is met with will be illuminating as to the possibility of getting railroad stockholders to take a more active interest in the affairs of their company.

THE HANDLING OF L. C. L. FREIGHT

WHILE less-than-carload freight forms only about 4.3 per cent of the total tonnage handled, the revenue derived therefrom is a very considerable part of the total income of the railways. This business is, therefore, attractive from the standpoint of the traffic solicitors, although the operating department finds it expensive to handle. In consequence, many operating officers are giving a great deal of attention to means of reducing the cost of handling l. c. l traffic. Houses for the receipt and delivery of less-than-carload freight must be located close to the centers of business in cities and therefore on high-priced land. In most cases those now in existence were built years ago and are receiving more freight than can be handled economically, while the high price of adjoining property makes enlargement difficult and frequently impracticable.

E. H. Lee, vice-president of the Chicago & Western Indiana, has estimated (*Railway Age Gazette*, April 3, 1914) that the fixed charges alone amount in some instances to as much as $1.50 per ton of freight handled. This condition is prompting careful and extensive studies of the design of freight houses to secure the maximum capacity, and thus keep down overhead charges, while at the same time securing economical operation. The increasing use of motor trucks and other mechanical appliances is also beginning to be reflected in the design of freight houses.

The less-than-carload freight gives rise to far more than its proportion of claims for loss and damage. This arises largely from improper packing and marking of the individual packages, from rough handling to and from the cars and from improper loading in the cars, all of which the roads are endeavoring to eliminate.

Another important phase of this subject is the consolidation of less-than-carload freight shipments to secure the maximum practicable car loading. From the nature of the traffic it cannot be expected that its loading will ever approach that of carload freight. At the same time investigations on several roads have shown that it can be materially increased. By an aggressive campaign one road raised the average tonnage of l. c. l. freight per car for all stations from 4.6 tons in 1909 to 6.8 tons in 1914, and estimates that for the first nine months of the present fiscal year it has saved over 14,000 car movements as compared with the same period in the previous year.

One of the most direct opportunities for improvement lies in the reduction of the labor cost of handling at the freight house. In a report just made to the City Council of Chicago, John F. Wallace states that the labor cost of handling l. c. l. freight at 19 houses in Chicago varies from $0.29 to $0.66, with an average of about $0.475. The bonus system and other means for improving the efficiency of the labor employed have been adopted at a number of stations, while the installation and economical use of motor trucks and similar equipment also effects a reduction in the labor required.

The above examples illustrate the importance of this subject. To stimulate discussion of the subject we announce a contest on The Handling of L. C. L. Freight, to include all phases of this problem, from the time the freight is received

at the door of the freight house until it is delivered to the consignee at destination. While general discussions are solicited, descriptions of improvements in operation actually made and detailed statements of the results secured will receive special attention. Prizes of $50 and $35 will be paid for the two best papers received, the award being based on the completeness of the discussion and the practicability of the ideas presented. All other papers accepted and published will be paid for at our regular space rates. Contributions should be sent to the Editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, and must be received before August 1, to be considered by the judges.

CREDIT—A NECESSARY ASSET

RIGHTLY understood the question and answer from the Wall Street Journal, reprinted elsewhere in this issue, throws light on one phase of the railroad problem which is probably less understood by the majority of legislators, and even by the Interstate Commerce Commissioners, than any other. The holder of Missouri, Kansas & Texas preferred stock who writes to the Wall Street Journal states substantially correctly the present very good showing which is being made in the operation of that property and winds up with the query: "With all these rugged facts, will the 'Board' dare to pass a dividend on the preferred stock this year?"

The Wall Street Journal points out the reasons why there is very small chance that the Katy will pay any dividends this year on its preferred. The company's credit must be restored, and this is as necessary as was the increase in its earning power. Credit is not only intangible, but of such a volatile nature that to discuss it even may destroy it. Yet credit is an asset just as vitally necessary to the operation and development of a railroad as the rolling stock or the roadway.

The Missouri, Kansas & Texas case is different in particulars from that of other roads of course. The present showing as compared with a year ago is better than the majority of roads are making. There are peculiar difficulties in the way of getting a specific vehicle for long term financing. There is illustrated, however, in this case the principle, the understanding of which is so necessary to an intelligent discussion of American railroad problems.

In a great majority of rate cases decided by the Interstate Commerce Commission, railroad credit never enters into the consideration of the case, and yet in the aggregate the Interstate Commerce Commission rate decisions vitally affect railroad credit. In the 1914 rate case one of the commissioners touched in a somewhat curious way on one of the points that is brought out in the Missouri, Kansas & Texas situation when he asked a railroad president whether he would tell a banker from whom he was going to try to borrow money how bad the earnings of the railroad were. In other words, what he wanted to know was whether a railroad president would make the same exhibit in trying to borrow money as was being made to the Interstate Commerce Commission in asking for higher rates. Pretty surely there were railroad managers who could have put before the Interstate Commerce Commission facts more convincing than any of the generalizations which were introduced as evidence, had it been possible to do so without at the same time injuring the credit of his road or of other roads.

As a railroad executive said recently, probably no one of the Interstate Commerce Commissioners ever raised $100,000 for business purposes in his life. The first plan for the reorganization of the Chicago, Rock Island & Pacific without receivership proceedings fell through, because when President Mudge and some of his operating officers appeared before the bankers who were to underwrite the plan, they could not truthfully say that in their opinion the road would earn the amount necessary to make reasonably sure of a preferred stock dividend. That was not a case of credit, but a case of earning power, and is just the converse of the Missouri, Kansas & Texas case. On the other hand, the present Rock Island situation is one in which credit plays a very important part. The Missouri Pacific is another instance.

Eastern roads especially are beginning to show material improvement in gross earnings. Many roads which had not shown a favorable comparison with the corresponding period of a year before for more than 15 months, showed a gain in May, 1915, as compared with May, 1914. Forces of train men as well as enginering and mechanical forces have been cut to the very minimum. As gross increases, expenditures for maintenance and renewals will be made on a more liberal scale than was possible last year. The Pennsylvania recent rail order is a case in point. The train crew and other forces in the transportation department will necessarily have to be increased and a considerable part of the gains which appear probable in gross will be absorbed in expenses, but not all it is to be hoped. Many roads ought to begin to show a larger net operating income. But beside the showing of earning power to pay interest charges on an issue of new securities for capital expenditures, there must also be a willingness on the part of the bankers to buy these securities. This is a point that is so hard apparently for legislators and theoretical students of railroad affairs to understand. There must be that indefinable something which supplies the incentive for the investment of money in railroads, and broadly that incentive has to be either a hope of very considerable profits or an assurance of a fair return and a reasonable guarantee against the discontinuance of this return. It is one thing to argue that bankers ought to have been glad to finance the Rock Island and quite another to put the deal through. Neither commissioners nor legislators can change a static force into a dynamic force; that is, they cannot make investors actually put their money into some particular enterprise; but what they can do and should do is to recognize that certain conditions are conducive of this change and certain other conditions are unfavorable to it.

PROGRESS OF THE BLOCK SYSTEM

NO less than 76 railroads report to the Interstate Commerce Commission that all of their passenger trains are run under the space-interval system, as will be seen by the abstract of the commission's latest bulletin, printed on another page. That is to say, 76 roads report that all of their passenger tracks excepting, in a few cases, lines on which only one engine is in service—are operated by the block system. In addition to these there are 20 others which report 90 per cent or over, thus operated, making a total of 96 roads reporting 90 to 100 per cent.

This is a gratifying exhibit. Progress in this field until recently has been slow, but at last it seems to be sure. The totals of the government tables are approaching the 100,000-miles mark and evidently the time is not far distant when passenger traffic on the important lines everywhere throughout the country will have the benefit of this system. That the principle of the space interval is well appreciated is evident from the fact that block signals are used on two or three hundred miles of road devoted exclusively to freight traffic; and that the good results on all sorts of lines are substantial is evidenced by the statistics of collisions for the last few years, showing a striking reduction in the losses from this cause. Some of these statistics were given in the *Railway Age Gazette* for May 21 last, page 1036. Another significant item, though it fills only an inch, is that printed in this issue, to the effect that on a very busy division of the Baltimore & Ohio the derrick and tool cars recently had a complete rest for 45 days. This record could be matched on other roads, no doubt. When the "A B C" block system was in use on the Northern Pacific, it was credibly reported that on one division the wrecking car was left standing unused for so long a time that it developed flat wheels!

The number of 100-per cent items in the table published today is about 20 per cent greater than the total in the table issued one year ago. Those in that report numbered only 50,

and the 90-and-above only 16. The increase, however, is not quite so large as it appears, for the Grand Trunk this year is divided into 13 items, while last year the total for the system was consolidated in one item. There are a few other similar cases, making the net increase in 100-per cent items, as stated above, about 20 per cent. Again, it is to be borne in mind that this year there are many new names in the table, including some electric roads; and that on these, while the statistics are new, it may be that the signaling is not. But, making all allowances, there still remains a gratifying increase in the number of roads which believe in the space interval through thick and thin; and this gratification has a substantial basis, notwithstanding the further allowance that must be made, namely, that on some of these 100-per cent. roads the space interval is not much used except for the protection of passenger trains. The use of the space interval in any degree, at any time, is ground for satisfaction, for it has a constant educational effect; and sooner or later this leads to the further introduction and the perfection of the system. The government statistics (Table No. 4, manual block signal practice) afford further gratification in the column headed "permissive signaling forbidden," in which there are 32 items, aggregating 5051 miles of road.

This great improvement costs money, of course. The difficulty of raising money under the present almost impossible conditions is the reason why a greater extension of the best signaling cannot be reported at the present time. It will be noted that the figures of two roads, the Southern Pacific and the New York, New Haven & Hartford, account for 87 per cent of all the increased mileage shown, in the smaller table, under the head of non-automatic signaling. On both these roads this extension has been mostly made on lines not classed as important parts of the system. In other words, the officers have improved their service, not because of losses by wrecks, temporarily stirring the directors' feelings, but from a clear understanding of the permanent principle; the principle that the space interval is fundamentally rational while the time interval can never be other than patch-work. If these officers had shortsightedly drawn a balance between the cost of maintaining safe methods and the cost of wrecks under the old methods they might have decided not to make the improvement. By shutting one's eyes to the future this is often possible. On the New Haven road the change added to the current expenses about $1,000 a month, and that road just now has no thousand-dollar bills to throw away; but, as has been said, the officers evidently decided to do what was best for the service, not what would be best temporarily to sustain the cash balance.

NEW BOOKS

The Panama Canal. By Reuben E. Bakenhus, civil engineer, United States navy; Harry S. Knapp, captain, United States navy, and Emory R. Johnson, professor of transportation and commerce, University of Pennsylvania. Size 6 in. by 9 in., 257 pages, with maps and illustrations. Bound in cloth. Published by John Wiley & Sons, Inc., New York City. Price $2.50.

This book includes under one cover five papers originally published in the Proceedings of the United States Naval Institute. In their preparation the authors have endeavored to present a comprehensive view of the canal, its history, the manner in which it was built, and its place in commercial and international activities. One-half of the book is devoted to the construction of the canal, including discussions of the reasons prompting the adoption of the present location and the lock rather than the sea level type. The chapter on the standing of the canal in international law, including copies of the various treaties concerning it, and the discussion of its commercial importance and its effect on lines of travel, will also be of interest to railway men. In an appendix is given the President's proclamation of last year, assuring the neutrality of the Canal Zone. The book is accompanied by six maps, showing the features of the canal in detail.

Letters to the Editor

STATE AND FEDERAL ACCIDENT-REPORT REQUIREMENTS

New York City.

To the Editor of the Railway Age Gazette:

Your correspondent "R. R. N. Y." in a letter published May 28, under the caption "The Government Accident Records," presumes that the railroads "are using their influence with the Washington authorities, through the committee of which Mr. Kruttschnitt is chairman"; and asks "Why should they not also use their influence with the state commissions?"

The American Railway Association Special Committee on Accident Statistics, in conference with W. J. Meyers, statistician of the Interstate Commerce Commission, arranged for a meeting with the representatives of the railway labor organizations, the National Association of Railway Commissioners, and representatives of the public service commissions of New York and Pennsylvania, at which the proposed accident forms and rules were fully discussed and conclusions were reached acceptable to all interests represented. It was obviously impossible to take up the preliminary steps with the commissions of 45 states, and our committee thought that with the approval and endorsement by the representatives of the National Association of Railway Commissioners, and of the public service commissions of two of the most important states in the Union, of what had been done, that they were making a very fair start, and that after a tentative conclusion had been reached, would be the proper time to submit the forms and rules, etc., to the railway commissions of all of the states that had commissions. The statistician of the Interstate Commerce Commission mailed copies of the revised draft of the rules and the proposed forms to all of the state railroad commissions, to public service commissions, and to all others interested, on May 17, with a request for further criticisms and suggestions.

It is therefore evident, from the above, that the co-operation of the state railroad commissions has been invited, and our committee hopes that the general adoption of the Interstate Commerce Commission's blanks for reporting accidents will result therefrom. J. Kruttschnitt.

SIMPLE TRAIN AND ENGINE NUMBERS

Little Rock, Ark.

To the Editor of the Railway Age Gazette:

Is there any benefit to be derived from trains and engines carrying large numbers? I am sure it is not apparent from a despatcher's standpoint. The car service office and the general transportation clerk may secure a little advantage in being able to know off-hand just where a certain train runs, without having to consult the time cards, but it is doubtful if they rely on that to any degree now. Some tables show individual train and engine numbers as high as four figures; and when a despatcher in writing and sending an order has to spell out the train numbers two or three times, and add the long engine numbers, there is quite a little loss of time. How much easier and simpler to say and write train No. 1, engine 5, than train No. 1326, engine 7702.

Some local trains are run from, say A to B under No. 52, B to C as No. 54 and so on. What is there to prevent No. 52 being carried over the entire line? C. H. A.

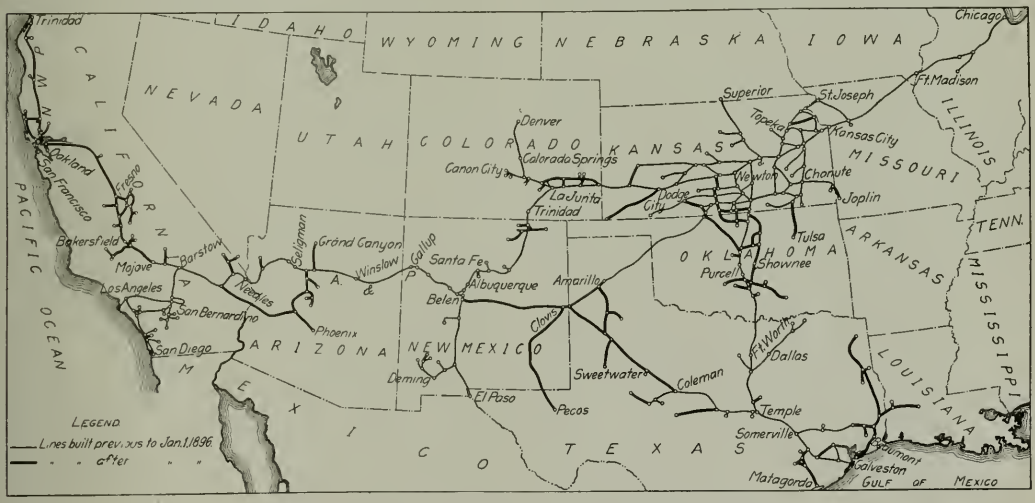
An Argentine Railway Record.—The Central Argentine recently made a record non-stop run. A special train of six cars, a total of 34 axles and 258 tons in weight, made the journey over the Rosario line of the Central Argentine, between Rosario and Retiro, Buenos Ayres, a distance of 189 miles. The run was made without a stop in three hours and 40 minutes, an average of 51 miles an hour.

Nineteen Years' Development Work on the Santa Fe*

Part 1—Outline of Methods by Which Property Has Been Developed and Physical Condition Improved

On January 1, 1896, the Atchison, Topeka & Santa Fe emerged from a receivership of two years' duration with 6,435 miles of line and with gross earnings for the preceding fiscal year of $28,851,841, resulting in a net deficit for the year of $4,433,380, after the payment of fixed charges. On January 1, 1915, nineteen years later, this road was recognized as one of the strongest in the United States, having over 11,000 miles of line, while its gross earnings for the fiscal year ending June 30, 1914, were $111,109,770, and its corporate income available for dividends and surplus was $20,183,965. Its record is made the more interesting by the fact that the gross operating revenues for the first nine months of the present fiscal year show an increase of $4,797,176, while its net corporate income shows an increase of $3,434,626 as compared with the same period last year, at a time when almost every other railroad is showing large decreases in both gross and net revenues.

The means by which this property has been developed from its earlier condition of weakness to its present position of strength, during a period when some of its closest competitors have become involved in difficulties of one kind or another, form a most interesting and instructive example of constructive and efficient American railroading. It will be the endeavor in this article to point out the more important policies underlying this development and the manner in which they have been applied to secure these results.



The Development of the Santa Fe Lines Since the Receivership

CONDITIONS LEADING TO THE RECEIVERSHIP

To understand fully the development which has taken place since the reorganization of the Santa Fe, it is necessary to review briefly some of the conditions leading to the receivership. The road was chartered in Kansas in 1859, but construction was not begun until nearly 10 years later. By 1873 the main line had been built from Atchison, Kan., west 471 miles to the western line of the state, and 38 miles of branches had also been constructed. In 1877, when William B. Strong was placed in charge of the property it had increased to 786 miles, nearly all of which was in Kansas. Mr. Strong was a man of wide vision, and he saw the opportunity for a system extending from the Great Lakes to the Gulf of Mexico and the Pacific coast, not only to reach these important sources of traffic, but to secure a widely diversified traffic. He, therefore, inaugurated at once a policy of active expansion. The main line reached La Junta, Col., in 1878; Albuquerque in 1879, and El Paso, Tex., and Deming, N. Mex., in 1881. The intention at that time was to extend to southern California over the general route now followed by the Southern Pacific, but this was blocked by the Southern Pacific interests building a line east from southern California. The Atlantic & Pacific was then acquired by the Santa Fe and the St. Louis & San Francisco jointly and construction started westward from Albuquerque, reaching the Colorado river at Needles, Cal., in 1883, where it met another Southern Pacific line built south from Bakersfield. An agreement was soon reached whereby this line of the Southern Pacific, from Needles to Mojave, Cal., was leased with an option to purchase. After the reorganization of the Santa Fe this line was secured in exchange for the Sonora line which the Santa Fe had built south from Benson, Ariz., to Guaymas, Mex.

During this time the Gulf, Colorado & Santa Fe was being built north from Galveston by local interests, reaching Fort Worth in 1881 and Dallas in 1882. In 1886 the Santa Fe secured control of this property and extended it north to a connection with its own line at Purcell, Okla., the following year. However, it was from 1885 to 1887 that there was the greatest activity in construction. In 1886 almost 1,700 miles of line were completed, 1,000 miles of branch line being built in Kansas alone. The extension from Pueblo to Denver was completed that year, while the line to Chicago was finished the following year.

This period was characterized by widespread construction work throughout the entire West. It was at this time that the Burlington and Rock Island extended to Colorado, the Southern Pacific

*This, the first of two articles, describes the causes leading to the receivership, the condition of the property at the time of the reorganization and the policies governing the building of extensions and the maintenance of the roadway and equipment. The second article will appear in next week's issue and will describe the means by which the traffic has been developed, the methods of operation and the resulting increase in earnings.

reached New Orleans, and the Northern Pacific, the Great Northern and the Canadian Pacific were pushing westward. All of these and other roads were also building correspondingly large mileages of branch lines. As a result there was over-extension, the country did not develop as fast as the roads, and the net earnings of the Santa Fe, in common with those of other roads, began to decrease rapidly. As a result of accumulated troubles Mr. Strong resigned in 1889 and the management was changed.

The succeeding management at once endeavored to recoup its earnings by engaging in a war of rate cutting. At the same time it secured control of the St. Louis & San Francisco and the Colorado Midland. These developments greatly complicated the already serious problem, and led to the receivership on December 23, 1893. This lasted for two years, during which time numerous improvements were made to the property, and the Colorado Midland was sold. The capitalization was readjusted and on January 1, 1896, the receivership came to an end and the property was placed in charged of the present management.

CONDITIONS OF THE PROPERTY IN 1896

At the time it came out of the receivership the property consisted of 6,435 miles of line extending from Chicago to Galveston, Denver, Albuquerque and El Paso, in addition to a joint interest with the St. Louis & San Francisco in the Atlantic & Pacific, then in receivers hands. Its condition has been well described by Charles S. Gleed, a director, in a booklet entitled, "The Rehabilitation of the Santa Fe Railway System" as follows:

"When the new directors and officers took charge the line from Chicago to Kansas City, which recently had been constructed in very great haste, was in bad condition and required extraordinary expenditures. The line extending from St. Louis toward Kansas City for about 70 miles had to be extended or sold. Many new lines in Kansas needed heavy improvement. The Atlantic & Pacific had to be bought and then rebuilt. The line from Needles to Mojave was a wretched piece of track.

"The new lines in Indian Territory and Texas were in the poor condition usual to new lines in the west. The equipment was inadequate and the buildings were nearly all of the temporary style characteristic of new lines. The Sonora and some other lines were operating at a loss. The St. Louis & San Francisco lines were in most primitive condition. The old main line from Kansas City to Denver and El Paso was the only line in good condition for the service which had hitherto been required of it. Practically all of these lines had been well built and greatly improved, considering the standards of that day and the requirements of the traffic, but they were in no condition to accommodate the high speed and the heavy traffic of the time at hand."

This was the condition of the property when the new management assumed control. President E. P. Ripley and his associates have been in direct and continuous charge since that time, which must be borne in mind, for it is of primary importance in a study of the reconstruction of the property. Too often managements have been changed in the midst of the difficulties following a receivership before they have had an opportunity to demonstrate their ability or the wisdom of their plans. Mr. Ripley and his associates have been given full and uninterrupted opportunity for the working out of the policies outlined by them at the outset.

THE BUILDING OF EXTENSIONS

One of the fixed policies of the present management has been the concentration of its entire attention on the development of the Santa Fe proper. One of its first acts was to dispose of its interest in the St. Louis & San Francisco and other properties not essential to the operation of the Santa Fe itself. The broadness of this attitude and the determination behind it are revealed by the early sale of the St. Louis, Kansas City & Colorado, a short line extending west from St. Louis about 70 miles. At the time the Chicago extension was built this line was bought with the idea of incorporating it into a line from Kansas City to St. Louis to give the Santa Fe an entrance to the latter city, but no work had been done upon the construction of the intermediate link. As there were already several other lines between these two cities, its construction would only serve to further divide the traffic moving between those points and create an economic waste of capital. For this reason the line was sold in preference to building the connecting link. While by this act the Santa Fe gave up its opportunity to secure an entrance into St. Louis with its large traffic, which has been regarded by some as a mistake, it prevented the diversion of interchange traffic to its competitors. On the other hand, the Atlantic & Pacific, owned jointly by the Santa Fe and the St. Louis & San Francisco previous to its receivership and operated as a separate property, was essential to the Santa Fe, and it was taken over by it directly on July 1, 1897.

The same strict policy of conservation of capital has been followed in making expenditures for extensions and for increased facilities. No attempt has been made to engage in competitive building with other lines or to invade territory already provided with transportation facilities, unless the entrance to San Francisco be so regarded, and this was secured by the purchase of a line already built and in operation. Rather, construction activities have been confined to the large area in the southwest without adequate transportation facilities. Even here, a very conservative attitude has been maintained and extensions have been built only to reach sources of traffic definitely known to exist or which gave promise of developing within a very few years. As a result, the mileage of unremunerative branch lines today is limited. In the same way short lines of proven traffic value have been purchased from time to time.

While the attitude regarding extensions has been conservative, the mileage has grown from 6,435 in 1896 to 11,092 on January 1, 1915, located in 13 different states, in addition to 594 miles owned jointly with other companies and 225 miles controlled through lease or the ownership of stock. It is instructive to note that the extensions built by the present management have followed very closely the lines laid down by Mr. Strong. Also, practically all of the lines built during the earlier administration have since proved their value from the traffic and strategic standpoints, evidencing the foresight displayed at that time. As a result the system now comprises main trunk lines extending from Chicago to Colorado, the Pacific coast and Texas, as well as from Texas to the Pacific coast, about which branch line feeders may be built as the country develops as has been done in Kansas, where the Santa Fe now has 2,817 miles of line and enters 74 of the 104 counties.

The policy of avoiding waste of capital by competitive building has also been avoided in numerous instances by joining with other roads in the construction and use of joint facilities essential to both. The most important recent instance of this nature is the co-operation with the Southern Pacific in the construction of the Northwestern Pacific along the coast north of San Francisco for nearly 300 miles. Rather than build another line, the Santa Fe uses the tracks of the Southern Pacific over the Tehachapi mountains for 67 miles, while it shares its tracks with the Salt Lake line for 90 miles over the San Bernardino mountains. Likewise when building second track between Chicago and Kansas City a few years ago, arrangements were made to combine the single tracks of the Alton and the Santa Fe into a double track for 20 miles near Joliet, Ill., while a similar arrangement was made with the Wabash for the joint use of 30 miles of tracks near Carrollton, Mo., so that each road secured the advantage of double track with practically no increased expenditure.

IMPROVING THE PROPERTY

As stated above, while in general the lines had been built well according to the standards prevailing at the time of their construction and the traffic then in sight, heavy grades were common and the facilities were inadequate in many ways when the new management took hold. Practically the only exception to this was the Chicago extension which had been built only a few years before with a maximum grade of 0.8 per cent to handle the relatively large amount of business collected by the network of lines west of Kansas City. Furthermore, the property had been allowed to run down during the years immediately preceding the receivership. Therefore, in addition to constructing extensions to reach new traffic, the new management had to reconstruct the existing property to enable it to handle a greater traffic more economically and to bring it up to the proper standards of maintenance.

Some of the most extensive improvement work has been connected with the reduction of grades. The main line to the Pacific coast crossed four ranges of mountains with ruling grades ranging from 1.8 per cent to 3.5 per cent. The most serious operating problems were presented on that portion of the line between Trinidad, Colo., and Albuquerque, N. Mex. When the line was first projected beyond Dodge City in 1878 it was planned to build directly southwest to Albuquerque, avoiding the Raton mountains. However, local Pueblo interests started building a line east from Pueblo along the Arkansas river, and the Santa Fe location was deflected to meet it at La Junta. The western extension was then continued south from this point, passing over Raton mountain with a 3.5 per cent grade on the north and a 3.3 per cent grade on the south slopes and a tunnel at the summit. Aside from making operations very expensive, these conditions led to very serious congestion and blockades which the construction of a second track only partially relieved, and for a number of years this portion of the line was regarded as limiting the capacity of the entire system. A similar, although less serious condition existed at Glorietta summit, 175 miles further south, while the grade line was badly broken with numerous 1.4 per cent grades all the way to Albuquerque.

To relieve these conditions a new low grade line was built from Belen, 30 miles south of Albuquerque on the El Paso line, east 345 miles to Amarillo on the Pecos Valley line, and the latter line was rebuilt into Wellington, Kans. With the exception of a 1.2 per cent. grade just out of Belen, on which helper engines are operated, the maximum grade on this line is 0.6 per cent each way to Kansas City, a distance of 928 miles. The immediate advantage of this cut-off and alternate main line which was placed in service in 1906, was an increase in the tonnage rating from 900 to 1,000 tons on the old line with considerable helper service, to 2,600 tons on the new. The congestion was also removed, while a considerable saving in the time of trains was also effected. In addition, because of its more southerly location, the new line escapes a large portion of the snow troubles of western Kansas and Colorado. All freight traffic between points east of Newton, Kans., and west of Belen, now moves over this new line, while in conjunction with the line completed last year across west Texas a 0.6 per cent grade is also secured from Belen to a connection with the Gulf lines at Coleman, Tex., and all traffic interchanged between the Gulf and Coast lines is sent over this cut-off, instead of moving through southern Kansas, as was formerly necessary.

Similar extensive improvement work has also been done west of Albuquerque. For the first 158 miles to Gallup, the original ruling grade of 1 per cent has been reduced to 0.6 per cent. Between Winslow and Needles the line was built originally with ruling grades of 2.6 per cent over the summits and 1.8 per cent elsewhere. These grades have now been reduced to 1.8 per cent and 1.4 per cent, respectively. In most instances this has been accomplished by the construction of a single track line on the lower grade for ascending traffic, leaving the old track on the heavier grade for descending trains. However, in one place east of Seligman, where a second track was required and the existing line was already on the desired grade, the unusual practice was adopted of building the new track on a 3 per cent grade for descending trains, thereby effecting a saving of over two miles in distance and a material reduction in the cost of the second track.

In the same way the grades southbound on the line from Newton, Kans., to Texas have been reduced to a maximum of 0.6 per cent to the crossing of the Red river, a distance of 330 miles. From this point to Temple, Tex., the original 1.25 per cent ruling grade still remains.

While not on so large a scale, similar improvements have been made over the entire system according to a carefully prepared program. When work has once been undertaken on one line it has been followed to completion. Only such work has been undertaken as time and the funds available permitted, and when only a limited amount of money has been available it has been devoted to completing the work on a certain mileage rather than distributing it in lesser amounts over a greater area and not completing the work anywhere. By concentrating attention in this way numerous improvements have been made in the way of minor grade reductions, etc., and the main and important branch lines have been improved materially with relatively small expenditures.

INCREASING THE FACILITIES

In this interval of 19 years large additions have also been made to the facilities. At the time of the reorganization only 16 miles of second track was in service. Today there is 975 miles. The line has been double tracked all the way from Chicago to Newton, Kans., 655 miles, while 300 miles of second track has been built west of Albuquerque. Counting the low grade line from Newton to Belen as second track, all but 475 miles, or 22 per cent of the line between Chicago and Barstow, Cal., where the Los Angeles and San Francisco lines separate, is double track. Terminals have also been enlarged. With two exceptions, the road owns its own terminals and it is not dependent on facilities leased from other roads.

While most of the terminals were secured by the earlier administrations the present management has made relatively large expenditures to secure adequate facilities at San Francisco and Kansas City. When the San Francisco & San Joaquin Valley railroad was taken over in 1900 it had limited terminal facilities which have been supplemented since that time at considerable expense.

The water problem is a serious one on all southwestern roads. During the winter of 1897, 43 per cent of the traffic across the desert east of Barstow, Cal., consisted of water and company coal. Relatively large expenditures have been made to develop reservoir and other water supplies, and while it is still necessary to haul water for several stations at isolated points the total amount has been very materially reduced, while the substitution of oil for fuel on locomotives as far east as Winslow, Ariz., has reduced the amount of fuel required on the Coast lines east of Barstow to an average of 14 cars daily.

MAINTENANCE OF WAY AND STRUCTURES

Intimately connected with the policy governing the construction of extensions and additional facilities has been that relating to the standards of maintenance. At the time of the reorganization large parts of the property were badly run down, while at the present time it is one of the best maintained properties in the country. This has been brought about primarily by the expenditure of liberal sums for maintenance regularly from year to year. This is shown most clearly by the fact that for the 19 years since the reorganization an average of 15.2 per cent of the gross operating revenues has been returned to the property in expenditures for maintenance of way. The liberality of this expenditure is indicated by a comparison with that of 52 other leading roads for the past 10 years. During this period these roads spent an average of 13.3 per cent of their gross revenues for this purpose as compared with 15.5 per cent for the Santa Fe. Making another comparison, the average annual expenditure per mile of line on the Santa Fe for the last five years has been $1,589, while on the Burlington it has been $1,458, and on the Southern Pacific $1,529, these latter two roads being recognized as unusually well maintained and as fairly comparable in climatic and other conditions. The activity with which this policy has been followed since the first year of control is shown by a statement in the third annual report for the fiscal year ending June 30, 1898, that "nearly every building on the right of way between Chicago and El Paso, all buildings on the Southern California (those lines in southern California southwest of the connection with the Atlantic & Pacific-Southern Pacific line at Barstow), and a large number of buildings on the Gulf, Colorado & Santa Fe have been painted."

The standards of maintenance are high and a progressive policy has been followed in authorizing increased expenditures

to reduce ultimate maintenance charges as the following illustrations will show. At the present time all main and many branch lines are tie plated continuously, over 50,000,000 tie plates being in service. The Santa Fe has been a pioneer in the use of treated ties, having started treating them on an extensive scale at Las Vegas, N. Mex., in 1885. It now operates treating plants at Somerville, Tex., and Albuquerque, N. Mex., with a combined annual capacity of 3,600,000 ties or practically its entire annual requirements. Over 65 per cent. of all the ties now in the track are treated, and as result the tie requirements for replacement purposes are showing a marked decrease, amounting to over 600,000 ties for each of the past two years, while the average number of ties inserted per mile for the last five years shows a decrease of 9 per cent as compared with the preceding five years.

The Santa Fe has also been a pioneer in the use of screw spikes, installing the first section in 1905 and having over 120 miles of screw spike main track in service on January 1, 1912. Since that time their use has been extended gradually. On the Western lines it is now the standard practice to insert screw spikes in 8 ties per rail length when laying new 90-lb. rail to secure a more rigid track construction. Another interesting maintenance practice which has been followed, particularly on the Western and Coast lines, has been that of laying all curves up to 10 deg. to exact gage without any allowance for curvature, which practice has been found to result in a greatly reduced rail wear.

The Santa Fe has also been a pioneer in the use of ballasted deck bridges. Starting with this form of construction about 1898, over 160,000 lin. ft. of ballasted deck structures are now in service. This construction is general on the main lines, obtaining even on structures as large as the new bridge over the Missouri river at Sibley, Mo., with spans 396 ft. long, and it is being extended gradually to the more important branch lines. By this means, in addition to securing the other advantages of this form of bridge deck, the cost of maintenance is reduced at least one-half. These and numerous other expenditures are already paying excellent returns in the form of reductions in maintenance of way expenditures so that the relative comparisons are even more favorable to the Santa Fe than shown above.

MECHANICAL DEVELOPMENTS

At the time of the reorganization the road owned 962 locomotives while in 1904 this number had increased to 1,433 and at the present time it is 2,150. The number of passenger cars owned has increased from 641 in 1896, to 861 in 1904, and 1,653 in 1914, while the number of freight cars has risen from 27,719 in 1896, to 39,072 in 1904, and 69,366 in 1914. From this it will be seen that the increase in equipment has been particularly rapid during the last decade.

As would be expected, the increase in the weight and tractive power of the locomotives has been considerably greater than in the number of locomotives themselves, for a great deal of attention has been devoted to the development of heavy engines for use especially, on the mountain divisions, and this road has led in the development of certain types of engines. With widely differing conditions as regards grades on different portions of the system, the aim has been as far as possible to so adjust and distribute the motive power with reference to the grades as to require the minimum breaking up of trains at intermediate terminals. Thus, at present, trains are made up at Kansas City for delivery to the Coast lines at Belen and to the Gulf lines at Purcell without breakup, and it is expected that with the readjustment of motive power and of grades now contemplated between Kansas City and Chicago it will be possible within the next two or three years to despatch trains from Chicago to Belen and Purcell without changing tonnage. The average tractive power of locomotives has risen from 25,578 lb. in 1904 to 33,290 lb. in 1914, an increase of 30 per cent in 10 years. This compares with an average tractive power for the locomotives of the entire country for June 30, 1913 (the last figures available) of 29,702 lb. as reported by the Interstate Commerce Commission. West of Belen and Albuquerque the combined improvement in grades and motive power has increased the tonnage rating on the mountain divisions from 416 tons in 1897 to 1,300 tons today.

Because of the large proportion of the traffic which is time freight it has been necessary for the mechanical department to consider the question of speed as well as tonnage in designing the freight locomotives for use on many of the divisions, for it is necessary that they be capable of running at relatively high speed. One of the most successful recent types of locomotives placed in service on this line is the Prairie Mallet, which is hauling trains of 2,250 tons across the Belen cut-off at speeds up to 45 miles an hour.

The efficiency of the motive power and the economy of operation have also been greatly increased by the substitution of fuel oil for coal on all lines west of Winslow, Ariz. To insure a sufficient supply of oil the Santa Fe has acquired large areas of oil land in California which are operated by a subsidiary company. Considerable oil is also purchased from other producers for the purpose of conserving the road's own supply for future years.

Reference was made above to the liberal expenditures for maintenance of way. Those for the maintenance of equipment have been equally liberal. For the entire period under the present management these expenditures have averaged 14.5 per cent of the gross operating revenues, while for the past five years they have averaged 15.9 per cent, rising to 17.2 per cent in 1914. Combining the expenditure for the maintenance of equipment with that for the maintenance of way and structures, it will be seen that an average of 30.4 per cent of all of the gross revenues has been devoted to the upkeep of the property for the entire period the present management has been in control.

Two or three instances will be cited as indicative of the methods by which the equipment is maintained. To insure that the proper repairs will be made on each of the four grand divisions a car repair pool is maintained, and all charges for the system are distributed according to an arbitrary basis. In this way there is no incentive for one grand division to send bad order cars to another. Last fall floating car repair gangs were sent over the lines in the wheat belt of Kansas and Oklahoma to repair the surplus equipment stored along the road in order to insure that every car was in proper condition before loading. In the same way all refrigerator cars are thoroughly inspected and all necessary repairs made at the last terminal before distribution for loading. In this way not only is the equipment kept in good condition, but the damage claims have been materially reduced.

United States Navy Specifications.—The new specifications of the United States Navy indicate a changed opinion as to the extent to which sulphur is detrimental in steel castings. Former specifications allowed a maximum of 0.05 per cent sulphur in all carbon castings of grades A, B and C and 0.04 per cent in nickel-steel castings designated as "special grade." In the new specifications grades A and B are subdivided into two classes—A and D, the high carbon, and B and E, the medium carbon relatively. A and B maintain the old limit of 0.05 per cent sulphur and D and E permit castings to go as high as 0.07 per cent sulphur. The two subclasses include castings of less importance than the others. For castings in grade C the limit is changed from 0.05 per cent sulphur to 0.07 per cent. The nickel-steel or special grade castings now have 0.05 per cent instead of 0.04 per cent sulphur as the limit. The requirements for tensile strength are reduced from a minimum of 90,000 lb. per sq. in. in nickel-steel to 85,000 lb. The elastic-limit stipulation is 45 per cent of the tensile strength in carbon castings, instead of a definite limit in pounds. The elongation requirements are advanced from 20 to 22 per cent in the special, or nickel-steel, grade, and the bending bar required is 120 deg. instead of 90 deg.—*American Machinist.*

Locomotives Recently Built for Foreign Countries

Baldwin Works Completed Engines for France, Russia, East Africa and New Zealand in the Past Few Months

During the past few months, several notable orders for export have been filled by the Baldwin Locomotive Works. These are of special interest, not only because of the types of locomotives built, but because of the quick delivery effected. With comparatively little domestic work in hand, there were unusually good opportunities for the builders to concentrate on the foreign orders.

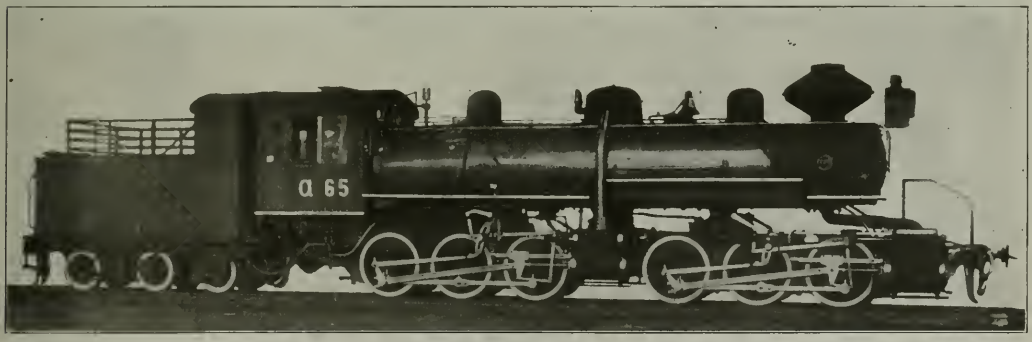
An order for ten Pacific type locomotives for the New Zealand government railways was received November 18, 1914, and the last engine was completed January 7, 1915. These locomotives are suitable for either passenger or freight service; the weight limit specified was 12 tons (of 2,240 lb.) per axle, or 1½ tons per foot of total length. With these limitations, and a track gage of 3 ft. 6 in., a most effective design of locomotive has been produced. The tractive effort exerted is 22,900 lb., which is unusually high in proportion to the weight on the driving wheels, which is 76,000 lb. The driving wheels are 49 in. in diameter, the cylinders 18 in. by 24 in., and the working steam pressure 170 lb.

2-10-2 Type Locomotive for Portuguese East Africa

In construction, these locomotives follow American practice closely. The boiler is of the straight top type, with a wide firebox, a Schmidt superheater and Security sectional arch. The steam distribution is controlled by 9½ in. piston valves, which are driven by Walschaert motion. The cylinders are cast separate from the saddle, and live steam is received through outside steam pipes. Other features of interest include the Hodges design of trailing truck, English Westinghouse brakes, and acetylene headlight and cab lights. The tender is carried on two four-wheel trucks. All the wheels under the locomotive and tender have cast steel centers, and are steel tired.

The 2-10-2 type locomotive illustrated is one of two built for the Lourenco Marques Railway, in Portuguese East Africa. This engine is of rather unusual size and capacity for a gage of 3 ft. 6 in., as it develops a tractive effort of 33,400 lb., with a ratio of adhesion of 4.3. The line is laid with 80-lb. rails, and has curves of 300 meters (984 ft.) radius and maximum grades of 1½ per cent. Under these circumstances, the use of a locomotive having a long rigid wheelbase is not prohibitive. Flange oilers are applied to the first pair of driving wheels, and the wheels of the third pair have plain tires.

These locomotives, apart from their dimensions, are similar in design to the 2-10-2 type locomotives operated in the United States. The special equipment includes a Baldwin steam brake on the driving wheels, and the English automatic vacuum brake on the tender, with train connections. A boiler feed pump is applied, and is driven from the right hand crosshead. The boiler is of the straight top, wide firebox type, equipped with Schmidt superheater and Security sectional arch. The weight on drivers is 144,000 lb., while the total engine weight is 179,100 lb. The cylinders are 21½ in. by 24 in., the driving wheels 48



Wood-Burning Mallet Compound for the Archangel Railway, Russia

in. in diameter and the working pressure 170 lb. The Mallet locomotive illustrated is one of 30 which were built for the Archangel section of the Russian government railways.

The order for these locomotives was received November 10, 1914; the first engine was completed on December 21, and the last on January 6, 1915. The design was new throughout, and special care was necessary on account of the weight limitations imposed. The engines were built for a gage of 3 ft. 6 in., but the design is such that they can be subsequently changed to meter gage if desired.

The boiler is of the straight top type, with a long firebox placed above the frames. The inside box is of copper, and the tubes are of iron with copper ends. Wood fuel is used, and the grate consists of plain bars. The stack is of the Radley and Hunter type, with top and bottom sections of pressed steel, each made in one piece and formed in the same dies.

These locomotives use saturated steam, which is distributed to the high pressure cylinders by 8-in. piston valves and to the low pressure cylinders by balanced slide valves. The Walschaert motion is applied, and the gears are controlled by the Baldwin pneumatic screw reverse mechanism. The machinery is as light as possible, consistent with the required strength. Cast steel is used for the driving wheel centers, driving boxes, pistons, crossheads, and many of the structural parts. The weight on drivers, which is also the total weight, is 105,800 lb.; the cylinders are 13 in. and 18 in. by 22 in.; the driving wheels are 44 in. in diameter, and the boiler pressure is 180 lb.

The tender has a capacity of 2,640 gal. of water and 3½ cords of wood. It is carried on six wheels, the first axle being held in rigid pedestals, and the second and third in a truck of the arch bar pattern. The tender frame is composed of steel channels, and the tank is wedge shaped. The forward end of the tank is covered with a hood, and the locomotive cab is entered through side doors, the arrangement being such as to thoroughly protect the engine crew from cold and stormy weather.

Three orders for locomotives have been received from the French government, and have been filled with unusual despatch. The first order called for 20 tank locomotives of the 0-6-0 type. This order was received on Tuesday afternoon, November 3, 1914, and it was specified that the engines be finished at the earliest date possible. The first boiler was completed November 10, at 11 a. m.; and one of the locomotives was entirely finished on November 13. At 11:35 a. m., November 21, the last engine, completely boxed, left the erecting shop, the 20 locomotives having thus been completed in 16 working days.

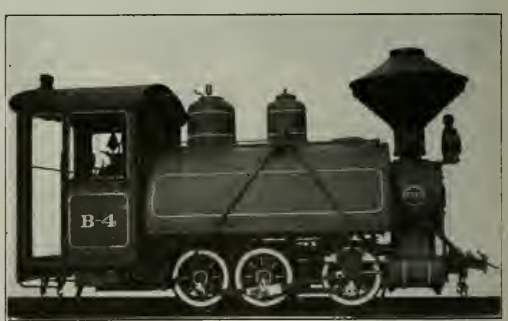
These locomotives have a track gage of 60 cm. (1 ft. 11⅝ in.), and are designed to traverse curves of 45 ft. radius and to operate on rails weighing 9½ kg. per meter (a little more than 15 lb. per yd.). They are equipped for burning wood, and have smoke stacks of the Radley and Hunter pattern. The water supply is carried in a saddle tank. The steam distribution is controlled by plain slide valves, driven by the Stephenson link motion. The cab is of steel, and both side windows and also the front window on the left side have drop sashes of steel, 3/16 in. thick. A steam brake, with auxiliary hand gear, is applied to the driving wheels. The weight of the engine is 29,000 lb., the cylinders being 9 in. by 12 in., while the driving wheels are 26 in. in diameter. These locomotives were each shipped complete in one case, ready to be fired up and operated immediately upon arrival at destination.

The second order from the French government called for six locomotives for service in Morocco. These are tank engines of the 4-6-0 type, built for the same gage as the 0-6-0 type locomotives previously referred to. They were designed to meet a limiting weight of four metric tons per axle. The water supply is carried in side tanks, and the fuel, which is soft coal, in a box back of the cab. The boiler is of the straight top type, with a copper firebox and brass tubes. The firebox rivets and water space stays are of copper. Walschaert valve motion is used, and the steam is distributed by plain slide valves.

Restricted space on these locomotives necessitates an unusual design of engine truck. Each side frame is cast in one piece with its adjacent boxes, and the castings are tied together at their ends by transverse tie rods. The transom is a steel casting which is pinned to the side frames, and supports a swing bolster through two links placed on the center line of the locomotive. The weight is transferred to the bolster through a coil spring, which serves the purpose of a center pin as well as providing the necessary elasticity. These locomotives were each shipped in one piece, completely assembled, except the stack and a few minor fittings.

The third order from the French government was for 100 locomotives of the Pechot type, with 0-4-4-0 wheel arrangement, somewhat similar to the well-known Fairlie type. Fairlie locomotives have been used in this country to only a very limited extent, attempts to introduce them having proved unsuccessful. Their use abroad has been confined to roads where curves are frequent and sharp, necessitating locomotives of unusual flexibility. The Fairlie type differs from the Mallet type in that it is carried on two steam trucks or "bogies," and is provided with a boiler having two barrels, or cylindrical sections, and two fireboxes. The latter are placed in a single outside shell, which is located between the bogies. This provides an exceedingly flexible locomotive, but introduces certain complicated features which have always been considered undesirable in American practice.

The locomotives now referred to have a gage of 1 ft. 11⅝ in. They were built throughout to metric measurements, and



Six Wheel Tank Locomotive for the French Government

represent a design introduced in 1888, and which has several times been duplicated since that date. Although these locomotives are very small, they are of unusual interest in view of the many special features incorporated in their construction.

The boiler has a steel shell, with copper fireboxes and brass tubes. The fireboxes are separated by a water space 50 mm. (about 2 in.) wide. Each communicates with a separate set of tubes, and there is a smokebox and stack at each end of the boiler. A high steam dome is placed above the fireboxes. The boiler barrels are supported on saddles placed above the bogie center pins, and the firebox is supported in a cradle, consisting of two plate frames which are riveted to the saddles. The boiler shell rests on the saddles, but is not fastened to them in any way. This construction supports the boiler firmly, permits expansion and contraction of the shell, and also maintains the correct distance between the bogie centers.

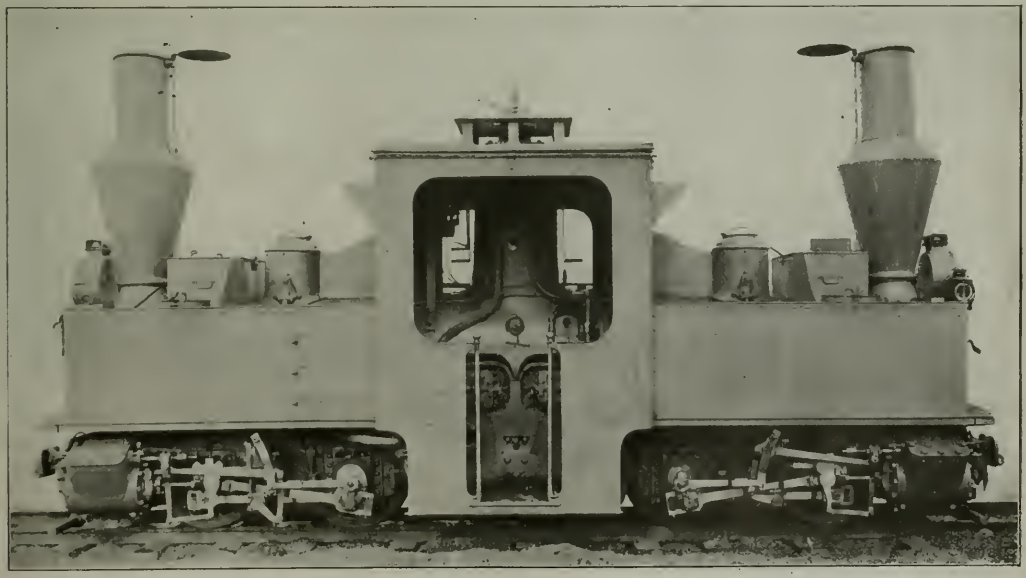
The bogie frames are of steel plate, placed outside the wheels, while the driving boxes are of wrought iron, case hardened and tempered. The wheel loads of each bogie are equalized. The steam distribution to all the cylinders is controlled by balanced slide valves which are circular in plan, and are driven by Walschaert motion. The four gears are controlled simultaneously by means of a hand lever. An interesting detail is the arrangement of the live steam pipes, which leave the boiler through

openings in the bottom and pass down through the bogie center pins. The ball joint in the pipe can thus be arranged to coincide with the center on which the bogie swivels. Each pair of cylinders is located under its respective smokebox, so that a comparatively simple arrangement of exhaust piping can be used. The exhaust pipe has a ball joint at its lower end.

The locomotives weigh, in working order, 12,790 kg., or 28,100 lb. The cylinders are 175 mm. by 240 mm., or 6.88 in. by 9.44 in., and the driving wheel diameter is 650 mm., or 25.5 in.

The water supply is carried in four side tanks, one of which is placed on each side of the two boiler barrels. All four tanks are connected by equalizing pipes. The cab is located between the tanks, in the center of the locomotive. The two tanks on the fireman's side are shorter than the others, thus providing space adjacent to the cab for coal bunkers. Each firebox has a side door. Such an arrangement would be inconvenient on a heavy locomotive consuming large quantities of fuel, but on these small engines firing is a simple matter. However, it is

Running Gears of the Pechot Type Locomotives in the Philadelphia Erecting Shop; They Were Shipped to the Eddystone Plant in Automobile Trucks



Fireman's Side of One of the Pechot Type Locomotives Built for the French Government

necessary to have two operators, as the boiler runs through the cab and it is impossible to step from one side to the other.

The locomotives are equipped with a hand screw brake, which can be applied from either side of the cab. The brake shoes are of poplar. The drawbars are of the radial type rotating about pins whose centers are located as close as possible to the bogie centers. These pins are seated in transverse steel castings, which are riveted to the side frames.

The steam dome contains two sliding throttles, each connected to a pipe leading to one of the bogies. In the cab are three throttle levers; two of these operate both throttles and are so located that one of them can be easily reached from any part of the cab. The third throttle lever controls the admission of steam to the cylinders of one bogie only. Normally this lever is latched with the others, so that all four cylinders receive steam simultaneously. If it is desired to run the engine with one-half of its power, the third throttle lever can be unlatched and steam used in only one pair of cylinders.

Special provision has been made to insure easy riding qualities. The weight is transferred to the bogie center pins through heavy rubber washers, which absorb vibration. The bogie side bearings are also of rubber. The bogie frames are connected to the frames supporting the boiler by links fitted with specially designed springs. These act as a centering device, and aid in restoring the alinement of the bogies after traversing curves.

The American-made equipment used in these engines includes injectors, whistle, safety valves, lubricator, steam gages, headlights, and cab and signal lamps. The steam gages are graduated to indicate the pressure in kilograms per square centimeter.

These locomotives were built to exceedingly rigid specifications, which covered not only the quality of the materials, but also the methods of manufacturing the various details and of erecting and testing. It was specified that each locomotive should be run under its own steam for approximately half a day. The engines were erected at the Eddystone plant, and a special track was built for testing purposes. During part of its run, each locomotive was required to draw a train of four small cars, which were loaded to a total weight of 30 tons. The locomotives rode admirably; there was practically no jar or vibration in the cab and very little lurching when traversing curves and passing over uneven track.

The engines were each shipped complete in one case. The stacks and a few small fittings were removed, but were boxed with the locomotive; so that very little erecting work was necessary on arrival at destination. Considering the unusual design and the rigid specifications, these locomotives were built in a remarkably short space of time. The order was received on February 1, 1915; 40 engines were shipped on March 31, and the last one left the works on April 24.

Germany's Strategic Railways.—Although a multitude of writers have enormously exaggerated the extent of the network of strategic railways in the German Empire, it is a fact that no other country has built anything like such a large railway mileage mainly or entirely with a view to its utilization for offensive purposes. If any country is in the future allowed to build such railways unchecked, it will represent a constant menace to the peace of the world. It is true that Germany's defeat will mean that a large proportion of these strategic railways will pass into other hands, the unification of Poland and the restoration of Alsace-Lorraine to France, meaning, incidentally, the loss to the German Empire of strategic railways. But these territorial changes will not in themselves prevent Germany from laying down a network of strategic railways to convenient points on the new frontiers. If the allies are determined to smash Prussian militarism, they will have to take account of this matter, as well as of armaments and the like. Alone among the great powers, Germany has for years past built railways with the definite and deliberate purpose of aggression. It should be the task of the allies to see to it that the terms of peace contain provisos that will at least check this kind of preparation for war in the near future.—*Railway Gazette.*

MISSOURI, KANSAS & TEXAS

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Can you tell me, who, or what, is to blame for the low price of M. K. & T. stock? I am the owner of some of it, and that is why I inquire. Considering all things, of course, it should be low priced now, in common with all other railroad shares, but it does seem to me this stock is unreasonably and unrighteously low, under even present conditions. This company in the ten months of this fiscal year ending April 30, 1915, earned more in gross than in any other like ten months in its history, and nearly a million more than same period last year. It earned the largest net in its history in April, 1915, and the largest net in ten months in its history. Also it earned in that period the largest surplus in its history and the dividend on its preferred stock more than three times over. It has paid its dividend on preferred stock for more than ten successive years, except last year, and has earned an average, at least, of 1½ per cent on its common stock for more than ten successive years, but has paid its common stockholders nothing. It will, at the end of fiscal year ending June 30, 1915, at present operations, have earned more gross and more surplus than any like period of its history. The territory served by the road has grown more rapidly in wealth and population in the past three years than any territory of like extent in this country and every factor that makes for growth, development and wealth is at the present time wonderfully promising. Have gross, net and surplus earnings, and rapid development, nothing to do with values? Compare this road with others of like, or even greater mileage, and M. K. & T. loses nothing by the comparison. If all the above do not create "a marketable and mortgageable equity," what does constitute such things? With all these rugged facts will the "Board" dare to pass the dividend on the preferred stock this year?—C. C. B.

Answer.—This year the earnings of the M. K. & T. have nothing to do with the market price of its shares. M. K. & T. stocks have been low, because of the road's financial position. On May 1, $19,000,000 5 per cent notes fell due, and as no satisfactory arrangements could be made with bankers as to paying them off, holders were asked to consent to an extension of the notes for a year. Interest rate on the notes was increased to 6 per cent. Approximately 95 per cent of the note holders agreed to the extension, leaving about $1,000,000 of the notes still undeposited. Last week, a holder of $10,000 of the notes secured an attachment in the New York Supreme Court against the road for the amount of his holdings. In the meantime, a special committee of directors is working on a financial readjustment plan, which has for its primary object the paying off of the notes, or their permanent funding. This plan has been somewhat delayed by the international situation, but the management hopes to have it completed, and underwritten in the not distant future. Naturally, if such a plan can be underwritten, the company's serious difficulties are at an end, for with the notes paid off or otherwise taken care of, the question of pressing financial obligations would be disposed of satisfactorily. The above situation as outlined explains the weakness of the stock.

To date there has been no acute danger that a reorganization of the road would be sought through the courts. For the fiscal year ending June 30, M. K. & T.'s surplus after charges will be $1,500,000, but there is no question of paying any dividend on the preferred stock. All surplus will be put back into property improvements, or used to clear from the books some of the temporary loans. It is understood that the road has short time bank loans of about $2,000,000. The company officials regard the present traffic outlook as very satisfactory.

Water in Coal Mines.—For every ton of coal raised from one of the anthracite mines, the operators of that field are obliged to pump to the surface about 11 tons of water. It is estimated that in the anthracite mines there are 900 pumps in use at the present time. The capacity of these pumps is approximately 1,000,000 gal. a minute.—*American Machinist.*

The Ticket Offices of Large Passenger Terminals

Factors of Design and Operation Influencing the Efficiency of the Ticket Offices in Such Stations

The ticket office is usually the first place where the passenger comes in contact with the railway, through its representative, the ticket clerk. A passenger's opinion of the line on which he travels is formed very largely by his treatment by the railroad employees. Since first impressions count most it is easy to see wherein lies the real work of the ticket office. It must sell tickets, but it must also do its part to encourage good will towards the railroads. To be efficient the ticket office must be such that its clerks can work in pleasant surroundings under pleasant conditions, for these are conducive to courtesy and careful performance of duty.

The function of selling tickets is so important that the location, layout and organization of the ticket office should receive most careful attention. The existence of so many stations, some of them new ones, in which the ticket offices have been entirely subordinated to architectural exigencies shows that this problem has not always received deserved attention. Every effort should be made, therefore, to ascertain what has already proved best. Presumably those best informed are the ticket agent and his assistants. They know how the traffic runs, they know its peculiarities and they alone know how well or ill their office does its work. The agent usually has some practical ideas of improvement, and whenever he proposes or disapproves his argument should be given weight accordingly. It is often worth while to call on other agents at stations in the same city. Every city has its peculiar idiosyncrasies and other offices may have some good ways of meeting them. Designers often seem reticent to call on the experience of other cities; the idea deserves greater consideration. It is not advisable to introduce new departures in design without careful study. One of the greatest faults in modern passenger terminal design is this striving for the original or the spectacular. The most successful features of proper ticket office or terminal design are the well established ones.

LOCATION

The ticket office should be so placed relatively to the station's other facilities that a person entering the station may buy his ticket, check his baggage and proceed to his train without retracing steps. The office should, if possible, be in plain view. Usually, if it is well placed no signs are necessary to indicate where it is. If it is not so placed there should be signs to make up for the delinquency. Whether the ticket office be in the waiting room, on the concourse or in a special so-called ticket lobby depends entirely on the station. Preferably there should be a ticket lobby through which passengers who have to buy tickets may proceed without molesting persons in the waiting room. If the waiting room is that part of the station around which all the other facilities center, the ticket office, being the most important, should be among them. At stations where there is a large proportion of suburban traffic it is not advisable to make the waiting room a general entrance or passageway. The commuters should preferably enter the concourse directly from the street, and the ticket office and the other station facilities should face or lead from the concourse. This makes the concourse the passageway it is intended to be and leaves the waiting room a place to wait and rest. The tendency of passengers after buying their tickets is to move towards the platform gates. To avoid congestion about the ticket windows, the office should be across the waiting room or concourse from the train shed.

A SINGLE TICKET OFFICE PREFERABLE

It is usually inadvisable to have more than one set of ticket windows. There are some stations used by two or three roads in which each line prefers to have its own ticket office, but unless each office does sufficient business to make it an economic unit, it is usually better to confine the work to one office. The organization is more flexible, and since there is no duplication the work can usually be done by fewer clerks. Patrons find two or more offices an inconvenience, because they are continually going to the wrong window. There is also better opportunity for supervision if the work is confined to one office. In many stations, however, there are special physical conditions which make necessary a division of ticket office facilities, as for example at the Grand Central or the Pennsylvania terminals in New York, where there are two separate levels.

It is impossible to define any rules relative to the size of a ticket office. A passenger station usually lasts at least 20 years. The ticket agent's domain should be designed with that in view, or so laid out that it can be enlarged without unnecessary rearrangement of other facilities or reconstruction of the station. There is absolutely no justification for cramped quarters for the ticket selling force in any new large passenger terminal.

LET THERE BE LIGHT

It is to some extent unfortunate that ticket office designers do not more often consider how easy it is to secure outside light. The problem in many cases is not so much to place the office where it can get natural light but to see that outside light is not shut off. If the office is in a large light waiting room, for example, the proper thing is to get all the light possible from the big area. Instead of placing a solid roof over the office and shutting off the light from the top it would be better to use a grating or a glass roof which can be opened if necessary for ventilation. In the same way, care should be taken to have windows or skylights wherever possible, and, if there are such already, not to block them. The natural light is free; it is far better for the eyes and if there is plenty of it the open and bright effect will have a most salutary effect on the clerks and their relations towards the public. Precisely the same considerations apply to ventilation. A poorly ventilated ticket office is as stuffy as a prison cell and not the least conducive to courtesy and accurate work. Care must be taken, on the other hand, not to have a draughty office; illness will not promote courtesy.

COUNTER ARRANGEMENT

The height of the counter is quite important, especially in a busy office, because if the counter is a few inches too high it hinders rapid work, and if too low the clerk may acquire a stoop. Careful tests have shown that about 3 ft. 8 in. is the best height.

The size of the counter deserves considerable attention. Its width should be sufficient on the inside so that the clerk can easily place the ticket and money on the counter, but not so wide that he has to reach unnecessarily to push them out to the purchaser. It is usually not best to use the inside counter as a desk for writing coupon tickets; it is better to use a special desk set to one side of the window or a few feet in the rear of it for this purpose. This desk is usually like a short bookkeeper's desk. It is the right height for writing; and the clerk while fixing a long coupon ticket can have all the room he wants without being bothered by well intended, but unnecessary remarks about the weather and business.

The tendency is to make the counter too wide on the outside of the grill. The shelf should be wide enough so that the passenger can easily open his pocketbook on it. It should not be so wide that he must lean over it to make himself heard, or to tempt him to put his baggage on it.

The front of the office, outside, is not complete without a baggage shelf about knee high below the counters. Passengers find it a great convenience to rest their bags on this shelf and since the bags are nearer than if they were on the floor feel

more at ease. The shelf should be about 8 or 10 in. wide. It is usually made of some material, such for example as ornamental brass pipe, which harmonizes with the surroundings.

Ticket counters in modern ticket offices are not often of wood. Much better results are obtained by using glass, marble or a similar material. Wood is not fireproof and it has a tendency to absorb moisture on damp days whereupon the difficulty of sliding tickets over it is liable to wear on the seller's nerves. But the worst thing about a wooden counter is that it is so nearly the same color as the money passed over it, that the passengers are much more likely to leave change on it than on glass or marble. The counter should be of a material which does not reflect too much light. Marble is very satisfactory, bright brass or similar material impossible. Thick plate glass firmly imbedded and painted black on the under side or placed on a dark green mat is also satisfactory. The counter should not be so thick that passengers can not take their change without fear of dropping some of it.

If the ideal ticket office were in an ideal community its windows would have no grills. The average ticket buyer goes to a ticket office so seldom that he is easily inconvenienced by having to talk through a grill. Nevertheless it is necessary to protect the tickets and money. Without it the latter would have to be moved so far back from the counter as to interfere with rapid selling. The grill used in railway ticket offices is preferable to the glass front of the average theater ticket office. It should be of simple design and constructed of vertical rods with a dull finish. A grill of complicated design collects dust, is hard to clean and almost serves as a barrier between clerk and patron. One of bright finish reflects too much light.

It has been stated above that the properly located ticket office needs no signs to indicate its position. It is always necessary, however, to have a sign over the office to indicate that it is the ticket office and usually a sign is needed over each window to indicate the kind of tickets sold at that window. The system used at the Grand Central Terminal deserves mention. Over each window is a lighting fixture with a triangular globe on which is painted the word Through, Local or Pullman. There is a light in the globe only when the window is open, and the passenger can see at a glance to what window he must go to get his ticket.

OFFICE EQUIPMENT

Ticket office equipment has become so well standardized that but little need be said concerning it. Although some recent installations of wooden equipment have been made, present tendencies are towards the use of steel cases almost exclusively. Steel is slightly more expensive than wood, but it has advantages that make it peculiarly adapted for ticket offices. It is fireproof, and there are few places where that quality is more valuable than in a ticket office. Tickets are more than "scraps of paper," and if a station's stock of them is destroyed it is a tremendous task, as well as a costly one, to replace them with sufficient quickness to prevent delay to business. Steel cases are more compact and a clerk working at a steel local ticket case has more of his tickets within arm's reach whereby he is saved many extra movements and can work at greater speed. There is also considerable saving in the stock room where the available space is almost always limited. It is well known that steel cases are cleaner than wooden cases and that vermin and rodents, even if they succeed in securing access to them, do not breed in them. The steel cases are less susceptible to weather variations, a considerable convenience in damp climates.

The ticket stock cases in many offices are adjacent to the selling cases. In some offices, however, the reserve stock is so great as to require a separate stock room. Usually the stock for a particular window, or, to be more exact, any particular stock, is kept compactly in a particular section of the storage cases. If a window is assigned and one clerk alone handles the tickets for it the clerk is given responsibility for the section of the cases containing his stock. He has a private key and only he and the ticket agent can have access to the tickets. It is even more essential that the ticket storage cases be fireproof than that the cases in the ticket office proper be so, and for that reason the use of steel cases is most advisable. The stock room should be in close proximity to the ticket office. In some stations the stock cases are on a mezzanine floor in the ticket office. The idea is good from some points of view, but the office is often given a crowded effect and the outside light is sometimes cut off considerably.

The desks for the cashier and the accountants are usually in or near the stock room, for therein is usually the most available space. The idea is good provided the room is light and well ventilated, because it helps to keep the various departments of the office compact. The ticket agent's desk is usually in a convenient nook in the ticket office proper, although in some stations the agent is considered important enough to have an office of his own. In the latter case the agent and his assistants will be saved many steps if this office is adjacent to the ticket office, the stock room and the accounting desks. If these facilities are separated private telephone connection between the various departments is necessary.

Every ticket office should be supplied with lockers in which the clerks may keep their wearing apparel. Steel lockers are to be preferred because they are fireproof. It is also advisable for the office to have its own toilets, as the latter will save many steps and considerable time.

SELLING TICKETS

Hardly two ticket offices have the same method of selling tickets. The chief difference is that in some stations a ticket for any destination may be obtained at any window, whereas in others there is a sharp distinction between local and interline business. Each system has its advantages and its advocates, but the determination of the method to be used at any particular station seems to rest entirely on the character of the traffic. For some reasons it would always be preferable to sell both local and interline tickets from any window. Passengers always have a tendency to go to the first open window they see and resent being sent from one window to another. Many of them either do not see the signs indicating whether the clerk has local or through tickets, or do not understand what the words mean if they do read them.

At many stations, however, it is impossible to sell both local and through tickets at the same window. Reference to conditions at the South station in Boston or the New York Central ticket office in the Grand Central Terminal in New York will explain. At either of these offices, and particularly at the former, a very large proportion of the tickets sold are card locals, while at the same time there is also a large percentage of interline tickets which must be handled in an entirely different way. The card local tickets are almost always purchased in haste; for the clerk to sell one requires but few seconds. The number of interline forms is so great, on the other hand, that the tickets cannot be within arm's reach; to obtain a through ticket, to write up a complicated one, in particular, and to sell it is frequently a matter of two or three minutes. It would check rapid work and try the patience of purchasers of local tickets if the locals were not sold at one window and the interline tickets at another. Except in cases like these, where there are peculiar conditions, it would seem advisable to sell both local and through tickets from one window.

It is next in order to treat of the methods of operation inside the office. As far as the traveler is concerned it would be preferable to have a separate stock of both local and interline tickets for each window. It has been seen that there are some cases where a separation of suburban business must be made. There are other offices where it is manifestly impossible, because of the great number of forms, to have the desired separate stocks of interline tickets. In the New Haven ticket office at the Grand Central Terminal, where there are 10 windows on the upper level selling both local and interline tickets, a through or suburban ticket may be obtained at any window. The interline tickets are, on the whole, comparatively simple and the

number of forms is not large. This is the best system provided conditions permit of its use, because a patron can get his ticket at any window, and because every ticket that may be called for is almost within arm's reach.

The Pennsylvania Railroad follows the same method at its New York terminal. The interline tickets sold at the latter are somewhat more complicated and the number of forms is greater, but the number of local tickets is not as large, since most of the suburban business is handled at the Long Island ticket office on the lower level. The ticket office of the Boston & Albany at Worcester, Mass., sells local and through tickets over three roads. There are five ticket windows and the number of interline ticket forms is so great that the interline ticket case extends the full length of the office. There is a separate stock of local tickets for each window. For each window also there is a supply of the most lively interline tickets, but there is only one stock of the other interline tickets for the entire office. This seems to be the best possible scheme for use at offices where there is a fair local business and where provision must be made for a large supply of interline forms.

At the South station in Boston, there is an absolute division of through and local business. Each local window has a separate stock of local tickets and a supply of some of the more important interline tickets. There is but one stock of the ordinary interline forms for the several windows selling through tickets, but at each through window there is also a supply of some of the livelier long-distance local forms.

It is usual in ticket offices having a sufficient number of windows for the purpose to assign each window to a particular clerk and to permit him and the ticket agent only to have access to his cases. The clerk is thereby given an undivided responsibility for the appearance of his ticket cases and for his tickets, as well as for his cash. The window can only be used when he is on duty and his account for both tickets and cash is entirely distinct from that of any other clerk. Of course if three or four clerks are selling from a single interline ticket case the idea must be modified to suit; in principle, however, it remains the same. In this scheme no tour system is necessary. The clerk going off duty simply closes his window and can check cash and tickets without unnecessary haste and without interference by the clerk who, with a tour system, would follow him at the same window. The clerk coming on duty finds things just as he left them the night before and knows exactly where he stands without having to see that the clerk on duty before him has left matters just as they should be. It is another advantage that if one clerk is to relieve another there is absolutely no delay. It is a disadvantage that there must be a separate stock of tickets for each window, but in most offices a separate stock of local tickets must be supplied for each window anyway. In a busy office, in addition, it should be no hindrance, for the turnover of tickets will be sufficiently rapid for them to be sold before they have become too old. It would seem as though the advantages of assigning windows in a station busy enough to warrant that procedure outweighed to some extent the disadvantages.

Windows cannot be assigned according to the above method unless there is a sufficient number of them or unless a few cages that can be moved on rollers are used. The latter are so bulky and require so much extra room when they are not in use that they do not often meet with favor.

PULLMAN TICKETS

If, in the city served, the railroad maintains a number of city ticket offices, it is a problem to take care of the Pullman reservations. It is usual either for each office to be assigned a certain portion of the chairs and berths, or for one of the offices to be given entire charge, reservations at the other offices being made only on its authority as given by telephone conversation. For obvious reasons the office handling the reservations must be connected with all the rest by private wires. In many cases it has been found best for the one of the city offices to handle reservations. The entire list is kept at that office, entries being made to suit the reservations, until about one-half hour before train time, when the diagrams are sent to the ticket office at the terminal, sales being made there until a few minutes before the train leaves, when the statement is sent out to the train. In some cases the reservations are telephoned to the station office and there are a few instances in which they are telegraphed.

One solution of the problem that deserves more than passing mention is that worked out at one of the terminals in New York City. The ticket office is a large one. There are often four clerks selling Pullman tickets, and in addition it handles reservations for all the city offices. Behind the clerks at the windows is a large rack, holding all the cards for several days ahead. The rack is so arranged that cards may be taken from either side of it. On the opposite side is a table at which sit the clerks who handle the reservations asked for by telephone, the rack being so devised that the clerks on one side of it can obtain the diagrams without interfering in any way with those on the other side.

It is impossible here to treat of the methods of accounting which form an important part of the work of the ticket office.

"COURTESY ALWAYS"

It has been stated that each clerk should be provided with a locker. He should also be assigned a private drawer or compartment for his money in the office safe. Each of these compartments should have an individual lock, a combination perhaps being preferable, and the clerk, himself, and possibly the ticket agent in charge of the office should be the only ones to have access to the contents.

If ever the safety-first movement is succeeded or supplemented by a campaign of "Courtesy—Always," as is beginning to seem possible, ticket agents in charge of terminal ticket offices will have first claim to appointments as "Courtesy-Always" agents. The ticket agent has peculiar qualifications for the job. He knows how to pick men, how to train them in ways of courtesy towards the public, how to supervise them in the results of their training, and presumably he has been through the mill himself. It is possibly somewhat strange to speak almost as though courtesy were the first requirement for proper ticket selling. Courtesy is not the first requirement; it is subordinate to honesty and perhaps to accuracy, but it is the thing that needs most emphasis.

The ticket agent at the large station is usually given entire responsibility for the proper conduct of the work of his office, subject to the approval of the station master or some similar officer. He is, therefore, allowed to choose his own men. Each agent has his own ideas as to the best methods of picking assistants. Some find it best to take men from smaller stations on the line, and others to take them from other service in the terminal, as for example, from the information bureau. In almost every case an effort is made to secure men who have had service with the company. Such men already have a fair knowledge of the road's passenger service and are usually well versed concerning fares and connections. They only need to learn how to sell tickets under the arduous conditions of busy terminal ticket office service. It is now considered bad practice to take men from ticket offices of other roads, for it is the general opinion that positions in the ticket office should be looked upon as rewards for good work in other departments of the service.

The difficult task for the ticket agent is not to find men who are accurate and honest, but to find men who are sufficiently courteous. Courtesy, if it is not born in a man, can be acquired only by long training. It is hard to learn, because it is intangible and because it often seems as if to be courteous to some people were but a step to being servile; and to be servile hurts. The results of courtesy, so far as the ticket clerk is concerned are the impressions made on the minds of the purchaser. The ticket seller, therefore, must be something of a student of human nature. If he is fitted for his work, he should acquire a faculty of telling a person's character and frame of mind almost by his appearance, his actions and the sound of his voice. There are some people, however, who are tough nuts to crack.

The ticket clerk is paid to serve such people right. He will derive the most satisfaction from his work if he can take pride in solving the idiosyncrasies of people. He should feel that he has accomplished something when he has pleased a grouch, when he has convinced a crank that there is something intelligible about the timetables and tickets after all, or when he has conveyed a complicated bit of information to a foreigner who speaks almost no English. It has been suggested that he should put himself in the place of the person outside the window. The idea is a good one. Every person who asks a question usually has good reasons for the query, and if the clerk will think a moment he can usually frame an intelligent answer no matter how foolish the question. There are few snobs in this world, but there are enough and they are the hardest kind of people with whom the ticket clerk has to deal. He should, nevertheless, try to follow his rule of putting himself in their places. When they have gone he can find solace for any ill-treatment in thanking Heaven that the state is figurative, not normal.

It is usual in most large offices for the junior clerk to be put on local tickets first and then for him to work up gradually to one of the windows selling complicated interline forms. In one large office each clerk is strongly encouraged to understudy the next higher man. Each clerk is thus always improving himself for his next higher position, and if the older clerk is out his place is easily filled. Schedules and rates are changed so often that even an experienced clerk must learn new things about his work continually. The ticket agent can never be too careful that the orders and instructions are properly understood and remembered. At the office mentioned above the agent has a check on this in the form of periodical written tests. It is something of a job to compile the various questions, and even more difficult to correct the papers, but the office always knows where it stands. The agent is sure that orders are being understood and he has a check on every man. The same agent also holds monthly or bi-monthly staff meetings. Here he has a chance to emphasize the need of courtesy and every man has an opportunity to offer and discuss all kinds of suggestions for the good of the office. It is a waste of words to say that the staff of this office and its management are unexcelled.

TRAIN ACCIDENTS IN MAY[1]

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of May, 1915:

Collisions

Date.	Road.	Place.	Kind of Accident.	Kind of train.	Kil'd.	Inj'd.
5.	St. Louis, I. M. & S.	Grassy Lake.	bc	P. & F.	1	29
15.	N. Y. Central	Scarborough.	rc	F. & P.	0	6

Derailments

Date.	Road.	Place.	Cause of Derailm't.	Kind of train.	Kil'd.	Inj'd.
3.	Norfolk & W.	Boyce.	unx	F.	1	3
3.	Southern	Marion.	d. track	P.	0	3
14.	Balt. & Ohio	Belmont.	d. drawbar	F.	8	0
15.	Chicago, M. & St. P.	Yankton.	b. flange	P.	0	20
15.	Southern	Toccoa.	unx	F.	0	0
*17.	Missouri Pac.	Nebraska City.	b. wheel	F.	5	0
22.	Northern Pac.	Honeyford.	unx	P.	0	20

The trains in collision near Grassy Lake, Ark., on the night of the fifth were eastbound passenger No. 20 and an engine without train, westbound. Twenty-eight passengers and five employees were slightly injured and a trespasser was killed. The light engine, in charge of a conductor, an engineman and a fireman, had encroached on the road right of the passenger train.

The trains in collision at Scarborough, N. Y., on the 15th were a northbound local passenger train and an electric locomotive without train, the locomotive running into the rear of the passenger train and damaging itself and the rear passenger car. Four passengers and two employees were injured. The electric engine had run past a distant and a home signal set against it.

The train derailed near Boyce, Va., on the third was a northbound freight and 21 cars left the rails. One trespasser was killed and 3 were injured. The cause of the derailment was not determined.

The train derailed near Marion, N. C., on the third was westbound passenger No. 1. One sleeping car was ditched and three passengers were injured. The derailment was due to distortion of the rails by excessive heat, at a place where new ties were being put in.

The train derailed at Belmont, Ohio, on the 14th was a westbound freight, and 14 steel cars were wrecked. Riding on the cars were a number of trespassers, of whom eight are said to have been killed. The derailment was due to the failure of a drawbar which was pulled out and fell to the roadbed.

The train derailed near Yankton, S. D., on the 15th was an eastbound passenger and the three rear cars were overturned. Eighteen passengers and two trainmen were injured, none seriously. The cause of the derailment was the breaking of the flange of a wheel of a freight car.

On the Southern Railway near Toccoa, Ga., on the 15th there was a derailment in which several freight cars were wrecked which ordinarily would not appear in this list, but which became prominent by reason of the fact that the next morning, while the wrecking crew were picking up the last car, six men, including the supervisor, the section foreman, and four laborers, were killed, and nine other employees were injured, by the fall of a car which was being lifted by derricks. A chain slipped and the car dropped suddenly on the men, who were beneath it.

The train derailed near Nebraska City, Neb., on the 17th was a westbound freight, and seventeen cars were wrecked. Oil or gasolene in one of ten tank cars took fire and the wreck was burnt up, including two carloads of silver bullion, the metal in which was melted. Five trespassers riding on the train were burned to death. The cause of the derailment was a broken wheel.

The train derailed near Honeyford, N. D., on the 22nd was southbound passenger No. 14. The train was running about 25 miles an hour. Eighteen passengers and two trainmen were slightly injured. The cause of the derailment was not determined.

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

RULES FOR TRACK WALKING.—The first and most important rule is akin to an Irish bull: Don't walk on the track if you can possibly find any other road, path or field to walk on. But if you must walk on the track, then be sure to look behind you frequently, especially if the wind is blowing in the opposite direction as you are walking. On the approach of a train look around and let the engineer know that you see him. Don't wait until he is almost upon you, don't leave him in doubt. Don't compel him to whistle for you. Your danger grates on his nerves and the unnecessary whistling grates still more on the nerves of the peaceful dwellers along the tracks. If on a double track railroad, walk on the track on which trains come towards you, but don't neglect to look behind you often, for trains sometimes run on one track in both directions. . . . Never "hop" a moving car or engine; it is always dangerous; always gets your hands (and often your clothes) dirty, and very rarely brings a reward. Finally, the famous advice of Punch, about telling jokes applies with sledge hammer force to walking on tracks: DON'T.—*Alton (Ill.) Evening Telegraph.*

Necessity for Additional Revenues on Western Railways

Brief Submitted by C. C. Wright in Western Rate Advance Case Discusses Condition of Carriers Since 1901

The attorneys representing the western railways have filed their briefs with the Interstate Commerce Commission in the western freight rate advance case, and oral arguments are to be heard before the commission at Washington beginning on June 22. Separate briefs were filed by the committee of six attorneys representing all of the lines for the different commodities involved in the case. The brief on the necessity for additional freight revenues was prepared by C. C. Wright, general solicitor of the Chicago & North Western and chairman of the attorneys' committee. Some extracts from this brief are as follows:

The question naturally divides itself into three interrogatories, viz.:

(1) What is the revenue of the carriers and what return are they receiving upon their property?

(2) What is the cause of the low returns?

(3) What ought the carriers to earn?

REVENUES

We submit that the showing as to the 41 roads, which has been presented by the carriers, is the fairest way possible in which to determine the actual revenues of the roads in the territory, throughout which the advance in rates is proposed. It is true that there are some small lines which are omitted and that there has not been included in this group some which are known as transcontinental lines, and which will receive an incidental, small advantage by the advance. It is true, some of the lines extend into territory outside of that involved, but sub-groupings make it plain that the 41 roads reflect the condition in the territory.

Attention is particularly directed to the exhibit in relation to the net operating income of the various years. It is shown that the operating revenues for the period 1908-1914 increased $1,348.42 per mile of road, as compared with 1901-1907, but at the same time, the operating expenses, hire of equipment and joint facilities increased $1,407.34 per mile of operated road. The taxes in the second period, over those in the first, increased $115.17 a mile, while the rental and net lease of road decreased $20.95. As a result, the net operating income of these roads, on an average for the last seven years, has been $153.14 less than the average of the seven years immediately preceding. If the last six years are taken, as against the six years prior to that period, the results will not be materially different.

It will be noted that in only four of the years in the last seven, has the net operating income per mile operated, equaled the lowest net operating income during the prior period of seven years. In no year in the last seven has it equaled the highest yield in the prior seven years. The average for the second period was $2,045.34, as against $2,198.48 for the first.

It will be noted also that in 1909 and 1910 the return was much greater than in 1914. In three of the last seven years, the net operating income per mile has been less than $2,000, while it was less than $2,000 in only one year in the first period, which was the year 1904, when all business was paralyzed. If one compares the year 1913, one of large volume of business, with the year 1907, it is readily seen that the operating income per mile for 1907 was $260 in excess of that most prosperous year in the latter period.

If a comparison is made of the last five years, that is, 1910 to 1914, inclusive, with the five years immediately preceding, it will be seen the decrease is even greater than in the preceding seven-year period, so that any grouping of the years which may be selected indicates a declining net operating income per mile of road. Comparing the lowest year in the latter period with the lowest year in the first, shows a decline of $159.93. Comparing the highest year in the second period with the highest year in the first period, shows a decline of $285.63. A like comparison might be made by taking the two and three lowest in each period, or the two and three highest in each period.

The same story is told by Exhibit 10, in a comparison of ratios of operating expenses to revenue. In no year in the last period has the operating ratio been as low as in the former period.

The study of the variations of operating ratios, as made by the commission in connection with this case, is both interesting and illuminating. As stated in the resume presented by A. M. Bean, one of the examiners of the commission, it discloses that while exceptional conditions on individual roads may in part account for unusual variations in the operating ratio, there are certain general conditions which operate alike upon the different roads, which would have the tendency to increase the operating ratio. Among those are included the increase in wages; increase in price of fuel; increase in cost of ties; larger expenditures required to properly maintain road and equipment; increase in taxes; more numerous requirements by state and interstate commissions; decreasing revenue due to reductions in rates, and to the introduction of depreciation charges. These are all general in their character, and there is nothing in the record to indicate that there will be any change which would counteract such increased expenses. The only one of the general reasons why the operating ratio has increased which may be reasonably expected to be remedied is the one mentioned as the decreased revenue due to reduction in rates. That seems to be the only one in which this almost steady increase in operating ratio may be checked without serious detriment to the public service.

It would seem that these exhibits lead irresistibly to the conclusion that the net operating income per mile of road of the carriers is declining. It is shown that in 1914 it was only $1,963.36 per mile of road and that for the average of the last seven years it was only $2,045.34.

If the road and equipment cost, as shown in the exhibits and from the books of the carriers, represents the value of the property, it will be seen that the earnings for the last seven years yielded a net return of 4.19 per cent. In the year 1914, the earnings returned only 3.81 per cent. A comparison of different years in the same period demonstrates the decreasing rate of return, as well as the insufficiency of the revenues. The highest year in the first period was 1907, when it was 5.64 per cent, and the highest year in the second period was 1909, when the return was 4.61 per cent. During the first period, in no year did the return fall below 4.55 per cent. In only one year in the last period did it reach that figure; that is, there is only one year in the last period when the rate of return was as high as the lowest year in the first period. If comparison is made with the earnings in 1914 and the year immediately preceding, it will be seen that the returns had fallen from 4.44 to 3.81. The reports of the fiscal year 1915, so far as yet received, would indicate that 1915 was no better than 1914. The last five years of this period may be compared with any other five years that may be selected, but still the rate of return is less in the last five years. Even the panic year of 1904 was better than any year since 1909.

This showing of the carriers is not met by any counter evidence, because it cannot be. By grouping of strong roads protestants were able to show an earning above 6 per cent on the group selected, but they were not able to show a return of 7 per cent, even after making deductions from road and equipment of amounts which they had pointed out as, in their opinion improperly included, and without adding anything for working cap-

ital, during any of the periods. Even under the showing of selected groups by the protestants, the same downward trend was apparent.

THE CAUSES OF DECLINE

It is proper to discuss the causes of this declining net operating income from rail activities, and determine whether it is due to the fault of the carriers, or to causes beyond their control.

Attention is here directed to the fact that the carriers have been steadily investing more money in the property, amounting in the last seven years to more than a hundred million dollars a year for additions and betterments to the existing roads. They have been steadily improving the character of their railroads and equipment out of the money so expended. The evidence, we believe, fairly demonstrates that the roads in question in this case have been meeting the public demand and improving their service from year to year; they have increased their efficiency by all known means within their power. The density of traffic per mile has increased, and yet, notwithstanding all of these things, which make for efficiency and lower costs, the cost per unit of service has increased.

It is true that the operating revenues of the lines in question have increased, but it is also true that the operating expenses and the taxes have increased at a faster ratio. The revenues per mile of road increased in the last period over the first, on a yearly average of $1,348.42, but the operating expenses, exclusive of taxes, rental, etc., increased $1,407.34; the increase in taxes was $115.17 per mile and the decrease in rentals $20.95 per mile, which results in a net decrease on the average for the last seven years, as compared to the seven years prior thereto, of $153.14 per mile. It thus is apparent that the carriers have not been able by the means employed to meet the increasing costs out of increasing revenues.

It is difficult to determine accurately the extent to which each of the different causes has contributed to this result, but there are some things that can be pointed to as potent factors.

By exhibit 12 it will be seen that the ton-miles per mile of road had increased from an average of 613,059 tons in the first period, to 709,889 tons in the second period. It appears, however, that the increase in the first period was much more rapid than in the second. The average of the second period over the first was approximately 13.5 per cent. The average of the tons per train mile in the first period was 266.78, and in the second, 316.54, which was approximately 18.5 per cent. It will be noted, however, that the greatest increase was in the last period.

Notwithstanding the increased capacity and weight of the freight cars, it will be seen that the increase in the tons per mile, has been less than 10 per cent; and exhibit 14 shows that there has been very little increase in the revenue tons per car mile since 1907. This is partly accounted for by the fact of the low minimums which are enforced by various state commissions, and partly by the fact that with the diversified character of traffic and the necessity of special equipment, the empty car mileage has increased.

That the labor costs have been a material element in the increased expenses of the carriers is not only apparent from the special study of operating ratios, which was made by the commission, but appears conclusively from exhibit 15. This exhibit shows the increase in wages paid, year by year, on account of the increase in rate of pay. The exhibit was prepared to include general officers and also excluding general officers. It will be noted that the increase has been greater when the general officers are excluded than when they have been included. That is particularly noticeable in the last seven years. The increase in labor costs has not been uniform. From 1902 to 1903 there was a very large increase, being a little over six and one-half million. The increase for 1903 to 1904 was over four and one-half million. There was a material increase from 1907 to 1908, being nearly six million, but in 1909 there was a decrease of nearly two and one-half million over 1908. In 1910 the increase was over fourteen million, and in 1911 over twelve million. It will be noted that this increase came at about the time of the decision of the commission in 1910.

This exhibit shows that the increase in expenses, due to increase in the rate of pay for employees, was in the year 1914 over 1900, $85,167,085.95.

On exhibit 17 is shown the increase in taxes and the increase due to the advance in the rate of taxation. It shows that taxes in 1914 were $17,628,142.61 more than they would have been, if computed on the rate of taxation in 1901, or $179.06 per mile of road operated.

The increased labor costs, due to the increase in rate of pay, was $865.11 more per mile of road operated in 1914 than it would have been under the 1900 wage scale. This makes a total increased operating expense per mile of road operated, due to increases in the rate of pay for employees and the rate of taxation by states and municipalities of $1,044.17 per mile, which would be equivalent to a return of 2.02 per cent upon the cost of road and equipment. In other words, if the same wage scale and the same rate of taxation had been applied in 1914 as in 1900 and 1901, the carriers would have been able to have earned a return of 5.83 per cent upon the cost of road and equipment, instead of 3.81 per cent. This very definitely locates a large element of the increased cost.

Exhibit 18 shows in detail the increase in cost of material and other items. Attention is directed to the fact that since 1909 the cost per mile of road for material and other items has increased more than $400.

A study was made to determine as far as possible the relation of the maintenance costs. It was a recognized fact that maintenance costs, particularly of equipment, has increased in the last few years.

The ratio of maintenance of way and structures to the revenue has decreased in the last seven years over what it was in the preceding seven years and there is only a small increase in the ratio of maintenance of way and structures expenses to the cost of road and equipment. On the other hand, maintenance of equipment shows that it has increased faster than the revenue and faster than the cost of road and equipment. For the first period the total maintenance costs were 26.69 per cent of the revenue, and in the second period 29.24 per cent of the revenue. In the first period the maintenance expenses averaged 4½ per cent of the value of road and equipment, and in the second 5.29 per cent.

An examination of this exhibit, however, will disclose a rather uniform advance. It does not indicate an abrupt advance, due to change in accounting methods, in 1908. The increase, 1901 to 1907, in maintenance of equipment, amounted on these roads, to approximately $54,000,000. From 1908 to 1914 the increase was approximately $52,000,000. The gradual increase of this cost of maintenance of equipment would indicate that it was not due to the latter period to the depreciation account, but was the result of far-reaching causes.

Maintenance of equipment shows a much more radical increase. It will be observed, however, that maintenance of equipment per mile of road shows a steady advance. There was no sudden advance from 1907 to 1908. In 1906 maintenance of equipment per mile of all tracks operated was $809.22, in 1907 $894.01, in 1908 $849.08 and in 1909 $887.10.

NEEDS FOR THE FUTURE

In Wettling's Exhibit 29 the carriers assembled the amount of maturing obligations for the next seven years. This was for the purpose of indicating that the carriers involved in this case must renew a large amount of obligations or place new securities beyond the amount necessary for additions and betterments each year. It is true that the building of new roads in this territory has almost entirely ceased. It is not believed that the public is going to be satisfied unless additional lines are constructed. Every indication is that it will require as much for additions and betterments annually in the future as it has for the last seven years, therefore these various carriers must raise at least $100,000,000 a year from

some source, in addition to the amount necessary to refund or refinance their maturing obligations. For 1915 they would require over $155,000,000 for additions and betterments and to take care of maturing obligations.

A noticeable fact in this connection is that the increase in capital liability has been largely made by the increase of interest-bearing obligations, rather than by the increase of stock. Exhibit 28 shows that in 1910 the capital liabilities represented by stocks were 46.33 per cent, by bonds 53.77 per cent. In 1914 this had changed so that the ratio of stock to total capital liabilities was only 37.74 per cent and the ratio of bonds and funded debts had risen to 62.26 per cent.

The facts disclosed cannot help having an unfavorable effect on the borrowing ability of these carriers. We care not whether you call it credit, or not. They will not be able to borrow additional capital on as favorable terms as they would if their proportion of property represented by the bonds and outstanding interest-bearing securities was less. When we speak of the impaired credit of the railroads, we do not refer to the interest rate on underlying securities, which represent less than 50 per cent of the value of the property. What we mean, however, is that for new money and for money which is needed for additions and betterments and the development of the property, the carriers are not now able to borrow on as advantageous terms as formerly; that they have about reached the limit of their borrowing capacity on top of their present debt; and that they are not able to float their stocks, because of insufficient revenues to guarantee dividends commensurate with the risk.

Statisticians may make exhibits without end, but they can never overcome the fact that any company, be it a railroad, an industrial or a public utility company, can not have as good credit with a mortgage covering 65 per cent of the value of its property as it would have if its mortgage covered only 50 per cent of its property, and the increasing per cent of the interest-bearing debt must obviously affect its credit. This fact is aggravated by the large amount of short time obligations entering into the aggregate of its interest-bearing obligations.

While we have not laid any great stress in this case upon impaired credit, we do insist that the evidence shows that the ability of the carriers to borrow new or additional money and the ability of the carriers to raise money by the sale of stocks is greatly curtailed; that higher rates must be paid and that it is increasingly difficult to secure money from any of these sources. This, we believe, to be largely due to the fact of a declining net revenue.

TO WHAT RETURN ARE THE CARRIERS ENTITLED?

The only authoritative statement of the rate of return to which a carrier is entitled is found in the decisions of the courts in cases where the court has been asked to enjoin the enforcement of legislative acts or the orders of commissions, reducing rates or curtailing the revenues of the carrier. These cases must, of course, be based upon individual conditions, *i. e.*, the court can consider only the rate of return to be received by the particular line asking the injunction.

The question before the Commission, in considering an application of this kind, is, of course, much broader. This undoubtedly has been recognized by the commission, but we desire to suggest, in this connection, that when they are considering the reasonableness of rates, the rate of return upon a single line, or upon two or three lines, operating in a territory, can form no criterion as to whether or not the rates are reasonable. This is apparent from the fact that one line, under the same rates, may earn 8, 10 or 12 per cent. upon the value of its property, while another line may earn only 4 or 5 per cent upon the value of its property. It is in recognition of this fact that we have presented the matter as though all the lines in the territory were operated as one line. This must rest upon the assumption that the maintenance of these lines is all necessary and proper.

The carriers in this case have based their contention upon the right to earn at least 7 per cent upon the value of their property. In the Minnesota Rate Case, the circuit court held that the carriers in question in that case were entitled to earn at least 7 per cent upon the value of their property. While the case was reversed by the Supreme Court of the United States, the position of the circuit court as to the rate of return to which the companies were entitled was not reversed nor criticized. In a case, not yet reported, which has been decided, pending this present hearing, by the district court of Arkansas, it was held that the carriers in that section had the right to earn not less than 7½ per cent upon the value of their property. These and other cases indicate very clearly that the carriers in the territory in question, as a minimum, are entitled to 7 per cent upon the value of their property.

The advances in this case were expected to increase the revenues of the carriers by about $10,000,000 per year, as stated in the opening. The evidence and a more careful analysis of it discloses the fact that the estimate was too large. If the increase were $10,000,000 a year, it would make the full net operating income of these roads only $203,286,463.22, and would increase the rate of return by only a small fraction of one per cent. In round figures, the rate of return in 1914, if the proposed rates had been applied, would have been 4 per cent and such rate of return must be considered to be below anything that even the most radical could claim to be reasonable. It would not pay the interest on the bonds, assuming that 100 per cent value of the property could be bonded at the rate of interest accruing on the underlying mortgages.

In this connection, and to meet what appears to be the opinion of the Supreme Court in recent cases, the carriers have attempted to separate the costs of the freight and passenger business and ascertain the rate of return upon each class of business. There being no authoritative method for the separation of expenses the carriers used various methods and any or all of them are only approximate. We believe them to be such reasonable approximations that they may justly and rightly be used as the foundation for an opinion.

Under these bases, as shown by Exhibit 30, the ratio of expenses, including taxes, hire of equipment, etc., to revenue on the freight business, runs from 75.14 to 76.98, and the rate of return under these different bases, on the freight business, varies from 4.23 to 4.68 per cent, so that on any of the bases used there is such a margin of insufficiency of return as to render negligible any possible errors in the bases used.

HOW MAY THE REVENUES OF THE CARRIERS BE INCREASED

From this evidence, it seems that but one conclusion can be drawn, and that is, the increase in rates for the purpose of increase in revenues has been justified. If this conclusion is correct, it remains only to determine in what place and upon what commodities the advance shall be applied. It would be impracticable to make the advance of rates in either of the sections of the territory involved upon such commodities as grain, live stock and packinghouse products, without making a corresponding advance in the other portions of the territory

As to the selection of commodities, there will always be difference of opinion. The striking thing about this hearing has been that each protestant has been vigorous in asserting that the advance ought to be made on "the other fellow's commodity." The carriers in this case have exercised the best judgment they had, having in view the raising of additional revenue and the distribution of the additional charge to the public. The traffic managers familiar with their territory, know very well that there are certain commodities and classes of commodities that cannot stand an advance. If, therefore, there are certain rates which from competitive or commercial reasons, cannot be advanced so as to afford the same ratio of profit to the carriers as the other rates, it constitutes no reason for denying the advances on other commodities. Neither does this necessarily mean unjust discrimination.

The attempt in this case has been to select those commodities which will produce the needed revenue, with the least hardship, and to so distribute the advances that they may be borne by the

public generally, rather than by any separate class. It has not been thought practicable at the present time to advance the class rates in the western territory. They have been, many of them, fixed by orders of the commission, which would prevent an advance, and beyond that, the class rates in the western territory have not been so carefully and uniformly adjusted as in the east.

We beg leave to suggest that the act of Congress in relation to regulation of commerce fully contemplates that the carriers themselves shall retain the initiative in the matter of fixing rates, and the power of the commission is intended to be regulatory only, for the purposes of seeing that excessive or extortionate charges are not made by the carriers, and preventing undue or unjust discriminations. The law does not authorize the commission to fix rates. If, therefore, the initiative in fixing rates is to be left to the carriers, they must be allowed some discretion and must be expected to exercise that discretion within reasonable limits. It would seem that the duty of the commission in passing upon an application of this kind, somewhat general in its character, should be limited to the determination of whether the carriers have exercised a reasonable discretion.

A RECENT DEVELOPMENT IN RAILROAD FINANCE

By George A. Clark

The development of rail transportation in the United States can be conveniently studied from at least three points of view. There may be others, but certainly the problems of this industry fall into three natural groups; these are the physical and engineering problems arising from the construction and operation of the plant, the organization of the employees, and the development of the financial structure of the individual corporation. The latter is primarily of interest at this time because of the significance of a recent development to which as yet little attention has been given.

Capital has entered into the transportation industry in two forms, through the purchase of investors of either a share interest in the undertaking, having a more or less well-defined speculative value, or through the purchase of a fixed obligation (bonds), which generally has a rather well-defined investment value. It has not been feasible to develop a single important railroad system in the United States through the sale of capital stock alone. In every instance from one-third to two-thirds of the capital which has been required for the development of a given property, has been secured through the sale of bonds. Considering the needs of the industry and the resources of the country, it is a tribute to the financial genius of the early railroad promoters that such a large proportion of capital has entered the industry through sale of capital stock.

The sale of bonds for the purpose of inducing capital to enter the industry introduces a consideration of the various elements that have entered into this form of finance. During this period every conceivable modification and variety of obligation has been created to meet real or fancied needs. During the past three years, however, a definite form of obligation securing bond issues has been developed. An instrument has now been devised which meets the more exacting requirements of the state banking and insurance investment laws, and which appears to be adequate for the future needs of the industry. The "blanket mortgage" has at last reached a point where it appears reasonable to expect that there will be no further changes of consequence in the character of obligations of this kind.

Although the more recent "blanket mortgages" are in many ways an advance over the Great Northern first refunding mortgage securing the 4¼s of 1951, it can be said that the precedent in this line, as in many others, was established by James J. Hill when he asked his stockholders to authorize an issue of $600,000,000 bonds. Within the past year the Pennsylvania, the New York Central, the Chicago, Milwaukee & St. Paul, the Northern Pacific and the Erie have secured the approval of their stockholders, authorizing the creation of "blanket mortgages." The New Haven, the Baltimore & Ohio and the Southern legal and financial officers are now working on similar mortgages.

In a very significant sense, this new type of obligation appears to mark the end of the period of construction, consolidation and system building in the railroad development of the United States. A bond has been issued, secured by a mortgage, which appears to incorporate all of the essential features of the divisional, consolidated, refunding, convertible and debenture issued with few of the disadvantages inherent in all of them. In a very real sense of the character of the obligation created by the railroads during their development closely corresponds to the physical development of the business. Out of the great variety of obligations which have been created for the purpose of raising capital, the following may be considered as typical of the period and purpose served.

The first of these is the divisional mortgage of which there still remain a great number. As various pieces of track were projected, the most natural method of raising a part of the capital for the undertaking was to place a mortgage upon the specific piece of track under construction. As detached mileage was welded into through line, the equities in earnings and property values grew rapidly. Many obligations of this type are a favorite with the most conservative investment institutions. There are a few companies which still employ them, notably the Chicago & North Western, which within the past two years created two important mortgages of this kind, the Milwaukee, Sparta & North Western first 4s of 1947 and the St. Louis, Peoria & North Western first 5s of 1948. Both of these issues have since been assumed by the Chicago & North Western. As a type, however, with the refunding of the existing divisional mortgages they will disappear from railroad finance.

The welding of local operating units into through lines brought about the consolidated and unifying mortgage. This type of obligation allowed somewhat greater freedom in the development and expansion of the property than was possible with divisional mortgages. It could be used for refunding such issues, for construction or acquisition of new mileage, for the development of existing mileage and for the purpose of uniting independent properties into a single system. The Louisville & Nashville unified 4s of 1940 is an illustration of this type of bond issue. The consolidated mortgage afforded a method of bringing about one of the most important developments in the industry, namely, the consolidation of local units into through lines.

Closely parallel to the consolidated mortgage but following it as the demand for a more flexible financial instrument arose with the further development of the country, is the general refunding mortgage. This perhaps has been the most conspicuously successful of the various instruments employed to date. A number of well-known issues of this type have served the purpose for which they were created most admirably. Of these, some of the better known are the Chicago, Burlington & Quincy general 4s of 1958, the Chicago & North Western general 4s of 1987 and the Delaware & Hudson first and refunding 4s of 1943.

This type of issue has not been without certain marked disadvantages. The most noticeable of these has been the fixed interest rate common to most of them, the fixed authorized amount and burdensome restrictions as to issuance of bonds for other than refunding purposes. The fixed interest rate has frequently made it impossible for the company to sell bonds except at a prohibitive discount. The general lien 3s of 2047 of the Northern Pacific, and the Atlantic Coast Line unified 4s of 1959 are two instances in point. The general refunding mortgage bonds have been commonly limited as to the total authorized issue by some more or less arbitrarily fixed amount. In no important instance has the amount fixed been adequate.

The third occasion of difficulty in the use of these refunding issues has arisen from what have proven to be unnecessary and burdensome restrictions as to the issue of additional bonds and the absence of liberal provisions as to redemption, con-

vertibility, etc., all of which serve to adapt the issue to the period in which it must be sold. An instance illustrating the importance of this feature is found in the Chicago, Rock Island & Pacific first refunding 4s of 1934 where the amount issuable for additions and improvements to existing lines is limited to $2,500,000 per calendar year. This provision has had the effect of depriving the operating company of the Rock Island system of necessary capital for development of the plant. It has been an important but little recognized factor in bringing the system to the point where a drastic reorganization is necessary.

A number of additional types of obligations have been very extensively used, such as the debenture bond common to New England railroads, the convertible bond common to many of the stronger companies, the equipment trust note and the collateral trust bond.

The debenture has been used by a number of companies of good credit with conspicuous success. Notable among these, in addition to the New England roads, are the New York Central group, the Chicago, Milwaukee & St. Paul, and the Baltimore & Ohio.

The convertible bond has been an effective method of securing new capital without permanently increasing fixed charges. but with the coming of the "blanket mortgage" in the case of the railroads with the better credit at least, it seems probable that they will gradually fall into disuse.

The last step in this process is the "blanket mortgage" variously known as general and refunding, improvement and refunding, etc. The more important characteristics of this type of mortgage are as follows:

The limit to the authorized issue with the exception of the Pennsylvania and the Erie, has been placed at three times the outstanding capital stock. In the case of the Pennsylvania, it is fixed at an amount equal to the capital stock; in the case of the Erie, it has been limited to $600,000,000. The bonds issuable under the mortgage are secured by a direct lien, with minor exceptions, upon the entire property of the company now owned or hereafter acquired. Bonds may be issued in series, the interest rate in no case to exceed 5 or 6 per cent. After the refunding of all existing issues and the use of from $200,000,000 to $300,000,000 additional further bonds can only be issued to pay for new work at from 75 to 80 per cent of its cost, and upon approval of stockholders for each issue or series.

The following comparative table illustrates clearly the remarkable uniformity in the leading provisions of these issues:

Comparison of Salient Provisions in Latest Type of Railroad "Blanket Mortgage" Bonds

	Company			
Provision	Pennsylvania	N. Y. C. & H.	C. M. & St. P.	N. P.
Maturity	100 years from date.	100 years from date.	100 years from date.	133 years from date.
Interest rate	Provision not announced.	To be fixed by company for each series.	To be fixed by company for each series, but cannot exceed 6 per cent.	To be fixed by company for each series, but cannot exceed 6 per cent.
Issuable in Series	Upon vote of stockholders approving each issue.	After $500,000,000 have been issued no additional bonds may be issued except for refunding purposes, unless authorized by stockholders.	Without restrictions.	After $500,000,000 have been issued no additional bonds may be issued except for refunding purposes, unless authorized by stockholders.
Authorized Issue	Limited to an amount *equal* to outstanding capital stock.	Limited to *three* times outstanding capital stock.	Limited to *three* times outstanding capital stock.	Limited to *three* times outstanding capital stock.
Smallest denomination issuable under terms of indenture	Not announced.	$500	$100	$100
Redeemable	Not announced.	Any series may be redeemed as a whole on terms to be stated on each bond.	Any series may be redeemable upon terms stated on the bond.	Any series may be redeemable as a whole upon terms stated on bond.
Convertible	Not announced.	Any series may be made convertible into capital stock.	Any series may be made convertible into capital stock.	No provision.
Further Provision	Not announced.	After $500,000,000 bonds have been issued, not including refunding, bonds can only be issued for new construction on property acquired at 80 per cent of cost.	After $226,961,600 bonds have been issued, not including refunding, bonds can only be issued for new construction on property acquired at 75 per cent of cost.	After $500,000,000 bonds have been issued, including bonds for refunding purposes, additional bonds can only be issued for 80 per cent of cost of new construction on property acquired.
Nature of lien	Direct lien on all property of company with minor exceptions.	Direct lien on all property of company with minor exceptions.	Direct lien on all property of company with minor exceptions.	Direct lien on all property of the company with minor exceptions.
Bonds issued to date	None	$40,000,000	$30,000,000	$20,000,000

The Southern Pacific, the Norfolk & Western and the Atchison, Topeka & Santa Fe have used issues of this type to advantage. This is particularly true of the latter company, which since 1905 has only increased its funded debt from $275,000,000 to $319,146,000, or approximately 16 per cent. In the same period its outstanding capital stock has increased from $102,000,000 to $160,836,500, or more than 87 per cent.

The equipment trust notes has been quite generally used by all classes of companies. It is interesting to note in this connection that the western roads form a notable exception to this general practice. The Great Northern, the Northern Pacific, the St. Paul, the Union Pacific, Atchison and Southern Pacific have not used this form of obligation in recent years. As an investment security it has had a most fortunate record from the point of view of the investor.

The collateral trust bond has been primarily an instrument which has been used in the process of system building. Now that the conditions of the transportation industry have become practically stabilized, it will not be used in the future.

Each of the above obligations has served an important part in the development of the financial structures of the railroads,

Comparing this type of mortgage instrument with the various mortgages which have been drawn in the past, it appears to have successfully overcome the most obviously difficult of those indentures from the point of view of the railroad company at least. All of the issues under consideration run for 100 years or more. In no case is a fixed interest rate provided, thus insuring a degree of flexibility to cope with the problem of shifting investment conditions. The ratio of debt to capital stock has been fixed upon most liberal terms rather than limiting the issue to a fixed authorized amount. The principle of a fixed ratio to capital stock or share interest has been adopted rather than fixing a definite amount. Provisions as to redemption, convertibility, etc., have been satisfactorily provided.

From the point of view of the corporation, the blanket mortgage provides complete freedom for future development.

From the point of view of the investor but one serious criticism can be directed against this type of finance. Too great latitude has been allowed in the creation of debt in ratio to capital stock. Undoubtedly the Pennsylvania has taken the wisest position on this point. The tendency, however, is to take advantage of the widest latitude allowed by the investment

laws of New York, Massachusetts and Connecticut. The reception which investors have accorded the obligations which have been offered during the past year would not indicate any serious disapproval of this feature, however.

With characteristic foresight the Pennsylvania was one of the first to secure approval of stockholders for an issue of this character, although as yet no bonds have been offered under it.

The New York Central & Hudson River in April, 1914, made the first public offering, with a total of $40,000,000 refunding and improvement 4½s of 2014 on a 4.70 per cent basis. The issue was well taken, according to the report of bankers.

The Chicago, Milwaukee & St. Paul followed in June of last year with an issue of $30,000,000 general and refunding 4½s of 2014. In this instance the bankers acted as an agent for the company. No commitment was made, the bankers receiving a commission of ½ point for all bonds sold. In spite of the unusual circumstances surrounding the offering, the issue appeared to go well on a 4.68 per cent basis. In January of this year $30,000,000 additional were offered to stockholders on a 5 per cent basis. This issue was made convertible. In July, 1914, $20,000,000 Northern Pacific refunding and improvement 4½s of 2047 on a 4.64 per cent basis were taken in an unusually short time.

It is of interest to consider this type of financing with reference to the industry as a whole. These instruments represent the last word in the effort of those responsible for the financial well-being of our railroads to provide a dependable and attractive bond serviceable alike to both the company and the investor.

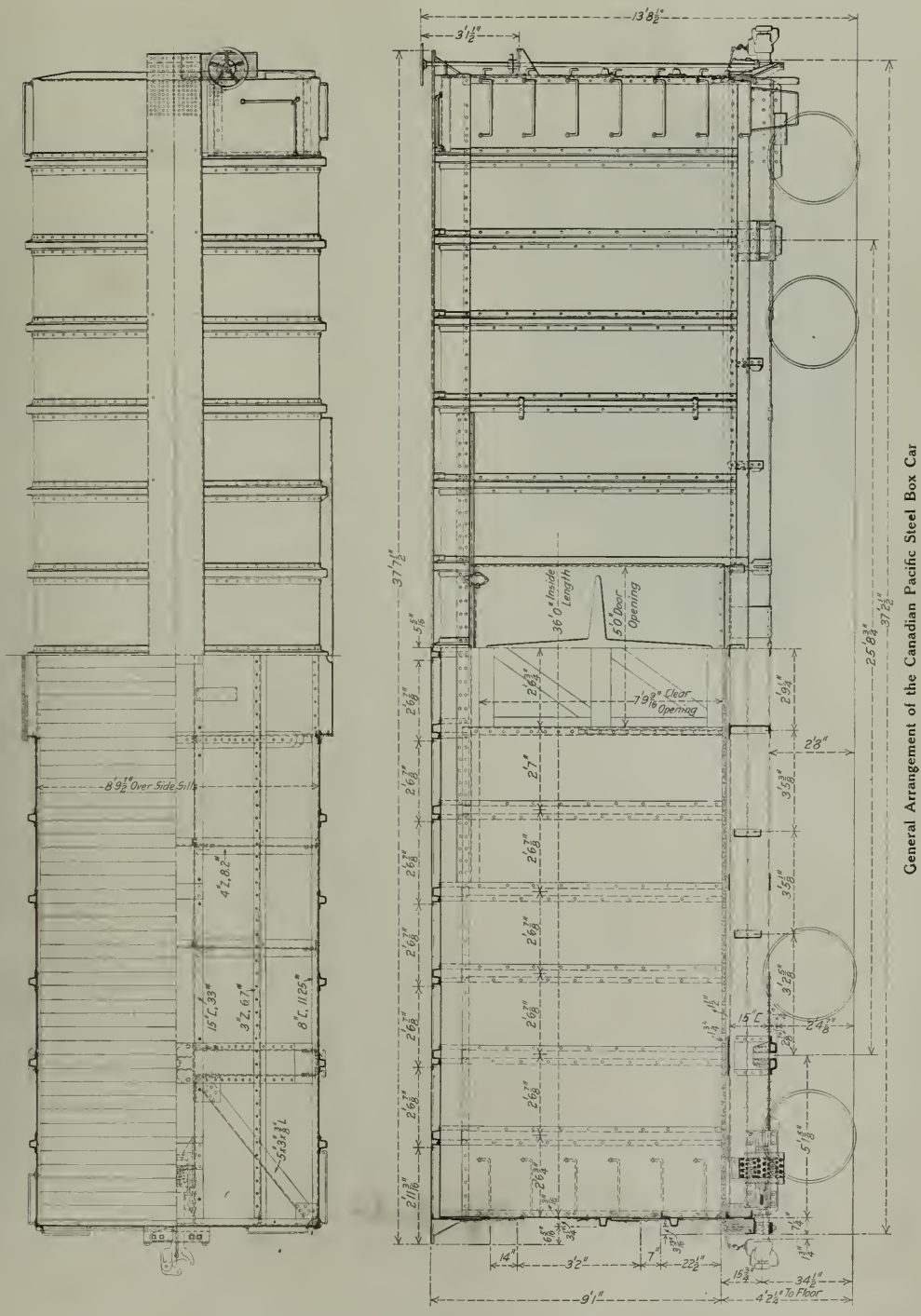
Ultimately the mortgage debt of American railroads, assuming that private ownership of these properties is to continue, will be greatly simplified. The size of the issues should make a better market for this type of bond than is possible with many comparatively small issues outstanding. The provision allowing for the issue of such bonds in denomination of $100 adequately provides for the development of the small investor, one of the most important factors with reference to the future.

STEEL BOX CAR FOR THE CANADIAN PACIFIC

An all-steel box car recently designed and built by the Canadian Car & Foundry Company, Montreal, Que., and now in service on the Canadian Pacific, is shown in the accompanying engravings. The car weighs 37,000 lb., and has an inside length of 36 ft., with a clear inside width of 8 ft. 8 in.

The construction of the car body is such that the interior surface is smooth, there being no braces employed in the side and end frames. The side posts are formed by pressing one vertical edge of each side sheet into a U section and are spaced 2 ft. 6⅞ in. between centers. The portion of the side sheets forming these posts is also offset to lap over the flat edge of the adjoining plate. A similar construction is employed in forming the roof members, the pressed U section in the roof sheets being made to correspond and to lap over the side sheets, thus practically forming a continuous post from side sill to side sill. As shown in the illustrations, these combined posts and carlines are on the exterior of the car, leaving a smooth interior which helps increase the loading space and makes the car easy to clean. The side plates are 3/16 in. thick and the roof plates are ⅛ in. thick, while the end plates are 3/16 in. thick and are reinforced by horizontal stiffeners of U-shaped section. Two sliding doors are provided in one end of the car to facilitate the loading of lumber

All-Steel Box Car Recently Built for the Canadian Pacific



General Arrangement of the Canadian Pacific Steel Box Car

and other long material. The running board is supported on angles riveted to the roof sheet.

The car is 37 ft. 2½ in. long over the buffer blocks on the end

End View of the Steel Box Car

sills and the distance between center plates is 25 ft. 8¾ in. The center sills are 15-in., 33-lb. channels, which are connected by channel-section distance pieces, spaced at 3 ft. 5⅛ in. intervals, and by plates at various points throughout the length of the car, there being no cover plates employed except on the under side for a short distance at the body bolsters. The body bolsters are built up of ¼-in. pressed steel webs or fillers with ½-in. top cover plates and ½-in. bottom cover plates. There are two cross-bearers placed 2 ft. 9¼ in. on either side of the center line of the car and built up of ¼ in. pressed fillers with ½-in. top cover plates and ½-in. bottom cover plates. The side sills are 8-in. 11.25-lb. channels and there are 5-in. by 3-in. by ⅜-in. diagonal bracing angles at the ends of the car, between the junction of the side and end sills at the corner of the car and the junction of the body bolster and the center sills. The center and the side sills are connected by 4-in., 8.2-lb. Z-bars and these support a 3-in., 6.7-lb. Z-bar placed about midway between the side and the center sills on both sides of the car, which acts as a floor stringer. The end sills are built up of steel plates and angles.

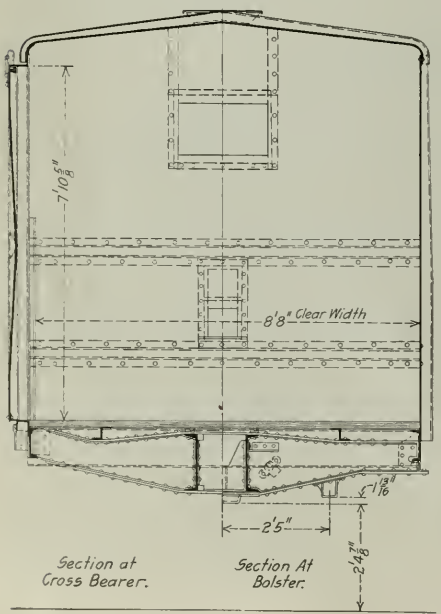
The drawings show provision for a steel door, but a wooden door was used on the car as shown in the photograph. The capacity of the car is 80,000 lb.

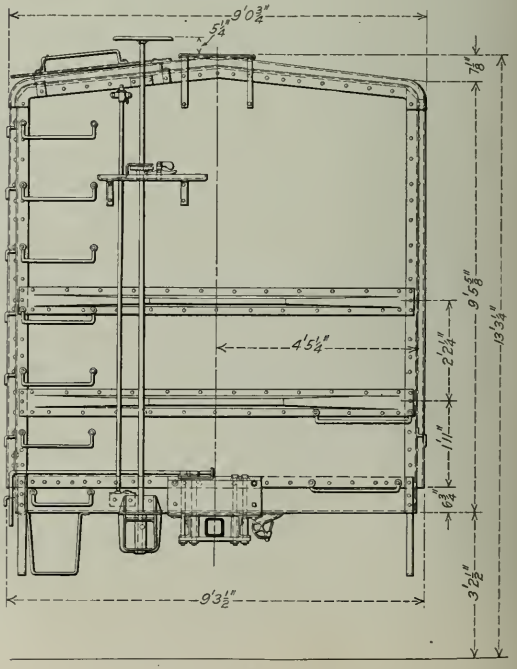
THE FRENCH RAILWAYS IN WAR TIME

The following account taken from an article on the subject in the *Journal des Transports* shows how the French railways are managed in time of war and indicates the efforts made to have them in readiness at the required moment.

Article 54 of the *Cahier des Charges* (specifications) under which the French railways operate, provides that if the government has to transport troops and supplies to any place served by a railway, the companies must immediately place all their facilities at the service of the state. This obligation has existed for over 40 years, so that before the war, a permanent military organization had been created whose duties were to prepare the railways for service in time of war.

Each of the large railways has attached to it a committee, the *commission de réseau*, composed of a technical member, usually





Cross Sections and End Elevation of Canadian Pacific Steel Box Car

the general manager, and a military member, a high officer of the general staff, nominated by the minister of war. The duties of this committee are to investigate in all its bearings, and with a view to strategic requirements, the manner in which the tracks and rolling stock and such special details as military platforms, stopping places for meals, etc., can be utilized in conformity with the needs of the war office.

Besides these individual *commissions de réseau*, there is a superior military railways committee. This body, which was created by a ministerial decree of 1898, is presided over by the chief of the general staff, and is composed of six generals or other officers of high rank, three representatives of the ministry of public works and the members of the above-described *commissions*. Its functions are advisory; it records its opinions concerning any measures proposed by the *commissions de réseau*, as well as on all questions relative to military transport.

On the declaration of war, there are special regulations affecting railway employees. These provide that if a railway man is called to the colors, he is mobilized as a railway man and on a territorial system whereby men employed by the same company are grouped together into regimental units. All these arrangements are worked out in time of peace. They were tested during the railway strike of 1910, when the men were called out under martial law, and for the time being became in effect soldiers whose duties were confined to railway work.

On the first day of mobilization, after having been duly notified by the minister of war, the railways must place at the disposal of the military authorities every available facility on certain divisions, or on the whole system, as the case may be. The railway system of the country is then divided into two "zones," under different authorities. Both are under military control. The "interior zone" comes under the ministry of war; the minister and the general staff regulating conditions of traffic. Under the authority of the minister, the *commission de réseau* of each line handles executive functions and each of the two members retains his individual responsibilities, one being entrusted with military measures, while the technical member sees to it that all requirements for the provision of rolling stock and other matters connected with actual operation are met. They are aided by subcommittees, each of which is also composed of a military and a technical member.

The "army zone" is under the control of the commander-in-chief of the armies in the field, assisted by an officer whose status is that of manager of the army railways. This zone is naturally sub-divided, a distinction being made between sections of line without and within the actual scene of military operations. The lines within the former zone are manned by the employees of the company concerned, organized under the territorial scheme referred to above. Within the zone of actual field operations the service is carried on by military units corresponding more or less with army engineers.

Precedence is naturally given to military requirements, but provision must be made for transporting foodstuffs and general commercial merchandise. Within the "army zone" ordinary traffic is suspended altogether, save for such exceptions as may be authorized by the commander-in-chief. In the "interior zone," such traffic is conducted exclusively according to the conditions prescribed by the ministry of war, which is empowered, after mobilization and concentration are completed, and on the request of the *commissions de réseau*, to authorize the partial or complete resumption of ordinary passenger and freight traffic. Throughout the duration of war, the railways must insure the conveyance of all military traffic under the best possible conditions.

FEMALE BOOKING CLERKS ON THE METROPOLITAN RAILWAY OF ENGLAND.—In common with many other companies, the Metropolitan Railway has now female booking clerks at several of its stations and is rapidly increasing the number in order to relieve men for other duties and to enable them to join the forces.

ANNUAL GOVERNMENT SIGNAL BULLETIN

On following pages we reprint Table No. 1 from the annual statistical report of block and interlocking signals on the railroads of the United States issued by the Interstate Commerce Commission, giving the mileage of road equipped, with other data, as of January 1, 1915.

The changes in total length of road signaled, as compared with January 1, 1914, are as follows:

Miles of Railroad on Which the Block System Is in Use

	Jan. 1, 1915	Jan. 1, 1914	Jan. 1, 1913
Automatic	29,600.0†	26,569.3	22,218.8
Manual	66,679.1†	60,167.6	61,731.0
Total	96,279.1†	86,736.9	83,949.8
Changes*—			
Automatic	I. 3,030.7	I. 4,350.5	
Manual	I. 6,511.5	D. 1,563.4	

The increase in mileage of road equipped with automatic block signals, as shown in the table, 3,030 miles, is less than the actual increase, because the total as given for the preceding year has not been corrected by deducting the duplicated items. The more important increases both in automatic and manual signaling are set forth in a separate table in the bulletin, which is reprinted below. The two largest items in the increase in manual signaling, the Southern Pacific and the New York, New Haven & Hartford, did not appear in the reports received by the *Railway Age Gazette*, and therefore were not counted in the totals published by us on January 1. The New Haven statement was corrected in a subsequent issue; but the ex-

Name of railroads.	Increase.		Decrease.
	Automatic.	Nonautomatic.	Nonautomatic.
	Miles.	*Miles.*	*Miles.*
Atchison, Topeka & Santa Fe: Coast Lines	123.1		88.9
Atlantic Coast Line	81.6		
Boston & Maine	73.0		
Brockton & Plymouth Street [1]		22.6	
Buffalo, Rochester & Pittsburgh	74.3		80.7
Canadian Pacific [1]		200.3	
Chattanooga Railway & Light [1]	28.5		
Chesapeake & Ohio and Chesapeake & Ohio of Indiana		75.8	
Chicago & North Western	151.2		181.6
Chicago, Burlington & Quincy	111.4		
Chicago, Milwaukee & St. Paul	483.0		468.8
Bellingham & Northern [1]		55.1	
Gallatin Valley [1]		48.1	
Idaho & Washington Northern [1]		111.7	
Chicago, South Bend & Northern Indiana [1]	10.0		
Duluth, South Shore & Atlantic [1]		24.4	
El Paso & Southwestern	60.1		
Erie	42.6		72.6
Chicago & Erie	205.3		205.3
Fort Dodge, Des Moines & Southern [1]	16.4		
Hocking Valley	1.9	99.1	
Illinois Traction	41.8		
Lehigh & Hudson River	49.7		
Lehigh Valley	55.8		49.8
Louisville & Nashville	91.5		92.2
Massachusetts Northeastern Street [1]	100.8		
Mineral Point & Northern [1]		26.4	
Mobile & Ohio	7.1		36.1
New York Central Lines:			
Cincinnati Northern [1]		202.8	
Toledo & Ohio Central		126.7	
New York, New Haven & Hartford		956.2	
New York, Westchester & Boston [1]	18.0		
Northern Pacific	189.7		229.2
Oakland, Antioch & Eastern [1]	82.1		
Oregon-Washington Railroad & Navigation	187.0		
Panama [1]	47.5		
Pere Marquette	67.2		7.8
Piedmont & Northern [1]	4.3	126.2	
Portland Railway, Light & Power [1]	20.6		
Queen & Crescent Route:			
Southern Railway	135.2		128.1
Southern	100.9		
Southern Pacific—Sunset Central Lines:			
Galveston, Harrisburg & San Antonio		1,233.7	
Houston & Shreveport [1]		39.8	
Houston & Texas Central [1]	2.9	814.5	
Houston, East & West Texas [1]	2.7	188.2	
Lake Charles & Northern [1]		44.3	
Louisiana Western		198.3	
Morgan's Louisiana & Texas		279.3	
Texas & New Orleans		397.7	
Southern Pacific—Pacific System	67.7	3,477.9	
Terre Haute, Indianapolis & Eastern Traction [1]	47.5		
Union Traction of Indiana [1]	49.9		
Western Maryland [1]	62.0		
Total	2,884.4	8,749.1	1,640.7

[1] Roads which have not heretofore reported block-signal mileage.

*Increase or Decrease compared with preceding year.

†From the totals in Table 1 there are deducted, for joint mileage reported by two companies, 263.5 miles of automatic and 66 miles manual.

MILEAGE OF RAILWAYS OPERATED UNDER THE BLOCK SYSTEM, JANUARY 1, 1915

Names of railroads.	Automatic block signals.						Nonautomatic block signals.						Total automatic and nonautomatic.		Total passenger lines operated.		Per centage block signaled, miles of track.
	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	
Albany Southern	0.5				0.5	0.5	26.7	16.3			43.0	59.3	43.5	59.8	43.5	59.8	100.0
Ann Arbor							1.0				1.0	1.0	1.0	1.0	293.8	293.8	.3
Arizona & New Mexico	1.0				1.0	1.0							1.0	1.0	109.0	109.0	.9
Atchison, Topeka & Santa Fe System:																	
Eastern lines	21.5	118.8			140.3	259.1	459.0	486.8			945.8	1,432.7	1,086.1	1,691.8	2,693.0	3,332.5	50.7
Western lines	5.5	2.5			8.0	10.5	557.4	23.8			581.2	605.0	589.2	615.5	2,985.6	3,016.6	20.4
Coast lines	73.3	319.7			393.0	701.0	4.3				4.3	4.3	397.3	705.3	2,144.3	2,458.8	28.6
Gulf, Colorado & Santa Fe	21.1				21.1	21.1							21.1	21.1	1,698.5	1,702.8	1.2
Atlanta & West Point								6.0			6.0	12.0	6.0	12.0	86.0	92.0	13.0
Atlantic Coast line	11.3	249.4			260.7	510.1	249.3	13.2			262.5	275.7	523.2	785.8	3,745.3	4,000.3	19.6
Auburn & Northern Electric	6.5				6.5	6.5							6.5	6.5	6.5	6.5	100.0
Baltimore & Ohio System:																	
Baltimore & Ohio	38.0	322.7	2.8	15.1	378.6	757.7	1,921.3	679.8	114.2	10.5	2,725.9	3,682.4	3,104.6	4,440.1	3,104.6	4,440.1	100.0
Baltimore & Ohio Chicago Terminal	1.2	20.0			21.2	40.6							21.2	40.6	43.5	71.3	57.0
Baltimore & Ohio Southwestern	35.1	24.9			60.0	84.8	866.7	36.5			903.2	939.7	963.2	1,024.5	963.2	1,024.5	100.0
Cincinnati, Hamilton & Dayton	118.4	27.0			145.4	172.4	744.0	24.3			768.3	792.6	913.7	965.0	913.7	965.0	100.0
Staten Island	.8	22.1		.6	23.5	47.4							23.5	47.4	23.5	47.4	100.0
Baltimore, Chesapeake & Atlantic							87.0				87.0	87.0	87.0	87.0	87.0	87.0	100.0
Bangor & Aroostook	5.6				5.6	5.6							5.6	5.6	576.7	607.0	.9
Bessemer & Lake Erie							65.1	129.5			194.6	324.1	194.6	324.1	191.4	320.8	98.2
Boston & Maine	509.2	618.9	3.4	2.1	1,133.6	1,765.6							1,133.6	1,765.6	2,212.8	2,793.7	63.2
Boston, Revere Beach & Lynn		13.8			13.8	27.6							13.8	27.6	13.8	27.6	100.0
Brockton & Plymouth Street	.4				.4	.4	22.6				22.6	22.6	23.0	23.0	23.0	23.0	100.0
Buffalo, Rochester & Pittsburgh	139.6	84.1			223.7	307.7	174.8	60.6			235.5	296.1	459.2	603.9	443.8	588.6	100.0
Butte, Anaconda & Pacific	7.9				7.9	7.9							7.9	7.9	58.0	58.0	13.6
Canadian Pacific							200.3				200.3	200.3	200.3	200.3	200.3	200.3	100.0
Carolina & North Western							2.4				2.4	2.4	2.4	2.4	133.5	133.5	1.8
Carolina, Clinchfield & Ohio, and Carolina, Clinchfield & Ohio of South Carolina	11.0				11.0	11.0							11.0	11.0	256.0	256.0	4.3
Central New England	2.7	34.4			37.1	71.5		34.3			34.3	68.6	71.4	140.1	296.9	368.9	37.9
Central of Georgia							47.9	7.4			55.3	62.7	55.3	62.7	1,767.3	1,774.7	3.5
Central of New Jersey	40.6	165.6	2.4	33.5	242.1	521.4							242.1	521.4	459.9	753.2	69.2
Central Vermont							396.3	6.2			402.5	408.7	402.5	408.7	402.5	408.7	100.0
Chattanooga Railway & Light	28.5				28.5	28.5	1.8				1.8	1.8	30.2	30.2	46.1	61.5	49.1
Chesapeake & Ohio and Chesapeake & Ohio of Indiana		454.6			454.6	909.2	1,607.7	21.2			1,628.9	1,650.1	2,083.5	2,559.3	2,083.5	2,559.3	100.0
Chesapeake Beach							1.8				1.8	1.8	1.8	1.8	28.3	28.3	6.0
Chicago & Alton	410.9	187.3			598.2	785.5	106.1	36.6			142.7	179.3	740.9	964.8	1,025.2	1,209.8	79.7
Chicago & Eastern Illinois	57.8	154.2			212.0	366.2	181.1	32.4			213.5	245.9	425.5	612.1	1,005.7	1,214.6	50.4
Chicago & North Western	209.7	804.3	14.9	8.3	1,037.2	2,099.1	2,533.4	27.3			2,560.8	2,588.1	3,598.0	4,687.2	7,266.9	8,338.8	56.2
Chicago & Western Indiana		20.5			20.5	41.0		3.6	3.2		6.8	16.8	27.3	57.8	27.3	57.8	100.0
Chicago, Burlington & Quincy	166.7	37.1	30.6	5.4	239.8	354.3	7,962.2	772.7	7.2		8,742.1	9,529.3	8,981.9	9,883.5	9,324.8	10,309.0	100.0
Chicago Great Western	256.6	89.6			346.1	435.7	48.6				48.6	48.6	394.7	484.3	1,338.2	1,443.6	33.5
Chicago, Indianapolis & Louisville	294.1				294.1	294.1							294.1	294.1	578.0	578.0	50.9
Chicago Junction							1.1				1.1	1.1	1.1	1.1	11.8	163.7	.7
Chicago, Milwaukee & St. Paul	365.4	839.8			1,205.2	2,050.1	3,078.1	143.9			3,222.0	3,365.9	4,427.2	5,416.0	8,548.0	9,543.0	56.8
Bellingham & Northern							55.1				55.1	55.1	55.1	55.1	55.1	55.1	100.0
Gallatin Valley							48.1				48.1	48.1	48.1	48.1	48.1	48.1	100.0
Idaho & Washington Northern							111.7				111.7	111.7	111.7	111.7	111.7	111.7	100.0
Tacoma & Eastern							75.8				75.8	75.8	75.8	75.8	75.8	75.8	100.0
Chicago, Ottawa & Peoria	15.9				15.9	15.9							15.9	15.9	107.9	107.9	14.7
Chicago, Peoria & St. Louis							247.2				247.2	247.2	247.2	247.2	247.2	247.2	100.0
Chicago, Rock Island & Pacific	658.1	283.1			941.2	1,224.3	1,087.3				1,087.3	1,087.3	2,028.5	2,311.6	7,563.1	7,847.2	29.4
Chicago, Rock Island & Gulf	32.6				32.6	32.6							32.6	32.6	472.7	472.7	6.9
Chicago, St. Paul, Minneapolis & Omaha	27.2	171.5			198.8	370.4	463.4		.6		464.0	464.7	662.9	835.1	1,574.2	1,757.2	47.5
Chicago, South Bend & Northern Indiana	10.0				10.0	10.0							10.0	10.0	67.0	67.0	14.9
Chicago, Terre Haute & Southeastern	1.5				1.5	1.5							1.5	1.5	178.5	188.2	.8
Colorado Midland							2.0				2.0	2.0	2.0	2.0	261.1	261.1	.8
Columbia & Puget Sound	10.0	8.9			18.9	27.8							18.9	27.8	50.8	61.2	45.4
Copper Range							78.7				78.7	78.7	78.7	78.7	78.7	78.7	100.0
Cornwall & Lebanon							8.8	13.2			22.0	35.2	22.0	35.2	22.0	35.2	100.0
Cumberland & Pennsylvania							4.3		3.0		7.3	13.3	7.3	13.3	31.3	37.3	35.6
Cumberland Valley	5.8	52.1			57.9	110.0	105.0				105.0	105.0	162.9	215.0	163.7	221.6	97.0
Delaware & Hudson	164.2	225.2	4.3	17.5	411.2	697.5		34.6			34.6	69.2	445.8	766.7	722.0	1,089.6	70.3
Delaware, Lackawanna & Western	280.5	476.0	43.3	23.3	823.2	1,456.0	8.8				8.8	8.8	832.1	1,464.8	930.0	1,553.1	94.3
Denver & Salt Lake							34.1				34.1	34.1	34.1	34.1	214.1	214.1	16.0
Duluth & Iron Range		17.1			17.1	18.5							17.1	18.5	200.0	274.1	6.7
Duluth, South Shore & Atlantic							24.4				24.4	24.4	24.4	24.4	518.6	515.6	4.7
Durham & Southern							56.9				56.9	56.9	56.9	56.9	59.0	59.0	96.8
Eastern Kentucky							4.5				4.5	4.5	4.5	4.5	36.0	36.0	12.5
Elgin, Joliet & Eastern	7.0	3.0			10.0	10.0	9.1				9.1	9.1	19.1	19.1	(1)	(1)	.....
El Paso & Southwestern System	159.3				159.3	159.3							159.3	159.3	816.8	816.8	19.5
Erie	15.2	620.0		14.8	650.0	1,314.4	528.9	207.6			736.5	944.1	1,386.5	2,258.5	1,695.3	2,570.5	57.8
Chicago & Erie		205.3			205.3	410.6	35.0	8.4			43.4	51.8	248.7	462.4	248.7	462.4	100.0
Columbus & Erie							13.2				13.2	13.2	13.2	13.2	(1)	(1)	.....
Erie & Jersey		38.6			38.6	77.2							38.6	77.2	(1)	(1)	.....
Genesee River							32.6				32.6	32.6	32.6	32.6	(1)	(1)	.....
New Jersey & New York	10.2	10.5			20.7	31.2							20.7	31.2	36.5	47.0	66.4
New York, Susquehanna & Western		4.9			4.9	9.8	32.0	13.7			45.7	59.4	50.6	69.2	209.4	215.0	31.7
Fort Dodge, Des Moines & Southern	16.4				16.4	16.4							16.4	16.4	119.3	119.3	13.7
Grand Trunk Railway System							3.1	.2			3.3	3.5	3.3	3.5	3.3	3.5	100.0
Atlantic & St. Lawrence							170.9	1.2			172.1	173.4	172.1	173.4	172.1	173.4	100.0
Champlain & St. Lawrence							1.2				1.2	1.2	1.2	1.2	1.2	1.2	100.0
Chicago, Detroit & Canada Grand Trunk Junction							61.5				61.5	61.5	61.5	61.5	52.8	52.8	100.0
Cincinnati, Saginaw & Mackinaw							60.5				60.5	60.5	60.5	60.5	60.5	60.5	100.0
Detroit, Grand Haven & Milwaukee							190.5				190.5	190.5	190.5	190.5	190.5	190.5	100.0
Grand Trunk Western		78.2			78.2	156.4	18.5	245.2			263.8	509.0	342.0	665.4	342.0	665.4	100.0
International Bridge Co							.4				.4	.4	.4	.4	.4	.4	100.0
Michigan Air Line							105.6				105.6	105.6	105.6	105.6	105.6	105.6	100.0
Pontiac, Oxford & Northern							118.8				118.8	118.8	118.8	118.8	118.8	118.8	100.0
St. Clair Tunnel Co							1.5				1.5	1.5	1.5	1.5	1.5	1.5	100.0
Toledo, Saginaw & Muskegon							95.9				95.9	95.9	95.9	95.9	95.9	95.9	100.0
United States & Canada							22.5				22.5	22.5	22.5	22.5	22.5	22.5	100.0
Great Northern	188.6	346.3			534.9	881.2	319.9	.1			320.0	320.1	854.9	1,201.3	7,144.4	7,368.8	16.3
Hocking Valley		1.9			1.9	3.8	237.5				237.5	237.5	239.4	241.3	336.9	390.2	61.8
Hudson & Manhattan	1.1	7.8			8.9	16.8	1.9				1.9	1.9	10.8	18.7	10.8	18.7	100.0
Huntingdon & Broad Top Mountain	5.4				5.4	5.4							5.4	5.4	49.2	49.2	10.9
Illinois Central	181.0	405.9		26.8	613.7	1,119.7	6.0				6.0	6.0	619.7	1,125.7	4,514.6	5,353.0	21.0
Yazoo & Mississippi Valley	14.8	2			15.0	15.1							15.0	15.1	1,214.6	1,241.3	1.2
Illinois Traction	124.1	1.5			125.6	127.1							125.6	127.1	443.1	452.6	28.1
International	4.6				4.6	4.6							4.6	4.6	33.7	44.0	10.5
Kanawha & Michigan	1.8				1.8	1.8	2.3				2.3	2.3	4.1	4.1	163.9	163.9	2.5
Kansas City Terminal		6.8			6.8	13.5							6.8	13.5	14.2	22.5	60.0
Kentucky & Indiana Terminal							3.0	8.2			11.2	19.4	11.2	19.4	11.2	19.4	100.0
Kentwood & Eastern							3.4				3.4	3.4	3.4	3.4	29.8	29.8	11.4
Lackawanna & Wyoming Valley								1.5			1.5	3.0	1.5	3.0	22.6	43.4	6.9

(1) Freight Line.

MILEAGE OF RAILWAYS OPERATED UNDER THE BLOCK SYSTEM, JANUARY 1, 1915—CONTINUED

Names of railroads.	Automatic block signals.						Nonautomatic block signals.						Total automatic and nonautomatic.		Total passenger lines operated.		Per centage block signaled, miles of track.
	Single track.	Double track.	Three track.	Four track.	Total.		Single track.	Double track.	Three track.	Four track.	Total.		Miles of road.	Miles of track.	Miles of road.	Miles of track.	
					Miles of road.	Miles of track.					Miles of road.	Miles of track.					
Lehigh & Hudson River	73.3				73.3	73.3	.3				.3	.3	73.6	73.6	73.6	73.6	100.0
Lehigh & New England	2.9				2.9	2.9							2.9	2.9	73.5	75.7	3.8
Lehigh Valley	71.3	432.0	51.4	31.3	586.0	1,214.7	593.4	52.4			645.8	668.2	1,231.8	1,912.9	1,218.2	1,898.1	100.0
Ligonier Valley							14.3				14.3	14.3	14.3	14.3	14.3	14.3	100.0
Long Island		95.8	3.3	14.5	113.6	262.7	29.7	9.8			39.5	49.3	153.1	312.0	360.9	537.7	58.0
Louisville & Nashville	214.7	55.8			270.5	326.3	102.2	55.4			157.6	213.1	428.1	539.4	4,564.9	4,919.3	10.9
Louisville & Northern Railway & Light	4.1				4.1	4.1							4.1	4.1	16.3	17.1	23.9
Maine Central	437.0	63.0			500.0	563.0							500.0	563.0	1,103.0	1,166.5	48.3
Portland Terminal	5.0	11.9			16.9	28.8							16.9	28.8	19.7	32.5	88.6
Maryland, Delaware & Virginia							77.4				77.4	77.4	77.4	77.4	77.4	77.4	100.0
Massachusetts Northeastern Street	100.8				100.8	100.8							100.8	100.8	116.6	119.8	84.1
Mineral Point & Northern							26.4				26.4	26.4	26.4	26.4	26.4	26.4	100.0
Mineral Range		4.7			4.7	4.7	4.7				4.7	4.7	4.7	4.7	77.3	77.3	6.1
Minneapolis & St. Louis		4.0			4.0	8.0	11.3				11.3	11.3	15.3	19.3	1,537.4	1,547.3	1.2
Minneapolis, St. Paul & Sault Ste. Marie							1,409.9	12.1			1,422.0	1,434.1	1,422.0	1,434.1	3,489.1	3,501.2	40.9
Missouri, Kansas & Texas	9.4				9.4	9.4	9.5				9.5	9.5	18.9	18.9	1,608.8	1,663.0	1.1
Missouri, Kansas & Texas of Texas	92.0	8.8			100.8	109.0							100.8	109.0	1,623.0	1,642.8	6.6
Missouri Pacific	59.6	38.9			98.5	137.0	3,527.5	19.6			3,547.2	3,566.8	3,645.8	3,703.8	3,688.7	3,776.6	98.2
St. Louis, Iron Mountain & Southern	113.8	13.2			127.0	140.2	2,641.4	169.8			2,811.2	2,981.1	2,938.3	3,121.3	3,062.4	3,297.1	94.6
Mobile & Ohio	1.5	10.3			11.8	22.1	15.8				15.8	15.8	27.6	38.0	1,122.5	1,132.9	3.3
Monongahela	.5	2.0			2.5	4.5							2.5	4.5	65.7	67.7	6.7
Munising, Marquette & Southeastern							3.7				3.7	3.7	3.7	3.7	123.8	123.8	2.9
Nashville, Chattanooga & St. Louis							72.0	38.6			110.6	149.2	110.6	149.2	1,230.1	1,268.6	11.7
Nashville Terminals		1.8			1.8	3.7	4.0				4.0	4.0	5.8	7.7	93.1	100.5	7.6
Newburgh & South Shore							.1	5.2			5.3	10.5	5.3	10.5	(1)	(1)	
New York & Long Branch		38.0			38.0	76.0							38.0	76.0	38.0	76.0	100.0
New York Central Lines:																	
Boston & Albany	2.6	128.0	56.4	24.9	211.9	527.4		.2	0.4		.6	1.6	212.5	529.0	357.0	676.0	78.2
Chicago, Indiana & Soutnern		5.0			5.0	10.0	238.9	59.1			298.0	357.1	303.0	367.1	303.0	367.1	100.0
Cincinnati Northern							202.8				202.8	202.8	202.8	202.8	202.8	202.8	100.0
Cleveland, Cincinnati, Chicago & St. Louis	23.9	98.5			122.4	220.9	569.2	274.7			843.9	1,118.6	966.3	1,339.5	1,878.2	2,266.4	59.1
Lake Erie & Western	48.0	8.8			56.8	65.0	814.7	.1			814.9	815.1	871.8	880.8	537.7	537.7	100.0
Lake Shore & Michigan Southern	27.9	210.8	99.4	267.1	605.2	1,816.1	994.9	1.3			996.2	997.5	1,601.4	2,813.6	1,607.8	2,820.7	99.7
Dunkirk, Allegheny Valley & Pittsburgh							90.5				90.5	90.5	90.5	90.5	90.5	90.5	100.0
Lake Erie & Pittsburgh							27.8				27.8	27.8	27.8	27.8	27.8	27.8	100.0
Michigan Central		271.9			271.9	543.8	871.6	19.3			890.9	910.2	1,162.8	1,454.0	1,162.8	1,454.0	100.0
New York Central & Hudson River	1.9	452.5		276.9	731.3	2,024.3	1,664.8	555.1	15.4		2,235.3	2,821.4	2,966.7	4,845.7	2,983.3	4,879.5	99.3
Peoria & Eastern							85.7	1.7			87.4	89.1	87.4	89.1	337.9	340.3	23.2
Pittsburgh & Lake Erie		107.8	1.6	49.3	158.7	417.6	2.7				2.7	2.7	161.4	420.3	166.0	427.0	98.4
Toledo & Ohio Central	2.1	4.2			6.3	10.5	126.7				126.7	126.7	133.0	137.2	390.7	397.4	34.6
Zanesville & Western	.8				.8	.8							.8	.8	65.8	65.8	1.2
New York, Chicago & St. Louis	146.3	12.2			158.5	170.7							158.5	170.7	512.5	603.3	28.2
New York, New Haven & Hartford	1.6	283.9		60.7	346.2	830.6	1,037.4	353.4		32.8	1,418.6	1,870.4	1,761.7	2,701.0	1,887.5	2,881.1	93.7
New York, Ontario & Western	48.3	149.4			197.7	303.7							197.7	303.7	513.7	667.7	45.5
New York, Philadelphia & Norfolk		8.7			8.7	17.5	40.0	63.2			103.2	166.4	112.0	183.9	112.0	183.9	100.0
New York, Westchester & Boston		11.2		6.8	18.0	49.7							18.0	49.7	18.0	49.7	100.0
Nevada Northern	1.2				1.2	1.2							1.2	1.2	140.3	140.3	.8
Norfolk & Western	98.7	486.9			585.6	1,072.5	1,001.5	24.6			1,026.1	1,050.7	1,611.7	2,123.2	1,725.9	2,237.4	94.9
Northern Pacific	684.0	500.3			1,184.3	1,688.4	276.5	61.0			337.5	398.2	1,521.8	2,086.6	5,655.0	6,308.6	33.0
Northwestern Pacific	11.1	15.5			26.6	42.1							26.6	42.1	406.5	420.9	10.0
Oakland, Antioch & Eastern	82.1				82.1	82.1							82.1	82.1	98.7	98.7	83.2
Ohio Electric	4.8				4.8	4.8							4.8	4.8	552.3	552.3	.9
Ohio Valley Electric							11.1				11.1	11.1	11.1	11.1	22.1	29.7	37.3
Pacific Electric		11.5			11.5	23.0	17.7				17.7	17.7	29.2	40.7	594.9	1,043.2	3.9
Panama	40.2	7.2			47.5	54.7							47.5	54.7	54.5	61.4	89.3
Pennsylvania		103.4	8.5	388.6	500.5	1,792.8	2,326.1	810.4	22.1	11.4	3,170.0	4,080.6	3,670.5	5,873.4	3,670.5	5,873.4	100.0
Cherry Tree & Dixonville							31.1				31.1	31.1	31.1	31.1	26.7	26.7	100.0
Grand Rapids & Indiana							224.8	2.0			226.6	228.6	226.6	228.6	544.7	557.3	41.0
Pennsylvania Co		433.6	27.7	66.3	527.6	1,215.3	809.6	189.7	3.0	12.0	1,014.3	1,246.2	1,541.9	2,461.5	1,645.4	2,569.3	95.8
Pennsylvania Terminal							1.7	1.2			2.9	4.0	2.9	4.0	2.9	4.0	100.0
Philadelphia, Baltimore & Washington		73.0	22.6	39.2	134.8	370.6	427.8	78.8		1.9	508.5	593.0	643.3	963.6	643.3	963.6	100.0
Pittsburgh, Cincinnati, Chicago & St. Louis		33.5	2.7	3.5	39.7	89.0	727.3	527.7	57.4	26.2	1,338.6	2,059.6	1,378.3	2,148.6	1,412.9	2,200.8	97.7
West Jersey & Seashore		88.8	6.3		95.1	196.5	185.5	35.5			221.0	256.5	316.1	453.0	316.1	453.0	100.0
Vandalia	6.0				6.0	6.0	303.2	60.9			364.1	425.0	370.1	431.0	781.8	842.7	51.0
Peoria & Pekin Union	.8				.8	.8		6.1			6.1	12.2	6.9	13.0	18.0	24.8	52.4
Pere Marquette	108.8	7.6			116.4	124.0							116.4	124.0	1,628.9	1,687.4	7.3
Philadelphia & Reading	26.1	358.7	25.6	41.4	451.9	936.2	146.4	62.9			209.3	272.2	661.2	1,258.4	900.1	1,527.3	80.8
Atlantic City	1.1	86.7			87.8	174.5	36.0				36.0	36.0	123.9	210.6	166.3	254.2	82.8
Gettysburg & Harrisburg							24.2				24.2	24.2	24.2	24.2	31.0	31.0	78.0
North East Pennsylvania	7.3	2.0			9.3	11.3	1.6				1.6	1.6	10.9	12.9	25.6	27.6	46.6
Perkiomen							38.2				38.2	38.2	38.2	38.2	38.2	38.2	100.0
Philadelphia, Newtown & New York	5.4	1.3	2.1		8.9	14.5	11.2				11.2	11.2	20.0	25.7	21.9	27.5	93.4
Reading & Columbia							34.9				34.9	34.9	34.9	34.9	53.4	53.4	65.4
Piedmont & Northern	.8	3.5			4.3	7.8	126.3				126.3	126.3	130.8	134.1	130.6	134.1	100.0
Pittsburg, Shawmut & Northern	1.5				1.5	1.5							1.5	1.5	294.6	294.6	.5
Portland Railway, Light & Power	20.6				20.6	20.6							20.6	20.6	75.6	81.5	25.2
Quincy, Omaha & Kansas City, and Iowa & St. Louis							295.5				295.5	295.5	295.5	295.5	295.5	295.5	100.0
Queen & Crescent Route:																	
Alabama & Vicksburg	78.6				78.5	78.5							78.5	78.5	139.3	139.3	56.4
Alabama Great Southern	267.9	.4			268.3	268.8							268.3	268.8	290.5	298.4	90.0
Cincinnati, New Orleans & Texas Pacific	212.4	119.2			331.6	450.8	3.8				3.8	3.8	335.4	454.6	335.4	454.6	100.0
New Orleans & Northeastern	97.7	15.5			113.2	128.7							113.2	128.7	195.6	211.1	60.9
Richmond, Fredericksburg & Potomac		19.1			19.1	38.2	10.0	68.6			68.6	127.2	87.7	165.4	87.7	165.4	100.0
Rochester, Syracuse & Eastern	14.0				14.0	14.0							14.0	14.0	72.9	145.8	9.6
St. Louis & San Francisco	698.4	34.1			732.4	766.5	10.6				10.6	10.6	743.0	777.1	5,227.1	5,304.4	14.6
Beaumont, Sour Lake & Western							82.6				82.6	82.6	82.6	82.6	82.6	82.6	100.0
Orange & Northwestern							61.6				61.6	61.6	61.6	61.6	61.6	61.6	100.0
St. Louis, Brownsville & Mexico							480.7				480.7	480.7	480.7	480.7	526.6	526.6	91.2
St. Louis Merchants Bridge Terminal		6.9			6.9	11.8		1.1			1.1	2.2	7.0	14.0	9.9	19.8	70.9
St. Louis Southwestern	.4				.4	.4							.4	.4	686.8	702.0	
Southern Illinois & Missouri Bridge		4.6			4.6	9.3							4.6	9.3	4.6	9.3	100.0
San Francisco-Oakland Terminal		3.8			3.8	7.6							3.8	7.6	21.8	35.9	21.4
San Pedro, Los Angeles & Salt Lake	3.7				3.7	3.7							3.7	3.7	1,131.8	1,131.8	.3
Seaboard Air Line							303.4	9.6			313.0	322.6	313.0	322.6	2,827.6	2,837.2	11.4
Southern	6.3	245.8			252.1	498.0	1,688.7	116.0			1,804.7	1,920.7	2,056.8	2,418.7	6,928.9	7,436.6	32.5
Virginia & Southwestern							1.9				1.9	1.9	1.9	1.9	203.0	203.0	.9

[1]Freight Line.

MILEAGE OF RAILWAYS OPERATED UNDER THE BLOCK SYSTEM, JANUARY 1, 1915—Continued

Names of railroads.	Automatic block signals.						Nonautomatic block signals.						Total automatic and nonautomatic.		Total passenger lines operated.		Per centage block signaled, miles of track.
	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Single track.	Double track.	Three track.	Four track.	Total. Miles of road.	Total. Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	
Southern Pacific—Sunset-Central Lines:																	
Galveston, Harrisburg & San Antonio	279.5	.....	.....	.....	279.5	279.5	1,233.7	.....	.....	.....	1,233.7	1,233.7	1,513.2	1,513.2	1,235.7	1,241.5	99.7
Houston & Shreveport	.....	.....	.....	.....	.....	.....	39.8	.....	.....	.....	39.8	39.8	39.8	39.8	39.8	39.8	100.0
Houston & Texas Central	2.9	.....	.....	.....	2.9	2.9	814.5	.....	.....	.....	814.5	814.5	817.4	817.4	749.9	751.2	99.8
Houston, East & West Texas	2.7	.....	.....	.....	2.7	2.7	188.2	.....	.....	.....	188.2	188.2	190.9	190.9	190.9	190.9	100.0
Lake Charles & Northern	.....	.....	.....	.....	.....	.....	44.3	.....	.....	.....	44.3	44.3	44.3	44.3	44.3	44.3	100.0
Louisiana Western	103.6	.....	.....	.....	103.6	103.6	198.3	.....	.....	.....	198.3	198.3	301.9	301.9	140.3	140.3	100.0
Morgan's Louisiana & Texas	95.3	.....	.....	.....	95.3	95.3	239.1	40.2	.....	.....	279.3	319.5	374.6	414.8	242.4	279.7	91.1
Texas & New Orleans	111.4	.....	.....	.....	111.4	111.4	397.7	.....	.....	.....	397.7	397.7	509.1	509.1	407.5	411.0	100.0
Southern Pacific—Pacific System	2,385.8	408.6	3.1	2.5	2,800.0	3,222.3	3,526.0	10.8	.....	.....	3,536.8	3,547.6	6,336.8	6,769.9	6,336.8	6,769.9	100.0
Spokane, Portland & Seattle	.5	6.8	.....	.....	7.3	14.1	.....	.....	.....	.....	.....	.....	7.3	14.1	540.0	550.0	2.5
Oregon Electric	1.0	6.9	.....	.....	7.9	14.8	.....	.....	.....	.....	.....	.....	7.9	14.8	7.9	14.8	100.0
Spokane & Inland Empire	.2	.....	.....	.....	.2	.2	.....	.....	.....	.....	.....	.....	.2	.2	168.3	187.3	.1
United Railways	1.1	.....	.....	.....	1.1	1.1	.....	.....	.....	.....	.....	.....	1.1	1.1	27.8	27.8	3.9
Syracuse, Lake Shore & Northern	16.7	5.9	.....	.....	22.6	28.5	.....	.....	.....	.....	.....	.....	22.6	28.5	32.3	47.1	60.8
Terminal Railroad Association of St. Louis	.....	6.0	.....	.....	6.0	12.0	.....	1.1	.....	.....	1.1	2.2	7.1	14.2	12.7	25.4	56.0
Terre Haute, Indianapolis & Eastern Traction	47.6	.....	.....	.....	47.6	47.6	.....	.....	.....	.....	.....	.....	47.6	47.6	366.1	366.1	13.0
Texas & Pacific	1.0	.....	.....	.....	1.0	1.0	.....	.....	.....	.....	.....	.....	1.0	1.0	1,879.8	1,879.8	.....
Tidewater Power Co.	.....	.....	.....	.....	.....	.....	6.2	.....	.....	.....	6.2	6.2	6.2	6.2	11.3	15.7	39.5
Toledo, Peoria & Western	.....	.....	.....	.....	.....	.....	.6	.....	.....	.....	.6	.6	.6	.6	230.7	230.7	.2
Toledo, St. Louis & Western	.....	.....	.....	.....	.....	.....	188.1	.....	.....	.....	188.1	188.1	188.1	188.1	451.0	451.0	41.7
Ulster & Delaware	24.1	.....	.....	.....	24.1	24.1	.....	.....	.....	.....	.....	.....	24.1	24.1	129.6	129.6	18.1
Union (Pa.)	.....	.6	.....	.....	.6	1.2	1.4	.....	.....	.....	1.4	1.4	2.0	2.6	7.4	14.8	17.6
Union Pacific	652.7	817.9	.....	1.7	1,472.4	2,293.2	10.9	.....	.....	.....	10.9	10.9	1,483.3	2,304.1	3,588.2	4,423.8	52.1
Oregon Short Line	519.9	106.9	.....	.....	626.8	733.7	.....	.....	.....	.....	.....	.....	626.8	733.7	1,742.6	1,849.5	39.6
Oregon-Washington Railroad & Navigation	603.4	26.8	.....	.....	630.2	657.0	1.3	.....	.....	.....	1.3	1.3	631.5	658.3	1,799.6	1,829.8	35.8
Union Traction Company of Indiana	49.9	.....	.....	.....	49.9	49.9	.....	.....	.....	.....	.....	.....	49.9	49.9	362.7	371.6	13.4
Virginia & Kentucky	.....	.....	.....	.....	.....	.....	.6	.....	.....	.....	.6	.6	.6	.6	4.8	4.8	12.5
Virginian	.....	.....	.....	.....	.....	.....	13.2	.....	.....	.....	13.2	13.2	13.2	13.2	470.0	470.0	2.8
Wabash	9.7	100.5	.....	.....	110.2	207.5	1,520.1	239.8	.....	.....	1,759.9	1,999.7	1,870.1	2,207.2	1,978.6	2,345.4	94.1
Wabash-Pittsburgh Terminal	.....	4.1	.....	.....	4.1	8.2	.....	.....	.....	.....	.....	.....	4.1	8.2	63.3	67.4	12.2
Washington, Baltimore & Annapolis	13.8	.....	.....	.....	13.8	13.8	.....	.....	.....	.....	.....	.....	13.8	13.8	52.2	84.3	16.4
Washington Southern	.....	4.1	.....	1.5	5.6	14.2	.....	28.5	.....	.....	26.5	53.1	32.1	67.3	32.1	67.3	100.0
Washington Terminal	.....	1.1	.....	1.0	2.1	20.4	.....	.....	.....	.....	.....	.....	2.1	20.4	2.1	20.4	100.0
Washington Water Power Co.	22.5	.....	.....	.....	22.5	22.5	.....	.....	.....	.....	.....	.....	22.5	22.5	22.5	22.5	100.0
Western Pacific	11.2	.....	.....	.....	11.2	11.2	.....	.....	.....	.....	.....	.....	11.2	11.2	11.2	11.2	100.0
Western Maryland	62.0	.....	.....	.....	62.0	62.0	.....	.....	.....	.....	.....	.....	62.0	62.0	662.7	735.0	8.4
Total	13,763.9	14,262.6	412.4	1,424.6	29,863.5	49,442.1	59,271.5	7,152.6	226.0	95.0	66,745.1	74,672.9	96,608.6	124,115.0	193,180.2	223,081.3	.....

tensive adoption of the manual block system on the Southern Pacific, as here noted, is now published for the first time.

It will be noted that the number of roads reporting block signal mileage for the first time is quite large; and in addition to those which appear in this table, the larger table shows also the following: Eastern of Kentucky; Huntingdon & Broad Top Mountain; Kansas City Terminal; Mineral Range; Nevada Northern; Pittsburgh, Shawmut & Northern, and a number of electric roads.

The cases of the New Haven and the Southern Pacific, just mentioned, are not the only ones in which there is a discrepancy between the data given to the *Railway Age Gazette* and that given to the government. As in former years, the time which elapsed between the sending of reports to the *Railway Age Gazette*, about December 1, and that when the statistics were sent to the government, about January 15, seems to have produced both increases and decreases. The following six roads reported a mileage to the government smaller than to us by the differences shown, the *Gazette* figures being shown first and the government figures following. Central New England, 264—71; Central of Georgia, 73—55; Chicago & North Western, 3,725—3,598; Ft. Dodge, Des Moines & Southern, 120—16; Michigan Central, 1,306—1,163; Southern, 2,378—2,057.

The following three, in addition to the two named above, show increases: Chesapeake & Ohio, 2,008—2,083; Chicago, Milwaukee & St. Paul, 4,386—4,717; St. Louis & San Francisco subsidiaries, 0—625. Many smaller roads show slight differences. The following roads, reported by us, do not appear in the government table: Florence & Cripple Creek, five miles; Rock Island Southern, 80 miles; South Dakota Central, 103 miles.

In the reproduction of Table No. 1, a number of explanatory notes have been omitted, the information contained in them being mainly a repetition of what has been published in former years.

No less than 686 miles of road operated by the manual block system is reported as equipped also with automatic signals, which are not reported in the table of automatic mileage. The roads reporting this apparent duplication are the Atchison, Topeka & Santa Fe; Baltimore & Ohio; Louisville & Nashville; Pittsburgh, Cincinnati, Chicago & St. Louis; Southern Pacific; Wabash.

Table No. 2 shows a decrease in the miles of road equipped with exposed disk signals of 53 miles; and of 68 miles in enclosed disks. On the Reading there is an increase in the item of enclosed disks, of about 38 miles of road, but on the two other roads which make extensive use of these signals—the Chicago & North Western and the Lehigh Valley—there are considerable decreases. The total of miles of road equipped with electro gas signals is 891, an increase of 372 miles which, however, appears to be due to errors in last year's statement. The Delaware & Hudson reports 318 miles of road using these signals, and the Atchison, Topeka & Santa Fe 78 miles.

The mileage of automatic block signals not classified is 353 miles. This represents mostly electric railways.

Tables 3, 4 and 5 give further details concerning methods and apparatus used with the manual block system, styles of automatic signals, data concerning alternating current, etc., and colors of night indications, all tabulated in the same shape as in the last preceding bulletin. Telephones are used in manual block signaling on 28,364 miles of road, or 2,122 miles more than on January 1, 1914.

Tables 6 and 7 give the number, types and characteristics of interlocking plants, with a variety of information concerning details of design and of practice. As heretofore, these tables appear without totals for the whole country, for the reason that a considerable number of interlocking plants are reported each by two or more different roads.

Telephones are used for the transmission of train orders on 93,467 miles of road, or 16,175 miles more than on January 1, 1914.

Russian Railway Affairs.—The Ministry of Ways of Communication has agreed to the need for widening the Archangel Railway next autumn to full gage.

Maintenance of Way Section

The Wage Differential

Officers in the maintenance of way department are familiar with the marked change in the personnel of their employees and also in the attitude of the men towards the companies during recent years. The primary reason for this, the continually increasing difference between the wages of organized and unorganized employees, is pointed out in another column. This problem is a difficult one for the railway managers to solve. Every one will admit that the present practice of increasing wages only where the companies are unable to resist the demands of the employees is a short-sighted one, but no manager has yet had the temerity to raise the wages of unorganized employees to the same basis as those for organized labor in the face of decreasing net revenues. Under present conditions the maintenance of way department employees, who are unorganized, suffer in comparison with those of the mechanical and transportation departments, who are very largely organized. This condition cannot continue indefinitely, and its results are distinctly evident today in the rapidly decreasing efficiency of the men in the former department and in the absence of the loyalty so marked among trackmen a couple of decades ago. It will take courage to meet this issue fairly, but it must be met in the near future, and temporizing with it only increases its difficulty.

The Selection of a Ballast Supply

The ballast best adapted to the needs of a particular railway may be of one material, while that most economical may be of an entirely different character. In other words, the kind of ballast it may be most practical to use depends upon the traffic, topographic and climatic conditions of the track to be ballasted, and also on the kind of material available. There is some particular kind and source of ballast most economical for any particular location. One sees material hauled long distances because of its excellent quality, the long haul making it unduly expensive by the time it is placed in the track. On the other hand, one also sees inferior ballast placed in the track when a better quality can be secured with a slightly longer haul. He also sees one road covering stone ballast with gravel and other placing stone on top of gravel. Between these extremes there is a mean. This prompts the suggestion that on a system of any magnitude a careful survey of ballast conditions can well be made, showing all the available sources of supply, and the relative merits of the different kinds for local purposes. From such a survey the most economical sources of supply can be determined, as well as the limits between which the material from any particular source should be secured. A survey will show the extent to which present practice based on general estimates is sound or unsound. Of course, in some localities there is little choice as to the material to be used, but on most roads this is not the case.

The Merits of Cinders as Ballast

The merits of engine cinders as ballast material are not sufficiently realized on many roads. With the exception of those burning oil in the southwestern and western states, almost every railroad produces large quantities of cinders. Too often they are considered a cause of necessary expense and are wasted or used only for filling. While their quality varies with the character of the fuel burned, in most cases they make excellent ballast for branch lines, or even for freight lines of relatively heavy traffic. They provide excellent drainage and are easily worked, while in many parts of the country they have relatively long life. Because of their relative cheapness, they can frequently be used to improve the condition of branch lines where heavy expenditures might not be justified. Their use should be more seriously considered in connection with other ballast materials.

Motion Study in Track Work

A roadmaster in a northern state was overheard taking a section foreman to task because one of the track laborers was observed to rest his elbow on his knee in lifting his tamping pick. The roadmaster closed his remarks by stating that no man who followed that practice could work on his district. If he should travel through the South he would see many colored track gangs at work, not one, but all of whose members would be observed to be doing the same thing. It is not our intention to discuss the merits of this or any other method of handling a tamping pick, but simply to call attention to the fact that motion study has never been seriously undertaken in connection with track work. Surely there could be no more simple or practical matter to which such study could be applied. References to the proportion of railway revenues expended for track labor have been made too often in these columns to require repetition. A proper study of this subject would involve a relatively insignificant outlay. The objection that the class of track laborers now available is not sufficiently good to offer an inviting field for such study, is answered by the fact that some of the earliest and most successful experiments in motion study related to the very simple tasks of lifting and carrying pig iron. Observations of track work in various parts of the country disclose wide differences in the methods used in doing the same tasks. While it is impossible to say that the method used at one place is correct, and that used at another wrong, there are certain to be material differences found in the efficiency of the several methods investigated. An effort to determine which is the best deserves serious consideration.

Standards of Maintenance

In the conference on valuation held in Washington a few weeks ago, Director Prouty of the department of valuation of the Interstate Commerce Commission asked how deferred maintenance could be determined and whether, comparing one road with a high standard of maintenance and another with a low standard, the one with the low standard should be considered to have deferred maintenance. For instance, one road may paint its stations at intervals of four years and another every six years. Would a union station at a junction point be maintained to the proper standard if it had not been painted for five years? This at once raises the question of how a standard of maintenance is determined. Every road must decide on the standards to which it will keep up its property. A road with a large proportion of heavy freight traffic is not justified in maintaining its tracks to as high standards as one with an equal traffic consisting largely of fast passenger trains. Likewise, track which will ride well at 40 miles an hour may not ride so well at 60 miles an hour. Maintenance of way expenditures are of two kinds, those which make for ultimate economy, such as the use of treated ties, and those necessary for the normal upkeep of the property. It is with the latter class that we are most directly concerned here. It is unfortunately, but necessarily, true that the basic factor governing the standards of maintenance on many roads is the amount of money they can afford to spend. However, on the average

road and during average years money is available for necessary and prudent expenditures. To make these expenditures most economically, those in charge must necessarily determine the standards justified by the traffic not only for the system as a whole but for each subdivision separately. The economy attending this distribution will depend upon the closeness of this determination. From this it can be seen that the answer to Director Prouty's question depends entirely upon local conditions and can only be answered in the light of a definite statement of facts for each particular location.

The Problems of the Supervisor of Bridges

The problems confronting the master carpenter or supervisor of bridges and buildings on the average road differ widely from those contronting the supervisor of track. The duties to be performed are of greater variety, and the difficulty of adequately supervising the gangs is greater. On most roads the bridge supervisor is responsible first for the maintenance and repair of the bridges on his territory. He must give his personal attention to their inspection at regular intervals and direct the work of the bridge carpenters, concrete gangs, pile driver crews and other forces engaged in the renewal or replacement of all but the larger structures. The supervisor of bridges and buildings is also in charge of building repairs, including stations, shops, coal chutes and other buildings on his territory. He has charge of their painting at regular intervals, as well as the painting of bridges, roadway signs, etc. Another important branch of his work is the water service. Usually he is not only in charge of the installation and maintenance of water stations, including the pumps, pipe lines and tanks, but of their operation as well, and the pumpers are carried on his time roll. In short, he is usually in charge of all maintenance other than that of track and signals. The supervisor of bridges usually has a considerably greater mileage than the supervisor of track, his territory frequently coinciding with that of the division superintendent. His gangs are scattered over the division, handling the various specialized problems and frequently moving rapidly from one small job to another, so that under the most favorable conditions a large portion of the time of the employees of this department is necessarily lost in traveling from one place to another. The wide variety of work, requiring men of different experience and skill, and provided with different kinds of tools, combined with the large mileage of line covered, make the securing of economical results in this department very difficult. Furthermore, this scattering of forces makes adequate supervision almost impossible. On some of the more intensively developed roads in the east these conditions have been greatly improved by subdividing the work and reducing the units of supervision. It is entirely possible that this plan can be followed to good advantage on the more important divisions on other roads, subdividing the work either by territorial lines or concentrating certain classes of work over the entire division, as, for instance, water service, with certain gangs. The most practical means of securing more satisfactory results under existing conditions is receiving serious attention on a number of roads.

THE LABOR PROBLEM

SINCE the beginning of railway operation maintenance of way work has been done almost entirely by company forces paid at a flat rate. This is strong circumstantial evidence that such a practice is the best. It is not, however, conclusive. Changed conditions require revised methods in all industries. No one will disagree with the statement that the character of the labor employed in the maintenance of way department has deteriorated within recent years, and the end does not appear to have yet been reached.

The experiment of the Michigan Central in placing ballast under its main tracks by contract, is one attempt to deal with present unfavorable labor conditions. Such a practice would be pronounced impracticable by many if it had not been worked out successfully on this road during the past six years. While contract work in a way, this plan of the Michigan Central in its mode of application is essentially a piecework system. The railroad furnishes the ballast unloaded along the track and the contractor places it at certain fixed unit prices. The company, therefore, provides the material and the contractor assumes the responsibility for the organization and handling of the labor. The incentive of personal gain is one of the strongest that influences mankind. In a large organization, such as that of a railroad, the feeling of personal responsibility for results is not developed as fully as in smaller organizations and many men become mere cogs in a machine. Under the Michigan Central plan the contractor secures directly for himself the benefit of the savings made by any increase in the efficiency of his men. He therefore has a personal interest in accomplishing the maximum amount of work and will put forth greater efforts than the average section or floating gang foreman. He will not only try to secure greater results from his men on the work, but he will naturally select his forces with more care and with more consideration of their qualifications for the work in hand.

He is also free from many of the regulations about rates of pay, etc., governing railway work. By securing reasonably low unit prices in the contract the railroad shares with the contractor in his savings, while the standards of work are maintained by proper inspection. Such a plan is not necessarily limited to ballast work, but is equally applicable to much of the other work commonly done. As with any experiment, great care must be exercised in the selection of the contractor and his foremen to get men who are familiar with the work and who will exercise the necessary precautions for the safe conduct of traffic. In this instance, former employees of the road who were known to be capable were given the contracts.

The method used by the Michigan Central is but one of many that may be employed to create an increased interest and sense of responsibility among track employees. Another road has given careful consideration to a plan whereby certain section foremen will be given definite allowances for labor from month to month and then be permitted to hire their own men and to conduct their work as they believe best, subject to suitable supervision. Any savings made out of their allowances go to the foreman, the idea being to cultivate in these men a sense of proprietorship in their sections whereby they will exercise the same care in the expenditure of the company's money as they would exercise in the spending of their own.

Another eastern road made careful time studies from which it determined the present and possible average unit costs of various items of track work. Standards were then placed before the laborers as well as the foremen and the company divided the savings resulting from the increased output with the men. Although this plan was only in effect a few months, the unit performances increased steadily.

We have given much space in these columns to these and similar developments of methods of increasing the efficiency of the labor in the maintenance of way department, as we believe that herein lies the greatest opportunity for economy in this department. Almost 60 per cent of all expenditures for maintenance of way and structures are for labor, as compared with 40 per cent for materials, in which, from their very nature, only relatively small savings can be made. The expenditures for labor offer a very promising field for careful study. All of the developments to which we have referred may be considered to still be in the experimental stage, and while perhaps the methods used may not be practicable for universal or even wide application in their present form, they may be capable of modification to meet varying conditions. The results to be secured warrant sympathetic and careful study.

NEW BOOKS

Proceedings of the American Wood Preservers' Association. Size 6 in. by 9 in., 527 pages, illustrated. Bound in cloth. Published by the American Wood Preservers' Association, F. J. Angier, secretary-treasurer, Mount Royal Station, Baltimore, Md. Price: cloth, $3.50; paper, $2.50.

The eleventh annual convention of the American Wood Preservers' Association was held in Chicago, January 19-21, 1915. This volume contains the complete proceedings of that convention, which was one of the best in the history of the association. A valuable feature of this book is the statistical information relative to the quantity of wood preservatives consumed and the amount of wood treated in the United States in 1914 and a list of the timber treating plants in operation with data concerning each. There is also published a list of almost 400 United States patents relating to wood preservation.

The Railroad Taper. By Lee Perkins, formerly assistant engineer, Southern Pacific Lines in Arizona and Mexico. Size 4 in. by 6¾ in., 355 pages, 41 figures, 42 tables. Published by John Wiley & Sons, Incorporated, New York City. Price $2.50.

This handbook contains an extension and elaboration of a transition curve devised a number of years ago by William Hood, chief engineer, Southern Pacific, and used extensively on those lines. This transition curve is theoretically a series of compound curves with 30 ft. chords and the tables are prepared so that it may be run with one setting of a transit. All the functions for both field and office work are given for 11 different easements of increasing increment, although three will meet almost all ordinary demands except in mountainous country. The spiraling of old curves is treated separately from that on new work. The discussion of the theory underlying this spiral is followed by the usual complete series of tables.

American Railway Engineering Association Proceedings. Size 6 in. by 9 in., 1,562 pages, illustrated. Published by the American Railway Engineering Association, E. H. Fritch, secretary, 900 S. Michigan avenue, Chicago. Price: paper, $6; cloth, $6.50; half morocco, $7.

This volume contains the complete reports presented before the sixteenth annual convention held in Chicago, March 16-18, 1915, with discussions. It also contains 11 monographs previously published in bulletin form during the year by the association. These proceedings are so well known among railway men that little description is necessary. They form a valuable and necessary part of the library of every railway officer concerned with construction and maintenance of way problems. The book is the same size as that of last year and is printed on thin paper in order that it may be bound in one volume.

Tunneling. By Eugene Lauchli. Size 6 in. by 9 in., 238 pages, 197 illustrations. Bound in cloth. Published by the McGraw-Hill Book Company, New York City. Price $3.

The very rapid and important development that has taken place in tunneling methods and machinery in recent years is in itself a sufficient justification for a new treatment of this subject, and the author has kept in mind the needs of the engineer in discussing these improvements. The book avoids long detailed descriptions of individual tunnel projects and arranges the discussions under the natural divisions of the work of driving and lining a tunnel. In developing the theoretical portions and in the discussion of current practice, however, frequent references to individual tunnels are included. The size of the book precludes a detailed treatment of numerous allied subjects, such as drilling machinery, compressor and ventilating plants and explosives, but ordinarily data on these subjects is readily available elsewhere. Of course, however, in discussing new methods of driving tunnels and of lining them, it is necessary to refer to and to some extent to describe the new types of machinery which have made the new methods of work possible.

Letters to the Editor

THE RISING WAGE DIFFERENTIAL AND THE CURE

CHICAGO, ILL.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

As a preface to what follows in this article the writer desires to state that he is not opposed to high wages, nor does he attack as a principle the right of employees to organize in just efforts for their protection and the improvement of conditions. Organization of a few branches of the service, however, has militated against the best interests of those departments which have not organized and which will not or are not in a position to identify themselves with protective affiliations.

In the early days of railroading and other industries in this country there was present a keener sense of loyalty and respect than prevails today, and this fact can be explained by an inspection of the relative treatment accorded to the organized and unorganized branches of the service. As in the case of an individual, no group or large body of men will have either respect or loyal feelings for an employer from whom they extract increases in pay or improved conditions as a result of concerted action of their own whether it be by political influence or sheer force of numbers. This explains the attitude of that group included in the large brotherhoods of this country and an appreciation of this fact will clear the way for an understanding of the reason why the unorganized branches are beginning to lose the old-fashioned sense of loyalty for the respective managements under which they labor.

The enforced recognition of the brotherhoods has worked untold harm on the unorganized branches in that the wages of the former have been boosted so high that the amount or relative importance of the work done is not a factor in determining the rates paid. Thus has come a strange and unnatural relation which may be termed the rising differential.

As successive and successful demands for increases have been made by the brotherhoods, the ratio representing the wages paid to them and to the unorganized branches has steadily risen and the difficulty of securing and retaining the right sort of men has proportionately increased. Loyalty thrives on only one thing —just treatment for all hands. This slogan has been absent from railroad wage adjustments for many years.

The railroads of this country have been very short-sighted in their method of handling wage matters. By ignoring costs of living and by deferring normal increases in pay until forced to make unjust distribution to a few favored departments, they have automatically placed a premium on organization and almost entirely killed that great feeling of loyalty that once existed. Though "almost" killed, there is still left of loyalty a small spark and it can be nourished and warmed into something substantial if steps are taken in time. In the writer's opinion the only cure lies in the establishment of a fixed policy on the part of the railroad managements to the effect that no increases will in future be made to any branch or department individually.

In other words, every increase must be a flat per cent increase on the wages paid to each and every one in the service. Such a policy as this would give to the railroads the greatest bulwark they could possibly secure, as it would make for ultimate peace. If the organized branches were to attack this principle, they would at once forfeit the sustaining power of public opinion, as the utter selfishness of such action would stand forth unmasked. The rising differential is a fact and is a monstrosity born of cupidity and cowardice: cupidity on the part of the organized branches through their clearly defined policy of looking only to their own interests, and cowardice on the part of the railroad managements which should have fought the issue years ago. The fight must be fought some day and the longer deferred, the harder will the contest be.

DIVISION ENGINEER.

The Stripping of Gravel Pits by Hydraulic Methods

An Outline of the Conditions Under Which this Practice is Economical and the Manner of Handling the Work

By W. H. Wilms

Manager, Universal Sand and Gravel Company, Brooklyn, Ind.

During the past ten years there has been a rapid increase in the use of the hydraulic method of earth removal. Engineers are just beginning to appreciate the possibilities of this method of excavation, and the next decade will undoubtedly witness a still greater development and growth in hydraulic excavation. The filling of trestles on the Northern Pacific and the Canadian Pacific at a cost of from 4 to 13 cents per cubic yard; the removal of 34,000,000 yd. of material in the regrading of Seattle, Wash.; the hydraulic construction of large embankments on the Pacific coast extension of the Chicago, Milwaukee and St. Paul; and the more recent construction of the Fernando dam of the Los Angeles acqueduct, where about 2,000,000 yd. of earth were sluiced at a total cost of 7 cents per yard are recent examples. The remarkable results obtained in these cases seem to be little realized or appreciated by many engineers unacquainted with this class of work.

A comparatively large field for this method of earth excavation is in stripping the overburden of gravel ballast pits and stone quarries. Conditions about a gravel pit are quite often favorable to the hydraulic method of stripping. The soil is generally a loam or soft clay that can be handled very effectively with water. A great many gravel deposits are either very close to a stream or river or underlaid with water, an ample supply of water thus being assured. The sluiced material can also be dumped in many cases into the abandoned or worked-out portions of the pit. Where this is possible, ample dumping grounds and sufficient grades for the flumes are generally assured.

Very little if any information of value on the hydraulicking of earth exists in published form. What has been printed is generally of a very meager nature and incomplete in its details. What information of value does exist, relates to the hydraulicking of auriferous gravel which requires much greater quantities of water proportionately than loam or soft clay. The Seattle regrade work and the Chicago, Milwaukee and Puget Sound embankment work, previously mentioned, were gravel or glacial drift; in the former case the material consisted of about 65 per cent gravel and 35 per cent very hard clay, the clay being so hard that it was necessary to use powder to effect its removal by the water; in the latter case the sand and gravel content was equally high. The results of these undertakings, therefore, afford us no criterion as to what can be accomplished in the hydraulicking of ordinary earth, such as loam or soft clay.

The conditions necessary for hydraulicking are an abundant water supply; a material that can be effectively sluiced with water; a dumping ground for the sluiced material; and ample flume grades to the dump. Where all of these conditions are favorable, hydraulicking becomes the most efficient and economical method of earth removal known. However, if any one of these conditions is lacking or decidedly unfavorable, hydraulicking is almost sure to prove a failure. In considering an hydraulic installation, therefore, it is necessary to investigate thoroughly and completely, and to analyze the above conditions before deciding on this method of excavation. The depth of the overburden is also to be considered. If the stripping is shallow, not exceeding 3 ft. in depth, and a large daily output or yardage is desired, the hydraulic method should be adopted with a great deal of caution.

DUTY OF THE WATER AND SIZE OF INSTALLATION

The amount of water necessary to move one cubic yard of material depends upon the grade of the flumes, the character of the material and to a more or less extent upon the pressure of water available. The quantity of water is of more importance than the pressure. Comparatively light grades can be used for the flumes if a sufficient quantity of water is present to effect complete suspension. Clay requires more water, greater pressure and greater flume grades to handle than ordinary loam or dirt. The amount and size of rocks, if any, also effects appreciably the duty or carrying capacity of the water. It may be said, however, that as a minimum, with ordinary loam or soft clay and flume grades of 7 to 9 per cent, 10 cu. yd. of water are required to move 1 cu. yd. of material. As a basis for an estimate, however, it is generally not advisable to depend upon a greater percentage of spoil than 15 per cent for loam or dirt with the usual flume grades of 7 to 9 per cent. For soft clay and heavy, sticky loam, 10 to 12 per cent can be considered a safe estimate where 7 to 9 per cent grades can be obtained. The above duties are based upon a flow of 1,000 gal. per min., which is considered by the writer as the minimum discharge advisable for hydraulicking.

In stripping gravel deposits a considerable amount of water is lost by flowing down into the gravel, which must often be considered in estimating the necessary water supply. If the top strata of the gravel deposit is a sand or compact gravel this loss is generally insignificant, amounting to only 2 or 3 per cent. If, however, the top strata is a coarse, loose gravel, the loss from this source may be as high as 10 per cent.

A pressure of from 40 to 60 lb. per sq. in. at the nozzle is usually sufficient for the sluicing of loam or dirt. For soft clay and some heavy loams, 60 to 80 lb. pressure is usually required. A pump having a capacity less than 1,000 gal. per min. should not be installed. A 1,500-gal. discharge would be more efficient, and for the ordinary installation is to be preferred. With such a discharge, using two nozzles, and with favorable grades, it should be possible to sluice from 450 to 700 cu. yd. of material per day of 10 hours. A crew would ordinarily be required for such an installation consisting of one pumper or engineer; two pipemen; one assistant to the pipemen; three laborers and a foreman tearing down and erecting flumes; and one laborer on the dump.

FLUMES

The water supply, the character of the overburden and the fall available to the dump determine the grades of the flumes. In the stripping of gravel pits where the excavated space is used as a dumping ground, ample grades for the flumes are generally assured. Full advantage, however, should be taken of all the fall available, a difference of only 1 per cent in the grade of the flume effecting a great difference in the carrying capacity or duty of the water. Where the available fall makes necessary the use of low flume grades much larger quantities of water are required to effect complete suspension of the material. For stripping service grades lower than 6 per cent should not be used. Where 3 per cent and 4 per cent are the maximum that can be used, the quantity of water necessary for the operation of such low grades is so great that hydraulicking fails to show any great economy over other methods. While it is true that grades as low as 3 and 4 per cent are often used in large hydraulic mining operations, it should be remembered that in such operations the flume grades must be kept comparatively low, so that the velocity of the water will not be so great as to prevent the gold from settling in the riffles in the bottom of the flume. The object here is to use sufficient water to transport the gold bearing gravel and flume grades that will not cause excessive velocities. It is because of this fact that the carrying capacity of water in hydraulic mining is very low, the

material excavated amounting to only about 2 to 6 per cent of the water used.

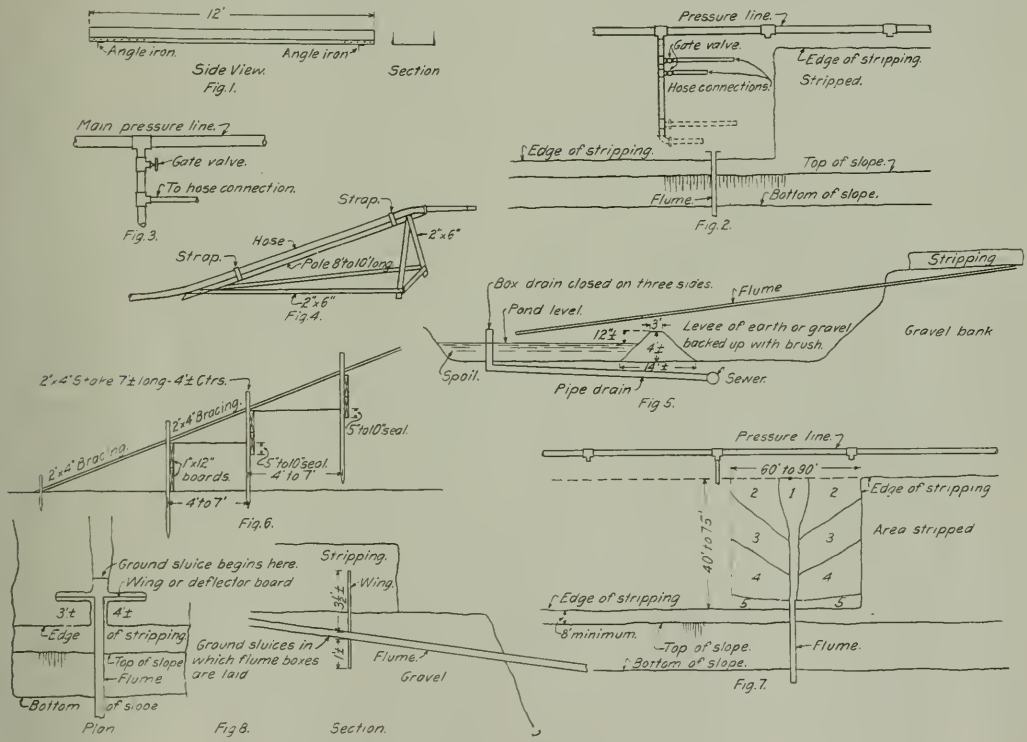
Where conditions will permit, the flume grade should be at least 7 per cent; 8 to 10 per cent grades with an abundant supply of water are considered very satisfactory grades, and are usually obtainable in stripping operations where the material is sluiced into the workedout portions of the pit. These remarks apply only to box flumes. Where ground sluices are used considerably heavier grades must be used, as they are very likely to become clogged up from roots, gravel, sticks and pieces of sod. In such cases the writer prefers to use flume boxes in these open sluices as shown in Fig. 8. The time required to place them will be but a fraction of that lost in continually cleaning out the open ditch.

Flume grades should be made as uniform as possible. A slight break in the grade will often cause clogging, especially if a sandy loam is being handled. Abrupt changes in the alinement of the flumes are best made by making a break or drop in the flume grade.

Sand requires heavy grades and shallow sluices. Wide, shallow sluices should be used where the grades are light. If the overburden contains many stones and boulders deep, narrow sluices should be used. In this case, the depth of the water in the flume should be equal to the width of the flume. The width and depth of flumes depends largely upon the character of the material as well as the water supply.

The rectangular section for flumes is generally to be preferred to the semi-circular or elliptical section. A large amount of the material carried by the water travels or rolls on the bottom of the flume. Where the circular section has been used the wear on the flume has been confined to a relatively small area in the lowest part of the section. Where stones or gritty material are present in the overburden this wear becomes excessive, the metal wearing through and becoming full of holes in a very short time. With the square or rectangular section, however, the wear is quite evenly distributed over the bottom, resulting in a much longer life of the flume.

In order that the flumes may be easily and quickly erected and taken down they should be built in sections or boxes from 10 to 12 ft. long. Both wooden and metal flumes are used. Wooden flume boxes have proven very unsatisfactory for stripping service, as they quickly become water soaked and heavy, and when dried out, check and split badly. Moreover, in the constant rehandling of the flume boxes, they go to pieces very soon. In stripping, flumes are changed many times and a flume box should be built that will not only stand the excessive wear and abrasion of the material being carried, but the rough and constant handling as well. For this service the metal flume is probably the best suited. Fig. 1 is a sketch of a steel box flume that has given very good service. This flume is constructed of No. 14 gage steel, and is made in sections 12 ft. long.



Flume Construction for the Stripping of Gravel Pits

It sometimes becomes necessary to carry the sluiceway or flume through an intervening ridge to obtain a dumping ground for the sluiced material. If the tunnel has a heavy grade, vitrified sewer pipe will prove satisfactory. If the grade is light, however, any slight settlement of the pipe joints is liable to cause clogging. Under such conditions riveted steel pipe in lengths of 20 ft. or more has given very satisfactory results. Pipe of No. 16 to No. 14 gage steel has been used for this purpose.

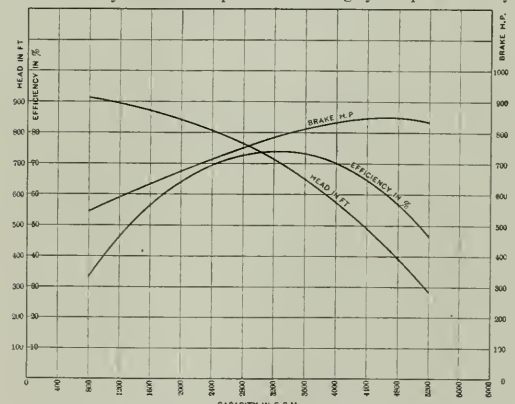
PIPE LINE

For diameters up to and including 10 in. standard lap welded

steel pipe is recommended for the pressure line, there being very little difference in the cost of this pipe and spiral riveted pressure pipe. Above 10 in., however, there is a decided difference in cost between the lap-welded and spiral pipe in favor of the latter. However, if the pipe is to be subject to frequent changes and rehandling, a very heavy grade of steel is necessary in spiral riveted pipe which may entirely wipe out this difference in cost. Owing to frequent rehandling, the asphaltic or tar covering of the spiral pipe, also suffers. Longitudinal riveted steel pipe is not usually obtainable in the sizes ordinarily required for hydraulic operations of moderate size, 20 in. being about the minimum diameter obtainable.

On account of the frequent shifting and changing of pipe a large number of flanged joints in the pressure line are desirable. Standard companion flanges and not flange unions are preferable.

All abrupt angles and changes in the pipe line should be securely anchored, as the water hammer and expansion stresses are extremely severe. Expansion can largely be prevented by



Curves Showing Characteristic of Worthington Turbine Pump

providing one or two gate valves and keeping the line full of water at all times. If the pipe line is particularly long and entirely exposed it may be necessary to provide a heavy expansion joint in the line. Leaky joints and broken flanges are generally the result of failure to provide for this expansion. Where the pipe line is to be permanent, it is advisable to bury it under at least 12 in. of ground.

While local conditions more or less determine the method of arrangement of pipes, Fig. 2, shows an arrangement that has proved very effective. After the overburden for one complete shovel cut has been removed, the main pressure line is uncoupled at the flanges and the pipe rolled back in sections and coupled up again preparatory to another cut. A gate valve is provided in each of the two leads from the main line, making it possible for the pipemen to change their positions without having to shut down the pump. Fig. 3 shows the method of accomplishing this where one nozzle only is being used. For handling from 500 to 700 gal. of water per minute at pressures ranging from 40 to 80 lb., the maximum amount of water at such pressures which it is advisable for one man to handle under conditions of comparatively shallow work, 3½ and 4 in. diameter 6-ply rubber hose has proven the most effective and economical. For ordinary stripping operations 50 to 75 ft. of this hose is usually sufficient. The writer has used 4 and 5-ply rubber hose for this service, but such hose quickly goes to pieces under this constant, hard and severe service. The writer has also used small monitors or giants with 4-in. pipe connections. With the ordinary depth of stripping of from 4 to 8 ft., however, monitors are not to be recommended, as too much time is lost in making and changing pipe connections.

Short play-pipes choke down the water too suddenly, causing a very irregular stream. Play-pipes at least 30 in. in length with a uniform taper, and provided with a small and a large screw tip or nozzle, should be used. A smooth, plain bore and not a ring nozzle should be used. A very convenient and practical device for supporting the hose and play-pipe is shown in the sketch of Fig. 4.

PUMPS

The reciprocating pump has an advantage over the centrifugal turbine pump in the great variation in pressure at constant discharge that it is possible to secure. Its disadvantages are its high first cost in the larger units, such as are necessary for hydraulic operations, and its low efficiency.

The turbine centrifugal pump is now almost universally accepted for all services where it is desired to deliver large quantities of water against high heads. It must not be inferred from this statement that the turbine pump is always to be recommended in preference to the reciprocating pump, as this is not the case. There is a limit to its application, but this limit is being continually widened by improvements in design, and at the present time the turbine pump is successfully employed for service where the reciprocating pump has been used exclusively heretofore.

The two principle factors which have assisted in the development of the turbine pump are the high speed motor and the steam turbine. The high speeds thus obtained make it possible to design a pump with comparatively few stages and with impellers of small diameter. This not only increases the efficiency of the pump, but also considerably reduces the cost. Turbine pumps are now built having efficiencies closely approaching 80 per cent.

Fig. 9 shows an average characteristic curve for a Worthington turbine pump operating at constant speed. It is shown that an increase in the head pumped against causes a reduction in the capacity and the horsepower required, and likewise, a reduction in the head increases the capacity and horsepower. If the total head is greater than that for which the pump was designed, the quantity of water discharged will be less than the full capacity, and may be even nothing at all if the head is sufficiently great. The power will also be less than the power required for the head for which the pump was designed. If the total head is less than the head for which the pump is designed, the amount of water will be greater than the normal capacity of the pump, and the power consumed will be greater.

This illustrates the difference which exists between the turbine and a pump of the displacement type. With a turbine pump the speed at which the impeller operates bears a fixed relation to the total head pumped against, and in order to increase the head it is necessary to increase the speed or reduce the capacity. Theoretically, the head varies as the square of the speed, and the capacity directly as the speed. With a displacement pump, however, the discharge also varies directly with the speed, but the pressure remains constant. With this in mind, it is shown that data regarding the conditions of operation should be verified carefully, in order to get results with turbine pumps. This is particularly necessary when constant speed induction motors are used.

The turbine pump has a distinct advantage over the reciprocating pump in that it is impossible to subject the pump and piping to a dangerous pressure, due to sudden closing of the discharge. The only effect is a slight increase in pressure, and the load on the motor is considerably reduced. Furthermore, air chambers and relief valves are not necessary, as the pressure will never build up to a dangerous point, even though the discharge valve be entirely closed.

With ordinary turbine pumps the horse-power required when operating at heads considerably below that for which the pump was designed, causes a dangerous overload on the motor. By selecting an impeller of suitable characteristic, however, it is possible to confine the overload to less than 25 per cent, which is the rated overload for all standard motors.

Pumps for hydraulic service are generally arranged for direct-connected motor drive, but those of the belted type and also direct-connected steam turbine-driven pumps can be used to advantage. It is common practice in the larger installations to arrange the pumps in pairs, piped so that they can be operated either in parallel or series. This makes it possible to double the pressure by operating in series when a hard strata is encountered. For removing the softer material, the pumps are operated in parallel, and doubling the capacity increases in proportion the amount of material removed.

DEPOSITION OF THE OVERBURDEN

Where it is possible to sluice the material in the worked-out portions of the pit it will be necessary to construct a levee or dike to retain the material and prevent it from spreading over the entire bottom of the pit. Small levees can be built of gravel and backed up with brush, to retain the material and prevent overflowing. Sewer pipe or box drains are placed in the center of the pond thus formed, their tops brought up and kept flush with the pond level (Fig. 5). In many respects a better method of retaining the material is by means of sheerboards. This method, known as sheerboard construction, is largely used in the building of dams and fills by hydraulicking. Under many conditions it is cheaper and more effective than the construction of earth or gravel levees. In this method the material is retained by two or more small bulkheads or sheerboards made of two 1 in. by 12-in. boards, nailed to 2 in. by 4-in. stakes about 7 ft. long. The 2 in. by 4's are pointed at one end and driven into the ground on about 4-ft. centers. (See Fig. 6.)

After the material is carried up to the top of the first row of sheerboards, a second row is built from 4 to 7 ft. back of the first. The bottom of this top sheerboard is placed from 5 to 10 in. below the top of the lower bulkhead to prevent the material from bulging and flowing out between the two bulkheads. The amount of seal necessary depends upon the nature of the material being sluiced. In ordinary loam 6 in. has proven effective, while in fine clay or sandy loam 10 in. is often necessary. As many sheerboards are built in the above manner as are necessary to take care of the stripping over a given area. In this method the water is taken off the top through spillways, which lead to a pipe drain or to a reservoir where the water is again used for sluicing.

If the pit has no natural drainage for the waste water, it is often possible to install an auxiliary pump and use this water again for sluicing. It would be necessary, of course, to excavate or provide a basin or reservoir of moderate capacity in the bottom of the pit sufficiently low to take the drainage or overflow from the spoil bank.

If the flume grades are heavy, however, it is often possible to drive the material as it is broken down directly to the flume, thus greatly increasing the duty of the water. Such conditions are the exception, however, and ordinarily the material must be broken up and put more or less in complete suspension before the flume will carry it. In such cases the water should be so directed as to remain with the material as long as possible.

As an example of what has been accomplished, an overburden 6 ft. deep, composed of a heavy loam, has been sluiced off in strips 90 ft. long and 50 ft. wide. The top of the gravel was practically level, the ground sluice having a fall of 3 ft. in 50. With one setting of the flumes and pipe connections, therefore, it was possible to sluice something like 1,000 cu. yd. of material.

METHOD OF DEVELOPMENT

The overburden being comparatively shallow, the main purpose here is to sluice as large an area as possible with one set of the flumes and pipe connections. In most cases it will be possible to strip a width equal only to one shovel cut, which is from 30 to 50 ft. See Fig. 8. If the top of the gravel deposit has a slope towards the flume, however, a much greater width is possible, depending, of course, on the degree of the slope. In the other direction the distance it is possible to go is also limited by the available fall to the ground sluice. In beginning to strip a given area, a trench is dug by hand down through the overburden and into the gravel a sufficient depth to obtain the necessary fall or grade of the ground sluice, and back a distance of about 3 ft. from the face of the stripping to provide a shoulder. Two short trenches are then dug at right angles to the main trench to provide room for the wings or deflector boards at the head of the first flume box. Bents are then erected, the flume sections put in place and sluicing begun. A comparatively narrow trench is first sluiced out from the head of the flume back as far as the stripping is to be extended. The upper end of this trench is then widened out to permit the pipemen to get their hose down on top of the gravel where the streams can be more effectively used. The material is then sluiced off in the manner shown in Fig. 7.

After the shoulders (5) and (5) (see Fig. 7) have been decreased to a width of from 3 to 5 ft., to prevent sluicing a part of the material over the face of the gravel bank, the streams are directed against the opposite side of these shoulders and the material sluiced backwards in a diagonal direction to the ground sluice. To provide room for the pipemen in removing these shoulders and to prevent the edge of the stripping from caving in and falling down the face of the gravel bank, it is necessary to strip the first "cut" sufficiently wide to provide a berm or shoulder of at least 8 ft.

If the stripping is deep and it is not possible, owing to the limited fall, to get the ground sluice deep enough, it is often advisable to obtain the necessary fall by leaving a portion of the stripping on the gravel until the greater portion is removed, when this wedge-shaped section can be sluiced off by driving it to the flume. This method is used in stripping stone quarries where the former method of lowering the flumes in the gravel is impossible. Where this drive is long and the material hard to handle, such as soft clay, it is often advisable to effect only a partial "clean up" with the water, the remainder being more economically taken off with teams and scrapers.

The direction of the stream on the material will depend entirely upon the amount of water, the character of the material and the grade of the flumes. Ordinarily the material must be put more or less in suspension before the flumes will carry it. In such cases the stream is directed against the bank in a direction opposite to the flow in the ground sluice and flume.

ECONOMY METHODS IN TRACK WORK

By W. C. NISBET

It may be questioned whether progress toward better methods in maintenance of way has kept pace with that in the maintenance of equipment. While naturally favoring the former department on account of long association, the writer, after casting up all the new processes or devices along economy lines generally adopted in the past ten years, ventures the answer that our progress in this line has been slight. Full credit is given for the patient technical labor toward improvements of rail and joint design and for the attempts to increase safety of track while working under reduced appropriation; however, in this paper we are not concerned with design or directly with operation.

Motor section cars are typical of modern improved devices, and it is true that there has been a large increase in their use, though by no means as large as the economy derived from their use warrants. No doubt when hand cars were being introduced there were those who deprecated their use as uneconomical and unsafe and who continued to walk their men to work. Rail handling and ditching machines are also reasonably common, but for regular track maintenance the pick, shovel and spike maul continue to be universally used in spite of the available power for tamping, drilling rail and placing spikes which the gasoline engine of the motor section car furnishes. In this, we might with advantage adapt the power tamping machines of the French railways to our conditions. While much of our American track cannot be tamped economically in this way, even on our dense

traffic divisions little advancement in method has been made if the experimental air tampers on the New York Central and the Long Island are excepted.

One feature retained in the track department, but now largely abandoned in machine and car shops, is payment by an hourly rate instead of in proportion to output. Throughout all modern industrial fields, some form of incentive payment is in use wherever possible, ranging from plain piece work to standard time with premium. There is no doubt but that every man works harder and uses more thought as to his work if he is paid in proportion to what he produces. This results in lower cost per unit.

In track work it would generally be necessary to figure the gang payments collectively, but similar methods are used in certain operations in car shops and in many instances in other industries. This apparent difficulty has a corresponding advantage in the incentive given the foremen to have all the men in the gang competent. This is exactly what is desired by the management, but under the ordinary plan the condition is often quite different.

It has been stated that, on account of differences in topography, climate and traffic, track work does not allow payment by piece work; yet we know that some operations in the car shops, for example, putting in wheels, trucks and drawbars paid for regularly at piece rates, uniform over a whole system of railroad, are frequently done under different circumstances, weather conditions and in varying locations where the conditions of work differ widely. The reason why this arrangement is satisfactory is because the variations average each other in the long run.

Without attempting to give further arguments as to the possibility of payment according to performance in track work, it is sufficient to say that one of the trunk lines has been using this method on three of its most important divisions under varying conditions for two years. The hourly rate is used plus a bonus which increases in proportion as the standard is approached for all jobs on which standard times have been set. The proportion of time covered by the standards varies from 50 to 90 per cent, depending mostly on the time of year. During the tie renewal season the higher figure is reached. The bonus is a per cent of the wages of both men and foremen. Quality of workmanship is controlled the same way as in the many shops where the pay is in proportion to production, that is by inspection and restriction of bonus payments to proper workmanship.

Another broad field awaiting more intensive cultivation is the development of simpler manual processes for the many operations which must continue to be done by hand, a definite campaign to find the best way and a still more definite campaign to instruct the foremen in these methods and to see that they are followed. Long since nearly all railways have had standards for most of their structures and the system is accepted as satisfactory and distinctly advantageous. In the same way there should be standard methods for surfacing track, renewing ties, raising track, etc.

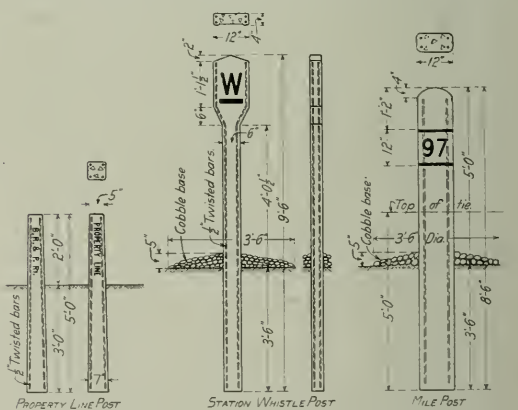
It may be quite generally supposed that in track work there can be but one method to follow in each operation or that if difference exists the result would show slight variation. The writer has looked into this subject on different railways during the last six months and the diversity of method found has been wide; in frequent cases there was great variation even on different sections of the same roadmaster's sub-division. An example of this was respacing ties in gravel ballast where one foreman was respacing 50 per cent more ties per man per day than any other foreman on the sub-division. The workmanship was excellent. The laborers were Americans, as was common in this locality. In this connection it is interesting to note that the second best production observed was made by a mixed gang of foreign laborers, rated as being indifferent workmen.

Some foremen are skilful and quick to find the easiest way to do any given piece of work; others, from inexperience or less ability, need careful teaching. Something more far-reaching than the usual roadmaster's supervision is needed, for, no matter how competent or alert the latter may be, he cannot leave the rest of the sub-division to itself while he teaches a green foreman for two or three days. The roadmasters as a class surely need no defense, as they constitute one of the finest types among railroad men in intelligence, loyalty and keen appreciation of responsibility, but they need assistance if the ideas advanced above are carried out.

Different opinions prevail as to the best method of furnishing such assistance. One way is to reduce the mileage of the sub-divisions. This is a simple plan, but it has defects. The writer favors the appointment of assistants who might be promoted from the foremen, members of the engineering corps or others who might be found to combine experience with the ability to impart knowledge and tact to follow up and check workmanship. These men should work under the roadmaster except as to standards which should be those set by the division engineers, just as the division engineer in the divisional organization takes orders from the superintendent except on engineering matters, in which he reports to the chief engineer or engineer maintenance of way.

B. R. & P. CONCRETE SIGN AND POST PLANT

The Buffalo, Rochester & Pittsburgh has adopted concrete posts and signs for a variety of uses and operates a plant at East Salamanca, N. Y., for the manufacture of these articles. Concrete fence posts are used universally, except in swamps and in places where there is a liability of slides, and since their adoption with the necessary concrete corner posts and braces they have proved very satisfactory. The company plant has manufactured about 15,000 of these posts, 500 concrete mile posts,



Details of Concrete Sign Posts

600 concrete property line posts and 100 concrete whistle posts. In addition, concrete signal foundations, concrete telephone booths and concrete pipe of various sizes are made at this plant.

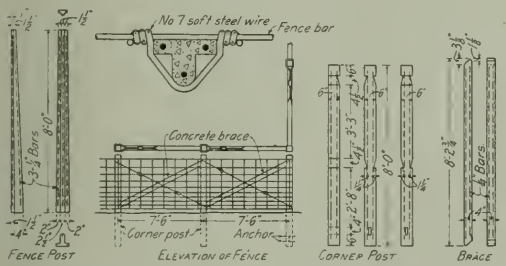
The post and sign plant is housed in a one-story building 90 ft. long and 19 ft. wide with an available floor space of 1,496 sq. ft. Coils of steam pipe are located under the concrete floor and along the sides of the building for heating, and a stationary boiler is provided in one corner to furnish the necessary steam. The cement to be used is stored in one end of the building, securely partitioned off to keep it perfectly dry. The balance of the building is used for the manufacture and curing of the posts and signs, which are stored here until required for use. No special equipment is required in this work other than ordinary concrete mixing tools, as the concrete is mixed by hand except in a few instances when a large amount is to be placed, requiring the use of a mixer to keep a supply on hand. The building is served by tracks along each side, allowing material

to be unloaded and the manufactured articles to be loaded with ease.

The designs of the principal signs and posts are illustrated in the accompanying drawings. The right of way fence posts are of the tapered T-section type 8 ft. long. The flange is 6½ in. wide and 1½ in. thick at the bottom and 4½ in. wide and 1 in. thick at the top, while the stem is 6½ in. deep and 2½ in. thick at the base tapering to 2½ in. deep and 1½ in. thick at the top. The reinforcement consists of three pieces of ¼-in. round bars 7 ft. 6 in. long, one bar being placed in each corner of the post. The line wire is attached to these posts by No. 7 soft steel tie wires, wrapped three times around the line wire on each side of the flange of the post. These wires are pulled tight to bite into the corners of the posts, thus preventing slipping.

The corner posts are 6 in. square and 8 ft. long. Notches 1¼ in. deep are cast 6 in. from the top and 3 ft. 6 in. from the bottom of these posts in which the diagonal corner post braces are set, and a slot 2 in. by 4 in. is provided through the post 6 in. from the bottom, into which short anchor bars can be placed at right angles to the fence line. All corners on these posts are rounded off to a ¼-in. radius. The reinforcement consists of four ¼-in. round bars 7 ft. 6 in. long. Five of these posts are placed at each corner on 7 ft. 6 in. centers, thoroughly braced and tied. The braces used with these corner posts are 8 ft. 2¾ in. long and 4 in. square, with mitered ends to fit into the notches provided in the corner posts. These braces are also reinforced with four ¼-in. round bars 7 ft. 6 in. long, and all corners are rounded to a ¼-in. radius.

The property line posts, which are set on all property corners,



Details of Line and Corner Fence Posts and Braces

opposite the beginning and the end of all curves and at 1,000-ft. intervals on tangents, are 5 in. square at the top and 7 in. square at the bottom with a length of 5 ft. They are set in the ground 3 ft. On one side of the post are moulded the letters "B. R. & P. Ry.," and on the opposite side are the letters "PROPERTY LINE." These letters are 2 in. high. The side of the post with the latter lettering is placed toward the main track whenever possible. The post is reinforced with four pieces of ½-in. twisted steel bars 4 ft. 6 in. long. The corners of the post are rounded to a 1-in. radius.

The concrete whistle posts, which are set on the engineer's side of the track 1,320 ft. from highway crossings and 7 ft. 6 in. from the near side of the post to gage side of the near rail, are 9 ft. 6 in. long, 6 in. wide and 4 in. thick at the bottom and 12 in. wide and 4 in. thick at the top. The latter width is only maintained for a length of 15½ in. to provide room for the letter "W." These posts are set in the ground 3 ft. 6 in. The letter is 7½ in. high, ¾ in. deep and 1¼ in. wide and is placed only on one side of the post, the other side being left blank. This post is reinforced with four pieces of ½-in. twisted steel bars, 8 ft. 2 in. long and the corners are rounded to a ¾-in. radius. Station whistle posts are identical with those described except that a line 8 in. long is cast under the letter "W." These signs are placed ½ mi. from stations.

The concrete mile posts are made in two widths, one for one or two figures, and one for three figures. The former are 6 in. thick and 12 in. wide and the latter 6 in. thick and 14 in. wide. All are 8 ft. 6 in. long with the upper 4 in. rounded off from the edges to the center. The figures, which are 6 in. high, are set into the posts between two horizontal lines ½ in. wide placed 14 in. and 26 in., respectively, from the top of the post. Both sides of the post are made the same. The reinforcement consists of four pieces of ½-in. twisted steel bars 8 ft. long and the corners are rounded to a 1-in. radius. These posts are set 3 ft. 6 in. in the ground, and are placed 10 ft. from the center of the post to the gage side of the near rail on the right hand side of the track going south from Buffalo and Rochester. They are used both on the main line and branches.

A mixture of 1 part cement and 3 parts fine gravel is used in the fence posts, corner posts, and corner post braces, while a 1:2:4 concrete mixture is used in the other cases. The fence posts are cast in gang moulds of 30 each, mounted on trucks. Three of these batteries are used, giving a capacity of 90 posts at one pouring. The other posts and signs described are moulded in wooden forms made of 2-in. surfaced yellow pine, the parts of the moulds being fastened together by hinges and hasps in all cases, except the mile post form, which is clamped in position. In all cases the forms are constructed so that they can be readily removed from the posts after the concrete has set sufficiently, which is about 48 hours. After removing the posts from the forms they are placed on end along timber racks outside of the building for one week to cure properly. During this time they are sprinkled once a day, or as often as necessary, and covered to protect them from the action of the weather. At the end of the week, or when they are strong enough to permit them to be removed, they are corded up in a pile ready for shipment. During the winter they are treated in much the same manner with the exception that they are not taken out of the building until thoroughly cured. The building is kept at an even temperature of 60 deg. After the posts are removed from the forms, the latter are thoroughly cleaned and sparingly coated over with fuel oil to prevent the concrete from sticking to the form when being removed. In the case of the property line post and the whistle post the surface of the concrete is rubbed down to a true, even, uniform surface as soon as the form is removed, using a small briquette and clean water. This briquette is made of 1 part of cement and 2 parts of sand mixed with clean water.

The letters used on these posts are V-shaped and indented into the concrete, the indentation being painted black in the case of the whistle and mile posts. An advantage of this type of letter is that it eliminates the necessity for restenciling the posts from time to time. In the case of the whistle post the letter "W" and the line, when it is used, are fastened to the bottom of the forms and the post made face down. The figures and the cross lines on one side of the mile posts are secured to the forms, while the corresponding depressions for the other side of the posts are moulded into the concrete from the exposed surface while it is in the form. The weights and detailed cost of manufacture of these various posts and signs are shown on the accompanying table.

We are indebted to G. H. Stewart, master mason, for the foregoing information.

		Cost									
		Material									
		Cement			Aggregate		Reinforcement			Total	
	Weight, lb.	Amount sacks	Labor	Cost	Amount cu. ft.	Cost	Amount lin. ft.	Cost		matl. cost	Total cost
Fence post....	87.5	$0.055	0.30	$0.07	0.623	$0.02	22.5	$0.09		$0.18	$0.23
Corner post...	285	0.18	0.81	0.19	1.90	0.05	30.0	0.12		0.36	0.54
Corner post brace	146	0.15	0.355	0.08	0.875	0.03	30.0	0.12		0.23	0.38
Property line post	202	0.50	0.29	0.07	1.65	0.05	18.0	0.18		0.30	0.80
Whistle post...	410	1.00	0.41	0.09	2.31	0.07	36.66	0.37		0.53	1.53
12-in. mile post.	560	0.80	0.88	0.20	5.64	0.17	32.00	0.32		0.69	1.49
14-in. mile post.	690	0.80	1.15	0.26	6.63	0.20	32.00	0.32		0.78	1.58

Recent Important Developments in Ballast Practice

The Merits of Contracting This Work and of Cleaning Rather Than Renewing Material on Two Large Roads

STONE BALLASTING BY CONTRACT

By John Evans

Division Engineer, Michigan Central, Detroit, Mich.

On the greater part of the stone ballasting on maintenance work done by the Michigan Central since the opening of the working season in 1909, the labor of putting the stone under the track has been handled by contract. A total of approximately 90 miles of double track has been ballasted in this way, distributed over the seasons of 1909, 1910, 1911 and 1913. No stone ballasting was done in 1912 or 1914.

There has been practically no change in the method of procedure since the practice of doing this work by contract was introduced. The contract provides unit prices per foot of track for skeletoning out the old ballast to the bottom of the ties; lifting the track to the grade stakes, and surfacing, lining and trimming. All work not covered by the contract prices, such as unloading the stone, putting in and spacing ties, making a preliminary lift on gravel or cinders, widening banks, etc., is done either by the railroad forces or by the contractor on force account. In either case the unloading of the stone is done under the railroad company's supervision, and the contractor is allowed extra compensation when, on account of shortage or surplus in the distribution, he has to move stone more than 300 ft. to complete the finished ballast section. The railroad company provides bunk cars at its own expense for the contractor's men and supplies all tools and equipment needed in the work. It also furnishes free transportation for the men over its own lines.

The track is given a minimum lift of 6 in. on stone. The contractor makes lifts up to and including 8 in. at the contract price for lifting and for lifts over 8 in. an extra allowance per foot of track for each additional inch of lift is made. In cases where the stakes as set by the engineer show a lift of more than 6 in. for any considerable length of track, the lift to within 6 in. of the top of the stakes is made with gravel or cinders. The contractor is allowed extra compensation on a force account basis where the throw in lining track to the center stakes exceeds 1 in.

The railroad company places an experienced track man on the work as inspector. This man looks over the track after it has been surfaced, lined and trimmed, and either accepts it or notifies the contractor to do such additional work on it as may be necessary to make it acceptable. After the track has been accepted by the inspector, the railroad company is responsible for its maintenance.

The work turned out under the above arrangement has been entirely satisfactory. The track has ridden well when finished and has retained its line and surface fully as well as it has in the best work done by our own forces. We are doing no stone ballast work at the present time, owing to financial conditions, but it is practically certain that our future work of this kind will be handled by contract. As a matter of fact, the contract system of doing track maintenance work is expanding with us and we are extending its application from time to time to new items with satisfactory results.

The men employed on the work are Italians and the contractor is an Italian with wide experience in business dealings of all kinds with his countrymen. He keeps in close touch with the labor situation throughout the country, and his knowledge and experience results in the finding of a better class of men and in getting more and better work out of them. Since starting in this work he has developed several good Italian track foremen.

The contractor, being financially concerned with the amount of work done, has a more effective interest in increasing the output than our own foremen have, regardless of how capable or conscientious they may be. Under this system small concessions can be made to the men in the way of increased pay, whereas wage rates paid by the railroad company are not adjustable. For this reason local shortages in the labor market do not affect the size of the contractor's gangs as seriously as they do the railroad company's. Furthermore, a small increase in pay is usually more than offset by the additional effort which it results in.

Doing ballasting by contract relieves our roadmasters and assistant roadmasters of the greater part of the supervision of this work at the time of the year when their attention is badly needed for other branches of maintenance.

A possible improvement in our method from the railroad company's standpoint would be to have the contractor supervise the unloading of the stone and be responsible for its proper distribution. In this way the clause providing for an extra allowance in case stone has to be moved more than 300 ft. could be done away with. This should work no hardship on the contractor, because it is our experience that very little stone has had to be moved more than the specified distance. There have been several occasions where the contractor has made claims on account of the alleged improper distribution of the stone. In most cases these claims were not allowed, because they did not appear to be justified by the terms of the contract, or to be based on sound argument. If the contractor were unloading the stone, all opportunity for argument from this source would be done away with.

The proportion of the work done under contract could be increased and possibly the cost of the work reduced by having the contractor put in what ties are needed at the time of ballasting at a unit price per tie. I think it not improbable that this will be tried out in some of our future work.

The ballasting done during the season of 1913 included 12 miles of double track on the East division of the main line about 55 miles west of Detroit. On this particular job the total number of men, including force account and contract work, varied from 110 to 140. The skeletoning gang numbered about 15 men, and the lifting gang 50. The remainder of the men were in a gang which worked between the skeletoning and lifting gangs, putting in and spacing ties, widening banks, etc.

The lifting gang did all the track raising, both on gravel and stone. It also surfaced, lined and trimmed the track. The lifting on stone was done in stretches of single track one mile long; that is, no lifting was done until stone was distributed ahead for one mile of track. The lifting of this mile was ordinarily one day's work for the lifting gang. After being raised, the track was allowed to stand for not less than three days before surfacing, lining and trimming was started. Between the time the track was lifted and the time it was finished a speed limit of 30 miles per hour was in effect. After the mile of track had been surfaced, lined and trimmed it was looked over by the inspector, and, if accepted, the speed restriction was removed.

CLEANING STONE BALLAST WITH SCREENS

By H. M. Church

Division Engineer, Baltimore & Ohio, Baltimore, Md.

Previous discussions of the performance of ballast screens and the methods employed for cleaning stone ballast have shown in detail the great saving in both labor and material that can be effected by their use. On the Philadelphia and Baltimore divisions of the Baltimore & Ohio, where traffic is heavy and where considerable ballast has been cleaned, the

results have been quite gratifying and have led to the conclusion that the cleaning of stone ballasted tracks is justified where only one cubic yard of stone may be conserved in a distance of 8.1 lineal feet of double track; that is, one cubic yard of material saved in this distance justifies the employment of the necessary labor to screen it out. In the cleaning of several miles of freight tracks formerly ballasted with stone, it has been amazing to see the amount of stone so saved. Tracks that had deteriorated by the presence of dirt and cinders in the voids of the stone ballast were restored to a condition that had formerly been obtained only by the wholesale removal of the material from the tie cribs; loading and taking it away as waste, an extravagance that has been overcome by the use of screens.

The employment of ballast screens has been found economical in the "out of face" cleaning of single tracks and multiple track and in yards; also in combining the cleaning with tie renewals. As an example of the saving effected, an organization consisting of 12 men, one foreman and one water boy cleaned 200 lineal feet of standard ballasted double tracks per 10-hour day where tracks were 12 ft. centers, using 3 screens, one on either side and one in the center between tracks. The ballast was cleaned 12 in. below the bottom of the tie on the berme, 6 in. below the bottom of the tie in the center ditch and level with the bottom of the tie in the cribs. It amounted to the handling of 104 cu. yd. of stone in the 200 ft. stretch per day. The unit costs of this progress were arrived at as follows:

Length of double track cleaned per day, lin. ft.	200
Cubic yards stone cleaned per day	104
1 foreman at $77 per month.	
1 water boy at 15c. per hour.	
12 laborers at 15c. per hour.	
Total cost per day	$22.46
Total cost per lin. ft. double track	0.112
Total cost per cu. yd. ballast	0.216

The ballast yielded 400 wheelbarrow loads of dirt per 100 lin. ft. of track, representing approximately 50 per cent of the volume of the stone. The voids in the stone amounted to 40 per cent, so that the loss of volume in cleaning amounted to 10 per cent. To determine the extent to which the material conserved justifies cleaning ballast we have the following:

Cu. yd. dirty ballast handled	Percentage of total volume		Total cost cleaning	Cost per cu. yd. stone saved	Cost per cu. yd. new stone unloaded on track
	Stone	Dirt			
104	100	40	$22.46	0.216	1.00
104	90	50	22.46	0.24	1.00
104	80	60	22.46	0.27	1.00
104	70	70	22.46	0.31	1.00
104	60	80	22.46	0.36	1.00
104	50	90	22.46	0.43	1.00
104	40	100	22.46	0.54	1.00
104	30	110	22.46	0.72	1.00
104	21.5	118.5	22.46	1.00	1.00
104	20	120	22.46	1.08	1.00

When only 21.5 per cent of the total volume of material handled passes over the screen and is saved for re-use, the screening operation becomes as expensive as the application of new stone. In other words, 21.5 per cent of the volume per lineal foot of double track represents the amount of stone which must be saved in order that screening be economical, which is equivalent to the conservation of only 1 cu. yd. in 8.1 lin. ft. of double track.

Aside from this very important economy, the practice of screening ballast instead of putting the track up on new ballast admits of maintaining surface without disturbing the roadbed under the ties, a factor of vital importance in ideal track maintenance. It has the advantage of being quicker and more thorough than the fork method; laborers do not tire as quickly under it, and with the screens arranged as described the invariable tendency is for the men to compete with each other for speed.

CHARACTERISTICS OF SLAG AND CHAT BALLAST

By P. H. HAMILTON

Roadmaster, St. Louis & San Francisco, Memphis, Tenn.

All trackmen agree that crushed limestone makes the best ballast under any traffic, or in any locality. However, a large per cent of the railroads in the United States are not so situated that they can secure limestone ballast, or are not financially able to purchase or to produce it. Consequently they are forced to use the best natural ballast available and the refuse, or by-products, from other industries are often utilized.

Cleaning Stone Ballast with Screens

Slag is used extensively by roads entering the great iron and steel producing centers, some of them transporting it hundreds of miles. Slag is the residue stone from blast furnaces, and pig iron smelters produce the best slag. There are many classes and varieties, ranging from snow white to dark brown in color, some are chalky in substance and others hard as flint rock.

When the slag comes from the furnace it amalgamates, and it is necessary to blast it loose before loading. That used for ballast is seldom classified or screened, most roads or contractors loading it directly onto ballast cars with steam shovels. Consequently there is great variation in the size of the particles. The larger per cent runs from ½ in. to 2 in. in diameter; but in a car of fine slag we find many pieces larger than a water bucket, which often cause trouble in unloading. Sometimes they block the opening in the bottom of the car. When a drag tie is being used for leveling the ballast these pieces frequently catch on the track and derail the car being unloaded. Where the ties have been properly spaced previous

to unloading slag these larger pieces often drag on the ties, bunching them and making respacing necessary. These larger pieces may be broken up by hand, but it is more often necessary to discard them when applying the ballast.

The darker slag, called glassy slag, breaks into small particles of prismic form, ranging from ½ in. to 2 in. in diameter, and is considered the best slag for ballast. The white, or grey slag, is lighter in weight. Some of it resembles limestone, and sometimes it resembles coral and breaks up very easily when being tamped. That which resembles limestone makes good ballast, but it is not uniform in size and generally contains a large percentage from 2 to 6 in. in diameter. Sometimes these larger pieces can be broken with spike mauls or tamping picks, but more often it is necessary to lay them to one side and finally to move them to some place where they can be used for bank protection.

While it is not the general practice to classify slag for ballast, I believe that it should be done as it is loaded, and all pieces too large for the purpose should be run through a crusher, or discarded at the pit.

Slag ballasted track can be worked at any time of the year. It drains well and it is practically dustless. It will keep down the growth of vegetation, but it should be cleaned as often as limestone ballast. This is especially necessary on heavy grades where there is an accumulation of engine sand and front-end cinders. Where the embankments are sodded with Bermuda grass the only way to keep this grass out of the ballast is to clean it every two years. Slag has been objected to on account of being chemically injurious to the rails and ties, but this effect is not noticeable. When unloading slag a faint gaseous odor is noticeable, and the dust causes a smarting of the eyelids. However, exposure to the air soon eliminates this chemical property. Like crushed stone, slag is hard to work, and the insertion of ties is more expensive in slag. It is applied and the track is maintained practically in the same manner as with crushed stone.

Chat ballast is used for ballast by all of the roads entering the mining districts of Missouri, Kansas, Oklahoma and Arkansas and is transported hundreds of miles. Chat is flint or ore bearing rock, broken into small angular pieces averaging ¼ in. to ½ in. in diameter. It is the refuse from the jigs at the lead and zinc mines after the mineral has been separated from the stone. It is crushed very fine to get all of the mineral out of it, and is known as tailings at the mines after it has gone over the jigs and all of the lead or zinc ore has been taken from it.

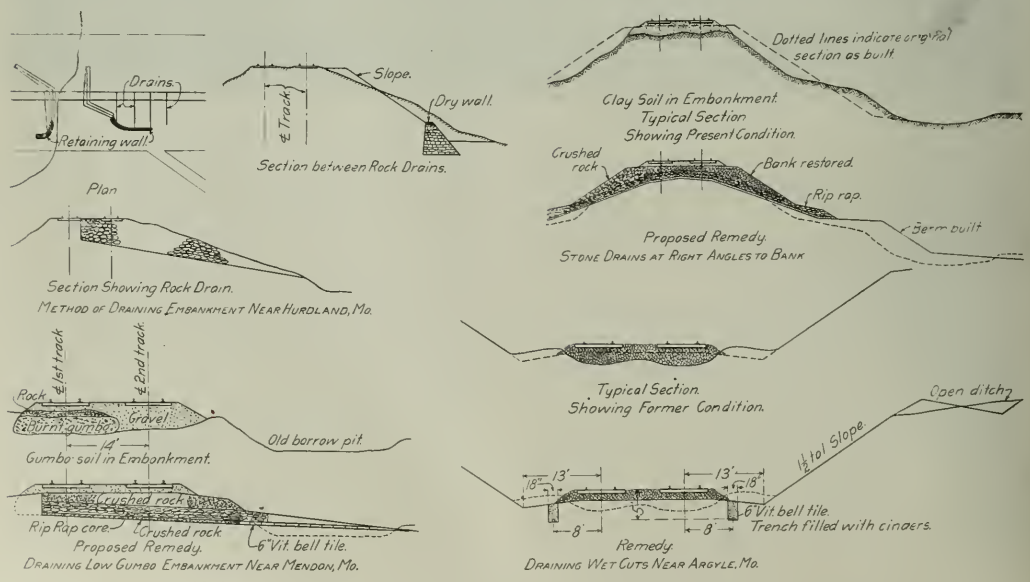
The chat is carried away from the jigs in a stream of water through a trough emptying on to a tailing pile. Sometimes the tailing trough empties into a ballast car, but more often the chat is loaded from abandoned tailing piles with steam shovels. The former method is cheap, but the stream of dirty water passing through the car is injurious to it. It also packs the ballast in the car and makes it hard to unload.

Hand jigged chat is larger than that which goes through the mills, and makes better ballast, but the quantities are limited. Chat has a good weight and is hard. It does not crumble or wear out quickly. It sheds water well, but it is necessary to have a heavy shoulder to hold the track in line, and to keep it from becoming center bound. It is easily worked, all of the tamping being done with shovels or tamping bars. Sometimes "end tampers" are used. Vegetation will not grow in it. At one time the mine owners or mill men were willing to give chats to anyone who would remove them, but now nearly all of the chat piles are controlled by contractors who lease a pile to a railroad, or furnish chat loaded on cars. It costs from 10 cents to 15 cents per cu. yd. loaded on cars.

DRAINING EMBANKMENTS IN MISSOURI

Because of the nature of the soil the railroads in northern Missouri have great difficulty in securing adequate drainage of embankments as well as of cuts. In common with other roads, the Santa Fe has given a great deal of attention to the solution of this problem, and has placed rock drains in embankments at a number of points with satisfactory results.

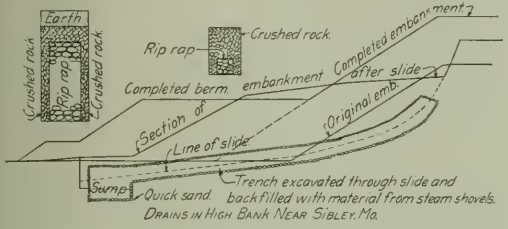
At one point 1½ miles west of Hurdland, Mo., water formerly collected under the ballast, causing slides in the embankment that interfered with traffic not only on the railroad but on an adjacent highway. This condition was overcome by the construction of five rock drains in the embankment extending from the



Methods of Draining Wet Cuts and Fills on the Missouri Division of the Santa Fe

toe of slope of the eastbound track to the inside end of the tie under the westbound track, trapping the water pocket under the latter track. These trenches were excavated to a depth of seven feet under the track and filled with crushed stone and riprap. A dry retaining wall was also built out from the wings of the abutments for a short distance, connecting with these drains as shown in the drawing and the accompanying photograph. Following the constructoin of this system of drains no further difficulty has been experienced in maintaining the track and trains have operated over it at the regular scheduled speeds.

At another point near Mendon where the track was on a low gumbo embankment several barrels of water ran out when a trench was cut into it during the very dry season last year. To



Trenches Built in a High Fill at Sibley, Mo.

drain this place permanently it is planned to dig trenches, filling them with crushed rock with a 6-in. vitrified drain tile in the bottom leading to a drainage ditch parallel with the tracks beyond the toe of slope. At other points difficulty has been encountered with water collecting under the ballast, causing the shoulder to slough off. The drawing shows the manner in which this has been overcome by the construction of stone drains at right angles to the track. In general these drains are built of crushed stone with a core of riprap to facilitate the flow of the water.

In the vicinity of Argyle considerable difficulty was experienced in maintaining the track through clay cuts where the ballast had become compacted into pockets under the tracks somewhat as shown in the accompanying drawing. As the bottom of these pockets was below the side ditches there was no outlet for the

View of the Rock Drains Near Hurdland, Mo.

water. This condition has been overcome by correcting the subgrade conditions, leveling up the ballast and constructing trenches 18 in. wide and extending 5 ft. below the base of the rail, 8 ft. out from the center of the adjacent track. A 6-in. vitrified tile drain was also laid in the bottom of each trench, after which it was filled with cinders above the tile. Since the intsallation of these drains slow orders have been removed permanently while the tracks have been maintained in better condition and at less cost.

In rebuilding the bridge across the Missouri river at Sibley, Mo., it was necessary to raise the grade of the embankment for 10,000 feet on the east approach and to widen it for second track, requiring the addition of 1,750,000 cu. yd. of material. As this material was placed in slabs, and as it consisted of clay, considerable difficulty was encountered with the shoulder sliding off from time to time. To remedy this a trench approximately 16 ft. wide was excavated outside of the toe of the slope and parallel with it to a depth of about 8 ft., which brought it below the level of the strata on which the superimposed material was moving. Sumps were excavated to quicksand at intervals along this trench as the slide was too deep to drain into the surface ditches along the right of way line. Eighty trenches were then excavated into the embankment along the line of the slide and filled with riprap and crushed rock. The large trench was backfilled with material brought in by train from a distance rather than refilling it with the gumbo originally taken out. The berme was constructed over it by work trains. This work was done early last year and it has proven entirely satisfactory so far, while there is no indication that it will not continue so.

SOME OF THE MORE IMPORTANT ELEMENTS IN THE MAINTENANCE OF TRACK

By W. F. Rench
Supervisor, Pennsylvania Railroad, Perryville, Md.

There are certain basic requirements for substantial track which may not be slighted. They are, generally speaking, three in number: Drainage, which has for its two principal adjuncts roadway design and ballast cleaning; adequate crosstie replacement, and proper force and methods for maintaining line and surface. There are other important items such as the organization of the working forces, rail repairs, special equipment, etc.; but those first named are of primary importance.

ROADWAY DESIGN

The standard plans of the road exhibit the ideal cross-section, but most maintenance rules wisely permit a deviation from the plan when necessary to meet local conditions. The essential requirement from the maintenance standpoint is that transverse drainage be afforded not only to the track, but to the sub-bed also and that proper longitudinal drainage be secured either through the surface ditches or by submerged pipes.

The question of draining wet cuts has been a favorite topic for discussion in recent times and it generally appears that the solution found is one of strictly local application. It may not be amiss, however, to refer briefly to three recent developments along this line. The use of a wooden box drain between tracks with its bottom 4 ft. below the base of rail and containing numerous peforations to allow the water to percolate freely has rendered possible the maintenance of high speed service through very bad quick-sand cuts in several instances. The raising of troublesome stretches of road sufficiently to provide a blanket of cinders from 12 in. to 24 in. thick between the ballast and the wet soil has furnished present relief and invariably gives expectation of permanent results. One of the main-line divisions of the Pennsylvania has introduced a rather extensive system of longitudinal underdrainage for wet cuts and the advantage obtained has been quite remarkable. The drain is of 12-in. glazed terra cotta pipe laid upon a floor of boards 5 ft. below the base of rail and 5 ft. from the gage line in both ditches. In order that the water may have free access to the drain the joints are left open. To exclude the soil these have hay packed about them. The entire trench in which the pipe is laid is then back filled with ballast or coarse pebbles. To secure the very best results the sides of the trench and the top of the ballast filling are likewise protected from the entrance of soil by a layer of hay.

BALLAST CLEANING

No drainage system is of complete benefit unless the ballast is kept clean. The depth to which this cleaning should go is a variable one, but it should generally be to the bottom of the ties in the inter-tie spaces and several inches below the bottom of the tie in the ditches. It is desirable to carry the cleaning of the ditches somewhat below the bottom of the

ties as a labor saving item, because when the sub-grade is reached work with the ballast forks is greatly facilitated.

Cleaning the ditches is a slow and expensive process, but it may be rendered less so by the use of a device for loosening up the ballast which has been tried with good success. It is known as a ballast plow and consists of a fish-tail spud about 6 in. long and 4 in. across which is rigidly attached to an arm which can be moved out or in. The arm is attached to a flat car which is heavily weighted to give it stability and to prevent derailment while the car is moving with the plow plunged into the roadbed. All movements of the plow and arm are made by the use of compressed air.

The car moves at a rate of five miles per hour and can thus be used to loosen up a considerable stretch of center ditch in a day. This device saves the labor of many men with picks and the loosening of the ditch in itself supplies improved drainage, which is thus effective somewhat in advance of the actual cleaning. The average accomplishment of one man cleaning a center ditch after it has been loosened by the plow is 100 ft. in one day. It will be found that this dirt with the stone forked out makes an excellent border for the stone ballast on fills as its nearly dead black color contrasts pleasingly with the lighter stone and it is the best material known for retarding the growth of grass and weeds.

The cleaning of track is not of the maximum benefit until a raise is made and a clean bed of ballast applied beneath the ties. If there is a good sub-bed the raising may be made in lieu of the cleaning of the tie spaces, or similarly if the tie spaces are cleaned the raising may be omited, although track never suffers from a light surface raise. Indeed, periodical raising, particularly on lines of heavy tonnage, is the life of main track. The raise should generally be about 2 in., which can be made without flagging. The periods between successive raises are variable for different kinds of roadbed and for different classes of traffic. Generally, for a well-maintained track mostly under passenger traffic, raising once in four years is sufficient, while under a traffic with heavy freight movement predominating, once in two years is none too much and there are places where the service is extreme and the roadbed bad that require this treatment every year.

Its necessity is determined by the appearance of a center-bound condition of the track which fails to give comfortable riding even when the line and surface are perfect to all appearances. The condition as is well known arises from the track having settled into the bed until the unyielding part of the tie support is at the middle of the tie. It is to postpone this condition that maintenance rules prescribe that the tamping should not be carried more than 15 in. inside the rail.

When the roadbed is very hard raising the track in advance of tie respacing or tie renewal effects a large saving in labor. But when the ballast is fairly clean it will generally be found preferable in either work to follow the respacing or the renewal with a light surface raise so that a uniform bed may be secured.

CROSSTIE REPLACEMENT

There has been at times in the past great activity on the part of maintenance officers to effect a stringent restriction in the use of crossties. The thought doubtless is that such restriction is a maintenance economy. But it is a temporary saving, the direct result of which will be a measurable increase in the labor of maintenance later on. There is a stage in the life of a crosstie when no matter what its appearance may be its usefullness in main track is ended. When continued respiking through the absence of tie plates has resulted in the condition best described by the expression, "spiked to death;" when through repeated tamping the bottom of the tie has become rounded and has no base or an insufficient one for adequate bearing upon the bed; when through decay the function of preserving the gage or the surface are lost, then the continuation of the tie in a main track becomes a separate item of expense. Every main line supervisor knows that the track which has a large percentage of inferior ties is the one where most of the sub-division labor is spent.

Appreciating the importance of good tie support the supervisor should carefully ascertain the normal renewals for his sub-division and it should be zealously sought to apply the indicated number of ties year by year. The total number of ties in the main tracks of the main line, divided by 7, in the branch main tracks, divided by 8, and in the sidings divided by 9 will supply the average yearly requirement, where untreated ties largely predominate or where past use of tie plates has not been plentiful. It is assumed that the mileage will be corrected for new tracks that require no renewals and for the distance through switch connections and over bridges. Unless the indicated number of ties is used year after year, the excellence of the track will diminish. Maintenance of good timber on bridges and through switch connections, is of no less importance. The utility of tie plates in prolonging the life of ties and in preserving the gage is so fully recognized that all roads are committed to some definite plan for ultimately equipping all ties both on curves and tangents with this necessary accessory.

LINE AND SURFACE

The maintenance of a good railroad basically requires that the drainage shall be well taken care of and that the ties shall be kept in good condition, but there is also necessary the periodical repair of the track as regards line and surface. This repair should be made on a regular program to be of maximum benefit. The year on the Pennsylvania line is punctuated every seven weeks by the trip of the Track Inspection committee which determines by observation and by the records of certain instruments the relative merits of the different supervisors' sub-divisions by which prizes of considerable value are awarded at the close of the working year. These seven weeks' periods serve to divide the year into convenient intervals for restoring the detail line and surface.

Immediately upon the passing of the inspection party a period of four weeks of steady prosecution of tie renewals, ballast cleaning, rail replacement and track raising is entered upon. At the end of this period three weeks are given over to lining and surfacing the main tracks, so that seven times during the year the riding features of the road are brought to the highest state attainable and naturally through the remainder of the year they do not fall very much below this standard. As far as possible during the four weeks' period of applying material the road is cleaned of scrap, old rails, old ties and dirt. But on busy lines it is not practicable to keep a work train cleaning up with the progress of renewals, and the remaining three weeks, while active renewals are suspended, furnishes the needed time for completion of the cleaning, so that upon the inspection dates the road is likewise fully policed.

As floating gangs are proverbially inefficient in the finer surfacing their labor is mainly devoted to rail renewal and ballast cleaning. With such work lifted from the sub-division forces it has been found that very good results in maintenance have been secured by an allotment of laborers 50 per cent greater than the miles of main track, those sub-divisions having interlocking or other special burdens being allotted additional force.

On busy lines it is important to utilize every advantage that makes for decreased surfacing and to this end joints are eliminated from road crossings by the use of 60 ft. rails; the ties under road crossings are maintained in the best condition possible; the ballast is cleaned below the ties at such points each year late in the season to diminish the trouble from heaving; anti-creeping devises are generously used to modify the trouble from rail running which causes distortion both of the line and the gage; and prompt correction of defective ash pans is made to save burning good ties in the track and to avoid imposing additional burden of dirt upon the roadbed.

Using Bulk Cement on Railway Construction Work

A Discussion of the Advantages of This Practice Including a Reduction in Cost, Methods of Handling, Etc.

By Mac Rae D. Campbell

Although bulk cement is still more or less of an innovation, the idea has a number of strong points to commend it and has won considerable endorsement from several railway systems. Among these are the Chicago, Milwaukee & St. Paul; the Chicago & Alton; the Chicago & North Western; the Duluth, Missabe & Northern; the Bessemer & Lake Erie; the Union Railway; the Pennsylvania, and the Baltimore & Ohio. One cement company reports that bulk shipments from its mills have increased from 15,485 bbl. in 1912 to 180,258 bbl. in 1914.

The economy resulting from using cement in bulk is made up of a number of items. First, there is a saving of 2 cents a barrel in the price made by the manufacturer through eliminating the labor and expense of sacking. Probably no user of cement has escaped the trouble and annoyance consequent upon handling empty sacks preliminary to their return to and redemption by the cement manufacturer. Cement in bulk eliminates sack troubles. Experience has shown that mixing crews of the average size may be reduced by two men, each of whom probably receives $2 per day, which has been estimated as an additional saving of from 2 to 3 ct. per cubic yard of concrete in a daily

Runway for Unloading Bulk Cement from a Box Car Hung by Brackets from the Roof

output of 150 cu. yd. Another saving comes from the elimination of the customary charge made against the job to cover damage or loss of sacks, 2 ct. a barrel being a conservative estimate of the amount that must be so charged off. Collectively the tangible items show a saving of not less than 6, and in some instances perhaps as much as 10 ct. a barrel.

The Chicago, Milwaukee & St. Paul is using bulk cement on the Evanston division track elevation work which has already involved somewhat over 4½ miles of retaining walls. On the Council Bluffs division over two miles of retaining walls were constructed with bulk cement. It was also used by the Chicago & Alton in track elevation work and in connection with shop and other construction work at Bloomington, Ill.

On many roads that are employing concrete construction to an increasing extent, the construction equipment might include a concreting work train outfit planned for using bulk cement. It is probably safe to say that once equipped with an outfit of this kind the engineering department would find employment for it not fewer than eight months a year in most sections of the country, while in the South it would have even a longer period of usefulness. Various types of mixers and associated equipment have been used on railroad construction work where bulk cement has been a feature. Usually it is necessary to modify minor details of the method for handling materials for each particular piece of work. Nevertheless, equipment of this kind can be more or less standardized so that it will serve repeatedly for the usual construction jobs.

Among the ways for devising runways is one shown by one

Wooden Bracket on Roof of Car Supporting a Runway

of the accompanying views which suggests that equipment for this purpose may be made standard and will serve for repeated use. The work train may be made up so that gravel and sand can be handled in a similar manner, thus avoiding the necessity of unloading and rehandling. With an outfit such as suggested, all expense of unloading, housing, and reloading to move to the next job, is eliminated. If more than one car of cement is required it simply becomes necessary to handle two, three, four or more cars in bulk in the train. As soon as the cars are empty they can be returned to regular traffic. The writer's experience in railway

A Work Train, Including Mixer and Material Cars Equipped for Handling Bulk Cement

engineering work convinces him that careful estimates would show that the usual accredited expense of keeping a car out of regular service and using it to house the cement during the period of time necessary to use a carload would be less than the cost of performing repeated loading, and reloading with the consequent loss of sacks and material unavoidable with sack shipments. This presumes, of course, that the job is one that will require at least a carload. Shelters provided on the job to protect cement must be taken down so that the lumber may be

moved and perhaps re-erected elsewhere for a similar purpose. In all of these operations some material is unavoidably destroyed which increases the expense, and each time the labor of erection and wrecking is a total loss.

Loading bulk cement at the mill is performed in a simple manner. A tight car such as would be used for grain, and fitted with grain doors, is required. In loading, a spout is set in place through one of the car door openings. The cement is measured by weighing with a device called a "weightometer," as it passes along the belt conveyor to the spout. This weighing is not the accepted weight under which the car is billed, as it is afterward

Unloading Material to Wheelbarrows Handled Over Double Gangways to Mixer Providing Runway in Each Direction

weighed over track scales, but until the "weighometer" was devised, it was necessary to shift the car several times to track scales in order to determine how nearly the desired loading had been attained.

Experience seems to have proved that bulk cement shipments are more likely to reach their destinations in good shape than sacked shipments. One would naturally expect the opposite to be the case, but the jolting of the car in transit causes the cement to settle down so that at destination the surface of the cement is smooth and level, and the material so compacted that a man can walk over it without sinking in above the soles of his shoes. The total shipments made in bulk by one large cement company dur-

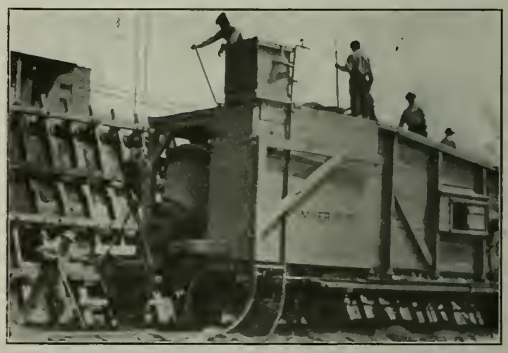
Dumping Bulk Cement Into a Hopper Over the Mixer Showing Absence of Dust

ing three years have involved only one damage claim and this was less than $5.

Several cases have been noted where cars with leaky roofs and loaded with bulk cement have passed through rainstorms with only trifling damage to the contents. Below the hole in the roof there is formed as a result of a leak a small lump of cement about the shape and size of a soup plate. When this has been removed the remainder of the cement is clean and ready for use. If sacked cement is exposed to leaks in the same manner, the rain will run over the surface of the sacks, flow down through spaces between them, possibly to the car floor, and damage a large quantity. One of the commonest causes of trouble with sacked shipments is from nails that work loose in the car floor or sides. It is absolutely impossible to prevent these nails from tearing sacks, so that frequently they are refused for redemption. There is also a considerable loss of cement from the torn sacks.

At first thought one would be inclined to think that the unloading and other handling of bulk cement would raise an objectionable amount of dust. As a matter of fact, there seems to be less dust than results from handling sacked cement. This may perhaps be explained by considering the porous nature of the cloth sack and realizing that there is a continual sifting of contents through it so that more dust results from dropping sacks on a truck than by allowing a shovelful of closely compacted bulk cement to slide into a wheelbarrow.

Two methods of unloading bulk cement that have proved entirely satisfactory are being used: First, shovels and wheelbarrows; and second, a power scoop such as is used for unloading grain. In most cases the shovel and wheelbarrow method will be found the simpler and more economical, although on jobs which are large enough to warrant the expense of additional equipment, the power scoop has shown remarkable efficiency. On one large job it was found that one man with the aid



The Mixer in a Bulk Cement Plant Discharging Into Placing Buckets, One Mix Every 45 Seconds or 220 Yards per 10 Hour Day

of a power scoop, could unload a carload of bulk cement in less than two hours. In this particular case the bulk cement was conveyed to an overhead bin by means of a bucket elevator, so that this man's work represented the entire labor cost of unloading and housing the cement.

Cement when compacted will stand up at an angle of about 90 deg., so that it is advisable that storage bin bottoms and chutes should have a pitch of 45 deg. On a great many construction jobs it will be found unnecessary to provide storage facilities for bulk cement, as it will be both practicable and convenient to use the cement out of the car as needed. When bulk cement must be stored, the ideal arrangement is the overhead bin from which the contents may be discharged by gravity. Where the overhead bin is not practicable, one may be constructed on the same level with the mixer from which the cement may be shoveled or drawn by means of a conveyor into the mixer hopper. Bin walls should be made strong enough to resist considerable side thrust. A safe way to figure the side thrust of loose cement is to estimate 20 lb. to the square foot for each foot of depth; in other words, if the cement is to be placed in a bin 3 ft. deep, the lowest side plank should be strong enough to withstand a pressure of 60 lb. per sq. ft.

Another objection which would naturally be advanced

against the use of bulk cement is the difficulty of measuring it, but those experienced in using it say they have not had any more difficulty in this regard, than in measuring sand, gravel or stone. It is very conservative to figure an average package loss and expense of 5 cents per barrel where cement is used in cloth sacks, or 10 cents per barrel where it is used in paper bags. People fail to realize that they are paying from 5 to 10 cents per barrel to have the cement measured for them.

There seems no reason why bulk cement should not be measured in wheelbarrows or boxes in exactly the same manner that sand, gravel and stone are measured. In the case of a 1:2:4 mix, for instance, measured in this way, any factor of error that may exist is likely to be constant in the case of all the materials, whereas if the cement is measured in sacks, the factor of error will be multiplied by two in the case of the sand and by four in the case of the stone. If greater refinement of measurement is desired, measuring boxes of different types may be used, or if exact measurements are wanted, the cement may be weighed.

Various methods of measuring that have been used on a number of the large jobs have proved that remarkable accuracy may be attained. On one job which the writer has in mind, concrete was mixed for a 1:3:6 mixture in two-bag packages. One man operating the wheelbarrow merely had to bring the wheelbarrow to the measuring box, dump the box and return to the mixer. The efficiency of the measuring device was shown by records made and kept by the foreman on the job. These were checked against the bill of lading and showed a discrepancy of only seven sacks per car, corresponding to an error of only 0.6 per cent.

Concrete products manufacturers, especially those engaged in the manufacture of block, tile, sewer pipe and fence posts, have found it decidedly advantageous to buy and handle their cement to and from storage bins in bulk. This suggests other possibilities for those railroads which are manufacturing fence posts in large quantities, who would, no doubt, find it a distinct economy to install storage bins and other necessary equipment to handle bulk cement at post manufacturing plants. One large machinery concern has devoted considerable attention to designing various equipment for handling bulk cement, but requirements are usually simple and anyone with the average knowledge of conveyor systems can no doubt devise means suited to his individual requirements.

MAKING RECORDS WITH LOADING MACHINES

By F. N. LOUGHNAN
Division Engineer, Lehigh Valley, Wilkesbarre, Pa.

A work train made up of a locomotive and nine loading machines, each manned by an operator, a fireman and four laborers, loaded 115,817 ft. of 90-lb. relaying rail, or almost 11 track miles, on the main line of the Wyoming division of the Lehigh Valley on April 5, 1915. The rails were in a continuous stretch, were numbered consecutively, and were loaded into 37 cars, as they came out of the track in such a manner as to permit of their being unloaded and relaid in track in the same order.

All details of careful organization are attended to every time a work train is used on this road, and, at the same time, arrangements are made to prevent the slightest delay to traffic. Although in the case mentioned the day was Monday when there is no decrease in the usual number of trains operated over the division, there was not the slightest delay or interruption to traffic. The equipment, which included all sorts of loading machines, from a regular rail loader and a locomotive crane to a ditcher equipped for the purpose, started the work of loading at 6:30 in the morning and the last rail was placed on a car at 3:55 in the afternoon. The rails were shipped the same afternoon to the western end of the system, where they will be placed in use again.

The cost of loading and unloading track materials such as rails, switches, frogs, etc., has been greatly reduced by the substitution of mechanical power for manual labor. A work train on the Lehigh Valley ordinarily unloads from 70 to 128 cars of crossties daily while at work on the main line. In unloading and distributing new rail along its main line, picking up rail or unloading ashes, the results are just as interesting. Remarkable results have been obtained through the employment of as many rail loaders and other hoisting machines in one train as are available. The charges for train service are conspicuously reduced because with these machines and one engine as much material is handled in one day as could be done with a single machine in six or seven days.

The use of the work trains is under constant scrutiny. The burden is on the supervisor to show he has need for a work train and then he has the co-operation of all to get his work done as quickly and effectively as possible. The high wages paid engine and train crews have so considerably increased the cost of all work train service that every effort has been directed towards reducing the number of work trains employed and to the substitution of mechanical for manual labor wherever possible.

The largest number of new rails unloaded and distributed along the main line with one work train in a single day was 67,126 ft. of 100-lb. rail. Six machines were used in this case and 22 gondola cars were unloaded. By using two more machines it would have been possible to distribute and unload over 100,000 ft. of new rail in one day with the same work train service. In the work of unloading crossties and distributing them along the main line, 128 cars containing 28,094 ties have been unloaded in a single day. These ties were distributed along a supervisor's subdivision, ready to be used in renewals, and it is now contended that it will be possible to unload 150 cars of ties in a day under similar circumstances. With regard to unloading ashes, the contents of 125 coal cars

A Work Train on the Lehigh Valley with Six Rail Loading Machines

were unloaded on April 6, 1915, with one work train. Regarding the rail loading record mentioned at the beginning, it is believed it will be possible either to pick up or unload the rail for 15 miles of track in one day with one train when organization is further perfected and a few additional machines are available.

THE COMPARATIVE COST OF HANDLING EARTH ON FLAT AND AIR DUMP CARS

In excavating for the new passenger terminal and belt line at Kansas City it was necessary to remove over 2,000,000 cu. yd. of earth and rock. This material was handled on flat cars and on 12-yd. Western air dump cars. For two months, the cost of handling material with these two types of equipment was carefully compiled, and this data has recently become available for publication. During these two months the conditions under which the two kinds of equipment were employed were very similar, the material in each case consisting of at least 75 per cent solid rock. If conditions favored either type of equipment, the advantage was with the flat cars as the interference with traffic was greater at the dump when the air dump cars were used.

The following tabulation gives the relative cost of operation for the two months:

	Flats	Dumps
First Month		
Car repairs	$0.0706	$0.0011
Engines	.0821	.0235
Lidgerwood and airmen	.0052	.0067
Labor on cars	.0274	.0087
Labor on track	.0838	.0658
Eng. and super.	.0043	.0043
Miscellaneous	.0102	.0031
Total per cu. yd.	$0.2836	$0.1132
Second Month		
Car repairs	$0.0698	$0.0070
Engine service	.0748	.0243
Lidgerwood and airmen	.0044	.0080
Labor on cars	.0337	.0077
Labor on track	.0926	.0570
Eng. and super.	.0036	.0050
Miscellaneous	.0063	.0043
Total per cu. yd.	$0.2852	$0.1133

It will be noticed from the above that there was considerable difference in the cost of car repairs. In justice to the flat cars it should be said that the repairs shown for these two months exceeded the average cost up to that time by approximately 1½ ct. per cu. yd. The flat cars were of wooden construction with capacities of 60,000 lb. and 80,000 lb., and had been in constant service for 18 months at the time this information was collected. The dump cars were of steel frame construction, of 80,000-lb. capacity and had been in service five months.

The cost of engine service includes the rental of the engines and the pay of the crews from the time of their arrival to the time of the departure of the trains at the dump. A sufficient track force was always maintained to assure no delays to the trains waiting for the dump tracks to be put into condition. During the two months under consideration the unloading was done in yards exclusively, and for this reason the cost of engine service was not as great as later when the material was unloaded on the main tracks, which carried a traffic of approximately 150 trains per day in addition to many switching movements. Very little unloading was done on the main tracks by means of a Lidgerwood engine and plow because of the danger of delays both to the construction trains and to traffic. On the other hand trains of dump cars were frequently sent out to unload a few minutes ahead of passenger trains with only slight danger of delaying them.

The third item of cost, that for Lidgerwood and airmen, arose from the fact that it was found desirable to have a mechanic operate the Lidgerwood to reduce delays and for the same reason to have a mechanic with the air dump cars. In addition to taking care of the air valves and pipes, this man also made light repairs on the cars. The expense for labor on the cars was much greater on flat than on dump cars, especially during the winter months, as would be expected because of the difficulty of keeping the car floors and aprons clean to prevent the dirt from accumulating and freezing.

The cost of track labor was dependent more on the height of the fill and other conditions than on the type of equipment used. Where it was practicable to use only one track a saving in track labor was effected by the use of the dump cars as they could be unloaded more quickly and thereby cause less delay to the track laborers. Where two dumping tracks were available this difference did not exist.

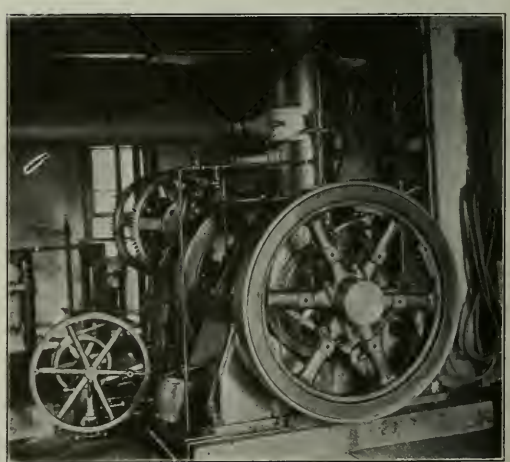
While the last two items in the tabulation do not depend on the type of equipment used, it was found that more emergencies arose from the use of flat cars with Lidgerwood unloaders and plows than from the use of dump cars. Also, it was found possible to unload at the end of a spur track on a fill successfully with dump cars, while this could not be done with flat cars and plows since the plow at the end of the train occupied a space of at least 20 ft.

This work was handled under the direction of, and the data compiled by E. P. Weatherly, formerly engineer maintenance of way, of the Kansas City Terminal Railway, under the general supervision of J. V. Hanna, chief engineer.

SERVICE OF A FUEL OIL ENGINE IN A RAIL WAY PUMPING STATION

About 5,000,000 gal. of water per month is being pumped at the Nevada, Mo., pumping station of the Missouri Pacific at a cost of 1.73 cents per thousand gallons. This service, which is being performed by a fuel oil engine, is considered very satisfactory in comparison with the average rate at steam plants under similar conditions on this and other roads.

In order to obtain a reliable and satisfactory supply of water



The Fuel Oil Engine in the Missouri Pacific Pumping Station at Nevada, Mo.

for roundhouse purposes and for about 1,175 engines per month at this division point, which is the most important terminal on the Joplin division, it was necessary to locate the pumping station about four miles west of the engine house on the Marmaton river, and the abandoned pump house and grounds of the Nevada Water Company were acquired at a very reasonable cost. The plant consists of a 42 ft. by 48 ft. brick pump house, a three-room frame pumper's dwelling, 18,000 ft. of 8-in. discharge line, about 150 ft. of 10-in. suction line, a steel standpipe 24 ft. in diameter and 45 ft. high and two pumping units, each of approximately

400 gal. per min. capacity. A low storage dam has also been provided in the river. The total cost of these facilities was approximately $31,500.

The main pumping unit for regular use consists of a 40-hp. vertical single cylinder Crescent oil engine direct connected to a Deming single action triplex pump having cylinders 9 in. in diameter and a stroke of 10 in. The engine is equipped with a compressed air starting device. The water cylinders of the pump are located in a pit with their base 18 ft. 6 in. below the base of the power head or main floor level of the pump house. The discharge head from the center line of the suction pipe to the top of the steel tank is 164.4 ft. An auxiliary steam unit consisting of a 45-hp. vertical boiler and a 12 in. by 7 in. by 12 in. duplex pump was installed for emergency use.

The fuel oil used in the Crescent engine is low grade engine distillate of 32 deg. to 34 deg. Baume specific gravity. A storage tank 8 ft. in diameter and 28 ft. long is located underground outside of the pump house which provides a storage capacity for approximately 18 months' supply of oil at the present rate of consumption. A test of this fuel oil showed a consumption of 3.23 gal. per hour when the engine was making 300 r. p. m. against a pressure of 96 lb.

The operating expenses of this plant for six months were as follows:

3,250 gal. of fuel oil at 3c. a gal.	$97.50
144 gal. of lubricating oil at 17c. a gal.	24.48
110 gal. of coal oil at 3½c. a gal.	3.98
Labor maintaining	51.00
Minor repair parts	20.00
Salary of pumper	300.00
Total for six months	$496.96

During this time 28,680,000 gal. of water was pumped against a head of about 225 ft., including friction and suction, at the average rate per thousand gallons of 1.73 cents.

The operating cost of a steam plant at this point for the same six months is estimated as follows:

152 tons of coal at $2	$304.00
Hauling coal five miles at $1 per ton	152.00
Oil, waste and supplies	50.00
Repairs	100.00
Pumper's salary	300.00
Total for six months	$906.00

For the total quantity of water mentioned above, this would mean an average cost of 3.09 cents per thousand gallons. The comparative cost of installation of the fuel oil engine and the steam plant is estimated as follows:

40-hp. oil engine	$2,000.00	Boiler in place	$1,200.00
Pumps	600.00	Steam pump	600.00
Foundation	100.00	Foundation	200.00
Pipe and connections	200.00	Pipe and fittings	200.00
Labor	125.00	Labor	200.00
		Boiler feed	150.00
Total	$3,025.00	Heater	200.00
		Total	$2,750.00

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men to which readers of this section may wish to refer have appeared in the *Railway Age Gazette* since May 21, 1915:

Preparing for the Federal Valuation of the Railways.—A description of the methods adopted by seven representative roads in preparing their information for the federal valuation parties now working on their lines was published in the issue of May 28, page 1107.

A Modern Concrete and Brick Roundhouse at DuBois, Pa.—The Buffalo, Rochester & Pittsburgh has recently completed a 16-stall roundhouse at DuBois, Pa., involving a number of interesting details of reinforced concrete construction. This building was described and illustrated in the issue of May 28, page 1110.

Fundamental Problems Involved in Railway Valuation.—A detailed report of the conference held in Washington attended by Director Prouty of the federal valuation board and his staff, and over 200 representatives of the railways and state commissions was published in our issue of June 4, page 1146.

Norfolk & Western Elkhorn Grade Electrification.—The Norfolk & Western is now completing the electrification of 30 miles of its main line between Bluefield, W. Va., and Vivian. This installation was described in detail in an illustrated article in the issue of June 4, page 1152. Additional details regarding traffic and operating conditions were discussed editorially in the issue of June 11, page 1230.

Report of the Chicago Railway Terminal Commission.—The recommendations made to the Chicago City Council Committee on Railway Terminals by the Chicago Railway Terminal Commission in a recent report were published in the issue of June 4, page 1163.

Lateral Stresses in Rails on Straight Track.—An extensive series of experiments carried on recently in the main track of a prominent road to determine the lateral stresses in rails on straight track under different conditions of line and surface, and with various types of locomotives running at different speeds, was described by George L. Fowler in an extensive illustrated article in the issue of June 11, page 1231.

Overhead Charges in Valuation.—In an article in the issue of June 11, page 1242, Richard Hoadley Tingley discussed the lack of agreement regarding the allowances generally made in valuation work and urged careful investigation to determine actual charges to this account.

BUFFALO ROCHESTER & PITTSBURGH STANDARD OUTFIT CARS

The Buffalo, Rochester & Pittsburgh provides unusually complete outfit cars for its bridge and building, mason, signal and water service gangs. The equipment for a small gang consists of a foreman's car and a combination dining and sleeping car, while that for larger gangs consists of a foreman's car, a combination kitchen and dining car and as many sleeping cars as are necessary to accommodate the gang. The interior of all cars except the tool and material room in the foreman's car is sealed on the sides and top with ⅞-in. T. & G. seasoned yellow pine over a layer of waterproof building paper. The regular car floor is covered with a 1¼-in. maple flooring laid on a layer of waterproof building paper. Par-

Exterior View of a Camp Outfit

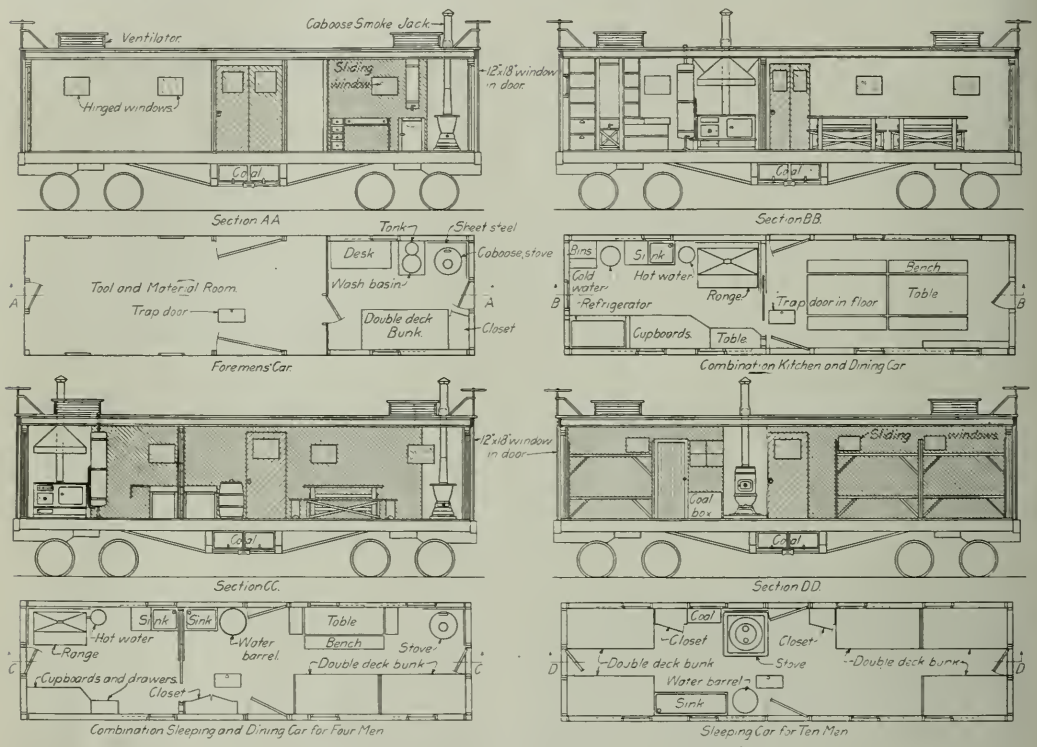
ticular care is taken to secure tight joints and to properly flash around the ventilators and smoke jacks.

The standard foreman's car is divided into two compartments, the larger being used for the storage of material. Partitioned off at one end is the foreman's quarters, provided with a desk, a washstand and a double deck steel bunk. It is heated with an ordinary caboose stove placed in one corner.

The combination kitchen and dining car is divided into two compartments. The smaller one is devoted to the kitchen and contains a stove with a hood, a hot water tank, sink, cold water tank, refrigerator and various storage bins. The stove is placed on a concrete base and thoroughly secured to the floor. All walls and ceilings adjacent to these stoves are protected by sheet steel furred out from the wall and the ceiling. The opposite end of the car is provided with the customary benches and a dining table.

The combination sleeping and dining car is provided with a kitchen at one end and two double deck steel bunks along one wall and a 6-ft. table along the opposite wall in the other end. The standard sleeping car provides for five double deck steel bunks in the ends of the cars and a stove along one wall opposite the door in the center of the car.

A color board is placed on the outside at the upper right hand corner on each side of each car indicating the branch of the engineering department to which the car belongs. The organization of the B. R. & P. is departmental and all mainte-



Standard Outfit Cars of the Buffalo, Rochester & Pittsburgh

Interior Views of the Cars

nance of way work is under the charge of the engineering department. Each branch of this department is assigned a standard color—the bridge and building yellow, mason black, track green, signal gray, water service blue, etc. All hand and push cars, feeders, tool boxes, tools, etc., are also painted with these distinctive colors to distinguish them and indicate their ownership.

STAFF MEETINGS FOR MAINTENANCE OF WAY EMPLOYEES

By J. T. Bowser

Maintenance of Way Department, Queen & Crescent Route, Danville, Ky.

Why should not the practice of holding staff meetings be extended to the maintenance of way department? Meetings attended by section and extra gang foremen and supervisors, presided over by the road master or division engineer cannot fail to be of considerable benefit to the department as a whole. It should not be a difficult matter to arrange for such meetings at stations centrally located, and the managements of many railroads would undoubtedly authorize an arrangement by which the expenses of men who have to be away from home would be paid by the company.

The division officer who is to preside at the meeting should prepare notes beforehand on subjects which he desires to discuss or explain. Such occasions offer excellent opportunities for outlining and explaining new practices, thus insuring their more intelligent application. When these matters have been disposed of the meeting can be thrown open to the men for the general discussion of any questions on which they may desire information. They should be encouraged to describe their methods and to comment on those described. New men should be encouraged to ask questions, and all complaints should be freely discussed and investigated.

The men should be encouraged to make note of conditions involving the safety of employees or others, or in any matter in which the company's interests are involved. Any recommendation should be acknowledged and discussed and if not adopted, the reasons should be explained.

Such meetings, held three or four times a year, will wonderfully improve the spirit and personnel of the organization. The men will become acquainted with each other, with their supervisors and with the division officials. Their interest in their work and in all matters involving the company's interests will be greatly increased, while a general rise in the tone of the organization will be readily noticed. Men who have been in the rut of old methods for years will pick up ideas of improved methods, while the "hard headed" foreman, who cannot be taught or instructed in the usual manner, will assimilate ideas that he might never get otherwise.

A NEW TYPE OF WALL BOARD

The "Certain-teed" wall board recently placed on the market by the General Roofing Manufacturing Co., St. Louis, Mo., is made by cementing together four sheets of clean wood fibre material and is designed to secure great strength and resistance to moisture and dampness. Experiments were carried on for about four years in an endeavor to secure these qualities to the greatest possible extent, with the result that this material is shown by tests to have a strength of 424 lb. per sq. in., and that its absorption of water in a one-hour test is 70 per cent, and in a four-hour test, 98 per cent. While this material has been used satisfactorily for interior finish in many buildings, the object of the manufacturers has been to secure the best service rather than a beautiful finish.

This material is particularly adapted to railway buildings in which there is a considerable amount of vibration, where plaster is cracked and broken. In factories, shops and offices where revolving machinery or passing trains cause such vibration, the wall board can be satisfactorily used and in passenger stations it is more attractive and also more economical than some of the common methods of finishing the interior walls. The further advantages are claimed for it that it is a non-conductor of heat, therefore saving fuel in cold weather and keeping the building cooler in summer, and that it is clean, durable and sanitary. It can be calcimined, varnished

Bundles of "Certainteed" Wall Board Ready for Shipment

or painted with oil or water color paint, and can be applied more quickly and easily than laths and plaster.

This material is made in widths of 32 and 48 in., and in lengths varying from 6 to 16 ft. It weighs approximately 650 lb. per 1,000 sq. ft. It is packed in bundles containing 10 pieces each and protected by container board covering held in place by steel bands, enabling it to be handled readily.

WOOD PRESERVATION STATISTICS

The American Wood Preservers' Association in co-operation with the Forest Service, United States Department of Agriculture, has compiled and published statistics showing the quantities of wood preservatives consumed and the amount of wood treated in the United States in 1914. The following information is abstracted from this report:

In 1914 the Forest Service records showed 122 plants of all types, 100 of which were of the pressure-cylinder type. In Table 1 the consumption of wood preservatives used by the treating plants is shown by years, kinds of preservatives and quantities. For 1910, 1911 and 1912 the increase in the use of creosote oil was approximately 10,000,000 gal. annually. The greatest consumption of preservatives was recorded in 1913. In 1914 the total quantity of creosote oil reported dropped approximately 29,000,000 gal. This was due primarily to the facts, that the supply of creosote from England and Germany during 1914 decreased, and that for years prior to 1914 paving oil was included in the creosote statistics. In this report paving oil, reported as 9,429,444 gal., is listed separately.

Table I—Consumption of Wood-Preservatives by the Treating Plants in the United States, 1909-1914

Year	Number of Plants	Creosote, Gallons	Zinc chloride, Pounds	Other preservatives, Gallons*
1909.....	64	51,431,212	16,215,107	.....
1910.....	71	63,266,271	16,802,532	2,333,707
1911.....	80	73,027,335	16,359,797	1,000,000
1912.....	84	83,666,490	20,751,711	3,072,462
1913.....	93	108,373,359	26,466,803	2,885,738
1914.....	94	79,334,606	27,212,259	{ 9,429,444† / { 2,486,637

*Includes crude oil, coke oven-tar, refined coal-tar, and carbolineum oils.
†"Paving oil."

The total consumption of zinc chloride in 1914 exceeded the 1913 figures by approximately 750,000 lb.

Some firms have experienced considerable difficulty in obtaining foreign oil, very largely due to inability to obtain tank steamers for its transportation. Some of the larger manufacturers of creosote oil in the United States estimate that the production of the American oil has been increased by 25 per cent, owing to the installation of new coke ovens. However, many of the coke ovens which manufacture the crude coal-tar have not been operating; consequently this increased production has not been felt materially to date. The difference in the totals of creosote oil consumed for 1913 and 1914 was nearly equally distributed between the foreign manufacturers and the American producers of this commodity.

Table II—Relative Quantities of Domestic and Imported Creosote Used in the United States, 1909-1914

Year.	Total creosote used, Gallons	Domestic creosote, Gallons	Per cent of total	Imported creosote, Gallons	Per cent of total
1909.....	51,426,212	13,862,171	27	37,569,041	73
1910.....	63,266,271	18,184,355	29	45,081,916	71
1911.....	73,027,335	21,510,629	29	51,516,706	71
1912.....	83,666,490	31,135,195	37	52,531,295	63
1913.....	108,373,359	41,700,167	38	66,673,192	62
1914.....	79,334,606	28,026,870	35	51,307,736	65

The price of domestic creosote in 1914 averaged in the neighborhood of 8 cents to 8½ cents per gallon, f. o. b. plant. Very few quotations for creosote are being given for 1915 delivery, but, owing to the scarcity of oil, prices for 1915 probably will be somewhat higher. Much the same condition exists in the production of zinc chloride, owing to the inability to obtain spelter. However, some firms are buying their supplies of this preservative at very slight increase over the figures current in 1914.

Increased amounts of creosote oil may have to be produced in the United States in the future owing to the perfection in Europe of engines using such oil as a fuel. Also in European countries increasing amounts of tar are being used for road making, and as tar is distilled for commercial creosote the tendency is to reduce the quantity of creosote oil manufactured in Europe for preservation purposes. Considerable progress has been made in this country on some plants located in the Middle West, which when completed, will add 10,000,000 or more gallons annually to the supply of domestic creosote.

The number of ties treated in 1914 exceeded the total in 1913 by 3,577,571. The hewed ties treated comprised about 70 per cent of the total or 30,222,183, while 13,624,804 were sawed. A few companies treated more hewed ties in 1914 than in 1913, owing to the fact that more tie cutters were available during 1914 than in the preceding year. Nevertheless, the increase in the total number of cross ties treated is reflected chiefly in sawed ties. Oak ties lead in the number treated. Over 39,000,000 ties were treated by creosote and zinc chloride, approximately one-half of the total being reported under each class. Over 50 per cent of the ties treated with zinc chloride were oak. The most common treatment of pine was made with creosote, and 1,159,929 ties of the total of 1,956,278 treated with zinc and creosote emulsion were oak. Zinc creosote emulsion was used for treating 1,956,278 cross ties; 2,625,681 ties were impregnated with miscellaneous preservatives, including crude oil, paving oil, refined coal-tar and oils reported as carbolineum. The treatment varied from dipping in open tanks, as practiced by some tracTable III—Number of Cross Ties Treated, by Kinds of Wood and Kinds of Preservatives, in 1914

Preservative	Oak	Yellow Pine	Douglas Fir	Western Pine	Beech	Gum	Tamarack	Maple	Birch	Elm	Other species	Total
Creosote	6,537,857	7,102,396	5,452,516	712,631	572,828	255,672	183,044	419,535	126,735	1,972	1,226,257	22,591,443
Zinc Chloride	8,549,073	1,866,627	2,221,163	1,656,721	352,415	536,267	340,462	132,644	.....	41,358	976,855	16,673,585
Zinc Chloride and Creosote	1,159,929	111,998	.....	.....	114,466	32,091	.....	28,728	.....	.....	509,066	1,956,278
Miscellaneous	148,275	1,526,243	57,085	.....	.....	86,833	290,424	.....	208,700	.....	308,121	2,625,681
Total	16,395,134	10,607,264	7,730,764	2,369,764	1,039,709	910,863	813,930	580,907	335,435	43,330	3,020,299	43,846,987
Per cent of each kind of total number treated	37.39	24.19	17.63	5.40	2.37	2.08	1.86	1.32	.77	.10	6.89	100

tion lines, to heavy penetration of 10 to 12 lb. of oil per cubic foot by steam railroads. Approximately 135,000,000 ties are purchased annually by railroads, and although much progress has been made in tie treatment to date, but 43,846,987 ties are run through cylinders.

Table IV—Comparative Statement of Material Treated in the United States, 1909-1914

Preservative	Year	Cross ties, cubic ft.	Piling, cubic ft.	Poles, cubic ft.	Paving blocks, cubic ft.	Construction timbers, cubic ft.	Cross-arms, cubic ft.	Lumber and miscellaneous, cubic ft.	Total material treated each year, cubic ft.
Creosote	1909	29,830,080	4,421,726	659,664	2,994,290	4,902,311	41,764	417,787	43,267,622
	1910	44,525,229	5,219,254	255,597	4,692,453	7,801,272	88,069	2,687,713	65,269,587
	1911	49,532,163	4,937,363	106,213	10,145,724	7,417,105	71,961	2,499,995	74,710,524
	1912	57,461,515	7,624,939	1,169,981	7,091,658	6,892,493	1,643,128	2,841,195	84,724,909
	1913	75,998,307	7,630,328	2,367,769	6,810,308	10,308,883	1,813,010	1,853,993	106,782,598
	1914	67,774,329	7,804,657	1,188,511	3,127,506	8,389,158	393,403	1,348,566	90,027,630
Zinc Chloride	1909	24,153,162	.....	.....	.....	320,891	.....	2,333	24,476,386
	1910	27,587,583	.....	.....	.....	541,514	.....	71,060	28,200,157
	1911	28,337,883	.....	.....	.....	1,043,531	.....	119,921	29,501,665
	1912	28,532,874	.....	18,246	.....	259,972	.....	20,092	28,831,184
	1913	36,051,816	.....	47,996	.....	585,756	.....	7,670	36,693,238
	1914	50,020,755	.....	.....	.....	1,317,925	.....	4,355	51,343,035
Zinc Creosote	1909	8,095,794	.....	.....	.....	62,918	.....	43,699	8,202,411
	1910	6,354,219	38,392	.....	.....	181,143	.....	30,646	6,604,400
	1911	7,312,374	.....	.....	.....	.....	.....	.....	7,312,374
	1912	8,214,303	97,874	.....	.....	560,613	.....	99,367	8,972,157
	1913	6,938,838	327,594	.....	.....	758,989	.....	53,628	8,079,049
	1914	5,868,834	.....	.....	.....	140,718	.....	.....	6,009,552
All Preservatives	1909	62,079,036	4,421,726	659,664	2,994,290	5,286,120	41,764	463,819	75,946,419
	1910	78,467,031	5,257,646	255,597	4,692,453	8,523,929	88,069	2,789,419	100,074,144
	1911	85,182,420	4,937,363	106,213	10,145,724	8,460,956	71,961	2,619,926	111,524,563
	1912	97,183,009	7,737,035	1,188,579	7,397,095	7,793,524	1,643,128	2,988,686	125,931,056
	1913	120,781,248	7,957,922	2,500,420	6,856,293	11,653,628	1,824,719	2,039,658	153,613,888
	1914	131,540,961	8,061,902	1,482,407	6,869,370	9,847,801	417,914	1,362,284	159,582,639

Converting Factors

To obtain the number of cross ties, divide figures shown by 3.

To obtain the number of lineal feet of piling, divide the figures shown by .6763.

To obtain the number of lineal feet of poles, divide the figures shown by .5868.

To obtain the number of square yards of paving blocks, divide the figures shown by 2.625.

To obtain the number of board feet of construction timbers, divide the figures shown by .0833.

To obtain the number of cross-arms, divide the figures shown by .6198.

To obtain the number of board feet of lumber and miscellaneous material, divide the figures shown by .0833.

CORRUGATION OF RAILS IN ELECTRIC RAILWAY SERVICE

In a paper delivered before the Institution of Civil Engineers of England by William Willox, on Rail Steels for Electric Railways, there appeared considerable information on the corrugation of rails in electrified steam railway tracks. The electrification of existing railways in England was begun in 1903, and the running of electric trains commenced in 1905. Apparently it was not foreseen that this would have other than the usual effect on the running rails, but it is now evident that electric trains, more especially, perhaps, in London, have reduced the life of the rails in a marked degree. This is due not so much to the fact that the trains are driven electrically as to the design of the motors used. The motors are therefore placed under the floors of the cars, except where electric locomotives are used to haul ordinary equipment. In the former case great difficulty has been encountered in carrying the motors on springs, and they are slung on the axles and so become a dead load, or nearly so. Besides this, the wheels are of small diameter, the trucks are short, the drive is near the extremities of the axles, and after a short period of service where there are curves, the wheels are in many cases of unequal diameter. The result on the road is very marked, the life of the rails being reduced by years. On part of the Metropolitan Railway where electric traction is in use the life of the rails in the open is only about 8 years and in the tunnel section barely 3 years. As the traffic increases, even this life cannot be maintained unless more durable rails than those ordinarily used are substituted. The 3 years' life for the tunnel section is the average, and on curves the life is much shorter.

The first trouble met with under electric traction was side wear, which was excessive on curves and occurred not only there but also on tangents, owing no doubt to the nosing of the motor cars. In order to prevent this on sharp curves inside guard rails were provided. These guard rails lasted only 3 to 6 months and it was necessary to keep a gang at work on renewals continuously. The difficulty has been entirely overcome on the Metropolitan Railway by the use of a special hard guard rail of such a shape as to prevent it from being put into the running rails by mistake.

The second, and a much worse trouble, is the grinding of the running surface of the running rail into hollows, called locally "battering," which is not corrugation but something much more than that. It occurs chiefly on curves. The hollows are nearly always just at the sides of the chairs towards approaching trains, the portion of the rail between consecutive chairs being hardly affected. It would thus seem that where the rail has spring the grinding is much less. The battering is apparently caused by the hammering action of the unspring-borne load of the motors on the rails; by skidding action along the rail, arising from the direct drive on the axle and by skidding action across the rail, arising from the rebound of the rail when it has reached its limit of side spring, caused by the pushing of the wheels as they go round the curve. Ordinary corrugation, such as occurs in street car rails, exists in all sorts of places near stations and between stations, but it has no serious effect, except probably to increase the noise of trains. It is this battering that so seriously lessens the life of the rails, especially on curves.

Because of this experience of the English railways, inquiry was made of Dr. P. H. Dudley, consulting engineer, New York Central Lines, regarding the extent to which this same effect had been noticed on the electrified portions of his lines. We quote from his reply as follows:

"I do not know of any corrugation in our rails, either on the Hudson or Harlem branch operated by electric traction. The rails used for electric traction on the New York Central are either our 6 in. 100-lb. or 105-lb. sections. The breadth of the head at its extreme width is 3 in., with sides inclined 1/16 in. per inch of height, and with 5/16 in. radii for the upper corners. The top radius of the rail is 14 in. This is a broad flat top rail, quite different from the T or doubleheaded section used in England, and I have not noticed any corrugations whatever on rails which have been put in service the last 3 or 4 years. When electric traction was installed with electric motors to draw the former steam cars, it was noticed in one or two places that there was a slight evidence of a sway and a small increase of wear at recurring positions on a few rails, but this has practically disappeared on more recent rails.

"There are two types of corrugations—long and short waves, which must be discussed in electric traction. The first I have partially described, and it no longer appears on our recent rails, while I have never noticed the short waves upon our stiff, broad, flat-topped rails.

"So far as I have observed in this country and in England the method of blooming the ingots is quite different in the ragging of the rolls. We use ragging with one sharp angle, but the other is inclined, while in England the ragging or cogging, as they term it, is done by square projections on the rolls. That type of ragging seems to effect the metal in the passes to an extent by its irregular pressure which is not completely overcome in the final rolling. The heads of the T or doubleheaded section have a smaller top radius with greater corner radii, consequently the actual bearing surface between the rail head and the wheel tread is smaller than in our practice, and corrugations can more readily occur.

"The long waves are due to a repeated oscillation of the equipment over the rails. The short waves produce shorter corrugations, and are noticeable for practically every inch or two in the rail top. I have never observed the latter type on our own rails, but I have seen this type to a slight extent upon rails of a different section of shorter top radius and greater corner radii."

DIFFICULTIES IN INCREASING THE SCOPE OF THE SECTION FOREMAN'S DUTIES

By J. P. Costello

Roadmaster, Atchison, Topeka & Santa Fe, Pueblo, Col.

In a recent issue an article appeared setting forth the economic value of increasing the duties of section foremen to take care of light repairs to bridges, buildings, signals, etc., the main objects being to make repairs quickly and to save the expense of the time lost by workmen moving on trains to and from the scene of the work. I grant that it is unfortunate that, under present arrangements, men cannot be on the ground to make these needed repairs, but the question arises, can the section forces do this work and if they can, will they, by so doing, increase the efficiency of the maintenance of way organization?

In order to save time, special tools and materials for these additional jobs would have to be kept on hand at all times on each section even though some of them would probably only be used on comparatively rare occasions. Although the allotments of tools and materials were small and restricted, their summation would certainly exceed the requirements of one or two special gangs at some central point. There would also be a greater chance of lost, misplaced, or misused tools and materials.

A man accustomed to the use of a claw bar, spike maul, or wrench cannot turn his hand to the use of carpenters' tools with any more readiness than a carpenter can turn from his own tools to those in use by the track department. Neither can a track foreman apply his mind to carpentry or signal work with the precision which he applies to his own class of work. Certain jobs might not present themselves as often as once in a year on an ordinary section. No man can do a piece of work with finished skill the first time it presents itself nor can he do it with real skill if it presents itself only after long intervals of time. The efficiency of a laborer depends upon his skill and skill is the result of experience—practice.

I have seen a statement that railway maintenance forces were less than 40 per cent efficient. I will not argue that this statement is inaccurate and I do not deny that the track forces contribute their share, at least, to this inefficiency. The discussion of increased duties for section foremen is no doubt the result of an attempt to overcome this inefficiency, but why should we expect to increase the efficiency of the whole department of maintenance by requiring more diversified work of one branch of that department? A study of some of our highly efficient factory organizations would indicate that the fundamental idea is to keep certain men engaged at one definite class of work.

Of course, in an organization like that of railway maintenance, where rather small units of the organization are maintained not directly under the eye of a supervising official, the attempt to make the work too machine-like would be a failure. A study of work which is essentially manual in character cannot be considered in the light of an exact science because we have the human element, interest, to deal with. Track work properly conducted and in a state of *evident progress* is interesting, otherwise we would not be able to secure men to handle it and at the same time accept with a degree of cheerfulness the rigors of the occupation.

I am convinced that the duties of section men are far too diversified now—too much energy dissipated in discontinuing one task to take up another. Their duties extend from menial tasks to important ones chargeable to other branches of the service. I agree that many of these things, under present conditions, must be performed by section men for the simple reason that no other provision is made to take care of them.

I have in mind a district which terminated at the end of a bridge over which only a restricted car tonnage was permissible, causing many heavily loaded cars either to be transferred or lightened. At another point were several mines at which cars were frequently damaged and had to be repaired —many times after they had been loaded. At another, a junction point, there was some sort of an agreement or arrangement about interchange of l. c. l. shipments whereby much unloading and concentrating of freight was necessary. The three sections whose headquarters were at these points were very unsatisfactory to handle, because at irregular intervals the heavy work of freight handling was thrown upon the section men and, of course, had to be done regardless of track work. It was impossible to get any systematic "line up" on the work or to arrange any definite program. These sections were always short of men and I am satisfied that this outside work had a greater influence on this shortage than the smallness of the wages which they received. Men engaged in any class of constructive or repair work, no matter what their nationality, intelligence, or education, must be able to see consistent progress in their essential work or they will not be interested. I believe everyone agrees that the *essential work* of section men is track work.

Engineers in charge of maintenance have usually figured that, by increasing the size of a gang at a point where outside work interfered, the same results in track work could be secured as by using a proportionately smaller gang engaged solely in track work. This idea is absolutely wrong. Work accumulates a certain momentum as it progresses. Every interruption or change of work dissipates this momentum—hence, loss of efficiency.

I have observed a couple of roads where the section men were required to wash the windows, scrub the floors and clean the outhouses of local stations. I have observed another road where this was not the rule. I have noticed, in the latter case, that the agent took a little personal pride in keeping his windows clean; that he discouraged the loafers and tobacco spitters, and that he kept his outside toilets locked. With the exception of a very few cases, I have never seen it to fail where section men could be called in to do odd jobs that they were imposed upon.

This new scheme of increased efficiency in maintenance is as much in error as many others for the reason that the idea is to accomplish the same results as formerly by the expenditure of less money. Present conditions require better track and the future will require still better and better track conditions. Why not aid the section foreman to increased efficiency and then encourage him by allowing him to see the results of his efforts?

Although seasonal in character, section work submits to a fairly definite program and by arranging such a schedule better results can be secured as to quantity and quality of work obtained. Increased efficiency will be the result of a definite program, while diversified duties interfere with the carrying out of a definite program of work.

As to the smaller repair jobs, aside from track work, which might be assigned to the section men, these could be better taken care of by special branches of the maintenance department if a definite program of repairs were carried out and I have noticed that, where such a program obtains, the small apparent defects vary inversely as the perfection of the program. The "window-pane" illustration is not a fair one because it refers to a fragile material and a condition of failure which is sudden and not of a progressive nature. Certainly no one would expect a local station to get along with a broken window for several months until the regular time in the program arrived to take care of it. In the proposed scheme, the idea would be to take care of such things as the loose hinge on the station door; the few decayed planks in the freight house platform; the loose shingles on the roof of the pump house; the corroded or broken bond wires at some street crossing; a water accumulation in the pipe lines of the crossing gates; or the thousand and one things which go wrong but which do not arise in a second. The stitch in time idea is all right, but we should not allow our faith in it to degenerate into the belief that repairs should be made in the barest scratch of time necessary to avoid the failure of a device.

Among men who have not handled track work directly the idea seems to prevail that the scheme of section work is for the foreman to find or to have pointed out to him something which needs attention and fix it, then go to some other point and do the same thing and so on. If this idea continues prevalent among the men who influence track work, section work will never be done with efficiency. Section work properly conducted aims at the general prevailing condition. I am satisfied that the present day inefficiency is not due entirely to the class of labor employed.

The position of section foreman is different from most other minor railway positions for the reason that when a man is made foreman in charge of a piece of track, his relationship to that piece of track borders on ownership. He may, at times, work for days or even weeks without conversing with his superior. Unlike other men he is free from intimate directions or regulations. If he is the right kind of a man and if he is not overwhelmed with a multitude of duties he takes a certain pride in the upkeep of the property turned over to him. On the other hand, if he has more duties than he can attend to properly, his attitude becomes that of a property-poor landlord.

To increase efficiency in the maintenance of way department the various branches of the department should be improved. If we condense the section work into the most essential things to be obtained, if we "programize" the work to take care of these essentials at the proper time, if the section men are allowed to carry out each part of their program with a minimum of outside interruptions and if the work be conducted so that the foreman and his men can see actual, positive progress, the increased efficiency of the section gangs will prove that they do not need additional duties. Such a policy should have the support of the highest officials who influence maintenance work.

General News Department

The Pennsylvania Railroad has received word from the Panama-Pacific International Exposition at San Francisco that the company has been awarded the grand prize, the highest honor which could be conferred upon any railroad exhibiting.

Southern Pacific passenger train No. 22, running from San Francisco to Los Angeles, was held up late on the night of June 11, near Chatsworth, Cal., by two masked men who went through the last four cars and robbed a number of passengers. The robbers then stopped the train and escaped.

Miss Irma Pratt, a member of the graduating class of the St. Clairsville (Ohio) high school, who lives at Barton, and has traveled back and forth on the Baltimore & Ohio, 6 miles each day, reports that she did this for five years without ever missing a day or a fractional part of a day of school, and without being tardy.

The Magnolia cut-off of the Baltimore & Ohio, which was opened for traffic last December, has effected an average reduction of 2 hours and 5 minutes in the time of train crews over the east end of the Cumberland division. The Magnolia cut-off, shortening the main line about 6 miles and giving more favorable grades, was described in the *Railway Age Gazette* of April 30, 1915.

The railroad department of the Young Men's Christian Association is establishing a railroad school in its recently completed college for the training of secretaries at Chicago. This course will be under the direction of leading railroad Y. M. C. A. secretaries, with W. N. Northcott, executive secretary of the railroad associations of Chicago, as dean. The purpose of the course is to train men to become efficient secretaries of railroad branches. This department of the school will begin its work next October.

For forty-five days the wreck train assigned to the east end of the Cumberland division of the Baltimore & Ohio was not called out in the territory between Cumberland and Brunswick, which embraces a distance of 102 miles of three-track and four-track railroad for a greater part of its length, and includes the Magnolia cut-off. This section of the Baltimore & Ohio is one of the busiest railroads in the United States.

Railway Sanitation

This is the title of a pamphlet which has been printed by the Baltimore & Ohio for circulation among employees in all departments of the service for the general benefit. It consists of five articles on the subject by Dr. E. M. Parlett, re-printed from the Baltimore & Ohio Employees' Magazine. Dr Parlett is a member of the General Safety Committee of the road. These essays include one dealing in detail with the sanitation of construction camps, and another on typhoid fever and its conquest.

Results of Safety-First Work on Norfolk & Western

C. H. Blakemore, chairman of the safety commission of the Norfolk & Western, has issued a bulletin showing the decrease in injuries to employees during the 20 months ending December 31, 1914, since the safety movement was inaugurated on this road. The improvement with relation to the number of employees is shown on a chart on which is plotted a line showing the number of injuries and a line showing the fluctuations in the pay roll. The total pay roll and the total number of injuries as of May, 1913, is taken as a base line for making comparisons, and with relation to this line from August, 1913 (the high point, with 463 accidents), to December, 1914, with 172 accidents, there was a decline of 70 per cent. From May, 1913, the lines showing pay roll and injuries gradually diverge and at the end of 1913 the pay roll had declined 7 per cent, while accidents had gone down 25 per cent. At the end of 1914 the pay roll had declined to 17 per cent below the base line, while accidents had gone down 58 per cent, a further gain in accident reduction of 41 per cent. When the safety movement was inaugurated one employee on the line was being injured for each $3,600 of pay roll. For December, 1914, one employee was injured for each $7,000 of pay roll.

Economy in Distribution of Time-Tables

[From New York Central Bulletin]

It has probably never occurred to many agents how easy it is to throw away the company's money in handfuls by a wasteful distribution of time-tables.

An agent in an up-state village sent in a requisition for 300 copies form 1001, our General Folder, and 500 form 110, our Adirondack Division folder. We consulted our records and found that this station used about 5 form 1001 and 15 form 110 per month. As the first form costs about 1 cent a copy and the latter ½ cent, this agent would have received $5.50 worth of time-tables, when 25 cents worth would have answered his purpose until the summer schedule becomes effective two months hence. At a larger station, 2,000 copies of form 1001 were ordered. We found that this agent had used but 500 of this form in the past seven months. Bearing in mind the summer change in time 150 copies were ample to meet this requirement and that quantity was sent. If the full quantity requested had been shipped, he would have thrown away $18.50.

You are probably saying that these cases are exceptional. Nothing of the kind. They are every-day occurrences.

Stop and consider that the New York Central is supplying over 2,000 stations monthly with 25 different forms of time-tables, costing from 1 mill to 1 cent each in quantities ranging from 5 to 5,000 copies.

Order enough folders for one month only.

Street Railway Strike in Chicago

The 14,000 motormen and conductors employed on the Chicago surface and elevated lines went on strike at midnight on Sunday last, after the management of the companies had refused their demands for increases in pay and changes in working conditions. The three-year contract between the companies and the Amalgamated Association of Street and Electric Railway Employees of America expired on May 31, and negotiations on the new demands of the men have been in progress for some time. The employees for a long time refused to consider arbitration, and after the mayor of Chicago had held conferences with the officers of the union and of the companies in the effort to bring about an agreement, they proposed a plan of arbitration providing for a guarantee in advance of certain changes in working conditions which the companies declared would amount to an increase in pay of over $1,000,000 a year, while other questions were to be submitted to a board of arbitration composed of one man selected by the union, one by the companies and a third to be selected from a list of five names proposed by the union. The companies declined to agree to this kind of an arbitration and proposed that each side should select an arbitrator and that the two thus selected should choose the third. The company agreed to ask for no reductions in pay. This proposition was declined by the union leaders.

The surface lines made no attempt to run cars on Monday or Tuesday. The elevated lines ran a few trains on Monday without attempting to carry passengers, but on Tuesday attempted to give some service. As a result the steam railroads which normally bring in only a small percentage of the daily current of commuters, were confronted on Monday with an unusual traffic problem, with only a few hours to prepare for it. The railroads that ordinarily operate suburban service put every available car into that service, lengthening the regular trains and putting on as many additional trains as they could handle; and railroads that do not ordinarily run suburban trains put on extras and carried as many people as they could. The Illinois Central, the Chicago & North Western and the Chicago, Rock Island & Pacific, which carry the bulk of the suburban passengers into and out of Chicago, were taxed to the limit of their capacity on Monday, but on Tuesday

had organized the service so that it was handled with less confusion. The ticket selling facilities proved entirely inadequate, and it was found necessary to install many emergency ticket booths; and the cars were so crowded that the conductors missed a large percentage of the fares. On some roads the schedules were practically abandoned and trains were run one after the other as fast as they could be made up, in many instances with passengers hanging onto the engines and the roofs of cars. Emergency stations were established at various points where trains ordinarily do not stop. While there was a great deal of crowding and delay the inconveniences were generally accepted by the public good naturedly.

Many of the large stores and other business houses organized automobile or wagon service for their employees, and every available vehicle of any character was pressed into service to handle the crowds.

On Wednesday morning the officers of the companies and the representatives of the strikers agreed to arbitration, the third arbitrator to be Mayor Thompson.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday of each month, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Traffic Manager, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

Traffic News

William A. Colston, general solicitor of the Louisville & Nashville, addressed the Transportation Club of Louisville on June 8, advocating life terms and high salaries for railroad commissioners, and restriction of appointments to men with at least eight years of experience in the railroad business.

Members of the Traffic Club of Chicago made an inspection trip over the Chicago railway terminals on June 15 in a special train, leaving the LaSalle street station over the New York Central, going through the Union stock yards by the Chicago Junction, through the Clearing yard by the Belt Railway of Chicago, then to Blue Island via the Indiana Harbor Belt for inspection of the Indiana Harbor Belt icing plant and returning to the Calumet district via Indiana Harbor, Ind.

According to the Canal Record the earnings from tolls through the Panama Canal for the month of March were greater than the cost of operation and maintenance of the canal by $137,509. This gain reduced the deficit for the fiscal year beginning on July 1, 1914, to $123,588, which represents a loss of 4.09 per cent on the total outlay, not counting anything for interest on the investment or depreciation of the plant. It is stated that the deficit was further reduced during the month of April.

On the petition of the attorney general of Massachusetts, Judge Crosby in the Supreme Judicial Court of the state has issued a temporary injunction against the Boston & Maine and the New Haven railroads, restraining them from breaking a contract of 1912 whereby they agreed to absorb the switching charges on freight to and from the Commonwealth Pier in South Boston. The railroads had filed new rates, effective June 28, which added the switching charges to the straight Boston rates.

Car Surpluses and Shortages

The committee on relations between railroads of the American Railway Association in presenting statistical statement number 5, giving a summary of freight car surpluses and shortages for June 1, 1915, says:

"The total surplus on June 1, 1915, was 295,295, comparing with a surplus of 292,269 on May 1, 1915, and 242,572 on June 1, 1914. The surplus, as shown for May 1, includes figures reported since the issue of statistical statement number 4.

"The increases in surplus over May 1, 1915, are chiefly in groups 3, 5 and 6 (central, north and southeast) and group 10 (west) except coal cars. There is a decrease in the surplus of coal cars chiefly in groups 3 and 5."

The total car shortage on June 1, 1915, was 203, comparing with 966 on May 1, 1915, and 770 on June 1, 1914. The figures by classes are as follows:

Classes	Surplus	Shortage
Box	123,436	55
Flat	14,429	51
Coal and gondola	105,852	73
Other	51,578	24
Total	295,295	203

CLEANING CASTINGS.—In a leading article in the Electrical Review, dealing with lubrication troubles, it is stated that the difficulty with new turbine and engine bearings is frequently attributable to the fact that manufacturers do not clean the castings properly. Castings are never properly cleaned of sand, even externally, by the still common methods of brushing and coke rubbing, and in steam ports and passages it is hopeless to expect cleanliness from such antiquated methods. The most effective way for removing sand seems to be to pickle the castings. First, they are roughly cleaned and fettled and then hosed with weak hydrochloric acid. When sand is present this spreads the acid by capillary attraction, and the result of a few hours of acid action is to remove all sand and to leave the surfaces clean and free from hard siliceous scale. Afterwards the castings are washed with warm water dosed with soda to neutralize any remaining acid.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF APRIL, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama Great Southern	309	$308,859	$71,161	$414,415	$49,750	$96,920	$10,783	$144,993	$2,689	$10,289	$308,303	$106,112	$15,156	$90,941	$48,345
Ann Arbor	294	142,628	37,390	191,563	22,751	37,088	5,707	73,551	320	8,211	137,628	53,936	10,580	43,349	10,995
Arizona Eastern	367	152,575	27,424	190,794	32,085	20,679	1,808	49,827	998	10,667	116,035	74,759	12,460	62,299	—31,496
Atlanta & West Point	93	57,527	32,726	103,646	8,971	19,105	5,469	31,512	1,624	5,067	71,704	31,943	5,525	26,312	17,849
Atlantic & St. Lawrence	167	86,020	25,479	126,915	15,846	16,097	3,394	59,568	.....	3,090	97,996	28,919	10,800	18,119	—868
Atlantic City	170	71,241	72,832	151,215	42,210	17,414	1,563	80,285	83	1,712	143,207	8,008	13,500	—5,724	—5,888
Atlantic Coast Line	4,701	2,073,722	646,352	2,977,165	368,571	412,501	53,964	969,897	10,782	70,784	1,884,164	1,093,002	138,000	954,019	143,707
Baltimore & Ohio—System	4,516	5,823,229	1,020,821	7,430,050	642,769	1,183,443	166,100	2,647,675	50,622	206,553	4,890,381	2,539,669	266,188	2,270,749	213,429
Bangor & Aroostook	631	459,736	50,972	527,342	40,985	46,243	2,216	84,999	2,679	19,003	187,125	340,217	12,525	327,691	—53,169
Bessemer & Lake Erie	205	448,557	22,592	482,155	37,727	154,333	10,796	136,423	.....	12,124	335,258	146,896	17,005	129,892	155,167
Canadian Pacific Lines in Maine	233	111,796	21,449	142,097	14,201	13,471	5,839	47,937	.....	3,871	85,319	56,778	12,000	44,778	—1,458
Carolina, Clinchfield & Ohio	248	161,675	11,635	176,821	21,373	23,635	7,415	35,704	.....	10,621	97,900	78,921	14,250	64,662	—19,281
Carolina, Clinchfield & Ohio of S. C.	18	11,291	890	12,555	1,705	75	1,545	3,095	.....	723	6,143	6,412	750	5,662	—799
Central of Georgia	1,924	687,394	215,001	1,012,351	130,359	161,112	34,231	338,476	2,156	37,866	706,315	306,036	50,297	254,276	129,656
Central of New Jersey	678	2,056,318	403,052	2,585,140	203,605	470,791	27,708	817,648	11,306	49,453	1,580,510	1,004,630	117,447	887,182	272,521
Central New England	304	384,008	32,085	431,869	64,827	35,488	1,461	101,107	.....	4,300	207,139	224,731	16,000	208,731	57,458
Central Vermont	411	327,344	63,079	317,731	33,693	44,636	9,751	141,100	1,325	10,306	240,810	76,920	15,760	61,160	43,064
Charleston & Western Carolina	341	141,568	21,850	172,033	26,474	21,063	3,581	55,403	.....	4,550	111,052	60,981	5,000	55,981	13,269
Chicago & Eastern Illinois	1,282	770,652	201,456	1,065,269	373,097	282,595	25,326	406,249	7,791	35,982	1,128,745	—63,476	53,600	117,231	—116,236
Chicago & Erie	270	431,563	42,358	516,588	62,329	83,624	16,736	222,039	2,906	15,120	402,506	114,082	20,500	93,582	87,140
Chicago, Burlington & Quincy	9,367	4,541,429	1,450,571	6,689,143	1,522,888	1,233,216	128,544	2,180,327	63,246	164,571	5,292,792	1,396,351	331,020	1,065,331	331,142
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	50,246	12,360	73,225	7,969	10,578	1,522	40,780	.....	1,690	63,540	10,685	2,870	7,815	2,066
Chicago Junction	24	.....	.....	163,616	20,405	21,116	1,943	89,228	.....	6,746	139,439	24,177	2,367	21,660	—9,907
Chicago, Terre Haute & Southeastern	374	143,044	13,749	161,253	17,804	41,238	2,986	48,764	964	9,654	121,410	39,843	12,500	27,343	66,324
Cincinnati Northern	246	105,352	12,524	122,525	21,551	24,088	2,471	39,899	.....	4,348	92,336	30,169	5,500	24,668	25,478
Colorado Midland	338	82,945	10,386	101,710	18,511	26,993	8,712	46,424	952	5,379	106,971	—5,261	10,000	—15,261	—3,524
Denver & Rio Grande	2,575	1,167,197	340,880	1,633,646	139,151	289,387	41,579	467,859	29,927	59,946	1,027,831	595,815	81,600	514,081	152,037
Denver & Salt Lake	255	77,333	18,784	102,667	14,297	16,404	2,363	35,395	.....	4,851	73,079	29,588	7,500	22,088	26,393
Detroit & Toledo Shore Line	79	115,252	.....	115,450	9,904	9,517	1,772	34,448	.....	2,987	58,627	56,824	3,687	53,137	11,879
Detroit, Grand Haven & Milwaukee	191	137,000	35,000	197,193	21,147	31,961	6,178	105,553	571	5,106	170,517	26,676	3,360	21,917	36,663
Detroit, Toledo & Ironton	441	102,322	9,174	118,981	18,244	12,788	3,293	61,340	.....	5,622	101,287	17,694	5,500	12,194	72,501
Duluth & Iron Range	273	221,229	16,547	247,166	50,091	41,321	827	73,833	1,241	9,404	176,717	70,449	12,250	58,199	123,384
Duluth, South Shore & Atlantic	626	141,291	60,410	219,088	38,871	36,612	7,447	87,106	3,737	9,686	183,458	35,630	16,000	19,603	—19,885
Duluth, Winnipeg & Pacific	185	67,506	14,280	83,509	13,152	11,622	1,383	31,249	181	6,333	63,920	19,589	4,175	15,414	—4,137
Elgin, Joliet & Eastern	776	708,411	5	751,150	98,587	115,827	5,676	218,890	.....	22,674	461,655	289,495	40,890	248,374	20,295
Erie	1,988	3,428,510	665,734	4,495,620	413,627	1,218,848	98,909	1,593,377	27,456	126,540	3,467,817	1,027,803	168,654	857,473	—466,745
Florence & Cripple Creek	87	88,372	15,340	105,287	10,099	10,311	2,633	27,042	.....	6,078	56,164	49,123	5,645	43,478	8,345
Florida East Coast	745	318,954	168,907	561,039	49,043	53,605	6,841	149,247	3,045	16,400	275,097	285,932	20,466	265,467	17,203
Fort Worth & Denver City	454	252,846	85,802	362,943	53,235	72,859	5,849	132,779	2,013	15,248	281,983	80,960	12,621	68,340	18,154
Galveston, Harrisburg & San Antonio	1,350	517,636	232,244	826,564	174,633	118,066	30,491	363,750	10,129	33,638	730,378	96,186	39,624	56,402	—36,415
Georgia	307	154,462	52,284	225,709	26,116	54,201	12,249	97,600	347	10,484	200,965	24,745	3,100	21,628	—8,571
Georgia, Southern & Florida	395	102,228	46,283	173,251	23,899	24,582	7,270	71,338	778	10,144	138,002	35,250	10,122	25,075	12,522
Grand Rapids & Indiana	575	277,969	115,634	424,270	54,680	77,681	10,614	174,554	36	14,366	331,931	92,339	21,513	70,826	20,274
Grand Trunk Western	347	441,000	125,000	608,261	71,997	122,946	17,575	247,844	4,503	14,975	479,840	128,421	35,920	92,459	41,873
Great Northern	8,077	3,006,955	916,336	4,449,056	1,374,313	566,288	97,059	1,300,595	57,553	102,739	3,495,112	953,944	325,019	628,667	33,182
Gulf, Colorado & Santa Fe	1,937	865,130	194,451	1,135,973	234,898	177,024	28,187	444,683	.....	32,602	917,147	218,825	45,043	173,716	59,940
Hocking Valley	351	350,615	59,474	442,497	46,976	80,428	8,450	153,640	.....	13,041	302,536	139,961	34,050	105,911	33,431
Houston, East & West Texas	191	87,842	21,482	116,088	14,969	9,898	1,850	40,319	567	3,529	71,128	44,960	4,170	40,790	19,555
Houston & Texas Central	894	296,958	93,002	427,876	110,699	68,506	15,333	186,269	3,890	17,019	400,689	27,187	26,951	165	55,258
Kansas City Southern	827	622,704	95,474	786,066	72,745	85,493	26,595	263,261	.....	36,171	476,108	309,958	48,170	260,422	—15,737
Lake Erie & Western	900	392,618	49,906	463,910	71,535	94,359	13,925	179,591	.....	11,936	371,346	92,564	24,000	68,523	25,657
Lehigh & Hudson River	97	166,739	8,855	177,173	19,692	19,519	1,471	52,462	.....	5,714	98,858	78,315	4,150	74,165	28,749
Louisiana & Arkansas	279	124,626	12,224	140,685	28,549	22,136	3,070	35,398	.....	3,932	93,086	47,599	7,500	40,090	3,836
Louisiana Ry. & Navigation Co.	351	127,664	27,737	165,991	34,357	19,948	6,045	62,724	.....	4,829	127,903	38,087	11,500	26,587	8,570
Louisiana Western	208	104,710	50,193	169,994	45,149	20,364	7,063	53,436	1,581	6,321	133,906	36,087	9,895	26,082	—14,583
Louisville & Nashville	5,034	2,979,499	806,326	4,136,668	823,157	807,511	107,864	1,347,715	16,738	103,908	3,200,098	936,569	160,355	775,880	—14,245
Louisville, Henderson & St. Louis	200	71,737	30,502	109,394	25,763	15,873	5,281	36,357	.....	3,448	86,722	22,673	3,800	18,868	—3,034
Michigan Central	1,800	1,871,956	697,091	2,863,499	343,878	468,376	54,832	1,114,966	41,246	58,260	2,081,559	781,941	121,000	660,554	27,392
Midland Valley	380	57,742	30,515	94,854	22,326	16,880	2,012	35,720	.....	5,377	82,315	12,539	4,749	7,755	6,861
Minneapolis & St. Louis	1,646	568,799	135,116	750,905	94,456	102,685	16,537	291,705	167	22,098	527,648	223,257	31,201	192,050	82,525
Minn., St. Paul & Sault Ste. Marie	4,104	1,454,295	394,557	2,012,634	257,457	333,274	50,186	718,970	12,790	65,299	1,418,279	594,355	79,671	514,684	—92,440
Missouri & North Arkansas	365	62,243	22,701	92,215	32,787	23,709	2,431	50,343	.....	5,767	115,036	—22,821	5,268	—28,183	—25,016
Missouri, Kansas & Texas System	3,865	1,832,157	559,958	2,598,981	401,956	407,457	52,469	956,947	22,497	84,970	1,906,857	692,125	114,880	576,802	68,438
Missouri, Oklahoma & Gulf of Texas	19	7,603	148	8,088	1,281	3,869	177	5,133	.....	396	10,855	—2,767	140	—2,907	—3,999
Missouri Pacific	3,920	1,595,934	348,912	2,128,978	301,886	410,244	49,863	855,808	7,420	56,038	1,681,261	447,717	108,650	333,962	71,591
Monongahela	75	100,018	1,831	103,457	22,023	14,390	379	22,421	.....	2,086	61,298	42,159	1,810	40,349	—31,443
Morgan's La. & Tex. R. R. & S. S. Co.	405	205,480	81,444	317,862	43,935	39,437	11,722	139,154	1,916	11,523	247,528	70,334	20,013	50,173	52,596
Nevada Northern	165	113,118	8,548	124,957	17,997	12,800	489	24,472	14	4,456	60,228	64,729	5,004	59,673	9,421
New York Central Railroad	5,979	8,970,688	3,498,502	14,426,358	1,480,459	2,692,878	263,484	4,623,204	149,671	347,683	9,557,379	4,868,979	824,746	4,043,970	.....
New York, New Haven & Hartford	2,003	2,833,740	2,094,935	5,536,894	776,928	909,091	36,766	1,985,277	49,638	129,597	3,886,241	1,650,653	200,000	1,450,294	332,730
New York, Philadelphia & Norfolk	112	243,244	34,791	299,684	30,988	75,934	3,846	130,198	4,124	11,224	256,315	43,369	9,500	33,869	—23,257

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF APRIL, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Operating revenues: Passenger.	Operating revenues: Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Operating expenses: Maintenance: Of equipment.	Operating expenses: Traffic.	Operating expenses: Trans-portation.	Operating expenses: Miscel-laneous.	Operating expenses: General.	Operating expenses: Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
New York, Susquehanna & Western	140	$237,874	$42,776	$308,351	$24,648	$32,544	$2,064	$116,531	....	$8,484	$184,241	$124,110	$13,208	$110,897	$30,606
Norfolk & Western	2,044	3,263,318	358,619	3,759,184	477,374	720,989	60,896	1,036,828	$8,957	75,981	2,363,189	1,395,995	168,000	1,227,922	136,865
Northwestern Pacific	401	90,428	135,457	258,405	42,348	45,559	5,967	108,128	....	7,327	207,333	51,072	15,452	35,619	—6,576
Oregon Short Line	2,162	965,155	323,229	1,424,903	236,617	234,019	32,266	365,478	22,668	52,456	942,058	482,846	114,803	367,699	—234,628
Oregon-Washington R. R. & Nav. Co.	2,027	719,019	306,457	1,132,298	144,714	162,234	39,621	376,276	10,424	59,803	791,266	341,032	102,544	238,168	—37,029
Panhandle & Santa Fe	670	265,911	61,531	343,579	98,016	86,335	3,483	105,854	....	9,363	303,051	40,527	12,082	28,445	—6,063
Pere Marquette	2,312	1,145,153	280,098	1,550,851	187,082	310,526	28,964	565,155	3,686	39,026	1,134,397	416,454	46,831	369,623	287,625
Philadelphia & Reading	1,120	3,544,174	482,894	4,208,399	514,973	710,257	41,443	1,392,736	15,102	69,749	2,743,519	1,464,879	99,603	1,364,813	142,676
Pittsburgh & Lake Erie	225	1,023,287	117,637	1,190,908	110,526	221,212	12,111	288,810	3,201	26,394	662,255	528,653	49,500	479,153	113,092
Pittsburgh, Shawmut & Northern	294	125,043	9,384	136,099	15,779	34,512	2,117	43,399	....	5,464	101,270	34,828	1,611	33,217	39,702
Port Reading	21	101,832	....	125,437	15,619	5,066	38	39,813	....	101	60,637	64,800	12,000	52,800	15,840
Richmond, Fredericksburg & Potomac	88	145,872	92,134	274,134	26,009	32,371	5,343	88,106	5,141	7,556	164,527	109,597	6,476	103,117	1,642
Rutland	468	160,255	96,010	291,281	25,220	48,247	8,757	106,629	987	5,808	195,648	95,634	16,859	78,741	25,085
St. Louis, Iron Mountain & Southern	3,364	1,789,067	371,974	2,338,246	336,528	439,816	62,209	751,245	7,313	75,473	1,672,583	665,663	109,280	552,751	—164,929
St. Louis Merchants' Bridge Terminal	9	....	132	139,982	20,557	6,016	843	72,593	....	5,491	105,500	34,481	6,540	27,937	30,495
St. Louis Southwestern	943	425,261	74,348	536,211	40,632	71,487	23,423	147,713	2,774	23,836	309,750	226,461	39,333	186,995	61,657
St. Louis Southwestern of Texas	810	176,886	52,704	251,924	58,300	50,981	11,362	145,938	574	16,930	250,947	977	15,008	—14,047	77,676
San Antonio & Aransas Pass	724	160,014	64,596	265,810	80,572	54,571	6,316	133,663	....	11,965	287,048	—21,238	14,077	—35,315	—10,053
Southern in Mississippi	281	39,145	21,872	66,625	19,678	7,763	1,802	37,259	....	3,454	69,955	—3,331	8,375	—12,067	—9,979
Spokane International	163	46,267	9,648	58,250	11,773	4,568	2,423	18,983	....	3,159	40,905	17,344	3,861	13,484	—14,424
Spokane, Portland & Seattle	556	162,764	98,647	293,303	102,009	39,109	7,532	80,173	3,083	13,082	244,971	48,331	53,400	—5,442	—110,160
Tennessee Central	294	91,302	28,287	126,903	33,048	15,165	5,538	44,779	....	7,649	106,177	20,725	4,480	16,239	—7,148
Terminal R. R. Ass'n of St. Louis	35	....	200	213,467	17,510	10,187	903	79,932	....	5,006	113,539	99,928	28,168	71,760	53,299
Texas & New Orleans	469	196,795	73,011	300,160	57,526	69,550	7,951	113,174	3,912	9,982	261,732	38,428	15,805	22,545	26,863
Texas & Pacific	1,944	936,495	270,915	1,318,286	166,818	236,039	36,609	697,800	11,084	40,160	1,188,125	131,161	68,700	61,006	—103,449
Toledo & Ohio Central	446	280,881	41,219	340,000	51,533	65,379	6,536	136,020	1,795	10,285	271,548	68,453	21,000	47,238	55,454
Toledo, Peoria & Western	248	40,937	32,091	78,621	16,784	28,437	1,935	44,877	....	3,590	95,623	—17,002	6,100	—23,102	12,183
Toledo, St. Louis & Western	451	317,562	23,710	367,447	43,565	121,150	16,944	139,195	....	7,343	328,198	39,249	17,864	21,385	—38,233
Trinity & Brazos Valley	315	32,741	9,039	48,737	21,452	12,068	2,477	31,912	....	7,256	75,165	—26,428	4,585	—31,227	20,169
Union Pacific	3,617	2,443,923	810,274	3,736,799	561,243	604,161	129,700	943,147	68,209	134,782	2,440,568	1,296,231	193,543	1,102,413	—40,778

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has issued another order, to take effect July 15, requiring that station agents receiving tariffs must note on each the date on which it was received; and must also keep a record of the date that all tariffs and supplements are received; also the date posted.

The Interstate Commerce Commission announces that after July 15 carriers must take care to make no changes in rates which have been ordered continued because the commission decides to suspend and investigate proposed new rates. Until the suspension has expired the rates, practices, etc., which are continued in effect by virtue of the suspension must not be changed in any particular.

Mixed Carload Shipments of Lime, Cement, and Plaster from Interstate to Arkansas Points

Investigation and Suspension Docket No. 554. Opinion by Commissioner Hall.

Proposed withdrawal of tariff provision under which mixed carloads of lime, cement and plaster are shipped "from interstate to Arkansas points" found not to be justified. Tariff withdrawing the provision ordered to be canceled, and carriers required to name such provision by other tariffs, upon the basis of the highest rated commodity contained in the mixture. (34 I. C. C., 124.)

Rates for Warming Potatoes Found Reasonable

Albert Miller & Company v. Northern Pacific. Opinion by Commissioner Hall:

Upon complaints alleging that defendants' rules and charges relating to the protection from cold of potatoes in transit are unreasonable and unjustly discriminatory: it is held that complainants have not shown themselves entitled to relief. Complaints dismissed. Rates 4 to 7 cents per 100 lb. for heating cars held to be fair. (34 I. C. C., 154.)

Erie Retains Chicago Water Craft

Upon applications of the Chicago & Erie and the Erie to continue their interest in and operation of certain tugboats, barges and other equipment used on the Chicago river; the commission, in an opinion by Chairman McChord, holds that the fact that the petitioners are parties to through all-rail route arrangements between the points served by the water equipment here involved makes it possible for the petitioners to compete for traffic with such water equipment within the meaning of the act; but that the service by water is being operated in the interest of the public, and that a continuance thereof will neither exclude, prevent, nor reduce competition on the route by water under consideration. The tariffs of rates applicable via this water route must be filed in accordance with the provisions of the act, to become effective by July 15, 1915.

Rates on Sugar to Arizona

Arizona Corporation Commission v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Daniels:

The complaint attacks as unreasonable the rates on sugar and syrup in straight and mixed carloads from producing and refining points in California to all points in Arizona. Subsequent to the hearing the carriers published reduced rates on these commodities to many points of destination in the state. Except as to the rates to Phoenix and Prescott, the evidence does not show that the rates in effect, at the time of the hearing, on sugar and syrup in straight carloads, minimum weight 36,000 lb., were unreasonable to a greater extent than the amounts of the reductions since made. Rates to Phoenix and Prescott ordered to be established for the future upon a basis of not more than 5 cents per 100 lb. higher than the rates to the junction points. No finding is made as to the rates on sugar and syrup in mixed carloads. (34 I. C. C., 158.)

Ownership of San Francisco & Portland Steamship Company

Opinion by Commissioner Clark:

Upon application of the Oregon-Washington Railroad & Navigation Company for an extension of time beyond July 1, 1914, in which petitioner may continue to operate the San Francisco & Portland Steamship Company; it is held that a rail carrier does not necessarily have to reach a point in order to compete for traffic with water carriers that operate directly to that point, but such competition may exist by the rail carriers participating in joint rates. The O.-W. R. & N. does or may compete for traffic with the San Francisco & Portland Steamship Company within the meaning of the act. The operation of the steamships is in the interest of the public, and a continuance of such operation will neither exclude, prevent, nor reduce competition on the route by water. The application should be granted. All the rates and regulations of the steamship company covering traffic subject to the act moved by it in the operations considered herein must be filed with the commission and posted. (34 I. C. C., 165.)

Erie's Boats on Lake Keuka

Application of the Erie Railroad Company. Opinion by Chairman McChord:

Upon application of the Erie Railroad Company for authority to continue its interest in and operation of the Lake Keuka Navigation Company, it is held that the petitioner does not compete for traffic with the said Lake Keuka Navigation Company within the meaning of the act. The Erie Railroad owns the capital stock of the Erie Land & Improvement Company, which company in turn owns the capital stock of the Southern Tier Development Company, which company in turn owns the capital stock of the Lake Keuka Navigation Company, operating four boats serving the ports located on Lake Keuka, in the state of New York, which connect at Hammondsport with the Bath & Hammondsport Railroad, a subsidiary of the petitioner, and at Penn Yan with the central division of the Pennsylvania Railroad and with the New York Central. The navigation company furnishes the only means of transportation for the people living in the territory served. It does not appear that the rails of the petitioner, or any of its subsidiaries, serve the ports located on Lake Keuka in common with its said boats, nor does the petitioner join in through rates with other carriers reaching said ports. (34 I. C. C., 212.)

Rates to Coffeyville and Independence

Coffeyville Mercantile Company et al. v. Missouri, Kansas & Texas et al. Opinion by Commissioner Hall:

Upon reargument, it is held, that no occasion has been shown for modifying the original report and order. This case, reported in 33 I. C. C., at page 122, was reopened upon motion of the defendants and argued May 19. Complainants are wholesale and jobbing merchants at Coffeyville and Independence, Kan. In the original report the commission found that in the jobbing business they are in competition with merchants at Chanute, Parsons, Pittsburg and Fort Scott, Kan., and Kansas City, Mo., and ordered reductions to equalize with rates to Chanute and Parsons, with certain differentials. The chief objection urged by defendants to the original report of the commission is that, as alleged by them, it practically disrupts the rate fabric established in pursuance of the commission's decision in State of Kansas v. A. T. & S. F., 27 I. C. C., 673. But complainants have shown themselves entitled to relief, and such relief should not be denied simply because of the carriers' apprehension regarding the possible consequences. The readjustment tentatively suggested by defendants is manifestly beyond the scope of the present proceeding. The illustrations used to show the possible tendency of our decision herein are interesting, but seem to assume that all rates in this territory will be readjusted upon a differential basis, such differentials, apparently, being computed upon the basis of ton-mile earnings. The reports of the commission do not warrant the assumption that it has adopted such a theory. Nothing presented at the argument shows the occasion for any modification of our report and order in this case. The order requiring the establishment of the rates prescribed on or before June 15, 1915, will be left undisturbed.

Commissioner Daniels dissents. He says that the schedule of rates prescribed in this case is on the whole upon a basis lower than prescribed by the commission in State of Kansas v. A. T. & S. F., 27 I. C. C., 673, and below the scale of state prescribed rates in Missouri. While to some towns the rates reduced in the original report in this case were unjustifiably higher than to other nearby points, there is not sufficient evidence to declare the condemned rates unreasonable *per se*. Commissioner Clements also dissents. (34 I. C. C., 231.)

Southern Pacific Steamboats

Application of the Southern Pacific and the Central Pacific. Opinion by Commissioner Clark:

Upon application of the Southern Pacific Company and the Central Pacific Railway Company, under the provisions of section 5 of the act to regulate commerce as amended by the Panama Canal act, for an extension of time beyond July 1, 1914, during which petitioner may continue to operate boats on the Sacramento river and connecting waters, it is held that the Southern Pacific does not compete for traffic with its boat line; that the operation of the boat line is in the interest of the public and of advantage to the convenience and commerce of the people; that its continued operation by petitioner will neither exclude, prevent, nor reduce competition on the route by water, and that the application should be granted. The rates and regulations of the boat line governing its operations considered herein must be filed as required by the act and the regulations of the commission.

These boats engage principally in the handling of freight and passengers from and to the fruit and vegetable belt west of Sacramento, which, owing to topographical conditions, is, except to a very limited extent, inaccessible to any railroad line and is dependent almost entirely upon river service. There are six steamboats—the Apache, Modoc, Navajo, Fruto, Cherokee and Iroquois.

Fruit is shipped to Sacramento under local charges, consigned to various shipping firms and is there distributed through the medium of distributing organizations. It moves from Sacramento to eastern markets on new bills of lading, and there are no restrictions with respect to the outbound routing of shipments brought in by the boat line. In 1913, there were 149 craft of various kinds operating on the Sacramento river exclusively, and 167 operating in part on the Sacramento river and partly on other rivers, making a total of 316 boats on the Sacramento river, of which petitioner operates 6. The same report shows that for the year ended December 31, 1912, 202,015 passengers were carried by reporting lines, of which petitioner's boats carried 117,000. During the calendar year ended December 31, 1913, petitioner's boats carried 81,421 passengers. The tonnage carried by the four principal transportation companies on the Sacramento river for 1912 was 477,292 tons, of which petitioner's boats carried 109,097 tons, or a little less than one-fourth. There are several regular boat lines, also several irregular lines, in competition with that operated by petitioner. (34 I. C. C., 174.)

Rates on Hay to Chicago

Investigation and Suspension Docket No. 497. Opinion by Commissioner Hall.

Supplements to the Lowrey tariff governing switching in the Chicago, Ill., switching district, by which the Wabash proposes to discontinue its absorption of switching charges in that district on hay in carloads, allowed to become effective. Orders of suspension vacated.

The Lowrey tariff embodies an agreement between some 37 issuing and participating carriers under which they switch carload traffic, with some exceptions, to and from team tracks, industrial plants, warehouses, elevators and other points of destination or origin within the Chicago switching district therein described upon the line-haul rate to Chicago, unless that rate aggregates less than $15 for the carload, in which case the carrier receiving the line haul into or out of the switching district absorbs only so much of the switching charge of its connecting carrier as will leave it the same earning for that car as if it had received $15 for the line haul and paid the entire switching charge. More than 2,000 places in the Chicago switching district are designated by the carriers as points of origin and destination subject to the terms of this tariff.

From the inception of the agreement each issuing carrier has excepted designated commodities. Without enumerating these

it is sufficient to say that at the present time the exceptions made by the various carriers range from 2 to 16. The Wabash maintains 4, viz., coal, coke, grain and livestock, and now proposes to add hay as a fifth.

It alleges that the absorption by it of these switching charges on hay renders its transportation of that commodity to Chicago unremunerative. Records are shown of 77 shipments which originated at points in Missouri, Kansas, Oklahoma, Indiana and Ohio. The hauls averaged 267.6 miles, the rates ranged from 8 to 26 cents per 100 lb. and the average loading was about 25,000 lb. The total revenue received was $2,190, averaging $28 a car; and the total absorption paid was $676, averaging $8.79 a car, or about 31 per cent, leaving an average balance of $19.66 a car, which would yield average ton-mile earnings of 5.9 mills and car-mile earnings of 6.8 cents for the line haul. About 50 per cent of all hay transported to Chicago by the Wabash is there switched to points of delivery on the rails of other carriers.

Hay is delivered from the team tracks of the Wabash at two points only in the switching district. These are somewhat inaccessible, and consequently are not much frequented by purchasers of hay. For this reason it is difficult to sell hay from the team tracks of the Wabash in competition with that sold at points of delivery on other railroads, and hay sold at these points on the Wabash ordinarily brings from 50 cents to $1 less a ton than that sold at downtown team tracks on other lines. The commission merchants testify that, under the proposed supplements, shippers at points of origin on the Wabash will be at a disadvantage as compared with shippers on other lines in marketing their hay in Chicago and will seek other markets, such as St. Louis, Detroit and Cleveland.

The burden of proof of the reasonableness of rates increased after January 1, 1910, is upon the carriers, both as to the total or through charges and the separately established or separately stated charges which make up the total. And it is as much an increase of rate to give less service for the same amount as to charge a greater amount for the same service.

In *Board of Trade of Chicago v. A., T. & S. F.*, 29 I. C. C., 438, it was held that the failure of five carriers to absorb the switching charges on grain delivered to Chicago industries off their lines, while absorbing such charges in the cases of other commodities, did not constitute unlawful discrimination. The proposed cancellation of absorption of switching charges on sand and gravel from points in Wisconsin and Illinois to Chicago, Ill., and points in Indiana within the Chicago switching district was found to be justified. Upon the whole proof presented the respondent has justified the cancellation of the absorption of switching charges proposed by the suspended supplements. The orders of suspension will accordingly be vacated. (34 I. C. C., 150.)

STATE COMMISSIONS

The Public Utility Commissioners of New Jersey have refused to authorize the Fidelity Land Company of Beach Haven Terrace to extend a street across the track of the Barnegat & Beach Haven Railroad, declaring that it is the policy of the state to authorize no more grade crossings of steam railroads except where there shall be shown to be great public necessity.

The Texas Railroad Commission on June 1, resumed its hearing on the application of the railroads of Texas for a general advance in freight rates throughout the state. The case of the railroads was completed at the previous hearing, and this hearing was held to give shippers an opportunity to testify. Most of the shippers who testified last week said they were not opposed to an increase in revenue for the Texas roads, provided the increase be effected by an equal distribution among the different sections of the state, although some protested that the tariffs filed by the railroads would create discrimination against some sections. A series of resolutions was adopted by the shippers in attendance at the hearing that if it is the conclusion of the railroad commission that the present revenues are inadequate "then the measure of such inadequacy shall be justly apportioned over the entire state and on all classes of commodities where it can be consistently done upon some horizontal, or even percentage basis of distribution." Representatives of the railroads then presented a resolution endorsing this proposal and stating that the carriers would offer no objection to the plan, with the exception of a few items in the tariffs on which they wish to proceed with the hearing on the original plan. An agreement on these resolutions would remove from the controversy 29 of 37 subjects docketed for the hearing.

No More Temporary Doors

The New York State Public Service Commission, Second district, has refused to allow the railroads to cancel their regulation under which they supply temporary doors or bulkheads for freight cars. Tens of thousands of cars of potatoes and cabbages are annually shipped from western New York to the metropolitan markets and the practice of shipping apples and other perishable and semi-perishable produce is rapidly growing. Salt also comes under this regulation.

In an opinion by Commissioner Frank Irvine the Commission discusses at length the mechanical, economic and legal phases of the case. The present regulations were put into effect by an order of the Commission in 1909. Commissioner Irvine says that the broad question involved is whether these doors and bulkheads appertain to the car, which the carrier under common law and statute must furnish, or to the proper packing of the commodity to be shipped, which it is the duty of the shipper to supply. He finds that under a Court of Appeals decision they belong to the car. Referring to the practice of some of the western roads in equipping cars with permanent bulkheads and inside rigging, Commissioner Irvine finds that where the shippers are required to furnish this equipment for large shipments it is a total loss to them, while the railroads can recover it and use it again at small cost. Distinguishing these tariffs from dunnage allowances and lumber stakes—which the shippers must pay for—the opinion says that the latter are for a particular class or classes of shipments and are governed by particular conditions, while the demand for the equipment involved in this case is for a large general and growing class. If these equipments encourage delay in unloading through the practice of consignees in selling directly from the car the proper remedy of the roads is in demurrage and track storage charges. As to the allegation that but ten per cent. of the produce shipments are wholly intrastate and that the continuance of the allowances would be discriminatory against the roads reaching New York through New Jersey and Pennsylvania, Commissioner Irvine says that these roads have heretofore met this condition and will continue to do so. He says that recent decisions of the Interstate Commerce Commission, while not involving the exact point here involved, make use of the same reasoning and arrive at substantially similar results.

COURT NEWS

The Supreme Court of the United States has affirmed the decision of the Supreme Court of Pennsylvania against the Pennsylvania Railroad in the case of the Mitchel Coal & Coke Company, of Cambria, which had secured a verdict of $20,000 against the railroad company for alleged unlawful discrimination in the allowance of rebates.

The Supreme Court of the United States, taking a view contrary to that of the Supreme Court of Minnesota has annulled an order of the Minnesota Railroad & Warehouse Commission directing the Great Northern to install at Bertha, Minn., a platform scale for weighing livestock. It is held that the order was both arbitrary and unreasonable.

The New York State Court of Appeals, in a decision by Judge Hiscock, on a complaint by William R. Hearst, who resides on Riverside Drive, New York City, near the freight tracks of the New York Central Railroad, decides in substance that the smoke nuisance must be abated, and that the nuisances of noise due to switching of freight trains and offensive odors due to the practice of leaving cars of livestock standing a long time near residences, must be kept within reasonable bounds. The language of the opinion seems to indicate that Judge Hiscock intends not to condemn absolutely any of the practices of the road which were complained of; but only requires a high degree of care in avoiding excesses.

The New York State Court of Appeals has decided in favor of the railroad company in the suit against the New York, New Haven & Hartford to enforce an order of the Public Service Commission, Second district, annulling an advance in suburban fares made in 1910, the decision being on substantially the same grounds as those set forth in the similar suit against the New York Central, the decision in which was reported last week, page 1261.

In both of these cases the counsel for the Public Service Commission contended that the Public Service Commissions law of 1907 aimed to forbid such a review of the Public Service Commission's orders, as the orders in these cases were subjected to. Judge Cardozo dissented, in both the New York Central and the New Haven cases, but he wrote no opinion.

During the pendency of the suit the railroad has collected the higher rates, but with each sale has given thhe passenger a conditional rebate check. These checks will now become wastepaper.

Stipulation Against Riding in Car with Cattle

A contract for the shipmeut of livestock, provided that the person in charge should remain in the caboose while the train was in motion, and that a failure to do so should be prima facie evidence of negligence. It also stipulated that the responsibility of caring for the stock should be upon the person in charge. It is held by the Missouri Supreme Court that the latter stipulation did not authorize or require the person in charge to ride in the car with the stock, so as to allow a recovery by his widow for his death in a derailment while so riding. Rawlings v. St. Louis & S. F. (Mo.), 175, S. W., 935.

Crossing Accident—Contributory Negligence

In an action for personal injuries to the plaintiff it appeared that she started to walk across the tracks at a crossing in the city. Three tracks ran north and south; the one to the east being a storage track, the second a siding track, and that to the west a main single track. The plaintiff was familiar with the crossing, and testified that when she approached from the east there were coal cars standing on both the first and second tracks, close to the crossing on both sides, those on the second track being part of a train which had been separated; that before crossing each of these tracks she stopped, looked and listened, but could not see in either direction on account of the cars; that she heard nothing, except the puffing of an engine at her right (north); that as she passed over the second crossing she stooped forward to look to the northward, when she was struck by the overhang of an engine or its tender which was backing from the south. The distance between the rails of the second and main tracks was 7 ft. The Circuit Court of Appeals, second circuit, on a second appeal, held that on the evidence the question of contributory negligence was for jury, and affirmed judgment for plaintiff. New York, S. & W. v. Thierer, C. C. A., 221, Fed. 571.

Discharge of Railroad Employees—Proposed Legislation Criticized by Justices

In reply to questions put by the Senate of Massachusetts in respect to a pending bill which would prohibit railroads from discharging an employee by reason of information touching his conduct until after he has been given an opportunity to make a statement in the presence of the person furnishing the information, the justices of the Supreme Judicial Court of that state are of opinion that the proposed statute would violate the fourteenth amendment, prohibiting the state from depriving any person of life, liberty, or property, without due process of law. The right to contract, or to purchase or sell labor is part of the "liberty" guaranteed thereby. It would also violate the Massachusetts constitutional guaranties of the right to acquire, possess and protect property, which right includes the right to make reasonable contracts which will be under the protection of the law.

They consider that the proposed statute, having no reference to the safety of the traveling public, and applying only to one kind of carrier, "imposes a burden on railroads from which all other common carriers and employers are free. It singles out railroad employees and confers on them immunities and advantages enjoyed by no others who work for individuals and corporations, in a particular which has no relation to the kind of employment engaged in by them. In both respects it tends to destroy equality. It creates of railroad employees a specially privileged class, and subjects railroads, as to a matter having no special relation to their business, as distinguished from other kinds of business, to obstacles and burdens from which other employers are free. There is strong ground for the conclusion that the selection of railroads as the sole object of severely criminal legislation as to a matter having no particular relation to the management of railroads would be arbitrary and hence unwarrantable under the Constitution." *In re* Opinion of the Justices, 108 N. E., 807.

Railway Officers

Executive, Financial, Legal and Accounting

Charles A. Murray, assistant tax commissioner of the Northern Pacific, at Tacoma, Wash., has had his title changed to western tax attorney and commissioner.

Julian M. Bamberger, vice-president of the Salt Lake & Ogden, has been elected president and general manager, with headquarters at Salt Lake City, Utah, succeeding his father, Simon Bamberger, who resigned at the annual meeting. J. B. Bean, secretary and treasurer, was elected vice-president and treasurer, and E. J. Vail was elected secretary.

Operating

J. H. Nuelle, chief engineer of the New York, Ontario & Western, has been appointed also assistant general superintendent.

R. W. Howard, general manager of the New Orleans Great Northern has resigned. The duties of general manager will be performed by W. E. Farris, third vice-president, with office at New Orleans, La.

J. C. Tucker, whose appointment as assistant to the vice-president of the Erie, has previously been announced in these columns, began railway work in 1879 as a station helper on the Buffalo & Southwestern, now a part of the Erie. He became telegraph operator in 1880, and station agent in the following year. In 1883 he was transferred to the division headquarters and after six months' work there was appointed train despatcher. In 1887 he was made trainmaster, and in 1890 assistant trainmaster of the Buffalo division and branches of the Erie and of the Buffalo & Southwestern. The following year he was made trainmaster of that district. In May, 1901, Mr. Tucker was appointed superintendent of the Rochester division of the Erie, and in October of the following year superintendent of the New Jersey & New York, Greenwood Lake, Northern Railroad of New Jersey and branches, all of these being parts of the Erie. In May, 1903, he was appointed assistant superintendent of the New York division of the Erie, and in December, 1904, was made superintendent of the Alleghany division, and the following year had his authority extended over the Bradford division. He was transferred as superintendent to the Rochester division in 1907, and was made general inspector of transportation of the Erie on June 1, 1907. The following year he was made special representative on the general manager's staff and was appointed assistant to the general manager in January, 1914.

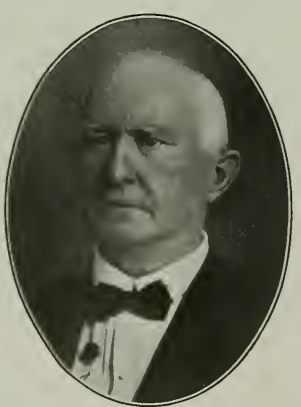
J. C. Tucker

A. A. Iams, whose appointment as superintendent of the Wellston-Delphos division of the Cincinnati, Hamilton & Dayton, with headquarters at Dayton, Ohio, has been noted in these columns, was born on January 31, 1874, at Englewood, Ohio, and received a common and high school education at that place. He entered railway service on December 15, 1890, with the Cincinnati, Hamilton & Dayton as yard clerk and operator at Dayton, Ohio, and has been with that company ever since. In 1898, he was made train despatcher at Wellston, Ohio, which position he held until 1905, when he was made chief train despatcher at the same place. In 1912, he was appointed trainmaster at Dayton, Ohio, from which position he is now promoted.

J. M. Cameron, whose appointment as general superintendent of the Alberta division of the Canadian Pacific, with headquarters at Calgary, Alta., has been announced, was born in December, 1867, and entered railway service in August, 1883, with the Canadian Pacific. He started as wiper, and was later made pumpman. He then went into the operating department as brakeman, from which position he resigned in 1888 to go with the Northern Pacific. In 1900, he re-entered the service of the Canadian Pacific as brakeman, and was soon made conductor, and later trainmaster at Nelson, B. C. He was then appointed superintendent at Moose Jaw and Medicine Hat, and on January 1, 1915, was appointed assistant general superintendent of the British Columbia division, from which position he is now promoted.

J. M. Cameron

John Charles Hagerty, who has been appointed general agent of the Baltimore & Ohio Southwestern, with headquarters at Cincinnati, Ohio, was born on May 4, 1854, at Cincinnati, Ohio. He entered railway service in 1869 with the Ohio & Mississippi as water boy, and in 1870, he worked as track laborer. He was promoted to foreman in 1872, and was employed as a switchman in 1874. Later in the same year he became a telegraph operator, having studied telegraphy at night, and in January, 1883, he was made train despatcher. He left railway service for a while, being engaged in newspaper work until March 9, 1893, when he was made chief despatcher of the Baltimore & Ohio Southwestern, which had absorbed the Ohio & Mississippi. On January 1, 1900, he was appointed trainmaster, and in October, 1904, was appointed superintendent of the Indiana division, with headquarters at Seymour, Ind., from which position he is now promoted.



J. C. Hagerty

Traffic

Alfred J. Ball has been appointed to the new position of eastern superintendent of the Empire Line of the Pennsylvania Railroad, with office at Philadelphia, Pa.

D. M. Bowman, assistant general passenger agent of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed general passenger agent, with office at Cincinnati, succeeding H. J. Rhein, resigned.

J. G. Smith, chief clerk in the general passenger office of the Missouri, Kansas & Texas of Texas, has been appointed general baggage agent, with headquarters at Dallas, Tex., succeeding W. A. Kellond, who has been transferred to Parsons, Kan., as general baggage agent of the Missouri, Kansas & Texas.

George M. Ball, manager of the Empire Line of the Pennsylvania Railroad, is to retire on June 30, under the pension regulations. The management of the Empire Line will be thereafter vested in the freight traffic manager. George M. Ball was born in Philadelphia in 1845. He began railroad work in 1868 with the Empire Transportation Company, and was made eastern superintendent of the company at Williamsport, Pa., in 1871, and was made manager of the Empire Line in 1881.

Engineering and Rolling Stock

Roy W. Bond, superintendent of shops of the Boston & Maine at Concord, N. H., has been appointed general mechanical shop inspector, with office at Boston, Mass. Mr. Bond will report to the superintendent of motive power.

G. E. Sisco, whose appointment as master mechanic of the Toledo and Marietta divisions of the Central system of the Pennsylvania Lines West, has already been announced in these columns, began railway work in June, 1901, at the Fort Wayne shops of the Pennsylvania, Fort Wayne, Ind. At the end of the summer he returned to Johns Hopkins University, graduating in 1902, and again went to the Fort Wayne shops, this time as special apprentice. He was made foreman in 1906, and in September of the same year was transferred as foreman to the Allegheny shops. In June, 1910, he was appointed assistant master mechanic at the Allegheny shops. In January, 1912, he was made assistant engineer of motive power of the Southwestern system of the Pennsylvania Lines, with office at Columbus, Ohio, holding this position until his appointment as master mechanic.

W. H. Keller, whose appointment as master mechanic of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, has already been announced in these columns, began railroad work on the Baltimore & Ohio as engine wiper in 1886. In the following year he became machinist apprentice on the Baltimore & Ohio at Keyser, W. Va., serving four years. He served as machinist at Keyser, at Cumberland, Md., and Grafton, W. Va., from 1891 to 1897. In that year he was appointed foreman at Jayenn, W. Va., and was later foreman at Wiston, W. Va., general foreman at Fairmont, W. Va., and later general foreman at Storrs. In 1912 he was transferred as general foreman from Storrs to Flora, Ill., and in 1914 was appointed division foreman of the Cincinnati, Hamilton & Dayton at Dayton, Ohio. In April, 1914, he was made acting master mechanic of the Cincinnati, Hamilton & Dayton at Indianapolis, and in February, 1915, was made assistant master mechanic at Cincinnati, which position he held when appointed master mechanic for the Indianapolis division of the Baltimore & Ohio.

H. R. Carpenter, whose appointment as assistant chief engineer of the Missouri Pacific-Iron Mountain System, with headquarters at St. Louis, Mo., has been announced, was graduated from the engineering course of Yale University in 1883. He entered railway service in 1884, working as rodman in the engineering department of the Union Pacific, and remained with that company for seven years, the last three of which he was in charge of location and construction work in the west. In 1891 he entered the service of the Denver & Rio Grande, and was engineer in charge of work in Colorado, New Mexico and Utah for four years. He left railway service at this time and went into private practice in Colorado for a period of four years. He then re-entered railway service and for the next four years was chief engineer of the Colorado Springs & Cripple Creek District Railway. He again went into private practice in Colorado for two years. In February, 1905, he was appointed assistant engineer of the Missouri Pacific-Iron Mountain System, in which capacity he worked for seven years. In 1912 he was appointed engineer of maintenance of way, with headquarters at St. Louis, Mo., and remained in that position until his recent promotion.

OBITUARY

Oliver Snyder, division superintendent of the Gulf, Colorado & Santa Fe, at Cleburne, Tex., died on June 6, in that city at the age of 45 years.

Charles Howard, formerly purchasing agent of the Chicago & North Western, died in Chicago, on June 13, at the age of 77 years. Mr. Hayward was born on October 15, 1837, entered railway service in 1879 with the Chicago & North Western, and was purchasing agent for many years.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CHICAGO GREAT WESTERN has ordered 5 switching engines from the Baldwin Locomotive Works.

THE SOUTHERN RAILWAY has ordered 2 Mikado type locomotives from the Baldwin Locomotive Works.

THE RED RIVER & GULF has ordered one ten-wheel type locomotive from the Baldwin Locomotive Works.

THE LIMA LOCOMOTIVE CORPORATION has received an order for eight Mikado locomotives from the Denver & Salt Lake.

THE WACCAMAW LUMBER COMPANY, Chevy Chase, Md., has ordered one Prairie type locomotive from the Baldwin Locomotive Works.

THE BALDWIN LOCOMOTIVE COMPANY has received an order from the Russian government for 250 locomotives for shipment within six months. The total price is said to be about $6,000,000.

THE RUSSIAN GOVERNMENT, it is understood, has in addition to the order for 250 locomotives from the Baldwin Locomotive Works ordered 100 locomotives from the American Locomotive Company and 50 locomotives from the Canadian Locomotive Corporation.

CAR BUILDING

THE QUANAH, ACME & PACIFIC is making inquiries for 25 40-ton box cars.

THE NORFOLK & SOUTHERN has ordered 24 ballast cars and one parlor car from the American Car & Foundry Company.

THE CHICAGO, ROCK ISLAND & PACIFIC receivers will apply to the court for permission to buy 4,000 freight cars, and will ask the court to rule on the method of financing this purchase.

It is understood that the Russian government has closed contracts for 22,000 cars as follows: 2,000 from the American Car & Foundry Company; 7,000 from the Pressed Steel Car Company; 3,000 from the Canadian Car & Foundry Company; 2,000 from the Eastern Car Company of Canada, and 8,000 from the Seattle Car Company

SIGNALING

The New York, New Haven & Hartford has authorized an expenditure of $600,000 for the installation of automatic block signals on its line, four-track, from Stamford, Conn., westward to the New York Central connections at Woodlawn, New York City, twenty miles. The controlled manual block system is now in use on this part of the road.

NO NAMES MENTIONED.—The New York Central Passenger Bulletin (L. F. Vosburgh, G. P. A.) has the following note concerning tickets for children: "We urge our ticket agents and doormen to be particular to see that the parents or guardians traveling with children between five and twelve years of age purchase half-fare tickets, and those over twelve full-fare tickets. We won't mention any names, but some agents and doormen 'pass the buck' to the conductors, and leave to the latter the necessity of explaining the rules and making cash collections on the train. This is a bad thing to do, as it opens the way for embarrassment on the part of the conductor and passenger, which, in the interests of all concerned, should be avoided. This hint as to the exercise of greater care on the part of ticket agents and doormen, who should whenever necessary tactfully call attention to the ticket requirements, will, we feel sure, have the desired result."

Supply Trade News

The Robinson Connector Company, of Washington, D. C., is about to move its main office to 187 Church street, New Haven, Conn., where the works of the company are located.

Joseph Battle has been appointed district sales manager, with office at Denver and territory including New Mexico, Colorado, Wyoming and the western portion of Nebraska, of the Terry Steam Turbine Company, Hartford, Conn.

J. B. Evans, engineer of sales installations of the General Railway Signal Company of Canada, Ltd., Montreal, Quebec, has left that company to become general manager of the National Concrete Machinery Company, Madison, Wis.

The Industrial Works, Bay City, Mich., have discontinued their Pittsburgh office. They now have agencies in New York; St. Louis, Mo.; Birmingham, Ala.; Montreal, Canada; San Francisco, Cal.; Los Angeles, Cal., and Seattle, Wash.

Willis C. Squire & Co., recently sold and delivered three automatic track inspectors to the Chicago Great Western. This road has had one of these inspectors in service on its lines for the past four years, and additional machines are required in order that track records can be made up for all divisions of the road.

Charles E. Chinnock, formerly vice-president and general manager of the Edison United Manufacturing Company, New York, died at his home in Brooklyn on June 12, at the age of seventy. Mr. Chinnock was at one time chief electrician of the Metropolitan Telephone Company, predecessor of the New York Telephone Company.

TRADE PUBLICATIONS

GAS AND GASOLENE ENGINES.—The Chicago Pneumatic Tool Company has issued a booklet describing its class A. G. "Giant" gas and gasolene engines. The book illustrates these engines in six sizes ranging in horsepower from 16 to 130.

AIR COMPRESSORS.—Ingersoll-Rand Company has recently issued a well illustrated pamphlet descriptive of the Ingersoll-Rogler steam driven single stage straight line air compressors. The illustrations show details of the machines in sections.

LOCOMOTIVE CRANES AND GRAB BUCKETS.—The Orton & Steinbrenner Company, Chicago, has recently issued its catalog No. 11, describing in detail the different types of cranes and grab buckets, and illustrating them in a wide variety of uses. Considerable data is also given regarding the capacities of various types of cranes under different conditions.

TRACTORS.—The Knox Motors Associates, Springfield, Mass., have just published a 16-page, well illustrated booklet setting forth the principles which apply in the hauling of heavy loads by tractors. There is also a very well illustrated discussion of the Knox tractor from the engineer's point of view and a brief set of specifications of the Knox model 35 tractor.

ELIMINATING GERMAN SHAREHOLDERS.—The directors of Pintsch's Patent Lighting Company, Ltd., an English company, regarding it as essential to eliminate from the company the only remaining connection, viz., the holding by German shareholders of a portion of the capital, have decided upon voluntary liquidation, and a resolution giving effect to that decision has been passed by the shareholders. The necessary permission to form a new company has been obtained. This new company will be registered under the name of the Patent Lighting Company, Ltd., and will consist entirely of shareholders of British nationality, the direction, management and staff being entirely British, as was the case in the old company. The new company will take over the assets of the old company, which include all the patent rights, and will carry on its business without intermission, all goods supplied being of British manufacture.—*Railway Gazette.*

Railway Construction

Bayfield Transfer Railway.—This company contemplates extending its line to Cornucopia, Herbster and Port Wing, Wis., along the south shore of Lake Superior, with Superior, Wis., as the ultimate western terminal. H. C. Hale, Bayfield, Wis., is secretary and general manager.

Illinois Central.—This company has started its track elevation work between One Hundred and One Hundred and Eleventh streets, at Chicago, Ill. The paving and sewer contract has been awarded to the Contracting and Material Company, Chicago, and the general concrete contract was awarded to John J. O'Heron & Co., of Chicago. The contract for the slabs has been awarded to the C. F. Massey Co., Chicago.

Northern Pacific.—This company will lay track on a grade that was constructed last year south of Beach, N. D., a distance of 26½ miles.

RAILWAY STRUCTURES

Albuquerque, N. M.—The Atchison, Topeka & Santa Fe is installing an 800-ton Fairbanks, Morse & Company mechanical coal chute at a cost of $20,500. It has also purchased two locomotive cranes for use at this point.

Amarillo, Tex.—See Wellington, Kan.

Bloomfield, Ind.—The Illinois Central will build a bridge over the White river near Bloomfield, Ind. It will be built of 52-ft. deck plate girder spans, which are now being taken from viaducts in the Hyde Park district of Chicago. It will also have a concrete pile trestle at each end. The masonry contract has been awarded to the Widell Construction Company of Minnesota, and the rest of the work will be done by company's own forces.

Deming, N. M.—The Atchison, Topeka & Santa Fe is enlarging its fruit icing plant at this place at a cost of about $3,500.

Florence, Kan.—The Atchison, Topeka & Santa Fe is installing a Fairbanks, Morse & Company mechanical coal chute at this place at a cost of $18,500. It is also making some changes in the yard and laying some additional track which will cost about $33,000.

Nonconnah, Tenn.—The Illinois Central will build some wooden car repair shop buildings at this place. The estimated cost of these new repair shops is about $150,000. Detail plans have not yet been prepared.

Philadelphia, Pa.—An officer writes that the Pennsylvania Railroad will increase the storage capacity of the grain elevator at Girard Point. The elevator, which was finished one year ago, has a capacity of 1,100,000 bushels, and it is planned to build additional bins to hold 1,000,000 bushels.

Prescott, Ariz.—The Atchison, Topeka & Santa Fe is constructing a seven-stall brick engine house at this place. The work has been begun.

St. Paul, Minn.—In addition to the 250-ft. counter-balanced swing span of the Chicago, St. Paul, Minneapolis & Omaha bridge, noted in the *Railway Age Gazette*, June 11, there are one 70-ft., six 80-ft., one 90-ft. and one 100-ft. deck plate girder spans requiring a total of 1,150 tons of steel. The contract for fabricating the girder spans was awarded to the Chicago Bridge & Iron Works, Chicago, Ill., and for the sub-structure was awarded to Guthrie & Company, St. Paul, Minn. A total of 2,774 cu. yd. of concrete, 45,696 ft. B. M. of timber, and 6,384 lineal ft. of piling are required. The total estimated cost is $225,000.

Wellington, Kan.—The Atchison, Topeka & Santa Fe is installing 100-ft. turntables at this point and at Amarillo, Tex. The cost of each is about $13,000.

Railway Financial News

Alabama & Mississippi.—This company has leased the Pascogoula Moss Point Northern. The Pascagoula Moss Point Northern runs from Pascagoula to Evanston, 42 miles. The Alabama & Mississippi runs from Vinerga Bend, Ala., to Leaksville, Miss., 17 miles.

Chicago, Rock Island & Pacific.—The Wall Street Journal says in regard to the petition which N. L. Amster has made to intervene in the Chicago, Rock Island & Pacific receivership that: "Judge Carpenter did not formally deny the petition of N. L. Amster to intervene in the Rock Island receivership, but strongly intimated that he would."

Cincinnati, Hamilton & Dayton.—The plan for the reorganization of the Cincinnati, Indianapolis & Western, which company is controlled by the Cincinnati, Hamilton & Dayton, has been approved by the bond holders' committee, of which William A. Read is chairman. The plan provides for a new company to have $12,000,000 first mortgage, 5 per cent 50 year bonds; $7,500,000 non-accumulative preferred stock and $7,500,000 common stock. The cash requirements are estimated at $4,053,200.

Grand Trunk.—This company has sold in London, with the permission of the British government $12,500,000 five-year 5½ per cent bonds at 99.

Missouri, Kansas & Texas.—E. R. Tinker, Jr., vice-president of the Chase National Bank, New York, has been elected a director of the Missouri, Kansas & Texas, succeeding George W. Davison, vice-president of the Central Trust Company, resigned.

Missouri, Oklahoma & Gulf.—It is reported that this company has made a trackage agreement for twenty-five years with the Houston & Texas Central and St. Louis Southwestern, which will give it an entrance into Fort Worth from Denison, Tex.

New York, New Haven & Hartford.—Judge William H. Hunt in the United States District Court has handed down the ruling that John L. Billard, who was under indictment for violation of the Sherman Anti-Trust Law in connection with the transfer of the Boston & Maine stock to the Billard Company, cannot be compelled to stand trial because he is entitled to immunity because of his testimony taken at Washington in the Interstate Commerce Commission's investigation of the New York, New Haven & Hartford case.

St. Louis Southwestern.—See Missouri, Oklahoma & Gulf.

The Houston & Texas Central.—See Missouri, Oklahoma & Gulf.

The Future of the Belgian Railways.—A great deal of attention has lately been given to plans for the rebuilding of Belgium. So far there has been little talk of the future of the Belgian railways, a matter which will also have to be taken in hand. The Belgians themselves destroyed points and signals and bridges as much as possible in order to render the lines useless to the Germans. It is improbable that much further damage has been done since the German occupation, but it may be taken for granted that when the German army is forced to evacuate Belgium, it will inflict as much destruction as possible, out of vindictiveness, as well as for the purely strategic reasons that always cause a retreating army to cut the lines of communication at its rear. In addition, the aggregate financial loss due to the destruction and looting of locomotives and rolling stock must amount to a very large sum. As Belgium's industrial and commercial revival will depend on the existence of adequate means of transport, it is obvious that an appreciable proportion of such war indemnity as Germany is made to pay will have to be devoted to the restoration of the Belgian railway system. Incidentally, it would be a very practical form of indemnity if Germany were made to surrender locomotives and rolling stock of an equivalent value and amount to those looted and destroyed during the war.—*Railway Gazette.*

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WE GUARANTEE, that of this issue 8,700 copies were printed; that of these 8,700 copies 7,318 were mailed to regular paid subscribers to the weekly edition, 158 were provided for counter and news companies' sales, 1,046 were mailed to advertisers, exchanges and correspondents, and 178 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 240,750, an average of 9,260 copies a week.

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VOLUME 58 JUNE 25, 1915 NUMBER 26

Contents

*Illustrated.

The story of the way in which the steam railways of Chicago came to the rescue of its people in their time of need during the recent strike on the traction system of that city, is told elsewhere in this issue. It is a remarkable narrative, disclosing a reserve of public spirit and efficiency possessed by the managements of the railways, whose existence the public of Chicago never fully appreciated before. The elevated and surface street car lines, which handle millions of urban and suburban passengers daily, were all suddenly forced to suspend operations. Within a single night the suburban business of the steam railways leaped from 125,000 to 625,000 people daily, an increase of 400 per cent. A growth of business which would have been large for a period of 10 years took place in 10 hours. And yet without any of the large increases in facilities and in employees which would have been made to handle this largely increased business if its growth had come normally, the railways dealt with it with hardly any more discomfort to their patrons than is often experienced during the rush hours on many urban and suburban lines, and without a single accident. On the streets all kinds of means of transportation were being operated at whatever rates those who ran them could extort from those using them. On the other hand, the steam railways carried the business at their regular rates, and in many cases for nothing because of the impossibility of collecting all the tickets and fares on the crowded trains. Never did the managements of the steam railways of this country show greater capacity for dealing effectively with a trying and difficult situation. The ignorant braying of blatherskites regarding "inefficiency" becomes ridiculous when confronted with the record of such an achievement. The recollection of the service rendered to them during this time by the steam railways ought to be, and probably will be, long held in grateful appreciation by the people of Chicago.

A Signal Service to the People of Chicago

"Safety First" has been amplified by Mr. McCrea, general manager of the Long Island, into "Safety First, Last and Always." This is a good idea. Mr. Richards, in preaching safety-first, has always implied, if he has not distinctly said, "Celerity Second"; but it is well to remind ourselves that the existence of the second postulate does not detract from the importance of the first one. "Safety-first" is a half truth; and the automobile fiends of Long Island cannot be subdued by anything less than whole truths and in heroic doses. "Safety first, with a margin," would be another useful variation. In a lawsuit recently tried on Long Island, concerning an automobile accident, in which two rich men were killed, the lawyers laid great stress on the fact (or the claim) that the passenger train, of seven cars, which wrecked the automobile (about midnight), was unlighted, except in the three rear cars; the persons approaching the crossing were deceived as to the nearness of the approaching train. In other words, believing that they had, say, two or three hundred feet leeway, they were justified in crossing the track ahead of a rapidly advancing train! It is not to be supposed that such vicious reasoning will affect even an anti-railroad jury; but in trial by newspaper it is, probably, not without its value. Failure to allow a little margin—to be a little more than safe—is the cause of half our troubles.

Be a Little More Than Safe

For many years the railroads have been kicking about too much regulation. Of late we have heard some complaints of this nature from men engaged in other lines of business. Some shippers have been heard to criticize certain acts of the Interstate Commerce Commission as being regulation of the shipper instead of the railroad. We have recently received from the secretary of state of New Mexico a pamphlet list of titles of bills enacted by the legislature of that state, which includes the following: "An act requiring railroads operating in New Mexico to compel locomotives transporting trains to use headlights." What dire penalty is to be imposed on the refractory, or perhaps, unrefractory locomotive, for violation of the act, is not stated. And now the dear public, in whose name and often without whose knowledge all of these regulations and restrictions have been enacted, are required by the Cummins law, as interpreted by the Interstate Commerce Commission, to sign a statement of the value of baggage offered for free transportation. No one ever heard of any difficulty being experienced by a passenger in making an affidavit as to the intrinsic or sentimental worth of any bag-

Who Is Being Regulated Now

gage that happened to meet the fate for which some trunks are predestined. But now that the statement is required in advance, if only to the effect that the value does not exceed $100, or if a charge of 10 cents is made for insurance in case the baggage happens to consist of something more than a few old clothes, Vox Pop and Pro Bono Publico begin to unlimber their heavy artillery. Many people ascribe this new regulation to a fiendish desire on the part of railroad officials to multiply red tape. They do not know that it represents simply an unexpected effect of another law intended to tie the hands of the railroads, and that while in some respects it may result beneficially to the roads, in others it adds to their troubles as well as causing some inconvenience to the public. Most of those who are "peeved" by this law have never given a thought to the fact that the railroads are continually harassed and put to unnecessary expense by numberless ill-advised laws which usually do not affect and have seldom come to the knowledge of the traveling public. It all depends on who is made the goat.

VETO OF PENNSYLVANIA EXTRA CREW REPEAL BILL

THAT large majority of the people of the United States who do not belong to labor unions should ponder the significance of the action of Governor Brumbaugh of Pennsylvania in vetoing the bill to repeal the extra crew law in that state. The railways carried on an extensive and vigorous advertising and publicity campaign to get this law repealed. They demonstrated that it increased railway expenses and did not increase railway safety. The proof was so complete that public sentiment favored the law's repeal, and both houses of the legislature acted accordingly. The labor unions all over the United States supported the railway brotherhoods in bringing to bear on Governor Brumbaugh a powerful pressure for the retention of the train crew law. Their influence proved more potent than the public sentiment of Pennsylvania. After a delay of several weeks Governor Brumbaugh has vetoed the repeal bill.

The governor in his veto message expresses the view that the extra man in a train crew promotes safety. If he really believes this he writes himself down an ass. He adds that if the railway companies can demonstrate to him within the next two years that the law is not fair it will be the duty of all officials to do justly by them. There is one public official of Pennsylvania to whom it will be impossible to demonstrate this. That is the present governor. He has shown that he is one of that common garden variety of American politicians with whom facts and arguments do not count and with whom nothing has any weight except the votes that they hope to get. To all appearances organized labor convinced him that the extra crew law was a good thing by impressing on his mind the notion that organized labor controls a great many votes.

If organized labor can exercise such an unwholesome influence over legislation affecting railways it will be only a matter of time until it will be exerting a similar influence over legislation affecting other industries. Indeed, its activities in regard to railway legislation already are indirectly affecting other industries. Every law affecting railways that labor gets passed increases railway expenses and thereby tends to increase the rates which the farmers, the manufacturers, the merchants and the other business men of the country must pay. Governor Brumbaugh's veto message was a move to maintain and increase the rates which the people of Pennsylvania must pay for transportation.

Inasmuch as the business interests of the country are so vitally affected by the legislation affecting railways and other classes of concerns which is being promoted by organized labor, it is plain that the time has come for all classes of business interests to organize to do battle with the labor lobby. The strength of union labor in dealing with spineless politicians of the Brumbaugh type results from the fact that it is organized. If the farmers, the merchants, the manufacturers and the other business men of the country do not want organized labor to get a strangle hold on the governments, of the nation and all of the states which it will be almost impossible to break the business interests must organize.

There is another lesson of great importance in this Pennsylvania incident. This is that it is easier, as well as better to keep bad laws off the statute books than it is to remove them after they have been passed. While the railways of Pennsylvania were fighting for the repeal of the extra crew law the railways of Illinois were fighting to prevent the passage of a train limit law. The two campaigns were carried on with equal success, so far as public opinion and the legislatures were concerned. In Pennsylvania the legislature passed a bill to repeal the extra crew law. In Illinois the legislature refused to pass the bill to limit the length of trains. But the ultimate results are entirely different, because in Pennsylvania the railways continue to be burdened by an unreasonable statute, while in Illinois the railways entirely escaped the burden sought to be imposed upon them.

It does not seem impracticable for the railways to enlist the business men of the country in a contest with organized labor to stop the passage of all these vicious and expensive measures for the regulation of railways. In Illinois the roads were energetically supported by the Illinois Manufacturers' Association and other organizations of business men. What is more needed than all, however, is that in some way all those who are being adversely affected by foolish and vicious labor legislation should unite to fight it to the bitter end, and to put out of public life once and for all, men of the Brumbaugh type, whose servility to union labor has become a public menace. Union labor constitutes a comparatively small minority of the people of the United States, but it is showing a power altogether disproportionate to its numbers. This was illustrated by the passage of the law at the last session of Congress to relieve labor unions of the operation of the Sherman anti-trust law. It is again illustrated by Governor Brumbaugh's cowardly veto of the Pennsylvania extra crew repeal bill. Unless the business interests of the country soon bestir themselves we shall soon have a government of, for and by the labor unions. The labor lobbyist is rapidly supplanting the political boss as the arbiter of our destinies.

NEW BOOKS

University of Illinois Bulletins. Bound in paper, 5½ in. by 9 in. Published by the University of Illinois Experiment Station, Urbana, Ill.

This is volume ten of the bulletin issued by the Engineering Experiment Station of the University of Illinois, most of which are noticed from time to time in these columns. This volume contains bulletins 68 to 74 inclusive, the subject of No. 68 being The Strength of I-Beams in Flexure, while that of No. 69 is Coal Washing in Illinois, No. 70 the Mortar Making Qualities of Illinois Sand, No. 71 Tests of Bond Between Concrete and Steel, No. 72 Magnetic and Other Properties of Electrolytic Iron Melted in Vacuo, No. 73 Acoustics of Auditoriums and No. 74 The Tractive Resistance of a 28-Ton Electric Car.

Records of Railway Interests in the War. Published by the Railway News, London. 88 pages, 8 in. by 13 in. Illustrated. Price one shilling.

The Railway News has published in book form a series of interesting articles reprinted from its regular issues describing the part that the British railways have taken and are taking in the great European war. This is a part of a series devoted to the railways of various countries. Among the articles are illustrated descriptions of ambulance trains for service on the continent, articles showing the number of employees of the various railways that have enlisted, the arrangements made by the railway companies for filling the places of their employees who have gone to war, and for the care of their families during their absence. Other articles describe various ways in which the railways have been affected by the war and statements are given showing the effects of the war on their business and revenues.

Letters to the Editor

PREMIUMS FOR FREIGHT TRAIN SPEED

PITTSBURGH, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I see by your issue of May 7 that W. T. Lechlider, superintendent of the Cleveland division of the Baltimore & Ohio, is giving freight trainmen special credit for making good time, using those credits to offset demerits and thus clear up a man's record.

This announcement suggests a number of very interesting questions. How about personal records that do not need "clearing up"? Why not let good men make their records still better? Why has the world waited so long to see this idea of merits tried? And why should there not be something more substantial than a book entry? Are "line and surface," "condition of frogs" and the elegance of the shoulder of the roadbed to remain forever in the future (as they have been in the past) the only features of railroading in which excellent work can be rewarded by something beyond and above the figures on the payroll? Progressive superintendents have proposed premiums for trainmen—actual, substantial money premiums—long since; how is it that such enterprising men do not get more attention from higher officers? Does the old notion that it is dangerous to encourage freight men to run faster than 15 miles an hour still have a good deal of influence?

When the 16-hour rule first went into effect a bunch of crews on a certain Eastern road, who had been averaging 18 hours, on a run of about 130 miles, at once adjusted themselves to the new rule. They shortened their time 11 per cent., with no trouble at all. Are the brotherhoods forever to go on working to make train-time slow, and no improvement be made in the process or instrumentalities which should tend to make it fast?

H. S. M.

THE FLAGMAN

HAILEYVILLE, Okla.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The article on "the new flagman" by Mr. Daniels in the Railroad Herald, which appeared in the *Railway Age Gazette* of May 7, touches a subject on which there has been an extensive amount of discussion.

The first thing to be considered is the kind of man to employ in train service. Too much care cannot be exercised in that direction, for the reason that a man of good qualities will eventually work himself into a more important position. If he is not ambitious he is not a fit subject for employment in any capacity. That a flagman has learned the road and has passed a satisfactory examination on the book and timetable is not enough to justify putting him out to protect a passenger train, unless he has had previous experience on other roads.

Would it be advisable to put a new man out to look after the rear of a heavily loaded passenger train? Has the conductor, who will, no doubt, be busy with transportation and looking out for his train orders, time, or will he take time to see that the flagman goes back far enough and that he understands when to come in, and how to use the flagging appliances?

No man should be sent out to protect a passenger train, or any other train for that matter, who has not had some practical experience on the road on freight trains; and, more than that, an experience long enough to have taught him thoroughly the importance of flagging. The new brakeman generally wants to go to work on the rear end, and the old heads generally want the head end. This is not the place for the new man to start; he should be put on the head end and given six months or a year there, before putting him on the rear.

It is true that some of the most serious collisions have occurred while old and experienced men were flagging; but this does not weaken my argument. There has been more or less leniency shown to flagmen, as well as others. Leniency is good, but it should not be indulged in too far. It is generally conceded that the matter of flagging is not given sufficient attention. To prove it, all one has to do is to make a trip over almost any railroad and ride on the rear end and notice the performance of the flagmen. There are officers, in different capacities, going over the road every day and surely some of them see this indifference on the part of the flagmen. If you mention it to them the answer, very likely, will be, "Oh, I hate to turn in the boys; you know it's not in my department," and so on. Just let them read of a serious collision, and see how soon they will condemn the man who was responsible; while, no doubt, they have seen the same thing on their own road, time and time again, and have failed to report it to the proper officer. Who is to blame?

A man, to do a job of flagging and do it properly and safely, must understand its importance above all things. If he is allowed to go on from day to day only half doing it, but a short time will elapse until something serious will occur, and then the individual man will be held responsible, while there are others, not called to account, who are equally responsible. It is the duty of every railroad employee, regardless of his position, to make a report to the proper officer of flagmen's negligence, wherever observed. The officer in charge is then responsible for dealing with the man who has violated the rules. With all classes thus recognizing their duty there will be better flagging all over the country.

J. L. Coss.

FACTOR OF ADHESION

SCRANTON, Pa.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I read the original communication on the above subject by "Mechanical Engineer," and noted the later comments thereon appearing in your issue of May 7, 1915.

It seems to me that Mr. Givin has more or less side-stepped the subject, to discuss the comparative merits of various wheel arrangements. Incidentally I agree with much that he has to say. For instance, it seems to me that many roads are following the prevailing fashion in wheel arrangements for no better reason than to be considered up-to-date. Any time given to a study of their peculiar traction problems, will, in such cases, be time well spent.

The question of selecting a factor of adhesion is, beyond doubt, of very considerable importance, but, like most problems, is best worked out by individual systems. The final result, in such an event, is much more likely to be satisfactory. This result is almost sure to be the outcome of compromise. So many factors should influence a decision that only with full knowledge of conditions of topography, traffic, equipment, schedule, shop facilities, as well as financial status and general policy, can a well balanced judgment be rendered. To illustrate, a big and wealthy road, secure in possession of heavy through traffic, on high class right of way, may standardize its power to meet the varying conditions of each division. This might mean quite widely divergent types, with, among other things, extreme conditions in factor of adhesion, each type giving the best results in its own territory or service.

A less fortunate road embodying the same conditions, but with thinner traffic, fewer engines, poorer road bed and less capital, might find it advantageous to concentrate on one or two standard types of power for the sake of reducing maintenance charges. This would result in an average engine that developed its full efficiency only over certain divisions or during certain parts of a run.

Here is another concrete case. There are two high class roads running passenger trains out of New York City, and both ar-

rive at the same goal, but by different routes. The first is a straight line but mountainous, the second more circuitous but fairly level. The first road has developed a satisfactory locomotive, with comparatively small wheels and a high factor of adhesion, which gets there. On the second the wheels are high and the factor of adhesion low, or comparatively so. Both are right. To make the schedules on the level road, the small wheeled power would show an unnecessarily high cost of maintenance, while the power with the high wheels and low factor of adhesion would never in the world make running time on the hills.

Slow freight service is best served by a good high factor of adhesion. This is a matter entirely independent of type or wheel arrangement, and becomes increasingly desirable in mountainous regions. The same is true of passenger locomotives operated in the same districts, especially if the stops are frequent.

With multiple cylinders, equal results could be obtained with a lower factor, or superior traction with the same adhesion. Today 20 miles per hour for slow freight is considered the maximum economical speed, while 25 miles per hour up a 1½ per cent gradient, with eight modern steel coaches is also good time for passenger trains. With usual proportions, under normal weather conditions, and at speeds not exceeding those mentioned above, it requires a factor of adhesion approaching five to satisfactorily absorb the tractive effort.

Therefore, I conclude with some reservations, that a high factor of adhesion is desirable, except under special conditions. Some of these are: sustained high speed, approximately level country and a sufficient demand for such high speed service to keep a considerable group of power in continuous operation. This last condition predicates a railroad doing a large through passenger and fast freight business. Gordon Baxter,

Delaware, Lackawanna & Western, Scranton, Pa.

WHY COST OF OPERATION HAS DECREASED ON THE FRISCO

Springfield, Mo.

To the Editor of the Railway Age Gazette:

By taking their employees into their confidence, the officials of the St. Louis & San Francisco are obtaining wonderful results in more economical and efficient operation. The novel and heretofore unheard of proposition of the official and employee meeting in common to discuss economical operation is an innovation adopted by the latter-day officials of the Frisco; to date the results obtained are almost unbelievable. These results were not accomplished by "absent treatment," but by the laying on of hands: friendly hands that gave the grip of encouragement.

The first educational meetings were in connection with the safety first movement; these were followed by other get-together meetings, and then came the freight claim preventive movement which was described in recent issues of your journal and which promises to show a saving of $200,000 for the fiscal year. This saving would not have been possible had it not been for the responsiveness of the men and the educational features developed by the use of the freight claim preventive postal cards,* calling the officials' attention to various causes of claims that would only have to be known to them to be eliminated. These cards were sent in with the distinct understanding from the general manager that no discipline would be applied to the party at fault. By this understanding and assurance the men did not feel that they were being made "snitches" or "spotters" against each other, and the fact that the company lived up strictly to its promise inspired the men to more confidence in the officers. Today, the employee does not fear or hesitate to send in cards to his superior, calling his attention to something that should not be; and at the same time he does not feel that he is snitching on his fellow workman.

*See *Railway Age Gazette*, April 16, 1915, page 818.

At meetings of the freight claim preventive committees the proposition of ventilation and refrigeration of cars was put plainly and forcibly before the men; facts were analyzed and the men brought to realize from a dollar standpoint what improper ventilation or refrigeration meant to the company. A card was posted in each caboose, showing at just what temperature certain commodities would freeze. Instructions as to ventilation were constantly before the men on duty. The men feel that the Frisco interests are their interests. A damage to freight handled under ventilation and refrigeration can by improper care run into dollars quicker than almost any other commodity transported by freight. The men know this, and feeling toward the company as they do, claims on this character of freight were far less this winter than ever before, and during the strawberry and peach handling this summer our percentage of loss through mishandling I am sure will be the lowest ever.

A contented man is generally a courteous man, and a courteous man makes friends, and friends and good service means increased business. Therefore 25,000 contented Frisco employees means increased revenue.

That the men appreciate the treatment accorded them can be best illustrated by their action in coming to the company's assistance to obtain increased freight and passenger rates at the hands of the law makers of the various states in which the Frisco operates. Our efforts along this line were not barren of success, for in no state where the Frisco operates was a line of adverse legislation passed. In our effort to assist the company in getting an increase of rates, personal interviews in many cases were necessary with the voters that their expression of sentiments on the subject could be called to the attention of their senator and representative. To obtain these interviews, it was necessary in many cases to endure hardships; but we did not have a passenger conductor, brakeman, fireman, engineer or a man on freight, or in the shops, or offices, or on the section who hesitated one moment to drive or walk through rain and snow that he might render assistance to the company to gain for it the increased revenue. Loyalty to the railroad by its employees can only be brought about in one way, and the Frisco officials have adopted that one way.

We are being educated as to the cost of material used and handled by us, and it will not be long before the men as a whole will know the value of the goods they are handling. Knowing the cost of material used will in a great many cases decrease the amount used. A child is destructive because of lack of knowledge, and seniority and organization has kept in the employ on many a railroad men of the children's minds. If it is necessary for us to keep them let us educate them. Educate the man so he will take pride in his work, for a man who prides himself on his work is ashamed to do a poor job, and a man who is ashamed to violate the rules does not violate them. At present too much of the green trainman's education and training is left largely with the crew he happens to be with. Start them right, teach them right and they will do right.

It will only be a short time when railroads will have bureaus of employment and instruction. In the employment of men keep in mind moral character, moral stamina, and remember that high ideals are as necessary and valuable on a railroad as in any other walk of life. And, also, that it is better to put iron in a man's courage than tears in his eyes, and that personal interest means more contentment which in turn produces better work, therefore increased efficiency and more profits.

F. D. Wrightsman,
Conductor.

The Simplon Tunnel of Switzerland.—On the second Simplon tunnel, 12 miles in length, with a maximum grade of .7 per cent, 46.2 per cent of the total length has now been fully excavated on the south and north side together. During February last 6,850 cu. ft. were excavated and 4,250 cu. ft. lined with masonry on the south side. Altogether 44.4 per cent of the tunnel is now complete.

Nineteen Years' Development Work on the Santa Fe

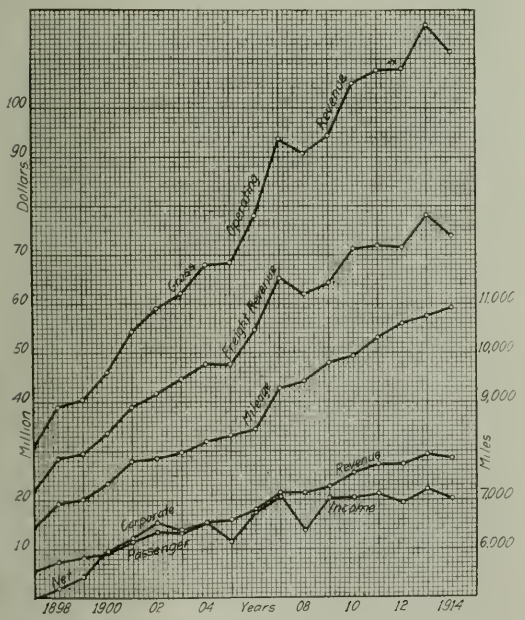
Part 2—A Description of the Various Methods Used to Build Up the Traffic and to Handle It Economically

This, the second of two articles, describes the methods by which freight and passenger traffic have been developed, the methods of operation, relations with employees and the financial results secured. The first article, which appeared in last week's issue, described the causes leading to the receivership, the condition of the property at the time of the reorganization and the policies governing expenditures for the building of extensions and for the maintenance of the property.

FREIGHT TRAFFIC

The gross operating revenues of the Santa Fe for the fiscal year previous to the reorganization were $28,814,853, or $4,446 per mile of line. Last year they had increased to $111,109,770 or $10,186 per mile of line. Thus, in this period the revenues had increased 350 per cent, while the use of the property per unit of length had more than doubled.

Referring to freight traffic only, for the fiscal year immediately preceding the reorganization the business aggregated



Relative Increases in Freight and Passenger Revenues, Corporate Income and Mileage of the Santa Fe Since 1897

1,673,407,050 ton miles, earning $19,561,659. Last year it amounted to 7,316,271,630 ton miles, earning $73,638,388. In other words the traffic increased 337 per cent in this period, while the revenue increased 276 per cent. The increase in traffic in the entire Western district in which all of the Santa Fe System is located, as reported by the Interstate Commerce Commission for the fiscal years 1896 and 1913 (the figures for 1914 not being available, but being less than those for 1913), is 276 per cent, while the revenue increased 200 per cent. Thus the traffic on the Santa Fe has increased over 20 per cent faster than the average for all the roads in this territory.

One of the principal purposes of the Strong administration in laying out the lines of the system was the development of a diversified business. The result is shown in an interesting manner by the present classification of the traffic. Fruits from California comprise 5 per cent of the total tonnage, grain from the middle west 6 per cent, livestock and products of animals from the same territory 6 per cent, ore and bullion from New Mexico 12 per cent, manufactured products mainly from Kansas City and Points east, 16 per cent, etc. This leads to relatively small fluctuations in traffic, and partially accounts for the fact that the Santa Fe is now showing an increase in business, while other roads, particularly in the east, show heavy decreases.

From a traffic standpoint the Gulf lines bear an interesting relation to the rest of the system. While originating considerable grain, cotton, lumber and other traffic, practically all of it goes to Galveston and other ports, and with the exception of lumber and a small amount of vegetables during certain seasons, the Gulf lines deliver practically no business to the remainder of the system. On the other hand, the parent lines deliver a large amount of business to the Gulf lines, including merchandise, wheat and export products.

The Santa Fe has shown itself a very strong competitor for traffic wherever it has gone. For example, 57 per cent of the total output of citrus fruits of southern California is loaded on Santa Fe tracks and 48 per cent of it is brought east by this road. This traffic alone amounted to over 20,000 cars for the Santa Fe last year. It also brought east over 2,000 cars of green fruit from the San Joaquin valley, over 2,000 cars of cantaloupes from the Rocky Ford, Colo., district and over 700 cars of apples and other fruit from Canyon City, Colo. It secures almost an equally large proportion of the wheat traffic from Kansas, while nearly one-half of all the livestock entering Kansas City is brought in by this road.

Such traffic is secured and held today primarily by service, for a road has no other inducement to offer. The high standards of maintenance of way and equipment enable the Santa Fe to give a high grade of service. Aside from regularity of operation, courteous treatment of shippers and other elements of service which are to be expected from every road, numerous special methods have been adopted to aid in securing traffic. One method which has assisted materially is that of furnishing consignees advance information regarding the arrival of shipments. This has meant the development of a complete and accurate system of car records and reports. As soon as freight is loaded at Chicago, Kansas City and other important terminals, duplicate copies of the waybills are prepared showing all information except weights and charges. These waybills are sent by United States mail to the agents at the various destinations. Ordinarily deliveries of time freight from Chicago are made at Denver on the fourth morning and at San Francisco on the tenth morning following loading.

In common with the practices on a number of other roads, passing reports are made out as the trains leave each important terminal. The special feature of the Santa Fe system consists in sending copies of these passing reports not only to the superintendent of transportation, but also to the agents at all important traffic points for which these shipments are billed. Receiving the waybills in advance of the shipments the agent at destination can ascertain the car number in which any shipment is loaded. The passing reports give him the location of the cars at any time. In this way he is able to inform a shipper when any shipment will reach him and the consignee can plan accordingly. It has been found that while the average patron desires prompt service he is more interested in securing regu-

larity of service and knowing when he may receive any definite shipment and the road which can give him this has a preferred claim on his business.

As a definite illustration of the value of such service and of the care with which it is being followed out in the regular routine, it recently became highly desirable to locate a shipment originating in Connecticut and turned over to the Santa Fe at Chicago by another road. The inquirer had only the date the shipment left the eastern factory, but in spite of the fact that the connecting line was unable to ascertain if the shipment had yet reached Chicago, within three hours it was located in a train west of Dodge City, Kan.

Another practice which has been found profitable from a traffic standpoint is that of the higher executive and operating officers making special trips over the lines with the traffic officers as often as opportunity permits, stopping for a few minutes at the various towns along the line and meeting the shippers. Many such trips have been made, and the personal contact of these officers with the present and prospective patrons has created a very friendly attitude which has been reflected in the traffic. One of the most recent trips was made over the Superior branch, late last fall, by the president, the vice-presidents, the general manager and the local officers. Similar visits are also made by the executive and operating officers to various towns on the occasion of the opening of new stations, etc. Also, the publicity agent devotes a large part of his time to calling on the patrons along the line, informing them of new improvements being made, additions to the service, etc.

From 8 to 10 demonstration trains of various kinds are operated annually through the agricultural territory in the central western states. One of the most recent was a general farming special, which was run through the state of Arizona in December, in conjunction with instructors from the state university.

PASSENGER TRAFFIC

The passenger traffic has shown as great an increase as the freight traffic. In the year preceding the reorganization the passenger revenue was $5,896,765, while last year it reached the total of $28,497,233, an increase of 383 per cent. Here, as with the freight traffic, the Santa Fe is a strong competitor, as is shown by the fact that it secures 51 per cent of the entire passenger business in and out of Kansas City, while in spite of the fact that it is the long line, it gets a very considerable portion of the business from Chicago and Kansas City to Denver. While it reaches nearly all of the important cities of the southwest, it traverses long stretches of practically unsettled country in western Texas and west of Albuquerque. Its passenger revenue per mile of road for 1914 of $2,600 is therefore high, comparing with $2,382 for the Burlington and $1,958 for the St. Paul. A considerable portion of this traffic is transcontinental business between Chicago, Kansas City and southern California, as is shown by the fact that the average length of haul per passenger is 87.5 miles, as compared with 55.5 miles for the St. Paul and 49.1 miles for the Burlington. The development of this transcontinental traffic is indicated by the fact that the average length of haul per passenger in 1896 was 68.2 miles. Five daily trains are run from Chicago to southern California throughout the year, in addition to a weekly excess fare train during the winter. The California Limited has been run in as many as eight sections this winter.

One strong asset of the passenger department which is unique on the Santa Fe is the Harvey hotel and dining car system. This company, which has a close working arrangement with the Santa Fe, operates a chain of 16 hotels at various important terminals west of Kansas City, in addition to 35 dining and lunch rooms. It also operates the Santa Fe's dining cars. The popularity of the dining rooms and hotels is such that only one train running west of Kansas City carries a dining car, all others stopping for meals at these various dining rooms. Because of the high standards of service maintained, this is an asset rather than a disadvantage in the solicitation of traffic and is instrumental in securing a considerable amount of passenger business. Another strong asset of the passenger department in soliciting transcontinental business is the location of the Grand Canyon of Arizona on its lines.

OPERATION

Having outlined the manner in which the property has been extended and improved and the traffic developed, it will be instructive to note briefly some of the details of its operation by which the net returns have been changed from a deficit of $4,433,380 in 1895 to a net corporate income of $20,183,965 last year. The operation of the property is in charge of a vice-president with supervision over the entire system, the largest mileage in this country under the direct charge of one man. The system is then subdivided into four grand divisions, the Eastern, the Western, the Gulf and the Coast Lines, with limits at Newton, Kan., Purcell, Okla., Sweetwater, Tex., and Albuquerque, N. Mex. Each grand division is in charge of a general manager, who is given broad authority to handle matters within his territory, and who has a complete staff of engineering, mechanical and operating officers assisting him.

One commonly accepted index of the efficiency with which a road is operated is the revenue freight train load. This has been increased from 115 tons for the six months ending June 30, 1896, to 364 tons for the last fiscal year, or 216 per cent in 18 years, which is highly creditable. The revenue freight train load of the St. Paul is 380 tons and the Burlington 479 tons. A comparison of the traffic of these roads shows that agricultural products form 20 per cent of the tonnage of the Santa Fe and 21.7 per cent on the St. Paul and the Burlington. Likewise, products of the mines furnished 37.3 per cent of the traffic of the Santa Fe, 25 per cent of that of the St. Paul and 40.9 per cent of that of the Burlington, while manufactured products afforded 17.6 per cent of the business of the Santa Fe, 17.5 per cent of the traffic of the St. Paul, and 15.5 per cent of that of the Burlington. Thus, in this general comparison the traffic on the three roads is quite similar and does not account for the differences in the train load.

However, the average revenue per freight train mile on the Santa Fe was $3.55 last year as compared with $3.07 on the St. Paul and $3.50 on the Burlington, indicating that there is probably a difference in the character of the traffic not shown by the general classification. This is further shown by the average revenue per ton, which was 1.007 cents on the Santa Fe, 0.8078 cents on the St. Paul and 0.729 cents on the Burlington. Also, in spite of the relatively low train load, the average operating ratio of the Santa Fe for the past five years was 66.22 as compared with 68.54 on the Burlington and 70.15 on the St. Paul. While the average rates may be somewhat higher in the Santa Fe territory than received by the other roads, this low train load is found to be caused very largely by the character of the traffic handled when it is analyzed more closely.

As stated above, fruits and vegetables comprise practically 6 per cent of the tonnage of the Santa Fe. The larger part of this traffic originates in California and is hauled to Kansas City or Chicago. Since the average haul on all traffic on the system last year was 292 miles, this fruit and vegetable traffic furnished much more than 6 per cent of the business, measured in ton-miles, and its influence on the train loading was therefore correspondingly greater. A heavy l. c. l. movement westbound to Denver and the Pacific coast also tends toward the same result. Even east of Kansas City over 75 per cent of the freight handled is time freight. West of Albuquerque so large a proportion of the traffic is of this character that frequently there is not enough dead freight to fill trains out to the time freight tonnage rating.

This expedited traffic requires rapid handling and a schedule of 8 days is maintained from Los Angeles to Chicago. The character of much of this traffic also prevents holding it at a terminal for several hours until trains can be filled out to economical

tonnage. The relatively heavy grades west of Albuquerque, over which all transcontinental freight must be hauled, and those between Albuquerque and Trinidad over which the heavy ore traffic and other business between Colorado and New Mexico points must be moved, also reduce the train loading on these districts.

Another factor tending to decrease the train loading is the necessity of running pick-up trains on the originating districts in the fruit country without regard to tonnage to save delay to this fruit. This traffic is brought into Bakersfield from the San Joaquin Valley and into San Bernardino from southern California, where it is consolidated into full trains for movement to Kansas City and Chicago. In some instances trains from the two districts are further consolidated at Barstow to give the fruit preferred movement. The fruit traffic moves most heavily during the winter months, and frequently 200 cars are forwarded from San Bernardino daily during the height of the season. However, the late summer movement is increasing from year to year, and this business now rarely falls below two train loads daily, even during the summer. An equally important condition tending towards low train loads is the large proportion of branch line mileage on which daily train service must be given, whether full tonnage is available or not. In view of these conditions adverse to heavy train loading, the revenue train load of the Santa Fe makes a very favorable comparison with that of the other western roads.

Another problem with which the operating department is confronted is the reduction of empty car mileage because of the lack of balance of the traffic. While much westbound l. c. l. and other business is loaded into refrigerator cars, it is still necessary to haul many such cars empty westbound. In the same way there is very little return loading for box cars eastbound, although it is hoped that this latter condition will be materially improved when the lumber begins to move eastbound from the country along the recently completed Northwestern Pacific lines north of San Francisco. In spite of these unfavorable conditions, 70 per cent of the revenue freight car mileage is loaded, as compared with 68 per cent on the Burlington and 74 per cent on the St. Paul.

Because of the large proportion of time freight handled, a relatively high average mileage per car per day is to be expected. For October, 1914, this figure was 33.6 miles, while it averages about 23 miles for the entire country. Because of the character of the traffic, special attention is also directed to this subject. The method of keeping track of cars in transit has been referred to previously. Another means adopted to keep cars moving is a 12-hour delay report on which is shown all cars of time or dead freight detained at any point over 12 hours. Special attention is then given these delayed cars until they are again started moving.

Contrary to general practice, the agents at the important terminals on the Santa Fe are given charge of all operations at those points. This practice exists at all terminals, except Pueblo, La Junta and Denver, and the agent has charge of yard operations, as well as traffic matters, being practically a superintendent of terminals. The combination of all duties in one officer in this way has worked out very satisfactorily.

One of the subjects which have been given a great deal of attention by the operating officers of the Santa Fe is that of the reduction of loss and damage claims. When the campaign on this subject was started five years ago, 1.6 per cent of the freight revenue went for the payment of these claims, and this was as low as the average for other roads operating in this territory. In spite of the fact that these claims have shown a distinct tendency to increase on most roads recently, the campaign conducted on the Santa Fe has resulted in a reduction in them on this road of 25 per cent. For the last six months of 1914 the proportion of freight revenues returned in payment for damage claims was reduced to the unusually low figure of 0.83 per cent. The campaign has been conducted under the supervision of a system loss and damage committee. Semi-annual meetings are held at which the sole topic for discussion by the operating and traffic officers is methods for the reduction of such claims. Similar meetings are also held on the grand divisions and on the local divisions. At the latter meetings it is common to invite certain locomotive engineers and conductors to attend. This method was described in detail in the *Railway Age Gazette* of August 7, 1914, so we will not refer further to it here.

RELATIONS WITH EMPLOYEES

Another policy of the present management has been the promotion of cordial relations with the employees. One important factor to this end has been the fixed practice of making all official appointments from among men already in the service of the road. When Mr. Ripley was given charge of the property he brought only three or four men with him, and since that time all positions have been filled by promotion from the ranks. While applications for positions are continually being received from men on other roads, the invariable reply is that the only way to secure those positions is to enter the ranks and take chances with other employees.

Retaining the proper class of employees has been a problem on all the roads operating in the southwest. For this reason, the Santa Fe has given special attention to the development of a system of reading rooms at nearly all the division points over the system, and about 25 different terminals are now equipped in this way. One man has supervision of these various reading rooms, with a separate manager in direct charge at each point. They are equipped with reading rooms, dormitories, bowling alleys, baths, etc. Various glee clubs and other entertainers present programs from time to time. Nominal charges are made for beds and for the use of the billiard tables and bowling alleys, but all other facilities are free to employees. The railroad company provides the buildings and their maintenance and operation, spending nearly $90,000 on this last year. It also co-operates in the support of three railroad Y. M. C. A.'s at places not provided with reading rooms.

A pension system similar to that of several other roads has been in force since 1907, with provision for a minimum monthly payment of $20 and a maximum of $75. On June 30, last, 346 employees were carried on this roll. Three separate hospital associations are maintained by contributions from employees, one on the Eastern and Western lines, one on the Gulf lines and the third on the Coast lines, and company hospitals are located at ten important terminals.

While not by any means confined to the Santa Fe, this road has been a strong advocate of apprentice courses in the mechanical department, adopting the system now in effect for machinist apprentices in 1908. This course covers four years. On November 30, 1914, 549 machinist apprentices were enrolled, while 865 apprentices had been graduated up to that date. A $12,000-building was completed at Shopton (Ft. Madison), Iowa, last year, with class rooms, laboratories, baths, etc., for the use of the apprentice students. A similar course lasting three years has recently been started for carpenter apprentices in the car department at Topeka and Shopton, while it is now planned to inaugurate in the near future a course whereby men may be trained for official positions in the mechanical department.

SUMMARY

Thus, in the 19 years since the receivership the property has been entirely rebuilt and improved, the mileage has increased over 70 per cent, the number of locomotives has increased over 120 per cent, while the tractive power has increased even faster and the number of freight cars has increased 150 per cent. The density of traffic has more than doubled, while the present facilities are ample to handle a considerable further increase in traffic. This has been accomplished by the expenditure of over $298,000,000, for which over $217,000,000 of "new money" has been raised. With all these improvements the capitalization per mile of line has decreased from $61,500 in 1896 to a little less than $57,000 per mile, practically 50 per cent of which is represented

by stock, while the fixed charges consume but 11.6 per cent of the gross revenue. This work has been carried on from year to year without any suggestion of irregularities, or criticism of methods of financing or operation.

RAILWAY MILEAGE OF THE WORLD

A world-wide reduction in railway construction was experienced during 1913 as compared with 1912, according to the annual railway statistics of the world compiled by Archiv fur Eisenbahnwesen, the official publication of the Royal Prussian Department of Public Works. The railway mileage of the entire world for 1913 was 684,614 miles, an increase of 15,009 miles for the year, as compared with an increase of 16,770 miles reported for 1912. The gain in mileage was also less than that for 1911, and even less than that for 1908. The increase in 1911 was 15,078 miles; in 1910, 14,387; in 1909, 14,139, and 1908, 16,672. How pre-eminently the United States is the railway nation of the world is shown by the fact that over 37 per cent of the entire mileage falls within its borders. The increase for the United States, as compiled by this publication, was 4,979 miles, or almost one-third of the entire gain for the year; while out of the entire 15,009 mile increase, 9,910 miles were contributed by the two Americas.

Railway systems of the five great geographical divisions of the earth compare in miles of operated line, as follows:

	1913.	Gain in 1913.	Gain in 1912.
Europe	214,665	2,238	2,296
North and South America	353,467	9,910	10,181
Asia	67,051	1,486	1,376
Africa	27,472	994	1,375
Australia	21,959	381	1,489
Total	684,614	15,009	16,717

Asia, it will be noted, was the only continent to show a larger increase in 1913 than in 1912.

The overwhelming leadership of the United States as a railway nation is shown more clearly in a comparison of individual countries, for after its 254,769 miles (including 653 for Alaska), Germany is second with only 39,513 miles, while European Russia is third with 38,563. Then follow in order, British East India, 34,572; France, 31,737; Canada, 29,233; Austria-Hungary, 28,641; Great Britain, 23,385; Argentina, 20,593; Mexico, 15,805; Brazil, 15,491; Italy, 10,933; Spain, 9,517; Sweden, 8,984, and Japan, 6,811.

In relative growth, however, the United States has not held its own, for while the world mileage in 5 years increased 9.6 per cent, our railways increased 7.7 per cent. This, however, exceeds Europe's growth of only 4.9 per cent. The Americas, as a whole increased 10.9 per cent in mileage in 5 years, while Asia increased only 8.8 per cent. Africa takes the leadership here with a growth of 32.3 per cent, the high spot being German East Africa, with 209.3 per cent. Australia's mileage increased 16.8 per cent.

Belgium remains at the head of the list in proportion of railway mileage to area, having 48.1 miles per 100 square miles. Next are Saxony with 34.1; Luxemburg, 32.5; Baden, 25.6; Alsace-Lorraine, 23.3; Great Britain, 19.3; all Germany, 19.0; Switzerland, 18.8; Bavaria, 18.2; Württemberg, 18.0, and Prussia, 17.5.

Though in this comparison the United States has only 7.1 miles per 100 square miles (including Alaska), many of its states are better provided than European countries. New Jersey having 30.7 miles; Massachusetts, 26.2; Pennsylvania, 25.7; Ohio, 22.4; Illinois, 21.4, etc.

Persia is still at the foot of the list with less than 1-200th mile per 100 square miles.

In relation to population, Western Australia leads the world with 72.5 miles per 10,000 inhabitants. Europe has only 4.9 miles, its best single record being Sweden with 16.4 miles. The United States, in contrast has 26.2 miles per 10,000 inhabitants. China is poorest with less than ½ mile per 10,000 population.

GOVERNOR BRUMBAUGH VETOES PENNSYLVANIA EXCESS CREW LAW

Governor Brumbaugh of Pennsylvania announced this week that he had vetoed the bill which was passed by the recent legislature to repeal the "full crew" law of that state (*Railway Age Gazette*, April 2 and May 14).

The governor, after reviewing the campaign carried on by the railroads to secure the passage of the bill, says that members of the legislature informed him they had been subjected to the pleadings of a "large and persistent lobby." The extra man required by the present law above the number willingly carried by the companies, he says, has added materially to the safety of the traveling public.

"It has been proclaimed that the loss of life since the present law became operative has been substantially reduced, if not eliminated, so far as passengers are concerned, and that this is due not so much to the manning of the passenger trains as to the fact that freight trains do not menace passenger traffic. The additional man is not always busy, but he is needed when the unusual occurs, and his presence may save life or property, or both."

Referring to the argument of the railroads that the full crew law added to the cost of operation, the governor cites the fact that the companies have within a year received increased freight rates by action of the Interstate Commerce Commission, and adds:

"They had scarcely secured the increased rate until steps were taken to repeal this law."

The governor says the railroad companies deserve fair consideration, and that if "they can demonstrate to him within the next two years that the law now in operation is not fair to them and to employees, it will be the duty of all officials to do justly by them."

President Rea of the Pennsylvania Railroad in a statement on Govenor Brumbaugh's veto of the "Extra Crew Law" repeal said:

"Speaking for the Pennsylvania Railroad Company, the most important transportation agency of our state, and with 32,000 of its 92,500 stockholders living within the state, I can only say that we are surprised and disappointed at the governor's action in vetoing the bill for the repeal of the so-called full crew law, which was passed by the legislature to correct a gross injustice to the railroads of the state and relieve them and the public of the enormous and wasteful expenditure which the extra crew law imposed on them.

"There is no well-founded reason or fact given in the veto to justify it, and, while I am entirely satisfied that the public should form its own judgment, it seems proper that particular attention should be directed to the fact that the very purpose of the bill, namely, to empower the Public Service Commission of the state to require railroad corporations to employ an adequate number of men upon their trains, is singularly ignored in the veto, notwithstanding that it practically meets every objection advanced by the government.

"The financial condition of the railroads throughout the country today is already well known, and on economic grounds alone there never has been any valid reason why they should be bound by statute to employ a stipulated number of men on passenger and freight trains irrespective of necessities or conditions. The legislature has adjourned and therefore the action of the governor in the exercise of his power has re-imposed this injustice on the public and the railroad companies for at least another two years, and places upon them an unwarrantable burden during that time of $2,700,000."

French Somaliland Railway.—According to a telegram received in Paris from the governor of French Somaliland, the railway connecting Dijibut with Adis-Abeba was completed on April 21.

Transportation in Chicago During a Traction Strike

For Three Days Steam Railroads Handle Over Six Hundred Thousand Passengers Daily Without Accident

The railroads entering Chicago made a remarkable record last week in handling an unprecedented number of passengers into and out of the business district during the strike of the motormen and conductors of the surface and elevated roads. The strike lasted from midnight on Sunday, June 13, until about 11:00 a. m., on Wednesday, June 16. During that time the surface lines operated no cars and the elevated lines made practically no attempt to carry passengers. As a result a population of about 2,500,000 was suddenly made dependent upon the steam railroads for transportation, except such as was afforded by automobiles, motorcycles, bicycles, omnibuses, motor trucks, wagons and carriages, and the steam roads were called upon over night to handle an increase of traffic which ordinarily would take years to develop.

The steam railroads normally carry about 125,000 suburban passengers daily, in addition to about 75,000 through passengers into and out of the city. During the first two days of the strike it is estimated that they handled about 625,000 a day in the suburban service, or about five times their regular business. Moreover, although this volume of traffic was thrown upon the roads almost without warning it was accommodated so successfully as to arouse general favorable comment, and without an accident of any kind being reported. In fact, after the roads had had time to adjust their facilities to the situation, several of them could easily have handled even greater crowds with success.

The steam roads entering Chicago radiate from the central business district in all directions, except toward the east. The bulk of the suburban traffic is handled by three roads, the Illinois Central running south along the lake shore; the Chicago & North Western, which has three lines out of the Chicago passenger terminal, one running directly north, one running northwest and one running west, and the Chicago, Rock Island & Pacific, running south and serving that portion of the south side lying west of the territory served by the Illinois Central. Most of the other roads also have some suburban business.

The elevated roads have one line to the south side with two branches into the territory served by the Illinois Central and one into that served by the Rock Island, and lines to the north, northwest and west, serving a territory which is reached by the North Western and other lines. The surface lines also radiate in all directions. The steam roads, of course, carry many passengers from points farther out from the city than the termini of the surface and elevated lines, and from many points they carry passengers in direct competition with the surface and elevated lines. The traction lines also carry many people from points that are beyond convenient walking distance from the steam lines, especially within a radius of three to five miles of the central district, where the steam roads are elevated and have fewer stations.

View of Crowd in Concourse of Chicago & North Western Passenger Terminal During the Monday Evening Rush

During the strike people living too near the business district to be within convenient reach of the steam road stations either walked to and from the city or patronized the hundreds of jitney busses and other vehicles that were pressed into service. From some outlying points where the distances between the steam lines are greatest many people also used vehicles of some sort to reach the steam roads.

ENORMOUS INCREASE OF TRAFFIC WITHOUT WARNING

If the roads had had definite fore-knowledge as to when the strike would begin, the achievement would have been considered less extraordinary, but they had only about six hours' notice after the strike was actually called. Conferences had been held during Sunday afternoon and evening in the mayor's office in the effort to reach a settlement and the traction companies had asked that the final decision be withheld until after a directors'

meeting on Monday. It was late in the evening when the labor leaders gave instructions to the men to leave their work. The strike had been threatened for over a week and the roads that would be called upon to handle the largest traffic had taken more or less active steps toward preparing for the emergency, but after the strike had been threatened and postponed two or three times many believed that the controversy would be settled.

Therefore, the task with which the roads were confronted presented a problem unique in their experience. The most difficult part of it was that of taking care of the Monday morning rush. Although every available car had been pressed into service there had not been sufficient time to complete arrangements. There was no way of ascertaining how big a crowd would have to be handled. Most of the regular patrons of the traction lines did not know that their usual means of transportation would be unavailable until they read their newspapers in the morning. Therefore the rush for the steam roads was concentrated into a very short space of time, and a large part of the people were unfamiliar with the steam road facilities and were without tickets, as well as being more or less panic-stricken because of their uncertainty as to whether they could be taken care of.

In addition to the inbound rush many roads were called upon to transport large numbers of people at the same time to outlying industries. Stations which normally handle two or three hundred passengers, distributed over a period of two hours, were stormed between seven and eight by thousands of people crowding to buy tickets and clamoring for information about the time of trains. Many stations did not have an adequate supply of tickets or of change, nor were there enough ticket sellers to handle them if they had been available. At stations with turnstiles or gates lines of people often extending for a block or more were formed. At others people crowded into the trains without tickets and swamped the collectors with so many cash fares that they were unable to take up all of the tickets. At some stations people had to wait as much as an hour while loaded trains passed without stopping, or if they did stop men climbed on to the roof of the coaches and the engines and tenders. On some roads whose terminal facilities were inadequate for the additional trains run there were delays on the way downtown, but the rush crowd had been taken care of by 9 o'clock.

In most cases the people were agreeably surprised to be taken care of as well as they were and the public generally accepted the situation with good nature, endeavoring to aid the roads in meeting the situation. During the day the roads were able to make more adequate arrangements. Additional equipment was obtained, additional ticket supplies were furnished, signs were posted in the stations urging the public to buy 10 or 25 ride tickets, and indicating where trains were to be found, extra ticket booths were erected and new plans were made for the handling of trains. The evening crowds, however, presented new problems because they were concentrated at the downtown terminals and on Monday there was a great deal of confusion and congestion, many people having to wait as long as an hour for trains. By Tuesday the arrangements were working smoothly, the people knew where to look for trains and were not so afraid of being left and so did not crowd so much as on the day before, and more of them had tickets. As a result there was very little congestion.

The strike was called off early Wednesday morning, but the surface and elevated lines did not get their service restored until nearly noon and the steam roads handled large numbers of extra passengers even after that time, partly because so many had purchased commutation tickets and partly because many people who had formerly used the local lines after having been introduced to the steam road service decided to continue to use that service.

ILLINOIS CENTRAL

The Illinois Central, which normally handles the largest suburban service in Chicago, about 40,000 passengers a day, competes directly with several surface car lines and also with the line of the South Side Elevated road as far south as Sixty-third street. This road naturally handled the largest crowds during the strike, as it operated the only railroad service in this territory. The Illinois Central's regular daily suburban service is 279 trains a day. During the strike it handled 311 trains in each direction, or a total of 622, and during the three days of the strike it transported a total of 678,640 passengers; 248,800 on Monday; 252,560 on Tuesday, and 177,280 on Wednesday. The officers had estimated it would be necessary to prepare for about 280,000 passengers a day. On Chicago Day during the World's Fair in 1893, the Illinois Central handled 1,000,000 passengers, but in that case arrangements had been made in advance and the traffic was fairly evenly distributed over the entire day, so that during the rush hours in the morning and evening it probably handled a larger traffic during the street car strike than in 1893. The road had made some preparations, but had not considered that a strike was seriously threatened until Sunday afternoon. The principal difficulty was in not being able to locate enough ticket sellers in time to handle the greatest rush on Monday morning. The additional force put on during the strike included 34 ticket agents, 40 ticket collectors, 20 directors, 50 engineers, 50 firemen, 30 conductors, 60 trainmen, 10 switchmen, 5 switch tenders and 15 supervising officers.

The entire movement was handled without a derailment or an engine failure. The suburban trains are operated on four tracks, of which two are used for express and two for local trains normally, but for about 60 ft. just south of the Randolph street terminal all trains must pass over a single track; therefore a derailment on this track would have resulted in very serious congestion.

The size of the regular trains was practically doubled, through coaches being used in some cases and regular schedules were abandoned. During the morning and evening rush hours, from about 7:30 to 9:00 or 9:30, trains were despatched on each of the four tracks every five minutes, making nearly one train to the minute. During the middle of the day a 15-minute schedule was maintained. Under ordinary conditions between 5 and 6 o'clock at night there are 78 distinct movements from Randolph street in one hour. In the morning many trains after arriving at Randolph street and being unloaded were backed to some of the stations nearest to the city in order to handle crowds northbound that could not be accommodated on northbound trains leaving Sixty-seventh street. Ordinarily the Illinois Central suburban service ends at 1:00 a. m., but during the strike trains were run throughout the night to accommodate night workers who ordinarily use the surface or elevated cars.

The first rush on Monday morning caused considerable congestion. At some of the principal stations the crowds were standing in long lines waiting to buy tickets. As soon as possible extra ticket sellers were placed at the various stations. During the day 40 temporary ticket booths were erected at the various stations from Randolph street south to Sixty-seventh street, and at the downtown stations a number of ticket clerks mingled with the crowds selling tickets. For express trains tickets were collected at the gate. At both the Randolph and Van Buren street stations downtown four temporary booths were erected. Large signs were placed in all the stations urging passengers to buy 10 or 25 ride tickets in order to save time and money.

An officer was placed at each suburban station to keep in touch with the situation at that point and advise the superintendent of terminals at the downtown office. These included a number of operating men and also a number of general officers. One man was stationed at Sixty-seventh street to supervise the work of turning engines to avoid delays, and another one at Randolph street.

As approximately 2,000 people are employed in the Illinois Central's general offices, most of whom use its suburban service, the offices were closed at 4 o'clock instead of 5, and opened an hour earlier than usual in the morning, so that the rush hour

traffic would not be complicated by this addition, and in the evening special trains were made up at 4 o'clock to accommodate the office forces.

CHICAGO & NORTH WESTERN

The Chicago & North Western had made some preparation in anticipation of the strike two or three days before it was actu-

Entrance to Randolph Street Terminal, Illinois Central

ally called, and had made some arrangements for having extra equipment available. On Sunday night, when it was known definitely that the strike had been called, coaches were ordered in from St. Paul, Omaha and South Dakota. The North Western normally handles about 50,000 passengers a day. On Tues-

Suburban Station During the Rush Showing Temporary Ticket Booth

day, the second day of the strike, it estimated that it handled 194,300 suburban passengers in 288 trains between 6:00 a. m. and midnight, in addition to 93 regular through trains to and from points outside the suburban district, with about 14,000 passengers. The capacity of the terminal has been estimated at 250,000. The number of trains and passengers handled on the different lines on Tuesday, is shown in the following table:

	Trains			Passengers		
	North and west	South and east	Total	North and west	South and east	Total
Milwaukee Line ...	66	72	138	46,200	45,400	91,600
Barrington Line ...	35	36	71	24,500	23,700	48,200
Galena Division	40	39	79	28,000	26,500	54,500
Totals	141	147	288	98,700	95,600	194,300

As soon as the strike appeared imminent rush orders were placed for thousands of extra tickets between the various suburban stations and Chicago, but on Monday some of the stations ran out of tickets. The most difficult rush to handle was that on Monday morning before complete preparations had been made, and on Monday evening, when a very large percentage of the passengers were still unfamiliar with the terminal. In the morning an attempt was made to adhere to the regular schedule of local and express trains, adding extra cars to trains and running the trains in sections, but by evening it was decided to abandon the regular schedules. Many trains were so fully loaded that they were obliged to omit station stops, leaving crowds waiting at the stations. From some stations trains

Increasing the Efficiency of the Tender

were loaded and rushed into the city without attempting to make other stops. Hundreds of people were carried free. On Monday afternoon the rush began about 4 o'clock, and the Chicago passenger terminal with its many entrances was jammed to its capacity. Newspaper men with counters estimated that people were entering the station at the rate of 500 per minute at 4:30. Trains were despatched as fast as they could be placed in the terminal. At times as many as 12 tracks were used for loading at once, and the rush hour crowd had been completely taken care of by 7 o'clock.

As soon as they could be printed, large signs were posted all over the station, bearing the words "Passengers, give us a little time and we will take you home." Other large signs were hung at the gates to the trainsheds showing the tracks from which the trains would leave and the stops to be made by each train. A large canvas sign was stretched across the concourse with the words "Buy your tickets now for tonight."

On Tuesday the arrangements had been so perfected that the crowds were handled without difficulty and many thousands more could have been taken care of. Outbound trains were

despatched at intervals of about 3½ minutes. The trains were made up just outside of the station ready to back in as fast as the track was cleared, with six to ten cars to a train. About 100 clerks from the general offices were sent to the passenger terminal wearing caps or badges, and each was given a series of small cards, duplicates of the placards hung at the gate to each track, showing which tracks the trains would leave from and all stops to be made. This proved a most effective plan. These men were scattered through the crowds at various points throughout the terminal and directed the passengers to the proper tracks, telling them that a train would leave at once, and were of great assistance in promoting an orderly movement of the crowd. In a balcony overlooking the trainshed and concourse a train announcer with a megaphone shouted directions for reaching the trains, and advised the people to take their time and not crowd.

Five or six extra ticket sellers were placed at the principal suburban stations during the rush hours, many of them clerks from the ticket auditor's office. At all stations within the zones within which most of the traffic is ordinarily handled by the elevated and surface lines temporary ticket booths were erected and the stations were operated on the "pay-as-you-enter" plan. These booths were placed at all stations between Chicago and Oak Park, on the Galena division, Irving Park on the Wisconsin division, and Ravenswood on the Milwaukee divison. Extra ticket sellers were on duty at the ticket windows in the terminal two at each window. Many people who had only bought single ride tickets in the morning stopped while in the terminal and bought commutation tickets in order to save time on the return trip in the evening. During the evening rush incoming trains were unloaded at the Washington street entrance to the station just outside the trainshed, so that trains were backed into the terminal empty.

On Wednesday morning the traffic was handled on regular schedules, with extra sections and extra cars.

The photograph of the crowd in the North Western terminal shown herewith was taken during the height of the rush on Monday evening before all arrangements had been perfected and before the crowds became familiar with the arrangements. This shows less than one-half of the concourse. It will be noted from the faces that can be distinguished that the crowd was accepting the situation good humoredly. The officials of the North Western have received several hundred letters commending the way in which they handled the situation, many of the people stating their intention to continue to use the North Western.

CHICAGO, ROCK ISLAND & PACIFIC

The Chicago, Rock Island & Pacific which normally handles between 15,000 and 18,000 passengers daily in its suburban service, with 39 trains each way between Chicago and Blue Island, handled over 15,000 extra passengers in each direction a day during the first two days of the strike, making a total of about 30,000 extra passengers a day. This was accomplished while adhering strictly to the regular schedule by putting extra cars on the regular trains and by operating four extra trains during the morning and evening rush hours at 15 minute intervals, between Washington Heights and Chicago, sandwiching them in between the regular trains.

The entire movement was handled by C. B. Pratt, superintendent of the Chicago terminal division. Mr. Pratt began making preparations several days before the strike was called. In the middle of the preceding week he called in a trainmaster and outlined a plan for handling the additional traffic if the strike should occur, which was carried out later in detail. It was thought that practically all of the people who were in the habit of using street cars to go into and out of the city live north of Washington Heights. One Hundred and Third street, and that the emergency could thus be met by operating extra shuttle trains between Washington Heights and Chicago. Mr. Pratt kept in touch with the situation by telephoning one of the newspapers, and about 2 o'clock, Sunday afternoon, he was told that the strike seemed to be inevitable. The cars and locomotives had been provided for and were ready at Blue Island. The extra crews were then arranged for and a trainmaster and a road foreman of engines were stationed at Blue Island all Sunday night. Monday morning four trains were started from Blue Island about 5:00 a. m. for Washington Heights and left Washington Heights for the city at 5:30 and every 15 minutes thereafter, with six cars in each train and a collector for each two cars. Three extra ticket sellers were placed on duty at the La Salle street station downtown and three at the Englewood station, and two extra men were placed in the information bureau. The plan was adhered to until after the strike had been declared off on Wednesday morning, and the entire service was operated with a maximum delay to any regular suburban train of 11 minutes on Monday and 10 minutes on Tuesday. The morning rush on Monday lasted until about 9:30, when the extra trains were taken off and placed in readiness for the outbound rush in the afternoon on storage tracks just outside the La Salle street station. There they were ready to back in for the evening rush, which began about 4 o'clock, as many offices were closed at that time.

The greatest difficulty in handling the crowds was experienced on Monday evening, but by Tuesday evening the people were handled practically without confusion. On Monday the bulk of the crowd had been taken care of, and the depot was on a normal basis by 6:30 p. m. On Tuesday the rush began about 4:30 and the station was clear by about 6:10. On Tuesday evening between 4:45 and 5:55, 22 trains of six cars each, including 10 regular trains and the 4 extra trains which made three round trips each, were backed into the station, loaded and despatched on two tracks. At an average of 100 people per car this made a total of 13,200 in a little over one hour.

On Monday morning between 7:20 and 9:00, six extra trains were run, in addition to the regular trains. On Tuesday morning seven extra trains were run during this time.

During the rush an engine was placed just outside the trainshed ready to back into the rear end of a train just as soon as it entered the station. Then the train was run out leaving the first engine, which was then backed out and placed in readiness to take out the next train. On Wednesday morning one train was despatched out loaded in just three minutes after it had arrived in the terminal loaded, and at other times trains were on their way out in from three to five minutes after their arrival. On Wednesday afternoon the Rock Island cut the extra service in two and on Thursday morning was able to handle its passengers by running eight-car instead of six-car trains on the regular schedule.

A road foreman of engines was stationed at Washington Heights, and a trainmaster at Englewood, while Mr. Pratt took charge at the La Salle street station. An extra train was placed on the track adjacent to the one on which the regular trains stood, and the gates from the concourse were thrown open long enough to let in about enough people to load the extra train. Then Mr. Pratt walked along beside the train, and if it was not fully loaded he told the gateman to let in more passengers. As soon as the extra train was despatched the gates were thrown open again for the regular train.

A count was kept of the tickets sold to inbound passengers. On Monday 9,898 tickets were sold; on Tuesday, 10,036, and on Wednesday, 6,342. A large proportion of these were commutation tickets, and most of them represent extra passengers. On Monday a great many people paid cash fares on the trains at the rate of three cents a mile. One collector reported 52 cash fares from one car, between Englewood and Chicago, which, of course, meant that a large number escaped paying fare altogether. On Monday evening large signs were posted in the stations advising people to purchase tickets in advance and save money by avoiding the necessity of paying the cash fare rate. Large placards were also hung on the ends of the

trains giving, in three-inch letters, the names of the stations at which the trains would stop, in addition to the regular train indicators in the concourse.

CHICAGO & WESTERN INDIANA

The normal suburban traffic on the Chicago & Western Indiana averages about 4,000 passengers a day, handled on 15 trains. As soon as the strike order was sent out Sunday night the operating officials were called together by the general superintendent for a conference. This lasted throughout Sunday night and arrangements were made for the operation of special trains, in addition to the regular trains at intervals of about 10 minutes during the rush hours of the morning and evening.

The men to handle these trains were got together in various ways, some were picked up in automobiles and others living nearer to the road were handled on a special train called for this purpose. The first special suburban train left the outer terminal at Dolton about 5:30 a. m., arriving at the Dearborn station about 6.10 a. m., and the special service, together with the regular trains, were operated close together without interruption until about 9:00 a. m., when the stations were all practically cleared. Trains throughout the day were run at intervals of 30 minutes to one hour.

The service was increased beginning about 4:00 p. m. to take care of the crowd homeward bound, and while the limited facilities at the Dearborn station, in most instances, prevented placing more than one train in the shed at a time, the loaded trains were pulled out and empty trains set with such regularity that the immense crowd was entirely cleared out of the station on Monday evening by 7:30 p. m., and on Tuesday evening by about 6:45 p. m.

The Chicago & Western Indiana operated in all 42 extra trains, handling at least 30,000 passengers daily, in addition to the regular traffic. While all trains were crowded, and at times the people were even held back for a short period in the concourse and waiting rooms, this unusual crowd was disposed of without great inconvenience to anyone and without accident.

CHICAGO, BURLINGTON & QUINCY

The Chicago, Burlington & Quincy, which normally handles each way between Chicago and intermediate stations to Riverside about 2,500 people per day, estimates that during the rush periods of the strike it handled each way to and from this district about 17,000 people, or 34,000 people each day, counting inbound and outbound passengers. The principal part of the rush was to intermediate stations up to and including Riverside. Beyond Riverside the additional business was handled by regular trains, all of which had some additional equipment. The rush period was between the hours of 4:30 and 6:40 p. m. Between those hours the Burlington ordinarily had 16 suburban trains leaving the Union depot. During these rush hours four additional trains were added, as that was about all the trains that could be sandwiched in between the regular trains and find track accommodations at the Union depot, where the facilities for handling a rush of that kind are somewhat limited. Inbound from Clyde and intermediate stations in the morning there were five special trains, in addition to the regular suburban trains. Additional coaches were placed on all of the 16 regular trains in the rush hours, and these with the special trains made some 75 additional cars in suburban service.

PENNSYLVANIA LINES

The Pennsylvania lines ordinarily handle but very little suburban business in the Chicago territory, but when it became known that the street car strike would probably be called at Sunday midnight, immediate arrangements were made to take care of the people employed at the several industries along the lines, as it was realized that the Pennsylvania would have to supply the means of transportation to take the place of the surface lines and elevated lines on which they usually travel. By placing additional coaches on all of the regular trains, and scheduling a number of extra trains, and making additional stops at convenient locations, all of these people were accommodated very satisfactorily. During the three days about 75 additional coaches were used and about 50 extra trains were run, carrying about 10,000 passengers, which is about four times the normal number.

There was a great crowd at the Union station in the evenings, but by giving preference to the suburban passengers, and with the assistance of the special city officers, in addition to the railroad forces, the people were handled with comparatively little confusion and absolutely no accidents.

CHICAGO, MILWAUKEE & ST. PAUL

The Chicago, Milwaukee & St. Paul does not operate a very extensive suburban business, but during the strike it operated a number of extra suburban trains into and out of an old station at Kinzie and Kingsbury streets because of the congestion in the Union Station. On Monday morning it was somewhat swamped by the unusually large number of people who tried to avail themselves of its facilities for getting down town, but by Tuesday arrangements were so perfected that the people were handled with little confusion, and during the three days the company handled about 50,000 suburban passengers.

GRAND TRUNK

For several days before, the Grand Trunk held at Elsdon several coaches in readiness for use if the strike was called. On Monday coaches were moved empty for several hundred miles in order to accommodate the suburban passengers along its lines in the southwestern part of the city. During the three days of the strike, in addition to the regular suburban trains, the Grand Trunk operated 20 special trains with an average of 8 cars per train, and handled a total of 31,331 suburban passengers. Of this total it was estimated that 24,731 had used the line on account of the absence of their usual transportation facilities. The 20 special trains handled a total of 9,403 passengers.

CHICAGO & ALTON

The Chicago & Alton handles a very small portion of the suburban traffic under normal conditions, as it serves a very limited territory of suburban homes. Since to a very considerable extent the people living in the southwest part of the city would be unable to get from their homes to their business in Chicago and back unless special service were furnished, two special trains were run in the morning from the Harrison street yard, one to Brighton Park and the other to Argo, the latter a point 13 miles out from Chicago. Return service was furnished from Argo to Chicago, leaving Argo at 5 p. m. Arrangements were also made to stop all of the regular trains at Halsted street, Thirty-first street, Thirty-seventh street, California avenue, Brighton Park, Corwith and Glenn, and the morning trains on Monday, Tuesday and Wednesday carried about 5,000 people into the city, handling as many on the returning trains on Monday and Tuesday nights.

BALTIMORE & OHIO CHICAGO TERMINAL

The Baltimore & Ohio Chicago Terminal, over which the trains of the Baltimore & Ohio, the Pere Marquette, the Chicago Great Western and the Minneapolis, St. Paul & Sault Ste. Marie enter the Chicago terminal, operates very little suburban service and has few stations within the city. The company did not anticipate that there would be a strike, and when at 7 p. m. on Sunday it received definite assurance that the strike would be called there were a great many details to be worked out. It succeeded in securing 33 coaches from various roads during the night, clerks were called out to act as collectors and a suburban train service was put into operation at 6 a. m. on Monday. It was necessary to use switch engines for this service, temporarily, at least, interfering seriously with the freight operations. On Monday this company ran 17 special trains between Forest Park on the west and Sixty-ninth street on the south and the Grand Central station. Additional coaches were also added to the suburban

trains from Chicago Heights to Chicago. The tenant trunk lines also arranged to pick up suburban traffic at various points on the line. On Tuesday 16 special trains were run. Arrangements were also made to honor B. & O. C. T. tickets on the Baltimore & Ohio trains. On Wednesday morning seven additional trains were operated. It is estimated that not less than 18,000 people were handled on these special trains between Monday morning and Wednesday morning.

WABASH

The Wabash, which uses the terminals of the Chicago & Western Indiana, normally handles about 700 people a day in suburban service. During the strike it put 10 extra coaches on its suburban trains, but did not operate any special trains. On Monday it handled 5,812 passengers; on Tuesday 5,710, and on Wednesday morning 3,308 passengers, making all regular stops between the Dearborn Station and Hamilton Park.

NEW YORK CENTRAL

The New York Central ordinarily handles comparatively little suburban service. During the strike extra trains were operated to the Union Stock Yards, both from Chicago and from Englewood, in the morning and the evening to accommodate several hundred people employed in the packing houses. The regular and through service was heavily patronized, but it was not necessary to add much extra equipment. Local and suburban trains which normally handle 4 and 5 cars were increased to 10 and 12 cars, which were very heavily loaded but which were easily handled with this company's large locomotives. Extra train collectors and ticket selling facilities were provided and the extra traffic was handled without difficulty.

THE INTERCHANGE PROBLEM IN YARD OPERATION

By E. C. Tucker

Yardmaster, Norfolk & Western, Portsmouth, Ohio.

In the operation of terminals and team track districts, economy of operation is secured by the reduction in the number of switches per car required to handle or forward each individual car. This should be considered for each car the entire time it is within the terminal superintendent's jurisdiction to get to the best results. Duplication of work is many times the cause of high terminal operating expense. It may be present in duplication of reports, records, switch movements, and many other ways.

The best aid to economy in yard operation is system. As far as practicable there should be a certain time, place and manner of performing every part of the work each day, with certain employees to perform it. If the same employees perform a certain service each day, they become familiar with every phase of that part of the work, so that it is performed in the shortest time and more correctly.

The movement of traffic between the classification terminal and the point of receipt or delivery to the connecting lines has a great influence on the terminal yard. Whenever possible advance notice of the volume of traffic expected and the approximate time it will arrive and be ready for the connecting line should be given to the connecting line officers in charge. This is especially necessary in preventing congestion on both the home line and the foreign line tracks during a period of sudden heavy movement of traffic.

Where a terminal delivers considerable or all of its traffic to several connecting lines, the cars destined to connecting lines having the greater volume of traffic should come into the terminal yard classified according to the connecting line, so that the entire cut of cars may be together in the incoming train and may be placed by the road or yard switching crew direct on the receiving track of the connecting line with practically one switch for the entire cut of cars, and within a short time after the cars arrive in the home line terminal yard.

Where there are connecting lines handling a relatively small amount of traffic the cars routed via these lines receive the best movement if they are received at the terminal yard in a joint classification, currently, to be classified after arrival, instead of being held at the distant classifying yard, waiting for a sufficient number of cars of each classification to accumulate and be forwarded. If the connecting lines averaging the smaller amounts of traffic are offered the small collections of cars at more regular intervals during the day they can more readily accept their interchange as it is offered, thus keeping each receiving line open for traffic and also reducing delays to the cars and overcoming more or less congestion in the home line terminal yard.

Usually two tracks are assigned for the traffic of each connecting line, for delivery and receipt, respectively. The receipt of cars should be considered just as important as the delivery of cars. It frequently occurs that the yardmaster will deliver cars to a connection but will fail to pull the receiving track at the same time. This is not fair to the connecting line. It causes delay to traffic routed via the home line, and additional expense of the switching crew by requiring two movements to this particular connecting line's transfer, which could have been covered by one. Before delivery is made of any cars to the connecting line some arrangement should be made to have all cars and bills checked so that correct billing is promptly delivered covering every car placed on the connecting line receiving track.

Since freight solicitors secure traffic for foreign lines as well as for the home road, the connecting line should be prompt in receiving all freight which reaches the junction point in any manifest trains. The transfer should be cleared at the proper time to receive this preference freight, sufficient interest having been taken so that arrangements are made by the connecting line not only to receive it as soon as offered, but to forward it in its manifest trains. When high class freight misses the schedule, both lines stand to lose the traffic and both lines should, therefore, work together and protect the business secured by their commercial agents.

A clear seal record should be kept, especially of the time cars are received and delivered. Both lines should be interested in securing these records as promptly after cars are set on transfers as possible. Many cars are pilfered on interchange and other tracks annually, but on account of an imperfect seal record the lost freight cannot be checked to either line, delaying the claim of the shipper and creating considerable labor in the claim department.

It is frequently noticed that one road will apparently hold a perishable shipment even though the connecting line is anxious to receive it for movement, and will fill the transfer to the connecting line, placing the perishable last in the track in an effort to compel the connecting line to receive the entire draft of cars, even though they may be unable to handle them successfully just at that time. This will usually work more harm than it does good, sometimes delaying the perishable load or manifest train, and invariably acting against any harmony in working of interchange tracks.

The handling of perishable or refrigeration shipments demands the most careful and exacting attention at interchange points. The billing should be checked for proper transportation information and the shipments themselves should be carefully examined as regards refrigeration and if additional icing is required, even though not called for by billing, the cars should be iced and that information recorded on the billing and otherwise as may be desired. No car under refrigeration should be allowed to leave the terminal until it is known to be iced sufficiently to protect the shipment to the next re-icing station, and in case of considerable distance between such stations, allowance should always be made for unforeseen delays.

Promptness in handling cars to and from transfers reduces per diem, and per diem, from a yardmaster's viewpoint, should mean a loss of earnings rather than a gain. Reduction of per diem will increase track space, which is a big item in prompt and economical handling of traffic through the yard.

Steel Passenger Equipment for the Union Pacific

Includes Dining, Baggage-Buffet, Chair, Baggage, and Postal Cars of Arch Roof Type; I-Beam Center Sills Used

The Union Pacific has, during the past year, added to its equipment a large number of all-steel cars for passenger train service. These cars were built by the Pullman Company and include dining, combination baggage-buffet, chair, baggage and postal cars and coaches.

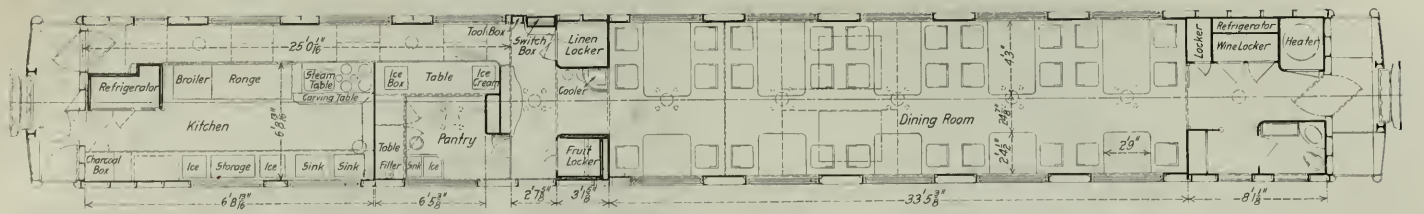
The dining cars are 72 ft. 6 in. long over the end sills and 80 ft. 5 in. long over the platforms when coupled. They are mounted on six-wheel trucks with 11-ft. wheel base, the wheel base of the car being 67 ft. 9½ in. The weight of the car, complete, is about 148,000 lb., and there is seating capacity for 30 passengers.

The combination baggage and buffet cars are 75 ft. long over the end sills and are mounted on six-wheel trucks; the total wheel base of the car is 67 ft. 9½ in. The seating capacity is 28, and the weight of the car ready for service is about 139,000 lb. The bodies of the chair cars and the coaches are the same, the length over end sills being 70 ft., the length over platforms when coupled, 77 ft. 11 in., and the wheel base 65 ft. 3½ in. These cars are also mounted on six-wheel trucks and the weight of the car complete is about 138,000 lb. Some of these cars are equipped with a smoking room in one end, in which case the seating capacity of the chair cars is 70, while without the smoking room it is 72; when equipped with a smoking room the coaches have a seating capacity of 82, and this is

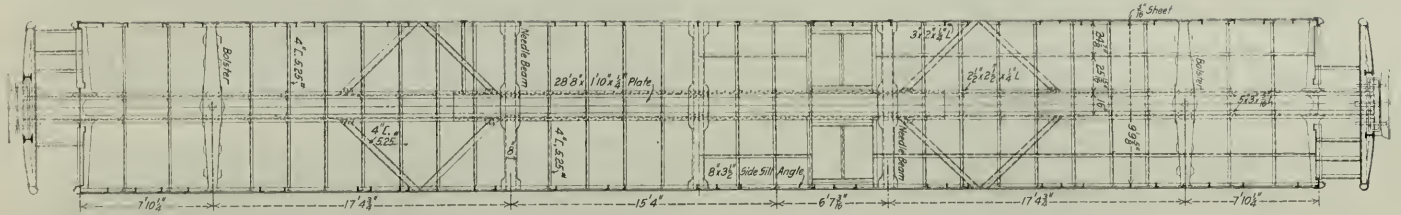
Union Pacific Steel Dining Car

Interior of the Dining Car

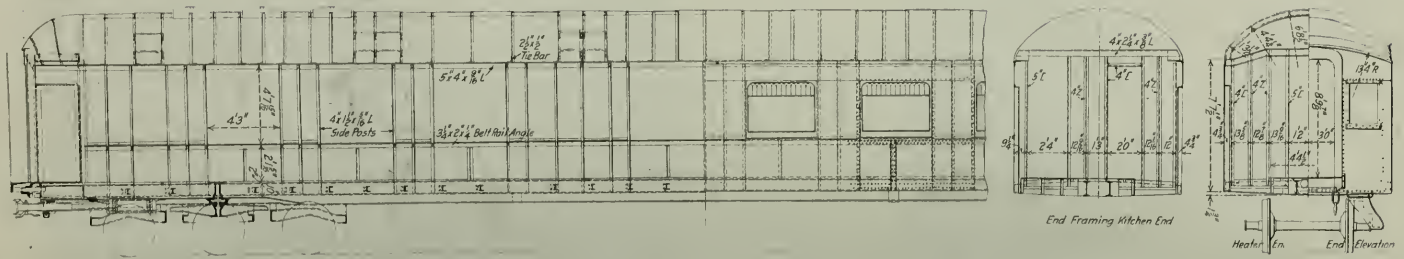
Kitchen of the Dining Car



Floor Plan of the Union Pacific Dining Car



Underframe of the Union Pacific Dining Car



Arrangement of the Frame Members in the Body and Ends; Union Pacific Steel Dining Car

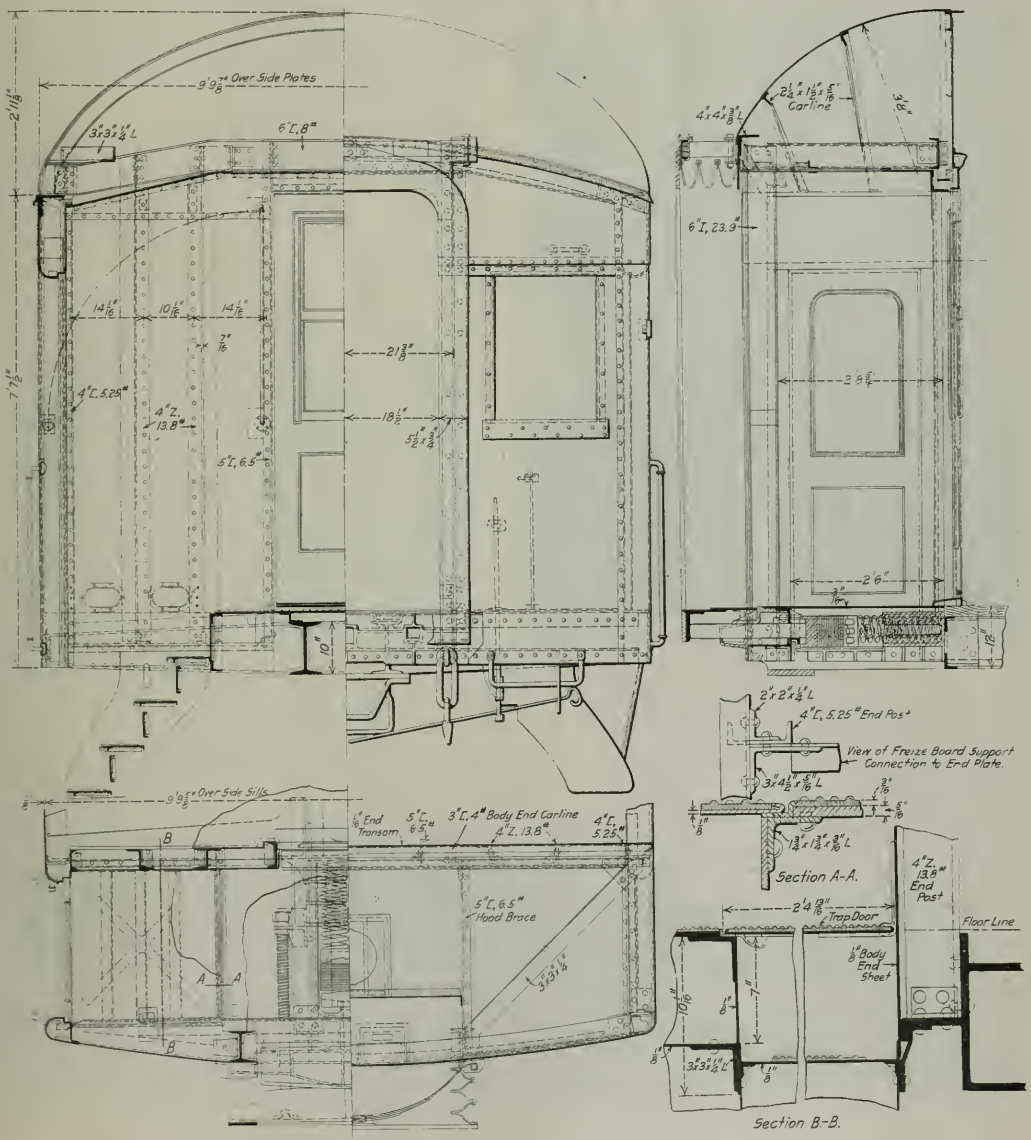
changed to 84 in the case of a car without a smoking room.

The baggage cars are 69 ft. 07/8 in. long over end sills, 71 ft. 11 in. long over the platforms when coupled, and have a wheel base of 64 ft. 07/8 in. They are mounted on four-wheel trucks and weigh about 106,000 lb. The postal cars are 60 ft. 1½ in. long over end sills, 63 ft. long over the platforms, with a wheel base of 55 ft. 1½ in. These cars weigh about 111,600 lb. The design of the six-wheel and four-wheel trucks is the same for all of the cars on which they are used.

The arch type of roof is used in all of this equipment, the suction type of ventilator being employed, the ventilation being satisfactory in every way. As the type of construction is similar in all of the cars, the framing for the dining car alone is shown in the illustrations.

UNDERFRAME

The center sills consist of two 15-in., 60-lb., I-beams placed at 16 in. centers and extending between the platform end sills. A 22 in. by ¼ in. top cover plate is used and the sills are given ⅜ in. camber. The body bolsters are steel castings; there are three cross bearers employed between the bolsters. The distance between truck centers is 56 ft. 8 11/16 in. Two sets of diagonal braces consisting of 4-in., 5.25-lb., channels are placed between



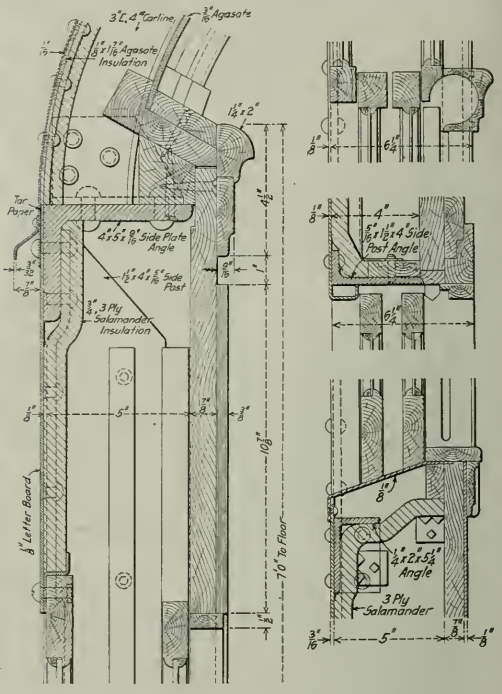
Platform and Vestibule Construction; Union Pacific Steel Dining Car

the center and side sills, and channels of the same size and weight are also used to support the floor stringers, which are 2½-in. by 2-in. by ¼-in. angles. The side sills are 3½-in. by 8-in. angles, a 3/16-in. plate being riveted to the side sill and to the belt rail, which is a ¼-in. by 2-in. by ¾-in. angle with the

Interior of Union Pacific Reclining Chair Car

2-in. leg on top, to which is riveted a 3/16-in. by 1⅜-in. by 2-in. angle. The 3/16 in. steel sheathing extends to a point just above the connection between the two belt rail angles, and ⅛-in. sheathing is used on the car body above this point.

posts consisting of 4-in., 13.8-lb., Z-bars. The vestibule door posts are 6-in., 23.9-lb., I-beams, braced at the top to the body corner posts by 3-in. by 3-in. by ¼-in. angles, while a 6-in.,



Some of the Dining Car Construction Details

8-lb., channel forms the vestibule end plate. The end sheathing of the car body is ⅛ in. thick.

FLOOR AND INTERIOR FINISH

Above the floor stringers is placed .04 in. galvanized iron, above which is a layer of ¾-in. Magnesite. Next to this is a

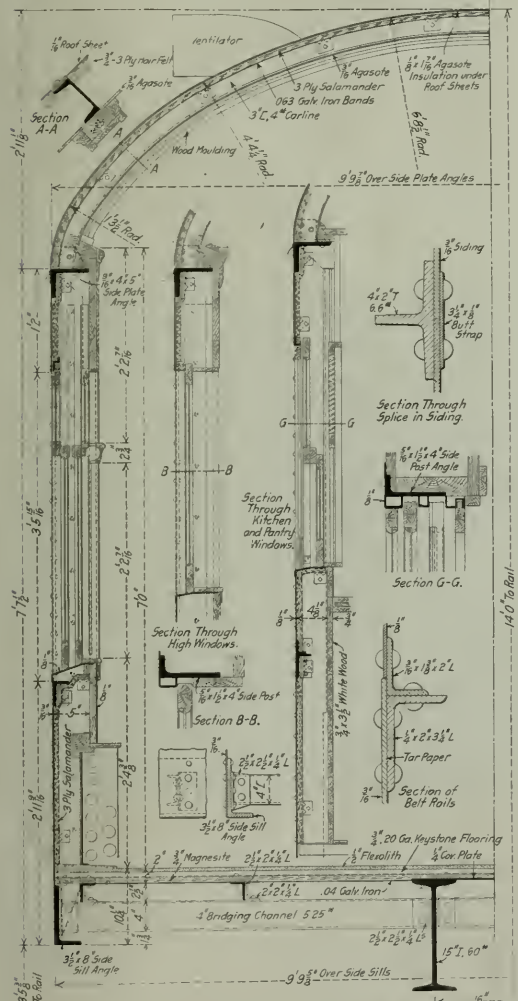
Union Pacific Steel Baggage and Express Car

BODY AND END FRAMING

The body side posts are 4-in. by 1½-in. by 5/16-in. angles and the side plate is a 4-in. by 5-in. by 9/16-in. angle. The carlines are 3-in., 4-lb., channels extending through between the side plates, and the end plate is a 4-in. by 2¼-in. by ⅜-in. angle. The body corner posts are 4-in., 5.25-lb., channels and the door posts are 5-in., 6.5-lb., channels, there being two intermediate

layer of ¾-in., No. 20 gage Keystone flooring, above which is placed the final flooring, which is ½ in. Flexolith. Three-ply Salamander insulation is applied to the inside of the steel sheathing and the interior finish and the window frames is of mahogany. Mahogany is also used in the baggage-buffet cars, but the interior finish of the chair cars and coaches is steel. The headlining is 3/16 in. Agasote.

The special equipment used includes New York air brake equipment, Chicago Car Heating Company's vapor system, Commonwealth cast steel truck frames, Creco brakebeams, Pitt couplers, Sessions friction draft gear, Waugh-Forsyth buffing device, Acme vestibule diaphragms, Utility ventilators, Transportation Utilities Company's window fixtures, National trap doors, Hale & Kilburn seats, Adams & Westlake's sanitary bubbling water fountains and white metal washstands, Duner flush closets, Johns-Manville Salamander hair felt insulation, Key-



Cross Sections of the Dining Car

stone floors, Rausch bag racks in the postal cars, Edison storage batteries and Gould axle lighting generators.

The following table gives some of the principal dimensions of the dining car:

Length over end sills	72 ft. 6 in.
Length over platforms, coupled	80 ft. 5 in.
Distance center of bolster to end sill	7 ft. 10¼ in.
Wheel base of car	67 ft. 9½ in.
Wheel base of truck	11 ft. 0 in.
Width over side sills	9 ft. 9⅝ in.
Width over side plates	9 ft. 9⅞ in.
Width over-all at eaves	9 ft. 11⅞ in.
Height top of rail to underside of side sills	3 ft. 3⅜ in.
Height top of rail to top of platform	4 ft. 3½ in.
Height top of rail to outer side of roof sheets	14 ft. 0 in.
Seating capacity	30

CENSORSHIP OF RAILWAY MESSAGES*

By W. W. Hall

Superintendent of Telegraph, Missouri, Kansas & Texas

I have for years been trying to eliminate unnecessary telegraphing. Requiring the managers of the offices to send in those messages which, in their opinion, contain superfluous words has not proved very successful. In August, 1912, I tried using symbol letters and file numbers in telegrams, according to a plan which had been used on the Santa Fe; and I issued a circular to agents and to others concerned, asking them to put a letter and a number at the end of every message, thus saving words in the reply. Each agent or officer was also called on to number his messages from 1 up to 999. At the same time an effort was made to have messages sent by train whenever practicable; and finally the vice-president in charge of operation authorized me to employ a telegraph censor. Offices were called upon to send in a whole day's business and the messages were carefully examined. Using a stereotyped form of letter proved unsatisfactory, and it was found best to dictate a separate letter in every case. Some departments resented this action of the telegraph department; but to these I got the vice-president to send letters, signed with his own name. This at once produced astonishing results; everyone began to wake up to the fact that there was a real campaign on to reduce telegraphing. Some of the heads of departments were displeased, but we are still sending some of these letters to the vice-president's office for signature.

A telegraph code is very useful, but most codes are too voluminous. We have one, adapted from one in use on the New York Central, containing less than 200 cipher words. With this code, in connection with the use of the file number and letter, we have reduced our telegraphing about 50 per cent. If I were to make a new code I would abandon the attempt to have the cipher word suggest the meaning of the sentence which it represents. A code should consist of uncommon English words of not over five letters.

Besides reducing the number of messages the messages are much shorter, and recently I have found operators handling 85 messages an hour. Many of these messages consisted only of a symbol letter, file number and two or three additional words.

The practice of using special envelopes for sending telegrams by train—envelopes marked "MAILGRAM"—is abused; the envelopes will be used for such a variety of letters that they fail to command respect. On the M. K. & T. a more systematic plan has been adopted. At important offices all messages filed after 4 p. m. are written and filed in duplicate, and where these messages can reach destination by mail before 9 o'clock the next morning the original is sent forward, in an envelope, the messages being numbered and all for one place being put in one envelope addressed to the manager of the telegraph office. A telegram is sent to him giving the numbers of messages to be expected on a given train, and this he acknowledges. Receiving the telegrams, he delivers them in the usual manner, and many of the recipients never notice but what the message came by wire. There may be some objection to leaving it to the discretion of the telegraph manager to send telegrams by train, but in more than a year we have had only a few complaints on this ground. The telegraph department assumes responsibility for the delivery of the messages. If the envelope should be carried by the telegraph manager would at once report the fact; and in such case the sending office, having the duplicates, sends them by wire. In more than a year we have had only five cases where messages were carried by.

Large numbers of reports covering the movement of fast

*Abstract of a paper read before the annual meeting of the Association of Railway Telegraph Superintendents at Rochester, N. Y., June 22.

freight, formerly sent by wire, are now sent by train. This policy is followed at all offices within a radius of 400 miles of headquarters.

THE VALUE OF PUBLICITY FOR RAILROADS*

By Oswald Garrison Villard
President of the New York Evening Post

As the son of a railroad president, the completer of a great transcontinental line [the Northern Pacific] it gives me much pleasure to address this gathering of railroad men. I was but 11 years old when it was my good fortune to travel on one section of the first through train between St. Paul, Minn., and Portland, Oregon; but nothing in all my life stands out more clearly than the events of that wonderful journey. That was a triumphal progress which was celebrated in every town along the line. Ours were honors rarely accorded even to a President, or a conqueror returning from the scene of his victory. No hamlet so humble but had its decorations and its parade. No state but offered its official hospitalities to the men who had forged that iron bond between East and West, who had conquered apparently insuperable barriers. It was the birth of an empire that we celebrated and those that officiated thereat were welcomed as among the greatest benefactors of their times. I dwell upon this occurrence of 32 years ago not to blow the trumpet for the men who did this wonderful thing, but to recall to your minds what was the attitude of the public towards railroad men in that day. How rapidly the scene changed! Within a decade everybody had forgotten all that acclaim and praise and all the promises of everlasting gratitude. We began to hear murmurings from press and public that all was not well; then came suspicion and accusation. Next a torrent of abuse and lo! we had swung directly to the opposite extreme and the railroad man had become a public enemy.

Now it is undeniable that the railroads themselves were in large part responsible for this revolution; not only because some of them have even until this date stuck to practices never in themselves justifiable, but also because they failed to realize that all our business conditions were undergoing a sea-change; that the day of unlimited freedom from governmental control was at an end and that the era of regulation, for better or for worse, was at hand. . . .

It is not my purpose to award praise and blame for all that has gone on during these years of tribulation. I am merely here to urge upon you one remedy for existing conditions, one already partly tried and found successful, but one that has only just begun to do its beneficial and efficacious work. That remedy is publicity. From my double point of view of an editor and as one who grew up in an atmosphere of great railroad achievements, that seems to me the truest and best way to right wrongs and to end intolerable conditions.

Primarily, of course, publicity can be of value to the railroads only if they have nothing to conceal. The railroad manager who would profit by wise publicity must believe in it sincerely and then be perfectly willing to let daylight play upon any part of his and his company's activities. This presupposes the abandonment of the old secret chamber and the old method of affecting public opinion through controlled newspapers and the influencing of public officials, legally or illegally, properly or improperly. . . .

It was not only from the common legislative striker that the railroads suffered. There is even one historic case where a President of the United States demanded free transportation by special train across the continent for himself, his official following, and a large party of newspaper men carried with him to exploit his triumphal tour. In this trip some $75,000 of the stockholders' money was paid out because the railroad did not have the good sense and the nerve to say no to some of the demands of its guest, or to go to Congress and demand reimbursement. . . .

The value of the advertising columns has been as little understood as the legitimate opportunities offered by the editorial and news pages. Such clever advertising as "Phoebe Snow" has appeared only occasionally.

A railroad which advertised with us withdrew its advertising when we faithfully reported the complete breakdown of its service one cold winter. . . . The obvious procedure, if our statements were untrue, was to have called us publicly to account, either through the courts of law or by demanding that the railroad's case be printed in full; or if we refused, then in newspapers of much larger circulation, or by inserting advertisements setting forth the facts. But the railroad sought refuge in silence and alienated its patrons by a refusal to give them information to which they were clearly entitled.

Very satisfactory has been the change by some railroads from the old-fashioned press agent, often merely a lobbyist and go-between, to so able and useful a type as Ivy L. Lee, long connected with the Pennsylvania Railroad, whom it was always a pleasure for editors to see. Even more striking evidence of the change in railroad sentiment has been the advertising campaign conducted in various states against the two-cent fare law and the outrageous extra-crew statutes. If those campaigns were not as successful as they should have been, the policy is none the less the correct one. Incidentally, the railroads have discovered that they have, themselves, enormous opportunities for legitimate publicity which they have never heretofore utilized, such as dining car bills of fare, the usual advertising folders, timetables, and the station bulletin boards. Unquestionably the use of these has had considerable to do with the marked improvement in the relations of railroads and the public and the courts, now so striking as to make it possible to say that the current of popular opinion has again begun to run in the railroad's direction. Even more striking is the campaign for fair play which has been carried on by President Elliott, of the New Haven Railroad since he took up his present task. I have never been able to understand why railroads that were playing the game squarely have not each taken a man like Mr. Lee, made him vice-president, and told him to do nothing else than to be a link between the press, the public and the railroad. If a high official were to appear occasionally at the small towns along the road and make friendships among the business men and show the railroad's interest in that town, and its desire to co-operate and to give a better and better service, there would speedily be stored up a reservoir of good-will and friendliness upon which the railroads could draw large drafts in time of need. Such a man would find that honest editors are not inaccessible, that they do not want to be dined or wined or kow-towed to, but that they can be influenced by the railroads precisely as anybody else can influence them and get their support, namely, by the presentation of facts and arguments. If such an official could not convert editors he could not convert the public. It is gratifying to record that other railroads beside the New Haven are beginning to move along these lines.

The railroads need the newspapers not only for protection against unjust laws, but because they are the best possible defense against the growing danger of labor-union aggrandizement on the one hand and government encroachments on the other. Few newspapers, like the Evening Post, are non-union; hence they are themselves deeply sympathetic sufferers at the hands of labor union extortionists, save where, as in New Orleans, they have at the risk of their existences and at a very heavy cost, thrown off the yoke. The railroads should realize that the newspapers of conscience and character are their chief allies, just as they should know that the greater the freedom and the independence in criticism which a newspaper shows the better it can serve their just interests. The public knows a mealy-mouthed organ, afraid to say its soul is its own, and cares little about its opinion. One has only to consider the agitation for government ownership now going on to realize the vital necessity that exists that the relations of the railroad and the newspaper should be put on the highest possible plane of mutual good-will, respect, and honorable co-operation.

*Extracts from an address before the 37th Semi-Annual Dinner of the American Railway Guild, New York City, May 18.

The Julian Train Control and Automatic Stop

A Description of the Demonstration Made on the Queen & Crescent and of the Equipment Required

The first public demonstration of the automatic train control and cab signal system of the Julian-Beggs Signal Company, Terre Haute, Ind., was given on the Queen & Crescent on May 18, to officers of that road and a number of invited guests. The demonstration also covered the speed control system which this company has developed, an installation on the private car of General Manager H. Baker being used for this test. The speed control system was described in the *Railway Age Gazette* of March 16, 1915.

As mentioned in the previous article, the speed control instrument is belt-connected to an axle. It has a series of contact segments arranged for any desired series of predetermined speeds, and a dial switch, on which is set the desired limiting speed. A series of platinum points are moved up and down over the contact segments by the piston of the recorder, which is raised as the speed increases. As these platinum points rise above the segment corresponding to the speed indicated on the dial switch, the normally closed cir-

Speed Recorder on the Locomotive

cuit through a solenoid magnet holding closed a valve in the air-brake train line or in a connection from the equalizing tank is broken, allowing this valve to open and the air to escape to the atmosphere, thereby setting the brakes. As the speed of the train is reduced the platinum points again make contact with the segments, completing the circuit, energizing the magnet, and closing the air valve.

The train control and cab signal system utilizes a similar speed recorder and air valve in connection with a roadside contactor and a third rail to control the speed of the train automatically, depending on the condition of the track ahead, and also to give the enginemen distinctive clear, caution and stop signals in the cab. This system, as developed at present, requires the following equipment: On the locomotive, a 12-volt storage battery, three standard relays, a light-signal with three lenses, a speed recorder mounted on the pilot and belted to one of the axles of the front truck, an electro-pneumatic valve connected in the air brake line from the equalizing tank, a push-button release for closing the engine circuit after the train has been stopped, a commutator on the reverse lever to change the wiring connection when the engine is to be run backward, and an armored conduit with the necessary junction boxes, for connecting the wiring on the cab to the tender; on the tender, two curved shoes attached to the journal boxes of the forward truck on each side, and mechanical circuit breakers with horizontal arms, also attached to the truck on each side; and on the roadside, a contactor box attached to the ends of the ties on each side of the track; one rail, about 6 ft. long, about 2 ft. outside the running rail and supported by brackets on the ends of the ties at a proper height to engage the circuit breakers on the tender; a 16-volt battery at the signal location, and the necessary line wire and trunking to connect the battery, the track relay and the track contactor box.

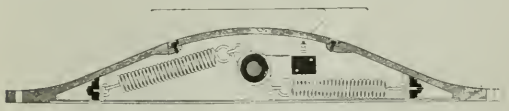
The section between Erlanger, Ky., and Crittenden, 18 miles, on which this train control system is installed, is equipped with three-position, a.c. upper-quadrant automatic block signals, controlled by three-position, polarized track relays. As these relays have one contact which was not in use, it was utilized for the control of the cab signal and automatic stop system. While this is a double-track line, only the southbound track is equipped with this system, 18 blocks being installed. The track contactors are located about 600 ft. north of (in the rear of) the signals in each case in order to allow an engine running at the caution speed to be stopped automatically by the device before passing a stop signal.

The complete circuits on the roadside and on the engine and tender are shown in the accompanying sketch. In the position shown, the engine is approaching a proceed signal, two blocks in advance being unoccupied. When the engine shoe strikes the track contactor the circuit is completed from the roadside battery through the front contact of the track relay, the track contactor, engine shoe and coil of the clear relay, to ground. This picks up the clear relay, completing a stick circuit from the engine battery through the two circuit breakers, the first back contact on the caution relay, the first front contact on the clear relay and the coils of this relay, to ground. Current can then flow from the engine battery through the second front contact of the clear relay, the upper contact segment on the speed recorder, the dial finger moving over this segment, the solenoid actuating the air valve, and back to ground.

The length of the contact segment can be adjusted for any desired speed, 48 miles being used on the Q. & C. installation. As soon as the speed exceeds this rate, the dial finger passes off the end of the segment, the circuit is broken and the brakes are applied through the de-energizing of the air valve magnet. As soon as the speed has been decreased to a point below a specified limit, the circuit is again completed, and the brakes released. After passing a clear signal and until the next track location is reached, the white light burns, as it is included in a circuit from the engine battery through the third front contact of the clear relay, to ground.

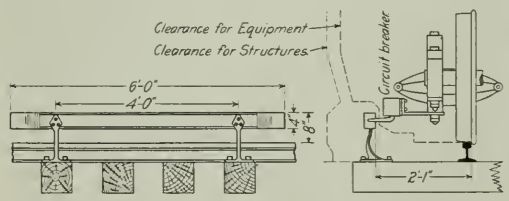
The function of the third rails, not shown in the wiring diagram, is to break the holding circuit on the engine by engaging the horizontal arm of one of the circuit breakers, shown above the engine shoes. The breaking of this circuit de-energizes any relay that may be energized at the time, and puts out any of the lights that may be burning. This prevents any indication from being carried improperly into the next block without the proper control from that block. If

the next two blocks are clear after the circuit is broken, the circuits previously described are again established and the train continues at full speed. If, however, only one block in advance is clear and the signal 600 ft. ahead is at caution, the polarized track relay will be reversed, allowing current from the roadside battery to flow through the back contact of the track relay, the track contactor on the opposite side, the engine shoe, the coils of the caution relay, and back to ground. The pick-up of the caution relay closes a stick circuit from the engine battery, through the two circuit breakers, the first



Sectional View of Track Contactor

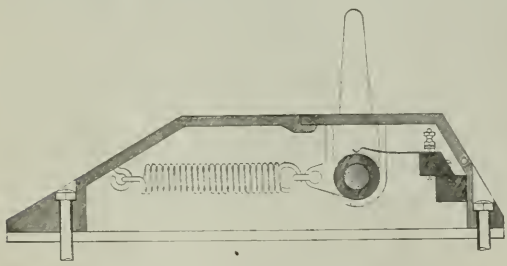
front contact and the coils of the caution relay and back to ground. Until this circuit is broken by the next third rail, therefore, current flows from the engine battery through the second back contact of the clear relay, the second front contact of the caution relay, the second contact segment on the speed recorder, the dial finger, air valve solenoid, and to ground. The length of this contact segment is adjusted for the desired caution speed, which in this installation is 25



Side and End Elevations of Contact Rail

miles an hour. If that speed is exceeded, the brakes are automatically set; and again released as soon as the speed has decreased below that rate. Also throughout this block the green light burns, being in a circuit from the engine battery through the third back contact of the clear relay and the third front contact of the caution relay.

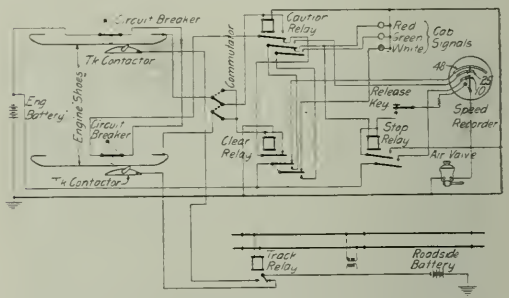
When the train approaches a stop signal, the block ahead being occupied, the engine circuits are broken by the circuit breaker as described above, and as the track relay is de-



Circuit Breaker Mounted on Tender Truck

energized, the circuit from roadside battery to engine cannot be completed when the engine shoes pass over the track contactors. This de-energizes the solenoid holding the air valve closed, exhausts air and applies the brakes; and as there is no circuit through the speed recorder, the train is brought to a full stop. When it has stopped, the dial hands on the speed recorder will have made contact with the fourth segment, allowing the circuit through the air-valve solenoid to be closed by operating the release key. In this case the current flows from the engine battery through the second back contact of the clear relay and the second back contact of the caution relay, the coils of the stop relay, release key, speed recorder, air valve magnet, and to ground. As soon as the stop relay is picked up by closing the release key, the stick circuit through the coils and the first front contact of this relay is completed, and also the circuit from battery through second front contact of the stop relay and the third contact segment on the speed recorder. This segment is arranged to allow a speed of 10 miles an hour until the next indication is received.

The air valve in this system, which has been worked out in connection with the Westinghouse Air Brake Company, has an opening of 3/8 in. to the atmosphere, causing a reduction of brake line pressure of 12 lb. to 15 lb. An auxiliary or pilot valve has also been developed for use on a freight locomotive, or in a caboose in connection with the speed control system, having a maximum opening of 1¼ in., which, however, by a manual valve in the head, can be reduced to secure the desired opening for use on shorter trains. In this valve



Track and Engine Circuits, Julian Train Control System

the electro-pneumatic pilot valve controls a balanced type air-controlled valve opening the air line.

In the demonstration referred to above, a special train was run from Ludlow, Ky., to Williamstown, and return, the train control system being in operation between Erlanger and Crittenden, 18 miles, and the speed control system being demonstrated over the remainder of the run. A freight engine with two cars was sent ahead of the special train with orders to stop at intervals, and the special was run as close to it as possible under the control of the automatic system. The system operated correctly in every instance. The party included H. Baker, general manager, Queen & Crescent; W. S. Andrews, general superintendent of transportation; W. T. Caldwell, superintendent; C. E. Rickey, superintendent of terminals; W. H. Dooley, superintendent of motive power; D. M. Case, superintendent of signals; C. F. Jones, supervisor of signals, and W. S. Melton, superintendent of telegraph; John E. Beggs, president of the Julian-Beggs Signal Company; M. R. Julian, the inventor, and M. H. Hovey, the company's signal engineer.

New Railway Lines in Belgium.—It is reported from Amsterdam that at many places the Germans are constructing new railway lines. A new line has been laid from Aix-la-Chapelle through the Belgian village of Wonck, in the Jeker valley, with the object of giving further railway access to Brussels. This line crosses the Maas near Visé. The line from Selzaete to Moerbeke is to be double tracked and probably also the Selzaete-Eecloo-Bruges line.

Some Important Considerations in Right of Way Valuation

A Discussion of the Principles of Valuation That Should Govern in the Selection of Right of Way Multiples

By Halbert P. Gillette
Consulting Engineer, New York, N. Y.

Ever since the decision in the Minnesota rate case there has been concern among railway officials and appraisers over the apparent exclusion of right of way multiples. For the purpose of this discussion we may define a right of way multiple as the factor by which the ordinary selling price per acre of land must be multiplied to get the acreage price paid for it when taken for public use under the exercise of the right of eminent domain. The use of a right of way multiple, therefore, is a convenient method of estimating severance damages, special value for railway purposes, etc., and it may even be taken to include overhead costs involved in securing the right of way.

The testimony in favor of right of way multiples failed to convince Justice Hughes. I believe it failed for two reasons: First, because a "right of way multiple" was treated, and even spoken of, as a "hold up factor"—a sort of piratical tax which, as Justice Hughes said, should not be recognized in a court even though it may exist as a fact; second, because the whole theory of reproduction cost of right of way was based on an untenable hypothesis, involving the absurdity of assuming the existing railway to be non-existent in order to conceive the cost of buying the existing right of way.

My object in this paper is to outline briefly a tenable theory of right of way valuation that can not be criticized adversely without abandoning all existing theories of commercial valuation. To do this I will first discuss the fundamental theory of land values. Then I will show how the general theory can be simplified for ordinary application to railway right of way valuation. Finally I will outline the elements of value that go to make a right of way multiple.

The value of land is the capitalized prospective ground rental derivable from it. Ground rental is measured by the economic advantage in position and in mineral and other marketable content of the given land, contrasted with land that barely pays operating expenses. Since the days of Ricardo there has been no serious dispute on this economic generalization. All land and all land entitles, such as coal, natural gas, water, etc., can be valued in no other way than by capitalizing the excess of their income over that obtainable from land that yields nothing in excess of actual operating expense plus fixed charges on the buildings and plant. Once this fact is clearly grasped, the proper methods of determining the value of land and land entitles become evident.

It may he said that the best test of land value is the price at which it sells in an open market. This is ordinarily true where there are frequent sales in a market and where the land is sold for the use under consideration. But even in such a case the sales are based on capitalized prospective rental, so that, in the final analysis, we come back to land income as the basis of land value.

In a very interesting pamphlet entitled The Valuation of Railroad Right of Way, Frank W. Stevens, special counsel for the New York Central, offers some suggestive thoughts as to the special value that attaches to right of way. He also cites many court decisions showing that land taken by condemnation must be valued upon its most advantageous prospective use. Two facts seem to be legally established: (1) That land may have a *special value* for particular purposes (such as reservoir sites, rights of way, etc.) and that this special value is recoverable by the owner where the condemnation occurs. (2) The consequential damages to the owner are also recoverable.

Let me first indicate how the value of land for special purposes is ascertainable. The following rules are perfectly general, and apply equally to a reservoir site, a railway right of way, a farm, or a city lot:

(1) For a given use the value of a given piece of land, A, exceeds that of the next available piece of land, B, by the capitalized difference in their respective *net earnings* after deducting therefrom the interest, depreciation and taxes on the buildings and plant used in production, as applied to that use.

Expressed algebraically this rule is:

$$V - v = \frac{(G - E) - (g - e) - (F + f)}{r}$$

In which V and v = values of the two land parcels.
G and g = gross earnings of same.
E and e = operating expense.
F and f = fixed charges (interest, depreciation and taxes) on buildings.
r = interest rate suitable to express normal return.

(2) If the gross earnings of the two pieces of land, A and B, are identical, then the value of A exceeds B by the capitalized difference in their respective *operating expenses* after deducting therefrom the interest, depreciation and taxes on the buildings and plant used in production; or

$$V - v = \frac{e - E - (F + f)}{r}$$

(3) If the gross earnings and investment in buildings and plant are identical for A and B, then the value of A exceeds B by the capitalized difference in their respective operating expenses; or

$$V - v = \frac{e - E}{r}$$

(4) If the gross earnings, the investment in buildings and plants, and the operating expenses for A and B are identical, then the value of A equals the value of B, or the *value* of an owned piece of land, A, is ascertainable by determining the *cost* of securing an alternative piece of land, B; or V = v.

As I conceive it, this last rule (4) is the one that a railway should ordinarily seek to apply in measuring the value of the right of way that it owns. Yet no such rule was presented to the Supreme Court in the Minnesota rate cases. Instead, the court was asked to conceive the existing railway plant as nonexistent and then to conceive what it would cost to *reproduce the existing* right of way. Confronted with such an impossible hypothesis Justice Hughes said:

"Moreover, it is manifest that an attempt to estimate what would be the actual cost of acquiring the right of way, if the railroad were not there, *is to indulge in mere speculation.* . . . The values of property along its line largely depends on its existence. It is an integral part of the communal life. *The assumption of its non-existence,* and at the same time that the values that rest upon it remain unchanged, *is impossible* and cannot be entertained."

Here we have an admirable illustration of the losing of an important point in a case almost entirely as a result of an incorrect theory of valuation. Suppose, instead of presenting to the court the hypothesis of non-existence of the railway, the court had been asked to consider the probable cost of securing right of way for a railway parallel to the existing railway, could the court have rejected such a proposition as "mere speculation" or "impossible"? The facts are that many a right of way has

been purchased under just such conditions, hence the assumption is not speculative or impossible. Moreover the test of *value* of A that is had by ascertaining the *cost* of securing an alternative, B, is a test that every man is accustomed to apply. The man who is intending to buy a city house and lot applies such a test repeatedly. Our rule (4) above given, is precisely such a test of value, as, in fact, are also the more general rules (1), (2) and (3).

If we approach the question of right of way value from this logical point of view, we can show at once that not only must there be paid the farm acreage price for farm land contiguous to the existing railway, but a considerable sum in addition to cover consequential damages. Also it can be then shown that land purchased at "retail," in small parcels, such as are bought for right of way, costs more per acre than land purchased "wholesale," as in buying an entire farm. Picturing, then, the process of buying a right of way approximately parallel to the existing right of way, we see at once that the following elements affect the purchase price:

(1) Severance damages resulting from the severance of associated parcels of land that can be more economically operated as a whole than in segments.

(2) Incidental damages resulting from noise, smoke, shutting off of view, etc., as a result of building a railway near places of habitation and business.

(3) Loss of income to the land owner during the period required for him to move to a new site and to establish a business equal to that lost as a result of being compelled to move.

After the purchase of the right of way is effected there comes not only the cost of removing existing buildings, but the loss of value of these buildings which were paid for by the railway. Where right of way is purchased through urban and suburban property, it is not merely the value of bare land that is involved, but also that of buildings and improvements. Although this is quite evident the moment we adopt the theory of testing the value of an existing right of way, A, by estimating the probable cost of a parallel right of way, B, it is not evident when the theory of wiping out the existing railway is adopted.

To sum up, a proper right of way multiple must provide not only for all consequential damages to the owner of the property, but must also provide for the value of buildings and improvements and the cost of removing them from the right of way.

I agree with Mr. Stevens that a railway right of way possesses value because of its superior economic location. There really can be no question on this point. Wellington's entire book on the economics of railway location is an exposition of the value of a given location as determined by capitalizing the profits securable from it. Part of the differences in value between different locations is attributable to the skill of the locating engineer, but the largest part is inherent in the topography and the productive character of the country. The question for the courts to decide is this: To whom belongs the right of way value due to its superior economic location? Is it the property of the public or the property of the railway? The value of the right of way is deducible by the rules above given.

Right of way values are analogous to water right values, particularly in that both depend largely upon topography. In deciding adversely to the contention that water rights possessed value for rate-making, it was held by the lower courts in California that capitalizing profits to ascertain value of water rights constituted circular reasoning, and water right values thus ascertained were therefore rejected. But the United States Supreme Court has recently reversed this decision, holding that water rights must be valued and included in the total value used as a rate making base. I see no cardinal difference between such a decision and one that would affirm that a railway is entitled to all the special value that inheres in its right of way by virtue of its economic location. Water rights possess value because of their economic location, and if this value is to be considered as part of a rate making value, wherein does it differ in principle from allowing a similar value due to the economic location of a railway right of way? If there is a difference, and if an economic railway location of right of way has no special value to be allowed in rate making, what becomes of the logic of the decisions relating to special value cited by Justice Hughes in his Minnesota decision? In fact what real meaning is there in his own language when he says:

"If, in the case of any such owner, his property had a *peculiar value or special adaptation for railroad purposes,* that would be an element to be considered."

There can be no "peculiar value or special adaptation for railroad purposes," except a value based on the capitalized excess net income securable with the given right of way as compared with some alternative right of way. Therefore, if we properly interpret the decisions of the Supreme Court itself, we find ample justification for applying rules (1) to (4) above given.

When railway and public service commissions assert that it is always untenable to establish any sort of value for rate making by capitalizing any sort of income, they go directly counter not only to court decisions but to their own decisions in every case where *land* value is involved. What, indeed, is the acreage value of a farm if it is not capitalized income? Yet the same commission that unhesitatingly allows a right of way value based on farm acreage price, will contend that it never capitalizes any income in establishing a rate making value, because that would involve circular reasoning!

Brooks Adams, in the Spokane Rate Case, unsuccessfully attempted to prove that every railway company has been a trustee or agent, and as such should be held accountable for all past transactions. Not only has the Interstate Commerce Commission rejected this theory of *past* agency relationship, but so has the Supreme Court. Justice Hughes was particularly emphatic on the point when he said:

"As the company may not be protected in its actual investment, if the value of its property be plainly less, so the making of a just return for the use of the property involves recognition of its fair value if it be more than its cost. The [railroad] property is held in *private ownership*, and it is that property, and not the original cost of it, of which the owner may not be deprived without due process of law."

Had the agency theory been sustained, the actual cost of right of way and not its present value would have been prescribed. The instant the agency theory as to past relations is thrown out, there remains no other way to appraise right of way than as private property owned by the railway. This would inevitably result in giving to a railway the full special value inherent in its lands as essential parts of an economic transportation plant.

EDUCATING THE PUBLIC TO BUY TICKETS

The Illinois Central and the Yazoo & Mississippi Valley are conducting a campaign to secure the co-operation of the public in purchasing tickets before boarding trains, to eliminate the practice of paying fares on trains. Some time ago a pamphlet was issued by T. J. Foley, general manager, addressed to the people of Mississippi, giving the reasons why the convenience of the entire public would be best served if people would take pains to purchase tickets beforehand. On June 1, Mr. Foley issued a circular addressed to all agents and passenger conductors on this subject, as follows:

"When it can reasonably be avoided, passengers should not be permitted to get on trains without tickets. One of the principal reasons that some passengers continue paying fare on the train is because it is an "old custom," not because it is more convenient for them.

"Collecting cash fares, consulting tariff book, making change and issuing receipts for fares detracts the attention of the conductor from very responsible duties; therefore, it is better for the passenger, for the employees and for the railroad companies to work out a system whereby passengers will no more think

of getting on a train without a ticket than they do of going into a theater, circus, baseball game or many other places without a ticket.

"Beginning June 1, 1915, these companies will inaugurate a thorough campaign to secure the co-operation of the public so that, after they have decided to make a trip, their first thought will be to reach the station in time to provide themselves with tickets. There are some points where a ticket agent is not located; other places where ticket agent is not on duty for night trains, and there will also be extreme cases where a passenger reaches the station at the last minute to board a train which it would not be advisable to delay long enough to enable passenger to purchase a ticket. In such cases it will, of course, be necessary to make collection on the train.

"It is fully appreciated by the management that it will take considerable time and patience to impress upon the patrons and also upon employees, that in nearly every case the "old custom" of paying fare on trains instead of at ticket office can be eliminated.

"With the hearty co-operation of agents and trainmen, these companies have been able to overcome many undesirable practices, such as excessive loss and damage to freight and baggage, damage to livestock on right of way, unwarranted overtime in train and station service, and have also materially reduced accidents of every description; all of which has led us to believe that you will enthusiastically assist in the elimination of the practice of passengers getting on trains without tickets, which has proven very detrimental to both the companies and their valued employees.

"To accomplish the desired results will be a huge task for the station masters, ticket agents, and passenger conductors and trainmen. Recognizing this, I have directed division officials that special attention must be given this subject, soliciting suggestions from agents and passenger conductors as to whether or not additional facilities are necessary, if more help is needed, or concerning anything which in their opinion might be of assistance in speedily making it known to the public that, from every viewpoint, it is preferable that they purchase tickets from the agent rather than pay on the trains.

"To be successful in this movement, it is essential that the employees be in hearty accord with it, and in explaining to the public that they should have tickets before boarding trains they do so in the most courteous manner. You are asked to bear in mind that it is not the intention to annoy or inconvenience those patronizing our trains, neither is it desired to attempt to make it compulsory in every case for passengers to have a ticket before getting on trains at points where ticket offices are open. In attempting to make it compulsory, you would no doubt encounter an occasional person who would feel that his rights were being imposed upon, and argue that it is one of his prerogatives to decide for himself where he will pay his railroad fare. However, I am thoroughly convinced that it will only be an occasional patron who will take this stand, and such a patron will no doubt have personal reasons for endeavoring to avoid purchasing a ticket.

"On branch line trains and main line local passenger trains, the conductor will use his own judgment in holding the train at a station for a minute or two if necessary in order to enable passengers who are not familiar with the requirements, and who attempt to board train without tickets, to provide themselves with same."

GASOLENE MOTOR MAIL AND BAGGAGE CAR

A gasolene motor mail, baggage and express car has recently been built for the Union Pacific by the McKeen Motor Car Company, Omaha, Neb. It is 70 ft. long, has a wheel base of 44 ft. 2 in., and is equipped with a motor of sufficient power to permit hauling a standard steel railway coach as a trailer. The arrangement is the conception of officers of the Union Pacific, developed with the purpose of providing greater facilities for handling branch line passenger traffic than are possible with single unit motor car trains.

The body of the motor car back of the engine room is divided into two compartments; a mail compartment 15 ft. long and the baggage and express compartment 38 ft. 3⅛ in. in length. The trailer car has a seating capacity of 78 passengers. The motor train will go into service between Kearney and Stapleton, Neb., a distance of 103 miles, where it will make a round trip each day, displacing a steam train consisting of three cars and a locomotive. The seating capacity of the steam train is 70 passengers, the advantage in seating capacity thus being with the motor car train.

The 300-hp. reversible engine truck in use on the motor car is known as type D, and is an enlargement of the builders' latest model type C truck, rated at 200 hp. The engine is reversed by compressed air, the control of which is placed on the right side of the engine near the throttle and brake valve, thus enabling the motorman to operate the car without leaving his seat. The motor truck has a wheel-base of 10 ft. and carries a weight of 33,800 lb. on the drivers. The maximum tractive effort is 8,200 lb. The car is said to have made a speed of 55 miles an hour on its initial trip.

Union Pacific Gasolene Motor Train for Branch Line Service

ENGLISH RAILWAYMEN'S NEW DEMAND.—The secretary of the National Union of Railwaymen has announced that the society has decided to apply for a revision of the agreement entered into in February with the railway companies on the question of war bonuses for the operative grades of railwaymen. The present agreement, which was made for a period of three months, and which was then to be subject to review, provided a war bonus of 3s. (75 cents) a week to men earning less than 30s. ($7.50) and 2s. (50 cents) to those whose wages were above that amount. It has already been announced that the executive committee of the Associated Society of Locomotive Engineers and Firemen has also decided to ask for an increased bonus.

General News Department

The arbitration board of Massachusetts has awarded the 4,000 employees of the Bay State Street Railway Company an increase in wages for conductors from 24.5 cents to 30 cents an hour, and has granted a minimum wage of $2.25 a day to all other employees, and these other employees' hours of labor are reduced from 59 to 54 weekly without loss of pay.

Discussion has been going on for some time between the representatives of the freight clerks on the New York, New Haven & Hartford and the management, and a strike was threatened last week. While no official announcement has as yet been made by the employees, it is understood that both sides to the controversy have agreed to accept mediation, and that G. W. W. Hangar, assistant commissioner of the United States Board of Mediation and Conciliation, is to act as mediator.

J. P. Morgan & Co., New York, have made the following announcement: "The Rothschilds in Paris have arranged to borrow in this market for a period of one year a considerable amount of money, the proceeds of which the Rothschilds will make available to the French government here for the payment of its commercial obligations in this country. The loan will be secured by high grade American railway bonds to be lodged with J. P. Morgan & Co. in New York. It is impossible to state at this time the amount of the loan."

The Western Rate Case Arguments at Washington

On Tuesday, June 22, the series of final hearings in the Western rate advance case was begun before the Interstate Commerce Commission at Washington, D. C. Tuesday was largely taken up by opening statements made by C. C. Wright, representing many of the roads, and Clifford Thorne, representing state railroad commissions.

Legislation in Illinois

The Illinois legislature, which has just adjourned, passed three laws to regulate railroads, a bill requiring all railroads to provide emergency chests for first aid to the injured on all trains, an amendment to the workmen's compensation act, applying its provisions to transportation companies, a bill amending the public utilities act to permit railroads or transfer companies to give or sell transportation to newspapers or magazines in exchange for advertising, and to issue free or reduced transportation to mail carriers, policemen and firemen, and members of the general assembly.

New Railroad Laws in New Hampshire

An act has been passed by the legislature of New Hampshire, to go into effect on October 1, 1915, requiring that all railroads transporting lumber within the state, which is loaded therein, shall equip cars with stakes and wire, when needed, details to be regulated by the Public Service Commission.

A law was passed requiring towns to erect signs at the approach to railroad grade crossings, as noted elsewhere in this issue.

Crossing Signs Maintained by Towns

In New Hampshire the highways throughout the state are being fitted out with signs at the approach to railroad crossings indicating the distance, in feet, to the crossing; and, in accordance with an act of the legislature, the work promises to be entirely finished by August 17 next.

The Public Service Commission started this movement last year and induced a considerable number of cities and towns to put up the signs; and, to make the matter uniform, secured at the last session of the legislature a special act specifically putting this duty on the cities and towns with a penalty of $1 a day for neglect in each case.

By an order of the commission the signs must be of enamelled metal with white letters on a dark blue background, the size of the sign to be 24 in. by 12 in. The sign is to be put up not less than 300 nor more than 500 ft. from the crossing; but the Public Service Commission has authority to suspend this and other regulations where it may be desirable to make an exception to the rule.

Grade Crossing Accidents Classified

The Long Island Railroad operates a heavy passenger traffic in a level country, near a large city. The frequency of highway crossing accidents in the territory of that company has long been noticeable. General Manager J. A. McCrea has published a statement showing that in the 4½ years since January 1, 1911, there have been 507 of these accidents. In that period 40 persons were killed and 111 injured, for none of which casualties the railroad company was responsible. Of the people killed 24 were in automobiles, 12 in wagons and carriages and 4 on bicycles and motorcycles. In 42 of the 507 accidents no person was injured. In 157 cases automobile and wagon drivers defiantly ran their machines and vehicles through lowered gates.

Mr. McCrea is urging the state of New York to follow New Hampshire in requiring every city and town to maintain warning signs on highways approaching crossings. (See article above.) He calls attention to the fact that the railroad cannot maintain signs at a distance from a crossing, nor has it the right to erect them.

The new signs of the Long Island road have been noticed in these columns. Mr. McCrea says: "We want to go 'Safety First' one better, and make it 'Safety First, Last and Always.' About 300 of our 600 grade crossings are protected by flagmen and gates, and we are spending at the present time $25,000 a month to protect these crossings."

New Subways Opened in New York

New York City has opened two subways this week; the Fourth Avenue subway, so-called from the Manhattan bridge southward through Brooklyn, about three miles toward Coney Island; and the Steinway tunnel from Forty-second street, Manhattan, under the East river to the borough of Queens. This last mentioned tube was finished about eight years ago, but has remained unused because of disputes about ownership and operation. It will be operated by the Interborough Rapid Transit Company with free transfers to and from the existing subway of that company running north and south in Manhattan. The Fourth Avenue subway, Brooklyn, will be operated by the New York Consolidated Railroad Company, which is controlled by the Brooklyn Rapid Transit Company. For the present the Fourth avenue trains will run to Coney Island over the Sea Beach Railroad, but eventually will have a connection with elevated lines running through New Utrecht avenue and Gravesend avenue.

Credit Where Credit is Due

The poem published on page 1377 of the Daily *Railway Age Gazette* of June 16, entitled "The Lament of the Foreign Bad Order Empty Car," which was read by Secretary Taylor at the Master Car Builders' convention at Atlantic City as anonymous, was written by E. E. Betts, superintendent of transportation of the Chicago & North Western and included by him in a series of bulletins issued to the members of the Chicago General Superintendents' Association by the committee on the Promotion of the Proper Handling of Equipment, of which Mr. Betts is chairman, for the purpose of calling atention to some of the methods in vogue for handling bad order cars. Mr. Betts says he is not so anxious about credit for his authorship as he is that somebody shall pay some attention to it. "It was reported as an amusing communication," he says, "all of which may be true. At the same time it was hoped that the moral would sink into some of our head mechanical men who would be aroused as to the necesity of taking some action to put a stop to the wanderings of the aforesaid foreign bad order empty cars."

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF APRIL, 1915

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atlanta, Birmingham & Atlantic	639	$168,899	$31,767	$221,295	$34,278	$40,059	$11,323	$95,819	.....	$10,737	$192,216	$29,080	$13,100	$15,980	$15,358
Chicago, Rock Island & Pacific	7,852	3,279,151	1,275,401	4,921,460	588,691	837,990	145,519	2,041,708	$42,341	141,524	3,796,941	1,124,519	283,788	840,404	230,433
Kansas City, Mexico & Orient	740	140,698	24,719	174,986	54,873	38,364	8,441	85,848	.....	9,807	197,333	—22,347	9,000	—31,347	.....
Oahu Railway & Land Co.	109	62,486	19,805	89,933	8,611	7,399	654	21,301	.....	3,438	41,403	48,530	7,152	41,378	645
St. Louis, San Francisco & Texas	235	57,711	18,584	82,544	21,790	14,184	2,295	42,977	.....	3,853	85,098	—2,554	1,216	—3,770	8,814
Ulster & Delaware	129	66,016	14,939	94,654	9,331	17,221	1,036	35,381	60	2,777	65,805	28,849	3,300	25,628	4,981
Vandalia	910	598,418	173,409	864,110	114,139	195,070	24,376	343,714	8,710	22,009	708,019	156,091	34,152	121,561	121,959
Virginia & Southwestern	240	127,028	10,896	141,756	27,387	34,684	1,991	39,878	.....	3,937	107,877	33,879	7,083	26,796	—13,432
Virginian	504	479,811	29,066	538,969	59,800	86,603	5,404	108,399	9,771	11,794	278,815	260,154	20,000	240,153	48,880
Wabash	2,519	1,687,197	445,026	2,343,794	337,954	464,141	80,018	984,818	12,202	67,350	1,944,857	398,937	78,725	319,542	144,777
Washington Southern	36	40,989	45,402	117,582	15,175	13,807	2,702	41,165	2,202	3,222	78,273	39,309	3,236	36,073	5,509
Western Pacific	943	277,109	131,231	439,624	85,022	50,938	21,634	150,709	13,355	17,472	339,130	100,494	30,343	70,075	52,928
Western Ry. of Alabama	133	64,025	31,690	106,717	19,475	21,155	6,358	29,500	1,522	5,445	83,393	23,324	5,113	18,208	11,774

TEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Alabama & Vicksburg	143	$794,251	$333,478	$1,245,026	$192,382	$313,921	$37,220	$478,758	$26,570	$56,273	$1,105,123	$139,903	$77,736	$62,167	—$161,710
Alabama Great Southern	309	2,768,833	864,587	3,972,251	464,868	960,322	134,060	1,409,021	29,835	93,480	3,062,418	909,833	153,654	755,962	—145,614
Ann Arbor	296	1,359,134	446,920	1,929,829	201,189	267,966	50,725	786,024	3,748	74,908	1,384,560	545,269	122,300	422,522	21,439
Arizona Eastern	367	1,342,677	262,783	1,729,857	280,605	225,021	20,796	475,155	10,439	103,189	1,115,140	614,716	128,630	485,337	—327,617
Atchison, Topeka & Santa Fe	8,514	54,104,493	19,752,372	80,553,051	10,927,854	13,944,493	1,766,971	22,938,313	.....	1,545,939	51,067,201	29,485,850	3,947,344	25,522,663	1,605,959
Atlanta & West Point	93	503,568	360,272	999,586	141,470	227,045	53,858	317,943	16,443	45,917	802,238	197,348	64,029	132,945	—64,796
Atlanta, Birmingham & Atlantic	643	1,632,963	424,810	2,252,215	354,014	440,272	122,256	978,523	.....	104,806	1,999,871	252,344	121,393	130,951	—284,852
Atlantic & St. Lawrence	167	986,638	267,823	1,381,218	183,988	211,711	40,973	610,875	.....	34,010	1,081,558	299,661	108,000	191,661	74,293
Atlantic City	170	658,253	1,169,192	1,926,846	362,544	234,383	23,705	989,653	953	14,273	1,624,635	302,211	135,000	166,847	13,364
Atlantic Coast Line	4,687	17,701,486	6,761,575	26,612,265	3,853,931	4,508,293	564,280	9,451,648	96,644	738,217	19,166,811	7,445,454	1,380,000	6,061,081	—1,887,798
Baltimore & Ohio Chicago Terminal	79	.....	5,680	1,293,512	111,797	182,024	8,725	554,538	19,495	44,961	914,039	379,474	187,476	191,587	109,301
Baltimore & Ohio—System	4,516	57,364,460	11,762,725	74,876,636	7,382,861	13,276,142	1,597,769	28,801,219	462,226	1,790,375	53,302,303	21,574,333	2,720,544	18,838,696	226,239
Bangor & Aroostook	631	2,448,027	534,861	3,150,158	455,308	487,733	25,568	926,169	13,693	96,189	2,004,128	1,146,030	103,372	1,042,606	3,389
Belt Ry. Co. of Chicago	24	.....	.....	2,696,174	145,966	251,816	8,405	962,966	.....	60,593	1,429,746	1,266,428	112,439	1,153,989	301,372
Bessemer & Lake Erie	204	6,018,717	318,718	6,460,367	546,866	1,558,311	102,670	1,569,115	10,106	117,353	3,843,743	2,616,623	182,025	2,434,540	862,502
Bingham & Garfield	27	972,969	34,431	1,012,719	89,558	133,506	9,467	180,418	758	18,146	431,853	580,866	25,316	555,551	—339,883
Birmingham Southern	43	390,401	8,610	679,766	135,441	120,869	5,517	258,295	.....	34,945	555,067	124,698	25,009	99,689	—161,871
Boston & Maine	2,302	22,270,643	12,909,963	38,762,508	5,842,482	5,795,199	361,032	17,024,294	165,773	979,307	30,168,088	8,594,419	1,617,472	6,976,947	1,094,870
Buffalo & Susquehanna R. R. Corporation	253	1,122,855	67,189	1,220,705	222,907	386,910	12,629	369,437	.....	54,515	1,046,398	174,307	26,000	148,307	—71,502
Buffalo & Susquehanna Railway	91	131,187	64,525	219,403	44,697	75,988	5,416	117,621	263	23,911	267,896	—48,492	16,000	—64,493	30,306
Buffalo, Rochester & Pittsburgh	586	6,595,520	931,736	7,808,833	1,013,475	1,810,727	120,193	2,631,156	12,378	186,391	5,774,319	2,034,514	200,000	1,833,955	—376,025
Canadian Pacific Lines in Maine	233	866,500	201,870	1,143,520	186,608	174,678	57,217	489,359	.....	36,240	944,102	199,417	120,000	79,417	146,604
Carolina, Clinchfield & Ohio	248	1,595,587	143,823	1,780,218	190,253	231,741	65,208	353,898	.....	94,202	924,591	855,627	142,500	712,899	—352,308
Carolina, Clinchfield & Ohio of S. C.	18	95,389	13,523	112,102	11,936	837	16,676	20,883	.....	6,690	57,021	55,081	7,500	47,566	—28,424
Central of Georgia	1,924	6,840,027	2,525,328	10,423,225	1,395,809	1,901,038	338,069	3,624,890	14,918	347,485	7,599,595	2,823,630	473,529	2,344,307	—460,926
Central of New Jersey	678	17,533,106	4,832,280	23,672,149	2,004,954	4,418,419	299,221	8,287,249	126,622	496,725	15,630,755	8,041,394	1,195,853	6,845,501	—71,419
Central New England	304	2,757,196	383,792	3,291,865	632,044	343,879	12,479	1,059,650	.....	38,447	2,085,905	1,205,961	127,000	1,078,925	15,770
Central Vermont	411	2,196,890	736,125	3,177,082	402,285	529,973	84,344	1,489,286	23,228	71,421	2,600,538	576,545	157,600	418,219	324,826
Charleston & Western Carolina	341	1,170,981	265,975	1,513,083	289,696	266,225	36,878	546,066	5	44,071	1,182,780	330,303	50,000	280,295	—105,347
Chesapeake & Ohio Lines	2,372	25,589,531	4,735,213	32,304,776	3,684,058	6,809,814	541,007	10,749,386	194,676	718,645	22,678,032	9,626,744	1,119,568	8,499,664	352,724
Chicago & Alton	1,033	7,676,428	3,215,842	11,894,768	1,386,522	2,828,089	368,410	4,420,257	97,422	303,342	9,404,042	2,490,726	446,414	2,041,961	751,970
Chicago & Eastern Illinois	1,282	8,848,018	2,321,096	12,130,458	1,688,964	2,587,216	240,150	4,577,448	81,400	365,185	9,534,160	2,596,298	528,800	2,066,341	429,366
Chicago & Erie	270	4,086,936	477,254	5,022,188	736,717	376,299	187,335	2,307,834	22,930	130,898	3,711,744	1,310,445	161,993	1,148,410	1,558,237
Chicago & North Western	8,108	43,669,613	17,122,803	67,674,885	8,548,097	10,830,816	1,103,644	25,030,505	499,311	1,466,971	47,354,716	20,320,169	3,750,000	16,565,308	—1,014,374
Chicago, Burlington & Quincy	9,334	53,079,428	16,897,556	76,907,228	8,436,034	13,169,070	1,345,907	24,691,482	671,045	1,734,774	50,048,312	26,858,916	3,288,206	23,570,710	—465,198
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	529,740	143,270	793,825	97,633	119,960	16,433	429,122	.....	14,621	677,769	116,056	28,700	87,338	—2,845
Chicago Great Western	1,428	8,084,753	2,572,585	11,651,023	1,506,240	2,047,823	466,252	4,350,506	70,273	335,604	8,767,536	2,883,488	483,648	2,396,027	—151,406
Chicago, Indianapolis & Louisville	618	3,551,206	1,419,049	5,434,023	584,419	929,279	204,240	2,011,429	1,570	170,392	3,899,278	1,534,745	266,199	1,268,054	79,589
Chicago Junction	24	.....	.....	1,643,215	208,505	187,715	10,998	915,909	.....	51,401	1,374,528	268,687	19,968	248,383	—123,499
Chicago, Milwaukee & St. Paul	10,071	53,546,315	14,936,331	76,380,309	8,489,139	11,287,243	1,457,183	30,431,002	596,849	1,515,720	52,191,501	24,188,807	3,989,058	20,173,645	—2,356,243
Chicago, Peoria & St. Louis	255	940,247	204,822	1,216,933	202,585	231,421	53,491	520,085	.....	47,246	1,054,828	162,105	51,300	110,805	203,943
Chicago, Rock Island & Gulf	477	1,822,699	495,866	2,510,849	289,159	359,024	97,188	986,185	18,236	79,530	1,829,321	681,528	77,404	603,566	64,327
Chicago, Rock Island & Pacific	7,852	38,686,237	14,709,938	57,435,320	7,515,686	9,341,153	1,467,916	23,064,480	$405,026	1,391,848	43,152,161	14,283,159	2,698,636	11,580,875	493,640
Chicago, St. Paul, Minneapolis & Omaha	1,753	9,854,343	4,176,358	15,141,996	1,575,190	2,073,610	286,283	5,761,482	145,340	361,232	10,186,417	4,955,579	856,901	4,095,073	73,836
Chicago, Terre Haute & Southeastern	372	1,662,512	160,898	1,874,069	242,516	439,449	34,978	574,741	9,010	98,818	1,399,511	474,558	120,000	354,558	151,758
Cincinnati, Hamilton & Dayton	1,003	5,854,927	1,241,589	7,935,653	1,227,476	1,712,488	195,267	3,590,055	29,882	216,877	6,968,782	966,871	361,149	603,650	180,951
Cincinnati, New Orleans & Texas Pacific	337	5,948,155	1,447,550	7,853,202	769,467	1,980,578	250,370	2,495,060	63,779	201,716	5,757,936	2,095,266	310,000	1,784,700	—617,325
Cincinnati Northern	246	1,060,347	177,087	1,290,214	195,891	258,837	26,958	430,820	.....	36,479	948,984	341,229	53,463	287,470	353,856
Cleveland, Cincinnati, Chic. & St. Louis	2,381	20,280,395	6,955,399	29,885,154	3,268,618	5,869,663	772,871	11,676,411	233,992	629,664	22,396,390	7,488,763	1,293,027	6,184,097	4,198,410
Colorado & Southern	1,089	4,862,175	1,167,756	6,512,209	765,632	1,479,108	103,177	2,046,657	39,559	198,573	4,632,706	1,879,503	352,445	1,526,702	168,017

REVENUES AND EXPENSES OF RAILWAYS

TEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Colorado Midland	338	$1,156,508	$181,169	$1,483,727	$231,183	$334,930	$76,637	$596,285	$11,042	$56,124	$1,306,200	$177,526	$89,709	$87,817	$130,751
Cumberland Valley	164	1,737,808	547,216	2,420,847	408,388	328,139	47,177	852,591	8,642	83,417	1,708,354	712,493	57,247	655,246	—124,622
Delaware & Hudson Co.—R. R. Dept.	881	15,485,105	2,322,845	18,908,217	1,358,760	3,105,453	266,607	6,838,577	119,880	634,976	12,310,613	6,597,603	567,619	6,029,496	.....
Delaware, Lackawanna & Western	959	25,066,352	6,884,840	35,492,528	3,736,265	5,848,183	731,892	11,488,107	296,836	752,671	22,594,466	12,898,063	1,697,232	11,199,175	650,013
Denver & Rio Grande	2,597	13,457,103	3,601,478	18,223,273	2,132,851	3,388,944	384,144	5,365,153	265,926	556,146	12,083,862	6,139,412	866,700	5,271,522	140,359
Denver & Salt Lake	255	1,031,614	265,461	1,372,642	166,947	236,919	22,979	463,697	.....	52,762	940,060	432,582	60,000	372,582	188,003
Detroit & Mackinac	400	579,311	258,087	905,115	112,012	160,001	20,916	335,995	1,021	27,889	657,834	247,281	67,451	179,830	—47,694
Detroit & Toledo Shore Line	79	1,238,078	.....	1,241,573	120,860	100,849	18,766	359,484	.....	28,301	628,260	613,313	57,137	556,176	—76,352
Detroit, Grand Haven & Milwaukee	191	1,340,089	503,749	2,137,157	299,543	337,276	67,117	1,120,943	8,553	48,158	1,882,090	255,067	33,600	218,992	—4,709
Detroit, Toledo & Ironton	441	1,284,264	140,729	1,515,639	200,903	243,970	38,477	897,252	.....	57,589	1,438,192	77,447	58,500	18,946	594,761
Duluth & Iron Range	284	2,961,716	183,528	3,276,411	619,601	582,265	10,172	852,327	23,410	88,410	2,176,185	1,100,226	167,912	932,314	—1,165,709
Duluth, Missabe & Northern	369	3,344,239	267,466	3,705,084	492,591	680,765	19,869	842,526	24,655	129,315	2,189,722	1,515,363	192,628	1,322,735	—966,749
Duluth, South Shore & Atlantic	628	1,459,039	718,679	2,393,248	424,299	352,698	80,387	955,812	37,486	104,025	1,954,707	438,542	159,970	278,465	—148,946
Duluth, Winnipeg & Pacific	185	891,481	174,616	1,099,474	162,358	180,281	21,487	408,942	9,600	61,513	844,181	255,293	54,862	200,431	—75,038
Elgin, Joliet & Eastern	777	6,491,357	52	6,899,889	730,876	1,290,858	56,824	2,101,742	.....	190,757	4,370,716	2,529,172	360,910	2,167,998	—507,085
El Paso & Southwestern Co.	1,027	4,773,623	1,093,528	6,343,266	817,175	890,663	187,565	1,707,290	57,665	234,680	3,882,610	2,460,656	330,965	2,114,465	—253,924
Erie	1,988	33,493,124	7,456,248	45,189,215	4,782,297	10,981,352	945,661	16,579,054	308,172	1,042,168	34,539,324	10,649,891	1,256,404	9,368,153	—959,517
Florence & Cripple Creek	87	833,845	157,905	1,010,085	112,201	101,140	21,504	290,415	.....	41,092	566,352	443,733	56,580	387,153	12,020
Florida East Coast	715	2,170,480	1,673,994	4,456,226	593,650	564,977	88,380	1,403,736	31,312	165,149	2,816,565	1,639,661	195,425	1,443,398	229,665
Fort Worth & Denver City	454	3,121,986	1,232,222	4,598,206	475,364	709,684	71,814	1,848,344	30,019	145,263	3,280,487	1,317,720	119,667	1,198,053	301,703
Galveston, Harrisburg & San Antonio	1,346	6,248,021	2,509,798	9,480,448	1,355,410	1,591,566	293,237	4,130,759	92,106	352,403	7,807,393	1,673,056	384,997	1,286,433	—118,646
Georgia	307	1,609,001	613,187	2,408,271	265,437	502,336	119,248	1,039,974	3,265	78,504	2,008,730	399,541	28,540	360,159	—235,249
Georgia, Southern & Florida	395	1,098,420	556,134	1,889,535	254,234	327,688	71,825	772,955	2,712	103,680	1,583,094	306,442	95,909	208,783	—74,620
Grand Rapids & Indiana	575	2,606,678	1,518,125	4,479,587	498,570	745,473	109,172	1,904,030	13,263	140,767	3,411,275	1,068,312	231,598	834,227	151,797
Grand Trunk Western	347	4,101,512	1,449,278	5,960,705	893,462	1,210,997	192,502	2,603,570	68,287	149,850	5,118,668	842,037	359,200	482,017	—146,607
Great Northern	8,054	40,397,304	11,077,855	57,137,947	6,399,655	6,026,428	968,872	15,446,692	681,013	1,033,299	30,501,225	26,636,722	3,667,801	22,966,348	1,036,764
Gulf & Ship Island	308	1,029,124	252,973	1,366,981	171,375	302,169	25,109	366,083	2,541	69,432	936,709	430,272	77,056	352,962	—123,897
Gulf, Colorado & Santa Fe	1,937	10,812,734	2,482,450	13,989,696	1,969,135	2,044,737	279,037	4,936,062	.....	336,953	9,553,764	4,435,932	478,011	3,954,546	1,869,746
Hocking Valley	352	4,091,600	704,161	5,149,495	595,123	988,307	93,209	1,709,843	.....	144,799	3,531,280	1,618,215	369,000	1,249,215	—267,409
Houston, East & West Texas	191	808,899	253,187	1,127,358	195,423	168,896	18,942	460,598	1,389	32,196	877,181	250,178	41,271	208,582	—60,243
Houston & Texas Central	864	3,944,285	1,229,015	5,568,256	992,541	787,805	153,786	2,225,131	22,368	176,179	4,353,607	1,214,649	253,074	960,249	266,230
Illinois Central	4,767	37,563,722	10,791,209	52,391,378	7,120,600	11,484,855	1,035,315	18,994,521	298,319	1,274,252	39,955,130	12,436,249	2,700,200	9,717,367	—326,120
Indiana Harbor Belt	110	.....	.....	2,759,067	346,554	266,107	27,984	1,205,960	.....	75,975	1,922,581	836,486	76,467	759,315	206,936
International & Great Northern	1,159	5,646,672	1,496,706	7,718,576	1,285,801	1,333,676	229,725	3,467,366	28,535	301,179	6,646,282	1,072,294	340,000	726,803	—776,466
Kanawha & Michigan	177	2,055,204	287,873	2,410,790	330,409	609,241	27,429	723,871	35	64,748	1,755,732	655,057	114,421	540,602	—138,013
†Kansas City, Mexico & Orient	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas City Southern	827	6,469,390	1,185,883	8,411,796	884,715	959,827	282,781	2,863,076	.....	405,311	5,356,478	3,055,319	477,977	2,572,933	—352,872
Lake Erie & Western	900	3,867,423	629,445	4,734,629	659,034	828,219	137,265	1,914,970	.....	122,304	3,661,792	1,072,837	232,541	839,236	251,147
Lehigh & Hudson River	97	1,373,200	96,152	1,486,353	195,143	198,699	14,180	535,070	.....	44,643	987,735	498,618	41,500	457,118	138,989
Lehigh & New England	296	1,990,102	12,454	2,104,433	282,411	308,743	19,994	531,059	.....	58,699	1,200,906	903,527	54,435	849,092	151,936
Lehigh Valley	1,444	29,605,636	3,350,010	35,045,844	3,663,240	6,847,959	783,751	12,802,799	116,846	734,682	24,944,773	10,101,071	1,412,500	8,679,362	671,956
Long Island	398	3,120,040	6,279,422	10,795,290	1,208,487	1,205,010	111,269	4,635,600	70,911	284,713	7,515,990	3,279,300	709,241	2,567,407	601,896
Louisiana & Arkansas	279	1,181,226	177,915	1,399,091	250,766	232,739	27,842	381,617	.....	41,512	934,035	465,057	67,400	397,404	—41,757
Louisiana Ry. & Navigation Co.	351	1,347,413	225,873	1,676,750	314,040	180,211	56,939	677,869	.....	53,002	1,282,061	394,689	87,000	307,689	44,687
Louisiana Western	208	1,155,656	560,800	1,844,499	228,103	324,595	67,762	572,119	26,546	63,866	1,282,843	561,657	102,988	458,354	—84,410
Louisville & Nashville	5,030	31,041,837	9,118,850	43,267,064	7,295,243	8,828,667	1,114,734	14,765,320	166,489	1,030,092	33,120,994	10,146,070	1,756,556	8,384,212	—2,502,154
Louisville, Henderson & St. Louis	200	768,641	325,665	1,169,523	244,094	160,635	53,316	398,172	.....	32,402	888,619	280,904	38,000	242,748	—9,399
Maine Central	1,219	5,958,914	2,814,170	9,435,421	1,331,040	1,448,404	108,729	3,565,063	51,758	273,737	6,777,906	2,657,515	518,850	2,138,486	56,706
Michigan Central	1,800	17,267,796	7,370,779	27,827,720	3,177,772	4,529,795	619,529	11,467,344	484,557	570,189	20,849,186	6,978,534	1,287,350	5,686,466	1,030,440
Midland Valley	380	762,724	345,013	1,180,535	223,088	205,075	20,768	397,324	.....	54,899	911,153	269,383	60,324	208,606	49,339
Minneapolis & St. Louis	1,046	6,486,812	1,614,177	8,576,773	971,895	1,217,362	178,374	3,328,428	637	208,542	5,905,239	2,671,534	371,345	2,300,182	270,019
Minn., St. Paul & Sault Ste. Marie	4,103	16,973,757	4,908,554	23,656,028	2,604,571	3,449,281	486,469	7,765,262	141,460	508,546	14,880,838	8,775,190	960,217	7,814,973	18,287
Missouri & North Arkansas	365	641,089	294,720	1,008,214	297,410	224,229	32,413	515,175	.....	57,342	1,126,569	—118,355	59,268	—178,171	—200,014
Missouri, Kansas & Texas System	3,865	19,392,622	6,834,340	28,232,058	3,780,921	3,782,762	551,231	10,258,493	252,526	860,037	19,363,242	8,868,816	1,105,364	7,758,168	1,646,140
Missouri, Oklahoma & Gulf	334	784,909	185,350	1,015,578	222,940	203,063	41,863	472,669	1,077	73,171	1,014,784	794	60,835	—60,590	—15,642
Missouri, Oklahoma & Gulf of Texas	19	104,207	2,749	109,576	15,408	24,942	2,141	46,565	.....	5,259	94,315	15,261	1,739	13,522	3,436
Missouri Pacific	3,920	17,869,799	3,920,894	23,762,839	3,052,723	4,539,836	579,219	9,362,454	75,168	584,696	18,194,096	5,568,743	995,960	4,555,286	1,547,083
Mobile & Ohio	1,122	7,363,636	1,038,283	9,132,151	906,882	1,586,840	393,973	3,494,306	26,026	288,917	6,696,144	2,436,007	317,685	2,116,992	37,077
Monongahela	72	865,052	20,278	901,999	167,172	81,079	6,009	229,712	.....	20,429	504,400	397,599	16,648	380,951	—327,281
Morgan's La. & Tex. R. R. & S. S. Co.	405	2,553,709	878,192	3,759,698	461,732	650,356	113,207	1,485,896	24,222	118,033	2,852,499	907,199	198,909	704,468	6,760
Nashville, Chattanooga & St. Louis	1,231	6,300,411	2,116,566	9,213,583	1,307,280	1,851,536	454,992	3,717,060	90,373	299,169	7,720,132	1,493,451	268,490	1,223,563	—717,270
Nevada Northern	165	799,689	77,082	910,121	161,038	130,953	5,085	223,347	563	38,889	559,826	350,295	50,256	299,987	—332,453
New Orleans & North Eastern	204	2,198,721	447,035	2,917,998	304,919	619,537	98,208	1,040,666	57,756	116,675	2,237,761	680,236	146,990	533,246	—73,374
New Orleans Great Northern	283	970,425	232,667	1,323,693	173,419	207,811	25,497	404,557	1,772	63,152	876,208	447,485	29,465	417,890	—187,773
New Orleans, Mobile & Chicago	403	1,181,395	239,621	1,500,146	284,082	203,297	38,752	526,676	Cr. 42	68,887	1,121,652	378,494	63,068	315,128	—273,763

†Operations began July 6, 1914. No data covering ten months.

REVENUES AND EXPENSES OF RAILWAYS

TEN MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance									
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.			
New Orleans, Texas & Mexico	286	$999,060	$201,512	$1,266,398	$258,581	$172,513	$37,718	$520,489	.....	$95,266	$1,084,568	$181,830	$16,088	$165,566	$33,202
†New York Central Railroad	5,982	32,807,304	13,132,052	53,438,700	5,535,810	11,454,451	982,502	19,220,545	$763,190	1,395,306	39,351,805	14,086,895	3,253,081	10,830,858	.....
New York, Chicago & St. Louis	568	7,932,784	1,093,920	9,432,496	1,094,785	1,367,708	430,086	4,422,781	49,863	202,262	7,567,485	1,865,011	401,267	1,462,977	79,913
New York, New Haven & Hartford	2,003	25,244,071	22,174,415	53,296,468	6,424,176	8,136,950	354,685	20,295,543	486,852	1,325,472	37,008,899	16,287,568	2,169,000	14,112,378	2,047,327
New York, Ontario & Western	568	5,119,653	1,309,880	7,498,870	938,102	1,376,288	83,095	2,965,541	.....	156,334	5,519,360	1,979,510	198,824	1,780,636	150,762
New York, Philadelphia & Norfolk	112	2,386,609	403,547	3,042,867	296,016	634,296	43,176	1,346,815	45,553	101,463	2,467,319	575,548	96,800	478,517	12,792
New York, Susquehanna & Western	140	1,901,832	433,335	2,611,339	251,694	298,600	23,914	1,157,270	.....	56,959	1,787,303	824,036	57,687	754,729	179,999
Norfolk & Western	2,043	29,330,882	3,870,389	34,598,138	4,539,881	6,849,891	585,993	10,383,114	92,274	694,403	22,752,919	11,845,219	1,542,000	10,302,656	—293,066
Norfolk Southern	900	2,166,187	852,027	3,254,117	442,390	510,235	72,421	1,248,960	852	196,619	2,471,477	782,640	107,443	673,816	—132,521
Northern Pacific	6,498	37,193,639	11,267,477	53,185,818	6,728,671	6,621,538	946,349	16,080,827	781,403	927,721	31,145,221	22,040,597	3,931,741	18,105,246	539,761
Northwestern Pacific	401	1,128,123	1,454,707	2,919,247	517,916	412,336	49,432	1,152,270	.....	80,936	2,176,858	742,389	159,649	582,617	—125,227
Oahu Railway & Land Co	109	746,717	214,712	1,030,970	100,507	86,674	6,626	215,825	.....	41,962	451,594	579,376	71,826	507,550	37,817
Oregon Short Line	2,162	11,731,168	3,630,497	16,811,549	2,299,923	2,383,110	310,119	4,211,489	256,546	543,320	9,932,917	6,878,632	1,050,593	5,825,719	—1,182,833
Oregon-Washington R. R. & Nav. Co	1,998	8,243,762	3,555,448	12,940,288	1,460,925	1,607,158	387,635	4,315,270	119,856	571,708	8,396,670	4,543,618	960,207	3,581,741	107,049
Panhandle & Santa Fe	669	2,601,788	568,951	3,330,788	648,495	665,643	38,533	1,048,344	.....	86,744	2,487,759	843,029	92,948	748,961	430,690
Pennsylvania *Company*	1,757	31,170,039	8,025,920	43,612,428	6,350,486	8,356,552	761,994	16,427,338	351,180	1,117,783	33,365,333	10,247,094	2,615,949	7,628,597	—1,786,714
Pennsylvania *Railroad*	4,512	106,121,371	31,673,380	151,710,563	20,351,204	31,026,965	2,047,055	57,357,764	2,238,272	4,136,856	117,158,617	34,551,946	6,434,283	28,096,491	—1,007,808
Pere Marquette	2,317	10,536,078	3,328,310	15,126,304	1,387,777	2,965,121	317,668	5,935,275	45,236	423,009	11,070,829	4,055,475	423,692	3,630,068	2,628,100
Philadelphia & Reading	1,120	31,416,998	5,365,447	38,664,477	3,680,046	7,072,858	452,361	13,873,582	161,336	703,338	25,932,690	12,731,787	1,000,103	11,726,787	—1,041,488
Philadelphia, Baltimore & Washington	717	8,109,751	6,853,874	16,689,708	2,548,609	3,210,347	272,844	7,176,722	182	464,334	13,671,038	3,018,669	565,313	2,452,381	249,159
Pittsburgh & Lake Erie	225	9,884,993	1,334,637	11,724,705	1,464,300	2,604,679	139,786	3,229,413	33,200	276,758	7,748,135	3,976,570	508,596	3,467,848	—1,721,583
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	21,671,294	6,601,937	31,901,126	4,112,375	6,343,220	653,340	12,035,735	242,982	799,485	24,187,137	7,713,989	1,612,315	6,099,142	371,979
Pittsburgh, Shawmut & Northern	294	1,423,404	103,934	1,547,441	265,048	416,925	16,949	513,520	.....	42,245	1,254,688	292,753	16,236	276,518	34,753
Port Reading	21	1,046,786	.....	1,272,670	115,252	77,719	387	431,493	.....	3,263	628,111	644,559	120,000	524,559	55,928
Richmond, Fredericksburg & Potomac	88	1,194,328	825,848	2,339,490	214,198	305,599	36,227	867,058	45,447	72,158	1,540,687	798,803	69,402	729,238	—21,315
Rutland	468	1,571,599	950,071	2,869,759	340,119	493,892	83,484	1,135,162	11,470	53,125	2,122,252	747,507	170,718	576,755	6,222
St. Joseph & Grand Island	258	931,342	247,233	1,270,931	218,223	202,238	46,928	474,507	.....	51,831	993,728	277,204	80,023	196,973	81,851
St. Louis & San Francisco	4,749	23,724,831	8,391,377	34,363,143	4,658,143	5,390,901	660,366	11,550,988	.....	910,094	23,133,825	11,229,318	1,030,981	10,182,033	1,232,582
St. Louis, Brownsville & Mexico	548	1,142,662	598,517	1,907,130	340,903	207,307	54,217	701,159	.....	107,911	1,492,321	504,809	63,423	440,921	11,563
St. Louis, Iron Mountain & Southern	3,364	19,059,001	4,356,458	25,357,035	3,619,401	4,592,427	593,676	8,056,238	81,034	648,244	17,591,019	7,766,016	1,120,568	6,628,611	—2,436,914
St. Louis Merchants' Bridge Terminal	9	.....	1,736	1,538,152	193,494	73,903	7,830	779,867	.....	63,349	1,118,434	419,718	70,109	349,594	160,923
St. Louis, San Francisco & Texas	335	675,027	250,420	991,154	240,021	170,804	22,837	472,117	.....	44,753	950,532	40,623	12,477	28,116	—157,790
St. Louis Southwestern	943	4,570,110	974,798	5,886,923	683,253	1,001,869	254,983	1,677,171	32,015	261,711	3,906,698	1,980,226	330,734	1,648,458	—741,808
St. Louis Southwestern of Texas	810	2,152,124	756,014	3,156,715	745,342	770,482	120,323	1,542,205	7,694	177,851	3,272,709	—115,994	147,161	—264,078	—89,755
San Antonio & Aransas Pass	724	2,155,313	867,309	3,257,105	696,211	616,582	65,516	1,565,149	.....	117,232	3,060,351	196,754	128,309	67,634	—461,581
San Pedro, Los Angeles & Salt Lake	1,133	4,972,885	2,047,600	7,722,496	736,186	1,189,531	326,462	2,531,195	149,186	182,266	5,114,826	2,607,670	426,614	2,180,477	—80,582
Seaboard	3,119	12,039,711	3,883,493	17,889,410	2,048,787	2,679,598	637,334	6,564,329	97,840	548,470	12,574,100	5,315,310	890,211	4,417,379	—1,442,066
Southern	7,022	34,247,565	13,671,006	52,539,019	7,253,776	9,290,264	1,790,495	19,280,223	329,711	1,681,271	39,444,676	13,094,342	2,155,821	10,923,084	—3,658,805
Southern in Mississippi	281	514,837	267,647	857,280	220,328	87,694	24,057	398,805	.....	36,824	767,708	89,572	84,407	4,690	—145,976
Southern Pacific	6,517	48,535,500	23,031,501	79,731,431	8,191,612	11,735,137	1,646,835	25,694,680	1,372,531	2,277,002	50,664,944	29,066,487	3,939,774	25,100,711	—2,411,395
Spokane International	163	469,736	135,142	636,159	109,793	47,169	22,656	210,707	33	35,161	425,518	210,640	43,149	167,364	—155,416
Spokane, Portland & Seattle	556	2,195,359	1,177,011	3,716,359	577,643	359,084	76,014	876,182	33,418	134,006	2,056,139	1,660,220	534,000	1,124,155	—210,423
Tennessee Central	294	843,703	317,156	1,238,334	298,895	165,196	54,810	490,130	.....	68,274	1,077,165	161,169	44,752	116,286	—196,204
Terminal R. R. Ass'n of St. Louis	35	.....	1,850	2,262,728	183,920	124,719	9,196	795,617	.....	53,320	1,166,772	1,095,956	286,004	809,952	288,270
Texas & New Orleans	469	2,063,944	867,378	3,258,439	538,496	804,996	78,968	1,335,776	84,456	105,588	2,947,055	311,384	158,934	150,733	—54,171
Texas & Pacific	1,893	10,641,017	3,450,323	15,301,145	1,589,108	2,385,487	367,370	6,618,008	139,767	388,653	11,477,913	3,823,233	696,136	3,122,921	—261,193
Toledo & Ohio Central	446	3,441,398	501,762	4,189,305	629,430	819,276	78,388	1,612,474	17,551	99,668	3,256,787	932,518	221,355	709,171	63,418
Toledo, Peoria & Western	248	565,673	370,754	997,563	161,390	272,242	24,001	446,304	.....	36,129	940,366	57,197	61,000	—3,810	—13,056
Toledo, St. Louis & Western	451	3,309,251	271,208	3,847,719	455,767	645,254	166,182	1,504,253	.....	82,597	2,854,052	993,666	226,844	766,822	—239,524
Trinity & Brazos Valley	330	653,368	157,360	877,316	204,523	110,504	29,802	427,121	.....	80,115	852,065	25,252	43,890	—19,164	61,327
Ulster & Delaware	129	436,258	274,689	853,780	127,703	171,005	14,175	398,502	596	35,329	747,311	106,470	33,000	72,769	—66,247
Union Pacific	3,616	30,344,950	8,225,614	43,294,989	5,049,749	6,223,252	991,884	11,023,178	699,912	1,235,709	25,207,439	18,087,560	1,972,373	16,110,708	—418,355
Union R. R. of Baltimore	9	1,117,139	213,801	1,348,369	136,868	.....	.....	46,122	.....	24,730	207,719	1,140,650	57,473	1,083,176	9,910
Union R. R. of Pennsylvania	31	.....	.....	2,704,988	410,331	931,474	1,210	1,250,855	.....	34,648	2,628,518	76,470	35,374	41,096	—199,248
Vandalia	910	6,270,202	1,968,212	9,258,413	1,223,131	1,875,524	236,909	3,653,986	94,762	218,005	7,302,317	1,956,096	325,881	1,629,677	—161,501
Vicksburg, Shreveport & Pacific	171	649,241	369,484	1,148,666	208,142	272,954	35,590	451,718	22,284	50,486	1,041,175	107,491	72,407	35,084	—266,820
Virginia & Southwestern	240	1,351,316	132,906	1,527,742	265,584	361,125	23,485	448,129	.....	38,328	1,136,651	391,091	66,649	324,442	—93,902
Virginian	503	4,237,468	322,308	4,863,439	609,613	853,683	53,698	1,114,430	98,509	111,931	2,817,118	2,046,321	212,500	1,833,579	—349,883
Wabash	2,518	17,075,577	5,131,545	24,398,826	2,808,802	4,502,100	853,237	10,100,037	140,138	617,373	19,001,530	5,397,296	807,843	4,586,485	337,669
Washington Southern	36	350,279	405,392	1,029,200	126,010	149,076	14,673	415,624	19,424	30,362	755,168	274,032	32,698	241,173	—14,050
West Jersey & Seashore	356	1,556,377	3,360,082	5,406,899	923,161	853,174	127,103	2,357,697	26,488	136,704	4,424,328	982,571	286,005	696,254	41,626
Western Maryland	661	5,874,101	795,078	7,000,726	991,318	1,195,343	217,643	2,544,709	25,508	191,547	5,159,044	1,841,682	252,000	1,589,682	1,260,854
Western Pacific	943	3,311,310	996,998	4,589,528	952,694	598,480	241,569	1,552,023	110,533	204,221	3,659,519	930,008	287,007	641,620	82,694
Western Ry. of Alabama	133	592,560	359,096	1,055,185	191,595	246,950	58,920	319,797	15,429	46,589	878,916	176,269	53,956	121,750	—148,954
Wheeling & Lake Erie	459	3,474,453	463,521	4,343,868	478,820	855,368	94,405	1,735,039	12,570	145,482	3,321,683	1,022,185	313,614	708,570	—1,034,178
Yazoo & Mississippi Valley	1,382	7,553,532	1,877,349	9,973,214	1,494,146	1,394,624	170,802	3,701,546	17,091	243,482	7,011,150	2,962,064	507,000	2,453,247	—533,203

†Figures shown here are for four months ending April 30, 1915.

The Greatness of the Pennsylvania

The award of the grand prize to the Pennsylvania Railroad at the Panama-Pacific International Exposition at San Francisco, was announced last week. In supplying information to the Jury of Awards, the company gave the following striking figures:

The freight service rendered by the Pennsylvania system in a year is the equivalent of one ton carried 36,900,000,000 miles; the passenger service is equivalent to one person carried 4,500,000,000 miles. The system's receipts are a million dollars a day; it pays out in wages half a million daily, and for supplies a quarter million. Its employees in normal times number upwards of 250,000, and its payrolls indirectly support 1,000,000 persons. It traverses 13 states and the District of Columbia and supplies transportation service to more than half the population of the United States. Its 4,500 stations include eight of the ten largest cities in the country.

The company's exhibit at the exposition includes a huge model of New York City showing the railroad approaches, a relief map of the entire territory served by the Pennsylvania lines, constructed on a scale of two miles to the inch, making it the largest topographical map in the world, models of Pennsylvania station in New York City and the Union station at Washington, and a moving picture theater.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, July 21, 1915, Milwaukee, Wis.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next meeting, August 19-20, 1915, San Francisco, Cal.

AMERICAN RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—W. E. Jones, C. & N. W., 3814 Fulton St., Chicago. Annual meeting, July 13-16, 1915, Hotel Sherman, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, July 19-21, 1915, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Association. Annual meeting, October, 1915.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday of each month, Pittsburgh.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Next convention, July 13-16, 1915, Sherman House, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Annual meeting, August 17, 1915, Philadelphia, Pa.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, July 15, 1915, Atlanta. Annual meeting, January, 1916.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Genl. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

Traffic News

The Oregon Short Line has announced that the serving of liquors in its dining cars will be discontinued on July 1.

The Great Northern has been awarded the gold medal at the Panama Pacific Exposition for the exploitation of scenic attractions, agricultural developments and industrial resources.

The western transcontinental railways have filed with the Interstate Commerce Commission their new tariffs of rates to intermediate western points in accordance with the decisions of the Interstate Commerce Commission, effective on July 15.

The Railroad Commission of Alabama has changed from July 1 to November 30, 1915, the time for the expiration of the term of its order allowing the principal roads of the state to charge 10 per cent above the tariff rate on certain commodities named in the "Eight Group Act."

The Nashville, Chattanooga & St. Louis is placing tablets at various points on its line marking points of interest, such as the scenes of battles during the civil war, so that passengers may easily recognize them from the car windows. The markers are of cast metal painted white with black lettering, and are mounted on railroad rails set in concrete. The markers also indicate the names of the principal streams crossed.

Not all of the summer travel to mountains and seashore is in the northern states. The Southern Railway reports a new train, put on last week, between Jacksonville, Fla., and Columbia, S. C., leaving Jacksonville at 8 p. m., and arriving at Asheville, N. C., at 2:10 p. m., with corresponding return schedule; sleeping cars between Jacksonville and Asheville, and between Savannah and Asheville. This week two sleeping car lines were established between New Orleans and Asheville; one via Montgomery and Atlanta and the other via Birmingham and Chattanooga; and two sleeping car lines between Memphis and Asheville, one starting in the morning and the other in the evening. Next Monday there will be a new train between Atlanta and Asheville.

The United States Public Health Service has been studying the experiences of the western and southwestern states in connection with tuberculosis and the large number of persons who go from the east to that region to improve their health; and while the need of very particular precautions in the sanitation of cars is emphasized, as always in discussions on this topic, the report declares that the degree of communicability of the disease has been overestimated. Medical statistics are notoriously unreliable. Something like 10,000 consumptives go west every year to die, says the report; and of those who die 46 per cent live less than six months after arrival. The tuberculous population of western Texas and New Mexico is said to be more than 50,000. In Albuquerque, N. M., the consumptive population which has come there from other states numbers more than 2,000; in El Paso over 2,000, and in San Antonio 3,500.

The Chicago, Rock Island & Pacific on June 19, put in effect new service to San Francisco via its Rocky Mountain Limited train from Chicago to Omaha, the Union Pacific to Ogden and the Southern Pacific from Ogden to San Francisco. No change will be made in the Rocky Mountain Limited service between Chicago and Colorado. The train leaves Chicago at 10:00 a. m., and leaves Omaha at 12:40 a. m., arriving at San Francisco at 9:30 a. m. the third morning. Returning, the train leaves San Francisco at 2:20 p. m., and arrives at Chicago at 2:50 p. m. New service was also announced in connection with the Colorado-California Express, which leaves Chicago at 10:30 p. m., and which will run west of Denver on the Union Pacific and Southern Pacific, arriving at San Francisco at 9:30 a. m., the fourth morning. Returning, the train leaves San Francisco at 2:20 p. m. and arrives at Chicago at 7:55 a. m.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The Interstate Commerce Commission has announced a hearing to be held at Chicago, beginning on July 19 and continuing for about two weeks, in connection with the western rate advance case. Evidence is to be taken at these hearings on advances on a number of commodities which have been filed since the beginning of the main hearings in the case. The hearings on July 19 to 24 will be devoted to agricultural implements, canned goods and furniture, proposed changes in rules and practices relating to general transit rules on grain and milling of grain in transit. July 26 to 31 will be devoted to beer and liquor, boots and shoes, cement, clothing, granite and marble, iron and steel, wire, lumber, lime, machinery, oil, paper, steel rails, cross ties, structural iron, sugar, sand, stone and other commodities. Evidence will also be taken on proposed changes in rules.

Rates to or from Certain Points in the Chicago Switching District

Opinion by Commissioner Clark:

The Lowrey tariff, of 1910, provided, with some exceptions, for the application of Chicago rates to and from industries, and other stations located within the Chicago switching district, whether or not such industry, or station was located upon or directly connected with the line performing the road haul. The Merchants Lighterage Company, and the Chicago Warehouse & Terminal Company, were and are parties to the Lowrey tariff and shipments to or from the stations of the lighterage company or of the tunnel company move as through shipments, these companies receiving divisions or allowances from the through rates.

It has now been proposed to cancel these arrangements with resulting increases in the rates to the stations of these companies, but this cancellation the commission refuses to allow.

The tunnels of the Chicago Tunnel Company, the stock of which is owned by the Chicago Warehouse & Terminal Company, are under the streets of the main wholesale and retail district. They aggregate about 60 miles, are 7.5 ft. high and 6 ft. wide, contain tracks of 2 ft. gage and are electrically operated. Access to the tunnels from the surface is afforded by 58 elevators which connect with the stations of the various railroads entering Chicago, 19 elevators connected with commercial houses and five elevators at so-called universal stations.

The tunnel company has two classes of freight stations: One, "universal" stations, at which less-than-carload shipments are received from and delivered to the public generally; the other, "commercial" stations, which are analogous to private sidings.

The tunnel company receives its compensation out of the through rates, without limitation as to the amount of freight taken from or delivered to the line-haul carriers, if the freight originates or is delivered at its universal stations. On that originating at its commercial stations it receives no compensation from the line-haul carriers unless certain minimum quantities are delivered to it by one shipper, or by it to one consignee from one of the line-haul carriers, in one day, nor unless the gross revenue accruing to the line-haul carrier and its connections on the required minimum quantity of freight equals or exceeds $15.

The eastern lines, such as the Erie, the Wabash, the New York Central, and the Pennsylvania, do not propose to withdraw the arrangement for through rates in connection with the tunnel company to or from its universal stations.

The lighterage company operates two boats on the Chicago river. It maintains universal stations and also serves certain industries at docks or landings not used by other shippers.

Both the lighterage and tunnel companies file tariffs and reports with the commission and have long been recognized as common carriers. Neither of them has had gross earnings sufficient to pay operating expenses and fixed charges.

In general, Chicago rates apply on shipments to and from all points within the Chicago switching district. Various universal stations for the receipt and delivery of less-than-carload freight are maintained by railroads reaching this district, to or from which Chicago rates are applied, the carriers compensating each other for the necessary switching service. The commission sees no substantial difference between the services performed by the tunnel and lighterage companies and those performed by the line-haul carriers for each other or those performed for the line-haul carriers by the several belt-line or industrial railroads within the switching district, and finds no good reason for placing the shippers served by the tunnel and lighterage companies at a disadvantage as compared with other shippers and consignees in the Chicago district.

The line-haul carriers believe that they are within their rights in cancelling the through rates because the service rendered by the tunnel and lighterage companies is a service beyond the rails of the line-haul carriers, for which they have a legal right to insist upon an additional charge. Since the line-haul carriers, however, join with each other and with various industrial and belt-line railroads in applying Chicago rates to and from industries in the switching district, the commission fails to see how discrimination could be avoided if they refused to accord the same rates and services to industries served by the tunnel and lighterage companies. The situation in Chicago is such that no single carrier can adequately serve the public with its own rails. It must enter into arrangements with other carriers which are in essence extensions of its rails. Transportation activities in and rates to and from Chicago are subject to conditions of intense competition. All this has led to the establishment and long maintenance of arrangements between the trunk lines themselves and with numerous terminal and belt lines in the Chicago district, which, have long included the tunnel and lighterage companies. No sufficient justification has been shown for singling them out from among the other terminal carriers or agencies in the Chicago switching district for the withdrawal of the uniform application of the Chicago rates.

For each rate, a carrier offers and obligates itself to perform a certain amount of service. If the service so offered and for a long time performed in consideration of that rate includes taking the property transported from a given point and delivering it at a given point, the delivery at that point is in no sense a "free service."

Commissioner Harlan, in a dissenting opinion, notes that the tunnel line cannot interchange equipment and that to accord joint rates to it is to extend transportation in interstate commerce "to the very basements of the private commercial establishments located along the tunnel." Whatever the value of the tunnel as a relief to congestion, it nevertheless offers a shipper's service and not a railway service. It does not differ in any particular having legal significance from the service performed by transfer and teaming companies in all the large cities.

So far as less-than-carload traffic is concerned, and such traffic only is handled by the tunnel company, the shippers of this country, as a general rule, bear the burden of getting it to and from the freight stations of the railroads. The trunk lines, however, several years ago, undertook to take this burden from shippers in Chicago, along the line of the tunnel and the route of the lighterage company, and to assume it themselves. In the tariffs now under suspension they have attempted to withdraw this free service and to put the burden back upon these shippers, where it properly belongs, and where, until a few years ago, it rested.

The free trap-car service which the carriers are endeavoring under other tariffs to withdraw is involved in another proceeding in which those tariffs are under suspension. But having here sanctioned the continuance of the free tunnel service partly because of the free trap-car service, the commission may later be compelled, under the reasoning of the majority report, to sanction and require the continuance of the free trap-car service partly because of the free tunnel service. These vastly important questions are thus pursued around a circle, and the dealing with them piecemeal, as in the majority report, and without relation to the broad general principles involved, makes any constructive consideration of them possible.

There can be no real regulation of interstate transportation without an affirmative course of action on the part of the commission itself in dealing with such matters. If the

commission refrains from upholding the carriers' efforts to get rid of one free service because it finds in existence another free service, without taking the steps necessary to strike both down as unlawful, the efforts of some railway officers to conform their practices to the requirements of the law will continue to be hampered by other officers who are willing to make the concessions necessary to obtain it. By constantly extending these free services to particular shippers in large communities, their cost becomes so great that relief is finally sought through an increase in the line-haul rates, which all shippers must pay, as was pointed out in the recent Five Per Cent Case (31 I. C. C., 351), where it was said that a substantial part of the increases had "been due to the increase in the special services performed for shippers at terminals and elsewhere without the imposition of any charge or for an inadequate charge."

"In the view I take of this case it presents a question of great public importance having two phases; one, the economic principle that our transportation costs should be placed where they properly belong, and the other a question of law, the right of a carrier performing a special service to make a charge for it. This right I regard as also a duty and the failure to perform it a violation of the act. And therefore in enforcing the integrity of the act it is the plain duty of this commission affirmatively to see to it that free services, of the special and private character involved on this record, are not performed by these servants of the public at the expense of the public." (34 I. C. C., 234.)

Carriers Must Furnish Tank Cars

Pennsylvania Paraffine Works v. Pennsylvania Railroad. Opinion by Commissioner Meyer:

The commission holds that it has the power to require carriers to furnish all necessary equipment, both ordinary and special, upon reasonable request. The question of what is a reasonably adequate car supply is an administrative one of which the commission alone can take original jurisdiction. A shipper's request for cars especially suited for the transportation of his products would not be reasonable if the cars must be prepared for shipment in a manner which is peculiarly within the technical knowledge of men connected with that industry, or if the movement of the commodity is a dangerous operation which can be safely performed only by men engaged in its production; but the shipment of petroleum products in tank cars does not call for such technical knowledge as would render unreasonable complainants' request that defendant furnish these cars. Tank cars are the only proper cars to use in the shipment of petroleum. The decision holds that all cars used by carriers, whether they be owned by the carriers themselves or leased from private car lines or from shippers, must be distributed without discrimination.

Commissioner Clark dissents, holding that the provision of section 1 of the act, that it shall be the duty of every carrier "to provide and furnish such transportation upon reasonable request therefor," did not enlarge the obligations or duties laid upon the carriers in this respect by the common law. There is no language in section 1 which indicates a legislative intent to expand the common-law duty of carriers to furnish facilities for transportation. If the act confers upon the commission power to order a carrier to enlarge its complement of cars and to award damages against it if it fails to comply with such order, it seems logically and necessarily to follow that the commission has the same power to order enlargement of terminal facilities, increase in the number of locomotives, and extension of tracks or branches. "I think that this power is vested in the courts and not in the commission." Commissioner Clements concurs in this dissent. Commissioner Harlan files a separate dissenting opinion wherein he says: "I concur in the general thought underlying the dissenting report herein of my brother Clark, namely, that the language in the act upon which the majority report is largely based is simply declaratory of the general duty of carriers at common law to furnish such cars and other facilities as are reasonably necessary to enable them to fulfill other public obligations, but does not impose upon this commission any such administrative duty or any such jurisdiction and power as are asserted in the majority report and in the order accompanying it." (34 I. C. C., 179.)

PERSONNEL OF COMMISSIONS

G. H. Byers, chief engineer of the Puget Sound & Willapa Harbor, at Raymond, Wash., has been appointed assistant engineer of the Pacific district of the Interstate Commerce Commission board of valuation engineers, with headquarters at San Francisco, Cal.

COURT NEWS

On the application of the Illinois Central and the Yazoo & Mississippi Valley, Judge Niles, of the United States district court, has issued a temporary injunction restraining the enforcement of the electric headlight law passed by the Mississippi legislature in 1912.

The United States Supreme Court has set aside a judgment of the supreme court of Pennsylvania giving the Clark Brothers Coal Mining Company a verdict for $124,443 against the Pennsylvania Railroad, representing triple damages for discrimination in car distribution. The United States Supreme Court held that the coal company, having applied to the Interstate Commerce Commission for redress and having obtained $31,000, could not now have recourse to the courts.

In the Federal Court at Jackson, Miss., June 15, a temporary injunction was granted restraining all district attorneys in Mississippi from prosecuting the Illinois Central and the Yazoo & Mississippi Valley for violating a headlight law passed by the legislature in 1912. The law stipulates that all locomotives operating on main lines in the state shall be equipped with high-power headlights. The case will be argued next month, when the roads will seek a permanent injunction.

In the United States District Court at Los Angeles, July 11, Judge Bean handed down a decision, in favor of the Government, in the suit against the Southern Pacific to recover 6,300 acres of land, alleged to contain oil, in Kern county, Cal., valued by the Government at over fifteen million dollars. Another suit, involving oil lands in the same region, of much greater value, is still pending. In the case now decided the Government charged that the affidavits produced by the railroad company to the effect that the land was not mineral but was agricultural, had been fraudulently obtained.

The Supreme Court of the United States, reversing the decision of the lower court, holds that the Adams Express Company was not violating the Webb-Kenyon law, regulating the transportation of liquor in interstate commerce, when it carried liquor into Kentucky for the personal use of the consignee. The destination of the liquor was in so-called dry territory; but the Kentucky Court of Appeals has held that the prohibition law of the state did not apply to liquor intended for the personal use of the consignee. In this case there was no evidence that the liquor was to be used otherwise.

Decision Against the Lackawanna in the Commodities Clause Case

The United States Supreme Court, in an opinion by Justice Lamar, has directed the government to bring new proceedings against the Delaware, Lackawanna & Western to stop the present plan by which the company sells coal through the Delaware, Lackawanna & Western Coal Company. This overrules the United States district court which had found in favor of the railroad. The full decision is not as yet available, but the following two paragraphs are taken from the New York Herald's report of the decision as handed down verbally:

"The railroad company, if it continues in the business of mining, must absolutely dissociate itself from the coal before the transportation begins. It cannot retain the title nor can it sell through an agent. It cannot call that agent a buyer while so hampering and restricting such alleged buyer as to make him a puppet subject to the control of the railroad company.

"If the railroad sells coal at the mouth of the mines to one buyer or to many it must not only part with all interest, direct or indirect, in the property, but also with all control over it or over those to whom the coal is sold at the mines. It must leave the buyer as free as any other buyer who pays for what he has bought. It should not sell to a corporation with officers and offices in common, for the policy statutes require that, instead of

being managed by the same officers, they should studiously and in good faith avoid anything either in contract or in conduct that remotely savors of joint action, joint interest or the dominance of one company by the other. If the seller wishes by a lawful and bona fide contract, whose provisions as to delivery and otherwise are not in restraint of trade, to sell all of its coal to one buying company, then that one buyer can be bound by reasonable terms and requirements to pay according to the contract. But such buyer should otherwise be absolutely free to extend the business to buy when, where and from whom he pleases, and otherwise to act as an independent dealer in active competition with the railroad company."

Discrimination Between Stations—Supplying Stock Scales Not Compulsory

The United States Supreme Court, in a case already briefly reported, holds unreasonable and arbitrary an order of the Minnesota Railroad & Warehouse Commission directing the Great Northern to erect within 45 days a six-ton scale in its stock yards at the village of Bertha, Todd county. This decision reverses that of the state supreme court (122 Minn., 55), which had affirmed the order on the ground that stock raisers who would otherwise market their stock at Bertha sometimes took it to Hewitt or Eagle Bend, a longer distance, in order to have the use of the scales installed at those places; that such scales tend to draw the stock business to and concentrate it at the places where they are located.

It appeared that six-ton scales installed by the railroad at 54 of its 259 stock-shipping stations in Minnesota were not used in transactions between carrier and shippers. The court sustained the railroad's contention that it should have had the opportunity of eliminating the discrimination between the stations by discontinuing the use of the scales at Eagle Bend and Hewitt. "The business of a railroad," the court said, "is transportation, and to supply the public with conveniences not connected therewith is no part of its ordinary duty. . . . It by no means follows, simply because a railroad voluntarily supplies a convenience at some stations which attracts trade, that it can be commanded positively to do likewise at other places along the line. A railroad's possessions are subject to its public duty, but beyond this and within charter limits, like other owners of private property, it may control its own affairs. Discontinuing the use of existing scales would abate the alleged discrimination and probably entail little, if any, outlay. The commission's order precluded use of this method to bring about lawful conditions and therein, we think, was plainly arbitrary and unreasonable." Decided June 14.

Employees' Liability Act—"Interstate Commerce"

A mechanic worked principally in running a machine where he shaped parts to be used in the repair of locomotives in immediate need of repair, and generally, but not exclusively, in the repair of locomotives used in interstate commerce. While engaged on a Sunday in moving the countershaft which supplied power to the shaping machine, his hand, while over the rail on a girder which he was drilling, was cut off by the wheels of a traveling crane moving on the girders. It was held by the New York Court of Appeals that he was not employed in interstate commerce and so could not recover in an action for his injury. The court distinguished Pedersen v. D. L. & W., 229 U. S., 146, 33 Sup. Ct. 648, where it was held that a person directly engaged in assembling material for the immediate repair of a bridge necessarily used in interstate commerce by a carrier is engaged in interstate commerce. From this holding, the court said, it does not follow that a person engaged at a shaping machine in a repair shop is engaged in interstate commerce; at least until it appears that the work he is doing is for the immediate repair of a locomotive or other instrumentality engaged in interstate commerce. Making parts to be used in a locomotive is a step further removed from commerce than the assembling of parts for the locomotive, and corresponds to the work of making bolts and rivets for use in bridge repairs. The plaintiff, in moving the countershaft, was doing millwork that in itself had no immediate or direct connection with commerce. Shanks v. D. L. & W. (N. Y.), 108 N. E., 644.

A car inspector was inspecting a train which ran on a division of an interstate road wholly within the state when he was struck and killed by another train of the same division. In an action under the federal employers' liability act there was no evidence that any passenger or baggage on either train was destined for a point in another state, though the time-tables of the company expressed a readiness to transport interstate passengers over that division and transfer them to interstate trains. The federal district court, E. D. Pennsylvania holds that there could be no recovery under the act. Boyle v. Pennsylvania, 221 Fed., 453.

The federal employers' liability act does not make an employer an insurer of the lives of its employees, and does not give a right of action unless negligence is shown. A conductor was caught between a doorpost of a freight house and the doors of a refrigerator car. The freight house had been used continuously for 15 years without injury to any employee. In an action for his injuries there was no evidence of faulty or unusual construction of the freight house. The Michigan Supreme Court held that the company was not negligent, under the act, for maintaining a defective place of work. The conductor was familiar with the surroundings and the manner of performing his duties, and knew of the nearness of the track to the doorpost. It was held that he assumed, as a matter of law, the risk of injury by being caught between a car and the doorpost. Miller v. Michigan Central (Mich.), 152 N. W., 235.

In an action for the death of a member of a shifting crew in the defendant's freight yard it appeared that the deceased handled both interstate and intrastate commerce, but at the time he met his death he was aiding in the movement of empty cars on a siding of a local private manufacturing company. The ultimate use to which the cars were to be devoted, and their ultimate destination when loaded was not shown. The deceased had been sent out as flagman. The character of the oncoming train which caused his death was not shown. The federal district court, E. D. Pennsylvania, held that he was not shown to have been engaged in interstate commerce so as to allow of recovery under the act. Shanley v. Philadelphia & Reading, 221 Fed., 1012.

Interstate Commerce in Intoxicating Liquor

The Adams Express Company was indicted for violation of the Kentucky statute by the delivery of intoxicating liquor from Tennessee to persons in Kentucky. The liquor was for the personal use of the buyers. The United States Supreme Court had this statute under consideration in Louisville & Nashville v. Cook Brewing Co., 223 U. S. 70, when the statute, as applied to interstate shipments, was held void as an attempt by the state to regulate commerce among the states. Such, the court says, must still be the fate of the statute, unless the Webb-Kenyon Act requires a different result. The Wilson Act did not prevent shipment of liquor in interstate commerce for the use of the consignee, provided he did not undertake to sell it in violation of the state laws. The court holds that the Webb-Kenyon Act does not prohibit all interstate shipment or transportation of liquor into so-called dry territory, but prohibits it only where the liquor is to be possessed, sold, or used in violation of the local law. The facts showed that the liquor was not to be used in violation of the state laws, therefore the Webb-Kenyon Act had no application. Judgment of conviction was reversed.—Adams Express Co. v. Kentucky (decided June 14).

Crossing Accidents—Care Required of Passengers in Vehicles

Action was brought for injuries to a passenger in a buggy, the wife of the driver, the buggy having been smashed into by a train at a crossing, in which the Circuit Court of Appeals, Sixth Circuit, held the plaintiff chargeable with contributory negligence barring recovery. It was held that where a driver and his passenger were both looking and listening for a train as they approached a crossing, the negligence of each while so engaged was the negligence of both. Where the plaintiff, as they approached the crossing, was looking out for her own safety and using her own eyes and ears for the purpose of determining whether trains were approaching, wholly independent of her husband, she was responsible for her own personal negligence in failing to see a train which might have been seen by exercising reasonble

care while looking. Although the doctrine that the negligence of the driver of a vehicle is imputable to his passenger has been generally discarded, it by no means follows that because a person is not controlling the vehicle, and because she is not responsible for the driver's negligence, she is not obliged to exercise due care for her own safety. Erie v. Hurlburt, C. C. A., 221 Fed. 907.

Plant Facility Subsequently Becoming Common Carrier is Bound by Published Rates

A railroad originally constructed as a plant facility in connection with ironworks was subsequently chartered as the Crane R. Co. under the Pennsylvania general railroad laws, which gave it a right of eminent domain. It was owned and operated by an independent company having track connection with other railroads and transporting freight for the public. Prior to the incorporation of the railroad the Central of New Jersey had an agreement with the ironworks, whereby the former paid to the ironworks 6 cents a ton on all cars hauled by the iron company to and from its works and other industrial establishments located along the line of the iron company's tracks to the Central of New Jersey's tracks. Following its incorporation the Crane company filed schedules of rates specifying a charge of $2 a car for all cars transported over its lines from and to connecting lines. In a suit to recover the difference between this rate and that stipulated in the agreement with the ironworks, the defense was that the Crane company was a plant facility of the ironworks and as such bound by the agreement. It was held, however, by the Pennsylvania Supreme Court, that the Crane company was a common carrier and not a mere plant facility. The court quoted the decision in the Tap Line Cases, 234 U. S. 1, 34 Sup. Ct., 741. The plaintiff, being engaged in interstate commerce and bound to accept shipments from the public, was required to file tariffs showing rates binding on all parties. Judgment for the plaintiff was affirmed.—Crane R. Co. v. Central of New Jersey (Pa.), 93 Atl., 1076.

Unexplained Boiler Explosion—Doctrine of Res Ipsa Loquitur

A locomotive engineer sued for injuries caused by the dislocation of a boiler flue, followed by an explosion and the throwing of hot water and steam upon him. The railroad company's contention was that, conceding that the plaintiff brought himself within the rule of *res ipsa loquitur* (the occurrence speaks for itself), the explanation offered by the company, and supported by two expert witnesses, without contradiction, was sufficient to overcome the presumption of negligence on the part of the company, and that it then became the duty of the plaintiff, as a condition of recovery, to establish the company's negligence.

There was evidence that the boiler at the time of the accident was carrying a steam pressure of 200 lb.; that it was just on the point of "popping"; and that at this time the engineer turned on the injector. It was the theory of the two experts that, the water being low in the boiler, the injection of cold water caused a contraction of the tube in question, drawing it away from the fastening at the end, and producing the leak which generated steam in the firebox, and forced off the doors of the furnace, producing the injuries complained of. This testimony was not disputed. The New York Appellate division, third department, holds, by a divided court, that this evidence supported a verdict for the plaintiff.

Justices Kellogg and Smith dissented, on the ground that the engineer had the control and management of the boiler, and the facts showed that the cause of the explosion was either a defect in the boiler itself or the improper management of it by the engineer. If a bystander, or an employee, having nothing to do with the boiler, had been injured by the explosion, the doctrine of *res ipsa loquitur* would have applied and indicated the company's negligence, for it would be equally responsible for either cause. But here the circumstances unexplained might point as directly to the negligence of the engineer as to a defect in the boiler. Therefore the engineer gained no advantage from the doctrine, except perhaps by confining the proof in the first instance to the allegation that he was not negligent, and therefore the boiler must have been defective. In order, therefore, to prove negligence of the company, it was necessary for the engineer to establish that the boiler was defective; in other words, that his conduct did not cause the explosion. Francey v. Rutland, 153 N. Y. Supp., 151.

Railway Officers

Executive, Financial, Legal and Accounting

Arthur S. Piers, real estate agent of the Canadian Pacific at Montreal, Que., has been appointed manager real estate department, with office at Montreal, in charge of the company's real estate and buildings not used exclusively for railway purposes, or administered by the general executive assistant at Vancouver, and the department of natural resources.

Edward A. Haid, whose appointment as general attorney of the St. Louis Southwestern, with headquarters at St. Louis, Mo., has already been announced in these columns, was born on November 4, 1881, in St. Louis, Mo., and graduated from the grammar schools of that city. He was graduated from the Benton (night) school of law in June, 1904, and entered the general practice of law on January 1, 1905. He left the general practice of law on February 4, 1907, to become chief clerk in the law department of the St. Louis & San Francisco. On December 1, 1912, he was appointed assistant general attorney of the St. Louis Southwestern at St. Louis, Mo., which position he held at the time of his recent appointment as general attorney of the same road, with headquarters at St. Louis, as above noted.

Edward A. Haid

Operating

J. A. Baldwin, acting superintendent of the Nashville, Chattanooga & St. Louis, at Atlanta, Ga., has been appointed superintendent of the Western & Atlantic division, with headquarters at Atlanta.

Edward E. Taylor, trainmaster of the Gulf, Colorado & Santa Fe, at Galveston, Tex., has been appointed division superintendent, with headquarters at Cleburne, Tex., succeeding Oliver Snyder, deceased. D. W. Nettleton, chief train despatcher at Temple, Tex., has been appointed trainmaster at Galveston, Tex., succeeding Mr. Taylor. H. S. Taylor succeeds Mr. Nettleton as chief train despatcher at Temple, Tex.

George W. Kirtley, whose appointment as general superintendent of transportation of the Erie, with headquarters at New York City, has already been announced in these columns, was born at Panora, Iowa, and was educated in the public and high schools of his native town. He began railway work in 1897, as a clerk in the office of the district passenger agent of the Northern Pacific at Des Moines, Iowa. From 1898, to 1900, he served as clerk in the office of the general passenger agent of the same road at St. Paul, Minn., and then to 1901, as clerk in the office of the general superintendent of the Chicago, St. Paul, Minneapolis & Omaha at St. Paul. He was then to 1902, secretary to the general superintendent of the Baltimore & Ohio, at Chicago. From 1902, to 1903, he was secretary to the general superintendent of transportation of the same road, and in 1903 entered the service of the Erie as chief clerk to the general superintendent at Cleveland, Ohio. In 1904, he was appointed assistant superintendent of transportation at New York City, remaining in that position until 1908, when he became superintendent of car service at the same place. Two years later he was appointed superintendent of transportation, which po-

sition he held at the time of his recent appointment as general superintendent of transportation of the same road as above noted.

Traffic

F. W. Whipper has been appointed assistant general passenger agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, succeeding D. M. Bowman promoted.

George Merki has been appointed chief inspector of the joint rate inspection bureau and the weighing and inspection bureau of the Central Freight Association, with headquarters in the Transportation building, Chicago, succeeding Paul P. Rainer, deceased.

Engineering and Rolling Stock

L. A. Hardin, general foreman of the Chicago & North Western at Boone, Iowa, has been appointed assistant master mechanic at South Pekin, Ill.

R. H. Howard, formerly general manager of the New Orleans & Great Northern, has been appointed chief engineer of maintenance of way of the Wabash, with headquarters at St. Louis, Mo.

E. B. De Vilbis, electrical engineer of the Pennsylvania Lines West, at Fort Wayne, Ind., has been appointed assistant engineer of motive power, with office at Toledo, Ohio, and W. E. Stockbridge, motive power inspector at Fort Wayne, Ind., has been appointed electrical engineer, succeeding Mr. De Vilbis.

OBITUARY

J. E. Gimperling, Sr., formerly superintendent of the Cincinnati, Dayton & Ironton and the Cincinnati, Dayton & Chicago, died at Dayton, Ohio, on June 14, at the age of 84 years.

M. E. Sherwood, division master mechanic of the Michigan Central, at Jackson, Mich., was accidentally shot and killed at that place on June 4. His age was 46 years.

William L. Breyfogle, formerly president of the Louisville, New Albany & Chicago, now the Chicago, Indianapolis & Louisville, and later president of the Bedford Belt Railway, died at Hillsborough, a suburb of San Francisco, Cal., on June 17, at the age of 68 years.

INDIAN RAILWAY NOTES.—The Balasand bridge on the Kissengunge line of the Darjeeling-Himalayan Railway has recently been completed. It has 14 spans of 40 ft. each and is a fine piece of engineering work. The Mahananda bridge on the same line cannot be completed at present, as the war has interfered with the delivery of girders. It is now proposed to get over the difficulty by constructing a temporary floating bridge. The Kissengunge-Matigora section, 62 miles long, has been opened for traffic; it is of narrow gage, runs from Siliguri via Nuzalbaree, thence along the boundary of Nepal and opens up a rich tract of the country.

THE PRIESKA-UPINGTON RAILWAY OF SOUTH AFRICA.—The electric light was brought into requisition and played an important part in the construction of the Prieska-Upington Railway, South Africa; the track of 142 miles was laid in record time, the average rate being equal to 2.25 miles per day. The maximum mileage completed in any one day was 3.25 miles. When once the work was properly set going it was carried on day and night, an up-to-date electric light generating plant enabling operations to be continued after sunset. This plant, which was headed by two powerful searchlights, travelled along the line as the rails were laid, driven by a locomotive, and carrying everything necessary for the generating of electricity. The lights were arranged on a long arm, which could be, and was, under perfect control, so that the light could be thrown in almost any direction within the half-radius of a circle. The speedy construction of the line was considered necessary in order to facilitate the movement of troops towards the German southwest border. The line is now being extended beyond Upington, and it is possible that the record established in the laying of the Prieska-Upington section may be eclipsed.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE INTERCOLONIAL is inquiring for 20 locomotives.

THE BULGARIAN STATE RAILWAYS are in the market for 10 locomotives.

THE CUMBERLAND & MANCHESTER is contemplating the purchase of a locomotive.

THE BELGIAN STATE RAILWAYS have ordered 20 locomotives from the American Locomotive Company.

THE VERDE TUNNEL & SMELTER RAILROAD has ordered one superheater six-wheel switching locomotive from the American Locomotive Company. This locomotive is to have 21 by 26-in. cylinders and 58-in. driving wheels.

THE CENTRAL RAILWAY OF BRAZIL has ordered 3 Pacific and 3 Consolidation type locomotives from the American Locomotive Company. The Pacific type locomotives will have 21½ by 28-in. cylinders, and 68-in. driving wheels; and the Consolidation type locomotives will have 22 by 24-in. cylinders and 50½-in. driving wheels.

THE RUSSIAN GOVERNMENT which, as reported in the *Railway Age Gazette* of last week, has ordered 250 locomotives from the Baldwin Locomotive Works, 100 from the American Locomotive Company, and 50 from the Canadian Locomotive Company, is also understood to have ordered 50 locomotives from the Lima Locomotive Corporation. The locomotives ordered from the Baldwin Locomotive Works are to be Decapod type locomotives for freight service. Those ordered of the American Locomotive Company are to be of the same type and are to have 25 by 28-in. cylinders, 52-in. driving wheels, and a total weight of 197,000 lb. The Baldwin Locomotive Works is also reported to have received an order for 365 traction engines from the Russian government.

CAR BUILDING

THE SEABOARD AIR LINE is inquiring for 4 dining cars.

THE INTERCOLONIAL is in the market for 1,000 steel underframe box cars.

THE CUMBERLAND & MANCHESTER intends to purchase a number of flat cars.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA is inquiring for 1,500 40-ton box cars.

THE CHICAGO & NORTH WESTERN has revived inquiries for 1,500 steel underframe box cars.

THE LAKE SUPERIOR & ISHPEMING has ordered 400 ore cars from the Cambria Steel Company.

THE CHILE EXPLORATION COMPANY, South Bethlehem, Pa., has ordered 40 ore cars from the Pressed Steel Car Company.

THE NEW YORK CENTRAL is said to be contemplating the purchase of a large number of freight cars. This item has not been confirmed.

THE CINCINNATI, HAMILTON & DAYTON has revived an inquiry for 1,000 40-ft. 40-ton steel underframe box cars and 1,000 50-ton hopper cars.

THE RUSSIAN GOVERNMENT is reported to have ordered 57,400 car wheels on axles from the Baldwin Locomotive Works for delivery within 90 days.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 2,500 40-ft. 40-ton box cars from the Pullman Company, 1,000 from the Bettendorf Company and 500 from the Haskell & Barker Car Company.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for 100 80,000 to 100,000-lb. capacity all steel or

steel underframe gondola cars, 1 or 2 60,000 to 70,000-lb. capacity box cars and a number of second-hand 3-ft. gage coal and flat cars.

The British Government is reported to have given the Canadian Car & Foundry Company a large order for box cars. This item has not been confirmed, and may possibly have been confused with the order which this company is supposed to have received from France.

The French Government is reported to have ordered 2,500 cars from the Standard Steel Car Company, and 1,000 from the Canadian Car & Foundry Company. The total order includes 10 and 20-ton flat and box cars. The French government is also said to be in the market for 345 passenger cars.

IRON AND STEEL

The Chesapeake & Ohio is negotiating for additional rails.

The Cuba Railroad has ordered 7,000 tons of rails from the Lackawanna Steel Company.

The Chicago, Milwaukee & St. Paul has ordered 516 tons of steel for through girder spans from the Wisconsin Bridge & Iron Company.

The Paducah & Illinois has ordered 540 tons of steel for trusses and frames for the Metropolis bridge, at Metropolis, Ill., from the Kenwood Bridge Company.

The Southern Railway has ordered 2,100 tons of rail from the Tennessee Coal, Iron & Railroad Company, and 6,000 tons from the Pennsylvania Steel Company.

The New York Central has ordered 1,500 tons of rails from the Illinois Steel Company in addition to the 15,500 tons reported in the *Railway Age Gazette* of May 28.

The Trans-Mississippi Terminal Railway has ordered 209 tons of steel for a passenger station and terminal buildings, at New Orleans, La., from the Virginia Bridge & Iron Company.

The St. Louis & San Francisco has ordered 21,212 tons of 90-lb. open hearth rails from the Tennessee Coal, Iron & Railroad Company, and has also placed an order for 205 tons of steel for four 77-ft. deck plate girder spans with the American Bridge Company.

The Pennsylvania Lines East & West of Pittsburgh, which were reported in the *Railway Age Gazette* of June 11, as having ordered 155,500 tons of rail, divided the order as follows: 69,700 tons from the Carnegie Steel Company, 34,850 tons from the Cambria Steel Company, 34,850 tons from the Pennsylvania Steel Company and 8,050 tons each from the Bethlehem Steel Company and the Lackawanna Steel Company.

MACHINERY AND TOOLS

The New York Central is inquiring for a number of machine tools.

The Pennsylvania Railroad is in the market for a few machine tools.

The Interborough Rapid Transit is said to be contemplating the purchase of machine tools.

The Baltimore & Ohio is said to be contemplating the purchase of a large number of machine tools.

The Maine Central has ordered one 35-ton crane from the Northern Engineering Works, Detroit, Mich.

The Lehigh Valley has ordered a 72-ft., 233-ton electrically operated locomotive transfer table and an electric tractor for a 100-ft. turntable from George P. Nichols & Brother, Chicago, for installation at Sayre, Pa.

Railroad Construction Projects in Switzerland.—Altogether 78 railway projects exist in Switzerland for which concessions have already been granted, besides a great many others which have not yet reached the stage of having a formal demand made for a concession. These 78 railway projects, for which concessions have been obtained, will for the most part probably never be carried out, at any rate, not for 15 or 20 years to come.

Supply Trade News

A. S. Baldwin has been appointed works manager of the R. D. Nuttall Co., Pittsburgh, Pa.

Frederick C. Lavarack of the Signal Accessories Company, will also represent the sales department of the Hayes Track Appliance Company in New York city and the east.

F. W. McIntyre, for the past four years connected with the Chicago office of the Niles-Bement-Pond Company, has been transferred to the Boston office, where he was formerly located.

The American Locomotive Company and the Westinghouse Air Brake Company have received permission to manufacture munitions of war in the former plant of the Texoleum Company at Kenilworth, N. J.

The American Locomotive Company is said to be planning to establish a branch plant in Cincinnati for the filling of war orders. According to the reports, if a suitable plant cannot be rented a new one will be erected.

Ira C. Rogers has resigned from the position of assistant purchasing agent of the Pittsburgh & Lake Erie, and has been appointed general purchasing agent of the International Steam Pump Company, New York.

The transportation department of the Panama-Pacific International Exposition at San Francisco has awarded the Rail Joint Company, New York, the only medal of honor presented for rail joint products.

At a meeting of the board of directors of Berry Brothers, Detroit, Mich., held on May 26, Orrin S. Goan was elected president and a director succeeding Frank W. Blair, who has resigned because of other business interests.

The Safety Car Heating & Lighting Company, New York, has been awarded a gold medal by the International Jury of Awards at the Panama Pacific International Exposition for its "Underframe" car lighting electric equipment.

M. A. Hudson has resigned as vice-president of the J. E. Lonergan Co., Philadelphia, Pa., to become manager of the western branch of the United Roofing & Manufacturing Company, with headquarters at 933 Marquette building, Chicago.

The Public Belt Railway Commission of New Orleans has just ordered from the Weir Frog Company of Cincinnati, 175 sets of manganese insert frogs, guard rails and switches. This order is for the full normal requirements of the Commission.

A three-story, 80-ft. by 600-ft addition is to be made to the boiler shop of the Eddystone, Pa., plant of the Baldwin Locomotive Works. The new shop is to be a woodworking shop, and it is said will be used in the manufacture of rifle stocks.

R. M. Newbold, formerly with the Adams & Westlake Company, has been appointed western manager of the railroad department of the Willard Storage Battery Company, succeeding P. D. Smith, who has resigned to accept service with another company.

The Kincaid Stoker Company, Cincinnati, Ohio, has been incorporated, with $50,000 capital stock, to manufacture mechanical stokers for use on locomotives, ships and in power plants. John Kincaid, Napoleon DuBrul, D. S. DuBrul and Clarence DuBrul, are the incorporators.

W. C. Irwin, formerly connected with the engineering department of the city of St. Louis, has been appointed district representative of the Kalamazoo Railway Supply Company, in charge of the St. Louis office at 304 Frisco building, succeeding W. D. Waugh, resigned.

The Harvey Company, 113 South street, Baltimore, Md., has recently been incorporated under the laws of Maryland to sell equipment and supplies to railroads, contractors, shop and engine building companies, etc. J. Edward Harvey, who has been elected president of the new company, was formerly vice-presi-

dent of the South Baltimore Steel Car & Foundry Company, Baltimore, Md., and at one time proprietor of the Eastern Railway Supply Company.

Richard S. Brown, formerly a salesman of railway apparatus, connected with the Boston office of the Westinghouse Electric & Manufacturing Company, died in New York June 5. Mr. Brown was 76 years of age and had been in the service of the Westinghouse company since 1890.

The American Car & Foundry Company will spend more than $50,000 in improvements to its Milton, Pa., plant. Included are new shops, 100 by 350 ft. in size, a 120-ft. extension to the steel storage yard, a 100-ft. extension to the tank car plant and the addition of some machinery.

Harrison G. Thompson, a vice-president, and manager of the railway department of the Edison Storage Battery Company, Orange, N. J., has been appointed general sales manager, and as such will henceforth have charge of all sales including the railway, house lighting and commercial departments.

H. C. Crawford, eastern traffic manager of the Cambria Steel Company at Philadelphia, has been appointed traffic manager of that company, succeeding William A. Sproul, who has resigned, effective August 1, after 25 years of service with the company, to take charge of the bureau of transportation and traffic of the Philadelphia Chamber of Commerce.

David A. Thomas, the well-known Welsh coal mine owner, has been appointed to represent the munition department of Great Britain in the United States and Canada. He will probably make his headquarters in Ottawa and New York, and will deal directly with makers of arms and munitions, co-operating in so far as possible with J. P. Morgan & Co.

The Chambers Valve Company, New York, announces that among other recent orders it has received orders for Chambers throttle valves for installation on 42 locomotives of the Missouri, Kansas & Texas, 55 of the Chicago, Burlington & Quincy, 15 of the Western Maryland, 12 of the New York, Ontario & Western, and 2 of the El Paso & Southwestern.

The Chicago Great Western has ordered 1,150 sticks of treated piling from the Central Coal & Coke Company, 400,000 ft. of long leaf pine from the Bell Lumber Company, 850,000 ft. of untreated Douglas fir from Washington points and 350,000 ft. of yellow pine from Louisiana points. All the timber will be treated by the International Creosoting & Construction Company, at Texarkana, Tex.

The Hagar Portland Cement Company has been incorporated under the laws of Maine, with $20,000,000 capital stock, for the purpose of acquiring and operating a chain of cement plants between the Atlantic coast and the Rocky mountains. Edward M. Hagar, recently president of the Universal Portland Cement Company, was elected president; Morris Metcalfe, vice-president; B. H. Rader, vice-president and sales manager; Gordon Wilson, secretary and in charge of cost accounting; Leonard Wesson, assistant to president in operation and construction; J. P. Beck, assistant to president in extension work; C. W. Lyon, engineer of economies, and J. H. Barbazette, superintendent of construction. Pending the election of a permanent treasurer the office will be filled by Gordon Wilson. The general offices of the company are located at 208 South La Salle street, Chicago.

The Ingersoll-Rand Company, New York, on June 1 opened a new branch office at 139 Townsend street, San Francisco, Cal., with a view to giving closer attention to the needs of present and prospective users of Ingersoll-Rand machinery. H. L. Terwilliger, president of Harron, Rickard & McCone, the present Ingersoll-Rand agents, has resigned from that position to become district manager of the territory handled by the Ingersoll-Rand Company's San Francisco and Los Angeles offices, with headquarters in the former city. H. G. Mitchell, formerly secretary of Harron, Rickard & McCone, has been elected president of that company, succeeding Mr. Terwilliger, and arrangements have been made whereby the company will continue to handle Ingersoll-Rand machinery and co-operate in other ways with the Ingersoll-Rand Company after the expiration of the agency contract on July 22.

Railway Construction

Athabasca & Fort Vermillion.—Announcement is made that surveys are to be started at once preliminary to actual construction of the line from Athabasca, Alta., northwesterly to Trout Lake and to Fort Vermillion, about 300 miles. J. M. Kernan, J. V. Rawle, J. Dalganeau, Athabasca; S. Clarke, Fort Vermillion, and K. Keith, Edmonton; D. A. Thomas, and A. G. McKay are interested. (April 23, p. 913.)

Cumberland & Manchester.—A contract has been given to T. J. Vermillion & Son, Barbourville, Ky., for grading and track laying on a section of three miles, and additional contracts are to be let shortly. The plans call for building from Barbourville, in Knox county, Ky., north via Cannon, Girdler, Hopper and Woollum to Manchester, 24 miles. An extension from Manchester is projected to Beattyville, about 30 miles, but this extension will not be built at the present time. The maximum grades to Manchester will be about 1 per cent, and the maximum curvature 8 deg. There will be four steel bridges on the line. The company expects to develop a traffic in lumber, coal, livestock, farm products and salt. Charles F. Heidrick, president, Brooksville, Pa. (June 4, p. 1181.)

Cumberland Railroad.—An officer writes regarding the reports that construction work would be resumed soon on an extension from Wheeler, Ky., southwest to Jellico, Tenn., about 24 miles, that it has not yet been definitely decided when construction work on this line will be resumed. The company now operates a line from Artemus, Ky., south to Wheeler, 10.2 miles.

Easton & Washington Traction.—This company, operating an electric line, from Easton, Pa., east via Washington, N. J., to Port Murray, has decided to build an extension northeast via Hackettstown to Lake Hopatcong, 19 miles.

Mascot & Western.—Track laying was finished recently, it is said, on this line from the Mascot Copper Company's property in Cochise county, Ariz., to the main line of the Southern Pacific. T. N. McCauley, president, Chicago; C. S. Henning, chief engineer, Dos Cabezos, Ariz. (February 19, p. 350.)

Missouri, Kansas & Texas.—This company is reducing grades on 3.1 miles of its line between Canadian and Eufaula, Okla., and is extending its bridge over the Canadian river at that point, as was reported in the *Railway Age Gazette*, May 21. The general contract has been awarded to the List & Gifford Construction Company, Kansas City, Mo., and the steel contract for the bridge to the Wisconsin Bridge & Iron Company. The work is now in progress.

Nashville, Springfield & Northern.—Incorporated in Tennessee to build a railway from Nashville, Tenn., connecting Springfield, Clarksville and Franklin, Ky., about 80 miles. E. G. Stribling, president, Nashville; W. B. Myers, vice-president, Goodlettsville, and R. C. Leonard, secretary and treasurer, Nashville.

New York Subways.—The New York Public Service Commission, First district, has awarded the contract for the construction of Section No. 1 of Route No. 29, the Nostrand avenue subway in the borough of Brooklyn, to the Newman & Carey Company, Brooklyn, the lowest bidder, who offered to do the work for $2,073,303. Section No. 1 covers that part of the line extending from Eastern Parkway southward under Nostrand avenue to a point about 220 ft. south of Church avenue.

Peoples Railroad Company.—Plans are being made by this company, which now operates a one-mile line at Fairhope, Ala., it is said, to build an extension east to Robertsdale, about 14 miles. The headquarters of the company are at Fairhope.

White Sulphur & Huntersville.—This company plans to build a line from White Sulphur, W. Va., northeast via Montague, Mapledale, Divide, Alvon and Shryock to a point 27 miles from White Sulphur, with a branch from a point near Shryock to Neola. The company expects to develop a traffic in lumber, but has not yet decided when the construction work will be carried out. T. J. Shryock, president, Baltimore, Md.

Yazoo & Southern.—Organized in Chicago with $3,000,000 capital to build a railroad from Yazoo City, Miss., east to Carthage, about 60 miles. W. C. Murphy, Yazoo City, P. R. McDonough and W. Kissock, Chicago, are the projectors and directors, and G. U. Nichols and S. Murphy, Chicago, are directors. (See Mississippi Roads, May 14, p. 1033.)

RAILWAY STRUCTURES

Baltimore, Md.—The Pennsylvania Railroad will ask for bids soon for installing some of the new coal handling facilities to be provided at Canton, Baltimore, which are expected to increase the tonnage of coal exported through Baltimore. The improvements to be carried out at Canton include a concrete bulkhead pier, machinery for loading coal into vessels, a coal dumper, thawing house and extensive freight yards for loaded and empty cars. The new pier is to be 942 ft. long and 66 ft. wide, and the coal handling machinery on the new pier will be capable of loading at least 6,000 tons of coal in ten hours. The thawing house will have a capacity of 30 cars, and there will be a tributary yard with a capacity of 79 cars. The loaded car yard is to have 36 tracks with a capacity of 620 cars, and the empty car yard is to have a capacity of 139 cars, with shop car tracks to hold 28 cars additional.

Bessemer, Ala.—The Alabama Great Southern will at once build a new station at Twentieth street, Bessemer, to cost $30,000. The building is to be of brick construction with Spanish tile roof, and cement floors. The company's forces will carry out much of the construction work. (May 28, p. 1140.)

Fredericton, N. B.—According to press reports, the Intercolonial has under consideration the question of building a new superstructure on the bridge over the St. John river at Fredericton.

Kinnickinnick, Wis.—The Chicago & North Western has awarded the contract for the pile foundation of its elevator at this place, to the Walsh Construction Company, Davenport, Iowa.

New York.—The War Department has granted permission for the construction of a bridge over the Bronx river at Westchester avenue in the borough of the Bronx. The bridge is to be built to carry the tracks of the Pelham Bay Park branch of the Lexington avenue subway, which at this point runs on an elevated structure. The plans call for a permanent bridge with a clearance of 61 ft. above mean high water.

Ottawa, Ont.—Bids are wanted until June 25, by J. W. Pugsley, secretary, Department of Railways and Canals, Ottawa, it is said, for improvements on the main line of the Intercolonial Railway as follows: Construction of abutments and piers at St. Henri river bridge, Riviere du Loup subdivision, and subways at Little Metis, Camphellton subdivision, and at Hampton, St. John subdivision.

Spartanburg, S. C.—The Southern Railway is asking for bids for work on a modern freight terminal, to include separate inbound and outbound warehouses with ample team track facilities at Spartanburg. The work is to be started at once, and the improvements will cost about $100,000. The new facilities will consist of a one story inbound freight house, 40 ft. by 198 ft., with a two story office section 40 ft. by 52 ft., to be of brick construction with concrete floor, fireproof roof, and equipped with rolling steel doors; the outbound freight house will be a one story structure 22 ft. by 250 ft., with concrete floor and base, frame construction and fireproof roof. There are to be four house tracks, with a capacity of 32 cars, and four team tracks with a capacity of 29 cars. A 20-ton Pillar crane will also be provided for handling heavy freight.

The Dalles, Ore.—The Oregon-Washington Railroad & Navigation Company will build a 12-stall roundhouse, a 40-ft. by 60-ft. storehouse, a 30-ft. by 40-ft. powerhouse, and a 50-ft. by 60-ft. machine shop. The powerhouse, machine shop and roundhouse will be brick buildings with mill interior, and the storehouse will be a corrugated, galvanized building on wood frame.

Bagdad Railway.—A Constantinople telegram states that 40 miles of the Bagdad Railway from Tellebiad to Tuan east of the River Euphrates have been opened to traffic.

Railway Financial News

Chesapeake & Ohio.—The following statement was issued by the board of directors on June 17:

"The board of directors at a meeting today decided not to declare at this time any dividend upon the stock of the company. While the gross earnings are the largest in its history, there has been a marked change in the character and direction of traffic carried, entailing a large decrease from hire of equipment and larger payments to other lines. The surplus for the year has also been unfavorably affected by decreased income from the Hocking Valley Railroad Company and the Kanawha & Michigan stocks.

"Advance figures indicate that earnings on the stock for the current fiscal year will be equivalent to about 4 per cent. A dividend of 1 per cent was paid on December 31, 1914, and the remainder has been devoted to improvements, payments on equipment, etc., thus enhancing the value of the property represented by the stock, thereby also complying with the terms of the note agreement of March 16, 1914.

"The $4,029,200 realized from the sale of the Kanawha & Michigan Railway stock was deposited with the trustee of the company's first lien and improvement mortgage, to be expended for improvements or investments which are permitted under the terms of that mortgage. The directors concluded that the very best use to which this special fund can be put, particularly at a time of low cost, is to invest it in the construction of a line nearly 30 miles in length, crossing the Ohio river east of Portsmouth, Ohio, and have accordingly authorized contracts for the bridge and for the line referred to. This line is to connect with the Norfolk & Western at Waverly, Ohio, from which point trackage rights have been arranged with the Norfolk & Western to a connection with the Hocking Valley near Columbus, Ohio.

"It is expected that this construction, which it is hoped may be completed by November 1, 1916, will not only restore to the Hocking Valley line a coal tonnage equivalent to that formerly received from the Kanawha & Michigan, but that it will also furnish a greatly needed additional outlet for coal originating on the Chesapeake & Ohio lines destined for the lakes and the northwest and will facilitate the significant development of coal lands in the territory served by the company.

"Such a connection is unqualifiedly considered the one important thing to be done for the Chesapeake & Ohio and will place it in a more commanding position than ever before, because it will have a short line from eastern Kentucky and a large part of West Virginia to Lake Erie. It is estimated that the cost of this new construction, including the Ohio river bridge, will not exceed $4,500,000. The present outlook for business is excellent."

Chicago, Rock Island & Pacific.—Judge Carpenter, in the federal court, has approved the issue of equipment trust certificates to pay for 85 per cent of the cost of 4,000 box cars, and has approved the payment of the remaining 15 per cent in cash by the receivers. The court has also approved the payment of $125,000 due to the Trinity & Brazos Valley. The Rock Island and the Colorado & Southern use the Trinity & Brazos Valley jointly from Dallas, Tex., to Houston, and the $125,000 represents the semi-annual payment of the Rock Island's share of the lease.

Colorado & Southern.—See Chicago, Rock Island & Pacific.

Missouri Pacific.—Brown Brothers & Company, New York, are asking holders of the collateral trust 5 per cent bonds due 1917 and the collateral trust 5 per cent bonds due 1920 of the Missouri Pacific to communicate with them, giving their addresses and holdings, with a view to concerted action for the protection of their interests in the plan which is now under discussion for a reorganization of the Missouri Pacific finances.

Brown Brothers & Company are also asking holders of the St. Louis, Iron Mountain & Southern refunding 4 per cent bonds to send their names and holdings to the firm.